



Technical Standard No. FB-L-5202

FIREBAG PROGRAM

PIPING MATERIAL SPECIFICATIONS

SUNCOR ENERGY INC.

CANADA




The intention of Interim Revision 4A is to issue, in hard copy, only those pages which have been amended in connection with the updated Piping Material Specifications as listed in the revision history on page 2. All other sections remain unchanged, and, therefore may be referred to in Revision 4 in conjunction with Revision 4A.

Note: Revision 4 and 4A will be amalgamated for the eventual issue of Revision 5.

4A	02-Jun-10	Interim Revision for Sour Service Pipe Class Requirements	R. Bandy	M. Lovett	W. Abernethy	E. Rollinson
Rev	Date	Document Status	Originator	Engineer	Reviewer	Approver


UNCONTROLLED DOCUMENT WHEN PRINTED (3-JUN-10) CONTROLLED DOCUMENT IN PROJECT LOCATION

			FIREBAG PROGRAM – PIPING ENGINEERING	
			TECHNICAL STANDARD	
Project Name: Firebag Program	Project No.: 100-2004-001	File Location: 02.04.04.07	Doc. No.: FB-L-5202	Rev: 4A
Title: PIPING MATERIAL SPECIFICATIONS				

REVISION HISTORY		
Rev	Date	Description
4A	02-Jun-10	Interim Revision for Sour Service Pipe classes 662-4, 662-6, 662.7, CDE, CDH, CLC, CLH, EAI, EDE, ELC, HBA, HBE, LLC, updated to Z662-07 requirements, highlighted with yellow background. Affected pages of this Technical Standard are pages 1 & 2, and Attachments B, B1 & M.
4	26-June-08	Issued for Implementation – Amendments as per detailed Revision History below.
3	12-Dec-06	Issued for Implementation
2A	21-Sep-06	Issued for Implementation (Interim Revision) Attachment L Revised. Pre-Amble and Attachments re-paginated
2	26-Jun-06	Updated to Std. 0202, Rev. 17. Re-issued for Use Pending Approval
1A	21-Jun-06	Issued for Internal Squad Check (Revised based on OS Standard 0202 Rev. 17)
1	14-Feb-06	Issued for Implementation (Operations comments incorporated) (Unsigned)

DETAILED REVISION HISTORY – REVISION 4

Table of Contents revised
 Paragraph 4.1.6 added
 Paragraphs 4.2.6 and 4.2.7 rewritten
 Paragraph 4.2.10 added
 Section 4.3.3 rewritten
 Paragraph 4.3.3.2 d, e and f added
 Paragraph 4.3.3.2 f, g and h deleted
 Table 1 – Gusset Requirements for Branch Connections revised
 Paragraph 4.3.5 a and b added
 Paragraph 4.5.1 re-written
 Paragraph 4.5.2 revised
 Paragraph 4.5.7 revised
 Paragraph 4.5.12 added
 Paragraph 4.7.1 revised
 Paragraph 4.7.2 added
 Paragraph 4.8.2 rewritten
 Paragraph 4.8.3 revised
 Paragraph 4.9 revised
 Paragraph 4.9.1 rewritten
 Paragraph 4.9.2 added
 Paragraph 4.10.2 added
 Paragraph 4.11 added
 Paragraph 5.1 revised
 Paragraph 5.5 reference to Energy Services UQP-0025A deleted
 Paragraph 5.6 revised
 Paragraph 5.9 revised
 Paragraph 5.9 e added
 Paragraph 5.9.2 d added
 Paragraph 5.9.3 d added
 Paragraph 5.9.4 c added

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Paragraph 6.1 added
 Paragraph 7.4.1 revised
 Paragraph 7.7 revised
 Paragraph 7.8 – various material description changes
 Paragraph 8.0, 8.1, 8.2, and 8.3 added
 Paragraph 9.0 and 9.1 added
 Paragraph 10.0 and 10.1 added
 Paragraph 11.0 replaces former paragraph 8.0
 Branch Connection tables #1, #2, #4, #5 & #6: header and branch size ranges expanded
 Attachments B and B1 re-worded
 Attachment D – More substitutions added
 Attachment E – Services expanded and re-arranged
 Attachment F – New classes added and miscellaneous revisions
 Attachment L – New classes added, size ranges expanded and notes added, as per bold italic text.

GENERAL

Several valve descriptions contain design references to both API-600 and ASME B16.34. API-600 only applies to cast gate valves 2” NPS through 24” NPS. For cast gate valves larger than 24” NPS, cast globe valves and cast swing check valves, the valve descriptions have been modified to move the API-600 reference next to the trim material reference. This move was initiated in order to clarify that the API-600 reference only applies to the trim specification.


662-1

Spec Header changed at this revision. Added “Stage 1 & 2” to service description
 Spec Header changed at this revision. PWHT to “NO”
 Revised bolting to “ASTM A-193 Gr. B7 c/w A-194 Gr. 2H nuts”
 Added note 9 “PWHT required for thickness per ASME B31.3 or CSA Z662-03”
 Added note 10 “This class used for Stage 1 & 2, design to CSA Z662-03”

662-2

Spec Header changed at this revision. Added “Stage 1 & 2” to service description
 Spec Header changed at this revision. PWHT to “NO”
 Bends spec description changed from Seamless to ERW to match pipe.
 Fittings (Schedule 80) size range extended to NPS 3 inch thru NPS 8 inch
 Note 3 changed to read “For Vents, Drains and Instrument connections use ASME B31.3 materials per Piping Material Specification class HBD”
 Note 6 added this revision (PWHT required for thickness per ASME B31.3 or CSA Z662-03)
 Note 7 added this revision (This class used for Stage 1 & 2, design to CSA Z662-03)
 VGA0064#8 - Gear Operator note removed from valve description at this revision

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662-3

Spec Header changed at this revision. Added “Stage 1” to service description
Spec Header changed at this revision. PWHT to “NO”
Pipe, Spec description changed from Seamless to ERW (16”NPS – 20”NPS)
Bends spec description changed from Seamless to ERW to match pipe
Transition Piece description changed from Seamless to ERW to match pipe
Note 3 changed to read “For Vents, Drains and Instrument connections use ASME B31.3 materials per Piping Material Specification class HBD”
Note 4 added this revision (PWHT required for thickness per ASME B31.3 or CSA Z662-03)
Note 5 added this revision (This class used for Stage 1, design to CSA Z662-03)
VGA0054#8 - Gear Operator note removed from valve description at this revision

662-4

Spec Header changed at this revision. Added “Stages 2-6” to service description
Spec Header changed at this revision. PWHT to “NO (**8)”
Bends description changed from Seamless to ERW to match pipe
Transition Piece description changed from Seamless to ERW to match pipe (16”NPS – 24”NPS)
Note 4 and 5 changed
Note 8 added this revision (PWHT required for thickness per ASME B31.3 or CSA Z662-07)
Note 10 added
VGA0054#12-N - Gear Operator note removed from valve description at this revision


662-5

Spec Header changed at this revision. Added “Stages 3 to 6” to service description
Spec Header changed at this revision. PWHT to “NO (**15)”
Description changed on NPS16 3D Bends to include the word Seamless.
Delete reference to note 5 for VGL1174#5-SW
Changed Note 5
Notes 6 to 12 revised
Notes 13 to 15 added
Increase size range for VGA1001#5-SW (0.75 to 2)
Added 8”-24” gate valves

662-6

Spec Header changed at this revision. Added “Stages 3 & 4 (**10, 11, 12)” to service description
Spec Header changed at this revision. PWHT to “NO (**9)”
Bends spec description changed from Seamless to ERW to match pipe (10”NPS – 42”NPS)
Transition Piece description changed from Seamless to ERW to match pipe
Tee description changed to ERW to match pipe (10”NPS – 36”NPS)
Reducer description changed to ERW to match pipe (10”NPS – 36”NPS)
Revised note 3 pipe material class to “HBE”

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Note 9 added this revision (PWHT required for thickness per ASME B31.3 or CSA Z662-03 Annex 1 (Stage 3 & 4))
Notes 10 to 12 added
VGA0064#8 - Gear Operator note removed from valve description at this revision. All valve tags changed to sour service

662-7

New material class added

ADA

Spec Header changed at this revision. PWHT to “NO”
Gasket description changed to read “Class 150 Full Face”
Drawing number changed in thermo-well description (DD100-L-14-1, 2)
Note 1 changed at this revision (All carbon steel components shall be internally epoxy coated per AWWA C210 with 10 mils DFT. 3/4" to 2" piping may be galvanized when epoxy coating is impractical)
Note 4 deleted, branch table 6 added to Branch Conn. Tbl. ref.
Note 6 added at this revision (Vents and Drains per DD100-L-12-1)
Note 7 added at this revision (Pressure Instrument Connections per DD100-L-11-1)
Note 8 added this revision (PWHT required for thickness per ASME B31.3)
Size range increased on VGA0011 (2"NPS – 8"NPS)
VGA0011 – Description changed to MSS SP-70.


ADX

Increased pipe, fittings, flanges and valves maximum size to 16" NPS
Note 3 added at this revision (Vents and Drains per DD100-L-12-1)
Note 4 added at this revision (Pressure Instrument Connections per DD100-L-11-1)
Note 5 added at this revision (PWHT required for thickness per ASME B31.3)
VBA0151 - Gear Operator note removed from valve description at this revision
VGA0041#8 - Gear Operator note removed from valve description at this revision
VGL0141#8 - Gear Operator note removed from valve description at this revision

AEA

Spec Header changed at this revision. PWHT to “NO”
26+ pipe description changed to (Wall thickness calculated per attachment L)
Spiral Wound Gasket added at this revision.
Note 4 Deleted at this revision
Note 7 added at this revision (Vents and Drains per DD100-L-12-1)
Note 8 added at this revision (Pressure Instrument Connections per DD100-L-11-1)
Note 9 added at this revision (PWHT required for thickness per ASME B31.3)
VKG0002 changed to FF in Valve Specifications (Front page)
VKG0003 changed to FF in Valve Specifications (Front Page)
VBA0151 - Gear Operator note removed from valve description at this revision

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VPL0342 - Gear Operator note removed from valve description at this revision
VPL0343 - Gear Operator note removed from valve description at this revision
VBU1502 - Gear Operator note removed from valve description at this revision

AEC

Spec Header “Based On” now states “Service”
Spec Header changed at this revision. PWHT to “YES”
Spec Header changed at this revision. P & T change, Maximum pressure increased to 245 psig (1689 kpag)
NPS 1.5” SW Fittings Class rating changed at this revision to Class 9000# (XXS)
Drawing number changed in thermo-well description (DD100-L-14-1, 2)
Note 1 changed at this revision (“For slurry service vents and drains use SW Plug valve. For non slurry service vents and drains use SW Gate valve.”)
Note 8 added at this revision (Vents and Drains per DD100-L-12-1)
Note 9 added at this revision (Pressure Instrument Connections per DD100-L-11-2)
VPL0331-SW Valve long description changed to socket weld (Was threaded)
VGA0041#12 - Gear Operator note removed from valve description at this revision
VGL0141#12 - Gear Operator note removed from valve description at this revision
VPL0342 - Gear Operator note removed from valve description at this revision

AED

Spec Header “Based On” now states “Service”
Spec Header changed at this revision. PWHT to “YES”
Spec Header changed at this revision. P & T change, Maximum pressure increased to 245 psig (1689 kpag)
NPS 1.5” SW Fittings Class rating changed at this revision to Class 9000# (XXS)
Drawing number changed in thermo-well description (DD100-L-14-1, 2)
Note 1 deleted at this revision
Note 6 deleted at this revision
Note 7 added at this revision (Vents and Drains per DD100-L-12-1)
Note 8 added at this revision (Pressure Instrument Connections per DD100-L-11-2)

AEX

Spec Header changed at this revision. PWHT to “NO”
Note 3 added at this revision (Vents and Drains per DD100-L-12-1)
Note 4 added at this revision (Pressure Instrument Connections per DD100-L-11-1)
Note 5 added at this revision (PWHT required for thickness per ASME B31.3)


AL5

Spec deleted from Firebag program

ALX

Spec Header changed at this revision. PWHT to “NO”
Drawing number changed in thermo-well description (DD100-L-14-1, 2)

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Flange rating changed in thermo-well description (300)
 Note 4 changed at this revision to (Pressure Instrument Connections per DD100-L-11-1)
 Note 5 added at this revision (Vents and Drains per DD100-L-12-1)
 VCH0A02-X-SW Valve long description changed to Class CL800 (Was CL150)
 VGA0A01-03-X - Gear Operator note removed from valve description at this revision
 VGA0A01-X - Gear Operator note removed from valve description at this revision

APB

Spec Header changed at this revision. PWHT to “NO”
 Spec Header changed at this revision. Welding Proc: FB-L-5212 **1
 Pipe material description changed this revision. (HDPE, ASTM F714 - DR11, ASTM D3350 Cell CL PE 345434C)
 Pipe fittings description changed this revision. (HDPE, ASTM F714 - DR11, ASTM D3350 Cell CL PE345434C ends flgd with backing ring ASME B16.5, and HDPE, ASTM F714 - DR11, ASTM D3350 Cell CL PE345434C Butt fusion ends)
 Pipe flanges description changed this revision. (HDPE, CL 150, ASTM D3350 Cell CL PE345464C, FF Stub end with Steel Backing Ring)

APD

Spec Header changed at this revision. PWHT to “NO”

APE

Spec Header changed at this revision. PWHT to “NO”


APF

Spec Header changed at this revision. PWHT to “NO”
 Spec Header changed at this revision. Materials: High Density Polyethylene (HDPE) / CS
 Pipe material description changed this revision. (HDPE, ASTM F714 - DR11, ASTM D3350 Cell CL PE 345434C)
 Pipe fittings description changed this revision. (Fabricated from HDPE pipe, ASTM F714 - DR11, ASTM D3350 Cell CL PE345434C joints wrapped with FRP, and Molded from HDPE pipe ASTM F714 - DR11, ASTM D3350 Cell CL PE345434C)
 Pipe flanges description changed this revision. (Molded from HDPE pipe ASTM F714 - DR11, ASTM D3350 Cell CL PE345464C FF Stud End with Steel Backing Ring).

APG

Spec Header changed at this revision. PWHT to “NO”
 Spec Header changed at this revision. Welding Proc: Joining shall be by fusion, bolting, threading
 Branch table note added
 Note 3 added

APH

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Spec Header changed at this revision. P & T changed to 252 psig (1737 kpag) at 225 F (107 C)

Note 4 changed at this revision to (Adhesive - DS 8000 Series two part Epoxy shall be used for Bell and Spigot Joints. DS 3033 Series two part Epoxy shall be used for saddle connections (or manufacturers equal))

Valve Tag BA1590 changed to VBA0163

VBA0163 - Gear Operator note removed from valve description at this revision

Flanges changed from "RF" to "FF"

CA

Spec Header changed at this revision. PWHT to "NO"

36 to 60 pipe description changed to (Wall thickness calculated per attachment L)

Drawing number changed in thermo-well description (DD100-L-14-1, 2)

Deleted 1" NPS thermo-well

Note 3 deleted at this revision

Note 4 deleted at this revision

Note 11 changed at this revision to (Pressure Instrument Connections per DD100-L-11-1)

Note 12 added at this revision (Vents and Drains per DD100-L-12-1)

Note 13 added at this revision (Pipe and fittings in Oily Water Sewer Service shall have external Coating in accordance with Suncor Firebag STD FB-L-5230)

Note 14 added at this revision (PWHT required for thickness per ASME B31.3)

VBA0151 - Gear Operator in valve description deleted at this revision

VBU01502 - Gear Operator in valve description deleted at this revision

VGA0041#8 - Gear Operator in valve description deleted at this revision

VGA0054#8 - Gear Operator in valve description deleted at this revision

VGL0141#8 - Gear Operator in valve description deleted at this revision

CAB

Spec Header changed at this revision. PWHT to "NO"

26 to 60 pipe description changed to (Wall thickness calculated per attachment L)

Deleted 1" NPS thermo-well

Drawing number changed in thermo-well description (DD100-L-14-1, 2)

Note 2 deleted at this revision

Note 3 deleted at this revision

Note 10 revised

Note 8 changed at this revision. Reference drawing now DD100-L-18-1 (Was DD0D-L-1065)

Note 12 added at this revision (Vents and Drains per DD100-L-12-1)

Note 13 added at this revision (Pressure Instrument Connections per DD100-L-11-1)

Note 13 added at this revision (PWHT required for thickness per ASME B31.3)


VGA6002#8 deleted at this revision (Combination Gate Valve)

VBA0151 - Gear Operator in valve description deleted at this revision

VBA0609 – Description changed to 'PTFE' seats

VBU1502 - Gear Operator in valve description deleted at this revision

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VGA0041#8 - Gear Operator in valve description deleted at this revision
VGA0054#8 - Gear Operator in valve description deleted at this revision
VGL0141#8 - Gear Operator in valve description deleted at this revision
VGA6003#8 – Valve description changed (Gusset plate details DD100-L-17-1)


CAF

Spec Header changed at this revision. PWHT to “NO”
26 to 48 pipe description changed to (Wall thickness calculated per attachment L)
26 to 48 pipe material changed to ASTM A672 CL22 Gr. C60.
Drawing number changed in thermo-well description (DD100-L-14-1, 2)
Note 2 deleted at this revision
Note 4 changed at this revision (Wall thickness readings shall be made per Work Practice, PMW 0018A,”Baseline Ultrasonic Survey)
Note 5 changed at this revision (Hardness control requirements of NACE RP0472 shall be met for all welds in this class as referenced in Suncor Firebag STD FB-L-5217)
Note 10 added at this revision (Vents and Drains per DD100-L-12-1)
Note 11 added at this revision (Pressure Instrument Connections per DD100-L-11-1)
Note 12 added at this revision (PWHT required for thickness per ASME B31.3)
Size range increased on VGA0054#12 (NPS3 - NPS4)
VBA0151 - Gear Operator in valve description deleted at this revision
VGA0041#12 - Gear Operator in valve description deleted at this revision
VGA0053#12 - Gear Operator in valve description deleted at this revision
VGA0054#12 - Gear Operator in valve description deleted at this revision
VGL0141#12 - Gear Operator in valve description deleted at this revision

CAG

Spec Header changed at this revision. PWHT to “NO”
Spec Header changed at this revision. MDMT to -50 F (-46 C)
12 to 24 pipe description changed to (Wall thickness calculated per attachment L)
Drawing number changed in thermo-well description (DD100-L-14-1, 2)
Bolting material grade changed to ASTM A193 Grade B7 c/w ASTM A194 Grade 2H Nuts at this revision
Note 2 deleted at this revision
Note 6 added at this revision (Vents and Drains per DD100-L-12-1)
Note 7 added at this revision (Pressure Instrument Connections per DD100-L-11-1)
VGA0805-SW – Valve added at this revision
Size range increased on VGA5056#12 (NPS3 – NPS4)
VBA0152 - Gear Operator in valve description deleted at this revision
VGA0046#12 - Gear Operator in valve description deleted at this revision
VGA5056#12 - Gear Operator in valve description deleted at this revision
VGL0142#12 - Gear Operator in valve description deleted at this revision

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CAH

12 to 24 pipe description changed to (Wall thickness calculated per attachment L)
 Note 2 revised
 Note 5 deleted this revision.
 Note 6 deleted at this revision
 Note 7 added at this revision (Vents and Drains per DD100-L-12-2)
 Note 8 added at this revision (Pressure Instrument Connections per DD100-L-11-1)
 Drawing number changed in thermo-well description (DD100-L-14-1, 2)
 Size range increased on VGA0054#8 (NPS3 – NPS4)
 VGA0041#8 - Gear Operator in valve description deleted at this revision
 VGA0054#8 - Gear Operator in valve description deleted at this revision
 VGL0141#8 - Gear Operator in valve description deleted at this revision

CAI

Spec Header changed at this revision. PWHT to “NO”
 Spec Header changed at this revision. Service description changed to read “Hydrochloric Acid (Outdoor)”
 Flange description revised
 Note 5 revised
 Note 8 added at this revision (Vents and Drains per DD100-L-12-1)
 Note 9 added at this revision (Pressure Instrument Connections per DD100-L-11-2)
 Note 10 added
 Note 11 added
 Note 12 added
 Added NPS2” Class 300 Ball valve at this revision (Valve Tag No. VBA0314)
 VBA0310 - Gear Operator in valve description deleted at this revision

CAL

Renamed to CAO this revision


CAM

Piping material class added this revision

CAO (was CAL in Rev. 3)

Spec Header changed at this revision. Service Description changed to read “Hydrochloric Acid (Indoor)”
 Spec Header changed at this revision. Maximum pressure changed to 285 psig (1965 kpag)
 Spec Header changed at this revision. PWHT to “NO”
 Pipe description changed at this revision (Removed “Ref DOW”)
 Flange description revised
 Note 5 revised
 Note 7 revised
 Note 10 added at this revision (Vents and Drains per DD100-L-12-1)

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Note 11 added at this revision (Pressure Instrument Connections per DD100-L-11-2)
Note 12 added at this revision (Previously Class CAL)
Note 13 added
Note 14 added
BA1590 Ball Valve tag number changed to VBA0163 at this revision
BF0000 Butterfly Valve tag number changed to VBU1507 at this revision
CK1543 Check Valve tag number changed to VCH0213 at this revision
P1510 Plug Valve tag number changed to VPL0313 at this revision
New valve descriptions given for the above listed valves

CAQ

Spec Header changed at this revision. PWHT to “NO”
Note 1 changed at this revision (Firebag STD FB-L-5230 added at this revision)
Note 2 changed at this revision (Insulating Flange Kit is required at connection between U/G and A/G. Material shall be temperature resistant thermiculite, monex type for high temperature)
Note 5 added at this revision (PWHT required for thickness per ASME B31.3)
VGA0041#12 – Gear Operator note removed from valve description at this revision


CAR

Spec Header changed at this revision. PWHT to “NO”
Spec Header changed at this revision. Material P&T changed 110 psig (758 kpag) at 700 F (371 C)
Minimum size range changed for Pipe to 0.75inches (Was 1.5 inches)
Note 1 changed at this revision (Firebag STD FB-L-5230 added at this revision)
Note 2 changed at this revision (Insulating Flange Kit is required at connection between U/G and A/G. Material shall be temperature resistant thermiculite, monex type for high temperature)
Note 7 added at this revision (PWHT required for thickness per ASME B31.3)
VGA0041#12 - Gear Operator note removed from valve description at this revision

CAX

Spec Header changed at this revision. PWHT to “NO”
Spec Header changed at this revision. Material P&T changed 125 psig (862 kpag) at 650 F (343 C)
Note 2 deleted at this revision
Note 6 deleted at this revision
Note 7 added at this revision (Vents and Drains per DD100-L-12-1)
Note 8 added at this revision (Pressure Instrument Connections per DD100-L-11-1)
Note 9 added at this revision (PWHT required for thickness per ASME B31.3)
VBA0155 - Gear Operator note removed from valve description at this revision
VBU1518 - added
VGA0050#12 - Gear Operator note removed from valve description at this revision

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VGA0305#12 - Gear Operator note removed from valve description at this revision
VGL0150#12 - Gear Operator note removed from valve description at this revision
VCH0240#12 – SW Piston/Lift Type with spring added to description

CAZ

Spec Header changed at this revision. PWHT to “NO”
Drawing number changed in thermo-well description (DD100-L-14-1, 2)
Note 1 deleted at this revision
Note 3 changed at this revision (Wall thickness readings shall be made per Work Practice, PMW 0018A,”Baseline Ultrasonic Survey)
Note 4 changed at this revision (5D Bends to be used only for 1.5”NPS thru 4” NPS in Lime slurry and Magox systems.3D Bends to be used for 6” NPS and above)
Note 5 added at this revision (Vents and Drains per DD100-L-12-2)
Note 6 added at this revision (Pressure Instrument Connections per DD100-L-11-2)
Note 7 added at this revision (PWHT required for thickness per ASME B31.3)
VDP0002 size range increased at this revision (2”NPS thru 12”NPS) Valve description also changed at this revision
VBA0151 - Gear Operator note removed from valve description at this revision
VGA0041#8 - Gear Operator note removed from valve description at this revision
VGL0141#8 - Gear Operator note removed from valve description at this revision


CB

Spec Header changed at this revision. PWHT to “NO”
Note 5 deleted at this revision
Note 6 added at this revision (Vents and Drains per DD100-L-12-1)
Note 7 added at this revision (Pressure Instrument Connections per DD100-L-11-1)
Note 8 added at this revision (PWHT required for thickness per ASME B31.3)
VBA0155 - Gear Operator note removed from valve description at this revision
VGA0050#12 - Gear Operator note removed from valve description at this revision
VGA0305#12 - Gear Operator note removed from valve description at this revision
VGL0150#12 - Gear Operator note removed from valve description at this revision
VCH0240#12 – SW Piston/Lift Type with spring added to description

CBA

Spec Header changed at this revision. PWHT to “NO”
Spec Header changed at this revision. MDMT to -20 F (-29 C)
Note 2 deleted at this revision
Note 4 deleted at this revision
Note 5 added at this revision (Vents and Drains per DD100-L-12-1)
Note 6 added at this revision (Pressure Instrument Connections per DD100-L-11-1)
Note 7 added at this revision (PWHT required for thickness per ASME B31.3)
Note 8 added at this revision
VBA0151 - Gear Operator in valve description deleted at this revision

UNCONTROLLED DOCUMENT WHEN PRINTED (26-JUN-08) CONTROLLED DOCUMENT IN PROJECT LOCATION

			FIREBAG PROGRAM – PIPING ENGINEERING	
			TECHNICAL STANDARD	
Project Name: Firebag Program	Project No.: 100-2004-001	File Location: 02.04.04.07	Doc. No.: FB-L-5202	Rev.: 4
Title: PIPING MATERIAL SPECIFICATIONS				

VGA0041#8 - Gear Operator in valve description deleted at this revision
VGA0054#8 - Gear Operator in valve description deleted at this revision
VGL0141#8 - Gear Operator in valve description deleted at this revision

CBF

Spec Header changed at this revision. PWHT to “NO”
8 to 24 pipe description changed to (Wall thickness calculated per attachment L)
Drawing number changed in thermo-well description (DD100-L-14-1, 2)
Note 1 deleted at this revision
Note 4 added at this revision (Vents and Drains per DD100-L-12-1)
Note 5 added at this revision (Pressure Instrument Connections per DD100-L-11-1)
Note 6 added at this revision (PWHT required for thickness per ASME B31.3)
VGA0041#12 - Gear Operator in valve description deleted at this revision
VGA0054#12 - Gear Operator in valve description deleted at this revision
VGL0141#12 - Gear Operator in valve description deleted at this revision

CCH

Spec Header changed at this revision. PWHT to “NO”
Spec Header changed at this revision. MDMT to -20 F (-29 C)
6 to 48 pipe description changed to (Wall thickness calculated per attachment L)
Pipe, Fittings and Flanges size range increased at this revision (26”NPS thru 48”NPS)
Drawing number changed in thermo-well description (DD100-L-14-1, 2)
Gasket material changed to (317 SS)
Note 4 deleted at this revision
Note 7 added at this revision (Vents and Drains per DD100-L-12-1)
Note 8 added at this revision (Pressure Instrument Connections per DD100-L-11-1)
VGA5030 - Gear Operator in valve description deleted at this revision
VGA5057 - Gear Operator in valve description deleted at this revision
VGL0147 - Gear Operator in valve description deleted at this revision

CDE

Piping material class added this revision.


CDH

Piping material class added this revision.

CHY

Spec Header changed at this revision. PWHT to “NO”
Spec Header changed at this revision. Welding: Firebag STD FB-L-5212 added
Pipe material description changed this revision. (HDPE, ASTM F714, Class 150, ASTM D3350 Cell CL PE345434C, FM Approved)
Pipe fittings description changed this revision. (HDPE, Fittings ASTM F714 Class 150, ASTM D3350 Cell CL PE345434C, FM Approved, Butt-Fusion Ends)

UNCONTROLLED DOCUMENT WHEN PRINTED (26-JUN-08) CONTROLLED DOCUMENT IN PROJECT LOCATION

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			TECHNICAL STANDARD	
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Title: PIPING MATERIAL SPECIFICATIONS				

Pipe flanges description changed this revision. (HDPE, CL 150, ASTM D3350 Cell CL PE345464C, FF Stub end with Steel Backing Ring)
 Note 3 changed at this revision (Firebag STD FB-L-5230 added at this revision)
 Note 13 Added at this revision (Pressure Instrument Connections per DD100-L-11-1)
 Note 14 added at this revision (PWHT required for thickness per ASME B31.3)
 Note 2 (**2) added to VGA0031#8-SW/TH at this revision
 Note 2 (**2) added to VGA5142#8 at this revision
 VGA0041#8-FH Line size increased to 6" NPS at this revision
 VGA0041#8 - Gear Operator in valve description deleted at this revision
 VGA0041#8 – Valve Long description changed at this revision

CKX


Spec Header changed at this revision. PWHT to "NO"
 Spec Header changed at this revision. P & T changed to 214 psig (1480 kpag) at 302 F (150 C)
 1" NPS thermo-wells deleted this revision
 Drawing number changed in thermo-well description (DD100-L-14-1, 2)
 Note 6 deleted at this revision
 Note 11 added at this revision (Vents and Drains per DD100-L-12-2)
 Note 12 added at this revision (Pressure Instrument Connections per DD100-L-11-1)

CKY

Spec Header changed at this revision. PWHT to "NO"
 Changed material description in Fittings section at this revision
 Drawing number changed in thermo-well description (DD100-L-14-1, 2)
 Note 3 added at this revision (Vents and Drains per DD100-L-12-1)
 Note 4 added at this revision (Pressure Instrument Connections per DD100-L-11-1)
 VGL0126#10-SW – 800# added to description

CLC

Spec Header changed at this revision. PWHT to "NO"
 26 to 60 pipe description changed to (Wall thickness calculated per attachment L)
 26 to 60 pipe material changed to ASTM A672 CL22 Gr. C60.
 Drawing number changed in thermo-well description (DD100-L-14-1, 2)
 Note 3 changed at this revision (Hardness control requirements of NACE RP0472 shall be met for all welds in this class as referenced in Suncor Firebag STD FB-L-5217)
 Note 7 changed at this revision (PWHT required for thickness per ASME B31.3)
 Note 9 revised
 Note 10 added at this revision (Vents and Drains per DD100-L-12-1)
 Note 11 added at this revision (Pressure Instrument Connections per DD100-L-11-1)
 VBU1516-N - Gear Operator in valve description deleted at this revision
 VGA0054#12-N - Gear Operator in valve description deleted at this revision

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Title: PIPING MATERIAL SPECIFICATIONS				

CLF

Piping material class added this revision

CLH

Piping material class added this revision


CS

Spec Header changed at this revision. PWHT to “NO”
 36 to 48 pipe description changed to (Wall thickness calculated per attachment L)
 1” NPS thermo-well deleted at this revision
 Drawing number changed in thermo-well description (DD100-L-14-1, 2)
 Note 1 deleted at this revision
 Note 2 deleted at this revision
 Note 3 deleted at this revision
 Note 6 deleted at this revision
 Note 7 added at this revision (Vents and Drains per DD100-L-12-1)
 Note 8 added at this revision (Pressure Instrument Connections per DD100-L-11-1)
 Note 9 added at this revision (PWHT required for thickness per ASME B31)
 Trap Valve Station VSP0040 deleted at this revision
 Trap Valve Station VSP0050 deleted at this revision
 VWC0163 – 26” NPS thru 30” NPS added at this revision
 VGA0041#8 - Gear Operator in valve description deleted at this revision
 VGA0054#8 - Gear Operator in valve description deleted at this revision, size range increased to 4” NPS
 VGL0141#8 - Gear Operator in valve description deleted at this revision
 VPL0301 deleted at this revision
 Stop check valves “Bolted Bonnet” added to description

CSA

Spec Header changed at this revision. PWHT to “NO”
 Drawing number changed in thermo-well description (DD100-L-14-1, 2)
 1” NPS thermo-well deleted at this revision.
 Note 2 deleted at this revision
 Note 3 changed at this revision (Wall thickness readings shall be made per Work Practice, PMW 0018A, “Baseline Ultrasonic Survey)
 Note 4 deleted at this revision
 Note 7 deleted at this revision
 Note 9 added at this revision (Vents and Drains per DD100-L-12-1)
 Note 10 added at this revision (Pressure Instrument Connections per DD100-L-11-1)
 Note 11 added at this revision (PWHT required for thickness per ASME B31.1)
 VBA0151 - Gear Operator in valve description deleted at this revision
 VCH0231#8-SW-C – Class changed to 800#
 VGA0041#8-C - Gear Operator in valve description deleted at this revision

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VSC0852#5-C - Gear Operator in valve description deleted at this revision
VGL0141#5 - Gear Operator in valve description deleted at this revision
Stop Check Valves “Bolted Bonnet” added to description

CXX

Spec Header changed at this revision. PWHT to “NO”
Drawing number changed in thermo-well description (DD100-L-14-1, 2)
Size range on W.N. Flanges increased at this revision (NPS 3” – NPS 16)
Note 3 deleted at this revision
Note 6 added at this revision (Vents and Drains per DD100-L-12-1)
Note 7 added at this revision (Pressure Instrument Connections per DD100-L-11-1)


EA

Spec Header changed at this revision. PWHT to “NO”
16 to 24 pipe description changed to (Wall thickness calculated per attachment L)
Drawing number changed in thermo-well description (DD100-L-14-1, 2)
Note 4 Added at this revision (Vents and Drains per DD100-L-12-1)
Note 5 Added at this revision (Pressure Instrument Connections per DD100-L-11-1)
Note 6 added at this revision (PWHT required for thickness per ASME B31.3)
VBA0301 - Gear Operator in valve description deleted at this revision
VGA0054#8 - Gear Operator in valve description deleted at this revision
VGL0151#8 - Gear Operator in valve description deleted at this revision

EAB

Spec Header changed at this revision. PWHT to “NO”
Spec Header changed at this revision. P & T changed to 410 psig (2827 kpag) at 800 F (427 C)
16 to 24 pipe description changed to (Wall thickness calculated per attachment L)
Material grade changed on forged fittings to ASTM A105N at this revision
Drawing number changed in thermo-well description (DD100-L-14-1, 2)
Note 1 deleted at this revision
Note 3 added at this revision (MDMT Reference)
Note 4 added at this revision (Vents and Drains per DD100-L-12-1)
Note 5 added at this revision (Pressure Instrument Connections per DD100-L-11-1)
Note 6 added at this revision (PWHT required for thickness per ASME B31.3)
VGA0054#8 - Gear Operator in valve description deleted at this revision
VGA0057#8 - Gear Operator in valve description deleted at this revision
VGL0151#8 - Gear Operator in valve description deleted at this revision

UNCONTROLLED DOCUMENT WHEN PRINTED (26-JUN-08) CONTROLLED DOCUMENT IN PROJECT LOCATION

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Title: PIPING MATERIAL SPECIFICATIONS				

EAG

Service description changed to Chemical Injection; Cogen fuel gas downstream of filter
Spec Header changed at this revision. PWHT to “NO”
Spec Header changed at this revision. MDMT to -50 F (-46 C)
3 to 24 pipe description changed to (Wall thickness calculated per attachment L)
Drawing number changed in thermo-well description (DD100-L-14-1, 2)
Bolting material grade changed to ASTM A193 Grade B7 c/w ASTM A194 Grade 2H Nuts at this revision
Note 2 deleted at this revision
Note 6 added at this revision (Vents and Drains per DD100-L-12-1)
Note 7 added at this revision (Pressure Instrument Connections per DD100-L-11-1)
VGA5054#12 - Gear Operator in valve description deleted at this revision
VGL5156#12 - Gear Operator in valve description deleted at this revision


EAH

Spec Header changed at this revision. PWHT to “NO”
8 to 24 pipe description changed to (Wall thickness calculated per attachment L)
Drawing number changed in thermo-well description (DD100-L-14-1, 2)
Material changed in Gaskets at this revision (Spiral Wound 317 SS)
Note 2 changed at this revision (With Owner's Engineers approval, NPS 12 to 24 pipe rolled from clad plate may be used as listed in Oil Sands Spec CAP. Pipe wall thickness shall be calculated per ASME B31.3)
Note 4 deleted at this revision
Note 5 added at this revision (Vents and Drains per DD100-L-12-1)
Note 6 added at this revision (Pressure Instrument Connections per DD100-L-11-1)
VGA5057 Size range increased at this revision to 24”NPS
VGA5057 - Gear Operator in valve description deleted at this revision

EAI

Spec Header changed at this revision. PWHT to “NO”
14 to 24 pipe description changed to (Wall thickness calculated per attachment L)
Drawing number changed in thermo-well description (DD100-L-14-1, 2)
Note 4 deleted at this revision
Note 6 changed at this revision (Hardness control requirements of NACE RP0472 shall be met for all welds in this class as referenced in Suncor Firebag STD FB-L-5217)
Note 7 added at this revision (Vents and Drains per DD100-L-12-1)
Note 8 added at this revision (Pressure Instrument Connections per DD100-L-11-1)
Note 9 added at this revision (PWHT required for thickness per ASME B31.3)
VGA0305#12-N - Gear Operator in valve description deleted at this revision
VGL0160#12-N - Gear Operator in valve description deleted at this revision
VCH0240#12-SW-N – Piston/Lift Type with spring added to description

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Title: PIPING MATERIAL SPECIFICATIONS				

EAX

Spec Header changed at this revision. PWHT to “NO”
 16 to 24 pipe description changed to (Wall thickness calculated per attachment L)
 Drawing number changed in thermo-well description (DD100-L-14-1, 2)
 Note 3 deleted at this revision
 Note 5 added at this revision (Vents and Drains per DD100-L-12-1)
 Note 6 added at this revision (Pressure Instrument Connections per DD100-L-11-1)
 Note 7 added at this revision (PWHT required for thickness per ASME B31.3)
 VBA0302 - Gear Operator in valve description deleted at this revision
 VGA0305#12 - Gear Operator in valve description deleted at this revision
 VGL0160#12 - Gear Operator in valve description deleted at this revision
 VCH0240#12-SW – Piston/Lift Type with spring added to description

EDB

Spec Header changed at this revision. PWHT to “NO”
 12 to 48 pipe description changed to (Wall thickness calculated per attachment L)
 Drawing number changed in thermo-well description (DD100-L-14-1, 2)
 Note 4 added at this revision (Vents and Drains per DD100-L-12-1)
 Note 5 added at this revision (Pressure Instrument Connections per DD100-L-11-1)
 Note 6 added at this revision (PWHT required for thickness per ASME B31.3)
 VGA0054#8 - Gear Operator in valve description deleted at this revision
 VGA0057#8 - Gear Operator in valve description deleted at this revision
 VGL0151#8 - Gear Operator in valve description deleted at this revision


EDC

Spec Header changed at this revision. PWHT to “NO”
 10 to 24 pipe description changed to (Wall thickness calculated per attachment L)
 Drawing number changed in thermo-well description (DD100-L-14-1, 2)
 Material grade changed on forged fittings to ASTM A105N at this revision
 Note 1 deleted at this revision
 Note 3 added at this revision (Vents and Drains per DD100-L-12-1)
 Note 4 added at this revision (Pressure Instrument Connections per DD100-L-11-1)
 Note 5 added at this revision (PWHT required for thickness per ASME B31.3)
 VGA0054#12 - Gear Operator in valve description deleted at this revision

EDE

Spec Header changed at this revision. PWHT to “NO”
 Note 3; NACE notes revised
 14 to 48 pipe description changed to (Wall thickness calculated per attachment L)
 26 to 48 pipe material changed to ASTM A672 CL22 Gr. C60
 Pipe, Fittings and Flanges size range increased at this revision (26”NPS thru 48”NPS)
 Material grade changed on forged fittings to ASTM A105N at this revision
 Flange rating fixed for 26 to 48 NPS flanges

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			FIREBAG PROGRAM – PIPING ENGINEERING	
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Title: PIPING MATERIAL SPECIFICATIONS				

Drawing number changed in thermo-well description (DD100-L-14-1, 2)
Note 2 deleted at this revision
Note 4 changed at this revision (Hardness control requirements of NACE RP0472 shall be met for all welds in this class as referenced in Suncor Firebag STD FB-L-5217)
Note 5 changed at this revision (PWHT required for thickness per ASME B31.3)
Note 7 added at this revision (Vents and Drains per DD100-L-12-1)
Note 8 added at this revision (Pressure Instrument Connections per DD100-L-11-1)
VGA0054#12-N - Gear Operator in valve description deleted at this revision
VGL0154#12-N - Gear Operator in valve description deleted at this revision

EDX

Spec Header changed at this revision. PWHT to “NO”
Spec Header changed at this revision. Maximum pressure 740 psig (5102 kpag)
Spec Header changed at this revision. MDMT to -20 F (-29 C)
Material grade changed on forged fittings to ASTM A105N at this revision
Note 3 deleted at this revision
Note 4 added at this revision (Vents and Drains per DD100-L-12-1)
Note 5 added at this revision (Pressure Instrument Connections per DD100-L-11-1)
Note 6 added at this revision (PWHT required for thickness per ASME B31.3)


ELC

Spec Header changed at this revision. PWHT to “NO”
14 to 48 pipe description changed to (Wall thickness calculated per attachment L)
26 to 48 pipe material changed to ASTM A672 CL22 Gr. C60.
Drawing number changed in thermo-well description (DD100-L-14-1, 2)
Note 1 revised
Note 2 changed at this revision (Hardness control requirements of NACE RP0472 shall be met for all welds in this class as referenced in Suncor Firebag FB-L-5217)
Note 5 changed at this revision (PWHT required for thickness per ASME B31.3)
Note 7 added at this revision (Vents and Drains per DD100-L-12-1)
Note 8 added at this revision (Pressure Instrument Connections per DD100-L-11-1)
VGA0054#12-N - Gear Operator in valve description deleted at this revision
VGL0154#12-N - Gear Operator in valve description deleted at this revision
VGA0301#12-N – Valve tag added this revision

ES

Spec Header changed at this revision. PWHT to “NO”
Spec Header changed at this revision. P & T changed to 410 psig (2827 kpag) at 800 F (427 C)
14 to 48 pipe description changed to (Wall thickness calculated per attachment L)
Material grade changed on forged fittings to ASTM A105N at this revision
Material grade changed on forged flanges to ASTM A105N at this revision
Drawing number changed in thermo-well description (DD100-L-14-1, 2)

UNCONTROLLED DOCUMENT WHEN PRINTED (26-JUN-08) CONTROLLED DOCUMENT IN PROJECT LOCATION

			FIREBAG PROGRAM – PIPING ENGINEERING	
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Project Name: Firebag Program	Project No.: 100-2004-001	File Location: 02.04.04.07	Doc. No.: FB-L-5202	Rev.: 4
Title: PIPING MATERIAL SPECIFICATIONS				

1 ½" NPS thermo-well deleted at this revision
 Note 2 deleted at this revision
 Note 4 changed at this revision (Wall thickness readings shall be made per Work Practice, PMW 0018A,"Baseline Ultrasonic Survey)
 Note 8 deleted at this revision
 Note 9 added at this revision (Vents and Drains per DD100-L-12-1)
 Note 10 added at this revision (Pressure Instrument Connections per DD100-L-11-1)
 Note 11 added at this revision (PWHT required for thickness per ASME B31.3)
 Trap Valve Station VSP0040 deleted at this revision
 Trap Valve Station VSP0050 deleted at this revision
 VGA0054#8 - Gear Operator in valve description deleted at this revision
 VSC0852#5-C - Gear Operator in valve description deleted at this revision
 VGL0151#5-C - Gear Operator in valve description deleted at this revision
 Stop Check Valves – "Bolted Bonnet" added to description


ESA

Spec Header changed at this revision. PWHT to "NO"
 Spec Header changed at this revision. P & T changed to 410 psig (2827 kpag) at 800 F (427 C)
 10 to 24 pipe description changed to (Wall thickness calculated per attachment L)
 Material grade changed on forged fittings to ASTM A105N at this revision
 Material grade changed on forged flanges to ASTM A105N at this revision
 Drawing number changed in thermo-well description (DD100-L-14-1, 2)
 1" NPS thermo-well deleted at this revision
 Note 2 deleted at this revision
 Note 3 changed at this revision (Wall thickness readings shall be made per Work Practice, PMW 0018A,"Baseline Ultrasonic Survey)
 Note 4 deleted at this revision
 Note 8 Added at this revision (Vents and Drains per DD100-L-12-1)
 Note 9 Added at this revision (Pressure Instrument Connections per DD100-L-11-1)
 Note 10 added at this revision (PWHT required for thickness per ASME B31.1)
 VSC0852#5-C - Gear Operator in valve description deleted at this revision
 VGL0151#8-C - Gear Operator in valve description deleted at this revision
 VCH0234#8-SW-C – Piston/Lift Type added to description
 Stop Check Valves "Bolted Bonnet" added to description

EXX

Spec Header changed at this revision. PWHT to "NO"
 Spec Header changed at this revision. P & T changed to 453 psig (3125 kpag) at 550 F (288 C)
 10 to 24 pipe description changed to (Wall thickness calculated per attachment L)
 Drawing number changed in thermo-well description (DD100-L-14-1, 2)
 Note 5 deleted at this revision

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Note 7 added at this revision (Vents and Drains per DD100-L-12-1)
 Note 8 added at this revision (Pressure Instrument Connections per DD100-L-11-1)
 Note 9 added at this revision (PWHT required for thickness per ASME B31.3)
 VBU3008-H - Gear Operator in valve description deleted at this revision
 VGL0156#10-H - Gear Operator in valve description deleted at this revision

HAG

Spec Header changed at this revision. PWHT to "NO"
 Spec Header changed at this revision. MDMT to -50 F (-46 C)
 Bolting material grade changed to ASTM A193 Grade B7 c/w ASTM A194 Grade 2H Nuts at this revision
 Note 2 deleted at this revision
 Note 5 added at this revision (Vents and Drains per DD100-L-12-1)
 Note 6 added at this revision (Pressure Instrument Connections per DD100-L-11-1)
 VGL0129#12-SW – changed to VGL0126#12-SW


HAX

Spec Header changed at this revision. PWHT to "NO"
 Spec Header changed at this revision. P & T changed to 1265 psig (8722 kpag) at 400 F (204 C)
 3 to 24 pipe description changed to (Wall thickness calculated per attachment L)
 Drawing number changed in thermo-well description (DD100-L-14-1, 2)
 Note 4 changed at this revision (Wall thickness readings shall be made per Work Practice, PMW 0018A,"Baseline Ultrasonic Survey)
 Note 6 deleted at this revision
 Note 9 added at this revision (Vents and Drains per DD100-L-12- 1)
 Note 10 added at this revision (Pressure Instrument Connections per DD100-L-11- 1)
 Note 11 added at this revision (PWHT required for thickness per ASME B31.3)
 VBA0601 - Gear Operator in valve description deleted at this revision
 VGA5065#12 - Gear Operator in valve description deleted at this revision
 VGL0162#12 - Gear Operator in valve description deleted at this revision
 VCH0240#12-SW – Piston/Lift Type with spring added to description

HB

Spec Header changed at this revision. PWHT to "NO"
 3 to 36 pipe description changed to (Wall thickness calculated per attachment L)
 Drawing number changed in thermo-well description (DD100-L-14-1, 2)
 Note 2 deleted at this revision
 Note 3 changed at this revision (Wall thickness readings shall be made per Work Practice, PMW 0018A,"Baseline Ultrasonic Survey)
 Note 6 added at this revision (Vents and Drains per DD100-L-12- 1)
 Note 7 added at this revision (Pressure Instrument Connections per DD100-L-11- 1)
 Note 8 added at this revision (PWHT required for thickness per ASME B31.3)

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			FIREBAG PROGRAM – PIPING ENGINEERING	
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VGA0064#8 - Gear Operator in valve description deleted at this revision
VGL0161#8 - Gear Operator in valve description deleted at this revision

HBA

Spec Header changed at this revision. PWHT to “NO”
3 to 24 pipe description changed to (Wall thickness calculated per attachment L)
Drawing number changed in thermo-well description (DD100-L-14-1, 2)
Note 1 revised
Note 5 changed at this revision (Hardness control requirements of NACE RP0472 shall be met for all welds in this class as referenced in Suncor Firebag FB-L-5217)
Note 7 deleted at this revision
Note 8 changed at this revision (Wall thickness readings shall be made per Work Practice, PMW 0018A,”Baseline Ultrasonic Survey)
Note 9 changed at this revision (PWHT required for thickness per ASME B31.3)
Note 11 added at this revision (Vents and Drains per DD100-L-12- 2)
Note 12 added at this revision (Pressure Instrument Connections per DD100-L-11- 1)
VGA0605#12-N-H - Gear Operator in valve description deleted at this revision
VGL0600#12-N-H - Gear Operator in valve description deleted at this revision


HBD

Spec Header changed at this revision. PWHT to “NO”
3 to 48 pipe description changed to (Wall thickness calculated per attachment L)
Drawing number changed in thermo-well description (DD100-L-14-1, 2)
Note 2 deleted at this revision
Note 3 changed at this revision (Wall thickness readings shall be made per Work Practice, PMW 0018A,”Baseline Ultrasonic Survey)
Note 6 added at this revision (Vents and Drains per DD100-L-12- 1)
Note 7 added at this revision (Pressure Instrument Connections per DD100-L-11- 1)
Note 8 added at this revision (PWHT required for thickness per ASME B31.3)
VGA0064#8 - Gear Operator in valve description deleted at this revision
VGA0068#8 - Gear Operator in valve description deleted at this revision
VGL0161#8 - Gear Operator in valve description deleted at this revision
VGA0031#8-SW - Deleted Spec 662-7 from Assigned Pipe Class in Valve long description
VGA0031#8-SW/TH - Deleted Spec 662-7 from Assigned Pipe Class in Valve long description
VGA0064#8 - Deleted Spec 662-7 from Assigned Pipe Class in Valve long description
VGA0068#8 - Deleted Spec 662-7 from Assigned Pipe Class in Valve long description

HBE

Spec Header changed at this revision. PWHT to “NO”
3 to 48 pipe description changed to (Wall thickness calculated per attachment L)
26 to 48 pipe material changed to ASTM A672 CL22 Gr. C60
Drawing number changed in thermo-well description (DD100-L-14-1, 2)

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			FIREBAG PROGRAM – PIPING ENGINEERING	
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Note 1 changed at this revision
Note 6 deleted at this revision
Note 5 changed at this revision (Hardness control requirements of NACE RP0472 shall be met for all welds in this class as referenced in Suncor Firebag FB-L-5217)
Note 8 changed at this revision (Wall thickness readings shall be made per Work Practice, PMW 0018A,"Baseline Ultrasonic Survey)
Note 9 changed at this revision (PWHT required for thickness per ASME B31.3)
Note 11 added at this revision (Vents and Drains per DD100-L-12- 1)
Note 12 added at this revision (Pressure Instrument Connections per DD100-L-11- 1)
VGA0605#12-N-H – Size range increased at this revision (2" NPS added)
VGA0605#12-N-H - Gear Operator in valve description deleted at this revision
VGL0600#12-N-H - Gear Operator in valve description deleted at this revision


HH

Spec Header changed at this revision. PWHT to "NO"
Spec Header changed at this revision. P & T changed to 835 psig (5757 kpag) at 850 F (454 C)
3 to 24 pipe description changed to (Wall thickness calculated per attachment L)
Drawing number changed in thermo-well description (DD100-L-14-1, 2)
Note 4 changed at this revision (Wall thickness readings shall be made per Work Practice, PMW 0018A,"Baseline Ultrasonic Survey)
Note 8 deleted at this revision
Note 10 added at this revision (Vents and Drains per DD100-L-12- 1)
Note 11 added at this revision (Pressure Instrument Connections per DD100-L-11- 1)
VGA0066#12 - Gear Operator in valve description deleted at this revision
VGL0166#12 - Gear Operator in valve description deleted at this revision

HS

Spec Header changed at this revision. PWHT to "NO"
6 to 36 pipe description changed to (Wall thickness calculated per attachment L)
Pipe size range increased to 36"
Drawing number changed in thermo-well description (DD100-L-14-1, 2)
Note 1 changed at this revision to read (For ASME B31.1 code materials use Oil Sands Spec. HSC)
Note 4 changed at this revision (Wall thickness readings shall be made per Work Practice, PMW 0018A,"Baseline Ultrasonic Survey)
Note 5 deleted at this revision
Note 6 deleted at this revision
Note 7 added at this revision (Vents and Drains per DD100-L-12- 1)
Note 8 added at this revision (Pressure Instrument Connections per DD100-L-11- 1)
Note 9 added at this revision (PWHT required for thickness per ASME B31.3)
VGA0065#5 – Parallel Slide Gate Valve deleted at this revision
VGA0063#5 – Flexible Wedge Gate Valve added at this revision

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LAX

Spec Header changed at this revision. PWHT to “NO”
 4 to 24 pipe description changed to (Wall thickness calculated per attachment L)
 Drawing number changed in thermo-well description (DD100-L-14-1, 2)
 Note 3 deleted at this revision
 Note 5 deleted at this revision – replaced with added note under gasket materials
 Note 7 added at this revision (Vents and Drains per DD100-L-12- 1)
 Note 8 added at this revision (Pressure Instrument Connections per DD100-L-11- 3)
 Note 9 added at this revision (PWHT required for thickness per ASME B31.3)
 VGA0080#12 - Gear Operator in valve description deleted at this revision
 VGL1151#12 - Gear Operator in valve description deleted at this revision
 VWC0914#12 – Description changed to state “to fit between’ flanges


LDA

Spec Header changed at this revision. PWHT to “NO”
 3 to 24 pipe description changed to (Wall thickness calculated per attachment L)
 Drawing number changed in thermo-well description (DD100-L-14-1, 2)
 Note 4 deleted at this revision
 Note 6 changed at this revision (Wall thickness readings shall be made per Work Practice, PMW 0018A,”Baseline Ultrasonic Survey)
 Note 8 deleted at this revision – replaced with added note under gasket materials
 Note 10 deleted at this revision
 Note 11 added at this revision (Vents and Drains per DD100-L-12- 1)
 Note 12 added at this revision (Pressure Instrument Connections per DD100-L-11- 3)
 Note 13 added at this revision (PWHT required for thickness per ASME B31.3)
 VGA1041#8-H – Gear Operator in valve description deleted at this revision

LLC

Spec Header changed at this revision. PWHT to “NO”
 3 to 24 pipe description changed to (Wall thickness calculated per attachment L)
 Drawing number changed in thermo-well description (DD100-L-14-1, 2)
 Note 5 deleted at this revision
 Note 6 changed at this revision (Hardness control requirements of NACE RP0472 shall be met for all welds in this class as referenced in Suncor Firebag STD FB-L-5217)
 Note 8 deleted at this revision – replaced with added note under gasket materials
 Note 9 changed at this revision (Wall thickness readings shall be made per Work Practice, PMW 0018A,”Baseline Ultrasonic Survey)
 Note 10 changed at this revision (PWHT required for thickness per ASME B31.3)
 Note 12 deleted at this revision
 Note 13 added at this revision (Vents and Drains per DD100-L-12- 2)
 Note 14 added at this revision (Pressure Instrument Connections per DD100-L-11- 3)
 VGA0900#12-N-H – Gear Operator in valve description deleted at this revision

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VGL0180#12-N-H – Gear Operator in valve description deleted at this revision


RAA

Spec Header changed at this revision. PWHT to “NO”
 2 to 24 pipe description changed to (Wall thickness calculated per attachment L)
 Drawing number changed in thermo-well description (DD100-L-14-1, 2)
 Note 1 deleted at this revision
 Note 4 changed at this revision (Wall thickness readings shall be made per Work Practice, PMW 0018A, “Baseline Ultrasonic Survey”)
 Note 7 deleted at this revision - replaced with added note under gasket material
 Note 9 deleted at this revision
 Note 10 added at this revision (Vents and Drains per DD100-L-12- 2)
 Note 11 added at this revision (Pressure Instrument Connections per DD100-L-11- 3)
 Note 12 added at this revision (PWHT required for thickness per ASME B31.3)
 VGA0081#8 – Gear Operator in valve description deleted at this revision
 VGL1164#5 – Gear Operator in valve description deleted at this revision
 VGL1164#5 – Deleted this revision
 VGL1193#5-120 – Deleted this revision
 VGL1193#5-80 – Deleted this revision
 VGL1162#5 – Added this revision (3” to 6”)
 VGL1196#5-120 – Added this revision (6”)
 VGL1196#5-80 – Added this revision (3” to 4”)
 VCH0282#8 -80 – Swing check added to description
 VCH0282#8-120 – Swing check added to description

RAX

Spec Header changed at this revision. PWHT to “NO”
 Spec Header changed at this revision. ASME B16.5 MG 1.1 (was 1.3)
 Spec Header changed at this revision. P & T changed to 3705 psig (25,546 kpag) at -50 F (-46 C)
 Spec Header changed at this revision. P & T changed to 3270 psig (22,547 kpag) at 300 F (149 C)
 4 to 24 pipe description changed to (Wall thickness calculated per attachment L)
 Drawing number changed in thermo-well description (DD100-L-14-1, 2)
 Note 1 deleted at this revision
 Note 3 deleted at this revision
 Note 5 deleted at this revision – replaced with added note under gasket material
 Note 7 added at this revision (Vents and Drains per DD100-L-12- 1)
 Note 8 added at this revision (Pressure Instrument Connections per DD100-L-11- 1)
 Note 9 added at this revision (PWHT required for thickness per ASME B31.3)
 VGA1580#12 – Gear Operator in valve description deleted at this revision
 VGL1551#12 – Gear Operator in valve description deleted at this revision

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RSA

Spec Header changed at this revision. PWHT to "NO"

Spec Header changed at this revision. P & T changed to 2055 psig (14,169 kpag) at 800 F (427 C)

2 to 42 pipe description changed to (Wall thickness calculated per attachment L)

Drawing number changed in thermo-well description (DD100-L-14-1, 2)

Note 4 deleted at this revision – replaced with added note under gasket material

Note 6 changed at this revision ("Use VGL1174#5 for external Bonnet vent and by-pass piping.")

Note 7 added at this revision (Vents and Drains per DD100-L-12- 1)

Note 8 added at this revision (Pressure Instrument Connections per DD100-L-11- 3)

Note 9 added at this revision (PWHT required for thickness per ASME B31.3)

VGA1069#5 – Deleted at this revision

VGA1565#5-120 – Deleted at this revision

VGA1565#5-160 – Deleted at this revision

VGA1070#5 (Parallel Slide) – Deleted at this revision

VGA1071#5 (Parallel Slide) – Deleted at this revision

VGA1061#5 (RF 3"NPS thru 24"NPS) – Added at this revision

VGA1077#5-160 (3" NPS) – Added at this revision

VGA1077#5 -120 (4"NPS thru 24"NPS) – Added at this revision

VGL1164#5 – Deleted at this revision

VGL1193#5-120 – Deleted at this revision

VGL1162#5 – Added at this revision (3" to 6")

VGL1196#5-120 – Added at this revision (4" to 6")

VGL1196#5-160 – Added at this revision (3")

VGL1504#5 - (2"NPS) – Added at this revision

RSB

Spec Header changed at this revision. PWHT to "NO"

Spec Header changed at this revision. P & T changed to 2055 psig (14,169 kpag) at 800 F (427 C)

2 to 42 pipe description changed to (Wall thickness calculated per attachment L)

Drawing number changed in thermo-well description (DD100-L-14-1, 2)

Note 4 deleted at this revision

Note 6 deleted at this revision – replaced with note under gasket material

Note 8 deleted at this revision

Note 9 added at this revision (Vents and Drains per DD100-L-12- 1)

Note 10 added at this revision (Pressure Instrument Connections per DD100-L-11- 3)


Note 11 added at this revision (This piping spec class is Firebag specific)

Note 12 added at this revision (PWHT required for thickness per ASME B31.3)

Note 13 added at this revision (Use Valve VGL1174#5 for external Bonnet vent and By-pass piping)

VGA1069#5 – Deleted at this revision

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VGA1565#5-140 – Deleted at this revision
 VGA1565#5-160 – Deleted at this revision
 VGA1070#5 (Parallel Slide) – Deleted at this revision
 VGA1071#5 (Parallel Slide) – Deleted at this revision
 VGA1061#5 (RF 3"NPS thru 24"NPS) – Added at this revision
 VGA1077#5-160 (3" NPS thru 6"NPS) – Added at this revision
 VGA1077#5 -140 (8"NPS thru 24"NPS) – Added at this revision
 VGL1164#5 – Deleted at this revision
 VGL1193#5-160 – Deleted at this revision
 VGL1162#5 – Added at this revision (3" to 6")
 VGL1196#5-160 – Added at this revision (3" to 6")



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10.0 ATTACHMENTS

Attachment A	Table # 1	Class 150 Carbon Steel and Alloy Material
Attachment A	Table # 2	Caustic Service All Pressure Ratings
Attachment A	Table # 3	(Cancelled)
Attachment A	Table # 4	Class 300 and Higher, Carbon Steel and Alloy Material
Attachment A	Table # 5	Critical Connections and Design Temperatures Above 800°F (427°C)
Attachment A	Table # 6	Internally Coated Piping Systems
Attachment B		NACE 0103 - Sour Service (Wet H ₂ S Service) Supplement
Attachment B1		NACE MR0175/ISO 15156 Corr 1 - Sour Service (Wet H ₂ S Service) Supplement
Attachment C		(Not Used)
Attachment D		Acceptable Substitutions
Attachment E		Service Index
Attachment F		Pipe Class Index
Attachment G		(Not Used)
Attachment H		Standard Drawings List
Attachment L		Pipe Wall Thickness Table
Attachment M		Piping Material Specifications

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1.0 SCOPE

- 1.1 This Piping Material Specification has Pipe Classes, based on ASME B31.1 and B31.3. These are to provide adequate and safe material selection for Refinery/Upgrading Process, Utility, Bitumen Production Piping, Hydro-Transport and Tailings Piping. Also included are non-industrial Pipe Classes which shall comply with the applicable Codes, Alberta Building Code (ABC), NFPA, etc. The descriptions and the Attachments explain how the abbreviated information in the Pipe Class tables must be interpreted. These specifications are also based on acceptable, standardized materials to minimize replacement inventories and maintenance parts.
- 1.2 This standard is for the use of Suncor Energy Inc. and any contractors engaged in the design, construction, and maintenance work for Suncor Energy Inc. Firebag, located near Fort McMurray, Alberta, Canada.
- 1.3 The term Owner where used in this standard means SUNCOR ENERGY INC.
- 1.4 In case of a conflict between this specification and any other document, the order of precedence shall be:
 1. This Specification.
 2. Referenced Codes and Standards.
 3. Material Requisition (in the event that material or requirement on the requisition are more stringent than that of this specification, the matter shall be brought to the attention of the Owner's Engineer.
 4. Other referenced documents.

2.0 REFERENCE CODES AND DOCUMENTS

- 2.1 The latest revision of Codes, Standards, local Government regulations, and specifications referenced in this Standard, shall be used as of the date of award of the Contract or Purchase Order unless noted otherwise. In case of conflict between this Specification and the Codes, Standards and Specifications, the more stringent requirements shall govern unless specifically noted otherwise in the Purchase Order.

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3.0 CHANGES AND SUBSTITUTIONS

- 3.1 When changes to these specifications, or new Pipe Classes, are required, the Owner's Engineer will develop the required changes or additions for approval and subsequent implementation. It is the responsibility of the Owner's Engineer to assign alphabetical designations for Pipe Classes.
- 3.2 Special conditions may warrant the use of material other than as shown in the Pipe Class tables. Routinely acceptable substitutions as listed in Attachment "D" may be used without prior approvals. Other substitutions shall only be made with the prior, written approval of the Owner's Engineer. Each entry in the Bill of Material of isometrics and other piping drawings that differs from the Pipe Class shall be marked with an asterisk.
- 3.3 Any modified pressurized components shall be registered with the authorized jurisdiction.


4.0 DESIGN NOTES AND MATERIAL SELECTION

Note: - This Section explains how the abbreviated information in the Pipe Class tables must be interpreted. For more complete design requirements see Suncor Firebag Program Standard FB-L-5201 Piping Design and Plant Layout.

4.1 PRESSURE AND TEMPERATURE RATINGS

- 4.1.1 For pipe sizes NPS 3 and over, the wall thickness given in the Pipe Class tables is based on the allowable stresses at 100°F (38°C), including corrosion allowance and wall thickness mill tolerance.
- 4.1.2 For flanges, the intermediate range of pressure vs. temperature shall be per ASME B16.5 or ASME B16.47, depending on size, but the maximum temperature shall be as limited in the Pipe Class.
- 4.1.3 Some components, for example "soft seated" valves, have pressure and temperature limits lower than the Pipe Class. The limit is stated in the Notes, but it is the Design Engineer's responsibility to verify that the operating conditions are covered.
- 4.1.4 For carbon steels with a letter designation in the minimum temperature column of ASME B31.3 Table A-1, the minimum temperature is defined by the applicable curves and notes shown in Fig. 323.2.2 A and B of ASME B31.3.

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4.1.5 If a required design minimum metal temperature/thickness combination falls below the respective curve, approval for use must be obtained from the Owner's Engineer.

4.1.6 Pipe wall thickness shall be based on satisfying pressure requirements at design conditions and allowing for the specified corrosion allowance and mill tolerance. In situations where the calculations result in a wall thickness that would exceed a commercially available thickness by a small margin, and strict adherence to the specified corrosion allowance would result in selection of the next heavier thickness, the actual corrosion allowance for a specific size may be reduced by up to 20% of the specified corrosion allowance to permit the use of commercially available thicknesses that are marginally deficient.

4.2 FITTINGS

4.2.1 Limitations of pressure and temperature for socket welded fittings are stated in the "Notes" of the applicable Pipe Classes. The Designer shall specify the appropriate butt weld fittings.

4.2.2 Vents and drains are usually sealed with a threaded cap, where threaded plugs are needed they shall be the solid round head type.

4.2.3 Line reductions in NPS 2 and smaller shall be made with swage nipples; reducing threaded bushings are not permitted.

4.2.4 Line reductions in NPS 3 and larger shall be made with formed reducers. The wall thickness of the reducer shall match the thicker wall thickness of the mating lines. Two schedule reducers may be used at the discretion of the Contractor's Engineer.


4.2.5 All changes to fittings shall comply with the applicable ASME Code.

4.2.6 Pipe nipples shall be between 75 mm minimum and 230 mm maximum in length and shall be SCH-160 minimum, unless otherwise defined elsewhere in this Standard. For orifice flange nipples see paragraph 4.5.1.

4.2.7 Short pieces of pipe used between various piping components i.e. control stations, are not considered nipples and shall have the same wall thickness as the pipe shown in the line classes. Nipples shall only be used at terminating connections such as vents, drains, instruments or as specified in 4.2.8. In cases where NPS $\frac{3}{4}$ " pipe run exceeds standard nipple length to first fitting or valve, wall schedule shall be per the line class.

4.2.8 Lines $\frac{3}{4}$ " in size between a main pipe run and the first block valve shall be Schedule 160 minimum (e.g.: warm up lines at pumps).

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4.2.9 Unions shall not be permitted at temperatures greater than 400°F (204°C) or in hazardous classes involving toxic, flammable, sour, corrosive or similar dangerous services irrespective of temperature.

4.2.10 It shall be understood that NPS ¾ size is the preferred minimum size for all line classes unless noted otherwise. Exceptions, such as orifice tap sizing, are allowed where required per ASME B16.36 (see 4.5.1).

4.3 BRANCH CONNECTIONS

4.3.1 Standard branch connections shall be made in accordance with the Branch Connection Tables 1 through 6, see Attachment “A”.

4.3.2 Connections to existing piping systems shall address the actual field conditions that are affected by:


- a. Wall thickness losses due to general corrosion.
- b. Pitting corrosion.
- c. Process conditions that require “bake-out” before “hot” cutting or welding.
- d. Hydrostatic pressure testing.
- e. If the connection requires hot tapping reference Suncor Firebag Hot Tap Standard FB-L-5220.
- f. Hot tap branch connections may deviate from the standard branch table at the discretion of the Owner’s Engineer. (Note: no formal technical deviation shall be required).

4.3.3 Small Bore Connections

4.3.3.1 Definitions and References

- a. In general, small bore connections are defined as NPS 2 and smaller branch connections to headers as defined in each line class.
- b. No threaded connections up to and including the first valve are permitted in branch connections except where permitted in the Pipe Class Table.
- c. For instrument connections refer to STD Drawing No. DD100-L-11-1, 2 & 3.

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- d. For vessel bridle connections and assembly see STD Drawing NO. DD100-L-23-1 & 2.

4.3.3.2 Gusseting

- a. Gusseting shall be used in ALL small bore piping (in these cases 1 ½" and below) as defined on Drawings DD100-L-17-1 & 2 (details 1 thru 9) in such applications as vents/drains, instrument, steam-outs, purges or similar stand alone connections that terminate without further continuation of process line.
- b. Alternately, for small bore connections where layout dictates requirement for shorter nipple length (3/4" or less), such connections shall be bridge welded per DD100-L-21-1 (e.g.: for maintenance purposes).
- c. Double gusseting shall be used around reciprocating compressors, reciprocating pumps and/or where defined by Stress Engineer and Process or P&IDs as vibrating service (e.g.: slugging service, water hammer, etc.).
- d. The requirement for dual plan gusseting in vibrating service shall be noted on the fabrication isometrics or drawings.
- e. In addition to the requirements for gusseting noted in paragraph 4.3.3.2a, gusseting may be required for small bore pipe branch connections (NPS 1-½ and below) for process piping in situations where vibration exists or where additional strength is required. Stress Engineering and/or Process shall assess piping where vibration or additional mechanical strength may be required and communicate the requirement for gusseting via LDTs and/or P&IDs.
The piping designers will specify locations on the piping isometrics in accordance with drawing DD100-L-17-1&2. Examples of these situations are presented in Table 1.
- f. Other applications of gussets shall be reviewed based on specific condition of the application also vibrating lines shall be indicated on LDTs by stating: - Slug Flow, Two-phase flow, or for any other process condition.

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Table 1 – Gusseting Requirements for Branch Connections

EQUIPMENT OR SERVICE CATEGORY	CONDITIONS REGARDING SMALL BORE BRANCHES
Reciprocating Compressors (All small bore connections with or without a valve shall be gusseted).	Connections to the interstage, upstream and downstream piping and equipment associated with reciprocating compressors (includes first major piece of equipment upstream and downstream of compressor).
Reciprocating Pumps	Connections to suction and discharge pipe and equipment for reciprocating pumps (includes first major equipment upstream and downstream of pump).
Centrifugal Compressors, Centrifugal Pumps, Centrifuges	Connections to piping within the greater of 6100 mm or 20 pipe diameters, measured along the pipe axis from the equipment nozzles.
Piping or Equipment Subject to Process Induced Vibration	All connections to piping or equipment: subject to process induced vibration (e.g. lines in slug flow, lines in two-phase flow, hydraulic shock from rapid valve operation).
Pressure Relieving Device	All connections to pressure relieving inlet and discharge piping within the greater of 6100 mm or 20 pipe diameters measured along the pipe axis from the pressure relieving device.
Control Valves	Upstream and downstream of control valves susceptible to pressure drop induced vibration.
Coker Furnace & Coker	All piping subject to vibration from Coker Furnace outlet through to Coker and all piping on the Coker structure.
Pipe Rack/Process Unit Applications	Small bore branches with heavy valves such as double block and bleed applications. Threaded branch connections on welded systems. Small bore steam system blow down application. Utility Stations – steam and condensate.

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EQUIPMENT OR SERVICE CATEGORY	CONDITIONS REGARDING SMALL BORE BRANCHES
All Other Services	When possibility of damage to small bore lines exist. e.g. due to falling ice, horizontal connections near building walls, misuse as steps or handholds, projections into traffic areas etc.


4.3.4 For Branches NPS 3 and Larger

- a. Reinforcement pads shall be designed per ASME B31.3 Section 304.3.3. When the branch is at least two pipe sizes smaller than the header and the design temperature less than 800°F (425°C), the following “standard” design may be used:
 - The re-pad width shall be half the nominal diameter of the branch pipe and pad thickness shall be the same as the header pipe. On the outside diameter of the pad the weld shall have a throat of not less than 0.7 times the pad thickness. The header to nozzle and re-pad to nozzle weld shall be full penetration.
- b. Reinforcing pads shall be drilled and tapped for NPS 6 mm telltale hole. If the pad is in two sections, a hole is required in each section. The hole shall be sealed with a water resistant grease.
- c. When piping is to be insulated, a nipple (minimum schedule 40) shall be installed in the telltale hole and shall extend beyond the insulation a minimum of 12 mm.
- d. Reinforcement pad shall be subjected to an air or nitrogen pressure test at minimum 103 Kpag (15 psig).

4.3.5 Integrally Reinforced Contoured Insert Welded Fittings

- a. Examples include Sweepolet from Bonney Forge, Vesselet from WFI or similar based on size limitations from manufacturers (ie: Sweepolet header size limited to NPS 6, outlet size limited to NPS 1¼. For NPS 4 header and all NPS ¾ and NPS 1 branches, utilization of Vesselet or similar is required).
- b. Interchange between manufacturer types is permitted based on availability.

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4.4 ELBOWS AND PIPE BENDS


- 4.4.1 Long radius elbows are the standard. Short radius elbows may be used only where limited by available space, and with the approval of the Owner's Engineer.
- 4.4.2 Multi-mitered elbows are acceptable only in pipe sizes NPS 26 and larger in Category "D" fluids. Exceptions require prior written approval by the Owner's Engineer.
- 4.4.3 Single-mitered, small angle joints are acceptable, when reduced angle elbows are not available, or when bending is not practical. Up to 3 degrees, a mitred joint is considered a butt weld. Steeper angles shall be calculated per ASME B31.3, paragraph 304.2.3.
- 4.4.4 Cold bending of NPS 2 and smaller carbon steel pipe, with a minimum bend radius of 5 D, is acceptable. Hot or cold bending carbon steel pipe NPS 3 and larger and all sizes of alloy steel process piping require prior approval of the Owner's Engineer.

4.5 FLANGES

4.5.1 Orifice Flanges


- a. For orifice flanges the minimum rating is Class 300 and minimum size NPS 2 to allow room for seal welding on tapping when applicable. Orifice tap nipples shall be minimum Schedule XXS. Tap sizing shall be per ASME B16.36. Where NPS ½ tap sizes are required, in-spec valves, fittings, etc shall be provided without requirement of deviation from specification.
- b. The following minimum guidelines are provided for Orifice Flanges:
 - All non critical Class 150 line classes may have threaded taps
 - All Class 150 line classes with critical or dangerous services (ie: sour, hydrogen, caustic, etc) shall have threaded taps with seal weld.
 - Class 300 line classes with maximum design conditions 500°F (260°C) and less may have thr'd taps with seal weld.
 - Class 300 line classes with maximum design conditions above 500°F (260°C) shall have socket welded taps.
 - Class 600 line classes with maximum design conditions 400°F (204°C) and less may have threaded taps with seal weld.

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- Class 600 line classes with maximum design conditions above 400°F (204°C) shall have socket welded taps.
 - Any flange rating Class 900 and above shall have socket welded taps.
- c. Orifice flanges with Class 900 or higher rating shall be provided with NPS ¾ orifice taps as detailed in Standard 0201 drawings GD00-L-1049/0001 & 0002.
- 4.5.2 Class 300 flanges shall be used in Class 150 systems as required to match instrument, and rotating equipment flanges. Beyond first flange connection to equipment nozzle, flanges, valves, etc., shall be per line class.
- 4.5.3 Steel flanges mating to cast iron flanges shall be flat faced with full faced gaskets.
- 4.5.4 Slip-on flanges may be used only in Class 150 systems and category “D” fluids.
- 4.5.5 For flanges up to and including NPS 24, all flanges shall comply with ASME B16.5.
- 4.5.6 For flanges of NPS 26 to 60, ASME B16.47 Series A is preferred. Class B (previously API 605) shall be used where required to match existing flanges, and may be used with prior approval by the Owner's Engineer.
- 4.5.7 For flanges larger than NPS 60, all flanges shall be designed to the appropriate code (eg: Class 150 Flange sizes greater than NPS 60 fall outside of ASME B16.47-A and require special design to ASME Section VIII, Division 1, Appendix 2). Consideration should be given to coordination with Mechanical Equipment Nozzles in same size systems.
- 4.5.8 All changes to flanges shall comply with the applicable Code.
- 4.5.9 For pressure safety and relief valves, where dynamic loading analysis shows piping connecting to the valve is subject to excessive dynamic stresses, and possibility of safety valve and piping fatigue failure exists, the safety valve shall be equipped with ASME Class 300 flanges minimum, unless piping up and downstream of the valve is secured by other means.
- 4.5.10 In general, flange faces shall have serration to 250 AARH. For hydrogen service the flange face shall be 125-150 AARH.
- 4.5.11 All A105 material shall be normalized (i.e.: A105N).
- 4.5.12 Flanges NPS 4 and below on vessel nozzles shall be Class 300 minimum.

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4.6 VALVE SELECTION

- 4.6.1 For valve specifications see Suncor Firebag Program Standard FB-L-5203, Standard for Valves.
- 4.6.2 For location, accessibility and configuration of valve stations see Suncor Firebag Program Standard FB-L-5201, Standard for Piping Design and Plant Layout.
- 4.6.3 Whenever more than one (alternative) valve type or tag numbers are listed it is the designers' responsibility to verify that the selected valves are suitable for the service, locations, and the pressure-temperature ranges at operating and design conditions.
- 4.6.4 Many Valve Tags have alternate and/or multiple suffixes. It is the Designer's responsibility to ensure that the correct suffixes are included in the Bill of Material. See Suncor Firebag Program Standard FB-L-5203, Standard for Valves, for Valve Tag and suffix designations.
- 4.6.5 Socket welded valves made out of threaded end valves shall be acceptable under the following conditions:
 - a. All threads are removed.
 - b. The socket step shall be as per API 602.
 - c. The wall thickness shall stay intact as per API 602.
 - d. Fabrication shall be performed in an authorized shop.

4.7 BLEED RINGS (SEE STANDARD DRAWING DD100A-L-20-1)

- 4.7.1 Bleed rings shall be limited to maximum Class 600 flange rating and shall be installed to ensure proper centering. Whenever possible, preference is to utilize pipe spool and drain for positive isolation.
- 4.7.2 Bleed rings may be installed in locations where installation of a standard drain valve is not practical such as:
 - a. a control valve immediately between two reducing fittings where drilling and installing drain directly onto reducer is not recommended.
 - b. a positive isolation configuration where there is no room for a pipe spool between two block valves for a bleed installation, except for a bleed ring.
 - c. a location where vents or drains are required at flanged connections with space constraints.

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4.8 THERMOWELL CONNECTIONS (SEE STANDARD DRAWING DD100-L-14-1&2)

- 4.8.1 Threaded thermowells are permitted only in services where threaded fittings are acceptable in the Pipe Class Table.
- 4.8.2 Flanged thermowell nozzles may be Pipets, NPS 2 x 6" long, with wall thickness per Pipe Class and Class 300 Flange minimum. If butt welds are used, the root pass must be ground smooth.
- 4.8.3 On NPS 4 lines thermowells shall be installed per standard drawings DD100-L-14-1 & 2.
- 4.8.4 Lines NPS 3 and smaller shall be increased to NPS 4 at the thermowell elbow. Straight line increases require prior approval from Instrument and Process Engineering.


4.9 GASKETS, STUDS, NUTS

- 4.9.1 Inner Rings shall be furnished in Spiral-wound gaskets for flanges NPS 24 and larger in Class 900, NPS 12 and larger in Class 1500, and NPS 4 and larger in Class 2500.
- 4.9.2 A required extra length shall be calculated for studs for the purpose of tensioning in the process & utility services that require tensioning. For guidelines on length of studs for stud tensioning and/or torque requirements, refer to Firebag Bolt & Stud Tensioning Procedure FB-L-5231.

4.10 BLANKS AND BLINDS

- 4.10.1 Line blanks and blinds shall be specified in accordance with ASME Standard B16.48 latest Edition.
- 4.10.2 For sizes that fall outside of ASME B16.48, refer to STD FB-L-5201, Dwg. DD100-L-07-1, 2 & 3 or handle as a specialty item on a case-by-case basis.

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4.11 EXTERNAL COATING

- 4.11.1 External coating of piping shall be assessed based on the requirements of Firebag Standard FB-L-5214.

5.0 INSPECTION AND NON-DESTRUCTIVE TESTING

- 5.1 Piping that has been coated for corrosion protection (external or internal) shall be tested as per NACE Standard SP0188. Externally coated piping shall be tested after installation.
- 5.2 All Pipe Classes specified as “Sour Service (NACE)” shall meet the supplemental hardness testing requirements of Suncor Firebag Program Standard FB-L-5217, Shop and Field Welding Requirements.
- 5.3 Hardness testing shall be required to verify satisfactory Post Weld Heat Treatment (PWHT). The extent of testing shall be as described in ASME B31.3-331.1.7. The hardness limits are specified in Suncor Firebag Program Standard FB-L-5217.
- 5.4 Positive Material Identification (PMI) shall be performed as required by Suncor Firebag Program Standard FB-L-5213.
- 5.5 Ultrasonic thickness measurements shall be taken as per PMW0018A Baseline Ultrasonic Survey, as specified in the Pipe Classes.
- 5.6 Ultrasonic examination may be used to supplement or to substitute for radiography at the discretion of the Owner’s Engineer. Acceptance criteria shall be as per the applicable piping code (ASME B31.1, B31.3). When Time of Flight Diffraction, TOFD, is used for examination of weldments, the acceptance criteria shall be reviewed by the Owner’s Engineer. For additional UT requirements, refer to Suncor Standard PQA-GS-0017 and PQA-GS-0020.
- 5.7 All ASME B31.3 piping examination shall meet the acceptance criteria for “Normal Fluid Service” unless specified otherwise.
- 5.8 The requirements of Progressive Sampling for Examination, as defined in ASME B31.3-341.3.4, shall also be required for ASME B31.1 piping.
- 5.9 Inspection Classes have been established based on the criticality of service for all piping systems. Fluid service, corrosion allowance, piping design temperature and pressure have been considered in the application of the required Inspection Class and corresponding extent of examination.

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The examination requirements for each Inspection Class as indicated on the individual Pipe Class Tables are:

5.9.1 Class I – ASME B31.1 Piping

- a. 100% visual examination shall be carried out on the welded joints and components.
- b. 10% random radiography and 10% MT required on welds specified as “others” on ASME B31.1 Table 136.4.
- c. The nondestructive examination requirements of ASME B31.1 Table 136.4 shall be met based on the design pressure or temperatures.
- d. 100% RT plus 100% MT required on Boiler External Piping Welds as defined in ASME B31.1.
- e. Where Ultrasonic (UT) Examination is to be used in lieu of radiography, the requirements of Suncor Standard PQA-GS-0020 shall be complied with utilizing extent of examination as noted in this inspection class.


5.9.2 Class II – ASME B31.3 Piping

- a. Visual examination shall be carried out on 100% of the welded joints and components.
- b. 100% radiography is required on all girth, longitudinal and miter groove welds including “sweep-o-let” branch welds.
- c. Magnetic particle or liquid penetrant examination shall be carried out on all welds not radiographed.
- d. Where Ultrasonic (UT) Examination is to be used in lieu of radiography, the requirements of Suncor Standard PQA-GS-0017 shall be complied with utilizing extent of examination as noted in this inspection class.

5.9.3 Class III – ASME B31.3 Piping

- a. Visual examination shall be carried out on 100% of the welded joints and components.
- b. 10% random radiography shall be carried out on all girth and miter groove welds.

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- c. Magnetic particle or liquid penetrant examination shall be carried out on all P3 through P8 welds, including girth and miter groove welds, not radiographed.
- d. Where Ultrasonic (UT) Examination is to be used in lieu of radiography, the requirements of Suncor Standard PQA-GS-0017 shall be complied with utilizing extent of examination as noted in this inspection class.


5.9.4 Class IV – Category D Fluid Service Only

- a. Visual examination shall be carried out on 100% of the welded joints and components.
- b. 5% random radiography shall be carried out on all girth and miter groove welds.
- c. Where Ultrasonic (UT) Examination is to be used in lieu of radiography, the requirements of Suncor Standard PQA-GS-0017 shall be complied with utilizing extent of examination as noted in this inspection class.

5.9.5 Class V – Non-Metallic, Low Pressure Service And Underground Sewer And Drainage Lines

- a. Visual examination shall be carried out on 100% of the joints and components for cuts, gouges, and scratches.
- b. O.D. Surface - max. allowable imperfection depth shall be less than 10% of wall thickness.
- c. I.D. Surface - no cuts, gouges or scratches of any size permitted.
- d. HPDE piping shall also be installed and tested in accordance with Suncor Firebag Program Standard FB-L-5212, High Density Polyethylene Pipe (HDPE) Installation Procedures.

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6.0 WELDING PROCEDURES

(Refer to Suncor Firebag Program Standard FB-L-5217, Shop and Field Welding Requirements.)


- 6.1 The following procedure shall only be applicable to Instrument Connections:
- Where Instrumentation requires need for piping vent/drain connections (eg: top/bottom of level gauge), such connections shall be provided to match applicable line class details per Drawings DD100-L-12-1 & 2.
 - If unavoidable to match detail per Drawings DD100-L-12-1 & 2 and if Instrument requires threaded ends, such connections shall be seal welded for classes Classes 300 & 600 flange rating (Class E & H series). Such seal welding shall be carried out even if dissimilar metal welding is required. In certain services such as Amine & other line classes where PWHT is specified, the welding procedure for seal welding to Instruments shall be developed such that PWHT is NOT required.
 - In line classes Class 900 and above (Class L, M, P, R, etc series), such threaded Instrument connections shall not be used.
 - It shall be understood that deviation from Drawings DD00-L-12-1 & 2 in cases of Instrument connections providing Piping vent/drain tie-ins be considered the rare exception and not the rule.

7.0 COLOUR CODING

7.1 SCOPE

- This document specifies the color coding requirements for piping materials.
- In-line components such as strainers, sight flow indicators, etc., shall not be color coded.
- Piping components supplied as fabricated spools shall not be color coded.
- This specification does not address color coding for purposes of area laydown identification or service definition.

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7.2 PURPOSE

- 7.2.1 Color coding is to aid fabricators and warehouse personnel in the recognition of material types. Stock code numbers and other permanent markings must always be checked before any component is released for fabrication or installation.
- 7.2.2 The presence of a color code does not diminish the need for permanent markings to be transferred whenever a component is cut during fabrication.

7.3 ORDER OF PRECEDENCE

- 7.3.1 In case of a colour conflict between this specification and any other document, the order of precedence shall be:
1. Material requisition.
 2. This specification.
 3. Referenced codes and standards.
 4. Other referenced documents.

7.4 CODES AND STANDARDS

- 7.4.1 Pipe Fabrication Institute, ES-22.

7.5 MATERIAL TYPES NOT INCLUDED

- 7.5.1 Suppliers shall advise the Owner's Engineer of any material of manufacture within their scope of supply which is not listed in this specification, requesting a suitable colour code.


7.6 MARKING MATERIALS AND TECHNIQUES

- 7.6.1 The paint used for colour coding shall be a purpose made paint. For materials other than carbon steel, low temperature carbon steel, high yield strength carbon steel and other ferritic material, the paint shall be completely free of metallic pigments or other metallic ingredients.

However, where the lighter colours specified cannot be easily obtained without metallic pigments, colour coding paint containing titanium dioxide or rutile titanium dioxide will be considered. No other metallic ingredient will be considered. Supplier shall submit proposed paint material for approval.

Suppliers shall include, in their quotation, a specific statement to the effect that this requirement is completely understood and that they can comply. Once an order has

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been placed, the supplier is to submit, as a vendor drawing, a data sheet or descriptive leaflet from the paint manufacturer stating the specific constituents and chemical composition of the proposed colour coding paint.

- 7.6.2 Surfaces to be colour coded shall be clean, dry and free from oil, grease, rust, scale and other foreign matter.
- 7.6.3 If any surface preparation is required, the colour code paint is to be applied within the same work shift. Prepared surfaces which must be left for a longer period shall be re-cleaned before painting.
- 7.6.4 Colour coding paint shall not be applied to any machined surface or on any surface intended for welding.
- 7.6.5 The paint manufacturer's instructions for use shall be followed.
- 7.6.6 One coat of paint shall be applied, the dry film thickness to be that recommended by the paint manufacturer.
- 7.6.7 Painted areas shall be thoroughly cured before the components are handled and prepared for packaging and shipping.

7.7 MARKING REQUIREMENTS FOR PIPE

- 7.7.1 Glass, plastic, fibreglass reinforced plastic, and galvanized piping components shall not be colour coded.
- 7.7.2 Each length of pipe or tubing shall be marked with a continuous stripe not less than 25 mm (1 inch) wide or one half the nominal diameter, whichever is smaller. If two stripes are required, each stripe shall not be less than 25 mm (1 inch) wide or one-half the nominal diameter, whichever is smaller.

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7.8 COLOUR CODES

CARBON STEEL	# OF STRIPES	COLOUR
ASTM A106 Gr. B, Seamless	One	Light Grey
ASME SA106 GR. B, Seamless	One	Light Blue
ASTM A333 Gr. 6	One	Yellow
ASTM A672 Cl. 22 Gr. C60	Two	One Red, One Yellow
ASTM A672 Cl. 22 Gr. C60, Nace	Two	One Red, One Dark Blue (Not Navy)
ASTM A691 Gr. 5, Cl. 22, EFW	Two	One Dark Green, One Dark Blue (Not Navy)
ASTM A691 Gr. 9, Cl. 22, EFW	Two	One Dark Green, One Yellow
API 5L Gr. B PSL-DSAW	Two	One White, One Yellow
API 5L Gr. B PSL-DSAW, Nace	Two	One White, One Dark Blue (Not Navy)
Galvanized	None	None
CSA Z245	One	White
CSA Z245 Quenched and Tempered	One	Red

CHROMIUM MOLYBDENUM	ALLOY	# OF STRIPES	COLOUR
ASTM A335 Gr. P11, Seamless	1 ¼ Cr. ½ Mo	One	Orange
ASTM A335 Gr. P22, Seamless	2 ¼ Cr. 1 Mo	One	Brown
ASTM A335 Gr. P5, Seamless	5 Cr. ½ Mo	One	Dark Green
ASTM A335 Gr. P9, Seamless	9 Cr. 1 Mo	One	Pink
ASTM A268 TP410, Seamless	12 Cr.	One	Dark Blue (Not Navy)

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STAINLESS STEEL	# OF STRIPES	COLOUR
ASTM A312, Type 304/304L, Seamless	One	Light Green
ASTM A358 Gr. 304/304L Cl. 1 EFW	Two	One Light Green, One Yellow
ASTM A312 Type 316/316L Seamless	Two	One Light Green, One Light Blue
ASTM A312 Type 316/316L Seamless Min. 2.5% Mo.	Two	One Light Green, One Pink
ASTM A312 Type 316H Seamless	Two	One Light Green, One Brown
ASTM A358 Gr. 316/316L Cl. 1 EFW	Two	One Light Green, One White
ASTM A358 Gr. 316/316L Cl. 1 EFW, Min. 2.5% Mo.	Two	One Light Green, One Dark Blue (Not Navy)
ASTM A312, Type 317L, Seamless	Two	One Light Green, One Red
ASTM A312, Type 317L, Welded	Two	One Light Green, One Dark Green
ASTM A312, Type 321, Seamless	Two	One Light Green, One Orange
ASTM A312, Type 347, Seamless	Two	One Orange, One Yellow

NICKEL BASED MATERIAL	GRADE	
Alloy C276, ASTM B619	Alloy C276	Pipe Listed in this section would have quality control beyond the need of colour coding
ASTM A790 UNS 31803, Seamless	Duplex SS	
ASTM A790 UNS 31803, Welded	Duplex SS	
ASTM B165 / UNS N04400 Seamless	Monel 400	
ASTM B407 – 800H, UNS N08810, Seamless	Incoloy 800H	
ASTM B444 (UNSN06625), Seamless	Inconel 625	
ASTM SB464 UNS N08020	Alloy 20	
ASTM B423 UNS N08825	Alloy 825	


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CARBON STEEL	VALVES	THD/SW FITTINGS	FLANGES	BUTTWEL D
ASTM A105N	None	None	None	N/A
ASTM A352 GR LCC	Light Green	A350/LF2	A350/LF2	N/A
ASTM A350 GR LF2 C11		Light Green	Light Green	
ASTM A234 GR WPB	N/A	N/A	N/A	None
ASTM A420 GR WPL6	N/A	N/A	N/A	Light Green
ASME SA105N	Aluminum	Aluminum	Aluminum	N/A
ASME SA 234 GR WPB	N/A	N/A	N/A	Aluminum

LOW CHROME ALLOY	VALVES	THD /SW FITTINGS	FLANGES	BUTTWELD
1 ¼ Chrome	Orange	Orange	Orange	Orange
2 ¼ Chrome	Brown	Brown	Brown	Brown
5 Chrome	Dark Green	Dark Green	Dark Green	Dark Green
9 Chrome	Pink	Pink	Pink	Pink
12 Chrome	Dark Blue (not Navy)	Dark Blue (not Navy)	Dark Blue (not Navy)	Dark Blue (not Navy)

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COLOUR CODING CHART FOR GASKET	
MATERIAL	COLOUR CODE
SPIRAL WOUND WITH TEFLON FILLER	PER ASME B16.20
SPIRAL WOUND HEAT SHIELDED	PER ASME B16.20
SPIRAL WOUND WITH GRAFOIL FILLER	PER ASME B16.20
OCTAGONAL RING SOFT IRON	PER ASME B16.20
OCTAGONAL RING STAINLESS STEEL	PER ASME B16.20


8.0 IMPLEMENTATION

- 8.1 It shall be the responsibility of the applicable Project Engineering Manager to ensure that the requirements of this standard are implemented on projects where this standard is adopted.

9.0 INTERPRETATION AND UPDATING

- 9.1 Interpretation and guidance shall be provided by the applicable Peer Review Network member for the business unit or the applicable Suncor Project or Discipline Engineer for a project. The Subject Matter Expert responsible for this technical standard may be consulted by the applicable Project or Discipline Engineer for any interpretation of the requirements within this standard.


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10.0 ATTACHMENTS

Attachment A	Table # 1	Class 150 Carbon Steel and Alloy Material
Attachment A	Table # 2	Caustic Service All Pressure Ratings
Attachment A	Table # 3	(Cancelled)
Attachment A	Table # 4	Class 300 and Higher, Carbon Steel and Alloy Material
Attachment A	Table # 5	Critical Connections and Design Temperatures Above 800°F (427°C)
Attachment A	Table # 6	Internally Coated Piping Systems
Attachment B		NACE 0103 - Sour Service (Wet H ₂ S Service) Supplement
Attachment B1		NACE MR 0175/ISO 15156 Corr 1 - Sour Service (Wet H ₂ S Service) Supplement
Attachment C		(Not Used)
Attachment D		Acceptable Substitutions
Attachment E		Service Index
Attachment F		Pipe Class Index
Attachment G		(Not Used)
Attachment H		Standard Drawings List
Attachment L		Pipe Wall Thickness Table
Attachment M		Piping Material Specifications

Note: Original Signed Copy to be Retained by the Lead Document Controller for the Firebag Project

			FIREBAG PROGRAM – PIPING ENGINEERING		
ATTACHMENT A					
Project Name:	Project No.:	File Location:	Doc. No.:	Rev.:	
Firebag Program	100-2004-001	02.04.04.07	FB-L-5202	4	
Title: PIPING MATERIAL SPECIFICATION					


BRANCH CONNECTION TABLE #1 **CLASS 150 CARBON STEEL AND ALLOY MATERIAL**

Use Weldolets in Pipe Classes where socket welds are not permitted. Thredolets may be used only when specified by line class.

This table shall not be used for cyclic service. See Table 5 for cyclic service.

- TOL = Thredolet (integrally reinforced branch fitting) only used when specified by line class.
- * SOL = Sockolet (integrally reinforced branch fitting).
- WOL = Weldolet (integrally reinforced branch fitting).
- RT = Reducing tee (stub-in with reinforcing pad if reducing tee unavailable)
- P = Stub-in with reinforcing pad
- FP = Full encirclement type required
- TEE = Equal branch tee

HEADER NPS	¾	TEE																		
	1	TEE	TEE																	
	1½	TEE	TEE	TEE																
	2	TEE	TEE	TEE	TEE															
	3				TEE															
	4				RT	TEE														
	6				WOL	RT	TEE													
	8			Use Sockolets	WOL	WOL	RT	TEE												
	10				WOL	WOL	WOL	RT	TEE											
	12			(WOL or TOL	WOL	WOL	WOL	RT	RT	TEE										
	14				WOL	WOL	WOL	P	RT	RT	TEE									
	16			may be utilized	WOL	WOL	WOL	P	P	RT	RT	TEE								
	18				WOL	WOL	WOL	P	P	P	RT	RT	TEE							
	20			when specified	WOL	WOL	WOL	P	P	P	P	RT	RT	TEE						
	24				WOL	WOL	WOL	P	P	P	P	P	RT	RT	TEE					
	30			by line class)	WOL	WOL	WOL	P	P	P	P	P	P	RT	RT	TEE				
	36				WOL	WOL	WOL	P	P	P	P	P	P	P	RT	RT	TEE			
	42				WOL	WOL	WOL	P	P	P	P	P	P	P	P	RT	RT	TEE		
	48				WOL	WOL	WOL	P	P	P	P	P	P	P	P	P	RT	RT	TEE	
	54				WOL	WOL	WOL	P	P	P	P	P	P	P	P	P	P	RT	RT	TEE
	60				WOL	WOL	WOL	P	P	P	P	P	P	P	P	P	P	P	RT	RT
	72				WOL	WOL	WOL	P	P	P	P	P	P	P	P	P	P	P	P	RT
	¾	1	1½	2	3	4	6	8	10	12	14	16	18	20	24	30	36	42	48	54
	BRANCH NPS																			


			FIREBAG PROGRAM – PIPING ENGINEERING	
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Title: PIPING MATERIAL SPECIFICATION				

BRANCH CONNECTION TABLE #2
CAUSTIC SERVICE ALL PRESSURE RATINGS

- TOL = Thredolet (integrally reinforced branch fitting)
WOL = Weldolet (integrally reinforced branch fitting).
RT = Reducing tee or tee with concentric reducer
TEE = Equal branch tee


HEADER NPS	¾	TEE																
	1	TEE	TEE															
	1½	TEE	TEE	TEE														
	2	TEE	TEE	TEE	TEE													
	3	TOL	TOL	WOL	WOL	TEE												
	4	TOL	TOL	WOL	WOL	RT	TEE											
	6	TOL	TOL	WOL	WOL	WOL	RT	TEE										
	8	TOL	TOL	WOL	WOL	WOL	RT	RT	TEE									
	10	TOL	TOL	WOL	WOL	WOL	WOL	RT	RT	TEE								
	12	TOL	TOL	WOL	WOL	WOL	WOL	WOL	RT	RT	TEE							
	14	TOL	TOL	WOL	WOL	WOL	WOL	WOL	RT	RT	RT	TEE						
	16	TOL	TOL	WOL	WOL	WOL	WOL	WOL	RT	RT	RT	RT	TEE					
	18	TOL	TOL	WOL	WOL	WOL	WOL	WOL	RT	RT	RT	RT	RT	TEE				
	20	TOL	TOL	WOL	WOL	WOL	WOL	WOL	RT	RT	RT	RT	RT	RT	TEE			
	24	TOL	TOL	WOL	WOL	WOL	WOL	WOL	RT*	RT	RT	RT	RT	RT	RT	TEE		
	30	TOL	TOL	WOL	WOL	WOL	WOL	WOL	RT*	RT	RT	RT	RT	RT	RT	RT	TEE	
	¾	1	1½	2	3	4	6	8	10	12	14	16	18	20	24	30		
BRANCH NPS																		

* Use reducing tee and reducer as size reduction not standard in ASME B16.9.

			FIREBAG PROGRAM – PIPING ENGINEERING	
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Title: PIPING MATERIAL SPECIFICATION				

BRANCH CONNECTION TABLE #3

Table # 3 has been cancelled, use Table # 1

			FIREBAG PROGRAM – PIPING ENGINEERING	
			ATTACHMENT A	
Project Name: Firebag Program	Project No.: 100-2004-001	File Location: 02.04.04.07	Doc. No.: FB-L-5202	Rev.: 4
Title: PIPING MATERIAL SPECIFICATION				

BRANCH CONNECTION TABLE #4
CLASS 300 AND HIGHER, CARBON STEEL AND ALLOY MATERIAL

In Pipe Classes that do not permit the use of Socket Welded Fittings above 800°F (427°C), Weldolets shall be used.

For cyclic service use Table 5.

- SOL = Sockolet (integrally reinforced branch fitting).
 WOL = Weldolet (integrally reinforced branch fitting).
 RT = Reducing tee or tee with concentric reducer
 P = Stub-in with reinforcing pad
 TEE = Equal branch tee

HEADER NPS	¾	TEE																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
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* Not standard in ASME B16.9 (above NPS 48 Vesselets may be substituted).



ATTACHMENT A

Project Name: Firebag Program Project No.: 100-2004-001 File Location: 02.04.04.07

Doc. No.: **FB-L-5202** Rev: **4**

Title: **PIPING MATERIAL SPECIFICATION**

BRANCH CONNECTION TABLE #5 CRITICAL CONNECTIONS AND DESIGN TEMPERATURES ABOVE 800°F (427°C)

Use this table also for cyclic and vibrating services.
Above 800°F reinforcing pads are not acceptable on fabricated tees.

- ** SWL = Sweepolet (integrally reinforced contoured insert welded branch fitting)
- ** VSL = Vessolet (integrally reinforced contoured insert welded branch fitting)
- RT = Reducing tee or tee with concentric reducer
- TEE = Equal branch tee

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* Use reducing tee and reducer as size reduction not standard in ASME B16.9 (above NPS 48 Vessels may be substituted).

** Alternately, full size tee and concentric reducer may be used. SWL, VSL or similar integrally reinforced contoured insert welded branch fitting may be interchanged based on availability.

UNCONTROLLED DOCUMENT WHEN PRINTED (26-JUN-08) CONTROLLED DOCUMENT IN PROJECT LOCATION



ATTACHMENT A

Project Name: Firebag Program Project No.: 100-2004-001 File Location: 02.04.04.07

Doc. No.: **FB-L-5202** Rev: **4**


Title: **PIPING MATERIAL SPECIFICATION**

BRANCH CONNECTION TABLE #6 **INTERNALLY COATED PIPING SYSTEMS**

TOL = Thredolet (integrally reinforced branch fitting)
WOL = Weldolet (integrally reinforced branch fitting).
RT = Reducing tee or tee with concentric reducer
TEE = Equal branch tee

HEADER NPS	¾	TEE							
	1	TEE	TEE						
	1½	TEE	TEE	TEE					
	2	TEE	TEE	TEE	TEE				
	3	TOL	TOL	WOL	RT	TEE			
	4	TOL	TOL	WOL	WOL	RT	TEE		
	6	TOL	TOL	WOL	WOL	WOL	RT	TEE	
	8	TOL	TOL	WOL	WOL	WOL	WOL	RT	TEE
	¾	1	1½	2	3	4	6	8	
BRANCH NPS									

UNCONTROLLED DOCUMENT WHEN PRINTED (26-JUN-08) CONTROLLED DOCUMENT IN PROJECT LOCATION

			FIREBAG PROGRAM – PIPING ENGINEERING	
			ATTACHMENT B	
Project Name: Firebag Program	Project No.: 100-2004-001	File Location: 02.04.04.07	Doc. No.: FB-L-5202	Rev.: 4A
Title: PIPING MATERIAL SPECIFICATION				

ATTACHMENT B
NACE MR 0103 SOUR SERVICE (WET H₂S SERVICE) SUPPLEMENT

Scope:

Additional information for requirements within pipe classes that are designated as “Sour Service (Wet H₂S Service)”, or refer to NACE Standard MR0103 (latest revision), and have the **-N2** suffix on the valve tags.

The specifications of these pipe classes were developed based on NACE documents MR0103 (latest revision), RP0472 and Suncor requirements.

NACE Standard MR0103 “Materials Resistant to Sulphide Stress Cracking in Corrosive Petroleum Refining Environments”.

For definition of Sour Environment (Wet H₂S Service), refer to para 1.3.5.1 of NACE standard MR0103 (latest revision).

This document, published by NACE International (the latest edition shall always be used) provides materials requirements for resistance to sulphide stress cracking (SSC). At Suncor, conformance to the material specifications, hardness limits and other requirements, such as heat treatment condition, fabrication practices, etc. as stated in MR0103 (latest revision) is required in sour service applications.

NACE recommended practice RP0472 “Methods And Controls To Prevent In-Service Environmental Cracking Of Carbon Steel Weldments In Corrosive Petroleum Refining Environments”.

The hardness control of weldments (weld deposit, heat affected zone – HAZ, base material) in carbon steels classified as P-1 materials in Sour Environments (Wet H₂S Service) shall be per NACE RP0472 (latest revision).


For definition of Sour Environment refer to para 1, above.

This document, published by NACE International, establishes guidelines to prevent most forms of environmental cracking of weldments in carbon steel refinery equipment and piping.

The use of NACE RP0472 shall be in conjunction with Section 5, “Inspection And Non Destructive Testing”, of Firebag Std FB-L-5202 and Firebag Standard for Shop and Field Welding Requirements, FB-L-5217.

Exceptions

Exceptions to any of these requirements shall only be made with the written approval of Owner's Engineer or designate.

			FIREBAG PROGRAM – PIPING ENGINEERING	
			ATTACHMENT B1	
Project Name: Firebag Program	Project No.: 100-2004-001	File Location: 02.04.04.07	Doc. No.: FB-L-5202	Rev.: 4A
Title: PIPING MATERIAL SPECIFICATION				

ATTACHMENT B1
NACE MR0175 / ISO 15156 CORR 1 SOUR SERVICE(WET H₂S SERVICE) SUPPLEMENT

Scope:

Additional information for requirements within pipe classes that are designated as “Sour Service (Wet H₂S Service)”, or refer to NACE Standard MR0175 (latest revision), and have the **-N1** suffix on the valve tags.

The specifications of these pipe classes were developed based on NACE documents MR0175 (latest revision), RP0472 and Suncor requirements.

NACE Standard MR0175 “Materials For Use in H₂S – Containing Environments in Oil & Gas Production”.

For definition of Sour Environment (Wet H₂S Service), refer to introduction section in NACE standard MR0175 (latest revision).

This document, published by NACE International (the latest edition shall always be used) provides materials requirements for resistance to sulphide stress cracking (SSC). At Suncor, conformance to the material specifications, hardness limits and other requirements, such as heat treatment condition, fabrication practices, etc. as stated in MR0175 (latest revision) is required in sour service applications.

NACE recommended practice RP0472 “Methods And Controls To Prevent In-Service Environmental Cracking Of Carbon Steel Weldments In Corrosive Petroleum Refining Environments”.

The hardness control of weldments (weld deposit, heat affected zone – HAZ, base material) in carbon steels classified as P-1 materials in Sour Environments (Wet H₂S Service) shall be per NACE RP0472 (latest revision).


For definition of Sour Environment refer to para 1 above.

This document, published by NACE International, establishes guidelines to prevent most forms of environmental cracking of weldments in carbon steel refinery equipment and piping.

The use of NACE RP0472 shall be in conjunction with Section 5, “Inspection And Non Destructive Testing”, of Firebag Std FB-L-5202 and Firebag Standard for Shop and Field Welding Requirements, FB-L-5217.


Exceptions

Exceptions to any of these requirements shall only be made with the written approval of Owner's Engineer or designate.

			FIREBAG PROGRAM – PIPING ENGINEERING	
			ATTACHMENT C	
Project Name:	Project No.:	File Location:	Doc. No.:	Rev:
Firebag Program	100-2004-001	02.04.04.07	FB-L-5202	4
Title: PIPING MATERIAL SPECIFICATION				

ATTACHMENT C
INTERNAL LININGS FOR PIPE CLASSES CAK, AEA AND EWA

Not used

			FIREBAG PROGRAM – PIPING ENGINEERING	
			ATTACHMENT D	
Project Name: Firebag Program	Project No.: 100-2004-001	File Location: 02.04.04.07	Doc. No.: FB-L-5202	Rev.: 4
Title: PIPING MATERIAL SPECIFICATION				

ATTACHMENT D
ACCEPTABLE SUBSTITUTIONS

The Acceptable Substitute(s) listed in this table shall only be used in the stated direction, reverse substitutions are not permitted.

Specified Item or Material	Acceptable Substitute	Comments
Type 304 Stainless Steel	Type 316 Stainless Steel	Must also match carbon content
Type 316 Stainless Steel	Type 317 Stainless Steel	A frequent substitute when a min. 2.5% Mo. content is specified, must also match carbon content
“Cast” Steel (or Alloy), as typically specified for valves	“Forged” Steel (or Alloy)	The ASTM numbers will be different, but the material must match
ASTM A216, Grade WCB	ASTM A352, Grade LCB.	This only applies to the body and bonnet material, the trim, gaskets, and packing in the valve description must match. Pressure/Temperature differences per ASME B16.5 must be considered
ASTM A, or B materials	ASME SA, or SB materials	
ASTM A216, Grade WCB	ASTM A216, Grade WCC	
ASTM A182 F11	ASTM A182 F22	The supplier shall add a tag: “PWHT @ 677°C (1250°F) min.”
Welded Pipe/Fittings ASTM A105N ASTM A106 Gr B API 5L Grade B PSL-2	Seamless Pipe/Fittings ASTM A350 LF2 CL.1 ASTM A333 Gr 6 ASTM A106 Gr B or ASTM A672 CL22 Gr.C60	
ASTM A234 WPB	ASTM A420 WPL6	

**ATTACHMENT D**

Project Name: Firebag Program Project No.: 100-2004-001 File Location: 02.04.04.07

Doc. No.: **FB-L-5202** Rev: **4**

Title: **PIPING MATERIAL SPECIFICATION**

ASTM A193 Gr B7 studs	ASTM A193 Gr B7M studs	
ASTM A194 Gr 4 nuts	ASTM A194 Gr 4L nuts	
ASTM A194 Gr 2H nuts	ASTM A194 Gr 2HM nuts	
316 SS gaskets (eg: ASTM A240, etc)	316L SS gaskets (eg: ASTM A240, etc)	
ASTM A672 Cl 22 Gr C60	ASTM A672 Cl 22 Gr C65 or Gr C70	
ASTM A672 (general)	ASTM A671 or A671/A672 dual grade (general)	
Pipe ≤ NPS 2 Bevelled ends (when specified in line class)	Pipe ≤ NPS 2 Plain ends	Plain end pipe can be bevelled. This allows for use of PE pipe from Surplus or MR when substituted.

For valve substitutions refer to Firebag Standard FB-L-5203.

UNCONTROLLED DOCUMENT WHEN PRINTED (26-JUN-08) CONTROLLED DOCUMENT IN PROJECT LOCATION

**ATTACHMENT E**

Project Name: Firebag Program Project No.: 100-2004-001 File Location: 02.04.04.07

Doc. No.: **FB-L-5202** Rev: **4**Title: **PIPING MATERIAL SPECIFICATION****ATTACHMENT E
SERVICE INDEX**

SERVICE	CLASS	RATING	TEMP °F (°C)		C.A. in (MM)		MTL
Acid, Hydrochloric (Outdoor)	CAI	150 RF	-50 to 200	(-46 to 93)	0		SS TFE Lined
Acid, Hydrochloric (Indoor)	CAO	150 RF	0 to 200	(-18 to 93)	0		CS (PTFE Lined)
Acid, Sulphuric 93 wt%	CAG	150 RF	-20 to 800	(-29 to 427)	0.125	(3.2)	316/316L(Dual Cert.)
Air, Instrument (Indoors)	CBA	150 RF	-20 to 200	(-29 to 93)	0.0625	(1.6)	CS
Air, Instrument (Outdoors)	CB	150 RF	-50 to 300	(-46 to 149)	0.0625	(1.6)	CS (A333)
Air Plant (Indoors)	CBA	150 RF	-20 to 200	(-29 to 93)	0.0625	(1.6)	CS
Air Plant (Outdoors)	CB	150 RF	-50 to 300	(-46 to 149)	0.0625	(1.6)	CS (A333)
Biocide	CKX	150 RF	-20 to 302	(-29 to 150)	None		316/316L(Dual Cert.)
Boiler Blowdown Drains Section I	CSA	150 RF	-20 to 800	(-29 to 427)	0.0625	(1.6)	CS (SA)
Boiler Blowdown Drains Section I	ESA	300 RF	-20 to 800	(-29 to 427)	0.0625	(1.6)	CS (SA)
Boiler Feed Water	CS	150 RF	-20 to 800	(-29 to 427)	0.0625	(1.6)	CS
Boiler Feed Water	ES	300 RF	-20 to 800	(-29 to 427)	0.0625	(1.6)	CS
Boiler Feed Water	HS	600 RF	-20 to 800	(-29 to 427)	0.0625	(1.6)	CS
Boiler Feed Water	RSB	1500 RF	-20 to 800	(-29 to 427)	0.0625	(1.6)	CS
Boiler Feed Water Chemicals	HH	600 RF	-20 to 850	(-29 to 454)	0.0625	(1.6)	316/316L(Dual Cert.)
Boiler Feed Water Section I	CSA	150 RF	-20 to 800	(-29 to 427)	0.0625	(1.6)	CS (SA)
Boiler Feed Water Section I	ESA	300 RF	-20 to 800	(-29 to 427)	0.0625	(1.6)	CS (SA)
Boiler Fuel Section I	CSA	150 RF	-20 to 800	(-29 to 427)	0.0625	(1.6)	CS (SA)
Boiler Fuel Section I	ESA	300 RF	-20 to 800	(-29 to 427)	0.0625	(1.6)	CS (SA)
Brine, Evaporator Concentrate	ALX	150 RF	-20 to 225	(-29 to 107)	None		AL6XN

UNCONTROLLED DOCUMENT WHEN PRINTED (26-JUN-08) CONTROLLED DOCUMENT IN PROJECT LOCATION

**ATTACHMENT E**

Project Name: Firebag Program Project No.: 100-2004-001 File Location: 02.04.04.07

Doc. No.: **FB-L-5202** Rev.: **4**Title: **PIPING MATERIAL SPECIFICATION****ATTACHMENT E
SERVICE INDEX**

SERVICE	CLASS	RATING	TEMP °F (°C)		C.A. in (MM)		MTL
Carbonate Solution + CO ₂	CXX	150 RF	-20 to 400	(-29 to 204)	0.031	(0.8)	304/304L(Dual Cert.)
Caustic Soda (All Concentrations)	CAH	150 RF	50 to 150	(10 to 66)	0.0625	(1.6)	CS
Chemical Injection	CAG	150 RF	-20 to 800	(-29 to 427)	0.125	(3.2)	316/316L(Dual Cert.)
Chemical Injection	EAG	300 RF	-20 to 800	(-29 to 427)	0.0625	(1.6)	316/316L(Dual Cert.)
Chemical Injection	HAG	600 RF	-20 to 650	(-29 to 343)	0.0625	(1.6)	316/316L(Dual Cert.)
CO ₂ (Wet)	EDX	300 RF	-20 to 350	(-29 to 177)	None		CS galv.
Coagulant	APG	150 FF	-20 to 104	(-29 to 40)	None		PVC
Condensate	CS	150 RF	-20 to 800	(-29 to 427)	0.0625	(1.6)	CS
Condensate	ES	300 RF	-20 to 800	(-29 to 427)	0.0625	(1.6)	CS
Condensate	HS	600 RF	-20 to 800	(-29 to 427)	0.0625	(1.6)	CS
Condensate	RSA	1500 RF	-20 to 800	(-29 to 427)	0.0625	(1.6)	CS
Condensate Section I	CSA	150 RF	-20 to 800	(-29 to 427)	0.0625	(1.6)	CS (SA)
Condensate Section I	ESA	300 RF	-20 to 800	(-29 to 427)	0.0625	(1.6)	CS (SA)
Corrosion Inhibitor	CKX	150 RF	-20 to 302	(-29 to 150)	None		316/316L(Dual Cert.)
DGA, Lean	CDE	150 RF	-20 to 350	(-29 to 177)	0.031	(0.8)	316/316L (Dual Cert)
DGA, Rich	CDE	150 RF	-20 to 350	(-29 to 177)	0.031	(0.8)	316/316L (Dual Cert)
Drain, Closed Hydrocarbon	CAQ	150 RF	100 to 140	(38 to 60)	0.0625	(1.6)	CS
Drain, Closed Hydrocarbon	CAR	150 RF	-20 to 700	(-29 to 371)	0.125	(3.2)	CS
Flocculant	APG	150 FF	-20 to 104	(-29 to 40)	None		PVC

UNCONTROLLED DOCUMENT WHEN PRINTED (26-JUN-08) CONTROLLED DOCUMENT IN PROJECT LOCATION

**ATTACHMENT E**

Project Name: Firebag Program Project No.: 100-2004-001 File Location: 02.04.04.07

Doc. No.: **FB-L-5202** Rev: **4**Title: **PIPING MATERIAL SPECIFICATION****ATTACHMENT E
SERVICE INDEX**

SERVICE	CLASS	RATING	TEMP °F (°C)		C.A. in (MM)		MTL
Fuel Oil	CAB	150 RF	-20 to 800	(-29 to 427)	0.0625	(1.6)	CS
Gas, Fuel	CAB	150 RF	-20 to 800	(-29 to 427)	0.0625	(1.6)	CS
Gas, Fuel	EA	300 RF	-20 to 400	(-29 to 204)	0.0625	(1.6)	CS
Gas, Inert	CAB	150 RF	-20 to 800	(-29 to 427)	0.0625	(1.6)	CS
Gas, Natural	CAB	150 RF	-20 to 800	(-29 to 427)	0.0625	(1.6)	CS
Gas, Natural	EA	300 RF	-20 to 400	(-29 to 204)	0.0625	(1.6)	CS
Gas, Natural (Low Temperature)	CAX	150 RF	-50 to 650	(-46 to 343)	0.0625	(1.6)	CS (A333)
Gas, Natural (Low Temperature)	EAX	300 RF	-50 to 400	(-46 to 204)	0.0625	(1.6)	CS (A333)
Gas, Natural (Low Temperature)	HAX	600 RF	-50 to 400	(-46 to 204)	0.0625	(1.6)	CS (A333)
Gas, Natural (Low Temperature)	LAX	900 RF	-50 to 300	(-46 to 149)	0.0625	(1.6)	CS (A333)
Gas, Natural (Rich Fuel Gas Sour)	EAI	300 RF	-50 to 400	(-46 to 204)	0.125	(3.2)	CS (A333)
Gas, Purge	CAB	150 RF	-20 to 800	(-29 to 427)	0.0625	(1.6)	CS
Gas, Tail	CAF	150 RF	-20 to 800	(-29 to 427)	0.125	(3.2)	CS
Gas, Wet Acid	CAF	150 RF	-20 to 800	(-29 to 427)	0.125	(3.2)	CS
Glycol	CAB	150 RF	-20 to 800	(-29 to 427)	0.0625	(1.6)	CS
Glycol	EAB	300 RF	-20 to 800	(-29 to 427)	0.0625	(1.6)	CS
Hydrocarbon, Closed Drain	CAQ	150 RF	100 to 140	(38 to 60)	0.0625	(1.6)	CS
Hydrocarbon, Closed Drain	CAR	150 RF	-20 to 700	(-29 to 371)	0.125	(3.2)	CS
Hydrocarbon, General (low corrosion)	CAB	150 RF	-20 to 800	(-29 to 427)	0.0625	(1.6)	CS
Hydrocarbon, General (low corrosion)	EAB	300 RF	-20 to 800	(-29 to 427)	0.0625	(1.6)	CS
Hydrocarbon, General (low corrosion)	HB	600 RF	-20 to 800	(-29 to 427)	0.0625	(1.6)	CS
Hydrocarbon, General (low corrosion)	HH	600 RF	-20 to 850	(-29 to 454)	0.0625	(1.6)	316/316L(Dual Cert.)
Hydrocarbon, General (low temperature)	CAX	150 RF	-50 to 650	(-46 to 343)	0.0625	(1.6)	CS (A333)

UNCONTROLLED DOCUMENT WHEN PRINTED (26-JUN-08) CONTROLLED DOCUMENT IN PROJECT LOCATION

**ATTACHMENT E**

Project Name: Firebag Program Project No.: 100-2004-001 File Location: 02.04.04.07

Doc. No.: **FB-L-5202** Rev: **4**Title: **PIPING MATERIAL SPECIFICATION****ATTACHMENT E
SERVICE INDEX**

SERVICE	CLASS	RATING	TEMP °F (°C)		C.A. in (MM)		MTL
Hydrocarbon, General (low temperature)	EAX	300 RF	-50 to 400	(-46 to 204)	0.0625	(1.6)	CS (A333)
Hydrocarbon, General (low temperature)	HAX	600 RF	-50 to 400	(-46 to 204)	0.0625	(1.6)	CS (A333)
Hydrocarbon, General (low temperature)	LAX	900 RF	-50 to 300	(-46 to 149)	0.0625	(1.6)	CS (A333)
Hydrocarbon, General (low temperature)	RAX	1500 RF	-50 to 300	(-46 to 149)	0.0625	(1.6)	CS (A333)
Hydrocarbon, General (intermediate corrosion)	CBF	150 RF	-20 to 800	(-29 to 427)	0.1875	(4.8)	CS
Hydrocarbon, General (corrosive)	CAF	150 RF	-20 to 800	(-29 to 427)	0.125	(3.2)	
Hydrocarbon, General (very corrosive)	EDC	300 RF	-20 to 800	(-29 to 427)	0.1875	(4.8)	CS
Hydrocarbon, General (very corrosive)	CAG	150 RF	-20 to 800	(-29 to 427)	0.125	(3.2)	316/316L (Dual Cert.)
Hydrocarbon, General (very corrosive)	EAG	300 RF	-20 to 800	(-29 to 427)	0.0625	(1.6)	316/316L (Dual Cert.)
Hydrocarbon, Vapour (low corrosion)	EA	300 RF	-20 to 400	(-29 to 204)	0.0625	(1.6)	CS
Hydrocarbon, Vapour (mild corrosion, vacuum)	CLH	150 RF	-20 to 500	(-29 to 260)	0.125	(3.2)	CS
Hydrocarbon, Vapour (very corrosive, vacuum)	CDH	150 RF	-50 to 350	(-46 to 177)	None		316/316L (Dual Cert)
Hydrocarbon, + Wet CO ₂	EXX	300 RF	-20 to 550	(-29 to 288)	0.031	(0.8)	304/304L (Dual Cert.)
Hydrocarbon with Napthenic Acid	CCH	150 RF	-20 to 800	(-29 to 427)	0.625	(1.6)	317L
Hydrocarbon with Napthenic Acid	EAH	300 RF	-20 to 800	(-29 to 427)	0.0625	(1.6)	317L
Hydrocarbon with H ₂	LDA	900 RF	-20 to 800	(-29 to 427)	0.0625	(1.6)	CS
Hydrocarbon with H ₂ and H ₂ S	HBA	600 RF	-20 to 800	(-29 to 427)	0.0625	(1.6)	CS
Hydrocarbon with H ₂ and H ₂ S	HBE	600 RF	-20 to 800	(-29 to 427)	0.125	(3.2)	CS
Hydrocarbon with H ₂ and H ₂ S	LLC	900 RF	-20 to 800	(-29 to 427)	0.125	(3.2)	CS
Hydrocarbon with H ₂ S	CLC	150 RF	-20 to 800	(-29 to 427)	0.125	(3.2)	CS
Hydrocarbon with H ₂ S	EDE	300 RF	-20 to 800	(-29 to 427)	0.125	(3.2)	CS
Hydrocarbon with H ₂ S	ELC	300 RF	-20 to 800	(-29 to 427)	0.125	(3.2)	CS
Hydrocarbon with Sulphur (<0.2 wt%)	EDB	300 RF	-20 to 800	(-29 to 427)	0.125	(3.2)	CS
Hydrocarbon with Sulphur (<0.2 wt%)	HBD	600 RF	-20 to 800	(-29 to 427)	0.125	(3.2)	CS
Hydrocarbon with Sulphur (<0.2 wt%)	RAA	1500 RF	-20 to 800	(-29 to 427)	0.0625	(1.6)	CS
Hydrochloric Acid Drains	APG	150 FF	-20 to 104	(-29 to 40)	None		PVC

UNCONTROLLED DOCUMENT WHEN PRINTED (26-JUN-08) CONTROLLED DOCUMENT IN PROJECT LOCATION

**ATTACHMENT E**

Project Name: Firebag Program Project No.: 100-2004-001 File Location: 02.04.04.07

Doc. No.: **FB-L-5202**Rev: **4**Title: **PIPING MATERIAL SPECIFICATION****ATTACHMENT E
SERVICE INDEX**

SERVICE	CLASS	RATING	TEMP °F (°C)		C.A. in (MM)		MTL
Hydrogen + Wet CO ₂	CXX	150 RF	-20 to 400	(-29 to 204)	0.031	(0.8)	304/304L (Dual Cert.)
Hydrogen + Wet CO ₂	EXX	300 RF	-20 to 550	(-29 to 288)	0.031	(0.8)	304/304L (Dual Cert.)
Hydrogen Peroxide	CAM	150 RF	-50 to 200	(-46 to 93)	0.0625	(1.6)	316L
Nitrogen	CAX	150 RF	-50 to 650	(-46 to 343)	0.0625	(1.6)	CS (A333)
Nitrogen	CB	150 RF	-50 to 300	(-46 to 149)	0.0625	(1.6)	CS (A333)
Nitrogen	EAX	300 RF	-50 to 400	(-46 to 204)	0.0625	(1.6)	CS (A333)
Nitrogen	HAX	600 RF	-50 to 400	(-46 to 204)	0.0625	(1.6)	CS (A333)
Oil, Control	CKX	150 RF	-20 to 302	(-29 to 150)	None		316/316L (Dual Cert.)
Oil, Lube	CKX	150 RF	-20 to 302	(-29 to 150)	None		316/316L (Dual Cert.)
Oil, Lube – Mist Distribution	AEX	150 RF	0 to 150	(-18 to 66)	0.031	(0.8)	CS galv.
Oil, Seal	CKX	150 RF	-20 to 302	(-29 to 150)	None		316/316L (Dual Cert.)
Oil and Grease Dispersant	CKX	150 RF	-20 to 302	(-29 to 150)	None		316/316L (Dual Cert.)
Production Liquids Stage 1 & 2	662-2	600 RF	-20 to 473	(-29 to 245)	0.125	(3.2)	CS
Production Liquids Stage 3 & 4	662-6	600 RF	0 to 473	(-18 to 245)	0.125	(3.2)	CS
Production Liquids Stage 5 & 6	662-7	600 RF	0 to 473	(-18 to 245)	0.125	(3.2)	CS
Production Vapour Stage 1	662-3	300 RF	-20 to 473	(-29 to 245)	0.125	(3.2)	CS
Production Vapour Sour Stage 2-6	662-4	300 RF	-20 to 473	(-29 to 245)	0.125	(3.2)	CS
Propane	CAX	150 RF	-50 to 650	(-46 to 343)	0.0625	(1.6)	CS (A333)
Propane	EAX	300 RF	-50 to 400	(-46 to 204)	0.0625	(1.6)	CS (A333)
Propane	HAX	600 RF	-50 to 400	(-46 to 204)	0.0625	(1.6)	CS (A333)

UNCONTROLLED DOCUMENT WHEN PRINTED (26-JUN-08) CONTROLLED DOCUMENT IN PROJECT LOCATION

**ATTACHMENT E**

Project Name: Firebag Program Project No.: 100-2004-001 File Location: 02.04.04.07

Doc. No.: **FB-L-5202** Rev: **4**Title: **PIPING MATERIAL SPECIFICATION****ATTACHMENT E
SERVICE INDEX**

SERVICE	CLASS	RATING	TEMP °F (°C)		C.A. in (MM)		MTL
Separator, Feed and Discharge	AEA	150 RF	0 to 180	(-18 to 82)	0.25	(6.4)	CS
Sewer, Force main	APF	150 RF	0 to 80	(-18 to 27)	None		HDPE
Sewage, Sanitary and Storm	APE	None	73 Max	(23)	None		PVC
Slurry, Lime	CAZ	150 RF	-20 to 240	(-29 to 116)	0.0625	(1.6)	CS
Slurry, MgO	CAZ	150 RF	-20 to 240	(-29 to 116)	0.0625	(1.6)	CS
Steam	CS	150 RF	-20 to 800	(-29 to 427)	0.0625	(1.6)	CS
Steam	ES	300 RF	-20 to 800	(-29 to 427)	0.0625	(1.6)	CS
Steam	HS	600 RF	-20 to 800	(-29 to 427)	0.0625	(1.6)	CS
Steam	RSA	1500 RF	-20 to 800	(-29 to 427)	0.0625	(1.6)	CS
Steam High Pressure Stage 1 & 2	662-1	1500 RF	0 to 650	(-18 to 343)	None		Q & T line pipe
Steam High Pressure Stage 3 to 6	662-5	1500 RF	0 to 650	(-18 to 343)	None		CS
Steam Section I	CSA	150 RF	-20 to 800	(-29 to 427)	0.0625	(1.6)	CS (SA)
Steam Section I	ESA	300 RF	-20 to 800	(-29 to 427)	0.0625	(1.6)	CS (SA)
Sulphur, Liquid	CLF	150 RF	-20 to 400	(-29 to 204)	0.125	(3.2)	CS
Water, Clarified	CA	150 RF	-20 to 200	(-29 to 93)	0.0625	(1.6)	CS
Water, Cooling	CA	150 RF	-20 to 200	(-29 to 93)	0.0625	(1.6)	CS
Water, Deluge	ADX	150 RF	-20 to 200	(-29 to 93)	None		CS galv.
Water, Disposal	AEC	150 RF	250 Max	(121)	0.25	(6.4)	CS
Water, Disposal (US Filter package only)	AED	150 RF	250 Max	(121)	0.25	(6.4)	CS
Water, Disposal Overflow	APH	150 FF	225 Max	(107)	None		FRP
Water, Filtered	CKY	150 RF	-20 to 300	(-29 to 149)	None		316/316L (Dual Cert.)
Water, Fire A/G	CA	150 RF	-20 to 200	(-29 to 93)	0.0625	(1.6)	CS

UNCONTROLLED DOCUMENT WHEN PRINTED (26-JUN-08) CONTROLLED DOCUMENT IN PROJECT LOCATION

**ATTACHMENT E**

Project Name: Firebag Program Project No.: 100-2004-001 File Location: 02.04.04.07

Doc. No.: **FB-L-5202**Rev: **4**Title: **PIPING MATERIAL SPECIFICATION****ATTACHMENT E
SERVICE INDEX**

SERVICE	CLASS	RATING	TEMP °F (°C)		C.A. in (MM)		MTL
Water, Firewater Distribution System U/G	CHY	150 RF/FF	80 Max	(27)	0.0625	(1.6)	CS & HDPE
Water, Hot Process	CAF	150 RF	-20 to 800	(-29 to 427)	0.125	(3.2)	CS
Water, Oily	CA	150 RF	-20 to 200	(-29 to 93)	0.0625	(1.6)	CS
Water, Potable Industrial	ADA	150 FF	50 to 100	(10 to 38)	None		CS, int. coated
Water, Potable (Indoors and Above Ground only)	APD	150 FF	73 to 140	(23 to 60)	None		PVC
Water, Potable (Underground only)	APB	150 FF	0 to 73	(-18 to 23)	None		HDPE
Water, Reverse Osmosis	CKY	150 RF	-20 to 300	(-29 to 149)	None		316/316L (Dual Cert.)
Water, River	CA	150 RF	-20 to 200	(-29 to 93)	0.0625	(1.6)	CS
Water, Seal	CA	150 RF	-20 to 200	(-29 to 93)	0.0625	(1.6)	CS
Water, Softened	CKY	150 RF	-20 to 300	(-29 to 149)	None		316/316L (Dual Cert.)
Water, Sour	CLC	150 RF	-20 to 800	(-29 to 427)	0.125	(3.2)	CS
Water, Sour	EAG	300 RF	-20 to 800	(-29 to 427)	0.0625	(1.6)	316/316L (Dual Cert.)
Water, Sour (low pressure & low temperature)	CAG	150 RF	-20 to 800	(-29 to 427)	0.125	(3.2)	316/316L (Dual Cert.)
Water, Utility	CA	150 RF	-20 to 200	(-29 to 93)	0.0625	(1.6)	CS
Water, Waste	APH	150 FF	225 Max	(107)	None		FRP
Water, Waste	CA	150 RF	-20 to 200	(-29 to 93)	0.0625	(1.6)	CS
Water, Sour	ELC	300# RF	-20 to 800	(-29 to 427)	0.125	(3.2)	CS

UNCONTROLLED DOCUMENT WHEN PRINTED (26-JUN-08) CONTROLLED DOCUMENT IN PROJECT LOCATION



ATTACHMENT F

Project Name: Firebag Program
Project No.: 100-2004-001
File Location: 02.04.04.07

Doc. No.: FB-L-5202
Rev: 4

Title: PIPING MATERIAL SPECIFICATION

ATTACHMENT F PIPE CLASS INDEX

CLASS	RATING	TEMP °F	TEMP (°C)	C.A. in (mm)		MTL	SERVICE
662-1	1500 RF	0 to 650	(-18 to 343)	None		Q & T line pipe	High Pressure Steam Stage 1 & 2
662-2	600 RF	-20 to 473	(-29 to 245)	0.125	(3.2)	CS	Production Liquids Stage 1 & 2
662-3	300 RF	-20 to 473	(-29 to 245)	0.125	(3.2)	CS	Production Vapour Stage 1
662-4	300 RF	-20 to 473	(-29 to 245)	0.125	(3.2)	CS	Sour Production Vapour Stage 2 to 6
662-5	1500 RF	0 to 650	(-18 to 343)	None		CS	Steam, High Pressure (80% Quality) Stage 3 to 6
662-6	600 RF	0 to 473	(-18 to 245)	0.125	(3.2)	CS	Production Liquids – Stage 3 & 4
662-7	600 RF	0 to 473	(-18 to 245)	0.125	(3.2)	CS	Production Liquids – Stage 5 & 6
ADA	150 FF	50 to 100	(10 to 38)	None		CS, int. coated	Water, Potable (Industrial A/G)
ADX	150 RF	-20 to 200	(-29 to 93)	None		CS galv.	Water, Deluge
AEA	150 RF	0 to 180	(-18 to 82)	0.25	(6.4)	CS	Separator Feed and Discharge
AEC	150 RF	250 Max	(121)	0.25	(6.4)	CS	Disposal Water
AED	150 RF	250 Max	(121)	0.25	(6.4)	CS	Disposal Water (US Filter)
AEX	150 RF	0 to 150	(-18 to 66)	0.031	(0.8)	CS galv.	Lube Oil Mist Distribution
ALX	150 RF	-20 to 225	(-29 to 107)	None		AL6XN	Evaporator Concentrated Brine
APB	150 FF	0 to 73	(-18 to 23)	None		HDPE	Water, Potable (Industrial U/G)
APD	150 FF	73 to 140	(23 to 60)	None		PVC	Water, Potable (Indoors and A/G only)
APE	None	73 Max	(23)	None		PVC	Sewage, Sanitary & Storm
APF	150 RF	0 to 80	(-18 to 27)	None		HDPE	Force Main Sewer
APG	150 FF	-20 to 104	(-29 to 40)	None		PVC	Flocculant, Coagulant, Hydrochloric Acid Drains
APH	150 FF	225 Max	(107)	None		FRP	Disposal Water Overflow; Waste Water
CA	150 RF	-20 to 200	(-29 to 93)	0.0625	(1.6)	CS	Water-Clarified, Cooling, Fire, (A/G), Glycol, Oily, River, Seal, Utility, Waste
CAB	150 RF	-20 to 800	(-29 to 427)	0.0625	(1.6)	CS	Hydrocarbons (low corrosion); Fuel Oil; Gas – Fuel, Inert, Natural (>-20°F), Purge, Glycol
CAF	150 RF	-20 to 800	(-29 to 427)	0.125	(3.2)	CS	Hydrocarbons (corrosive); Hot Process Water; Gas - Wet Acid, Tail

UNCONTROLLED DOCUMENT WHEN PRINTED (26-JUN-08) CONTROLLED DOCUMENT IN PROJECT LOCATION



ATTACHMENT F

Project Name: Firebag Program
Project No.: 100-2004-001
File Location: 02.04.04.07

Doc. No.: **FB-L-5202**
Rev: **4**

Title: **PIPING MATERIAL SPECIFICATION**

ATTACHMENT F PIPE CLASS INDEX

CLASS	RATING	TEMP °F	TEMP (°C)	C.A. in (mm)		MTL	SERVICE
CAG	150 RF	-20 to 800	(-29 to 427)	0.125	(3.2)	316/316L (Dual Cert.)	Hydrocarbons (very corrosive); Sour Water (low press. and temp); Chemical Injection; 93 wt% Sulphuric Acid
CAH	150 RF	50 to 150	(10 to 66)	0.0625	(1.6)	CS	Caustic Soda
CAI	150 RF	-50 to 200	(-46 to 93)	0		SS TFE Lined	Hydrochloric Acid (Outdoor)
CAM	150 RF	-50 to 200	(-46 to 93)	0.0625	(1.6)	316L	Hydrogen Peroxide
CAO	150 RF	0 to 200	(-18 to 93)	0		CS (PTFE Lined)	Hydrochloric Acid (Indoor)
CAQ	150 RF	100 to 140	(38 to 60)	0.0625	(1.6)	CS	Drain, Closed Hydrocarbon
CAR	150 RF	-20 to 700	(-29 to 371)	0.125	(3.2)	CS	Drain, Closed Hydrocarbon
CAX	150 RF	-50 to 650	(-46 to 343)	0.0625	(1.6)	CS (A333)	Nitrogen, Natural Gas, Propane & LT Hydrocarbons
CAZ	150 RF	-20 to 240	(-29 to 116)	0.0625	(1.6)	CS	Slurry, Lime; MgO Slurry
CB	150 RF	-50 to 300	(-46 to 149)	0.0625	(1.6)	CS (A333)	Instrument Air, Plant Air & Nitrogen
CBA	150 RF	-50 to 300	(-46 to 149)	0.0625	(1.6)	CS	Instrument Air, Plant Air (Indoors)
CBF	150 RF	-20 to 800	(-29 to 427)	0.1875	(4.8)	CS	Hydrocarbon, Intermediate Corrosion
CCH	150 RF	-20 to 800	(-29 to 427)	0.625	(1.6)	317L	Hydrocarbon with Naphthenic Acid
CDE	150 RF	-20 to 350	(-29 to 177)	0.031	(0.8)	316/316L (Dual Cert)	DGA – Lean & Rich
CDH	150 RF	-50 to 350	(-46 to 177)	None		316/316L (Dual Cert)	Hydrocarbon – Sour Corrosive Vapour and Vacuum Service
CHY	150 RF/FF	80 Max	(27)	0.0625	(1.6)	CS & HDPE	Water, Fire Distribution Systems (U/G)
CKX	150 RF	-20 to 302	(-29 to 150)	None		316/316L (Dual Cert.)	Oil – Control, Lube, Seal; Corrosion Inhibitor; Biocide; Oil & Grease Dispersant
CKY	150 RF	-20 to 300	(-29 to 149)	None		316/316L (Dual Cert.)	Water, Filtered, Softened, RO
CLC	150 RF	-20 to 800	(-29 to 427)	0.125	(3.2)	CS	Hydrocarbons with H ₂ S; Sour Water

UNCONTROLLED DOCUMENT WHEN PRINTED (26-JUN-08) CONTROLLED DOCUMENT IN PROJECT LOCATION



ATTACHMENT F

Project Name: Firebag Program Project No.: 100-2004-001 File Location: 02.04.04.07

Doc. No.: **FB-L-5202** Rev: **4**

Title: **PIPING MATERIAL SPECIFICATION**

ATTACHMENT F PIPE CLASS INDEX

CLASS	RATING	TEMP °F	TEMP (°C)	C.A. in (mm)		MTL	SERVICE
CLF	150 RF	-20 to 400	(-29 to 204)	0.125	(3.2)	CS	Liquid Sulphur
CLH	150 RF	-20 to 500	(-29 to 260)	0.125	(3.2)	CS	Hydrocarbon Vapour Mild Corrosion Vacuum Service
CS	150 RF	-20 to 800	(-29 to 427)	0.0625	(1.6)	CS	Condensate, Steam, BFW (B31.3)
CSA	150 RF	-20 to 800	(-29 to 427)	0.0625	(1.6)	CS (SA)	Steam, Condensate, BFW, Blowdown Drains and Boiler Fuel ASME Section I BEP
CXX	150 RF	-20 to 400	(-29 to 204)	0.031	(0.8)	304/304L (Dual Cert.)	Carbonate Solution + CO ₂ ; Hydrogen + Wet CO ₂
EA	300 RF	-20 to 400	(-29 to 204)	0.0625	(1.6)	CS	Fuel Gas; Nat Gas (> -20 °F); Hydrocarbon Vapours; low corrosive
EAB	300 RF	-20 to 800	(-29 to 427)	0.0625	(1.6)	CS	Hydrocarbons (low corrosion), Glycol
EAG	300 RF	-20 to 800	(-29 to 427)	0.0625	(1.6)	316/316L (Dual Cert.)	Hydrocarbon (very corrosive); sour water; chem. Injection
EAH	300 RF	-20 to 800	(-29 to 427)	0.0625	(1.6)	317L	Hydrocarbon with Naphthenic Acid
EAI	300 RF	-50 to 400	(-46 to 204)	0.125	(3.2)	CS (A333)	Natural Gas (Rich Fuel Gas) (Sour)
EAX	300 RF	-50 to 400	(-46 to 204)	0.0625	(1.6)	CS (A333)	Natural Gas (L.T.); Nitrogen, Propane, Hydrocarbons (L.T.)
EDB	300 RF	-20 to 800	(-29 to 427)	0.125	(3.2)	CS	Hydrocarbons with Sulphur (<0.2 wt %)
EDC	300 RF	-20 to 800	(-29 to 427)	0.1875	(4.8)	CS	Hydrocarbon, very corrosive
EDE	300 RF	-20 to 800	(-29 to 427)	0.125	(3.2)	CS	Hydrocarbons with H ₂ S
EDX	300 RF	-20 to 350	(-29 to 177)	None		CS galv.	CO ₂ (WET)
ELC	300 RF	-20 to 800	(-29 to 427)	0.125	(3.2)	CS	Hydrocarbons with H ₂ S; Sour Water
ES	300 RF	-20 to 800	(-29 to 427)	0.0625	(1.6)	CS	Condensate, Steam & BFW - B31.3
ESA	300 RF	-20 to 800	(-29 to 427)	0.0625	(1.6)	CS (SA)	Steam, Condensate and BFW, Blowdown Drains and Boiler Fuel ASME Section I BEP
EXX	300 RF	-20 to 550	(-29 to 288)	0.031	(0.8)	304/304L (Dual Cert.)	Hydrogen + Wet CO ₂ Hydrocarbon + Wet CO ₂
HAG	600 RF	-20 to 650	(-29 to 343)	0.0625	(1.6)	316/316L	Chemical Injection

UNCONTROLLED DOCUMENT WHEN PRINTED (26-JUN-08) CONTROLLED DOCUMENT IN PROJECT LOCATION


**ATTACHMENT F**

Project Name: Firebag Program Project No.: 100-2004-001 File Location: 02.04.04.07

Doc. No.: **FB-L-5202** Rev: **4**Title: **PIPING MATERIAL SPECIFICATION****ATTACHMENT F
PIPE CLASS INDEX**


CLASS	RATING	TEMP °F	TEMP (°C)	C.A. in (mm)		MTL	SERVICE
						(Dual Cert.)	
HAX	600 RF	-50 to 400	(-46 to 204)	0.0625	(1.6)	CS (A333)	Gas, Natural (L.T.); Nitrogen; Propane, Hydrocarbon, (L.T.)
HB	600 RF	-20 to 800	(-29 to 427)	0.0625	(1.6)	CS	Hydrocarbons (low corrosion)
HBA	600 RF	-20 to 800	(-29 to 427)	0.0625	(1.6)	CS	Hydrocarbons with H ₂ and H ₂ S
HBD	600 RF	-20 to 800	(-29 to 427)	0.125	(3.2)	CS	Hydrocarbons with Sulphur (<0.2 wt %)
HBE	600 RF	-20 to 800	(-29 to 427)	0.125	(3.2)	CS	Hydrocarbons with H ₂ and H ₂ S
HH	600 RF	-20 to 850	(-29 to 454)	0.0625	(1.6)	316/316L (Dual Cert.)	Hydrocarbons & Boiler Feed Water Chemicals
HS	600 RF	-20 to 800	(-29 to 427)	0.0625	(1.6)	CS	Condensate, Steam, BFW - B31.3
LAX	900 RF	-50 to 300	(-46 to 149)	0.0625	(1.6)	CS (A333)	Gas, Natural (L.T.), Hydrocarbon General (L.T.)
LDA	900 RF	-20 to 800	(-29 to 427)	0.0625	(1.6)	CS	Hydrocarbons with Hydrogen
LLC	900 RF	-20 to 800	(-29 to 427)	0.125	(3.2)	CS	Hydrocarbons with H ₂ & H ₂ S
RAA	1500 RF	-20 to 800	(-29 to 427)	0.0625	(1.6)	CS	Hydrocarbons with Sulphur (< 0.2 wt%)
RAX	1500 RF	-50 to 300	(-46 to 149)	0.0625	(1.6)	CS (A333)	General Hydrocarbon (low temp)
RSA	1500 RF	-20 to 800	(-29 to 427)	0.0625	(1.6)	CS	Condensate & Steam - B31.3
RSB	1500 RF	-20 to 800	(-29 to 427)	0.0625	(1.6)	CS	Boiler Feed Water

UNCONTROLLED DOCUMENT WHEN PRINTED (26-JUN-08) CONTROLLED DOCUMENT IN PROJECT LOCATION

			FIREBAG PROGRAM – PIPING ENGINEERING	
			ATTACHMENT G	
Project Name:	Project No.:	File Location:	Doc. No.:	Rev:
Firebag Program	100-2004-001	02.04.04.07	FB-L-5202	4
Title: PIPING MATERIAL SPECIFICATION				

ATTACHMENT G
CROSS INDEX OF BECHTEL/SUN R&M/SUNCOR PIPE CLASSES

Not used

	FIREBAG PROGRAM – PIPING ENGINEERING	
	ATTACHMENT H	
Project Name: Firebag Program Project No.: 100-2004-001 File Location: 02.04.04.07	Doc. No.: FB-L-5202	Rev: 4
Title: PIPING MATERIAL SPECIFICATION		

ATTACHMENT H
STANDARD DRAWINGS LISTS

Standard Drawings have been moved to Suncor Firebag Program Standard FB-L-5201

**ATTACHMENT L**

Project Name: Firebag Program Project No.: 100-2004-001 File Location: 02.04.04.07

Doc. No.: **FB-L-5202** Rev: **4**Title: **PIPING MATERIAL SPECIFICATION****PIPE WALL THICKNESS TABLE**

Class	Rating	Nominal Pipe Size															Based on
		3/4"	1"	1 1/2"	2"	3"	4"	6"	8"	10"	12"	14"	16"	18"	20"	24"	
ADA	150	S80	S80	S80	S80	STD	STD	STD	STD								Service – 150 psig @ 150 Deg. F
ADX	150	S80	S80	S80	S80	STD	STD	STD	STD	STD	STD	STD	STD				Service – 160 psig @ 200 Deg. F
AEA	150	XXS	XXS	XXS	S160	XS	XS	XS	STD	STD	STD	STD	STD	STD	STD	XS	Service – 150 psig @ 180 Deg. F
AEC	150			XXS	S160	S160	S80	S80	S80	STD	STD						Flange Rating - 285 psig @ 100 Deg. F
AED	150			XXS	S160	S160	S80	S80	S80	STD	STD	STD	STD	STD	STD	XS	Service – 150 psig @ 250 Deg. F
AEX	150	S80	S80	S80	S80												Service – 150 psig @ 150 Deg. F
ALX	150	40S	40S	40S	40S	10S	10S	10S	10S	10S	10S						Flange Rating - 285 psig @ 100 Deg. F
APB	HDPE All sizes use SDR-11																HDPE material - 150 psig @ 80 Deg. F
APD	PVC	S80	S80	S80	S80	S80	S80	S80	S80								Material - 150 psig @ 73 Deg. F
APE	PVC All sizes use DR-35																Material - 73 Deg. F
APF	HDPE/CS				STD	STD	STD	STD	STD								HDPE material - 150 psig @ 80 Deg. F
APG	PVC		80	80	80	80	80	80									Material - 150 psig @ 73 Deg. F
APH	FRP																Service - 450 psig @ 225 Deg. F
CA	150	S80	S80	S80	S80	STD	STD	STD	STD	STD	STD	STD	STD	STD	STD	STD	Flange Rating - 285 psig @ 100 Deg. F
CAB	150	S80	S80	S80	S80	STD	STD	STD	STD	STD	STD	STD	STD	STD	STD	STD	Flange Rating - 285 psig @ 100 Deg. F
CAF	150	S80	S80	S80	S80	STD	STD	STD	STD	STD	STD	STD	STD	STD	STD	STD	Flange Rating - 285 psig @ 100 Deg. F
CAG	150	80S	80S	80S	80S	40S	40S	40S	40S	40S	40S	0.375"	0.375"	0.375"	0.375"	0.375"	Flange Rating - 275 psig @ 100 Deg. F
CAH	150	S160	S160	S80	S80	STD	STD	STD	STD	STD	STD	STD	STD	STD	STD	STD	Flange Rating - 285 psig @ 100 Deg. F
CAI	150		40S	40S	40S	40S	40S	40S	40S	40S	40S	0.375"	0.375"				Flange Rating - 275 psig @ 100 Deg. F
CAM	150	80S	80S	80S	80S	10S	10S										Flange Rating - 230 psig @ 100 Deg. F
CAO	150		STD	STD	STD	STD	STD	STD	STD	STD	STD	STD	STD				Service – 260 psig @ 200 Deg. F
CAQ	150	S80	S80	S80	S80	STD	STD	STD	STD	STD	STD	STD	STD	STD	STD	STD	Flange Rating - 285 psig @ 100 Deg. F

UNCONTROLLED DOCUMENT WHEN PRINTED (26-JUN-08) CONTROLLED DOCUMENT IN PROJECT LOCATION

**ATTACHMENT L**

Project Name: Firebag Program Project No.: 100-2004-001 File Location: 02.04.04.07

Doc. No.: **FB-L-5202** Rev: **4**Title: **PIPING MATERIAL SPECIFICATION****PIPE WALL THICKNESS TABLE**

Class	Rating	Nominal Pipe Size															Based on
		3/4"	1"	1 1/2"	2"	3"	4"	6"	8"	10"	12"	14"	16"	18"	20"	24"	
CAR	150	XS	XS	XS	XS	XS	XS	XS	XS	XS	XS	XS	XS	XS	XS	XS	Flange Rating - 285 psig @ 100 Deg. F
CAX	150	S80	S80	S80	S80	STD	STD	STD	STD	STD	STD	STD	STD	STD	STD	STD	Flange Rating - 285 psig @ 100 Deg. F
CAZ	150	S80	S80	S80	S80	STD	STD	STD	STD	STD	STD						Service - 150 psig @ 240 Deg. F
CB	150	S80	S80	S80	S80	STD	STD	STD	STD	STD	STD						Flange Rating - 285 psig @ 100 Deg. F
CBA	150	S80	S80	S80	S80	STD	STD	STD	STD	STD	STD						Flange Rating - 285 psig @ 100 Deg. F
CBF	150	XXS	S160	S160	S160	XS	XS	XS	STD	STD	STD	STD	STD	STD	XS	XS	Flange Rating - 285 psig @ 100 Deg. F
CCH	150	80S	80S	80S	80S	80S	80S	10S	10S	10S	10S	0.375"	0.375"	0.375"	0.375"	0.375"	Flange Rating - 230 psig @ 100 Deg. F
CDE	150	40S	40S	40S	40S	10S	10S	10S	10S	10S	10S	10S	10S	10S	10S	10S	Flange Rating - 275 psig @ 100 Deg. F
CDH	150	40S	40S	40S	40S	10S	10S	10S	10S	10S	10S	10S	10S	40S	10S	10S	Flange Rating - 275 psig @ 100 Deg. F & Full Vacuum
CHY	150	S80	S80	S80	S80	STD	STD	STD	STD	STD	STD	STD	STD	STD	STD	STD	Service - 160 psig @ 80 Deg. F
CKX	150	80S	80S	80S	80S	40S	40S	40S	40S								Flange Rating - 275 psig @ 100 Deg. F
CKY	150	40S	40S	40S	40S	10S	10S	10S	10S	10S	10S	10S	10S	10S	10S	10S	Flange Rating - 275 psig @ 100 Deg. F
CLC	150	S80	S80	S80	S80	STD	STD	STD	STD	STD	STD	STD	STD	STD	STD	STD	Flange Rating - 285 psig @ 100 Deg. F
CLF	150	S80	S80	S80	S80	STD	STD	STD	STD	STD	STD	STD	STD	STD	STD	STD	Flange Rating - 285 psig @ 100 Deg. F
CLH	150	S80	S80	S80	S80	STD	STD	STD	STD	STD	STD	STD	STD	STD	STD	STD	Flange Rating - 285 psig @ 100 Deg. F
CS	150	S80	S80	S80	S80	STD	STD	STD	STD	STD	STD	STD	STD	STD	STD	STD	Flange Rating - 285 psig @ 100 Deg. F
CSA	150	S80	S80	S80	S80	STD	STD	STD	STD	STD	STD	STD	STD	STD	STD	STD	Flange Rating - 285 psig @ 100 Deg. F
CXX	150	40S	40S	40S	40S	10S	10S	10S	10S	10S	10S	0.375"	0.375"				Flange Rating - 275 psig @ 100 Deg. F
EA	300	S80	S80	S80	S80	STD	STD	STD	STD	STD	STD	STD	XS	XS	XS	S40	Flange Rating - 740 psig @ 100 Deg. F
EAB	300	S80	S80	S80	S80	STD	STD	STD	STD	STD	STD	STD	XS	XS	XS	S40	Flange Rating - 740 psig @ 100 Deg. F
EAG	300	80S	80S	80S	80S	40S	40S	40S	40S	40S	40S	0.375"	0.5"	0.5"	0.5"	0.625"	Flange Rating - 720 psig @ 100 Deg. F
EAH	300	80S	80S	80S	80S	80S	80S	80S	40S	40S	40S	0.375"	0.500"	0.500"	0.500"	0.625"	Flange Rating - 720 psig @ 100 Deg. F
EAI	300	S160	S80	S80	S80	S80	S80	S80	XS	XS	XS	S40	S40	S40	S40	S40	Flange Rating - 740 psig @ 100 Deg. F

UNCONTROLLED DOCUMENT WHEN PRINTED (26-JUN-08) CONTROLLED DOCUMENT IN PROJECT LOCATION



ATTACHMENT L

Project Name: Firebag Program Project No.: 100-2004-001 File Location: 02.04.04.07

Doc. No.: **FB-L-5202** Rev: **4**

Title: **PIPING MATERIAL SPECIFICATION**

PIPE WALL THICKNESS TABLE

Class	Rating	Nominal Pipe Size															Based on
		3/4"	1"	1 1/2"	2"	3"	4"	6"	8"	10"	12"	14"	16"	18"	20"	24"	
EAX	300	S80	S80	S80	S80	STD	STD	STD	STD	STD	STD	STD	XS	XS	XS	S40	Flange Rating - 740 psig @ 100 Deg. F
EDB	300	S160	S80	S80	S80	STD	STD	STD	STD	STD	S40	S40	S40	S40	S40	S40	Maximum Design Pressure = 4400 kpag @ Temperature = 245 C
EDC	300	XXS	S160	S160	S160	XS	XS	XS	XS	XS	XS	S60	S60	S60	S60	S60	Flange Rating - 740 psig @ 100 Deg. F
EDE	300	S160	S80	S80	S80	XS	XS	XS	XS	XS	XS	S40	S40	S40	S40	S40	Flange Rating - 740 psig @ 100 Deg. F
EDX	300	S160	S160	S160	S160	STD	STD	STD									Flange Rating - 740 psig @ 100 Deg. F
ELC	300	S160	S80	S80	S80	XS	XS	XS	XS	XS	XS	S40	S40	S40	S40	S40	Flange Rating - 740 psig @ 100 Deg. F
ES	300	S80	S80	S80	S80	STD	STD	STD	STD	STD	STD	STD	XS	XS	XS	S40	Flange Rating - 740 psig @ 100 Deg. F
ES	300															STD	Maximum Design Pressure = 2830 kpag @ Temperature = 250 C Note 7
ESA	300	S80	S80	S80	S80	STD	STD	STD	STD	XS	XS	XS	S60	S60	S60	S60	Flange Rating - 740 psig @ 100 Deg. F
EXX	300	80S	80S	80S	80S	40S	40S	40S	40S	40S	40S	0.375"	0.5"	0.5"	0.5"	0.625"	Flange Rating - 720 psig @ 100 Deg. F
HAG	600	80S	80S	80S	80S												Flange Rating - 1440 psig @ 100 Deg. F
HAX	600	S80	S80	S80	S80	S80	S80	S80	S80	S80	S80	S80	S80	S80	S80	S80	Flange Rating - 1480 psig @ 100 Deg. F
HB	600	S80	S80	S80	S80	S80	S80	S80	S80	S80	S80	S80	S80	S80	S80	S80	Flange Rating - 1480 psig @ 100 Deg. F
HBA	600	S80	S80	S80	S80	S80	S80	S80	S80	S80	S80	S80	S80	S80	S80	S80	Flange Rating - 1480 psig @ 100 Deg. F
HBD	600	S160	S160	S160	S160	S80	S80	S80	S80	S80	S80	S80	S80	S80	S80	S80	Flange Rating - 1480 psig @ 100 Deg. F
HBE	600	S160	S160	S160	S160	S80	S80	S80	S80	S80	S80	S80	S80	S80	S80	S80	Flange Rating - 1480 psig @ 100 Deg. F
HH	600	80S	80S	80S	80S	80S	80S	80S	80S	0.625"	0.625"	0.75"	0.75"	0.875"	0.875"	1.125"	Flange Rating - 1440 psig @ 100 Deg. F
HS	600	S80	S80	S80	S80	S80	S80	S80	S80	S80	S80	S80	S80	S80	S80	S80	Flange Rating - 1480 psig @ 100 Deg. F
LAX	900	S80	S80	S80	S80	S80	S80	S120	S120	S120	S120	S120	S120	S120	S120	S120	Flange Rating - 2085 psig @ 100 Deg. F See Note 5
LAX	900	S80	S80	S80	S80	S80	S120	S120	S120	S120	S120	S120	S120	S120	S120	S120	Flange Rating - 2220 psig @ 100 Deg. F

UNCONTROLLED DOCUMENT WHEN PRINTED (26-JUN-08) CONTROLLED DOCUMENT IN PROJECT LOCATION

**ATTACHMENT L**

Project Name: Firebag Program Project No.: 100-2004-001 File Location: 02.04.04.07

Doc. No.: **FB-L-5202** Rev: **4**Title: **PIPING MATERIAL SPECIFICATION****PIPE WALL THICKNESS TABLE**

Class	Rating	Nominal Pipe Size															Based on
		3/4"	1"	1 1/2"	2"	3"	4"	6"	8"	10"	12"	14"	16"	18"	20"	24"	
																	See Note 6
LDA	900	S80	S80	S80	S80	S80	S120	S120	S120	S120	S120	S120	S120	S120	S120	S120	Flange Rating - 2220 psig @ 100 Deg. F
LLC	900	S160	S160	S160	S160	S160	S120	S120	S120	S120	S120	S120	S120	S120	S120	S120	Flange Rating – 2220 psig @ 100 Deg. F
RAA	1500	S160	S160	S160	S80	S80	S80	S120	S120	S100	S100	S100	S100	S100	S100	S100	Service - 2060 psig @ 135 Deg. F (14,200 kpag @ 58 Deg. C)
RAX	1500	S160	S160	S160	S160	S160	S120	S120	S120	S120	S120	S120	S140	S140	S140	S140	Service - 2640 psig @ 104 Deg. F (18,200 kpag @ 40 Deg. C)
RSA	1500	S160	S160	S160	S160	S160	S120	S120	S120	S120	S120	S120	S120	S120	S120	S120	See Note 1 – Steam
RSA	1500	S160	S160	S160	S160	S160	S120	S120	S120	S140	S140	S140	S140	S140	S140	S140	See Note 2 – Steam & BFW
RSA	1500	S160	S160	S160	S160	S160	S160	S160	S160	S160	S160	S160	S160	S160	S160	S160	See Note 4 – BFW
RSB	1500	S160	S160	S160	S160	S160	S160	S160	S140	S140	S140	S140	S140	S140	S140	S140	See Note 3 – BFW

The RSA schedules have been developed over the various Firebag stages. Use the following notes for determining the appropriate schedule for the specific commodity and stage in question

Note 1 This line applies to all Steam lines with design conditions of DP=14,700 kpag @ DT=343 C for C& E plus Stages 3 and beyond.

Note 2 This line applies to Steam lines with design conditions of DP=14,700 kpag @ DT=343 C for stage 1 and stage 2.

This line also applies to BFW lines with design conditions of DP=18,750 kpag @ DT=215 C used in stage 1.

Note 3 This line applies to BFW lines with a DP=20,700 kpag @ 215 C used in Stage 2 and beyond.

Note 4 This line applies to BFW lines with a DP=21,736 kpag @ 210 C used in Plant 91 Co-generation.

Note 5 This line applies to Stage 1 and 2 lines

Note 6 This line applies to Stage 3 and beyond

Note 7 This line applies to 24" Pipe on Hot Blowdown line – Stage 3 only (excludes Co-Gen)

LARGE DIAMETER PIPING SCHEDULES

Class	Rating	Nominal Pipe Size															Based on
		28"	30"	32"	36"	42"	48"										

UNCONTROLLED DOCUMENT WHEN PRINTED (26-JUN-08) CONTROLLED DOCUMENT IN PROJECT LOCATION



ATTACHMENT L


Project Name: Firebag Program Project No.: 100-2004-001 File Location: 02.04.04.07

Doc. No.: **FB-L-5202** Rev: **4**

Title: **PIPING MATERIAL SPECIFICATION**

CA	150		STD		XS	XS	XS										Flange Rating – 285 psig @ 100 Deg. F
CAB	150		STD		XS	XS	XS										Flange Rating – 285 psig @ 100 Deg. F
CAF	150		XS		XS	0.625"	0.625"										Flange Rating - 285 psig @ 100 Deg. F
CCH	150		0.375"		0.375"	0.375"	0.5"										Flange Rating – 230 psig @ 100 Deg. F
CLC	150	0.5"	0.5"	0.5"	0.5"	0.625"	0.625"										Flange Rating – 285 psig @ 100 Deg. F
CS	150		STD		XS	XS	XS										Flange Rating – 285 psig @ 100 Deg. F
EAB	300		0.750"		0.875"	1.000"	1.125"										Flange Rating – 740 psig @ 100 Deg. F
EDB	300		0.750"		0.875"	1.000"	1.125"										Maximum Design Pressure = 638 psig @ 383 Deg F
EDE	300		0.875"		1.000"	1.125"	1.250"										Flange Rating = 740 psig @ 100 Deg. F
ES	300		0.75"		0.875"	1.0"	1.125"										Flange Rating = 740 psig @ 100 Deg. F
HBE	600		1.00"		1.125"	1.25"	1.5"										Maximum Design Pressure = 870 @ 383 Deg F
LLC	900		1.875														Maximum Design Pressure = 1946 psig @ 329 Deg F
RSA	1500		2.25"		2.75"	3.125"	3.625"										Maximum Design Pressure = 2132 psig @ 649 Deg F
RSB	1900		2.75		3.25	3.75	4.25"										Maximum Design Pressure = 3002 psig @ 419 Deg F

UNCONTROLLED DOCUMENT WHEN PRINTED (26-JUN-08) CONTROLLED DOCUMENT IN PROJECT LOCATION

			FIREBAG PROGRAM – PIPING ENGINEERING	
			ATTACHMENT M	
Project Name:	Project No.:	File Location:	Doc. No.:	Rev:
Firebag Program	100-2004-001	02.04.04.07	FB-L-5202	4A
Title: PIPING MATERIAL SPECIFICATION				

ATTACHMENT M

PIPING MATERIAL SPECIFICATIONS

Only the updated Piping Material Specifications, as listed below, have been included in this Revision 4A of Attachment M which shall replace the corresponding Piping Material Specifications from Revision 4.

Class:
662-4
662-6
662-7
CDE
CDH
CLC
CLH
EAI
EDE
ELC
HBA
HBE
LLC



Piping Material Specifications

Rev: **4**

Service Desc:	High Pressure 80% Quality Steam Stage 1 & 2 (**10)			Temp:	650 (343)	°F(°C)max
Materials:	Carbon Steel Q & T			Corrosion Allow:	0	Code: CSA Z662
Material P&T:	0	PSI @	0	°F min.	Based on:	Service
	(0)	Kpa @	(-18)	°C min.	Branch Conn Tbl:	Note 2
	2132	PSI @	650	°F max.	Inspection Class:	Note 1
	(14,700)	Kpa @	(343)	°C max.		
P.W.H.T. :	NO (**9)			Welding Proc:		

Standard Specifications

Valve Specifications

Pipe

0.75	2	ASTM A106 Gr. B, Seamless, Sch. 160
3		ASTM A106 Gr. B, Seamless, Sch. 160
6		ASTM A106 Gr. B, Seamless, Sch. 160
8	8	Line Pipe, Cat. 1 Gr 448, Q & T, Seamless, 8.77 mm minimum wall thickness
10	10	Line Pipe, Cat. 1 Gr 448, Q & T, Seamless, 10.93 mm minimum wall thickness
12	12	Line Pipe, Cat. 1 Gr 448, Q & T, Seamless, 12.96 mm minimum wall thickness
16	16	Line Pipe, Cat. 1 Gr 448, Q & T, Seamless, 16.26 mm minimum wall thickness

Fittings

0.75	2	ASTM A105, Class 6000 SW
2	6	Weldolet, ASTM A105, Sch 160 **2
8	8	Bends, Line Pipe, Cat. 1 Gr 448, Q & T, Seamless, 8.77 mm minimum wall thickness after bending
10	10	Bends, Line Pipe, Cat. 1 Gr 448, Q & T, Seamless, 10.93 mm minimum wall thickness after bending
12	12	Bends, Line Pipe, Cat. 1 Gr 448, Q & T, Seamless, 12.96 mm minimum wall thickness after bending
16	16	Bends, Line Pipe, Cat. 1 Gr 448, Q & T, Seamless, 16.26 mm minimum wall thickness after bending
8	16	Equal Tee, Cat. 1 Gr 448, Q & T, Seamless, (Schedule to match pipe)
8	8	Transition Piece, Cat. 1 Gr 448, Q & T, Seamless, (One end to match Q & T pipe, other end Sch 120)
10	16	Transition Piece, Cat. 1 Gr 448, Q & T, Seamless, (One end to match Q & T pipe, other end Sch 140)

Flanges

2	2	ASTM A105, Class 1500 RF. SW
6	6	ASTM A105, Class 1500 RF.WN, Sch 160

Compact Gate Valve

0.75 VGA1001#5-SW

Globe Valve, Y Pattern

0.75 2 VGL1174#5-SW

Special Material Specifications:

<u>Bolting</u>	ASTM A193 Gr. B7, c/w A194 Gr. 2H Nuts
<u>Gaskets</u>	Spiral Wound 316SS, Graphite filled, c/w CS Outer Ring, per ASME B16.20 **6

** SPECIAL NOTES **

1. Inspection and Non-Destructive Testing shall be as follows: (1) Visual Examination shall be carried out on 100% of the weld joints and components. (2) 100% Radiography is required on all girth welds. (3) Magnetic Particle or Liquid Penetrant Examination shall be carried out on all welds not Radiographed. (4) All attachment welds shall be examined by Magnetic Particle or Dye Penetrant methods.
2. Use sockolet for 1 1/2"NPS and below, use weldolet for 2" NPS and above branch connetions to main steam line. Materials per Piping Materials Specification Class RSA
3. Attention must be paid to avoiding the possibility of "Over Tempering" the Quenched & Tempered pipe.
4. Pipe shall be manufactured and tested in accordance with the "Scope of Supply - Section 1" attached to the purchase order.

5. *Minimum wall thickness is calculated based on Alternate Rules indicated in ABSA Information Bulletin No. IB05-001 Jan 5, 2005.*
6. *Inner rings as required by ASME B16.20.*
7. *Positive Isolation required per drawings DD100-L-31-1, 2 and 3.*
8. *For Vents, Drains & Instrument connections use ASME B31.3 materials per Class RSA.*
9. *PWHT required for thickness per ASME B31.3 or CSA Z662-03*
10. *This class used for Stage 1 &2, design to CSA Z662-03.*



Piping Material Specifications

Valve Details

Compact Gate Valve

VGA1001#5-SW

Rev Date 17-Feb-08

Compact Gate Valve, Class CL 1500 Socketweld, Forged Body to, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 5, Integral or Renewable seats, Regular Port, Design to API-602
Assigned Pipe Classes: HS, RSA, RSB, 662-1, 662-5

Globe Valve, Y Pattern

VGL1174#5-SW

Rev Date 22-Feb-08

Globe Valve, Y Pattern, Class CL 1500 Socketweld, Forged Body to, ASTM A105 N, bonnetless, API Trim 5, Integral or Renewable seats, Hard Faced Seat & Disc, Design to API-602
NOTES: Pressure/Temperature rating to ASME B16.34
Assigned Pipe Classes: HS, RSA, RSB, 662-1, 662-5



Piping Material Specifications

Rev: **4**

Service Desc: <i>Production Liquids Stage 1 & 2 (**7)</i>				Temp: <i>473 (245)</i> °F(°C)max		
Materials: <i>Carbon Steel</i>		Corrosion Allow: <i>0.125</i>		Code: <i>CSA Z662</i>		
Material P&T:	<i>0</i>	PSI @	<i>0</i>	°F min.	Based on: <i>Service</i>	Branch Conn Tbl: <i>Note 2</i>
	<i>(0)</i>	Kpa @	<i>(-18)</i>	°C min.		Inspection Class: <i>Note 1</i>
	<i>725</i>	PSI @	<i>473</i>	°F max.		
	<i>(5000)</i>	Kpa @	<i>(245)</i>	°C max.		
P.W.H.T. : <i>NO (**6)</i>				Welding Proc:		

Standard Specifications

Valve Specifications

Pipe

0.75	2	ASTM A106 Gr. B, Seamless, Sch160
3	8	ASTM A106 Gr. B, Seamless, Sch 80
10	12	Line Pipe, Cat. 1 Gr 359, ERW, 7.1 mm wall thickness
16	16	Line Pipe, Cat. 1 Gr 359, ERW, 8.7 mm wall thickness
18	18	Line Pipe, Cat. 1 Gr 359, ERW, 10.3 mm wall thickness
20	20	Line Pipe, Cat. 1 Gr 359, ERW, 11.1 mm wall thickness
24	24	Line Pipe, Cat. 1 Gr 359, ERW, 12.7 mm wall thickness
30	30	Line Pipe, Cat. 1 Gr 359, ERW, 15.9 mm wall thickness
36	36	Line Pipe, Cat. 1 Gr 359, ERW, 17.5 mm wall thickness
42	42	Line Pipe, Cat. 1 Gr 359, ERW, 19.1 mm wall thickness

Fittings

0.75	2	ASTM A105, Class 6000, SW
3	8	ASTM A234 Gr.WPB, Sch-80
10	24	Elbows, Cat. 1 Gr 359, CSA Z245.11 (Wall thickness to match line pipe) **4
10	10	Bends, Line Pipe, Cat. 1 Gr 359, ERW, 6.4 mm minimum wall thickness after bending
12	12	Bends, Line Pipe, Cat. 1 Gr 359, ERW, 7.1 mm minimum wall thickness after bending
16	16	Bends, Line Pipe, Cat. 1 Gr 359, ERW, 7.9 mm minimum wall thickness after bending
18	18	Bends, Line Pipe, Cat. 1 Gr 359, ERW, 9.1 mm minimum wall thickness after bending
20	20	Bends, Line Pipe, Cat. 1 Gr 359, ERW, 9.8 mm minimum wall thickness after bending
24	24	Bends, Line Pipe, Cat. 1 Gr 359, ERW, 11.1 mm minimum wall thickness after bending
30	30	Bends, Line Pipe, Cat. 1 Gr 359, ERW, 13.0 mm minimum wall thickness after bending
36	36	Bends, Line Pipe, Cat. 1 Gr 359, ERW, 14.9 mm minimum wall thickness after bending
42	42	Bends, Line Pipe, Cat. 1 Gr 359, ERW, 16.9 mm minimum wall thickness after bending
10	24	RedTee, Cat. 1 Gr 359, CSA Z245.11 (Wall thickness to match line pipe)
10	24	Reducer, Cat. 1 Gr 359, CSA Z245.11 (Wall thickness to match line pipe)
10	24	Transition Piece, Cat. 1 Gr 359, ERW, (One end to match Line pipe, other end Sch 80)

Flanges

0.75	2	ASTM A105, Class 600 RF. SW
3	6	ASTM A105, Class 600 RF.WN, (Bore to match Pipe)

Compact Gate Valve

0.75	2	VGA0031#8-SW
0.75	2	VGA0031#8-SW/TH

Gate Valve

3	24	VGA0064#8	RF
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10	24	Cat. 1 Gr 359 PN100 per CSA Z245.12 (Bore to match pipe)
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Special Material Specifications:

<u>Bolting</u>	ASTM A193 Gr. B7, c/w A194 Gr. 2H Nuts
<u>Gaskets</u>	Spiral Wound 316SS, Graphite filled, c/w CS Outer Ring, per ASME B16.20

**** SPECIAL NOTES ****

1. Inspection and Non-Destructive examination testing shall be carried out per CSA Z662-03 and also the following: (1) Visual examination shall be carried out on 100% of the weld joint and components. (2) Magnetic Particle or Liquid Penetrant shall be carried out on all branch connection welds.
2. Use sockolet for 2" NPS and below branch connections to headers. Use weldolets for 3" NPS and above branch connections to headers. Materials to Piping Material Specification Class HBD.
3. For Vents, Drains and Instrument Connections use ASME B31.3 materials per Piping Materials Specification Class HBD.
4. 5-D bends are preferred. Elbows are only to be used when approved by the Owners Engineer.
5. Positive Isolation required per drawings DD100-L-31-1, 2 and 3.
6. PWHT required for thickness per ASME B31.3 or CSA Z662-03.
7. This class used for Stage 1 & 2, design to CSA Z662-03.



Piping Material Specifications

Valve Details

Compact Gate Valve

VGA0031#8-SW

Rev Date 04-Apr-08

Compact Gate Valve, Class CL 800 Socketweld, Forged Body to, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 8, Integral or Renewable seats, Regular Port, Design to API-602

Assigned Pipe Classes: CA, CAB, CAZ, CBA, CHY, CS, EA, EAB, EDB, HB, HBD, 662-2, 662-3

Compact Gate Valve

VGA0031#8-SW/TH

Rev Date 04-Apr-08

Compact Gate Valve, Class CL800 Socketweld/Threaded, Forged Carbon Steel, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 8, Integral or renewable hard faced seats, Regular Port, Design to API-602

Assigned Pipe Classes: CA, CAB, CAZ, CBA, CHY, CS, EA, EAB, EDB, HB, HBD, 662-2, 662-3

Gate Valve

VGA0064#8

Rev Date 04-Apr-08

Gate Valve, Class CL 600 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 8, Integral or Welded in Seats, Design to API-600

Assigned Pipe Classes: HB, HBD, 662-2



Piping Material Specifications

Rev: **4**

Service Desc: <i>Production Vapour Stage 1 (**5)</i>				Temp: <i>473 (245)</i>		°F(°C)max	
Materials: <i>Carbon Steel</i>				Corrosion Allow: <i>0.125</i>		Code: <i>CSA Z662</i>	
Material P&T:	<i>0</i>	PSI @	<i>0</i>	°F min.		Based on: <i>Service</i>	Branch Conn Tbl: <i>Note 2</i>
	<i>(0)</i>	Kpa @	<i>(-18)</i>	°C min.			Inspection Class: <i>Note 1</i>
	<i>435</i>	PSI @	<i>473</i>	°F max.			
	<i>(3000)</i>	Kpa @	<i>(245)</i>	°C max.			
P.W.H.T. : <i>NO (**4)</i>				Welding Proc:			

Standard Specifications

Valve Specifications

Pipe

0.75	0.75	ASTM A106 Gr. B, Seamless, Sch.XXS
2	3	ASTM A106 Gr. B, Seamless, Sch 80
16	20	Line Pipe, Cat. 1 Gr 359, ERW, 7.9 mm wall thickness

Fittings

0.75	0.75	ASTM A105, Class 9000 SW
2	2	ASTM A105, Class 3000 SW
3	6	ASTM A234 Gr.WPB, Sch-80
16	20	Bends, Line Pipe, Cat. 1 Gr 359, ERW, 7.9 mm minimum wall thickness after bending
16	20	RedTee, Cat. 1 Gr 359, CSA Z245.11 (Wall thickness to match line pipe)
16	20	Reducer, Cat. 1 Gr 359, CSA Z245.11 (Wall thickness to match line pipe)
16	20	Transition Piece, Cat. 1 Gr 359, ERW, (One end to match Line pipe, other end Sch 40)

Flanges

0.75	2	ASTM A105 PN50 RF.SW
3	6	ASTM A105 PN50 RF.WN. (Bore to match pipe)
16	20	Cat. 1 Gr 359 PN50 per CSA Z245.12 (Bore to match pipe)

Compact Gate Valve

0.75	2	VGA0031#8-SW
0.75	2	VGA0031#8-SW/TH

Gate Valve

3	20	VGA0054#8	RF
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Special Material Specifications:

<u>Bolting</u>	ASTM A193 Gr. B7, c/w A194 Gr. 2H Nuts
<u>Gaskets</u>	Spiral Wound 316SS, Graphite filled, c/w CS Outer Ring, per ASME B16.20

** SPECIAL NOTES **

1. Inspection and Non-Destructive examination testing shall be carried out per CSA Z662-03 and also the following: (1) Visual examination shall be carried out on 100% of the weld joint and components. (2) Magnetic Particle or Liquid Penetrant shall be carried out on all branch connection welds.
2. Use sockolet for 3/4" NPS branch connections to headers. Use weldolets for 3" branch connections to headers.
3. For Vents, Drains and Instrument connections use ASME B31.3 Materials per Piping Materials Specification class HBD
4. PWHT required for thickness per ASME B31.3 or CSA Z662-03.
5. This class used for Stage 1, design to CSA Z662-03.



Piping Material Specifications

Valve Details

Compact Gate Valve

VGA0031#8-SW

Rev Date 04-Apr-08

Compact Gate Valve, Class CL 800 Socketweld, Forged Body to, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 8, Integral or Renewable seats, Regular Port, Design to API-602

Assigned Pipe Classes: CA, CAB, CAZ, CBA, CHY, CS, EA, EAB, EDB, HB, HBD, 662-2, 662-3

Compact Gate Valve

VGA0031#8-SW/TH

Rev Date 04-Apr-08

Compact Gate Valve, Class CL800 Socketweld/Threaded, Forged Carbon Steel, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 8, Integral or renewable hard faced seats, Regular Port, Design to API-602

Assigned Pipe Classes: CA, CAB, CAZ, CBA, CHY, CS, EA, EAB, EDB, HB, HBD, 662-2, 662-3

Gate Valve

VGA0054#8

Rev Date 17-Feb-08

Gate Valve, Class CL 300 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 8, Integral or Welded in Seats, Design to API-600

Assigned Pipe Classes: CA, CAB, CAH, CAZ, CBA, CS, EA, EAB, EDB, ES, 662-3



Piping Material Specifications

Rev: **4a**

Service Desc: <i>Sour Production Vapour Stage 2 - 6 (Above Ground only)</i>				Temp: <i>473 (245)</i>	°F(°C)max	
Materials: <i>Carbon Steel **4, 15</i>		Corrosion Allow: <i>0.125</i>		Code: <i>CSA Z662</i>		
Material P&T:	<i>0</i>	PSI @	<i>0</i>	°F min.	Based on: <i>Service</i>	Branch Conn Tbl: <i>Note 2</i> Inspection Class: <i>Note 1</i>
	<i>(0)</i>	Kpa @	<i>(-18)</i>	°C min.		
	<i>435</i>	PSI @	<i>473</i>	°F max.		
	<i>(3000)</i>	Kpa @	<i>(245)</i>	°C max.		
P.W.H.T. : <i>NO (**8)</i>				Welding Proc: <i>CSA Z662, Clause 7</i>		

Standard Specifications

<u>Pipe</u>		
0.75	2	ASTM A106 Gr. B, Seamless, Sch160
3	8	ASTM A106 Gr. B, Seamless, Sch 80 **13
10	12	Line Pipe, CSA Z245.1, Cat. II Gr 359, ERW, 6.4 mm wall thickness **14
16	20	Line Pipe, CSA Z245.1, Cat. II Gr 359, ERW, 7.9 mm wall thickness **11, 14
24	24	Line Pipe, CSA Z245.1, Cat. II Gr 359, ERW, 8.7 mm wall thickness **11, 14
30	30	Line Pipe, CSA Z245.1, Cat. II Gr 359, ERW, 10.3 mm wall thickness **11, 14
36	36	Line Pipe, CSA Z245.1, Cat. II Gr 359, ERW, 11.9 mm wall thickness **11, 14

Fittings

0.75	2	ASTM A105N, Class 6000, SW
3	8	ASTM A234 Gr. WPB, Sch-80
10	36	Elbows, Cat. II Gr 359, CSA Z245.11 (Wall thickness to match line pipe) **6
10	12	5D Bend, CSA Z245.11, Cat II GR 359, ERW, 6.4 mm minimum wall thickness after bending **10, 14
16	20	5D Bend, CSA Z245.11, Cat II GR 359, ERW, 7.9 mm minimum wall thickness after bending **10, 14
24	24	5D Bend, CSA Z245.11, Cat II GR 359, ERW, 8.7 mm minimum wall thickness after bending **10, 14
30	30	5D Bend, CSA Z245.11, Cat II GR 359, ERW, 10.3 mm minimum wall thickness after bending **10, 14
36	36	5D Bend, CSA Z245.11, Cat II GR 359, ERW, 11.9 mm minimum wall thickness after bending **10, 14
10	36	TEE, Cat II Gr. 359, CSA Z245.11 (Wall Thickness to match Line Pipe)
10	36	Reducer, Cat. II Gr 359, CSA Z245.11 (Wall thickness to match line pipe)
10	24	Transition Piece, Cat. II Gr 359, ERW, (One end to match Line pipe, other end Sch 40) **12

Flanges

0.75	2	ASTM A105N, Class 300 RF. SW
3	8	ASTM A105N, Class 300 RF.WN, (Bore to match Pipe)
10	36	Cat. II Gr 359 PN50 per CSA Z245.12 (Bore to match pipe)

Valve Specifications

<u>Compact Gate Valve</u>			
0.75	2	VGA0037#12-SW/TH-NI	
0.75	2	VGA0037#12-SW-NI	
<u>Gate Valve</u>			
3	24	VGA0054#12-NI	RF

Special Material Specifications:

Bolting	ASTM A193 Gr. B7M, c/w A194 Gr. 2HM Nuts
Gaskets	Spiral Wound 316SS, Graphite filled, c/w CS Outer Ring, per ASME B16.20

** SPECIAL NOTES **

1. Inspection and Non-Destructive examination testing shall be carried out per CSA Z662-07. (1) All welds meeting the definition per CSA Z662-

- 07 Clause 16.6.8, shall have 100% RT/UT for all butt weld joints and 100% MT/PT for all socket weld joints. For all welds excluded from the definition per Clause 16.6.8, there shall be a minimum 15% RT/UT for all butt weld joints and 15% MT/PT for all socket weld joints per CSA Z662-07, Clause 7.10.3 & 7.10.4. (2) Visual examination shall be carried out on 100% of the weld joint and components. (3) 100% MT/PT shall be carried out on all branch connection welds.
2. Use sockolet for 2" NPS and below for branch connections to headers. Use weldolet for 3" NPS and above branch connections to headers. Materials per Piping Material Specification Class EDE
3. For Vents, Drains and Instrument Connections use ASME B31.3 materials per Piping Material Specification Class EDE
4. All non CSA materials shall comply with the requirements of the sour service clause referenced in the applicable CSA Z245 standards: CSA Z245.1 Steel Pipe, CSA Z245.11 Steel Fittings, CSA Z245.12 Steel Flanges, CSA Z245.15 Steel Valves. Where no applicable CSA standard exists, the material requirements of NACE MR0175 / ISO 15156 (latest edition) apply. Note, all valves in this line class shall conform to NACE MR0175 / ISO 15156, latest edition. Sour service requirements shall be in accordance with Firebag Technical Note FB-PE6-TN008.
5. Shop and field hardness control by NACE SP0472 as referred in Suncor Firebag STD FB-L-5217. Weld hardness shall meet the requirements of CSA Z662-07 Clause 16.6.4.
6. Elbows are only to be used when approved by the Owners Engineer.
7. Positive Isolation required per drawings DD100-31-1, 2 and 3.
8. Stress Relieving (PWHT) required for thickness per CSA Z662-07, Clause 7.9.16.
9. Deleted
10. 5-D bends are preferred. Alternate pipe bend radius must be approved by owner's Engineer. Pipe Bends shall meet the requirements of CSA Z662-07 Clause 6.2.3 and CSA Z245.11-05. Bends shall comply with the sour service requirement of CSA Z245.11-05 Clause 13. Bend minimum wall thickness shall be no less than the specified thickness at any location within the bend. Bend maximum wall thickness and bend beveled end geometry shall comply with CSA Z662-07 Figure 7.2.
11. DSAW pipe is an acceptable substitute for ERW pipe.
12. Transition piece shall be in accordance with CSA Z662-07, Clause 16.6.3 c).
13. Pipe shall be used in Category I applications only, as defined in CSA Z662-07, Clause 5.2.2.
14. Wall thickness is based on a location factor of 0.75 per CSA Z662-07, Table 4.2. For applications where location factor is determined to be less than 0.75, wall thickness shall be approved by owner's Engineer.
15. Material selection shall be carefully reviewed for service and design conditions under NACE MR0175 / ISO 15156 latest revision. For material requirements not included in this pipe class, including valves, alternate pipe classes with more suitable materials shall be considered.



Piping Material Specifications

Valve Details

<u>Compact Gate Valve</u>	SUFFIX: -N1 Valve shall conform to NACE MR0175 latest revision
VGA0037#12-SW/TH-N1	Compact Gate Valve, Class CL 800 Socketweld/Threaded, Forged Body to, ASTM A105 N, Welded Bonnet, OS & Y, Solid Wedge, API Trim 12, Integral or Renewable seats, Regular Port, Design to API-602 Assigned Pipe Classes: 662-4
Rev Date 12-Mar-10	
<u>Compact Gate Valve</u>	SUFFIX: -N1 Valve shall conform to NACE MR0175 latest revision
VGA0037#12-SW-N1	Compact Gate Valve, Class CL 800 Socketweld/Threaded, Forged Body to, ASTM A105 N, Welded Bonnet, OS & Y, Solid Wedge, API Trim 12, Integral or Renewable seats, Regular Port, Design to API-602 Assigned Pipe Classes: 662-4
Rev Date 12-Mar-10	
<u>Gate Valve</u>	SUFFIX: -N1 Valve shall conform to NACE MR0175 latest revision
VGA0054#12-N1	Gate Valve, Class CL 300 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 12, Integral or Welded in Seats, Design to API-600 NOTES: For valves larger than 24" NPS flanges shall be ASME B16.47 Series A Assigned Pipe Classes: 662-4
Rev Date 12-Mar-10	



Piping Material Specifications

Rev: **4**

Service Desc: <i>High Pressure 80% Quality Steam Stage- 3 - 6</i>					Temp: <i>650 (343)</i>	°F(°C)max
Materials: <i>Carbon Steel Q & T</i>			Corrosion Allow: <i>0</i>		Code: <i>CSA Z662</i>	
Material P&T:	<i>0</i>	PSI @	<i>0</i>	°F min.	Based on: <i>Service</i>	Branch Conn Tbl: <i>Note 2</i>
	<i>(0)</i>	Kpa @	<i>(-18)</i>	°C min.		Inspection Class: <i>Note 1</i>
	<i>2132</i>	PSI @	<i>650</i>	°F max.		
	<i>(14,700)</i>	Kpa @	<i>(343)</i>	°C max.		
P.W.H.T. : <i>NO (**15)</i>				Welding Proc:		

Standard Specifications

Valve Specifications

Pipe

0.75	3	ASTM A106 Gr. B, Seamless, Sch. 160
4	6	ASTM A106 Gr. B, Seamless, Sch. 120
8	8	Line Pipe, CSA Z245.1, Cat. 1 Gr 448, Q & T, Seamless, 11.1 mm wall thickness **14
10	10	Line Pipe, CSA Z245.1, Cat. 1 Gr 448, Q & T, Seamless, 14.30 mm wall thickness **14
12	12	Line Pipe, CSA Z245.1, Cat. 1 Gr 448, Q & T, Seamless, 15.90 mm wall thickness **14
16	16	Line Pipe, CSA Z245.1, Cat. 1 Gr 448, Q & T, Seamless, 20.60 mm wall thickness **14
18	18	Line Pipe, CSA Z245.1, Cat. III Gr 550, DSAW, 11.9 mm wall thickness **6
20	20	Line Pipe, CSA Z245.1, Cat. III Gr 550, DSAW, 12.7 mm wall thickness **6
24	24	Line Pipe, CSA Z245.1, Cat. III Gr 550, DSAW, 15.9 mm wall thickness **6
30	30	Line Pipe, CSA Z245.1, Cat. III Gr 550, DSAW, 19.1 mm wall thickness **6
36	36	Line Pipe, CSA Z245.1, Cat. III Gr 550, DSAW, 23.8 mm wall thickness **6
42	42	Line Pipe, CSA Z245.1, Cat. III Gr 550, DSAW, 27.0 mm wall thickness **6

Fittings

0.75	2	ASTM A105, Class 6000 SW
3	3	Weldolet, ASTM A105, Sch 160
4	6	Weldolet, ASTM A105-N, SCH.120
8	8	3D BENDS, CSA Z245.11, Cat. I GR448, Q&T, 11.1mm minimum wall thickness after bending **10, 13
10	10	3D BENDS, CSA Z245.11, Cat. I GR448, Q&T, 14.3mm minimum wall thickness after bending **10, 13
12	12	3D BENDS, CSA Z245.11, Cat. I GR448, Q&T, 15.9mm minimum wall thickness after bending **10, 13
16	16	3D BENDS, CSA Z245.11, Cat I GR448, Q&T, Smls, 20.66 mm min wall thickness after bending, **10, 11
18	18	3D BENDS, CSA Z245.11, Cat II GR550, DSAW, 11.9 mm minimum wall thickness after bending **10, 13
20	20	3D BENDS, CSA Z245.11, Cat II GR550, DSAW, 12.7 mm minimum wall thickness after bending **10, 13
24	24	3D BENDS, CSA Z245.11, Cat II GR550, DSAW, 15.9 mm minimum wall thickness after bending **10, 13
30	30	3D BENDS, CSA Z245.11, Cat II GR550, DSAW, 19.1 mm minimum wall thickness after bending **10, 13

Compact Gate Valve

0.75	2	VGA1001#5-SW	**5
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Gate Valve

8	24	VGA1077#5-120	BW **12
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Globe Valve, Y Pattern

0.75	2	VGL1174#5-SW
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36	36	3D BENDS, CSA Z245.11, Cat II GR550, DSAW, 23.8 mm minimum wall thickness after bending **10, 13
42	42	3D BENDS, CSA Z245.11, Cat II GR550, DSAW, 27.0 mm minimum wall thickness after bending **10, 11
8	16	Tee, CSA Z245.11, Cat I GR 448, Q&T, Seamless, (Schedule to match pipe)
18	42	Tee, CSA Z245.11, Cat II GR 550, DSAW, (Schedule to match pipe) **11
8	16	Cap, CSA Z245.11, Cat I GR448, Q&T (Schedule to match pipe)
18	42	Cap, CSA Z245.11, Cat. II GR550 (Schedule to match pipe) **11
8	16	Transition Piece, Cat. I Gr 448, Q & T, Seamless, (One end to match Q & T pipe, other end Sch 120)
18	42	Transition Piece, Cat. II Gr 550, DSAW, (One end to match GR 550 pipe, other end valve body) **11
<u>Flanges</u>		
2	2	ASTM A105N, Class 1500 RF. SW
3	3	ASTM A105N, Class 1500 RF WN, Sch. 160
4	6	ASTM A105N, Class 1500 RF. WN, Sch 120

Special Material Specifications:

<u>Bolting</u>	ASTM A193 Gr. B7, c/w A194 Gr. 2H Nuts
<u>Gaskets</u>	Spiral Wound 316SS, Graphite filled, c/w CS Outer Ring, per ASME B16.20 **7

**** SPECIAL NOTES ****

1. Inspection and Non-Destructive Testing shall be as follows: (1) Visual Examination shall be carried out on 100% of the weld joints and components. (2) 100% Radiography is required on all girth welds. (3) Magnetic Particle or Liquid Penetrant Examination shall be carried out on all welds not Radiographed. (4) All attachment welds shall be examined by Magnetic Particle or Dye Penetrant methods.
2. Use socklets for 2" and below, use weldlets for 3" NPS branch connections to main steam line.
3. Attention must be paid to avoiding the possibility of "Over Tempering" the Quenched & Tempered pipe.
4. Pipe shall be manufactured and tested in accordance with the "Scope of Supply - Section 1" attached to the purchase order.
5. Use for Vents and Drains per drawings DD100-L31-1, 2, & 3
6. Pipe wall thickness calculated based on CSA Z662-07 Annex I.
7. Inner rings as required by ASME B16.20.
8. Positive Isolation required per drawings DD100-L-31-1, 2 and 3.
9. For Vents, Drains & Instrument connections use ASME B31.3 materials per Class RSA.
10. Bend maximum wall thickness and bend bevelled ends geometry shall comply with CSA Z662-07, Figure 7.2
11. Bends designated to meet all applicable requirements of CSA Z662-07 Annex I.
12. Valve c/w bevelled ends transition pieces matching pipe grade, category and wall thickness. Valve body and components to meet notch toughness requirements specified by CSA Z662-07 Par. 5.2.3.2
13. Bends designated to meet CSA Z662-07 Par. 14.2.3
14. Pipe wall thickness calculated based on CSA Z662-07 Section 14
15. PWHT required for thickness per ASME B31.3 or CSA Z662-03



Piping Material Specifications

Valve Details

Compact Gate Valve

VGA1001#5-SW

Rev Date 17-Feb-08

Compact Gate Valve, Class CL 1500 Socketweld, Forged Body to, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 5, Integral or Renewable seats, Regular Port, Design to API-602

Assigned Pipe Classes: HS, RSA, RSB, 662-1, 662-5

Gate Valve

VGA1077#5-120

Rev Date 22-Apr-08

Gate Valve, Class CL 1500 Butt weld Ends to match Pipe, Cast Body to, ASTM A216 Gr WCB, Pressure Sealed Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 5, Integral or Welded in Seats, Design to API-600

NOTES: Valve body shall have two bosses to accommodate by-pass piping and bonnet relief to have one boss. By-pass line size shall be in accordance with ASME B16.34. BW end wall schedule to be specified and suffix added per 6.1.4. External valved bonnet vent piping and/or valved integral by-pass is required complete with Y-Pattern Globe Valves, Class 1500 SW, Tag No. VGL1174#5-SW (NPS 1/2" for NPS 3" thru 4", NPS 3/4" for 6" thru 8", and NPS 1" for NPS 10" and larger) By-pass / bonnet vent piping and valve arrangement shall be in accordance with details shown in Suncor Technical Standard 0203 Appendix B.- "By-pass and bonnet relief configurations for valves in HP Steam and Boiler Feed Water." The piping and valve arrangement for each valve shall be treated as a Specialty Piping Item with data sheet also providing details of the configuration for each in-line valve. This data sheet shall be the responsibility of the involved EPC. The valve vendor shall be responsible for the hook-up and of the auxiliary piping to the in-line valve prior to shipment.

Assigned Pipe Classes: RSA, 662-5

Globe Valve, Y Pattern

VGL1174#5-SW

Rev Date 22-Feb-08

Globe Valve, Y Pattern, Class CL 1500 Socketweld, Forged Body to, ASTM A105 N, bonnetless, API Trim 5, Integral or Renewable seats, Hard Faced Seat & Disc, Design to API-602

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: HS, RSA, RSB, 662-1, 662-5



Piping Material Specifications

Rev: **4a**

Service Desc: Sour Production Liquids - STAGE 3 (**10, 11, 12) (Above Ground only)					Temp: 473 (245)		°F(°C)max	
Materials: Carbon Steel **11			Corrosion Allow: 0.125			Code: CSA Z662-03		
Material P&T:	0	PSI @	0	°F min.	Based on: Service	Branch Conn Tbl: Note 2		
	(0)	Kpa @	(-18)	°C min.		Inspection Class: Note 1		
	870	PSI @	473	°F max.				
	(6000)	Kpa @	(245)	°C max.				
P.W.H.T. : NO (**9)					Welding Proc: CSA Z662-03, Clause 7			

Standard Specifications

Valve Specifications

Pipe

0.75	2	ASTM A106 Gr. B, Seamless, Sch. 160
3	8	ASTM A106 Gr. B, Seamless, Sch 80
10	10	Line Pipe, CSA Z245.1, Cat. 1 Gr 359, ERW, 7.8 mm wall thickness **13
12	12	Line Pipe, CSA Z245.1, Cat. 1 Gr 359, ERW, 9.5 mm wall thickness **13
16	16	Line Pipe, CSA Z245.1, Cat. 1 Gr 359, ERW, 10.3 mm wall thickness **13
18	18	Line Pipe, CSA Z245.1, Cat. 1 Gr 359, ERW, 11.1 mm wall thickness **8, 13
20	20	Line Pipe, CSA Z245.1, Cat. 1 Gr 359, ERW, 11.9 mm wall thickness **8, 13
24	24	Line Pipe, CSA Z245.1, Cat. 1 Gr 359, ERW, 14.3 mm wall thickness **8, 13
30	30	Line Pipe, CSA Z245.1, Cat. 1 Gr 359, ERW, 15.9 mm wall thickness **8, 13
36	36	Line Pipe, CSA Z245.1, Cat. 1 Gr 359, ERW, 19.1 mm wall thickness **8, 13
42	42	Line Pipe, CSA Z245.1, Cat. 1 Gr 359, ERW, 20.6 mm wall thickness **8, 13

Fittings

0.75	2	ASTM A105N, Class 6000 SW
3	8	ASTM A234 Gr.WPB, Sch-80
10	24	Elbows, Cat. 1 Gr 359, ERW, CSA Z245.11 (Wall thickness to match line pipe) **4
10	10	3D Bend, CSA Z245.11, Cat I GR 359, ERW, 7.8 mm minimum wall thickness after bending **6, 13
12	12	3D Bend, CSA Z245.11, Cat I GR 359, ERW, 9.5 mm minimum wall thickness after bending **6, 13
16	16	3D Bend, CSA Z245.11, Cat I GR 359, ERW, 10.3 mm minimum wall thickness after bending **6, 13
18	18	3D Bend, CSA Z245.11, Cat I GR 359, ERW, 11.1 mm minimum wall thickness after bending **6, 13
20	20	3D Bend, CSA Z245.11, Cat I GR 359, ERW, 11.9 mm minimum wall thickness after bending **6, 13
24	24	3D Bend, CSA Z245.11, Cat I GR 359, ERW, 14.3 mm minimum wall thickness after bending **6, 13
30	30	3D Bend, CSA Z245.11, Cat I GR 359, ERW, 15.9 mm minimum wall thickness after bending **6, 13
36	36	3D Bend, CSA Z245.11, Cat I GR 359, ERW, 19.1 mm minimum wall thickness after bending **6, 13
42	42	3D Bend, CSA Z245.11, Cat I GR 359, ERW, 20.6 mm minimum wall thickness after bending **6, 13

Compact Gate Valve

0.75	2	VGA0038#12-SW/TH- NI
0.75	2	VGA0038#12-SW- NI

Gate Valve

3	24	VGA0605#12- NI-H
30	30	VGA0610#12- NI-H

10	36	TEE, Cat I Gr. 359, ERW, CSA Z245.11 (Wall Thickness to match Line Pipe)
10	36	Reducer, Cat. 1 Gr 359, ERW, CSA Z245.11 (Wall thickness to match line pipe)
10	42	CAP, CSA Z245.11 Cat I GR 359, (Schedule to match line pipe.)
10	24	Transition Piece, Cat. 1 Gr 359, ERW, (One end to match Line pipe, other end Sch 80)
Flanges		
0.75	2	ASTM A105N, Class 600 RF. SW
3	8	ASTM A105N, Class 600 RF.WN, (Bore to match Pipe)
10	36	Cat I, GR 359 PN 100 per CSA Z245.12 (Bore to match Pipe)

Special Material Specifications:

Bolting	ASTM A193 Gr. B7M, c/w A194 Gr. 2HM Nuts
Gaskets	Spiral Wound 316SS, Graphite filled, c/w CS Outer Ring, per ASME B16.20 **7

**** SPECIAL NOTES ****

1. Inspection and Non-Destructive examination testing shall be carried out per CSA Z662-03 with minimum: (1) 15% RT/UT for all butt weld joints and 15% MT/PT for all socket weld joints per CSA Z662-03, Clause 7.10.2 & 7.10.3. (2) Visual examination shall be carried out on 100% of the weld joint and components. (3) 100% MT/PT shall be carried out on all branch connection welds.
2. Use sockolets for 2" and below. Use weldolets for 3" NPS branch connections to main lines.
3. For Vents, Drains and Instrument Connections use ASME B31.3 materials per Class HBE.
4. Elbows are only to be used when approved by the Owners engineer.
5. Positive Isolation required drawings DD100-L-31-1, 2 and 3..
6. 3-D bends are preferred. Alternate pipe bend radius must be approved by owner's Engineer. Pipe Bends shall meet the requirements of CSA Z662-03 Clause 6.2.3 and CSA Z245.11. Bends shall comply with the sour service requirement of CSA Z245.11 Clause 13. Bend minimum wall thickness shall be no less than the specified thickness at any location within the bend. Bend maximum wall thickness and bend beveled end geometry shall comply with CSA Z662 Figure 7.2.
7. Inner rings as required by ASME B16.20.
8. DSAW Pipe is an acceptable substitute for ERW Pipe.
9. Stress Relieving (PWHT) required for thickness per CSA Z662-03, Clause 7.9.16 (Stage 3).
10. For Firebag Stage 3 only using CSA Z662-03 version.
11. All non CSA materials shall comply with the requirements of the sour service clause referenced in the applicable CSA Z245 standards: CSA Z245.1 Steel Pipe, CSA Z245.11 Steel Fittings, CSA Z245.12 Steel Flanges, CSA Z245.15 Steel Valves. Where no applicable CSA standard exists, the material requirements of NACE MR0175 / ISO 15156 (latest edition) apply (Stage 3). Note, all valves in this line class shall conform to NACE MR0175, latest edition.
12. All non sour service CSA materials shall meet the requirements of the EUB reference tool for sour service conversion of existing carbon steel pipelines. (Stage 3)
13. Wall thickness is based on a location factor of 0.75 per CSA Z662-03, Table 4.2. For applications where location factor is determined to be less than 0.75, wall thickness shall be approved by owner's Engineer.



Piping Material Specifications

Valve Details

<p><u>Compact Gate Valve</u></p> <p>VGA0038#12-SW/TH-N1</p> <p>Rev Date 12-Mar-10</p>	<p>SUFFIX: -N1 Valve shall conform to NACE MR0175 latest revision</p> <p>Compact Gate Valve, Class CL 800 Socketweld/Threaded, Forged Body to, ASTM A105 N, Welded Bonnet, OS & Y, Solid Wedge, API Trim 12, Integral or renewable, Reduced Port, Design to API-602</p> <p>Assigned Pipe Classes: 662-6, 662-7</p>
<p><u>Compact Gate Valve</u></p> <p>VGA0038#12-SW-N1</p> <p>Rev Date 12-Mar-10</p>	<p>SUFFIX: -N1 Valve shall conform to NACE MR0175 latest revision</p> <p>Compact Gate Valve, Class CL 800 Socketweld, Forged Body to, ASTM A105 N, Welded Bonnet, OS & Y, Solid Wedge, API Trim 12, Integral or Renewable seats, Regular Port, Design to API-602</p> <p>NOTES: Valve to be suitable for Hydrogen service</p> <p>Assigned Pipe Classes: 662-6, 662-7</p>
<p><u>Gate Valve</u></p> <p>VGA0605#12-N1-H</p> <p>Rev Date 12-Mar-10</p>	<p>SUFFIX: -N1-H Valve shall conform to NACE MR0175 latest revision, suitable for Hydrogen service with Flange facing of 125-150 microinch</p> <p>Gate Valve, Class CL 600 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 12, Welded in or Renewable Seats, Design to API-600</p> <p>Assigned Pipe Classes: 662-6, 662-7</p>
<p><u>Gate Valve</u></p> <p>VGA0610#12-N1-H</p> <p>Rev Date 12-Mar-10</p>	<p>SUFFIX: -N1-H Valve shall conform to NACE MR0175 latest revision, suitable for Hydrogen service with Flange facing of 125-150 microinch</p> <p>Gate Valve, Class CL 600 RF to ASME B16.47-A, Cast Body to, ASTM A216 Gr WCB, Pressure Sealed Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 12 design to API-600, Integral or Welded in or Renewable Seats, Regular Port</p> <p>NOTES: Pressure/Temperature rating to ASME B16.34</p> <p>Assigned Pipe Classes: 662-6, 662-7</p>



Piping Material Specifications

Rev: **4a**

Service Desc: Sour Production Liquids - STAGE 4, 5 & 6 (Above Ground only)				Temp: 473 (245) °F(°C)max		
Materials: Carbon Steel **8, 14		Corrosion Allow: 0.125		Code: CSA Z662-07		
Material P&T:	0	PSI @	0	°F min.	Based on: Service	Branch Conn Tbl: Note 2
	(0)	Kpa @	(-18)	°C min.		Inspection Class: Note 1
	870	PSI @	473	°F max.		
	(6000)	Kpa @	(245)	°C max.		
P.W.H.T. : NO (*10)				Welding Proc: CSA Z662-07, Clause 7		

Standard Specifications

Valve Specifications

Pipe

0.75	2	ASTM A106 Gr. B, Seamless, Sch. 160
3	8	ASTM A106 Gr. B, Seamless, Sch. XS.
10	10	Line Pipe, CSA Z245.1, Cat. 1 Gr 359, ERW, 7.8 mm wall thickness **13
12	12	Line Pipe, CSA Z245.1, Cat. 1 Gr 359, ERW, 9.5 mm wall thickness **13
16	16	Line Pipe, CSA Z245.1, Cat. 1 Gr 359, ERW, 10.3mm wall thickness **13
18	18	Line Pipe, CSA Z245.1, Cat. 1 Gr 359, ERW, 11.1 mm wall thickness **11, 13
20	20	Line Pipe, CSA Z245.1, Cat. 1 Gr 359, ERW, 11.9 mm wall thickness **11, 13
24	24	Line Pipe, CSA Z245.1, Cat. 1 Gr 359, ERW, 14.3 mm wall thickness **11, 13
30	30	Line Pipe, CSA Z245.1, Cat. 1 Gr 359, ERW, 15.9 mm wall thickness **11, 13
36	36	Line Pipe, CSA Z245.1, Cat. 1 Gr 359, ERW, 19.1 mm wall thickness **11, 13
42	42	Line Pipe, CSA Z245.1, Cat. 1 Gr 359, ERW, 20.6 mm wall thickness **11, 13

Fittings

0.75	2	ASTM A105N, Class 6000 SW
3	8	ASTM A234 WPB, XS
10	24	Elbows, Cat. 1 Gr 359, CSA Z245.11 (Wall thickness to match line pipe) **4,6
10	10	3D Bend, CSA Z245.11, Cat I GR 359, 7.8 mm minimum wall thickness after bending **6, 13
12	12	3D Bend, CSA Z245.11, Cat I GR 359, 9.5 mm minimum wall thickness after bending **6, 13
16	16	3D Bend, CSA Z245.11, Cat I GR 359, 10.3 mm minimum wall thickness after bending **6, 13
18	18	3D Bend, CSA Z245.11, Cat I GR 359, 11.1 mm minimum wall thickness after bending **6, 13
20	20	3D Bend, CSA Z245.11, Cat I GR 359, 11.9 mm minimum wall thickness after bending **6, 13
24	24	3D Bend, CSA Z245.11, Cat I GR 359, 14.3 mm minimum wall thickness after bending **6, 13
30	30	3D Bend, CSA Z245.11, Cat I GR 359, 15.9 mm minimum wall thickness after bending **6, 13
36	36	3D Bend, CSA Z245.11, Cat I GR 359, 19.1 mm minimum wall thickness after bending **6, 13
42	42	3D Bend, CSA Z245.11, Cat I GR 359, 20.6 mm minimum wall thickness after bending **6, 13

Compact Gate Valve

0.75	2	VGA0038#12-SW/TH- NI
0.75	2	VGA0038#12-SW- NI

Gate Valve

3	24	VGA0605#12- NI -H
30	42	VGA0610#12- NI -H

10	42	TEE, Cat I Gr. 359, CSA Z245.11 (Wall Thickness to match Line Pipe)
10	42	Reducer, Cat. 1 Gr 359, CSA Z245.11 (Wall thickness to match line pipe)
10	42	CAP, CSA Z245.11 Cat I GR 359, (Schedule to match line pipe.)
10	24	Transition Piece, Cat. 1 Gr 359, ERW, (One end to match Line pipe, other end Sch 80) **12
Flanges		
0.75	2	ASTM A105N, Class 600 RF. SW
3	8	ASTM A105N, Class 600 RF.WN, (Bore to match Pipe)
10	42	Cat I, GR 359 PN 100 per CSA Z245.12 (Bore to match Pipe)

Special Material Specifications:

Bolting	ASTM A193 Gr. B7M, c/w A194 Gr. 2HM Nuts
Gaskets	Spiral Wound 316SS, Graphite filled, c/w CS Outer Ring, per ASME B16.20 **7

**** SPECIAL NOTES ****

1. Inspection and Non-Destructive examination testing shall be carried out per CSA Z662-07. (1) All welds meeting the definition per CSA Z662-07 Clause 16.6.8, shall have 100% RT/UT for all butt weld joints and 100% MT/PT for all socket weld joints. For all welds excluded from the definition per Clause 16.6.8, there shall be a minimum 15% RT/UT for all butt weld joints and 15% MT/PT for all socket weld joints per CSA Z662-07, Clause 7.10.3 & 7.10.4. (2) Visual examination shall be carried out on 100% of the weld joint and components. (3) 100% MT/PT shall be carried out on all branch connection welds.
2. Use sockolets for 2" and weldolets for 3" NPS branch connetions to main lines. Materials per Piping Material Specification Class HBE.
3. For Vents, Drains and Instrument Connections use ASME B31.3 materials per Class HBE.
4. Elbows are only to be used when approved by the Owners engineer.
5. Positive Isolation required per drawings DD100-L-31-1, 2 and 3..
6. 3-D bends are preferred. Alternate pipe bend radius must be approved by owner's Engineer. Pipe Bends shall meet the requirements of CSA Z662-07 Clause 6.2.3 and CSA Z245.11-05. Bends shall comply with the sour service requirement of CSA Z245.11-05 Clause 13. Bend minimum wall thickness shall be no less than the specified thickness at any location within the bend. Bend maximum wall thickness and bend beveled end geometry shall comply with CSA Z662-07 Figure 7.2.
7. Inner rings as required by ASME B16.20.
8. All non CSA materials shall comply with the requirements of the sour service clause referenced in the applicable CSA Z245 standards: CSA Z245.1 Steel Pipe, CSA Z245.11 Steel Fittings, CSA Z245.12 Steel Flanges, CSA Z245.15 Steel Valves. Where no applicable CSA standard exists, the material requirements of NACE MR0175 / ISO 15156 (latest edition) apply (Stage 4, 5 & 6). Note, all valves in this line class shall conform to NACE MR0175 / ISO 15156, latest edition. Sour service requirements shall be in accordance with Firebag Technical Note FB-PE6-TN008.
9. Shop and field hardness control by NACE SP0472 as referred in Suncor Firebag STD FB-L-5217. Weld hardness shall meet the requirements of CSA Z662-07 Clause 16.6.4.
10. Stress Relieving (PWHT) required for thickness per CSA Z662-07, Clause 7.9.16.
11. DSAW pipe is an acceptable substitute for ERW pipe.
12. Transition piece shall be in accordance with CSA Z662-07, Clause 16.6.3 c).
13. Wall thickness is based on a location factor of 0.75 per CSA Z662-07, Table 4.2. For applications where location factor is determined to be less than 0.75, wall thickness shall be approved by owner's Engineer.
14. Material selection shall be carefully reviewed for service and design conditions under NACE MR0175 / ISO 15156 latest revision. For material requirements not included in this pipe class, including valves, alternate pipe classes with more suitable materials shall be considered.



Piping Material Specifications

Valve Details

<p><u>Compact Gate Valve</u></p> <p>VGA0038#12-SW/TH-N1</p> <p>Rev Date 12-Mar-10</p>	<p>SUFFIX: -N1 Valve shall conform to NACE MR0175 latest revision</p> <p>Compact Gate Valve, Class CL 800 Socketweld/Threaded, Forged Body to, ASTM A105 N, Welded Bonnet, OS & Y, Solid Wedge, API Trim 12, Integral or renewable, Reduced Port, Design to API-602</p> <p>Assigned Pipe Classes: 662-6, 662-7</p>
<p><u>Compact Gate Valve</u></p> <p>VGA0038#12-SW-N1</p> <p>Rev Date 12-Mar-10</p>	<p>SUFFIX: -N1 Valve shall conform to NACE MR0175 latest revision</p> <p>Compact Gate Valve, Class CL 800 Socketweld, Forged Body to, ASTM A105 N, Welded Bonnet, OS & Y, Solid Wedge, API Trim 12, Integral or Renewable seats, Regular Port, Design to API-602</p> <p>NOTES: Valve to be suitable for Hydrogen service</p> <p>Assigned Pipe Classes: 662-6, 662-7</p>
<p><u>Gate Valve</u></p> <p>VGA0605#12-N1-H</p> <p>Rev Date 12-Mar-10</p>	<p>SUFFIX: -N1-H Valve shall conform to NACE MR0175 latest revision, suitable for Hydrogen service with Flange facing of 125-150 microinch</p> <p>Gate Valve, Class CL 600 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 12, Welded in or Renewable Seats, Design to API-600</p> <p>Assigned Pipe Classes: 662-6, 662-7</p>
<p><u>Gate Valve</u></p> <p>VGA0610#12-N1-H</p> <p>Rev Date 12-Mar-10</p>	<p>SUFFIX: -N1-H Valve shall conform to NACE MR0175 latest revision, suitable for Hydrogen service with Flange facing of 125-150 microinch</p> <p>Gate Valve, Class CL 600 RF to ASME B16.47-A, Cast Body to, ASTM A216 Gr WCB, Pressure Sealed Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 12 design to API-600, Integral or Welded in or Renewable Seats, Regular Port</p> <p>NOTES: Pressure/Temperature rating to ASME B16.34</p> <p>Assigned Pipe Classes: 662-6, 662-7</p>



Piping Material Specifications

Rev: **4**

Service Desc: <i>Potable Water - Industrial (Above Ground only)</i>					Temp: <i>100 (38)</i> °F(°C)max	
Materials: <i>CS w/internal Epoxy coating/galvanized</i>			Corrosion Allow: <i>0</i>		Code: <i>ASME B31.3</i>	
Material P&T:	<i>150</i>	PSI @	<i>50</i>	°F min.	Based on: <i>Cast Iron valves & lining</i>	Branch Conn Tbl: <i>6</i>
	<i>(1034)</i>	Kpa @	<i>(10)</i>	°C min.		Inspection Class: <i>IV</i>
	<i>150</i>	PSI @	<i>100</i>	°F max.		
	<i>(1034)</i>	Kpa @	<i>(38)</i>	°C max.		
P.W.H.T. : <i>NO (**8)</i>				Welding Proc: <i>Refer to Suncor Firebag STD FB-L-5217</i>		

Standard Specifications			Valve Specifications			
<u>Pipe</u>			<u>Ball Valve</u>			
3	8	ASTM A106 Gr. B, Seamless, STD. Wt. **I	0.75	2	VBA0603-TH	
0.75	2	ASTM A106 Gr. B, Seamless, Sch 80 **I	<u>Check Valve</u>			
<u>Fittings</u>			3	8	VCH0211	FF
0.75	2	ASTM A105N, Class 3000 TH. **I	0.75	2	VCH0219#10-TH	
3	8	ASTM A234 WPB, STD. Wt. **I	<u>Compact Gate Valve</u>			
<u>Flanges</u>			0.75	2	VGA0026#10-TH	**6, 7
0.75	2	ASTM A105N, Class 150 FF.TH. **I	<u>Gate Valve</u>			
3	8	ASTM A105N, Class 150 FF.WN., STD.Wt. **I	2	8	VGA0011	FF
			<u>Globe Valve</u>			
			0.75	2	VGL0126#10-TH	
			<u>Plug Valve</u>			
			3	8	VPL0311	FF

Special Material Specifications:

<u>Thermowells</u>	NPS 2, Class 300 FF, Flanged, A105N, see Standard Drawing DD100-L-14-1, 2.
<u>Bolting</u>	ASTM A193 Gr. B7, c/w A194 Gr. 2H Nuts
<u>Gaskets</u>	Class 150 Full Face, .0625 " thick, Non-Asbestos, per ASME B16.21

**** SPECIAL NOTES ****

1. All carbon steel components shall be internally epoxy coated per AWWA C210 with 10 mils DFT. 3/4" to 2" piping may be galvanized when epoxy coating is impractical.
2. All piping in non-heated areas shall be electrically heat traced and insulated.
3. Internal coating shall be applied after welding.
4. Deleted.
5. Butt-weld epoxy coated piping shall be joined by flange connection. Ensure spool lengths do not exceed 20 ft. face to face.
6. Vents and Drains to DD100-L-12-1.
7. Pressure Instrument Connections to DD100-L-11-1.
8. PWHT required for thickness per ASME B31.3.



Piping Material Specifications

Valve Details

Ball Valve

VBA0603-TH

Rev Date 31-Mar-06

Ball Valve, Class CL600 Threaded, Forged 316 SS, ASTM A182 F316, Blow-out proof stem, 316 SS Ball and Stem, Renewable Seats, PTFE Seats, Regular Port, Design to API-608

NOTES: Firesafe per API-607; Maximum temperature 350 F

Assigned Pipe Classes: ADA

Check Valve

VCH0211

Rev Date 19-Jun-06

Check Valve, Class 125 FF, Cast Iron, ASTM A126 Class B, Bolted Cover, Swing Type, horizontal or vertical, Bronze Trim, Renewable Seats, AWWA C508

Assigned Pipe Classes: ADA

Check Valve

VCH0219#10-TH

Rev Date 22-Feb-08

Check Valve, Class CL800 Threaded, Forged Body to, ASTM A182 F316/316L Dual Cert., Bolted Cover, Horizontal Ball Type, API Trim 10, Integral or Renewable seat, Full Port, Design to API-602

NOTES: Pressure/Temperature rating to ASME B16.34.

Assigned Pipe Classes: ADA

Gate Valve

VGA0011

Rev Date 19-Mar-08

Gate Valve, Class 125 FF, Cast Iron, ASTM A126 Class B, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, Bronze Trim, Integral, Welded in or Renewable Seats, MSS SP-70

Assigned Pipe Classes: ADA, APB, APD

Compact Gate Valve

VGA0026#10-TH

Rev Date 17-Feb-08

Compact Gate Valve, Class CL 800 Threaded, Forged Body to, ASTM A182 F316/316L Dual Cert., Bolted Bonnet, OS & Y, Solid Wedge, API Trim 10, Integral or Renewable seats, Regular Port, Design to API-602

Assigned Pipe Classes: ADA, AEX, EDX

Globe Valve

VGL0126#10-TH

Rev Date 17-Feb-08

Globe Valve, Class CL 800 Threaded, Forged Body to, ASTM A182 F316L, Bolted Bonnet, OS & Y, API Trim 10, Integral or Renewable seats, Design to API-602

Assigned Pipe Classes: ADA

Plug Valve

VPL0311

Rev Date 18-Sep-07

Plug Valve, Class 125 FF, Cast Iron, ASTM A126 Class B, Bolted Bonnet, Tapered Plug

NOTES: Matryx Model 60 LP, short pattern body.

Assigned Pipe Classes: ADA, APD



Piping Material Specifications

Rev: **4**

Service Desc: Deluge Water			Temp: 200 (93) °F(°C)max		
Materials: Carbon Steel (Galvanized)			Corrosion Allow: 0		
Code: ASME B31.3					
Material P&T: 0	PSI @ -20	°F min.	Based on: Service	Branch Conn Tbl: 1	
(0)	Kpa @ (-29)	°C min.		Inspection Class: IV	
160	PSI @ 200	°F max.			
(1103)	Kpa @ (93)	°C max.			
P.W.H.T. : NO (**5)			Welding Proc: Refer to Suncor Firebag STD FB-L-5217		

Standard Specifications			Valve Specifications		
<u>Pipe</u>			<u>Ball Valve</u>		
0.75	2	ASTM A106, Gr. B, Sch. 80, Galvanized	3	16	VBA0151 RF
3	16	ASTM A106 Gr. B, Seamless, STD. Wt. **1,2	0.75	2	VBA0602-TH
<u>Fittings</u>			<u>Check Valve</u>		
0.75	2	ASTM A105N, Class 3000, TH. Galvanized	0.75	2	VCH0231#8-TH
3	16	ASTM A234 WPB, STD. Wt. **2	3	16	VCH0241#8 RF
<u>Flanges</u>			<u>Compact Gate Valve</u>		
0.75	2	ASTM A105N, Class 150 RF.TH., Galvanized	0.75	2	VGA0031#8-TH **3, 4
3	16	ASTM A105N, Class 150 RF.WN, STD.Wt. **2	<u>Gate Valve</u>		
			3	16	VGA0041#8 RF
			<u>Globe Valve</u>		
			0.75	2	VGL0131#8-TH
			3	8	VGL0141#8 RF

Special Material Specifications:

<u>Bolting</u>	ASTM A193 Gr. B7, c/w A194 Gr. 2H Nuts
<u>Gaskets</u>	Class 150 Flat Ring, .0625 " thick, Non-Asbestos, per ASME B16.21

** SPECIAL NOTES **

- Hot dipped butt-weld piping shall be joined by flange connections.
- Butt-weld piping systems shall be hot dipped galvanized after welding.
- Vents and Drains per DD100-L-12-1.
- Pressure Instrument Connections per DD100-L-11-1.
- PWHT required for thickness per ASME B31.3.



Piping Material Specifications

Valve Details

Ball Valve

VBA0151

Rev Date 02-Jan-08

Ball Valve, Class CL150 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Split body, Blow-out proof stem, 316 SS Ball and Stem, PTFE Seats and Body Gasket, Regular Port, Design to API-608 and/or ASME B16.34

NOTES: Valve shall be fire tested to API-607; Maximum temperature 350 F.

Assigned Pipe Classes: ADX, AEA, CA, CAB, CAF, CAZ, CBA, CSA

Ball Valve

VBA0602-TH

Rev Date 30-Oct-06

Ball Valve, Class CL 600 Threaded, Forged Body to, ASTM A105 N, Blow-out proof stem, 316 SS Ball and Stem, RTFE seats, Regular Port, Design to API-608

NOTES: Firesafe per API-607; Maximum temperature 350 F

Assigned Pipe Classes: ADX, CA, CAF, CAZ, EA

Check Valve

VCH0231#8-TH

Rev Date 22-Feb-08

Check Valve, Class CL 800 Threaded, Forged Body to, ASTM A105 N, Bolted Cover, Piston/Lift Type with Spring, API Trim 8, Integral or renewable, Full Port, Design to API-602

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: ADX, CAH

Check Valve

VCH0241#8

Rev Date 17-Feb-08

Check Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Cover, Swing Type, API Trim 8 design to API 600, Integral or Welded Hard Faced Seat

NOTES: Pressure/Temperature Rating to ASME B16.34

Assigned Pipe Classes: ADX, CA, CAB, CAH, CAZ, CBA, CHY, CLF, CS

Compact Gate Valve

VGA0031#8-TH

Rev Date 17-Feb-08

Compact Gate Valve, Class CL 800 Threaded, Forged Body to, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 8, Integral or Renewable seats, Regular Port, Design to API-602

Assigned Pipe Classes: ADX, CAH

Gate Valve

VGA0041#8

Rev Date 17-Feb-08

Gate Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 8, Integral or Welded in Seats, Design to API-600

Assigned Pipe Classes: ADX, CA, CAB, CAH, CAZ, CBA, CHY, CS

Globe Valve

VGL0131#8-TH

Rev Date 19-Jun-06

Globe Valve, Class CL 800 Threaded, Forged Body to, ASTM A105 N, Bolted Bonnet, OS & Y, Integral or renewable, Hard Faced Seat to API Trim 8, Design to API-602

Assigned Pipe Classes: ADX, CAH

Globe Valve

VGL0141#8

Rev Date 22-Feb-08

Globe Valve, Class CL 150 RF to ASME B16.5, Cast Carbon Steel, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, Plug Type Disc, API Trim 8 design to API 600, Integral or Welded in Seats

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: ADX, CA, CAB, CAH, CAZ, CBA, CS



Piping Material Specifications

Rev: **4**

Service Desc: <i>Separator Feed and Discharge</i>				Temp: <i>180 (82)</i> °F(°C)max		
Materials: <i>Carbon Steel</i>		Corrosion Allow: <i>0.25</i>		Code: <i>ASME B31.3</i>		
Material P&T:	<i>0</i>	PSI @	<i>0</i>	°F min.	Based on: <i>Service</i>	Branch Conn Tbl: <i>I</i>
	<i>(0)</i>	Kpa @	<i>(-18)</i>	°C min.		
	<i>150</i>	PSI @	<i>180</i>	°F max.		
	<i>(1034)</i>	Kpa @	<i>(82)</i>	°C max.		
P.W.H.T. : <i>NO (**9)</i>				Welding Proc: <i>Refer to Suncor Firebag STD FB-L-5217</i>		

Standard Specifications

Valve Specifications

<u>Pipe</u>			<u>Ball Valve</u>			
0.75	1.5	ASTM A106 Gr. B, Seamless, Sch.XXS	2	4	VBA0151	RF
2	2	ASTM A106 Gr. B, Seamless, Sch160	<u>Butterfly Valve, Wafer Style</u>			
3	6	ASTM A106 Gr. B, Seamless, Sch. XS. **I	3	12	VBUI502	RF
8	20	ASTM A106 Gr. B, Seamless, Sch STD WT **I	<u>Check Valve</u>			
24	24	ASTM A106 Gr. B, Seamless, Sch. XS. **I	2	6	VCH0241#10	RF
26+		ASTM A672 Cl 22 Gr.60, (Wall thickness calculated per Attachment L)	<u>Check Valve, Wafer Style</u>			
<u>Fittings</u>			8	24	VWC0151	RF
0.75	2	ASTM A105N, Class 6000 Threaded	<u>Knife Gate Valve</u>			
3	24	ASTM A234 WPB, (Schedule to match Pipe)	2	12	VKG0002	FF
<u>Flanges</u>			14	24	VKG0003	FF
0.75	2	ASTM A105N, Class 150 RF.TH. **5	<u>Plug Valve</u>			
3	24	ASTM A105N, Class 150 RF, Slip-on **2,5	0.75	1.5	VPL0331-TH	**7, 8
			2	4	VPL0341	RF
			6	12	VPL0342	RF
			14	24	VPL0343	RF

Special Material Specifications:

<u>Bolting</u>	ASTM A193 Gr. B7, c/w A194 Gr. 2H Nuts
<u>Gaskets</u>	Class 150 Flat Ring, .0625 " thick, Non-Asbestos, per ASME B16.21 **6
	Spiral Wound 316SS, Graphite filled, c/w CS Outer Ring, per ASME B16.20

** SPECIAL NOTES **

1. The wall thickness shown is for unlined pipe.
2. Use WN flanges adjacent to BW fittings.
3. Victaulic couplings to be used when specified by the Owner. (Style & type to be agreed by the Owner's Engineer).
4. Deleted at revision 4.
5. Use FF flanges at connections to flat faced equipment.
6. Use Neoprene Flat Ring gaskets with FF flanges.
7. Vents and Drains per DD100-L-12-1
8. Process Instrument Connections per DD100-L-11-1
9. PWHT required for thickness per ASME B31.3.



Piping Material Specifications

Valve Details

Ball Valve

VBA0151

Rev Date 02-Jan-08

Ball Valve, Class CL150 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Split body, Blow-out proof stem, 316 SS Ball and Stem, PTFE Seats and Body Gasket, Regular Port, Design to API-608 and/or ASME B16.34

NOTES: Valve shall be fire tested to API-607; Maximum temperature 350 F.

Assigned Pipe Classes: ADX, AEA, CA, CAB, CAF, CAZ, CBA, CSA

Butterfly Valve, Wafer Style

VBU1502

Rev Date 17-Sep-07

Butterfly Valve, Wafer Style, Class CL 150 RF to fit between ASME B16.5 flanges, Cast Body to, ASTM A216 Gr WCB, 316 SS Disk and Shaft, PTFE Seats, Design to API-609

NOTES: Teflon bushing; Maximum temperature 350 F;

Assigned Pipe Classes: AEA, CA, CAB

Check Valve

VCH0241#10

Rev Date 17-Feb-08

Check Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Cover, Swing Type, API Trim 10 design to API-600, Integral or Welded in Seats

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: AEA

Knife Gate Valve

VKG0002

Rev Date 19-Jun-06

Knife Gate Valve, Class CL 150 FF to ASME B16.5 & ASME 16.47-A, Cast NI - Resist Body, ASTM A439 Type D2, Heavy Duty Enclosed Bonnet w/2 Lexan Covers, 17-4 Ph Gate, HeatTreated to 900F, non-stick coated, HVOF coated gate face, Scrappers on Transverse Seal, Resilient, Full Port, MSS SP-81

NOTES: Alternate Body Material: ASTM A436 Type I, non-stick coated. NI-Hard Wear Ring installed on the inlet side of the valve. OSHA conforming lockout.

Assigned Pipe Classes: AEA

Knife Gate Valve

VKG0003

Rev Date 19-Jun-06

Knife Gate Valve, Class CL 150 FF to ASME B16.5 & ASME 16.47-A, Cast NI - Resist Body, ASTM A439 Type D2, Heavy Duty Enclosed Bonnet w/2 Lexan Covers, Transverse seal w/PTFE packing, 17-4 Ph Gate, HeatTreated to 900F, non-stick coated, HVOF coated gate face, Scrappers on Transverse Seal, Resilient, Full Port, MSS SP-81

NOTES: Alternate Body Material: ASTM A436 Type I, non-stick coated. NI-Hard Wear Ring installed on the inlet side of the valve. OSHA conforming lockout.

Assigned Pipe Classes: AEA

Plug Valve

VPL0331-TH

Rev Date 20-Jun-06

Plug Valve, Class CL 300 Threaded, Forged Body to, ASTM A105 N, Bolted Bonnet, Tapered Plug, Metal Seated

Assigned Pipe Classes: AEA, AEC

Plug Valve

VPL0341

Rev Date 19-Jun-06

Plug Valve, Class CL 150 RF to ASME B16.5, Cast Carbon Steel, ASTM A216 Gr WCB, Bolted Bonnet, Tapered Plug, Metal Seated

Assigned Pipe Classes: AEA, AEC

Plug Valve

VPL0342

Rev Date 18-Sep-07

Plug Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, Tapered Plug, Metal Seated

Assigned Pipe Classes: AEA, AEC

Plug Valve

VPL0343

Rev Date 18-Sep-07

Plug Valve, Class CL 150 RF to ASME B16.5, Cast Carbon Steel, ASTM A216 Gr WCB, Bolted Bonnet, Tapered Plug, Metal Seated, Venturi

Assigned Pipe Classes: AEA

Check Valve, Wafer Style

VWC0151

Rev Date 19-Jun-06

Check Valve, Wafer Style, Class CL 150 RF to fit between ASME B16.5 flanges, Cast Body to, ASTM A216 Gr WCB, Retainerless Style, Dual Carbon Steel Plates, Inconel X750 Spring(s), Lapped Seats, w/Stellite Hard Faced Overlay, Design to API-594

Assigned Pipe Classes: AEA, CA, CAB, CAZ, CS



Piping Material Specifications

Rev: **4**

Service Desc: <i>Disposal Water</i>				Temp: <i>250 (121)</i> °F(°C)max	
Materials: <i>Carbon Steel</i>		Corrosion Allow: <i>0.25</i>		Code: <i>ASME B31.3</i>	
Material P&T: <i>150 (1034)</i>	PSI @ <i>250</i>	°F min.	Based on: <i>Service</i>	Branch Conn Tbl: <i>I</i>	
	Kpa @ <i>(121)</i>	°C min.		Inspection Class: <i>III</i>	
	PSI @	°F max.			
	Kpa @	°C max.			
P.W.H.T. : <i>YES</i>			Welding Proc: <i>Refer to Suncor Firebag STD FB-L-5217</i>		

Standard Specifications		Valve Specifications	
<u>Pipe</u>		<u>Check Valve</u>	
1.5	1.5	ASTM A106 Gr. B, Seamless, Sch.XXS	
2	3	ASTM A106 Gr. B, Seamless, Sch. 160	
4	8	ASTM A106 Gr. B, Seamless, Sch 80	
10	12	ASTM A106 Gr. B, Seamless, STD. Wt.	
<u>Fittings</u>		<u>Compact Gate Valve</u>	
1.5	1.5	ASTM A105N, Class 9000, SW	
2	2	ASTM A105N, Class 6000 SW	
3	12	ASTM A234 WPB, (Schedule to match Pipe)	
<u>Flanges</u>		<u>Gate Valve</u>	
1.5	2	ASTM A105N, Class 150 RF. SW	
3	12	ASTM A105N, Class 150 RF.WN, (Bore to match Pipe)	
		<u>Globe Valve</u>	
		1.5 2	VGL0131#12-SW **7
		3 12	VGL0141#12 RF **7
		<u>Plug Valve</u>	
		1.5 1.5	VPL0331-SW **1, 8
		1.5 1.5	VPL0331-TH
		1 1/2 4	VPL0341 RF
		6 12	VPL0342 RF

Special Material Specifications:

<u>Thermowells</u>	NPS 2, Class 300 RF, Flanged, A105N, see Standard Drawing DD100-L-14-1, 2.
<u>Bolting</u>	ASTM A193 Gr. B7, c/w A194 Gr. 2H Nuts
<u>Gaskets</u>	0.125" thick Full Face or Flat Ring Neoprene

** SPECIAL NOTES **

1. For slurry service vents and Drains use SW Plug valve. For non-slurry service use SW Gate valve.
2. Use FF flanges at connections to flat faced flanged equipment.
3. Use Neoprene Full Face gaskets with FF flanges.
4. 1 1/2" NPS is the smallest size allowed.
5. These ball valves are to be used for sample connections only.
6. These ball valves are to be used for corrosion probes only.
7. Globe valves are not to be used in slurry service.
8. Vents and Drains per DD100-L-12-1
9. Pressure Instrument Connections per DD100-L-11-2



Piping Material Specifications

Valve Details

Check Valve

VCH0231#12-SW

Rev Date 22-Feb-08

Check Valve, Class CL 800 Socketweld, Forged Body to, ASTM A105 N, Bolted Cover, Piston/Lift Type with Spring, API Trim 12, Integral or Renewable seats, Hard Faced Seat & Disc, Full Port, Design to API-602
NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: AEC, CAF, CBF

Check Valve

VCH0241#12

Rev Date 17-Feb-08

Check Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Cover, Swing Type, API Trim 12 design to API-600, Integral or Welded in Seats, Hard Faced Seat
NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: AEC, CAF, CBF

Compact Gate Valve

VGA0031#12-SW

Rev Date 17-Feb-08

Compact Gate Valve, Class CL 800 Socketweld, Forged Body to, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 12, Integral or Renewable seats, Regular Port, Design to API-602

Assigned Pipe Classes: AEC, CAF, CAR, CBF

Compact Gate Valve

VGA0031#12-SW/TH

Rev Date 17-Feb-08

Compact Gate Valve, Class CL 800 Socketweld/Threaded, Forged Body to, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 12, Integral or Renewable seats, Regular Port, Design to API-602

Assigned Pipe Classes: AEC, AED, CAF, CAQ, CAR, CBF

Gate Valve

VGA0041#12

Rev Date 17-Feb-08

Gate Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 12, Integral or Welded in Seats, Design to API-600

Assigned Pipe Classes: AEC, CAF, CAQ, CAR, CBF

Globe Valve

VGL0131#12-SW

Rev Date 19-Jun-06

Globe Valve, Class CL 800 Socketweld, Forged Body to, ASTM A105 N, Bolted Bonnet, OS & Y, Integral or Renewable seats, Hard faced Seat & Disc, API Trim 12, Design to API-602

Assigned Pipe Classes: AEC, CAF, CBF

Globe Valve

VGL0141#12

Rev Date 22-Feb-08

Globe Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, API Trim 12 design to API-600, Integral or Welded in Seats, Hard Faced Seat

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: AEC, CAF, CBF

Plug Valve

VPL0331-SW

Rev Date 16-Feb-07

Plug Valve, Class CL 300 Socketweld, Forged Body to, ASTM A105 N, Bolted Bonnet, Tapered Plug, Metal Seated

Assigned Pipe Classes: AEC

Plug Valve

VPL0331-TH

Rev Date 20-Jun-06

Plug Valve, Class CL 300 Threaded, Forged Body to, ASTM A105 N, Bolted Bonnet, Tapered Plug, Metal Seated

Assigned Pipe Classes: AEA, AEC

Plug Valve

VPL0341

Rev Date 19-Jun-06

Plug Valve, Class CL 150 RF to ASME B16.5, Cast Carbon Steel, ASTM A216 Gr WCB, Bolted Bonnet, Tapered Plug, Metal Seated

Assigned Pipe Classes: AEA, AEC

Plug Valve

VPL0342

Rev Date 18-Sep-07

Plug Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, Tapered Plug, Metal Seated

Assigned Pipe Classes: AEA, AEC



Piping Material Specifications

Rev: **4**

Service Desc: <i>Disposal Water (US Filter package only)</i>				Temp: <i>250 (121)</i> °F(°C)max	
Materials: <i>Carbon Steel</i>		Corrosion Allow: <i>0.25</i>		Code: <i>ASME B31.3</i>	
Material P&T: <i>150 (1034)</i>	PSI @ <i>250</i>	°F min.	Based on: <i>Service</i>	Branch Conn Tbl: <i>I</i>	
	Kpa @ <i>(121)</i>	°C min.		Inspection Class: <i>III</i>	
	PSI @	°F max.			
	Kpa @	°C max.			
	P.W.H.T. : <i>YES</i>			Welding Proc: <i>Refer to Suncor Firebag STD FB-L-5217</i>	

Standard Specifications			Valve Specifications		
<u>Pipe</u>			<u>Compact Gate Valve</u>		
1.5	1.5	ASTM A106 Gr. B, Seamless, Sch.XXS	0.75	2	VGA0031#12-SW/TH
2	3	ASTM A106 Gr. B, Seamless, Sch. 160			
4	8	ASTM A106 Gr. B, Seamless, Sch 80			
10	20	ASTM A106 Gr. B, Seamless, STD. Wt.			
24	24	ASTM A106 Gr. B, Seamless, XS			
<u>Fittings</u>					
1.5	1.5	ASTM A105N, Class 9000 SW			
2	2	ASTM A105N, Class 6000 SW			
3	24	ASTM A234 WPB, (Schedule to match Pipe)			
<u>Flanges</u>					
1.5	2	ASTM A105N, Class 150 RF. SW			
3	24	ASTM A105N, Class 150 RF. WN, (Bore to match Pipe)			
3	24	ASTM A105N, Class 150 RF. Slip-on **5			

Special Material Specifications:

<u>Thermowells</u>	NPS 2, Class 300 RF, Flanged, A105N, see Standard Drawing DD100-L-14-1 & 2
<u>Bolting</u>	ASTM A193 Gr. B7, c/w A194 Gr. 2H Nuts
<u>Gaskets</u>	0.125" thick Full Face or Flat Ring Neoprene

** SPECIAL NOTES **

1. Deleted
2. Use FF flanges at connections to flat faced flanged equipment.
3. Use Neoprene Full Face gaskets with FF flanges.
4. 1 1/2" NPS is the smallest size allowed.
5. Slip-on flanges are preferred over weld neck flanges.
6. Deleted
7. Vents and Drains per DD100-L-12-1
8. Pressure Instrument Connections per DD100-L-11-2



Piping Material Specifications

Valve Details

Compact Gate Valve

VGA0031#12-SW/TH

Rev Date 17-Feb-08

Compact Gate Valve, Class CL 800 Socketweld/Threaded, Forged Body to, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 12, Integral or Renewable seats, Regular Port, Design to API-602
Assigned Pipe Classes: AEC, AED, CAF, CAQ, CAR, CBF



Piping Material Specifications

Rev: **4**

Service Desc: <i>Lube Oil Mist distribution</i>				Temp: <i>150 (66)</i> °F(°C)max		
Materials: <i>Carbon Steel (Galvanized)</i>		Corrosion Allow: <i>0.03125</i>		Code: <i>ASME B31.3</i>		
Material P&T:	<i>0</i>	PSI @	<i>0</i>	°F min.	Based on: <i>Service</i>	Branch Conn Tbl: <i>1</i>
	<i>(0)</i>	Kpa @	<i>(-18)</i>	°C min.		
	<i>15</i>	PSI @	<i>150</i>	°F max.	Inspection Class: <i>IV</i>	
	<i>(103)</i>	Kpa @	<i>(66)</i>	°C max.		
P.W.H.T. : <i>NO (**5)</i>				Welding Proc: <i>Refer to Suncor Firebag STD FB-L-5217</i>		

Standard Specifications			Valve Specifications		
<u>Pipe</u>			<u>Ball Valve</u>		
0.75	2	ASTM A106, Gr. B, Sch. 80, Galvanized	0.75	2	VBA1000-TH
<u>Fittings</u>			<u>Compact Gate Valve</u>		
0.75	2	ASTM A105, Class 3000, TH. Galvanized	0.75	2	VGA0026#10-TH **3, 4
<u>Flanges</u>					
0.75	2	ASTM A105N, Class 150 RF. TH., Galvanized			

Special Material Specifications:

<u>Bolting</u>	ASTM A193 Gr. B7, c/w A194 Gr. 2H Nuts
<u>Gaskets</u>	Class 150 Flat Ring, .0625 " thick, Non-Asbestos, per ASME B16.21

**** SPECIAL NOTES ****

1. Downstream of isolation valves, interconnecting tubing shall be 316SS.
2. Use only PTFE Tape on threaded joints. Do not use pipe dope.
3. Vents and Drains per DD100-L-12-1
4. Pressure Instrument Connections per DD100-L-11-1.
5. PWHT required for thickness per ASME B31.3.



Piping Material Specifications

Valve Details

Ball Valve

VBA1000-TH

Rev Date 19-Jun-06

Ball Valve, Class CL 600 Threaded, Forged Body to, ASTM A182 F316/316L Dual Cert., Split body, Blow-out proof stem, 316 SS Ball and Stem, Renewable RTFE Seats, Full Port, Design to API-608

NOTES: Maximum temperature 350 F

Assigned Pipe Classes: AEX

Compact Gate Valve

VGA0026#10-TH

Rev Date 17-Feb-08

Compact Gate Valve, Class CL 800 Threaded, Forged Body to, ASTM A182 F316/316L Dual Cert., Bolted Bonnet, OS & Y, Solid Wedge, API Trim 10, Integral or Renewable seats, Regular Port, Design to API-602

Assigned Pipe Classes: ADA, AEX, EDX



Piping Material Specifications

Rev: **4**

Service Desc: <i>Evaporator Concentrated Brine</i>					Temp: <i>225 (107)</i>	°F(°C)max
Materials: <i>AL6XN</i>			Corrosion Allow: <i>0</i>		Code: <i>ASME B31.3</i>	
Material P&T:	<i>260</i>	PSI @	<i>-20</i>	°F min.	Based on: <i>ASME B16.5 MG</i>	Branch Conn Tbl: <i>I</i>
	<i>(1793)</i>	Kpa @	<i>(-29)</i>	°C min.		Inspection Class: <i>IV</i>
	<i>236</i>	PSI @	<i>225</i>	°F max.		
	<i>(1627)</i>	Kpa @	<i>(107)</i>	°C max.		
P.W.H.T. : <i>NO</i>				Welding Proc: <i>Use ENiCrNo-10 or ERNiCrMo-10 electrode</i>		

Standard Specifications			Valve Specifications		
<u>Pipe</u>			<u>Ball Valve</u>		
0.75	2	ASTM B675 welded, ASTM B690 smls AL6XN (N08367) SCH 40S	0.75	2	VBA0A01-X-SW
3	12	ASTM B675 welded, ASTM B690 smls AL6XN (N08367) SCH 10S	<u>Butterfly Valve</u>		
			3	12	VBU0A01-X RF
<u>Fittings</u>			<u>Check Valve</u>		
0.75	2	ASTM B366-WP6XN, BW, AL6XN (N08367) Supplement S5, SCH 40S	2	12	VCH0A01-X RF
3	12	ASTM B366-WP6XN, BW, AL6XN (N08367) Supplement S5, SCH 10S	<u>Compact Check Valve</u>		
			0.75	1.5	VCH0A02-X-SW
<u>Flanges</u>			<u>Compact Gate Valve</u>		
0.75	2	ASTM B462 AL6XN (N08367) Class 150 RF WN (Bore to match pipe)	0.75	2	VGA0A02-X-SW **5
3	12	ASTM B462 AL6XN (N08367) Class 150 RF WN or stub end (Bore to match pipe)	0.75	2	VGA0A02-X-SW/TH **4
			<u>Compact Globe Valve</u>		
			0.75	2	VGL0A01-X RF
			0.75	2	VGL0A01-X-40S BW
			<u>Gate Valve</u>		
	2		2	2	VGA0A01-03-X 300# RF
	2		2	12	VGA0A01-X RF
			<u>Plug Valve</u>		
	0.5		0.5	8	VPL0A01-X RF
	3		3	8	VPL0A01-X-10S BW
	0.5		0.5	2	VPL0A01-X-40S BW
	0.75		0.75	2	VPL0A01-X-SW
	0.5		0.5	8	VPL0A02-X RF
	0.5		0.5	8	VPL0A03-X RF

Special Material Specifications:

<u>Thermowells</u>	NPS 2, Class 300 RF, ASTM B462 AL6XN (N08367) Flanged, see Standard Drawing DD100-L-14-1, 2.
<u>Bolting</u>	ASTM A193 Gr. B8, c/w A194 Gr. 8 Nuts
<u>Gaskets</u>	Class 150 RF .125 " thick, Garlock Gylon Style 3510, per B16.21
	Class 150 FF .125 " thick, Garlock Gylon Style 3545, per B16.21

** SPECIAL NOTES **

1. 254SMO, 25-6 MO, 926MO are all suitable substitutes for AL6XN.
2. All connections to flat faced flanges require full faced gaskets. When connecting to FRP, PVC, or CPVC, flat faced flanges will be required.
3. Use 10 diameter bends where shown on the drawings. (For use in gravity flow lines to prevent plugging with brine.)
4. Pressure Instrument Connections per DD100-L-11-1
5. Vents and Drains per DD100-L-12-1



Piping Material Specifications

Valve Details

Ball Valve

VBA0A01-X-SW

Rev Date 20-Jun-06

Ball Valve, Class CL600 Socketweld (2000 lb WOG), Cast Alloy, ASTM A744 GR. CN-3MN 6% Mo., Blow-out proof stem, Hastelloy C-276 Trim, Renewable RTFE Seats, Full Port

NOTES: For socket welding, ends must be removable or extended, with ASTM B675 Gr B690 AL6XN Sch 40S pipe nipple; Maximum temperature limit fo 350 F.

Assigned Pipe Classes: ALX

Butterfly Valve

VBU0A01-X

Rev Date 17-Sep-07

Butterfly Valve, Class Lug Style, CL150 RF to ASME B16.5, Cast Alloy, ASTM A494 GR. CW-12MW Ni-Cr-Mo, TFE shaft bearings, Hastelloy C-276) Trim, PTFE Seats and Seal

Assigned Pipe Classes: ALX

Check Valve

VCH0A01-X

Rev Date 20-Jun-06

Check Valve, Class CL150 RF to ASME B16.5, Cast Alloy, ASTM A744 GR. CN-3MN 6% Mo., Bolted Cover, Swing Type, horizontal or vertical, AL-6XN Trim, Renewable Hard Faced Seat

NOTES: ASTM A744 Gr. CK3MCuN (254 SMO) is an acceptable alternate for body and plug material.

Assigned Pipe Classes: ALX

Compact Check Valve

VCH0A02-X-SW

Rev Date 18-Sep-07

Compact Check Valve, Class CL 800 Socketweld, Forged Alloy Steel, ASTM B462 N08367 (AL6XN), Bolted Cover, Piston/Lift Type with Incoloy X-750 Spring, AL-6XN Trim, Integral Hard Faced Seat

Assigned Pipe Classes: ALX

Gate Valve

VGA0A01-03-X

Rev Date 22-Feb-08

Gate Valve, Class CL300 RF to ASME B16.5, Cast Alloy, ASTM A744 GR. CN-3MN 6% Mo., Bolted Bonnet, OS & Y, Flexible Wedge, AL-6XN Trim, Renewable Hard Faced Seat, Design to API-600

NOTES: ASTM A744 Gr CK3MCuN (254 SMO) is an acceptable alternate for body and wedge material;

Assigned Pipe Classes: ALX

Gate Valve

VGA0A01-X

Rev Date 22-Feb-08

Gate Valve, Class CL150 RF to ASME B16.5, Cast Alloy, ASTM A744 GR. CN-3MN 6% Mo., Bolted Bonnet, OS & Y, Flexible Wedge, AL-6XN Trim, Renewable Hard Faced Seat, Design to API-600

NOTES: ASTM A744 Gr CK3MCuN (254 SMO) is an acceptable alternate for body and wedge material;

Assigned Pipe Classes: ALX

Compact Gate Valve

VGA0A02-X-SW

Rev Date 20-Jun-06

Compact Gate Valve, Class CL 800 Socketweld, Forged Alloy Steel, ASTM B462 N08367 (AL6XN), Bolted Bonnet, OS & Y, Solid Wedge, AL-6XN Trim, Integral Hard Faced Seats, Regular Port, Design to API-602

Assigned Pipe Classes: ALX

Compact Gate Valve

VGA0A02-X-SW/TH

Rev Date 17-Feb-08

Compact Gate Valve, Class CL 800 Socketweld/Threaded, Forged Alloy Steel, ASTM B462 N08367 (AL6XN), Bolted Bonnet, OS & Y, Solid Wedge, AL-6XN Trim, Integral Hard Faced Seats, Regular Port, Design to API-602

Assigned Pipe Classes: ALX

Globe Valve

VGL0A01-X

Rev Date 18-Sep-07

Globe Valve, Class CL150 RF to ASME B16.5, Cast Alloy, ASTM A744 GR. CN-3MN 6% Mo., Bolted Bonnet, OS & Y, Plug Type Disc, AL-6XN Trim, Full Port

NOTES: ASTM A744 Gr CK-3MCuN (254 SMO) is an acceptable substitute for body and plug material;

Assigned Pipe Classes: ALX

Globe Valve

VGL0A01-X-40S

Rev Date 18-Sep-07

Globe Valve, Class CL150 Butt weld Ends to SCH 40S, Cast Alloy, ASTM A744 GR. CN-3MN 6% Mo., Bolted Bonnet, OS & Y, Plug Type Disc, AL-6XN Trim, Full Port

NOTES: ASTM A744 Gr CK-3MCuN (254 SMO) is an acceptable substitute for body and plug material;

Assigned Pipe Classes: ALX

Plug Valve

VPL0A01-X

Rev Date 18-Sep-07

Plug Valve, Class CL150 RF to ASME B16.5, Cast Alloy, ASTM A744 GR. CN-3MN 6% Mo., Bolted Bonnet, Tapered Plug, AL-6XN Trim, PTFE sleeve
 NOTES: ASTM A744 Gr. CK-3MCuN (254 SMO) is an acceptable substitute for body and plug material;
 Assigned Pipe Classes: ALX

Plug Valve

VPL0A01-X-10S

Rev Date 18-Sep-07

Plug Valve, Class CL150 BW to ASME B16.5, Cast Alloy, ASTM A744 GR. CN-3MN 6% Mo., Bolted Bonnet, Tapered Plug, AL-6XN Trim, PTFE sleeve
 NOTES: ASTM A744 Gr. CK-3MCuN (254 SMO) is an acceptable substitute for body and plug material;
 Assigned Pipe Classes: ALX

Plug Valve

VPL0A01-X-40S

Rev Date 18-Sep-07

Plug Valve, Class CL150 Buttweld Ends to SCH 40S, Cast Alloy, ASTM A744 GR. CN-3MN 6% Mo., Bolted Bonnet, Tapered Plug, AL-6XN Trim, PTFE sleeve
 NOTES: ASTM A744 Gr CK-3MCuN (254 SMO) is an acceptable substitute for body and plug material;
 Assigned Pipe Classes: ALX

Plug Valve

VPL0A01-X-SW

Rev Date 20-Jun-06

Plug Valve, Class CL150 Socketweld, Cast Alloy, ASTM A744 GR. CN-3MN 6% Mo., Bolted Bonnet, Tapered Plug, AL-6XN Trim, PTFE sleeve, 2 port regular plug
 NOTES: ASTM A744 Gr. CK3MCuN (254 SMO) is an acceptable alternate for body and plug material;
 Maximum temperature limit 350 F; Wrench operator
 Assigned Pipe Classes: ALX

Plug Valve

VPL0A02-X

Rev Date 18-Sep-07

Plug Valve, Class CL150 RF to ASME B16.5, Cast Alloy, ASTM A351 Gr. Cd4MCu, Bolted Bonnet, Tapered Plug, A351 Cd4MCu Trim, PTFE sleeve
 NOTES: 0.1% - 0.25% Nitrogen required for cast Cd4MCu parts;
 Assigned Pipe Classes: ALX

Plug Valve

VPL0A03-X

Rev Date 18-Sep-07

Plug Valve, Class CL150 RF to ASME B16.5, Cast Alloy, ASTM A744 GR. CN-3MN 6% Mo., Bolted Bonnet, Tapered Plug, three way configuration, AL-6XN Trim, PTFE sleeve
 NOTES: ASTM A744 Gr CK-3MCuN (254 SMO) is an acceptable substitute for body and plug material;
 Assigned Pipe Classes: ALX



Piping Material Specifications

Rev: **4**

Service Desc: <i>Potable Water (Underground only)</i>				Temp: <i>80 (27)</i> °F(°C)max		
Materials: <i>High Density Polyethylene (HDPE)</i>		Corrosion Allow: <i>0</i>		Code: <i>ASME B31.3</i>		
Material P&T:	<i>0</i>	PSI @	<i>0</i>	°F min.	Based on: <i>Material</i>	Branch Conn Tbl: <i>Manuf. Std.</i> Inspection Class: <i>Note 1</i>
	<i>(0)</i>	Kpa @	<i>(-18)</i>	°C min.		
	<i>150</i>	PSI @	<i>80</i>	°F max.		
	<i>(1034)</i>	Kpa @	<i>(27)</i>	°C max.		
P.W.H.T. : <i>NO</i>				Welding Proc: <i>Refer to Suncor Firebag STD FB-L-5212 **1</i>		

Standard Specifications				Valve Specifications			
<u>Pipe</u>				<u>Gate Valve</u>			
2	8	HDPE, ASTM F714 - DR11, ASTM D3350 Cell CL PE 345464C		2	4	VGA0011	FF
				2	8	VGA0013	FF
<u>Fittings</u>							
2	8	HDPE, ASTM F714 - DR11, ASTM D3350 Cell CL PE345464C Butt fusion ends					
2	8	HDPE, ASTM F714 - DR11, ASTM D3350 Cell CL PE345464C ends flgd with backing ring ASME B16.5					
<u>Flanges</u>							
2	8	HDPE, CL 150, ASTM D3350 Cell CL PE345464C, FF Stub end with Steel Backing Ring					

Special Material Specifications:

<u>Bolting</u>	ASTM A307 Gr.B Machine Bolts, Heavy Hex Head c/w A-563 A Heavy Hex Head Nut, c/w Washers to ASTM F844
<u>Gaskets</u>	Class 150 0.125" thick Full Face Neoprene

**** SPECIAL NOTES ****

1. Installation, Inspection and Testing of HDPE piping shall be per Suncor Firebag STD FB-L-5212.
2. Minimum underground pipe size shall be NPS 2".



Piping Material Specifications

Valve Details

Gate Valve

VGA0011

Rev Date 19-Mar-08

Gate Valve, Class 125 FF, Cast Iron, ASTM A126 Class B, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, Bronze Trim, Integral, Welded in or Renewable Seats, MSS SP-70

Assigned Pipe Classes: ADA, APB, APD

Gate Valve

VGA0013

Rev Date 19-Jun-06

Gate Valve, Class 125 FF, Cast Iron, ASTM A126 Class B, Bolted Bonnet, Non-rising Stem , Solid Wedge, Bronze Trim

NOTES: Valve boxes shall be 6" diameter Cast Iron, sliding type, c/w operating extension stems to provide 2 ft adjustment flexibility, c/w lid marked "Water". Rock Disc, 1" square mild steel valve spindle, with riveted adaptor to fit 2" valve operating nut. The box shall have watertight barrel and be asphaltic coated., Reference Norwood Foundry box type A

Assigned Pipe Classes: APB



Piping Material Specifications

Rev: **4**

Service Desc: <i>Potable Water, indoors & above ground only</i>					Temp: <i>140 (60)</i>	°F(°C)max
Materials: <i>Polyvinyl Chloride (PVC)</i>			Corrosion Allow: <i>0</i>		Code: <i>ABC</i>	
Material P&T:	<i>150</i>	PSI @	<i>73</i>	°F min.	Based on: <i>Material</i>	Branch Conn Tbl: <i>Manuf. Std.</i>
	<i>(1034)</i>	Kpa @	<i>(23)</i>	°C min.		Inspection Class: <i>V</i>
	<i>40</i>	PSI @	<i>140</i>	°F max.		
	<i>(276)</i>	Kpa @	<i>(60)</i>	°C max.		
P.W.H.T. : <i>NO</i>				Welding Proc:	<i>Joining shall be by fusion, bolting, threading</i>	

Standard Specifications				Valve Specifications			
<u>Pipe</u>				<u>Ball Valve</u>			
0.75	8	Polyvinyl Chloride, Sch.80, per ASTM D1785		0.75	2	VBA0154-TH	Socket Type
<u>Fittings</u>				<u>Check Valve</u>			
0.75	8	ASTM D2467, Sch.80, Socket Type		3	8	VCH0212	FF
<u>Flanges</u>				<u>Compact Check Valve</u>			
0.75	8	ASTM D2467, Class 150 FF, Socket Type		0.75	2	VCH0201-TH	Socket Type
				<u>Gate Valve</u>			
				3	8	VGA0011	FF
				<u>Plug Valve</u>			
				3	8	VPL0311	FF

Special Material Specifications:

<u>Bolting</u>	ASTM A193 Gr. B7, c/w A194 Gr. 2H Nuts
<u>Gaskets</u>	Class 150, Neoprene, Full Face, .0625" thick.

**** SPECIAL NOTES ****

- Solvent shall be per ASTM D2564, and NSF listed.
- Cement primer shall be Type P-70.
- PVC piping in NPS 2" to 8", and Cast iron valves shall be used only in the Water Treatment Plant, and other pre-approved areas.



Piping Material Specifications

Valve Details

Ball Valve

VBA0154-TH

Rev Date 19-Jun-06

Ball Valve, Class CL 150 Threaded, Poly Vinyl Chloride, ASTM D1785 Gr.PVC 1120, Vertical, Ball Type, Teflon Seat

NOTES: Maximum temperature 140 F

Assigned Pipe Classes: APD

Compact Check Valve

VCH0201-TH

Rev Date 19-Jun-06

Compact Check Valve, Class CL 150 Threaded, Poly Vinyl Chloride, ASTM D1785 Gr.PVC 1120, Vertical, Ball Type, Teflon Seat

NOTES: Maximum temperature 140 F.

Assigned Pipe Classes: APD

Check Valve

VCH0212

Rev Date 19-Jun-06

Check Valve, Class 125 FF, Cast Iron, ASTM A126 Class B, Bolted Cover, Swing Type, horizontal or vertical, Bronze Trim, Renewable Seats

Assigned Pipe Classes: APD

Gate Valve

VGA0011

Rev Date 19-Mar-08

Gate Valve, Class 125 FF, Cast Iron, ASTM A126 Class B, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, Bronze Trim, Integral, Welded in or Renewable Seats, MSS SP-70

Assigned Pipe Classes: ADA, APB, APD

Plug Valve

VPL0311

Rev Date 18-Sep-07

Plug Valve, Class 125 FF, Cast Iron, ASTM A126 Class B, Bolted Bonnet, Tapered Plug

NOTES: Matryx Model 60 LP, short pattern body.

Assigned Pipe Classes: ADA, APD



Piping Material Specifications

Rev: **4**

Service Desc: <i>Sanitary and Storm Sewer</i>				Temp: <i>73 (23)</i>		°F(°C)max	
Materials: <i>Polyvinyl Chloride (PVC)</i>				Corrosion Allow: <i>0</i>		Code: <i>ABC</i>	
Material P&T:	<i>0</i>	PSI @	<i>0</i>	°F min.	Based on: <i>Material</i>	Branch Conn Tbl: <i>Manuf. Std.</i>	Inspection Class: <i>V</i>
	<i>(0)</i>	Kpa @	<i>(-18)</i>	°C min.			
	<i>0</i>	PSI @	<i>73</i>	°F max.			
	<i>(0)</i>	Kpa @	<i>(23)</i>	°C max.			
	P.W.H.T. : <i>NO</i>						

Standard Specifications

Valve Specifications

Pipe

4 36 PVC, DR35, per ASTM D3034, & CSA B182.2, with bell & spigot compression joints

Fittings

4 36 Injection moulded PVC per ASTM F679, with bell & spigot compression joints

Special Material Specifications:

Gaskets Viton per ASTM F477

** SPECIAL NOTES **

1. Tee Branches shall be installed at all service connections (no saddles).
2. Manholes (4ft (1219 mm) Dia.) and Catch Basins (3ft (914 mm) Dia. With Tee-Top) shall be Precast Concrete conforming to ASTM C478. All sections shall have confined "O" Ring Joints to ASTM C443 using rubber gaskets. Manholes to be complete with 3/4" (19 mm) galvanized ladder rungs at 16" (406 mm) O.C.
3. Manhole frame and covers shall be Grey Cast Iron, ASTM A48, 33" (838 mm) Dia. Norwood Foundry No. F39.
4. Catch Basin frames and grates shall be Grey Cast Iron, ASTM A48, 33" (838 mm) Dia. Norwood Foundry No. F38, F39.
5. Concrete shall be sulphur resistant, ASTM Type 50, strength 20 Mpa in 28 days.



Piping Material Specifications

Rev: **4**

Service Desc: <i>Force Main Sewer</i>				Temp: <i>80 (27)</i> °F(°C)max			
Materials: <i>High Density Polyethylene (HDPE) / CS</i>		Corrosion Allow: <i>0</i>		Code: <i>ASME B31.3</i>			
Material P&T:	<i>0</i>	PSI @	<i>0</i>	°F min.	Based on: <i>Material</i>	Branch Conn Tbl: <i>Manuf. Std.</i>	Inspection Class: <i>I</i>
	<i>(0)</i>	Kpa @	<i>(-18)</i>	°C min.			
	<i>150</i>	PSI @	<i>80</i>	°F max.			
	<i>(1034)</i>	Kpa @	<i>(27)</i>	°C max.			
P.W.H.T. : <i>NO</i>				Welding Proc: <i>Firebag STD FB-L-5212 & FB-L-5217</i>			

Standard Specifications

Valve Specifications

Pipe

- | | | |
|---|---|---|
| 2 | 8 | ASTM A106 Gr. B, Seamless, STD. Wt. **6,7 |
| 2 | 8 | HDPE, ASTM F714 - DR11, ASTM D3350 Cell CL PE 345464C **3 |

Fittings

- | | | |
|---|---|--|
| 2 | 4 | Molded from HDPE pipe ASTM F714 - DR11, ASTM D3350 Cell CL PE345464C **2,3 |
| 2 | 8 | ASTM A234 WPB, STD. Wt. **6,7 |
| 6 | 8 | Fabricated from HDPE pipe, ASTM F714 - DR11, ASTM D3350 Cell CL PE345464C joints wrapped with FRP. **2,3 |

Flanges

- | | | |
|---|---|---|
| 2 | 8 | ASTM A105, Class 150 RF.WN, STD.Wt. **6,7 |
| 2 | 8 | HDPE, CL 150, ASTM D3350 Cell CL PE345464C, FF Stub end with Steel Backing Ring **3 |

Special Material Specifications:

- | | |
|-----------------------|--|
| <u>Bolting</u> | ASTM A193 Gr. B7, c/w A194 Gr. 2H Nuts |
| <u>Gaskets</u> | 0.125" thick Full Face or Flat Ring Neoprene |

** SPECIAL NOTES **

1. Installation, Inspection and Testing of HDPE piping shall be per Suncor Firebag STD FB-L-5212.
2. All fittings shall be factory made.
3. Thermal Butt Fusion per Manufacturer's specifications.
4. Minimum underground pipe size shall be NPS 2".
5. Use HDPE Manufacturer approved gasket.
6. Carbon steel pipe and fittings to be used for risers only.
7. All U/G CS pipe and fittings to be externally coated



Piping Material Specifications

Rev: **4**

Service Desc: <i>Flocculant, Coagulant, Hydrochloric Acid Drains</i>					Temp: <i>104 (40)</i> °F(°C)max	
Materials: <i>Polyvinyl Chloride (PVC)</i>			Corrosion Allow: <i>0</i>		Code: <i>ASME B31.3</i>	
Material P&T:	<i>150</i>	PSI @	<i>73</i>	°F min.	Based on: <i>Material</i>	Branch Conn Tbl: <i>Manuf. Std.</i>
	<i>(1034)</i>	Kpa @	<i>(23)</i>	°C min.		Inspection Class: <i>V</i>
	<i>100</i>	PSI @	<i>104</i>	°F max.		
	<i>(690)</i>	Kpa @	<i>(40)</i>	°C max.		
P.W.H.T. : <i>NO</i>				Welding Proc: <i>Joining shall be by fusion, bolting, threading</i>		

Standard Specifications				Valve Specifications			
<u>Pipe</u>				<u>Ball Valve</u>			
0.75	6	PVC Sch. 80 per ASTM D1784, CSA B137.3 & NSF 61		0.75	4	VBA0154-SW	PVC, Soft
<u>Fittings</u>				<u>Compact Check Valve</u>			
0.75	6	ASTM D2467, Sch.80, Socket Type		0.75	4	VCH0201-SW	
<u>Flanges</u>							
0.75	6	ASTM D2467, Class 150 FF, Socket Type					

Special Material Specifications:

<u>Bolting</u>	ASTM A193 Gr. B7, c/w A194 Gr. 2H Nuts
<u>Gaskets</u>	0.125" thick Full Face or Flat Ring Neoprene

**** SPECIAL NOTES ****

- Solvent shall be per ASTM D2564, and NSF listed
- Cement primer shall be Type P-70.
- Material may be operated to a minimum temperature of -20°F (-29°C) at 150 psig (1034 kPag), but must not be installed below a temperature of 40°F (4.4°C) unless manufacturer is consulted regarding alternative solvent/bonding methods.



Piping Material Specifications

Valve Details

Ball Valve

VBA0154-SW

Rev Date 06-May-06

Ball Valve, Class CL150 Socket type, Poly Vinyl Chloride, ASTM D1785 Gr.PVC 1120, Union Body, Viton Seals, PTFE Seats, Regular Port
Assigned Pipe Classes: APG

Compact Check Valve

VCH0201-SW

Rev Date 06-May-06

Compact Check Valve, Class CL150 Socket type, Poly Vinyl Chloride, ASTM D1785 Gr.PVC 1120, Union Body, PVC inline ball, Viton Seals, PTFE Seats
Assigned Pipe Classes: APG



Piping Material Specifications

Rev: **4**

Service Desc: <i>Disposal Water Overflow; waste water</i>				Temp: <i>225 (107)</i> °F(°C)max	
Materials: <i>FRP (Fiberglass)</i>		Corrosion Allow: <i>0</i>		Code: <i>ASME B31.3</i>	
Material P&T:	<i>252</i>	PSI @	<i>225</i>	°F min.	Based on: <i>Pipe material</i>
	<i>(1737)</i>	Kpa @	<i>(107)</i>	°C min.	
		PSI @		°F max.	
		Kpa @		°C max.	
	Branch Conn Tbl: <i>Manuf. Std.</i>				
Inspection Class:					
P.W.H.T. : <i>NO</i>				Welding Proc: <i>N/A</i>	

Standard Specifications

Valve Specifications

<u>Pipe</u>			<u>Ball Valve</u>		
1	16	ASTM D-2996 Type 1, Gr. 1, Class F, 6300 psig HDB, Bell x Spigot, Smith Green Thread or equal **1, 4	1	12	VBA0163 **5
<u>Fittings</u>					
1	16	ASTM D5685, 6300 psig HDB, Smith Green Thread or equal **4			
<u>Flanges</u>					
1	6	ASTM D-4024 Filament Wound, Class 150 FF, Smith Green Thread or equal			
8	16	ASTM D4024 Filament Wound Stub End c/w steel Flange Ring **2			

Special Material Specifications:

<u>Bolting</u>	ASTM A193 Gr. B7, c/w A194 Gr. 2H Nuts and washers
<u>Gaskets</u>	0.125" thick Neoprene, Flat Full Face, 65 Durometer
	CL 150 Reinforced PTFE, 3mm

** SPECIAL NOTES **

1. Installation, Support spacing, and provision for thermal expansion shall be in accordance with Manufacturers Instructions.
2. Filament wound flanges and Flange Stub Ends may be connected directly to raised face steel flanges.
3. All pipe, fittings, flanges and joints shall be rated for continuous static pressure service at 450 psig.
4. Adhesive - DS 8000 Series two part Epoxy shall be used for Bell and Spigot Joints. DS 3033 Series two part Epoxy shall be used for saddle connections (or manufacturers equal)
5. For Vents and Drains use raised face Valve.



Piping Material Specifications

Valve Details

Ball Valve

VBA0163

Rev Date 17-Sep-07

Ball Valve, Class 150 RF, Ductile Iron, ASTM A395, PFA lined body, Hastelloy C Stem, PFA Encap DI

ASTM A395 ball, Renewable RTFE Seats, Full Port, Suncor OSG STD 0203

NOTES: Short Pattern per ASME B16.10, Two Position Lock Hand Lever; Temperature Range 32 F to 200 F;

Assigned Pipe Classes: APH, CAO



Piping Material Specifications

Rev: **4**

Service Desc:	Cooling Water, Fire Water AG, Treated Cooling Water, Oily Water Sewer				Temp:	200 (93)	°F(°C)max
Materials:	Carbon Steel				Corrosion Allow:	0.0625	Code: ASME B31.3
Material P&T:	285	PSI @	-20	°F min.	Based on:	ASME B16.5 MG 1.1	Branch Conn Tbl: I
	(1965)	Kpa @	(-29)	°C min.			Inspection Class: IV
	260	PSI @	200	°F max.			
	(1793)	Kpa @	(93)	°C max.			
P.W.H.T. :	NO (**14)				Welding Proc:	Refer to Suncor Firebag STD FB-L-5217	

Standard Specifications

<u>Pipe</u>		
0.75	2	ASTM A106 Gr. B, Seamless, Sch 80
3	24	ASTM A106 Gr. B, Seamless, STD. Wt. **13
26	30	API 5L GR B PSL-2, DSAW, 0.375" WALL
36	60	API 5L GR B PSL-2, DSAW, Wall thickness calculated per Attachment L)
<u>Fittings</u>		
0.75	2	ASTM A105N, Class 3000 SW
3	24	ASTM A234 WPB, STD. Wt. **13
26	30	ASTM A234 WPB-W (100%RT), 0.375"Wall
36	60	ASTM A234 Gr.WPB-W (100%RT) (Schedule to match pipe)
<u>Flanges</u>		
0.75	2	ASTM A105N, Class 150 RF. SW
3	24	ASTM A105N, Class 150 RF.WN, STD.Wt. **13
26	30	ASTM A105N, Class 150 RF.WN, B16.47-A 0.375" Wall
36	60	ASTM A105N, Class 150 RF.WN, B16.47-A (Bore to match pipe)

Valve Specifications

<u>Ball Valve</u>				
3	12	VBA0151		Soft, Reg; RF **1
0.75	2	VBA0602-TH		Soft, Reg **1
<u>Butterfly Valve Full Body Lug Style</u>				
26	42	VBUI510		RF **5
3	24	VBUI516		RF **5
<u>Butterfly Valve, Wafer Style</u>				
3	24	VBUI502		RF
26	42	VBUI509		RF
<u>Check Valve</u>				
0.75	2	VCH0231#8-SW		
3	6	VCH0241#8		RF
<u>Check Valve, Wafer Style</u>				
8	24	VWC0151		RF
26	42	VWC0163		RF
<u>Compact Gate Valve</u>				
0.75	2	VGA0031#8-SW		**12
0.5	2	VGA0031#8-SW/TH		**11
<u>Gate Valve</u>				
3	24	VGA0041#8		RF
3	3	VGA0054#8		RF **6
0.75	2	VGA0111#8		RF
1.50	2	VGA0315#8		RF **6
26	42	VGA5142#8		RF
<u>Globe Valve</u>				
0.75	2	VGL0131#8-SW		
3	8	VGL0141#8		RF
<u>Plug Valve</u>				
0.75	2	VPL0314		TH **1

Special Material Specifications:

<u>Thermowells</u>	NPS 2, Class 300 RF, Flanged, A105N, see Standard Drawing DD100-L-14-1, 2
<u>Bolting</u>	ASTM A193 Gr. B7, c/w A194 Gr. 2H Nuts
<u>Gaskets</u>	Spiral Wound 316SS, Graphite filled, c/w CS Outer Ring, per ASME B16.20 0.125" thick Full Face Neoprene **10

** SPECIAL NOTES **

1. Soft Seated Valves have reduced pressure/temperature ratings. Maximum temperature shall not exceed 400 F (204 C).
2. Slip-on flanges may be used when limited by space with approval for the Owner's Engineer.
3. Deleted
4. Deleted.
5. Shall be used only where bi-directional shut-off, or blind flange installation is required.
6. Class 300 Valves shall be used where required on instrument bridles.
7. Valves for above ground and underground Firewater System shall be UL or FM Certified.

8. Deleted

9. For 1/4" CA, refer to line class CAC.

10. Neoprene gaskets are only to be used with flat faced flanges. Maximum design temperature of 300 F (149 C).

11. Pressure Instrument Connections per DD100-L-11-1.

12. Vents and Drains per DD100-L-12-1.

13. Pipe and Fittings in Oily Water Sewer Service shall have external coating in accordance with Suncor Firebag STD FB-L-5230

14. PWHT required for thickness per ASME B31.3.



Piping Material Specifications

Valve Details

Ball Valve

VBA0151

Rev Date 02-Jan-08

Ball Valve, Class CL150 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Split body, Blow-out proof stem, 316 SS Ball and Stem, PTFE Seats and Body Gasket, Regular Port, Design to API-608 and/or ASME B16.34

NOTES: Valve shall be fire tested to API-607; Maximum temperature 350 F.

Assigned Pipe Classes: ADX, AEA, CA, CAB, CAF, CAZ, CBA, CSA

Ball Valve

VBA0602-TH

Rev Date 30-Oct-06

Ball Valve, Class CL 600 Threaded, Forged Body to, ASTM A105 N, Blow-out proof stem, 316 SS Ball and Stem, RTFE seats, Regular Port, Design to API-608

NOTES: Firesafe per API-607; Maximum temperature 350 F

Assigned Pipe Classes: ADX, CA, CAF, CAZ, EA

Butterfly Valve, Wafer Style

VBU1502

Rev Date 17-Sep-07

Butterfly Valve, Wafer Style, Class CL 150 RF to fit between ASME B16.5 flanges, Cast Body to, ASTM A216 Gr WCB, 316 SS Disk and Shaft, PTFE Seats, Design to API-609

NOTES: Teflon bushing; Maximum temperature 350 F;

Assigned Pipe Classes: AEA, CA, CAB

Butterfly Valve, Wafer Style

VBU1509

Rev Date 19-Jun-06

Butterfly Valve, Wafer Style, Class 150 RF to fit between ASME B16.47-A flanges, Cast Body to, ASTM A216 Gr WCB, 316 SS Disc and Stem, PTFE Seats, Design to API-609

Assigned Pipe Classes: CA

Butterfly Valve Full Body Lug

VBU1510

Rev Date 19-Jun-06

Butterfly Valve Full Body Lug Style, Class 150 RF to fit between ASME B16.47-A flanges, Cast Body to, ASTM A216 Gr WCB, Stainless Steel Shaft, 316 SS Disk and Shaft, PTFE Seats, Design to API-609

Assigned Pipe Classes: CA

Butterfly Valve Full Body Lug

VBU1516

Rev Date 19-Jun-06

Butterfly Valve Full Body Lug Style, Class CL 150 RF to fit between ASME B16.5 flanges, Cast Body to, ASTM A216 Gr WCB, 316 SS Disc and Stem, PTFE Seats, Design to API-609

Assigned Pipe Classes: CA, CAB

Check Valve

VCH0231#8-SW

Rev Date 22-Feb-08

Check Valve, Class CL 800 Socketweld, Forged Body to, ASTM A105 N, Bolted Cover, Piston/Lift Type with Spring, API Trim 8, Integral or renewable, Full Port, Design to API-602

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: CA, CAB, CAZ, CBA, CHY, CS, EA, EAB, EDB, ES, HB, HBD

Check Valve

VCH0241#8

Rev Date 17-Feb-08

Check Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Cover, Swing Type, API Trim 8 design to API 600, Integral or Welded Hard Faced Seat

NOTES: Pressure/Temperature Rating to ASME B16.34

Assigned Pipe Classes: ADX, CA, CAB, CAH, CAZ, CBA, CHY, CLF, CS

Compact Gate Valve

VGA0031#8-SW

Rev Date 04-Apr-08

Compact Gate Valve, Class CL 800 Socketweld, Forged Body to, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 8, Integral or Renewable seats, Regular Port, Design to API-602

Assigned Pipe Classes: CA, CAB, CAZ, CBA, CHY, CS, EA, EAB, EDB, HB, HBD, 662-2, 662-3

Compact Gate Valve

VGA0031#8-SW/TH

Rev Date 04-Apr-08

Compact Gate Valve, Class CL800 Socketweld/Threaded, Forged Carbon Steel, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 8, Integral or renewable hard faced seats, Regular Port, Design to API-602

Assigned Pipe Classes: CA, CAB, CAZ, CBA, CHY, CS, EA, EAB, EDB, HB, HBD, 662-2, 662-3

Gate Valve

VGA0041#8

Rev Date 17-Feb-08

Gate Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 8, Integral or Welded in Seats, Design to API-600

Assigned Pipe Classes: ADX, CA, CAB, CAH, CAZ, CBA, CHY, CS

Gate Valve**VGA0054#8**

Rev Date 17-Feb-08

Gate Valve, Class CL 300 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 8, Integral or Welded in Seats, Design to API-600
Assigned Pipe Classes: CA, CAB, CAH, CAZ, CBA, CS, EA, EAB, EDB, ES, 662-3

Gate Valve**VGA0111#8**

Rev Date 17-Feb-08

Gate Valve, Class CL 150 RF to ASME B16.5, Forged Body w/integral flanges, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 8, Integral or Renewable seats, Regular Port, Design to API-602
Assigned Pipe Classes: CA, CAB, CAH, CBA, CS

Gate Valve**VGA0315#8**

Rev Date 17-Feb-08

Gate Valve, Class CL 300 RF to ASME B16.5, Forged Body w/integral flanges, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 8, Integral or Renewable seats, Regular Port, Design to API-602
Assigned Pipe Classes: CA, CAB, CAH, CBA, CS, EA, EAB, EDB, ES

Gate Valve**VGA5142#8**

Rev Date 22-Feb-08

Gate Valve, Class CL 150 RF to ASME B16.47-A, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, Flexible Wedge, API Trim 8 design to API 600, Integral or Welded in Seats
NOTES: Pressure/Temperature rating to ASME B16.34
Assigned Pipe Classes: CA, CAB, CHY, CS

Globe Valve**VGL0131#8-SW**

Rev Date 23-Jun-06

Globe Valve, Class CL 800 Socketweld, Forged Body to, ASTM A105 N, Bolted Bonnet, OS & Y, Integral or Renewable seats, Hard Faced Seat to API Trim 8, Design to API-602
Assigned Pipe Classes: CA, CAB, CAZ, CBA, CHY, CS, EA, EAB, EDB, HB, HBD

Globe Valve**VGL0141#8**

Rev Date 22-Feb-08

Globe Valve, Class CL 150 RF to ASME B16.5, Cast Carbon Steel, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, Plug Type Disc, API Trim 8 design to API 600, Integral or Welded in Seats
NOTES: Pressure/Temperature rating to ASME B16.34
Assigned Pipe Classes: ADX, CA, CAB, CAH, CAZ, CBA, CS

Plug Valve**VPL0314**

Rev Date 19-Jun-06

Plug Valve, Class CL 125 Threaded, Cast Iron, ASTM A126 Class B, TFE Stem Seals, Cast Iron Tapered Plug, Lubricated Plug
NOTES: Super Nordstrom Two Bolt Cover, short pattern body, Wrench Operated or equal
Assigned Pipe Classes: CA

Check Valve, Wafer Style**VWC0151**

Rev Date 19-Jun-06

Check Valve, Wafer Style, Class CL 150 RF to fit between ASME B16.5 flanges, Cast Body to, ASTM A216 Gr WCB, Retainerless Style, Dual Carbon Steel Plates, Inconel X750 Spring(s), Lapped Seats, w/Stellite Hard Faced Overlay, Design to API-594
Assigned Pipe Classes: AEA, CA, CAB, CAZ, CS

Check Valve, Wafer Style**VWC0163**

Rev Date 06-Nov-07

Check Valve, Wafer Style, Class 150 RF to fit between ASME B16.47-A flanges, Cast Body to, ASTM A216 Gr WCB, Retainerless Style, Dual Carbon Steel Plates, Inconel X750 Spring(s), Lapped Seats, w/Stellite Hard Faced Overlay, Design to API-594
Assigned Pipe Classes: CA, CAB, CS



Piping Material Specifications

Rev: **4**

Service Desc: General Hydrocarbon, low corrosion	Temp: 800 (427) °F(°C)max
Materials: Carbon Steel (Note 10)	Corrosion Allow: 0.0625
Code: ASME B31.3	
Material P&T: 285 PSI @ Note 10 °F min.	Based on: ASME B16.5 MG 1.1
(1965) Kpa @ Note 10 °C min.	Branch Conn Tbl: I
80 PSI @ 800 °F max.	Inspection Class: III
(552) Kpa @ (427) °C max.	
P.W.H.T. : NO (**14)	Welding Proc: Refer to Suncor Firebag STD FB-L-5217

Standard Specifications	Valve Specifications
<u>Pipe</u> 0.75 2 ASTM A106 Gr. B, Seamless, Sch 80 3 24 ASTM A106 Gr. B, Seamless, STD. Wt. 26 60 ASTM A672 Cl 22 Gr.60, (Wall thickness calculated per Attachment L) <u>Fittings</u> 0.75 2 ASTM A105N, Class 3000 SW 3 24 ASTM A234 WPB, STD. Wt. 26 60 ASTM A234 Gr.WPB-W (100%RT) (Schedule to match pipe) <u>Flanges</u> 0.75 2 ASTM A105N, Class 150 RF. SW 3 24 ASTM A105N, Class 150 RF.WN., STD.Wt. 26 60 ASTM A105N, Class 150 RF.WN, B16.47-A (Bore to match pipe)	<u>Ball Valve</u> 3 24 VBA0151 RF **1,4 3 24 VBA0153 RF **4,6 0.75 2 VBA0609-SW **1,4 0.75 2 VBA0616 SW **4 0.75 2 VBA0617-SW **4,6 8 8 VBA5203 RF <u>Butterfly Valve Full Body Lug Style</u> 3 24 VBU1516 RF **1,5 <u>Butterfly Valve, Wafer Style</u> 8 24 VBU1502 RF **1 <u>Butterfly Valve, Double Flanged</u> 26 42 VBU1525 RF <u>Check Valve</u> 0.75 2 VCH0231#8-SW 3 6 VCH0241#8 RF <u>Check Valve, Wafer Style</u> 8 24 VWC0151 RF 26 42 VWC0163 RF <u>Combination Gate Valve</u> 3 24 VGA6003#8 RF <u>Compact Gate Valve</u> 0.75 2 VGA0031#8-SW **12 0.75 2 VGA0031#8-SW/TH **13 <u>Gate Valve</u> 3 24 VGA0041#8 RF 3 3 VGA0054#8 RF **7 0.75 2 VGA0111#8 RF 1.50 2 VGA0315#8 RF **7 26 42 VGA5142#8 RF <u>Globe Valve</u> 0.75 2 VGL0131#8-SW 3 8 VGL0141#8 RF

Special Material Specifications:

<u>Thermowells</u>	NPS 2, Class 300 RF, Flanged, A105N, see Standard Drawing DD100-L-14-1, 2
<u>Bolting</u>	ASTM A193 Gr. B7, c/w A194 Gr. 2H Nuts
<u>Gaskets</u>	Spiral Wound 316SS, Graphite filled, c/w CS Outer Ring, per ASME B16.20 Class 150, 0.125 " thk Full Face, Flexitallic - Thermicullite 715 Cut Gasket Performance series or equal **11

**** SPECIAL NOTES ****

1. Soft Seated Valves have reduced pressure/temperature ratings. Maximum temperature shall not exceed 400 F (204 C).
2. Deleted.

3. Deleted.
4. Valves shall be used only where specified by the Owner.
5. VBU1516 shall be used only where bi-directional shut-off, or blind flange installation is required.
6. Use Metal Seated Ball Valves for temperatures greater than 400 F (204 C).
7. Class 300 valves shall be used where required on instrument bridles.
8. For 45 degree branches on Flare Line, refer to DWG. DD100-L-18-1.
9. API 5L PSL-2 Br. B DSAW may be substituted for ASTM A672 Cl 22 Gr. 60 at discretion of Owner's Engineer.
10. This piping material class has a Minimum Design Metal Temperature (MDMT) of -20°F (-29°C) at the full flange rated pressure of 285 psig (1965 kPag). This piping material class may be used for applications with a MDMT of -50°F (-46°C) for design pressures of 180 psig (1241 kPag) or lower (See FIG. 323.2.2B of ASME B31.3). Based on a MDMT temperature reduction of delta 30°F, the allowable stress per ASME B31.3 is reduced by 30% (or 6000 psi).
11. Thermicullite gaskets are only to be used with flat faced flanges.
12. Vents and Drains per DD100-L-12-1
13. Pressure Instrument Connections per DD100-L-11-1
14. PWHT required for thickness per ASME B31.3.



Piping Material Specifications

Valve Details

Ball Valve

VBA0151

Rev Date 02-Jan-08

Ball Valve, Class CL150 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Split body, Blow-out proof stem, 316 SS Ball and Stem, PTFE Seats and Body Gasket, Regular Port, Design to API-608 and/or ASME B16.34

NOTES: Valve shall be fire tested to API-607; Maximum temperature 350 F.

Assigned Pipe Classes: ADX, AEA, CA, CAB, CAF, CAZ, CBA, CSA

Ball Valve

VBA0153

Rev Date 19-Jun-06

Ball Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Split body, Blow-out proof stem, 316 SS Ball and Stem, Metal Seats, 316 SS Spiral Wound Body Gasket, Regular Port, Design to API-608 and/or ASME B16.34

NOTES: Valve shall be fire tested to API-607, for use in temperatures above 400 F.

Assigned Pipe Classes: CAB, CAF, CSA

Ball Valve

VBA0609-SW

Rev Date 19-Mar-08

Ball Valve, Class CL 600 Socketweld, Cast Body to, ASTM A105 N, Removable ends for socketwelding, Blow-out proof stem, 316 SS Ball and Stem, PTFE Seats, Regular Port, Design to API-608

NOTES: Fire tested to API-607. Alternative valves may be supplied with ASTM A106 Gr. B Sch 160 nipples 150 mm (6 in.) long at each end for welding. Do not use PTFE seats at temperatures greater than 400 F

Assigned Pipe Classes: CAB, CBA

Ball Valve

VBA0616

Rev Date 19-Jun-06

Ball Valve, Class CL 600 Socketweld, Forged Carbon Steel, ASTM A105 N, Blow-out proof, 410 SS Ball, Stem & Seat to ASTM A276 Gr. 410, Renewable Seats, Regular Port, Design to API-608

NOTES: Fire tested to API-607

Stem Packing - Chesterton 1600

Bolting - A193 Gr B16

Bonnet Gasket - Spiral Wound 316 SS

Assigned Pipe Classes: CAB, EAB

Ball Valve

VBA0617-SW

Rev Date 19-Jun-06

Ball Valve, Class CL 600 Socketweld, Forged Body to, ASTM A105 N, Removable ends for socketwelding, Blow-out proof, 316 SS Ball and Stem, Metal Seated, Regular Port, Design to API-608

NOTES: Fire tested to API-607. Alternatively valves may be supplied with ASTM A106 Gr. B Sch 160 nipples 150 mm (6 in.) long at each end for welding. For use in temperatures above 400 F

Assigned Pipe Classes: CAB, CAF, CSA

Ball Valve

VBA5203

Rev Date 19-Jun-06

Ball Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Split body, Blow-out proof, 316 SS Ball and Stem, PTFE Seats and Body Gasket, Regular Port, Design to API-608 and/or ASME B16.34

NOTES: Fire tested to API-607

Trunnion Mounted

Size Range 2" - 12"

Assigned Pipe Classes: CAB

Butterfly Valve, Wafer Style

VBU1502

Rev Date 17-Sep-07

Butterfly Valve, Wafer Style, Class CL 150 RF to fit between ASME B16.5 flanges, Cast Body to, ASTM A216 Gr WCB, 316 SS Disk and Shaft, PTFE Seats, Design to API-609

NOTES: Teflon bushing; Maximum temperature 350 F;

Assigned Pipe Classes: AEA, CA, CAB

Butterfly Valve Full Body Lug

VBU1516

Rev Date 19-Jun-06

Butterfly Valve Full Body Lug Style, Class CL 150 RF to fit between ASME B16.5 flanges, Cast Body to, ASTM A216 Gr WCB, 316 SS Disk and Stem, PTFE Seats, Design to API-609

Assigned Pipe Classes: CA, CAB

Butterfly Valve, Double Flange**VBU1525**

Rev Date 19-Jun-06

Butterfly Valve, Double Flanged, Class CL 150 RF to ASME B16.47-A, Cast Body to, ASTM A216 Gr WCB, Carbon Steel Disc Triple Offset, Stainless Steel Shaft, bi-directional shut-off, Stellite Seat, Design to API-609

Assigned Pipe Classes: CAB

Check Valve**VCH0231#8-SW**

Rev Date 22-Feb-08

Check Valve, Class CL 800 Socketweld, Forged Body to, ASTM A105 N, Bolted Cover, Piston/Lift Type with Spring, API Trim 8, Integral or renewable, Full Port, Design to API-602

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: CA, CAB, CAZ, CBA, CHY, CS, EA, EAB, EDB, ES, HB, HBD

Check Valve**VCH0241#8**

Rev Date 17-Feb-08

Check Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Cover, Swing Type, API Trim 8 design to API 600, Integral or Welded Hard Faced Seat

NOTES: Pressure/Temperature Rating to ASME B16.34

Assigned Pipe Classes: ADX, CA, CAB, CAH, CAZ, CBA, CHY, CLF, CS

Compact Gate Valve**VGA0031#8-SW**

Rev Date 04-Apr-08

Compact Gate Valve, Class CL 800 Socketweld, Forged Body to, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 8, Integral or Renewable seats, Regular Port, Design to API-602

Assigned Pipe Classes: CA, CAB, CAZ, CBA, CHY, CS, EA, EAB, EDB, HB, HBD, 662-2, 662-3

Compact Gate Valve**VGA0031#8-SW/TH**

Rev Date 04-Apr-08

Compact Gate Valve, Class CL800 Socketweld/Threaded, Forged Carbon Steel, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 8, Integral or renewable hard faced seats, Regular Port, Design to API-602

Assigned Pipe Classes: CA, CAB, CAZ, CBA, CHY, CS, EA, EAB, EDB, HB, HBD, 662-2, 662-3

Gate Valve**VGA0041#8**

Rev Date 17-Feb-08

Gate Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 8, Integral or Welded in Seats, Design to API-600

Assigned Pipe Classes: ADX, CA, CAB, CAH, CAZ, CBA, CHY, CS

Gate Valve**VGA0054#8**

Rev Date 17-Feb-08

Gate Valve, Class CL 300 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 8, Integral or Welded in Seats, Design to API-600

Assigned Pipe Classes: CA, CAB, CAH, CAZ, CBA, CS, EA, EAB, EDB, ES, 662-3

Gate Valve**VGA0111#8**

Rev Date 17-Feb-08

Gate Valve, Class CL 150 RF to ASME B16.5, Forged Body w/integral flanges, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 8, Integral or Renewable seats, Regular Port, Design to API-602

Assigned Pipe Classes: CA, CAB, CAH, CBA, CS

Gate Valve**VGA0315#8**

Rev Date 17-Feb-08

Gate Valve, Class CL 300 RF to ASME B16.5, Forged Body w/integral flanges, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 8, Integral or Renewable seats, Regular Port, Design to API-602

Assigned Pipe Classes: CA, CAB, CAH, CBA, CS, EA, EAB, EDB, ES

Gate Valve**VGA5142#8**

Rev Date 22-Feb-08

Gate Valve, Class CL 150 RF to ASME B16.47-A, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, Flexible Wedge, API Trim 8 design to API 600, Integral or Welded in Seats

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: CA, CAB, CHY, CS

Combination Gate Valve**VGA6003#8**

Rev Date 29-Feb-08

Combination Gate Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 8, Integral or Welded in or Renewable Seats, Design to API-600

NOTES: Combination Gate Valve with 3/4" Drain Valve

Combination Gate Valve Tag VGA0041#8 w/Drain Valve to Tag VGA0031#8-SW.

Integral Drain Connection shall be Full Penetration Weld and shall be Gusseted to the main valve body with 2 Gusset Plates in the same plane per DD100-L-17-1.

Assigned Pipe Classes: CAB

Globe Valve

VGL0131#8-SW

Rev Date 23-Jun-06

Globe Valve, Class CL 800 Socketweld, Forged Body to, ASTM A105 N, Bolted Bonnet, OS & Y, Integral or Renewable seats, Hard Faced Seat to API Trim 8, Design to API-602
Assigned Pipe Classes: CA, CAB, CAZ, CBA, CHY, CS, EA, EAB, EDB, HB, HBD

Globe Valve

VGL0141#8

Rev Date 22-Feb-08

Globe Valve, Class CL 150 RF to ASME B16.5, Cast Carbon Steel, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, Plug Type Disc, API Trim 8 design to API 600, Integral or Welded in Seats
NOTES: Pressure/Temperature rating to ASME B16.34
Assigned Pipe Classes: ADX, CA, CAB, CAH, CAZ, CBA, CS

Check Valve, Wafer Style

VWC0151

Rev Date 19-Jun-06

Check Valve, Wafer Style, Class CL 150 RF to fit between ASME B16.5 flanges, Cast Body to, ASTM A216 Gr WCB, Retainerless Style, Dual Carbon Steel Plates, Inconel X750 Spring(s), Lapped Seats, w/Stellite Hard Faced Overlay, Design to API-594
Assigned Pipe Classes: AEA, CA, CAB, CAZ, CS

Check Valve, Wafer Style

VWC0163

Rev Date 06-Nov-07

Check Valve, Wafer Style, Class 150 RF to fit between ASME B16.47-A flanges, Cast Body to, ASTM A216 Gr WCB, Retainerless Style, Dual Carbon Steel Plates, Inconel X750 Spring(s), Lapped Seats, w/Stellite Hard Faced Overlay, Design to API-594
Assigned Pipe Classes: CA, CAB, CS



Piping Material Specifications

Rev: **4**

Service Desc: <i>General Hydrocarbon, corrosive, with Wet Acid Gas</i>					Temp: <i>800 (427)</i>	°F(°C)max
Materials: <i>Carbon Steel</i>		Corrosion Allow: <i>0.125</i>			Code: <i>ASME B31.3</i>	
Material P&T:	<i>285</i>	PSI @	<i>-20</i>	°F min.	Based on: <i>ASME B16.5 MG 1.1</i>	Branch Conn Tbl: <i>I</i>
	<i>(1965)</i>	Kpa @	<i>(-29)</i>	°C min.		Inspection Class: <i>III</i>
	<i>80</i>	PSI @	<i>800</i>	°F max.		
	<i>(552)</i>	Kpa @	<i>(427)</i>	°C max.		
P.W.H.T. : <i>NO (**5, 12)</i>				Welding Proc:	<i>Refer to Suncor Firebag STD FB-L-5217</i>	

Standard Specifications			Valve Specifications		
<u>Pipe</u>			<u>Ball Valve</u>		
0.75	2	ASTM A106 Gr. B, Seamless, Sch 80	3	12	VBA0151 RF **1,8,9
3	24	ASTM A106 Gr. B, Seamless, STD. Wt.	3	24	VBA0153 RF **8,9
26	48	ASTM A672 Cl 22 Gr.C60, (Wall thickness calculated per Attachment L)	0.75	2	VBA0602-TH **1,8,9
			0.75	2	VBA0617-SW **8,9
<u>Fittings</u>			<u>Check Valve</u>		
0.75	2	ASTM A105N, Class 3000 SW	0.75	2	VCH0231#12-SW
3	24	ASTM A234 WPB, STD. Wt.	3	6	VCH0241#12 RF
26	48	ASTM A234 Gr.WPB-W (100%RT) (Schedule to match pipe)	<u>Check Valve, Wafer Style</u>		
<u>Flanges</u>			8	24	VWC0157 RF
0.75	2	ASTM A105N, Class 150 RF. SW	26	48	VWC0158 RF
3	24	ASTM A105N, Class 150 RF.WN., STD.Wt.	<u>Compact Gate Valve</u>		
26	48	ASTM A105N, Class 150 RF.WN B16.47-A (Bore to match pipe)	0.75	2	VGA0031#12-SW
			0.75	2	VGA0031#12-SW/TH
			<u>Gate Valve</u>		
			3	24	VGA0041#12 RF
			26	48	VGA0053#12 RF
			3	4	VGA0054#12 RF **7
			0.75	2	VGA0112#12 RF **6
			1.50	2	VGA0312#12 RF **7
			<u>Globe Valve</u>		
			0.75	2	VGL0131#12-SW
			3	8	VGL0141#12 RF

Special Material Specifications:

<u>Thermowells</u>	NPS 2, Class 300 RF, Flanged, A105N, see Standard Drawing DD100-L-14-1, 2
<u>Bolting</u>	ASTM A193 Gr. B7, c/w A194 Gr. 2H Nuts
<u>Gaskets</u>	Spiral Wound 316SS, Graphite filled, c/w CS Outer Ring, per ASME B16.20

**** SPECIAL NOTES ****

1. Soft seated valves have reduced pressure/temperature ratings. Maximum temperature shall not exceed 400 F (204 C).
2. Deleted.
3. Positive Isolation required per drawings DD100-L-31-1, 2 and 3.
4. Wall thickness readings shall be made per Work Practice, PMW 0018A, "Baseline Ultrasonic Survey".
5. Hardness control requirements of NACE RP0472 shall be met for all welds in this class as referenced in Suncor Firebag STD FB-L-5217
6. Flanged gate valves are preferred for vents and drains and instrument connections.
7. Class 300 valves shall be used where required on instrument bridles.
8. Use Metal Seated Ball Valves for temperatures greater than 400 F (204 C).
9. Valves shall be used only where specified by the Owner.
10. Vents and Drains per DD100-L-12-1.
11. Pressure Instrument Connections per DD100-L-11-1.
12. PWHT required for thickness per ASME B31.3.



Piping Material Specifications

Valve Details

Ball Valve

VBA0151

Rev Date 02-Jan-08

Ball Valve, Class CL150 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Split body, Blow-out proof stem, 316 SS Ball and Stem, PTFE Seats and Body Gasket, Regular Port, Design to API-608 and/or ASME B16.34

NOTES: Valve shall be fire tested to API-607; Maximum temperature 350 F.

Assigned Pipe Classes: ADX, AEA, CA, CAB, CAF, CAZ, CBA, CSA

Ball Valve

VBA0153

Rev Date 19-Jun-06

Ball Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Split body, Blow-out proof stem, 316 SS Ball and Stem, Metal Seats, 316 SS Spiral Wound Body Gasket, Regular Port, Design to API-608 and/or ASME B16.34

NOTES: Valve shall be fire tested to API-607, for use in temperatures above 400 F.

Assigned Pipe Classes: CAB, CAF, CSA

Ball Valve

VBA0602-TH

Rev Date 30-Oct-06

Ball Valve, Class CL 600 Threaded, Forged Body to, ASTM A105 N, Blow-out proof stem, 316 SS Ball and Stem, RTFE seats, Regular Port, Design to API-608

NOTES: Firesafe per API-607; Maximum temperature 350 F

Assigned Pipe Classes: ADX, CA, CAF, CAZ, EA

Ball Valve

VBA0617-SW

Rev Date 19-Jun-06

Ball Valve, Class CL 600 Socketweld, Forged Body to, ASTM A105 N, Removable ends for socketwelding, Blow-out proof, 316 SS Ball and Stem, Metal Seated, Regular Port, Design to API-608

NOTES: Fire tested to API-607. Alternatively valves may be supplied with ASTM A106 Gr. B Sch 160 nipples 150 mm (6 in.) long at each end for welding. For use in temperatures above 400 F

Assigned Pipe Classes: CAB, CAF, CSA

Check Valve

VCH0231#12-SW

Rev Date 22-Feb-08

Check Valve, Class CL 800 Socketweld, Forged Body to, ASTM A105 N, Bolted Cover, Piston/Lift Type with Spring, API Trim 12, Integral or Renewable seats, Hard Faced Seat & Disc, Full Port, Design to API-602

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: AEC, CAF, CBF

Check Valve

VCH0241#12

Rev Date 17-Feb-08

Check Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Cover, Swing Type, API Trim 12 design to API-600, Integral or Welded in Seats, Hard Faced Seat

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: AEC, CAF, CBF

Compact Gate Valve

VGA0031#12-SW

Rev Date 17-Feb-08

Compact Gate Valve, Class CL 800 Socketweld, Forged Body to, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 12, Integral or Renewable seats, Regular Port, Design to API-602

Assigned Pipe Classes: AEC, CAF, CAR, CBF

Compact Gate Valve

VGA0031#12-SW/TH

Rev Date 17-Feb-08

Compact Gate Valve, Class CL 800 Socketweld/Threaded, Forged Body to, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 12, Integral or Renewable seats, Regular Port, Design to API-602

Assigned Pipe Classes: AEC, AED, CAF, CAQ, CAR, CBF

Gate Valve

VGA0041#12

Rev Date 17-Feb-08

Gate Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 12, Integral or Welded in Seats, Design to API-600

Assigned Pipe Classes: AEC, CAF, CAQ, CAR, CBF

Gate Valve

VGA0053#12

Rev Date 22-Feb-08

Gate Valve, Class CL 150 RF to ASME B16.47-A, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 12 design to API-600, Integral or Welded in Seats

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: CAF

Gate Valve

VGA0054#12

Rev Date 10-Jun-08

Gate Valve, Class CL300 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 12, Integral or Welded in Seats, Design to API-600
Assigned Pipe Classes: CAF, CBF, EDC

Gate Valve

VGA0112#12

Rev Date 17-Feb-08

Gate Valve, Class CL 150 RF to ASME B16.5, Forged Body w/integral flanges, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 12, Integral or Renewable seats, Regular Port, Design to API-602
Assigned Pipe Classes: CAF, CBF

Gate Valve

VGA0312#12

Rev Date 17-Feb-08

Gate Valve, Class CL 300 RF to ASME B16.5, Forged Body w/integral flanges, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 12, Integral or Renewable seats, Regular Port, Design to API-602
Assigned Pipe Classes: CAF, CBF, EDC

Globe Valve

VGL0131#12-SW

Rev Date 19-Jun-06

Globe Valve, Class CL 800 Socketweld, Forged Body to, ASTM A105 N, Bolted Bonnet, OS & Y, Integral or Renewable seats, Hard faced Seat & Disc, API Trim 12, Design to API-602
Assigned Pipe Classes: AEC, CAF, CBF

Globe Valve

VGL0141#12

Rev Date 22-Feb-08

Globe Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, API Trim 12 design to API-600, Integral or Welded in Seats, Hard Faced Seat
NOTES: Pressure/Temperature rating to ASME B16.34
Assigned Pipe Classes: AEC, CAF, CBF

Check Valve, Wafer Style

VWC0157

Rev Date 28-Jun-06

Check Valve, Wafer Style, Class CL 150 RF to fit between ASME B16.5 flanges, Cast Body to, ASTM A216 Gr WCB, Retainerless Style, Dual 316SS Plates, Inconel X750 Spring(s), Lapped Seats, w/Stellite Hard Faced Overlay, Design to API-594
Assigned Pipe Classes: CAF, CBF

Check Valve, Wafer Style

VWC0158

Rev Date 05-Jul-06

Check Valve, Wafer Style, Class CL 150 RF to fit between ASME B16.47-A flanges, Cast Body to, ASTM A216 Gr WCB, Retainerless Style, Dual 316SS Plates, Inconel X750 Spring(s), Lapped Seats, w/Stellite Hard Faced Overlay, Design to API-594
Assigned Pipe Classes: CAF



Piping Material Specifications

Rev: **4**

Service Desc:	Hydrocarbons, very corr, Wet Acid Gas, Sour Water & 93 wt% Sulphuric Acid			Temp:	800 (427)	°F(°C)max
Materials:	316/316L Stainless Steel **3			Corrosion Allow:	0.125	Code: ASME B31.3
Material P&T:	275	PSI @	-50	°F min.	Based on:	ASME B16.5 MG 2.2
	(1896)	Kpa @	(-46)	°C min.	Branch Conn Tbl:	I
	80	PSI @	800	°F max.	Inspection Class:	III
	(552)	Kpa @	(427)	°C max.		
P.W.H.T. :	NO			Welding Proc:	Refer to Suncor Firebag STD FB-L-5217	

Standard Specifications

Valve Specifications

<u>Pipe</u> 0.75 2 ASTM A312, Type 316/316L, Seamless, Sch.80S 3 10 ASTM A312, Type 316/316L, Seamless, Sch.40S 12 24 ASTM A358 Gr. 316/316L Cl.1, EFW (Wall thickness calculated per Attachment L)				<u>Ball Valve</u> 3 12 VBA0152 RF 0.75 2 VBA0805-SW			
<u>Fittings</u> 0.75 2 ASTM A182 F316/316L, Class 3000 SW **1 3 10 ASTM A403 Gr. WP 316/316L-S, (Schedule to match pipe) 12 24 ASTM A403 Gr. WP 316/316L-WX, (Schedule to match pipe)				<u>Check Valve</u> 0.75 2 VCH0218#12-SW 3 6 VCH0246#12 RF			
<u>Flanges</u> 0.75 2 ASTM A182 F316/316L, Class 150 RF.SW. 3 24 ASTM A182 F316/316L, Class 150 RF.WN, (Bore to match pipe)				<u>Check Valve, Wafer Style</u> 8 24 VWC0162 RF			
				<u>Compact Gate Valve</u> 0.75 2 VGA0028#12-SW 0.75 2 VGA0028#12-SW/TH			
				<u>Gate Valve</u> 3 24 VGA0046#12 RF 0.75 2 VGA0101#12 RF 2 2 VGA5028#12 RF **5 1.50 2 VGA5032#12 RF **5 3 4 VGA5056#12 RF **5			
				<u>Globe Valve</u> 0.75 2 VGL0126#12-SW 3 8 VGL0142#12 RF			

Special Material Specifications:

<u>Thermowells</u>	NPS 2, Class 300 RF, Flanged, A182 Type 316/316L, see Standard Drawing DD100-L-14-1, 2
<u>Bolting</u>	ASTM A193 Gr. B7, c/w A194 Gr. 2H Nuts
<u>Gaskets</u>	Spiral Wound 316SS, Graphite filled, c/w CS Outer Ring, per ASME B16.20

** SPECIAL NOTES **

- Unions not permitted, use flanges.
- Deleted.
- Dual certified material pressure/temperature ratings are based on the higher ratings of the straight grade material.
- Positive Isolation required per drawings DD100-L-31-1, 2 and 3.
- Class 300 valve shall be used where required on instrument bridles.
- Vents and Drains per DD100-L-12-1.
- Pressure Instrument Connections per DD100-L-11-1.



Piping Material Specifications

Valve Details

Ball Valve

VBA0152

Rev Date 26-Jun-08

Ball Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A351 Gr. CF8M, Split body, Blow-out proof stem, 316 SS Ball and Stem, Metal Seated, w/Stellite Hard Faced Overlay, Regular Port, Design to API-608 and/or ASME B16.34

NOTES: Valve shall be fire tested to API-607;

Assigned Pipe Classes: CAG

Ball Valve

VBA0805-SW

Rev Date 06-Nov-07

Ball Valve, Class CL 600 Socketweld, Forged Body to, ASTM A182 F316/316L Dual Cert., Blow-out proof stem, 316 SS Ball and Stem, Renewable RTFE Seats, Full Port, Design to API-608

NOTES: Valve shall be tested to API 607, Maximum temperature 350F

Assigned Pipe Classes: CAG

Check Valve

VCH0218#12-SW

Rev Date 17-Feb-08

Check Valve, Class CL 800 Socketweld, Forged Body to, ASTM A182 F316/316L Dual Cert., Bolted Cover, Spring-loaded Ball Type, API Trim 12, Integral or Renewable seats, Full Port, Design to API-602

Assigned Pipe Classes: CAG, EAG, HAG

Check Valve

VCH0246#12

Rev Date 17-Feb-08

Check Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A351 Gr. CF8M, Bolted Cover, Swing Type, API Trim 12 design to API-600, Integral or Welded Hard Faced Seat, Hard Faced Seat

NOTES: Pressure/Temperature Rating to ASME B16.34.

Assigned Pipe Classes: CAG

Compact Gate Valve

VGA0028#12-SW

Rev Date 17-Feb-08

Compact Gate Valve, Class CL 800 Socketweld, Forged Body to, ASTM A182 F316/316L Dual Cert., Bolted Bonnet, OS & Y, Solid Wedge, API Trim 12, Integral or Renewable seats, Regular Port, Design to API-602

Assigned Pipe Classes: CAG, EAG

Compact Gate Valve

VGA0028#12-SW/TH

Rev Date 17-Feb-08

Compact Gate Valve, Class CL 800 Socketweld/Threaded, Forged Body to, ASTM A182 F316/316L Dual Cert., Bolted Bonnet, OS & Y, Solid Wedge, API Trim 12, Integral or Renewable seats, Regular Port, Design to API-602

Assigned Pipe Classes: CAG, EAG

Gate Valve

VGA0046#12

Rev Date 17-Feb-08

Gate Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A351 Gr. CF8M, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 12, Integral, Welded in or Renewable Seats, Design to API-600

Assigned Pipe Classes: CAG

Gate Valve

VGA0101#12

Rev Date 17-Feb-08

Gate Valve, Class CL 150 RF to ASME B16.5, Forged Body w/integral flanges, ASTM A182 F316/316L Dual Cert., Bolted Bonnet, OS & Y, Solid Wedge, API Trim 12, Integral or Renewable seats, Regular Port, Design to API-602

Assigned Pipe Classes: CAG

Gate Valve

VGA5028#12

Rev Date 17-Feb-08

Gate Valve, Class CL 300 RF to ASME B16.5, Forged Body w/integral flanges, ASTM A182 F316/316L Dual Cert., Bolted Bonnet, OS & Y, Solid Wedge, API Trim 12, Integral or Renewable seats, Regular Port, Design to API-602

NOTES: Forging to have a 2.5% minimum Molybdenum content; ASTM A 182 Gr. 317/317L Dual certified is an acceptable substitute

Assigned Pipe Classes: CAG

Gate Valve

VGA5032#12

Rev Date 19-Jun-06

Gate Valve, Class CL 300 RF to ASME B16.5, Forged Body w/integral flanges, ASTM A182 F316/316L Dual Cert., Bolted Bonnet, OS & Y, Solid Wedge, Integral or Renewable seats, Hard faced Seat & Disc, API Trim 12, Regular Port, Design to API-602

Assigned Pipe Classes: CAG, EAG

Gate Valve

VGA5056#12

Rev Date 18-Sep-07

Gate Valve, Class CL 300 RF to ASME B16.5, Cast Body to, ASTM A351 Gr. CF8M, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, Integral or Welded in or Renewable Seats, Hard faced Seat & Disc, API Trim 12, Regular Port, Design to API-600
Assigned Pipe Classes: CAG

Globe Valve

VGL0126#12-SW

Rev Date 02-May-08

Globe Valve, Class CL 800 Socketweld, Forged Body to, ASTM A182 F316/316L Dual Cert., Bolted Bonnet, OS & Y, API Trim 12, Integral or Renewable seats, Design to API-602
Assigned Pipe Classes: CAG, EAG, HAG, HH

Globe Valve

VGL0142#12

Rev Date 22-Feb-08

Globe Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A351 Gr. CF8M, Bolted Bonnet, OS & Y, API Trim 12 design to API-600, Integral or Welded in Seats, Hard Faced Seat
NOTES: Pressure/Temperature rating to ASME B16.34
Assigned Pipe Classes: CAG

Check Valve, Wafer Style

VWC0162

Rev Date 19-Jun-06

Check Valve, Wafer Style, Class CL 150 RF to fit between ASME B16.5 flanges, Cast Body to, ASTM A351 Gr. CF8M, Retainerless Style, Dual 316SS Plates, Inconel X750 Spring(s), Lapped Seats, w/Stellite Hard Faced Overlay, Design to API-594
Assigned Pipe Classes: CAG



Piping Material Specifications

Rev: **4**

Service Desc: <i>Caustic Soda (all concentrations)</i>				Temp: <i>150 (66)</i> °F(°C)max	
Materials: <i>Carbon Steel</i>		Corrosion Allow: <i>0.0625</i>		Code: <i>ASME B31.3</i>	
Material P&T:	<i>285</i>	PSI @	<i>50</i>	°F min.	Based on: <i>ASME B16.5 MG 1.1</i> Branch Conn Tbl: <i>2</i> Inspection Class: <i>III</i>
	<i>(1965)</i>	Kpa @	<i>(10)</i>	°C min.	
	<i>273</i>	PSI @	<i>150</i>	°F max.	
	<i>(1882)</i>	Kpa @	<i>(66)</i>	°C max.	
P.W.H.T. : <i>YES</i>				Welding Proc: <i>Refer to Suncor Firebag STD FB-L-5217</i>	

Standard Specifications			Valve Specifications		
<u>Pipe</u>			<u>Check Valve</u>		
0.75	1	ASTM A106 Gr. B, Seamless, Sch. 160	0.75	2	VCH0231#8-TH **4
1.5	2	ASTM A106 Gr. B, Seamless, Sch 80	3	24	VCH0241#8 RF
3	24	ASTM A106 Gr. B, Seamless, STD. Wt.	0.75	1	VCH0295#8-160 BW Sch 160
26	30	ASTM A672 Cl 22 Gr.C60, (Wall thickness calculated per Attachment L)	1.50	2	VCH0295#8-80 BW Sch 80
<u>Fittings</u>			<u>Compact Gate Valve</u>		
0.75	1	ASTM A105N, Class 3000 TH. **1,4	0.75	2	VGA0031#8-TH
0.75	24	ASTM A234 WPB, (Schedule to match Pipe)	0.75	1	VGA0808#8-160 BW Sch 160
26	30	ASTM A234 WPB-W, (100%RT) (Schedule to match Pipe)	1.5	2	VGA0808#8-80 BW Sch 80
<u>Flanges</u>			<u>Gate Valve</u>		
0.75	1	ASTM A105N, Class 150 RF.TH. **4	3	24	VGA0041#8 RF
0.75	24	ASTM A105N, Class 150 RF.WN, (Bore to match Pipe)	3	4	VGA0054#8 RF **7
26	30	ASTM A105N, Class 150 RF.WN B16.47-A (Bore to match pipe)	0.75	2	VGA0111#8 RF
			1.50	2	VGA0315#8 RF **7
			<u>Globe Valve</u>		
			0.75	1	VGL0131#8-TH **4
			3	6	VGL0141#8 RF
			0.75	1	VGL0809#8-160 BW Sch 160
			1.5	2	VGL0809#8-80 BW Sch 80

Special Material Specifications:

<u>Thermowells</u>	NPS 2, Class 300 RF, Flanged, A105N, see Standard Drawing DD100-L-14-1, 2
<u>Bolting</u>	ASTM A193 Gr. B7, c/w A194 Gr. 2H Nuts
<u>Gaskets</u>	Spiral Wound 316SS, Graphite filled, c/w CS Outer Ring, per ASME B16.20

**** SPECIAL NOTES ****

1. Socketwelds shall not be used in Caustic Soda service.
2. Insulated flanges to have removable insulation blankets with weephole. Non-insulated flanges to have non-reactive metal spray shield with weephole.
3. For Caustic Soda services at higher temperatures see Pipe Class "CLB".
4. Threaded connections in NPS 3/4" and 1" are acceptable, but where disassembly for maintenance is not required, butt weld shall be used.
5. Deleted.
6. Deleted.
7. Vents and Drains per DD100-L-12-2.
8. Pressure Instrument Connections per DD100-L-11-1.



Piping Material Specifications

Valve Details

Check Valve

VCH0231#8-TH

Rev Date 22-Feb-08

Check Valve, Class CL 800 Threaded, Forged Body to, ASTM A105 N, Bolted Cover, Piston/Lift Type with Spring, API Trim 8, Integral or renewable, Full Port, Design to API-602

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: ADX, CAH

Check Valve

VCH0241#8

Rev Date 17-Feb-08

Check Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Cover, Swing Type, API Trim 8 design to API 600, Integral or Welded Hard Faced Seat

NOTES: Pressure/Temperature Rating to ASME B16.34

Assigned Pipe Classes: ADX, CA, CAB, CAH, CAZ, CBA, CHY, CLF, CS

Check Valve

VCH0295#8-160

Rev Date 22-Feb-08

Check Valve, Class CL 800 Butt weld Ends Sch 160, Forged Body to, ASTM A105 N, Bolted Cover,

Piston/Lift Type with Spring, API Trim 8, Integral or renewable hard faced seats, Full Port, Design to API-602

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: CAH

Check Valve

VCH0295#8-80

Rev Date 22-Feb-08

Check Valve, Class CL 800 Butt weld Ends Sch 80, Forged Body to, ASTM A105 N, Bolted Cover,

Piston/Lift Type with Spring, API Trim 8, Integral or renewable hard faced seats, Full Port, Design to API-602

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: CAH

Compact Gate Valve

VGA0031#8-TH

Rev Date 17-Feb-08

Compact Gate Valve, Class CL 800 Threaded, Forged Body to, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 8, Integral or Renewable seats, Regular Port, Design to API-602

Assigned Pipe Classes: ADX, CAH

Gate Valve

VGA0041#8

Rev Date 17-Feb-08

Gate Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 8, Integral or Welded in Seats, Design to API-600

Assigned Pipe Classes: ADX, CA, CAB, CAH, CAZ, CBA, CHY, CS

Gate Valve

VGA0054#8

Rev Date 17-Feb-08

Gate Valve, Class CL 300 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 8, Integral or Welded in Seats, Design to API-600

Assigned Pipe Classes: CA, CAB, CAH, CAZ, CBA, CS, EA, EAB, EDB, ES, 662-3

Gate Valve

VGA0111#8

Rev Date 17-Feb-08

Gate Valve, Class CL 150 RF to ASME B16.5, Forged Body w/integral flanges, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 8, Integral or Renewable seats, Regular Port, Design to API-602

Assigned Pipe Classes: CA, CAB, CAH, CBA, CS

Gate Valve

VGA0315#8

Rev Date 17-Feb-08

Gate Valve, Class CL 300 RF to ASME B16.5, Forged Body w/integral flanges, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 8, Integral or Renewable seats, Regular Port, Design to API-602

Assigned Pipe Classes: CA, CAB, CAH, CBA, CS, EA, EAB, EDB, ES

Compact Gate Valve

VGA0808#8-160

Rev Date 17-Feb-08

Compact Gate Valve, Class CL 800 Butt weld Ends Sch 160, Forged Body to, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 8, Integral or Renewable seats, Design to API-602

Assigned Pipe Classes: CAH

Compact Gate Valve

VGA0808#8-80

Rev Date 17-Feb-08

Compact Gate Valve, Class CL 800 Butt weld Ends Sch 80, Forged Body to, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 8, Integral or Renewable seats, Design to API-602

Assigned Pipe Classes: CAH

Globe Valve

VGL0131#8-TH

Rev Date 19-Jun-06

Globe Valve, Class CL 800 Threaded, Forged Body to, ASTM A105 N, Bolted Bonnet, OS & Y, Integral or renewable, Hard Faced Seat to API Trim 8, Design to API-602
Assigned Pipe Classes: ADX, CAH

Globe Valve

VGL0141#8

Rev Date 22-Feb-08

Globe Valve, Class CL 150 RF to ASME B16.5, Cast Carbon Steel, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, Plug Type Disc, API Trim 8 design to API 600, Integral or Welded in Seats
NOTES: Pressure/Temperature rating to ASME B16.34
Assigned Pipe Classes: ADX, CA, CAB, CAH, CAZ, CBA, CS

Globe Valve

VGL0809#8-160

Rev Date 22-Feb-08

Globe Valve, Class CL 800 Buttweld Ends Sch 160, Forged Body to, ASTM A105 N, Bolted Bonnet, OS & Y, API Trim 8 design to API 600, Integral or Renewable seats
NOTES: Pressure/Temperature rating to ASME B16.34
Assigned Pipe Classes: CAH

Globe Valve

VGL0809#8-80

Rev Date 17-Feb-08

Globe Valve, Class CL 800 Buttweld Ends Sch 80, Forged Body to, ASTM A105 N, Bolted Bonnet, OS & Y, API Trim 8, Integral or Renewable seats, Design to API-602
Assigned Pipe Classes: CAH



Piping Material Specifications

Rev: **4**

Service Desc: <i>Hydrochloric Acid (Outdoor)</i>					Temp: <i>200 (93)</i>		°F(°C)max	
Materials: <i>Stainless Steel Teflon Lined</i>				Corrosion Allow: <i>0</i>		Code: <i>ASME B31.3</i>		
Material P&T:	<i>275</i>	PSI @	<i>-50</i>	°F min.	Based on: <i>ASME 16.5 MG 2.1</i>	Branch Conn Tbl: <i>Manuf. Std.</i>		
	<i>(1896)</i>	Kpa @	<i>(-46)</i>	°C min.		Inspection Class: <i>III</i>		
	<i>230</i>	PSI @	<i>200</i>	°F max.				
	<i>(1586)</i>	Kpa @	<i>(93)</i>	°C max.				
P.W.H.T. : <i>NO</i>					Welding Proc: <i>Refer to Suncor Firebag STD FB-L-5217</i>			

Standard Specifications			Valve Specifications		
<u>Pipe</u>			<u>Ball Valve</u>		
1	10	ASTM A312 Type 304/304L, Seamless, Sch. 40S, PTFE Lined	1	10	VBA0310 RF, PFA Lined
<u>Fittings</u>			2	2	VBA0314 RF, PFA Lined
1	10	ASTM A403 Gr. 304/304L WP-S, (Schedule to match pipe), RF, PTFE Lined	<u>Check Valve</u>		
<u>Flanges</u>			1	10	VCH0239 RF, PFA Lined
1	10	ASTM A182 F304/304L, Class 150 RF, Blind Flange **10, 11			
1	10	ASTM A182 F304/304L, Class 150 Lap Joint per ASME B16.5 /w Stub End per ASME B16.9, PTFE Lined, OR Approved Manufacturer's Standard. **10, 12			

Special Material Specifications:

<u>Bolting</u>	Hastelloy C276 UNS N10276, ASTM F468 Studs, c/w F467 Nuts
<u>Gaskets</u>	CL 150 Reinforced PTFE, 3mm

**** SPECIAL NOTES ****

1. Spool length shall be per Manufacturer's recommendation.
2. All valves to have reinforced teflon packing and gaskets.
3. Inner liner forms raised face portion of lined valve and pipe flanged ends.
4. Gasket required only for connection to equipment and unlined components.
5. Flanges in outdoor applications to have removable insulation blankets with weep hole.
6. Install check valves immediately upstream of dilution tees and PTFE spools on both the acid and dilution water piping, as per recommended installation procedures by the pipe manufacturer.
7. Positive Isolation required per drawings DD100-L-31-1, 2 and 3.
8. Vents and Drains per DD100-L-12-1.
9. Pressure Instrument Connections per DD100-L-11-2.
10. Follow manufacturer's requirements for bolt torquing of flanges.
11. Blind flanges to be installed with a solid PTFE "blind spacer ring" between the mating piping flange and a carbon steel blind flange, or alternatively use lined blind flange depending on manufacturer selected.
12. Lap flange may be provided integral with pipe, in lieu of welded stub end.



Piping Material Specifications

Valve Details

Ball Valve

VBA0310

Rev Date 17-Sep-07

Ball Valve, Class CL 150 RF w/Recessed Seat Ring, Cast Body and Bonnet to, ASTM A351 Gr. CF8M, Split body, Blow-out proof stem, Fluoropolymer Lined, 316 SS Ball and Trim, Integral or Renewable seats, PTFE Seats and Body Gasket, Full Port, Design to ASME B16.34

NOTES: Body and bonnet to be Fluoropolymer Lined, 316 SS Ball and Trim Fluoropolymer Lined, Hastelloy "C" Stem, PTFE Stem Packing; Maximum temperature 350 F;

Assigned Pipe Classes: CAI

Ball Valve

VBA0314

Rev Date 06-Nov-07

Ball Valve, Class Class CL300 RF to ASME B16.5, Cast Body and Bonnet to, ASTM A351 Gr. CF8M, Split body, Blow-out proof stem, Fluoropolymer Lined, 316 SS Ball and Trim, Recessed Seat Ring, Full Port, Design to ASME B16.34

NOTES: Body and Bonnet to be Fluoropolymer Lined, 316 SS Ball and Trim to be Fluoropolymer Lined, Hastelloy "C" Stem, PTFE Stem Packing, Maximum temperature 350F

Assigned Pipe Classes: CAI

Check Valve

VCH0239

Rev Date 19-Jun-06

Check Valve, Class CL 150 RF w/Recessed Seat Ring, Cast Body and Cover to, ASTM A351 Gr. CF8M, Bolted Cover, In-line Ball Type, PTFE Lined, Integral, Welded in or Renewable Seats, Design to ASME B16.34

NOTES: Body and Cover to be Fluoropolymer Lined, 316 SS Disc and Seat Fluoropolymer Lined; Maximum temperature 200 F

Assigned Pipe Classes: CAI



Piping Material Specifications

Rev: **4**

Service Desc: <i>Hydrogen Peroxide</i>				Temp: <i>200 (93)</i> °F(°C)max	
Materials: <i>Stainless Steel</i>		Corrosion Allow: <i>0.0625</i>		Code: <i>ASME B31.3</i>	
Material P&T:	<i>230</i>	PSI @	<i>-50</i>	°F min.	Based on: <i>ASME B16.5 MG 2.3</i> Branch Conn Tbl: <i>Note 7</i> Inspection Class: <i>III</i>
	<i>(1586)</i>	Kpa @	<i>(-46)</i>	°C min.	
	<i>195</i>	PSI @	<i>200</i>	°F max.	
	<i>(1344)</i>	Kpa @	<i>(93)</i>	°C max.	
P.W.H.T. : <i>NO</i>				Welding Proc: <i>Refer to Suncor Firebag STD FB-L-5217</i>	

Standard Specifications			Valve Specifications			
<u>Pipe</u>			<u>Ball Valve</u>			
0.75	1.5	ASTM A312 Type 316L, Seamless, Sch. 80S **4	0.75	0.75	VBA0605	TH **3, 4, 5
2	4	ASTM A312 Type 316L, Seamless, Sch. 10S **4	<u>Check Valve</u>			
<u>Fittings</u>			0.75	4	VCH5281#10	RF **4
0.75	4	ASTM A403 Gr. 316L-S, (Schedule to match pipe) **4	<u>Gate Valve</u>			
<u>Flanges</u>			0.75	4	VGA0045#10	RF **2, 4
0.75	4	ASTM A182 F316L, Class 150 RF.WN, (Bore to match pipe) **4, 6				

Special Material Specifications:

<u>Bolting</u>	ASTM A193 Gr. B8M CL2, c/w A194 Gr. 8M Nuts
<u>Gaskets</u>	Flat Ring, 0.125 inches thick, Gylon 3510

** SPECIAL NOTES **

1. Dead ends shall be avoided. Piping shall be vented to prevent over pressure as a result of Hydrogen Peroxide decomposition.
2. For vents and drains use flanged gate valves.
3. Use threaded ball valves at Instrument connections only.
4. All piping components shall undergo a passivation process in accordance with ASTM A380 (latest edition) as applicable to Austenitic stainless steel or such alternative vendor recommended process approved in writing by Suncor's responsible engineer.
5. Ball valve cavities shall be vented to prevent entrapment of Peroxide fluid in the open or closed position.
6. Install spray shields with pH patches on all non-insulated flanges. For insulated flanges, use removable insulation blanket with weephole.
7. Use equal or reducing tees at all branch connections.
8. Vents and Drains per DD100-L-12-1
9. Pressure Instrument Connections per DD100-L-11-1



Piping Material Specifications

Valve Details

Ball Valve

VBA0605

Rev Date 02-Jan-08

Ball Valve, Class CL 600 Threaded, Forged Body to, ASTM A182 F316/316L Dual Cert., 316 SS Ball and Stem, PTFE Seats and Seal, Full Port, Design to API-608

NOTES: Ball valves for Hydrogen Peroxide service shall have ball cavities vented to prevent entrapment of peroxide fluid in the open or closed position. Valves to be passivated to ASTM A380 and suitable for Hydrogen Peroxide service.

Assigned Pipe Classes: CAM

Check Valve

VCH5281#10

Rev Date 02-Jan-08

Check Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A351 Gr. CF8M, 316 SS Spring Disc, Seat, Stem and guide bushing

NOTES: Valves to be passivated to ASTM A380 and suitable for use in Hydrogen Peroxide service.

DFT Inc. type GLC model or approved equal.

Valve body may also be forged to ASTM A182 F316/316L.

Assigned Pipe Classes: CAM

Gate Valve

VGA0045#10

Rev Date 17-Feb-08

Gate Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A351 Gr. CF8M, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 12, Integral or Welded in or Renewable Seats, Design to API-600

NOTES: Valves to be passivated to ASTM A380 and suitable for use in Hydrogen Peroxide service.

Valve body may also be forged to ASTM A182 F316/316L.

Assigned Pipe Classes: CAM



Piping Material Specifications

Rev: **4**

Service Desc: <i>Hydrochloric Acid (Indoor)</i>				Temp: <i>200 (93)</i> °F(°C)max	
Materials: <i>C.S. PTFE Lined</i>			Corrosion Allow: <i>0</i>		Code: <i>ASME B31.3</i>
Material P&T:	<i>285</i>	PSI @	<i>0</i>	°F min.	Based on: <i>ASME B16.5 MG 1.1</i> Branch Conn Tbl: <i>Manuf. Std.</i> Inspection Class: <i>III</i>
	<i>(1965)</i>	Kpa @	<i>(-18)</i>	°C min.	
	<i>260</i>	PSI @	<i>200</i>	°F max.	
	<i>(1793)</i>	Kpa @	<i>(93)</i>	°C max.	
P.W.H.T. : <i>NO</i>				Welding Proc: <i>Refer to Suncor Firebag STD FB-L-5217</i>	

Standard Specifications			Valve Specifications		
<u>Pipe</u>			<u>Ball Valve</u>		
1	10	PTFE lined Carbon Steel, STD Wt, ASTM A587 ERW **1	1	10	VBA0163 RF **8
<u>Fittings</u>			<u>Butterfly Valve</u>		
1	10	ASTM A216 WCB, STD. Wt. RF PTFE lined	1	10	VBUI507 RF
<u>Flanges</u>			<u>Check Valve</u>		
1	10	ASTM A105N, Class 150 RF, Blind Flange. **7, 13	1	10	VCH0213 RF
1	10	ASTM A105N, Class 150 Lap Joint per ASME B16.5 /w Stub End per ASME B16.9, PTFE Lined, OR Approved Manufacturer's Standard. **13, 14	<u>Plug Valve</u>		
			1	10	VPL0313 RF

Special Material Specifications:

<u>Bolting</u>	Hastelloy C276 UNS N10276, ASTM F468 Studs, c/w F467 Nuts
<u>Gaskets</u>	Class 150 Reinforced PTFE Ring, 3mm

**** SPECIAL NOTES ****

1. Flanged spool length shall be per manufacturer's recommendations.
2. All valves shall have reinforced teflon packing and gaskets
3. Inner lining forms raised face portion of lined valve flanged ends.
4. Gasket required only for connection to equipment and unlined components.
5. Install transparent spray shields on all flanges in non-insulated indoor applications.
6. Install double check valves upstream of dilution Tee's on both the acid and dilution water piping.
7. Blind flanges to be installed with a solid PTFE "blind spacer ring" between the mating piping flange and a carbon steel blind flange, or alternatively use lined blind flange depending on manufacturer selected.
8. For Vents & Drains and Instrument connections use RF Ball valves.
9. Spray shields, PTFE for flanges and valves.
10. Vents and Drains per DD100-L-12-1.
11. Pressure Instrument Connections per DD100-L-11-2.
12. Previously Piping Specification CAL (CAL discontinued).
13. Follow manufacturer's requirements for bolt torquing of flanges.
14. Lap flange may be provided integral with pipe, in lieu of welded stub end.



Piping Material Specifications

Valve Details

Ball Valve

VBA0163

Rev Date 17-Sep-07

Ball Valve, Class 150 RF, Ductile Iron, ASTM A395, PFA lined body, Hastelloy C Stem, PFA Encap DI ASTM A395 ball, Renewable RTFE Seats, Full Port, Suncor OSG STD 0203
NOTES: Short Pattern per ASME B16.10, Two Position Lock Hand Lever; Temperature Range 32 F to 200 F;
Assigned Pipe Classes: APH, CAO

Butterfly Valve

VBU1507

Rev Date 17-Sep-07

Butterfly Valve, Class Class 150 Wafer, Ductile Iron, ASTM A395, PFA lined body, Hastelloy C Stem, PFA Encap DI ASTM A395 disk, Viton O-rings
NOTES: Locking Lever, External Epoxy Coating; Temperature range 32F to 200F
Assigned Pipe Classes: CAO

Check Valve

VCH0213

Rev Date 18-Sep-07

Check Valve, Class Class 150 Wafer, Ductile Iron, ASTM A395, PFA lined body 45 deg ball, Horizontal Poppet Type, PFA coated Poppet, PFA coated poppet
NOTES: Temperature Range 32F to 200F
Assigned Pipe Classes: CAO

Plug Valve

VPL0313

Rev Date 18-Sep-07

Plug Valve, Class Class 150 RF, Ductile Iron, ASTM A395, PFA lined body, PFA Encap DI ASTM A395 plug, RTFE sleeve
NOTES: Reinforced Teflon packing and gasket, Wrench operated; Temperature range 32F to 200F
Assigned Pipe Classes: CAO



Piping Material Specifications

Rev: **4**

Service Desc: <i>Closed Hydrocarbon Drain</i>					Temp: <i>140 (60)</i>		°F(°C)max	
Materials: <i>Carbon Steel</i>				Corrosion Allow: <i>0.0625</i>		Code: <i>ASME B31.3</i>		
Material P&T:	<i>285</i>	PSI @	<i>100</i>	°F min.	Based on: <i>ASME B16.5 MG 1.1</i>	Branch Conn Tbl: <i>I</i>		
	<i>(1965)</i>	Kpa @	<i>(38)</i>	°C min.		Inspection Class: <i>III</i>		
	<i>275</i>	PSI @	<i>140</i>	°F max.				
	<i>(1896)</i>	Kpa @	<i>(60)</i>	°C max.				
P.W.H.T. : <i>NO (**5)</i>					Welding Proc: <i>Refer to Suncor Firebag STD FB-L-5217</i>			

Standard Specifications			Valve Specifications		
<u>Pipe</u>			<u>Compact Gate Valve</u>		
3	24	ASTM A106 Gr. B, Seamless, STD. Wt.	0.75	2	VGA0031#12-SW/TH **4
<u>Fittings</u>			<u>Gate Valve</u>		
3	24	ASTM A234 WPB, STD. Wt.	3	24	VGA0041#12 RF
<u>Flanges</u>					
3	24	ASTM A105N, Class 150 RF.WN., STD.Wt.			

Special Material Specifications:

<u>Bolting</u>	ASTM A193 Gr. B7, c/w A194 Gr. 2H Nuts
<u>Gaskets</u>	Spiral Wound 316SS, Graphite filled, c/w CS Outer Ring, per ASME B16.20

**** SPECIAL NOTES ****

- Buried pipe and fittings to be externally coated in accordance with Suncor Firebag STD FB-L-5230.
- Insulating Flange Kit is required at connection between U/G and A/G. Material shall be temperature resistant thermiculite, monex type for high temperature.
- Positive Isolation required per drawings DD100-L-31-1, 2 and 3.
- Use at Pressure Connections.
- PWHT required for thickness per ASME B31.3.



Piping Material Specifications

Valve Details

Compact Gate Valve

VGA0031#12-SW/TH

Rev Date 17-Feb-08

Compact Gate Valve, Class CL 800 Socketweld/Threaded, Forged Body to, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 12, Integral or Renewable seats, Regular Port, Design to API-602
Assigned Pipe Classes: AEC, AED, CAF, CAQ, CAR, CBF

Gate Valve

VGA0041#12

Rev Date 17-Feb-08

Gate Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 12, Integral or Welded in Seats, Design to API-600
Assigned Pipe Classes: AEC, CAF, CAQ, CAR, CBF



Piping Material Specifications

Rev: **4**

Service Desc: <i>Closed Hydrocarbon Drain</i>				Temp: <i>700 (371)</i> °F(°C)max	
Materials: <i>Carbon Steel</i>		Corrosion Allow: <i>0.125</i>		Code: <i>ASME B31.3</i>	
Material P&T:	<i>285</i>	PSI @	<i>-20</i>	°F min.	Based on: <i>ASME B16.5 MG 1.1</i>
	<i>(1965)</i>	Kpa @	<i>-29</i>	°C min.	
	<i>110</i>	PSI @	<i>700</i>	°F max.	Branch Conn Tbl: <i>I</i>
	<i>(758)</i>	Kpa @	<i>(371)</i>	°C max.	
P.W.H.T. : <i>NO (**7)</i>				Welding Proc: <i>Refer to Suncor Firebag STD FB-L-5217</i>	
Inspection Class: <i>III</i>					

Standard Specifications			Valve Specifications		
<u>Pipe</u>			<u>Compact Gate Valve</u>		
0.75	2	ASTM A106 Gr. B, Seamless, Sch XS	0.75	2	VGA0031#12-SW
3	24	ASTM A106 Gr. B, Seamless, Sch. XS.	0.75	2	VGA0031#12-SW/TH **6
<u>Fittings</u>			<u>Gate Valve</u>		
0.75	2	ASTM A105N, Class 3000 SW	3	24	VGA0041#12 RF
3	24	ASTM A234 WPB, XS			
<u>Flanges</u>					
0.75	2	ASTM A105N, Class 150 RF. SW			
3	24	ASTM A105N, Class 150 RF.WN., XS.			

Special Material Specifications:

<u>Bolting</u>	ASTM A193 Gr. B7, c/w A194 Gr. 2H Nuts
<u>Gaskets</u>	Spiral Wound 316SS, Graphite filled, c/w CS Outer Ring, per ASME B16.20

** SPECIAL NOTES **

- Buried pipe and fittings to be externally coated in accordance to Suncor Firebag STD FB-L-5230
- Insulating Flange Kit is required at Connection between U/G & A/G. Material shall be temperature resistant thermiculite, monex type for high temperature.
- 45 degree laterals shall be used as required.
- Positive Isolation required per drawings DD100-L-31-1, 2 and 3.
- Fabricated laterals shall be manufactured using Sch. 160 Pipe.
- Use at Pressure Connections.
- PWHT required for thickness per ASME B31.3.



Piping Material Specifications

Valve Details

Compact Gate Valve

VGA0031#12-SW

Rev Date 17-Feb-08

Compact Gate Valve, Class CL 800 Socketweld, Forged Body to, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 12, Integral or Renewable seats, Regular Port, Design to API-602
Assigned Pipe Classes: AEC, CAF, CAR, CBF

Compact Gate Valve

VGA0031#12-SW/TH

Rev Date 17-Feb-08

Compact Gate Valve, Class CL 800 Socketweld/Threaded, Forged Body to, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 12, Integral or Renewable seats, Regular Port, Design to API-602
Assigned Pipe Classes: AEC, AED, CAF, CAQ, CAR, CBF

Gate Valve

VGA0041#12

Rev Date 17-Feb-08

Gate Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 12, Integral or Welded in Seats, Design to API-600
Assigned Pipe Classes: AEC, CAF, CAQ, CAR, CBF



Piping Material Specifications

Rev: **4**

Service Desc: <i>Natural Gas, Nitrogen, Propane & LT Hydrocarbons **5</i>					Temp: <i>650 (343)</i>	°F(°C)max
Materials: <i>Low Temperature Carbon Steel</i>		Corrosion Allow: <i>0.0625</i>		Code: <i>ASME B31.3</i>		
Material P&T:	<i>285</i>	PSI @	<i>-50</i>	°F min.	Based on: <i>ASME B16.5 MG 1.1</i>	Branch Conn Tbl: <i>I</i>
	<i>(1965)</i>	Kpa @	<i>(-46)</i>	°C min.		Inspection Class: <i>III</i>
	<i>125</i>	PSI @	<i>650</i>	°F max.		
	<i>(862)</i>	Kpa @	<i>(343)</i>	°C max.		
P.W.H.T. : <i>NO (**9)</i>				Welding Proc: <i>Refer to Suncor Firebag STD FB-L-5217</i>		

Standard Specifications			Valve Specifications		
<u>Pipe</u>			<u>Ball Valve</u>		
0.75	2	ASTM A333 Gr.6, Seamless, Sch. 80	3	24	VBA0155 RF **I
3	24	ASTM A333 Gr.6, Seamless, STD. Wt.	0.75	2	VBA0607-SW **I
<u>Fittings</u>			<u>Butterfly Valve Full Body Lug Style</u>		
0.75	2	ASTM A350 LF2 CL 1, Class 3000 SW	3	24	VBU1518 RF **I
3	24	ASTM A420 WPL6, STD Wt	<u>Check Valve</u>		
<u>Flanges</u>			0.75	2	VCH0240#12-SW
0.75	2	ASTM A350 LF2 CL 1, Class 150 RF.SW.	3	6	VCH0250#12 RF
3	24	ASTM A350 LF2 CL 1, Class 150 RF.WN., STD Wt	<u>Check Valve, Wafer Style</u>		
			8	24	VWC0152 RF
			<u>Compact Gate Valve</u>		
			0.75	2	VGA0030#12-SW
			0.75	2	VGA0030#12-SW/TH **6
			<u>Gate Valve</u>		
			3	24	VGA0050#12 RF
			0.75	2	VGA0110#12 RF
			3	3	VGA0305#12 RF **4
			1.50	2	VGA0310#12 RF **4
			<u>Globe Valve</u>		
			0.75	2	VGL0140#12-SW
			3	8	VGL0150#12 RF

Special Material Specifications:

<u>Thermowells</u>	NPS 2, Class 300 RF, Flanged , A350 LF2 CL 1, see Standard Drawing DD100-L-14-1, 2
<u>Bolting</u>	ASTM A320 Gr. L7, c/w A194 Gr. 4 Nuts
<u>Gaskets</u>	Spiral Wound 316SS, Graphite filled, c/w CS Outer Ring, per ASME B16.20

**** SPECIAL NOTES ****

1. Soft seated valves have limited pressure/temperature ratings. Maximum temperature shall not exceed 400 F (204 C).
2. Deleted
3. Deleted
4. Class 300 valve shall be used where required on instrument bridles.
5. This line class shall be used for Propane and other LT Hydrocarbons at the discretion of Owner's Engineer.
6. Deleted
7. Vents and Drains per DD100-L-12-1.
8. Pressure Instrument Connections per DD100-L-11-1.
9. PWHT required for thickness per ASME B31.3.



Piping Material Specifications

Valve Details

Ball Valve

VBA0155

Rev Date 17-Sep-07

Ball Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A352 Gr. LCC, Split body, Blow-out proof stem, 316 SS Ball and Stem, PTFE Seats and Body Gasket, Regular Port, Design to API-608 and/or ASME B16.34

NOTES: Fire tested to API-607; Bolting, packing & seats to be suitable for -50 F (-46 C);

Assigned Pipe Classes: CAX, CB

Ball Valve

VBA0607-SW

Rev Date 19-Jun-06

Ball Valve, Class CL 600 Socketweld, Forged Body to, ASTM A350 Gr.LF2 CL 1, Blow-out proof stem, 316 SS Ball and Stem, RTFE seats, Regular Port, Design to API-608

NOTES: Fire tested to API-607; Bolting, packing & seats to be suitable for -50 F (-46 C); Valves require a ASTM A333 Gr. 6, Sch 160 Nipple 150 mm (6 in) long at each end for welding; Maximum temperature 350 F

Assigned Pipe Classes: CAX, CB, HAX

Butterfly Valve Full Body Lug

VBU1518

Rev Date 26-Jun-08

Butterfly Valve Full Body Lug Style, Class CL 150 RF to fit between ASME B16.5 flanges, Cast Body to, ASTM A352 Gr. LCC, 316 SS Disc and Stem, PTFE Seats, Design to API-609

Assigned Pipe Classes: CAX

Check Valve

VCH0240#12-SW

Rev Date 19-Mar-08

Check Valve, Class CL 800 Socketweld, Forged Body to, ASTM A350 Gr.LF2 CL 1, Bolted Cover, Piston/Lift Type with Spring, API Trim 12, Integral or Renewable seats, Full Port, Design to API-602

NOTES: Bolting and bonnet gasket to be suitable for -50 F (-46 C)

Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: CAX, CB, EAX, HAX

Check Valve

VCH0250#12

Rev Date 17-Feb-08

Check Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A352 Gr. LCC, Bolted Cover, Swing Type, API Trim 12 design to API-600, Integral or Welded in Seats

NOTES: Bolting and bonnet gasket to be suitable for -50 F (-46 C)

Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: CAX, CB

Compact Gate Valve

VGA0030#12-SW

Rev Date 17-Feb-08

Compact Gate Valve, Class CL 800 Socketweld, Forged Body to, ASTM A350 Gr.LF2 CL 1, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 12, Integral or Renewable seats, Regular Port, Design to API-602

NOTES: Bolting & bonnet gasket and packing to be suitable for -50 F (-46 C)

Assigned Pipe Classes: CAX, CB, EAX, HAX

Compact Gate Valve

VGA0030#12-SW/TH

Rev Date 17-Feb-08

Compact Gate Valve, Class CL800 Socketweld/Threaded, Forged Carbon Steel, ASTM A350 Gr.LF2 CL 1, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 12, Integral or renewable hard faced seats, Regular Port, Design to API-602

NOTES: Teflon bonnet gasket and packing; Maximum temperature 350 F

Assigned Pipe Classes: CAX, CB, EAX, HAX

Gate Valve

VGA0050#12

Rev Date 17-Feb-08

Gate Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A352 Gr. LCC, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 12, Integral or Welded in Seats, Design to API-600

NOTES: Bolting & bonnet gasket and packing to be suitable for -50 F (-46 C);

Assigned Pipe Classes: CAX, CB

Gate Valve

VGA0110#12

Rev Date 17-Feb-08

Gate Valve, Class CL 150 RF to ASME B16.5, Forged Body w/integral flanges, ASTM A350 Gr.LF2 CL 1, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 12, Integral or Renewable seats, Regular Port, Design to API-602

NOTES: Bolting & bonnet gasket and packing to be suitable for -50 F (-46 C)

Assigned Pipe Classes: CAX, CB

Gate Valve

VGA0305#12

Rev Date 17-Feb-08

Gate Valve, Class CL 300 RF to ASME B16.5, Cast Body to, ASTM A352 Gr. LCC, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 12, Integral or Welded in Seats, Regular Port, Design to API-600
 NOTES: Bolting & bonnet gasket and packing to be suitable for -50 F (-46 C);
 Assigned Pipe Classes: CAX, CB, EAX

Gate Valve

VGA0310#12

Rev Date 17-Feb-08

Gate Valve, Class CL 300 RF to ASME B16.5, Forged Body w/integral flanges, ASTM A350 Gr.LF2 CL 1, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 12, Integral or Renewable seats, Regular Port, Design to API-602
 NOTES: Bolting & bonnet gasket and packing to be suitable for -50 F (-46 C)
 Assigned Pipe Classes: CAX, CB, EAX

Globe Valve

VGL0140#12-SW

Rev Date 17-Feb-08

Globe Valve, Class CL 800 Socketweld, Forged Body to, ASTM A350 Gr.LF2 CL 1, Bolted Bonnet, OS & Y, API Trim 12, Integral or Renewable seats, Design to API-602
 NOTES: Bolting & bonnet gasket and packing to be suitable for -50 F (-46 C)
 Assigned Pipe Classes: CAX, CB, EAX, HAX

Globe Valve

VGL0150#12

Rev Date 22-Feb-08

Globe Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A352 Gr. LCC, Bolted Bonnet, OS & Y, API Trim 12 design to API-600, Integral or Welded in Seats
 NOTES: Bolting & bonnet gasket and packing to be suitable for -50 F (-46 C)
 Pressure/Temperature rating to ASME B16.34
 Assigned Pipe Classes: CAX, CB

Check Valve, Wafer Style

VWC0152

Rev Date 19-Jun-06

Check Valve, Wafer Style, Class CL 150 RF to fit between ASME B16.5 flanges, Cast Body to, ASTM A352 Gr. LCC, Dual 316SS Plates, Inconel X750 Spring(s), Lapped Seats, w/Stellite Hard Faced Overlay, Design to API-594
 NOTES: Valve to be suitable for -50 F (-46 C)
 Assigned Pipe Classes: CAX



Piping Material Specifications

Rev: **4**

Service Desc: <i>Ca(OH)2 Lime Slurry; MgO Slurry</i>				Temp: <i>240 (116)</i> °F(°C)max	
Materials: <i>Carbon Steel **2</i>		Corrosion Allow: <i>0.0625</i>		Code: <i>ASME B31.3</i>	
Material P&T:	<i>285</i>	PSI @	<i>-20</i>	°F min.	Based on: <i>ASME B16.5 MG 1.1</i>
	<i>(1965)</i>	Kpa @	<i>(-29)</i>	°C min.	
	<i>150</i>	PSI @	<i>240</i>	°F max.	Branch Conn Tbl: <i>I</i>
	<i>(1034)</i>	Kpa @	<i>(116)</i>	°C max.	
P.W.H.T. : <i>NO (**7)</i>				Welding Proc: <i>Refer to Suncor Firebag STD FB-L-5217</i>	
Inspection Class: <i>III</i>					

Standard Specifications			Valve Specifications		
<u>Pipe</u>			<u>Ball Valve</u>		
0.75	2	ASTM A106 Gr. B, Seamless, Sch 80	3	12	VBA0151 RF
3	12	ASTM A106 Gr. B, Seamless, STD. Wt.	3	12	VBA0159 RF
<u>Fittings</u>			1.50	2	VBA0160 RF
0.75	2	ASTM A105N, Class 3000 SW	0.75	2	VBA0602-TH
3	12	ASTM A234 WPB, STD. Wt.	<u>Check Valve</u>		
1.5	2	Bends, 5D, from ASTM A106 Grade B, Seamless, Schedule 80 minimum wall thickness. **4	0.75	2	VCH0231#8-SW
3	4	Bends, 5D, from ASTM A106 Grade B, Seamless, Schedule Std Wt, minimum wall thickness. **4	3	12	VCH0241#8 RF
6	12	Bends, 3D, from ASTM A106 Grade B, Seamless, Schedule Std Wt, minimum wall thickness. **4	<u>Check Valve, Wafer Style</u>		
<u>Flanges</u>			3	12	VWC0151 RF
0.75	2	ASTM A105N, Class 150 RF. SW	<u>Compact Gate Valve</u>		
3	12	ASTM A105N, Class 150 RF. WN., STD. Wt.	0.75	2	VGA0031#8-SW
			0.75	2	VGA0031#8-SW/TH
			<u>Diaphragm or Pinch Valve</u>		
			2	12	VDP0002 RF
			<u>Gate Valve</u>		
			3	12	VGA0041#8 RF
			3	12	VGA0054#8 RF
			<u>Globe Valve</u>		
			0.75	2	VGL0131#8-SW
			3	12	VGL0141#8 RF

Special Material Specifications:

<u>Thermowells</u>	NPS 2, Class 300 RF, Flanged, A105N, see Standard Drawing DD100-L-14-1, 2
<u>Bolting</u>	ASTM A193 Gr. B7, c/w A194 Gr. 2H Nuts
<u>Gaskets</u>	Spiral Wound 316SS, Graphite filled, c/w CS Outer Ring, per ASME B16.20

**** SPECIAL NOTES ****

1. Deleted
2. All valve selections shall be made by the Owner (Energy Services).
3. Wall thickness readings shall be made per Work Practice PMW0018A, "Baseline Ultrasonic Survey".
4. 5D Bends to be used only for 1 1/2"NPS thru 4" NPS, and 3D Bends for 6" NPS and above in Lime Slurry and Magox systems.
5. Vents and Drains per DD100-L-12-2
6. Pressure Instrument Connections per DD100-L-11-2
7. PWHT required for thickness per ASME B31.3.



Piping Material Specifications

Valve Details

Ball Valve

VBA0151

Rev Date 02-Jan-08

Ball Valve, Class CL150 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Split body, Blow-out proof stem, 316 SS Ball and Stem, PTFE Seats and Body Gasket, Regular Port, Design to API-608 and/or ASME B16.34

NOTES: Valve shall be fire tested to API-607; Maximum temperature 350 F.

Assigned Pipe Classes: ADX, AEA, CA, CAB, CAF, CAZ, CBA, CSA

Ball Valve

VBA0159

Rev Date 19-Jun-06

Ball Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Blow-out proof stem, 316 SS Ball and Stem, Metal Seated, Design to ASME B16.34

NOTES: Valve to be fire tested to API-607

Assigned Pipe Classes: CAZ

Ball Valve

VBA0160

Rev Date 19-Jun-06

Ball Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Split body, Blow-out proof stem, Stellite Ball & Seat, Full Port

NOTES: Graphite packing, Seat configuration suitable for Fly Ash and/or Slurry Service

Assigned Pipe Classes: CAZ

Ball Valve

VBA0602-TH

Rev Date 30-Oct-06

Ball Valve, Class CL 600 Threaded, Forged Body to, ASTM A105 N, Blow-out proof stem, 316 SS Ball and Stem, RTFE seats, Regular Port, Design to API-608

NOTES: Firesafe per API-607; Maximum temperature 350 F

Assigned Pipe Classes: ADX, CA, CAF, CAZ, EA

Check Valve

VCH0231#8-SW

Rev Date 22-Feb-08

Check Valve, Class CL 800 Socketweld, Forged Body to, ASTM A105 N, Bolted Cover, Piston/Lift Type with Spring, API Trim 8, Integral or renewable, Full Port, Design to API-602

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: CA, CAB, CAZ, CBA, CHY, CS, EA, EAB, EDB, ES, HB, HBD

Check Valve

VCH0241#8

Rev Date 17-Feb-08

Check Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Cover, Swing Type, API Trim 8 design to API 600, Integral or Welded Hard Faced Seat

NOTES: Pressure/Temperature Rating to ASME B16.34

Assigned Pipe Classes: ADX, CA, CAB, CAH, CAZ, CBA, CHY, CLF, CS

Pinch Valve

VDP0002

Rev Date 02-Jan-08

Pinch Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, EPDM lined, Bi-Directional bubbletight shutoff, Full Port

NOTES: EPDM lined Valve Body; Maximum temperature 240 F

Assigned Pipe Classes: CAZ

Compact Gate Valve

VGA0031#8-SW

Rev Date 04-Apr-08

Compact Gate Valve, Class CL 800 Socketweld, Forged Body to, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 8, Integral or Renewable seats, Regular Port, Design to API-602

Assigned Pipe Classes: CA, CAB, CAZ, CBA, CHY, CS, EA, EAB, EDB, HB, HBD, 662-2, 662-3

Compact Gate Valve

VGA0031#8-SW/TH

Rev Date 04-Apr-08

Compact Gate Valve, Class CL800 Socketweld/Threaded, Forged Carbon Steel, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 8, Integral or renewable hard faced seats, Regular Port, Design to API-602

Assigned Pipe Classes: CA, CAB, CAZ, CBA, CHY, CS, EA, EAB, EDB, HB, HBD, 662-2, 662-3

Gate Valve

VGA0041#8

Rev Date 17-Feb-08

Gate Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 8, Integral or Welded in Seats, Design to API-600

Assigned Pipe Classes: ADX, CA, CAB, CAH, CAZ, CBA, CHY, CS

Gate Valve

VGA0054#8

Rev Date 17-Feb-08

Gate Valve, Class CL 300 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 8, Integral or Welded in Seats, Design to API-600
Assigned Pipe Classes: CA, CAB, CAH, CAZ, CBA, CS, EA, EAB, EDB, ES, 662-3

Globe Valve

VGL0131#8-SW

Rev Date 23-Jun-06

Globe Valve, Class CL 800 Socketweld, Forged Body to, ASTM A105 N, Bolted Bonnet, OS & Y, Integral or Renewable seats, Hard Faced Seat to API Trim 8, Design to API-602
Assigned Pipe Classes: CA, CAB, CAZ, CBA, CHY, CS, EA, EAB, EDB, HB, HBD

Globe Valve

VGL0141#8

Rev Date 22-Feb-08

Globe Valve, Class CL 150 RF to ASME B16.5, Cast Carbon Steel, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, Plug Type Disc, API Trim 8 design to API 600, Integral or Welded in Seats
NOTES: Pressure/Temperature rating to ASME B16.34
Assigned Pipe Classes: ADX, CA, CAB, CAH, CAZ, CBA, CS

Check Valve, Wafer Style

VWC0151

Rev Date 19-Jun-06

Check Valve, Wafer Style, Class CL 150 RF to fit between ASME B16.5 flanges, Cast Body to, ASTM A216 Gr WCB, Retainerless Style, Dual Carbon Steel Plates, Inconel X750 Spring(s), Lapped Seats, w/Stellite Hard Faced Overlay, Design to API-594
Assigned Pipe Classes: AEA, CA, CAB, CAZ, CS



Piping Material Specifications

Rev: **4**

Service Desc: <i>Instrument Air, Plant Air (Outdoors)</i>				Temp: <i>300 (149)</i> °F(°C)max	
Materials: <i>Low Temperature Carbon Steel</i>		Corrosion Allow: <i>0.0625</i>		Code: <i>ASME B31.3</i>	
Material P&T:	<i>285</i>	PSI @	<i>-50</i>	°F min.	Based on: <i>ASME B16.5 MG 1.1</i> Branch Conn Tbl: <i>I</i> Inspection Class: <i>III</i>
	<i>(1965)</i>	Kpa @	<i>(-46)</i>	°C min.	
	<i>230</i>	PSI @	<i>300</i>	°F max.	
	<i>(1586)</i>	Kpa @	<i>(149)</i>	°C max.	
P.W.H.T. : <i>NO (**8)</i>				Welding Proc: <i>Refer to Suncor Firebag STD FB-L-5217</i>	

Standard Specifications			Valve Specifications		
<u>Pipe</u>			<u>Ball Valve</u>		
0.5	2	ASTM A333 Gr.6, Seamless, Sch. 80	3	12	VBA0155 RF **I
3	12	ASTM A333 Gr.6, Seamless, STD. Wt.	0.5	2	VBA0607-SW
<u>Fittings</u>			0.5	2	VBA0607-TH **I
0.5	2	ASTM A350 LF2 CL 1, Class 3000 SW	<u>Check Valve</u>		
3	12	ASTM A420 WPL6, STD Wt	0.5	2	VCH0240#12-SW
<u>Flanges</u>			3	12	VCH0250#12 RF
0.5	2	ASTM A350 LF2 CL 1, Class 150 RF.SW.	<u>Compact Gate Valve</u>		
3	12	ASTM A350 LF2 CL 1, Class 150 RF.WN., STD Wt	0.5	2	VGA0030#12-SW
			0.5	2	VGA0030#12-SW/TH
			<u>Gate Valve</u>		
			3	12	VGA0050#12 RF
			0.5	2	VGA0110#12 RF
			3	3	VGA0305#12 RF **4
			1.50	2	VGA0310#12 RF **4
			<u>Globe Valve</u>		
			0.5	2	VGL0140#12-SW
			3	6	VGL0150#12 RF

Special Material Specifications:

<u>Bolting</u>	ASTM A320 Gr. L7, c/w A194 Gr. 4 Nuts
<u>Gaskets</u>	Spiral Wound 316SS, Graphite filled, c/w CS Outer Ring, per ASME B16.20

** SPECIAL NOTES **

1. Soft seated valves have limited pressure/temperature ratings. Maximum temperature shall not exceed 400 F (204 C).
2. Deleted
3. Deleted
4. Class 300 valves shall be used where required on instrument bridges.
5. Deleted
6. Vents and Drains per DD100-L-12-1
7. Pressure Instrument Connections per DD100-L-11-1
8. PWHT required for thickness per ASME B31.3.



Piping Material Specifications

Valve Details

Ball Valve

VBA0155

Rev Date 17-Sep-07

Ball Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A352 Gr. LCC, Split body, Blow-out proof stem, 316 SS Ball and Stem, PTFE Seats and Body Gasket, Regular Port, Design to API-608 and/or ASME B16.34

NOTES: Fire tested to API-607; Bolting, packing & seats to be suitable for -50 F (-46 C);

Assigned Pipe Classes: CAX, CB

Ball Valve

VBA0607-SW

Rev Date 19-Jun-06

Ball Valve, Class CL 600 Socketweld, Forged Body to, ASTM A350 Gr.LF2 CL 1, Blow-out proof stem, 316 SS Ball and Stem, RTFE seats, Regular Port, Design to API-608

NOTES: Fire tested to API-607; Bolting, packing & seats to be suitable for -50 F (-46 C); Valves require a ASTM A333 Gr. 6, Sch 160 Nipple 150 mm (6 in) long at each end for welding; Maximum temperature 350 F

Assigned Pipe Classes: CAX, CB, HAX

Ball Valve

VBA0607-TH

Rev Date 23-Jun-06

Ball Valve, Class CL600 Threaded, Forged Carbon Steel, ASTM A350 Gr.LF2 CL 1, Blow-out proof stem, 316 SS Trim, Vespel or Peek seats, Regular Port, Design to API-608

NOTES: Firesafe per API-607; Maximum temperature 350 F

Assigned Pipe Classes: CB, EAX

Check Valve

VCH0240#12-SW

Rev Date 19-Mar-08

Check Valve, Class CL 800 Socketweld, Forged Body to, ASTM A350 Gr.LF2 CL 1, Bolted Cover, Piston/Lift Type with Spring, API Trim 12, Integral or Renewable seats, Full Port, Design to API-602

NOTES: Bolting and bonnet gasket to be suitable for -50 F (-46 C)

Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: CAX, CB, EAX, HAX

Check Valve

VCH0250#12

Rev Date 17-Feb-08

Check Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A352 Gr. LCC, Bolted Cover, Swing Type, API Trim 12 design to API-600, Integral or Welded in Seats

NOTES: Bolting and bonnet gasket to be suitable for -50 F (-46 C)

Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: CAX, CB

Compact Gate Valve

VGA0030#12-SW

Rev Date 17-Feb-08

Compact Gate Valve, Class CL 800 Socketweld, Forged Body to, ASTM A350 Gr.LF2 CL 1, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 12, Integral or Renewable seats, Regular Port, Design to API-602

NOTES: Bolting & bonnet gasket and packing to be suitable for -50 F (-46 C)

Assigned Pipe Classes: CAX, CB, EAX, HAX

Compact Gate Valve

VGA0030#12-SW/TH

Rev Date 17-Feb-08

Compact Gate Valve, Class CL800 Socketweld/Threaded, Forged Carbon Steel, ASTM A350 Gr.LF2 CL 1, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 12, Integral or renewable hard faced seats, Regular Port, Design to API-602

NOTES: Teflon bonnet gasket and packing; Maximum temperature 350 F

Assigned Pipe Classes: CAX, CB, EAX, HAX

Gate Valve

VGA0050#12

Rev Date 17-Feb-08

Gate Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A352 Gr. LCC, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 12, Integral or Welded in Seats, Design to API-600

NOTES: Bolting & bonnet gasket and packing to be suitable for -50 F (-46 C);

Assigned Pipe Classes: CAX, CB

Gate Valve

VGA0110#12

Rev Date 17-Feb-08

Gate Valve, Class CL 150 RF to ASME B16.5, Forged Body w/integral flanges, ASTM A350 Gr.LF2 CL 1, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 12, Integral or Renewable seats, Regular Port, Design to API-602

NOTES: Bolting & bonnet gasket and packing to be suitable for -50 F (-46 C)

Assigned Pipe Classes: CAX, CB

Gate Valve**VGA0305#12**

Rev Date 17-Feb-08

Gate Valve, Class CL 300 RF to ASME B16.5, Cast Body to, ASTM A352 Gr. LCC, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 12, Integral or Welded in Seats, Regular Port, Design to API-600
NOTES: Bolting & bonnet gasket and packing to be suitable for -50 F (-46 C);
Assigned Pipe Classes: CAX, CB, EAX

Gate Valve**VGA0310#12**

Rev Date 17-Feb-08

Gate Valve, Class CL 300 RF to ASME B16.5, Forged Body w/integral flanges, ASTM A350 Gr.LF2 CL 1, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 12, Integral or Renewable seats, Regular Port, Design to API-602
NOTES: Bolting & bonnet gasket and packing to be suitable for -50 F (-46 C)
Assigned Pipe Classes: CAX, CB, EAX

Globe Valve**VGL0140#12-SW**

Rev Date 17-Feb-08

Globe Valve, Class CL 800 Socketweld, Forged Body to, ASTM A350 Gr.LF2 CL 1, Bolted Bonnet, OS & Y, API Trim 12, Integral or Renewable seats, Design to API-602
NOTES: Bolting & bonnet gasket and packing to be suitable for -50 F (-46 C)
Assigned Pipe Classes: CAX, CB, EAX, HAX

Globe Valve**VGL0150#12**

Rev Date 22-Feb-08

Globe Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A352 Gr. LCC, Bolted Bonnet, OS & Y, API Trim 12 design to API-600, Integral or Welded in Seats
NOTES: Bolting & bonnet gasket and packing to be suitable for -50 F (-46 C)
Pressure/Temperature rating to ASME B16.34
Assigned Pipe Classes: CAX, CB



Piping Material Specifications

Rev: **4**

Service Desc: <i>Instrument Air, Plant Air (Indoors)</i>				Temp: <i>300 (149)</i> °F(°C)max	
Materials: <i>Carbon Steel</i>		Corrosion Allow: <i>0.0625</i>		Code: <i>ASME B31.3</i>	
Material P&T:	<i>285</i>	PSI @	<i>NOTE 8</i> °F min.	Based on: <i>ASME B16.5 MG 1.1</i>	Branch Conn Tbl: <i>I</i>
	<i>(1965)</i>	Kpa @	<i>NOTE 8</i> °C min.		Inspection Class: <i>III</i>
	<i>230</i>	PSI @	<i>300</i> °F max.		
	<i>(1586)</i>	Kpa @	<i>(149)</i> °C max.		
P.W.H.T. : <i>NO (**7)</i>				Welding Proc: <i>Refer to Suncor Firebag STD FB-L-5217</i>	

Standard Specifications			Valve Specifications		
<u>Pipe</u>			<u>Ball Valve</u>		
0.5	2	ASTM A106 Gr. B, Seamless, Sch 80	3	12	VBA0151 RF **I
3	12	ASTM A106 Gr. B, Seamless, STD. Wt.	0.5	2	VBA0609-SW **I
<u>Fittings</u>			<u>Check Valve</u>		
0.5	2	ASTM A105N, Class 3000 SW	0.5	2	VCH0231#8-SW
3	12	ASTM A234 WPB, STD. Wt.	3	12	VCH0241#8 RF
<u>Flanges</u>			<u>Compact Gate Valve</u>		
0.5	2	ASTM A105N, Class 150 RF. SW	0.5	2	VGA0031#8-SW
3	12	ASTM A105N, Class 150 RF. WN, STD. Wt.	0.5	2	VGA0031#8-SW/TH
			<u>Gate Valve</u>		
			3	12	VGA0041#8 RF
			3	3	VGA0054#8 RF
			0.5	2	VGA0111#8 RF
			1.50	2	VGA0315#8 RF
			<u>Globe Valve</u>		
			0.5	2	VGL0131#8-SW
			3	6	VGL0141#8 RF

Special Material Specifications:

<u>Bolting</u>	ASTM A193 Gr. B7, c/w A194 Gr. 2H Nuts
<u>Gaskets</u>	Spiral Wound 316SS, Graphite filled, c/w CS Outer Ring, per ASME B16.20

** SPECIAL NOTES **

1. Soft seated valves have limited pressure/temperature ratings. Maximum temperature shall not exceed 400 F (204 C).
2. Deleted
3. Class 300 valves shall be used where required on Instrument bridles.
4. Deleted
5. Vents and Drains per DD100-L-12-1
6. Pressure Instrument Connections per DD100-L-11-1
7. PWHT required for thickness per ASME B31.3.
8. This piping material class has a Minimum Design Metal Temperature (MDMT) of -20°F (-29°C) at the full flange rated pressure of 285 psig (1965 kPag). This piping material class may be used for applications with a MDMT of -50°F (-46°C) for design pressures of 180 psig (1241 kPag) or lower (See FIG. 323.2.2B of ASME B31.3). Based on a MDMT temperature reduction of delta 30°F, the allowable stress per ASME B31.3 is reduced by 30% (or 6000 psi).



Piping Material Specifications

Valve Details

Ball Valve

VBA0151

Rev Date 02-Jan-08

Ball Valve, Class CL150 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Split body, Blow-out proof stem, 316 SS Ball and Stem, PTFE Seats and Body Gasket, Regular Port, Design to API-608 and/or ASME B16.34

NOTES: Valve shall be fire tested to API-607; Maximum temperature 350 F.

Assigned Pipe Classes: ADX, AEA, CA, CAB, CAF, CAZ, CBA, CSA

Ball Valve

VBA0609-SW

Rev Date 19-Mar-08

Ball Valve, Class CL 600 Socketweld, Cast Body to, ASTM A105 N, Removable ends for socketwelding, Blow-out proof stem, 316 SS Ball and Stem, PTFE Seats, Regular Port, Design to API-608

NOTES: Fire tested to API-607. Alternative valves may be supplied with ASTM A106 Gr. B Sch 160 nipples 150 mm (6 in.) long at each end for welding. Do not use PTFE seats at temperatures greater than 400 F

Assigned Pipe Classes: CAB, CBA

Check Valve

VCH0231#8-SW

Rev Date 22-Feb-08

Check Valve, Class CL 800 Socketweld, Forged Body to, ASTM A105 N, Bolted Cover, Piston/Lift Type with Spring, API Trim 8, Integral or renewable, Full Port, Design to API-602

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: CA, CAB, CAZ, CBA, CHY, CS, EA, EAB, EDB, ES, HB, HBD

Check Valve

VCH0241#8

Rev Date 17-Feb-08

Check Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Cover, Swing Type, API Trim 8 design to API 600, Integral or Welded Hard Faced Seat

NOTES: Pressure/Temperature Rating to ASME B16.34

Assigned Pipe Classes: ADX, CA, CAB, CAH, CAZ, CBA, CHY, CLF, CS

Compact Gate Valve

VGA0031#8-SW

Rev Date 04-Apr-08

Compact Gate Valve, Class CL 800 Socketweld, Forged Body to, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 8, Integral or Renewable seats, Regular Port, Design to API-602

Assigned Pipe Classes: CA, CAB, CAZ, CBA, CHY, CS, EA, EAB, EDB, HB, HBD, 662-2, 662-3

Compact Gate Valve

VGA0031#8-SW/TH

Rev Date 04-Apr-08

Compact Gate Valve, Class CL800 Socketweld/Threaded, Forged Carbon Steel, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 8, Integral or renewable hard faced seats, Regular Port, Design to API-602

Assigned Pipe Classes: CA, CAB, CAZ, CBA, CHY, CS, EA, EAB, EDB, HB, HBD, 662-2, 662-3

Gate Valve

VGA0041#8

Rev Date 17-Feb-08

Gate Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 8, Integral or Welded in Seats, Design to API-600

Assigned Pipe Classes: ADX, CA, CAB, CAH, CAZ, CBA, CHY, CS

Gate Valve

VGA0054#8

Rev Date 17-Feb-08

Gate Valve, Class CL 300 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 8, Integral or Welded in Seats, Design to API-600

Assigned Pipe Classes: CA, CAB, CAH, CAZ, CBA, CS, EA, EAB, EDB, ES, 662-3

Gate Valve

VGA0111#8

Rev Date 17-Feb-08

Gate Valve, Class CL 150 RF to ASME B16.5, Forged Body w/integral flanges, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 8, Integral or Renewable seats, Regular Port, Design to API-602

Assigned Pipe Classes: CA, CAB, CAH, CBA, CS

Gate Valve

VGA0315#8

Rev Date 17-Feb-08

Gate Valve, Class CL 300 RF to ASME B16.5, Forged Body w/integral flanges, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 8, Integral or Renewable seats, Regular Port, Design to API-602

Assigned Pipe Classes: CA, CAB, CAH, CBA, CS, EA, EAB, EDB, ES

Globe Valve**VGL0131#8-SW**

Rev Date 23-Jun-06

Globe Valve, Class CL 800 Socketweld, Forged Body to, ASTM A105 N, Bolted Bonnet, OS & Y, Integral or Renewable seats, Hard Faced Seat to API Trim 8, Design to API-602

Assigned Pipe Classes: CA, CAB, CAZ, CBA, CHY, CS, EA, EAB, EDB, HB, HBD

Globe Valve**VGL0141#8**

Rev Date 22-Feb-08

Globe Valve, Class CL 150 RF to ASME B16.5, Cast Carbon Steel, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, Plug Type Disc, API Trim 8 design to API 600, Integral or Welded in Seats

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: ADX, CA, CAB, CAH, CAZ, CBA, CS



Piping Material Specifications

Rev: **4**

Service Desc: <i>Hydrocarbon, Intermediate Corrosion</i>				Temp: <i>800 (427)</i> °F(°C)max	
Materials: <i>Carbon Steel</i>		Corrosion Allow: <i>0.1875</i>		Code: <i>ASME B31.3</i>	
Material P&T:	<i>285</i>	PSI @	<i>-20</i>	°F min.	Based on: <i>ASME B16.5 MG 1.1</i> Branch Conn Tbl: <i>I</i> Inspection Class: <i>III</i>
	<i>(1965)</i>	Kpa @	<i>(-29)</i>	°C min.	
	<i>80</i>	PSI @	<i>800</i>	°F max.	
	<i>(552)</i>	Kpa @	<i>(427)</i>	°C max.	
P.W.H.T. : <i>NO (**6)</i>				Welding Proc: <i>Refer to Suncor Firebag STD FB-L-5217</i>	

Standard Specifications			Valve Specifications		
<u>Pipe</u>			<u>Check Valve</u>		
0.75	0.75	ASTM A106 Gr. B, Seamless, Sch.XXS	0.75	2	VCH0231#12-SW
1	2	ASTM A106 Gr. B, Seamless, Sch. 160	3	6	VCH0241#12 RF
3	6	ASTM A106 Gr. B, Seamless, Sch XS	<u>Check Valve, Wafer Style</u>		
8	24	ASTM A106 Gr. B, Seamless, (wall thickness calculated per attachment L)	8	24	VWC0157 RF
<u>Fittings</u>			<u>Compact Gate Valve</u>		
0.75	0.75	ASTM A105N, Class 9000 SW	0.75	2	VGA0031#12-SW
1	2	ASTM A105N, Class 6000 SW	0.75	2	VGA0031#12-SW/TH
3	24	ASTM A234 WPB, (Schedule to match Pipe)	<u>Gate Valve</u>		
<u>Flanges</u>			3	24	VGA0041#12 RF
0.75	2	ASTM A105N, Class 150 RF. SW	3	3	VGA0054#12 RF **3
3	24	ASTM A105, Class 150 RF.WN, (Bore to match Pipe)	0.75	2	VGA0112#12 RF
			1.50	2	VGA0312#12 RF **3
			<u>Globe Valve</u>		
			0.75	2	VGL0131#12-SW
			3	12	VGL0141#12 RF

Special Material Specifications:

<u>Thermowells</u>	NPS 2, Class 300 RF, Flanged, A105N, see Standard Drawing DD100-L-14-1, 2
<u>Bolting</u>	ASTM A193 Gr. B7, c/w A194 Gr. 2H Nuts
<u>Gaskets</u>	Spiral Wound 316SS, Graphite filled, c/w CS Outer Ring, per ASME B16.20

**** SPECIAL NOTES ****

1. Deleted
2. Deleted
3. Class 300 valve shall be used where required on instrument bridles.
4. Vents and Drains per DD100-L-12-1
5. Pressure Instrument Connections per DD100-L-11-1
6. PWHT required for thickness per ASME B31.3.



Piping Material Specifications

Valve Details

Check Valve

VCH0231#12-SW

Rev Date 22-Feb-08

Check Valve, Class CL 800 Socketweld, Forged Body to, ASTM A105 N, Bolted Cover, Piston/Lift Type with Spring, API Trim 12, Integral or Renewable seats, Hard Faced Seat & Disc, Full Port, Design to API-602
NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: AEC, CAF, CBF

Check Valve

VCH0241#12

Rev Date 17-Feb-08

Check Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Cover, Swing Type, API Trim 12 design to API-600, Integral or Welded in Seats, Hard Faced Seat
NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: AEC, CAF, CBF

Compact Gate Valve

VGA0031#12-SW

Rev Date 17-Feb-08

Compact Gate Valve, Class CL 800 Socketweld, Forged Body to, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 12, Integral or Renewable seats, Regular Port, Design to API-602

Assigned Pipe Classes: AEC, CAF, CAR, CBF

Compact Gate Valve

VGA0031#12-SW/TH

Rev Date 17-Feb-08

Compact Gate Valve, Class CL 800 Socketweld/Threaded, Forged Body to, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 12, Integral or Renewable seats, Regular Port, Design to API-602

Assigned Pipe Classes: AEC, AED, CAF, CAQ, CAR, CBF

Gate Valve

VGA0041#12

Rev Date 17-Feb-08

Gate Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 12, Integral or Welded in Seats, Design to API-600

Assigned Pipe Classes: AEC, CAF, CAQ, CAR, CBF

Gate Valve

VGA0054#12

Rev Date 10-Jun-08

Gate Valve, Class CL300 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 12, Integral or Welded in Seats, Design to API-600

Assigned Pipe Classes: CAF, CBF, EDC

Gate Valve

VGA0112#12

Rev Date 17-Feb-08

Gate Valve, Class CL 150 RF to ASME B16.5, Forged Body w/integral flanges, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 12, Integral or Renewable seats, Regular Port, Design to API-602

Assigned Pipe Classes: CAF, CBF

Gate Valve

VGA0312#12

Rev Date 17-Feb-08

Gate Valve, Class CL 300 RF to ASME B16.5, Forged Body w/integral flanges, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 12, Integral or Renewable seats, Regular Port, Design to API-602

Assigned Pipe Classes: CAF, CBF, EDC

Globe Valve

VGL0131#12-SW

Rev Date 19-Jun-06

Globe Valve, Class CL 800 Socketweld, Forged Body to, ASTM A105 N, Bolted Bonnet, OS & Y, Integral or Renewable seats, Hard faced Seat & Disc, API Trim 12, Design to API-602

Assigned Pipe Classes: AEC, CAF, CBF

Globe Valve

VGL0141#12

Rev Date 22-Feb-08

Globe Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, API Trim 12 design to API-600, Integral or Welded in Seats, Hard Faced Seat

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: AEC, CAF, CBF

Check Valve, Wafer Style

VWC0157

Rev Date 28-Jun-06

Check Valve, Wafer Style, Class CL 150 RF to fit between ASME B16.5 flanges, Cast Body to, ASTM A216 Gr WCB, Retainerless Style, Dual 316SS Plates, Inconel X750 Spring(s), Lapped Seats, w/Stellite Hard Faced Overlay, Design to API-594

Assigned Pipe Classes: CAF, CBF



Piping Material Specifications

Rev: **4**

Service Desc: <i>Hydrocarbon, very corrosive, with Naphthenic Acid</i>					Temp: <i>800 (427)</i>	°F(°C)max
Materials: <i>Type 317L SS</i>		Corrosion Allow: <i>0.0625</i>			Code: <i>ASME B31.3</i>	
Material P&T:	<i>230</i>	PSI @	<i>-20</i>	°F min.	Based on: <i>ASME B16.5 MG 2.3</i>	Branch Conn Tbl: <i>I</i>
	<i>(1586)</i>	Kpa @	<i>(-29)</i>	°C min.		Inspection Class: <i>III</i>
	<i>80</i>	PSI @	<i>800</i>	°F max.		
	<i>(552)</i>	Kpa @	<i>(427)</i>	°C max.		
P.W.H.T. : <i>NO</i>				Welding Proc: <i>Refer to Suncor Firebag STD FB-L-5217</i>		

Standard Specifications			Valve Specifications		
<u>Pipe</u>			<u>Check Valve</u>		
0.75	4	ASTM A312 Type 317L, Seamless, Sch. 80S	0.75	2	VCH0222-SW
6	24	ASTM A312 Type 317L, Seamless, wall thickness calculated per attachment L	3	6	VCH0251 RF
26	48	ASTM A312 Type 317L, Welded, wall thickness calculated per attachment L **2	<u>Check Valve, Wafer Style</u>		
<u>Fittings</u>			8	24	VWC0148 RF
0.75	2	ASTM A182 F317L, Class 3000 SW **1	<u>Compact Gate Valve</u>		
3	12	ASTM A403 Gr. WP 317L-S, (Schedule to match pipe)	0.75	2	VGA0020-SW
14	24	ASTM A403 Gr. WP 317L-WX, (Schedule to match pipe)	0.75	2	VGA0020-SW/TH
26	48	ASTM A403 Gr. WP 317L-WX, (Schedule to match pipe)	<u>Gate Valve</u>		
<u>Flanges</u>			0.75	2	VGA5029 RF
0.75	2	ASTM A182 F317L, Class 150 RF.SW.	3	24	VGA5030 RF
3	24	ASTM A182 F317L, Class 150 RF.WN, (Bore to match pipe)	26	48	VGA5048 RF
26	48	ASTM A182 F317L, Class 150 RF.WN, B16.47-A (Bore to match pipe)	3	3	VGA5057 RF **6
			1.5	2	VGA5058 RF **6
			<u>Globe Valve</u>		
			0.75	2	VGL0128-SW
			3	12	VGL0147 RF
			<u>Wafer Check Valve</u>		
			26	48	VWC0309-N

Special Material Specifications:

<u>Thermowells</u>	NPS 2, Class 300 RF, Flanged, A182 Type 317L, see Standard Drawing DD100-L-14-1, 2
<u>Bolting</u>	ASTM A193 Gr. B16, c/w A194 Gr. 4 Nuts
<u>Gaskets</u>	Spiral Wound 317SS, Graphite filled, c/w CS Outer Ring, per ASME B16.20

** SPECIAL NOTES **

1. Unions are not permitted.
2. The use of double welded pipe requires owner approval.
3. Pressure/Temperature limits are based on Grade 316L material ratings per ASME B16.5.
4. Deleted
5. Positive Isolation required per drawings DD100-L-31-1, 2, and 3.
6. Class 300 valve shall be used where required on instrument bridles.
7. Vents and Drains per DD100-L-12-1
8. Pressure Instrument Connections per DD100-L-11-1



Piping Material Specifications

Valve Details

Check Valve

VCH0222-SW

Rev Date 22-Feb-08

Check Valve, Class CL 800 Socketweld, Forged Body to, ASTM A182 F317L, Bolted Cover, Ball Type, 317 SS Trim, Integral or renewable hard faced seats, Full Port, Design to API-602

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: CCH, EAH

Check Valve

VCH0251

Rev Date 17-Feb-08

Check Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A351 Gr. CG8M, Bolted Cover, Swing Type, 317 SS Trim design to API-600, Integral or Welded Hard Faced Seat

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: CCH

Compact Gate Valve

VGA0020-SW

Rev Date 17-Feb-08

Compact Gate Valve, Class CL 800 Socketweld, Forged Body to, ASTM A182 F317L, Bolted Bonnet, OS & Y, Solid Wedge, 317 SS Trim, Integral or renewable hard faced seat, Regular Port, Design to API-602

Assigned Pipe Classes: CCH, EAH

Compact Gate Valve

VGA0020-SW/TH

Rev Date 17-Feb-08

Compact Gate Valve, Class CL 800 Socketweld/Threaded, Forged Body to, ASTM A182 F317L, Bolted Bonnet, OS & Y, Solid Wedge, 317 SS Trim, Integral or renewable hard faced seats, Regular Port, Design to API-602

Assigned Pipe Classes: CCH, EAH

Gate Valve

VGA5029

Rev Date 17-Feb-08

Gate Valve, Class CL 150 RF to ASME B16.5, Forged Body w/integral flanges, ASTM A182 F317L, Bolted Bonnet, OS & Y, Solid Wedge, 317 SS Trim, Integral or renewable hard faced seats, Design to API-602

Assigned Pipe Classes: CCH

Gate Valve

VGA5030

Rev Date 17-Feb-08

Gate Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A351 Gr. CG8M, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, 317 SS Trim, Integral, Welded in or Renewable Seats, Hard Faced Seat, Design to API-600

Assigned Pipe Classes: CCH

Gate Valve

VGA5048

Rev Date 22-Feb-08

Gate Valve, Class CL 150 RF to ASME B16.47-A, Cast Body to, ASTM A351 Gr. CG8M, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, 317 SS Trim design to API-600, Integral or Welded in or Renewable Seats, Hard Faced Seat

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: CCH

Gate Valve

VGA5057

Rev Date 17-Feb-08

Gate Valve, Class CL 300 RF to ASME B16.5, Cast Body to, ASTM A351 Gr. CG8M, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, 317 SS Trim, Integral, Welded in or Renewable Seats, Hard Faced Stellited Seat, Design to API-600

Assigned Pipe Classes: CCH, EAH

Gate Valve

VGA5058

Rev Date 17-Feb-08

Gate Valve, Class CL 300 RF to ASME B16.5, Forged Body w/integral flanges, ASTM A182 F317L, Bolted Bonnet, OS & Y, Solid Wedge, 317 SS Trim, Integral or renewable hard faced seats, Regular Port, Design to API-602

Assigned Pipe Classes: CCH, EAH

Globe Valve

VGL0128-SW

Rev Date 17-Feb-08

Globe Valve, Class CL 800 Socketweld, Forged Body to, ASTM A182 F317L, Bolted Bonnet, OS & Y, 317 SS Trim, Integral or renewable hard faced seats, Design to API-602

Assigned Pipe Classes: CCH, EAH

Globe Valve

VGL0147

Rev Date 22-Feb-08

Globe Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A351 Gr. CG8M, Bolted Bonnet, OS & Y, 317 SS Trim, Integral, Welded in or Renewable Seats, Hard Faced Seat
 NOTES: Pressure/Temperature rating to ASME B16.34
 Assigned Pipe Classes: CCH

Check Valve, Wafer Style

VWC0148

Rev Date 20-Jun-06

Check Valve, Wafer Style, Class CL 150 RF to fit between ASME B16.5 flanges, Cast Body to, ASTM A351 Gr. CG8M, Retainerless Style, Dual 317SS Plates, Inconel X750 Spring(s), Lapped Seats, w/Stellite Hard Faced Overlay, Design to API-594
 Assigned Pipe Classes: CCH

Wafer Check Valve

VWC0309-N

Rev Date 20-Jun-06

SUFFIX: -N Valve to conform to NACE MR0103 latest revision
 Wafer Check Valve, Class CL 300 RF to fit between ASME B16.5 flanges, Cast Body to, ASTM A352 Gr. LCC, Retainerless Style, Dual 316SS Plates, Inconel X750 Spring(s), Lapped Seats, w/Stellite Hard Faced Overlay, Design to API-594
 NOTES: Valve to be suitable for -50 F (-46 C)
 Assigned Pipe Classes: CCH, EAI



Piping Material Specifications

Rev: **4a**

Service Desc: Lean/Rich DGA **7	Temp: 350 (177) °F(°C)max
Materials: Type 316/316L SS **4	Corrosion Allow: 0.031
Material P&T: 275 PSI @ -20 °F min.	Code: ASME B31.3
(1896) Kpa @ (-29) °C min.	Based on: ASME B16.5 MG 2.2
205 PSI @ 350 °F max.	Branch Conn Tbl: I
(1413) Kpa @ (177) °C max.	Inspection Class: III
P.W.H.T.: NO (**8)	Welding Proc: Refer to Suncor Firebag STD FB-L-5217

Standard Specifications

<u>Pipe</u>		
0.75	2	ASTM A312 Type 316/316L, Seamless, Sch. 80S
3	12	ASTM A312 Type 316/316L, Seamless, Sch. 10S
14	30	ASTM A358, Cl. 1, Type 316/316L, EFW, Sch. 10S
<u>Fittings</u>		
0.75	10	ASTM A403 Gr. WP 316/316L-S, (Schedule to match pipe)
12	30	ASTM A403 Gr. WP 316/316L WX, (Schedule to match pipe)
<u>Flanges</u>		
0.75	24	ASTM A182 F316/316L, Class 150 RF.WN, (Bore to match pipe) **4
26	30	ASTM A182 F316/316L, Class 150 RF.WN, B16.47-A, (Bore to match pipe) **4

Valve Specifications

<u>Ball Valve</u>			
3	16	VBA0152-N2	RF
<u>Check Valve</u>			
0.75	2	VCH0220#12-N2	BW
3	6	VCH0246#12-N2	RF
<u>Check Valve, Wafer Style</u>			
8	24	VWC0147-N2	RF
26	30	VWC0164-N2	RF
<u>Compact Gate Valve</u>			
0.75	2	VGA0027#12-N2	BW
<u>Gate Valve</u>			
3	24	VGA0046#12-N2	RF
0.75	2	VGA0101#12-N2	RF
1.5	2	VGA5032#12-N2	RF **6
3	3	VGA5056#12-N2	RF **6
26	30	VGA5143#12-N2	RF
<u>Globe Valve</u>			
3	6	VGL0142#12-N2	RF
0.75	2	VGL5169#12-N2	BW

Special Material Specifications:

<u>Bolting</u>	ASTM A193 Gr. 16, c/w A194 Gr.4 Nuts
<u>Gaskets</u>	Spiral Wound 316 SS, Graphite filled, c/w CS Outer Ring, per ASME B16.20

** SPECIAL NOTES **

1. Use weldolets for branch connections NPS 3/4 to 2 on headers NPS 3 and larger.
2. Piping connections shall be flanged or butt weld. Socket welds are not permitted.
3. Unions are not permitted, use flanges.
4. Dual certified material pressure/temperature ratings are based on the higher ratings of the straight grade material.
5. For valved vents and drains use a BW valve with flange and blind flange.
6. Class 300 valve shall be used where required on instrument bridges.
7. Corrosion Allowance based on 300 F.
8. All materials must meet the requirements of NACE MR0103 latest edition, see Attachment B, Sour Service Supplement.
9. Vents and Drains per DD100-L-12-1
10. Pressure Instrument Connections per DD100-L-11-1



Piping Material Specifications

Valve Details

Ball Valve

VBA0152-N2

Rev Date 12-Mar-10

SUFFIX: **-N2** Valve shall conform to NACE MR0103 latest revision

Ball Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A351 Gr. CF8M, Split body, Blow-out proof stem, 316 SS Ball and Stem, Metal Seated, w/Stellite Hard Faced Overlay, Regular Port, Design to API-608 and/or ASME B16.34

NOTES: Valve shall be fire tested to API-607;

Assigned Pipe Classes: CDE

Check Valve

VCH0220#12-N2

Rev Date 12-Mar-10

SUFFIX: **-N2** Valve shall conform to NACE MR0103 latest revision

Check Valve, Class CL 800 Butt weld Ends Sch 40S, Forged Body to, ASTM A182 F316/316L Dual Cert., Bolted Cover, Piston/Lift Type with Spring, API Trim 12, Integral or renewable, Hard Faced Seat, Full Port, Design to API-602

NOTES: Pressure / Temperature rating to ASME B16.34

Assigned Pipe Classes: CDE

Check Valve

VCH0246#12-N2

Rev Date 12-Mar-10

SUFFIX: **-N2** Valve shall conform to NACE MR0103 latest revision

Check Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A351 Gr. CF8M, Bolted Cover, Swing Type, API Trim 12 design to API-600, Integral or Welded in, Hard Faced Seat

NOTES: Pressure / Temperature rating to ASME B16.34

Assigned Pipe Classes: CDE

Compact Gate Valve

VGA0027#12-N2

Rev Date 12-Mar-10

SUFFIX: **-N2** Valve shall conform to NACE MR0103 latest revision

Compact Gate Valve, Class CL 800 Butt weld Ends Sch 40S, Forged Body to, ASTM A182 F316/316L Dual Cert., Bolted Bonnet, OS & Y, Solid Wedge, API Trim 12, Integral or Renewable seats, Regular Port, Design to API-602

Assigned Pipe Classes: CDE

Gate Valve

VGA0046#12-N2

Rev Date 12-Mar-10

SUFFIX: **-N2** Valve shall conform to NACE MR0103 latest revision

Gate Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A351 Gr. CF8M, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 12, Integral, Welded in or Renewable Seats, Design to API-600

Assigned Pipe Classes: CDE

Gate Valve

VGA0101#12-N2

Rev Date 12-Mar-10

SUFFIX: **-N2** Valve shall conform to NACE MR0103 latest revision

Gate Valve, Class CL 150 RF to ASME B16.5, Forged Body w/integral flanges, ASTM A182 F316/316L Dual Cert., Bolted Bonnet, OS & Y, Solid Wedge, API Trim 12, Integral or Renewable seats, Regular Port, Design to API-602

Assigned Pipe Classes: CDE

Gate Valve

VGA5032#12-N2

Rev Date 12-Mar-10

SUFFIX: **-N2** Valve shall conform to NACE MR0103 latest revision

Gate Valve, Class CL 300 RF to ASME B16.5, Forged Body w/integral flanges, ASTM A182 F316/316L Dual Cert., Bolted Bonnet, OS & Y, Solid Wedge, API Trim 12, Integral or Renewable seats, Hard Faced Seat & Disc, Regular Port, Design to API-602

Assigned Pipe Classes: CDE

Gate Valve

VGA5056#12-N2

Rev Date 12-Mar-10

SUFFIX: **-N2** Valve shall conform to NACE MR0103 latest revision

Gate Valve, Class CL 300 RF to ASME B16.5, Cast Body to, ASTM A351 Gr. CF8M, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 12, Integral, Welded in or Renewable Seats, Hard Faced Seat & Disc, Regular Port, Design to API-600

Assigned Pipe Classes: CDE

Gate Valve

VGA5143#12-N2

Rev Date 12-Mar-10

SUFFIX: **-N2** Valve shall conform to NACE MR0103 latest revision

Gate Valve, Class CL 150 RF to ASME B16.47-A, Cast Body to, ASTM A351 Gr. CF8M, Bolted Bonnet, OS & Y, Flexible Wedge, API Trim 12 design to API-600, Integral or Welded in Seats

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: CDE

Globe Valve

VGL0142#12-N2

Rev Date 12-Mar-10

SUFFIX: **-N2** Valve shall conform to NACE MR0103 latest revision

Globe Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A351 Gr. CF8M, Bolted Bonnet, OS & Y, API Trim 12 design to API-600, Integral, Welded in or Renewable, Hard Faced Seat

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: CDE

Globe Valve**VGL5169#12-N2**

Rev Date 12-Mar-10

SUFFIX: **-N2** Valve shall conform to NACE MR0103 latest revision

Globe Valve, Class CL 800 Buttweld Ends Sch 40S, Forged Body to, ASTM A182 F316/316L Dual Cert., Bolted Bonnet, OS & Y, Integral or renewable, Hard Faced Seat to API Trim 12, Design to API-602

Assigned Pipe Classes: CDE

Check Valve, Wafer Style**VWC0147-N2**

Rev Date 12-Mar-10

SUFFIX: **-N2** Valve shall conform to NACE MR0103 latest revision

Check Valve, Wafer Style, Class CL 150 RF to fit between ASME B16.5 flanges, Cast Body to, ASTM A351 Gr. CF8M, Retainerless Style, Dual 316SS Plates, Inconel X750 Spring(s), Lapped Seats, w/Stellite Hard Faced Overlay, Design to API-594

Assigned Pipe Classes: CDE

Check Valve, Wafer Style**VWC0164-N2**

Rev Date 12-Mar-10

SUFFIX: **-N2** Valve shall conform to NACE MR0103 latest revision

Check Valve, Wafer Style, Class CL 150 RF to fit between ASME B16.47-A flanges, Cast Body to, ASTM A351 Gr. CF8M, Retainerless Style, Dual 316SS Plates, Inconel X750 Spring(s), Lapped Seats, w/Stellite Hard Faced Overlay, Design to API-594

Assigned Pipe Classes: CDE



Piping Material Specifications

Rev: **4a**

Service Desc: <i>Sour Corrosive Hydrocarbon Vapour and Vacuum Service</i>					Temp: <i>350F(177C)</i> °F(°C)max	
Materials: <i>Type 316 / 316L SS</i>			Corrosion Allow: <i>0</i>		Code: <i>ASME B31.3</i>	
Material P&T:	<i>275</i>	PSI @	<i>-50</i>	°F min.	Based on: <i>ASME B16.5 MG 2.2</i>	Branch Conn Tbl: <i>I</i>
	<i>1896</i>	Kpa @	<i>-46</i>	°C min.		Inspection Class: <i>III</i>
	<i>206</i>	PSI @	<i>350</i>	°F max.		
	<i>1420</i>	Kpa @	<i>177</i>	°C max.		
P.W.H.T. : <i>NO (**7)</i>				Welding Proc: <i>Refer to Suncor Firebag STD FB-L-5217</i>		

Standard Specifications				Valve Specifications			
<u>Pipe</u>				<u>Check Valve</u>			
0.75	2	ASTM A312 Type 316/316L, Seamless, Sch. 40S		0.75	2	VCH0220#12-N2-V	BW
3	14	ASTM A312 Type 316/316L, Seamless, Sch. 10S		3	6	VCH0246#12-N2-V	RF
16		ASTM A312 Type 316/316L, Seamless, Sch. 10S		<u>Gate Valve</u>			
18		ASTM A312 Type 316/316L, Seamless, Sch. 40S		3	20	VGA0046#12-N2-V	RF
20		ASTM A312 Type 316/316L, Seamless, Sch. 10S		0.75	2	VGA0101#12-N2-V	RF
<u>Fittings</u>				1.5	2	VGA5032#12-N2-V	RF **5
0.75	2	ASTM A403 Gr. WP 316/316L -Sch.40S		3	3	VGA5056#12-N2-V	RF **5
3	10	ASTM A403 Gr. WP 316/316L -Sch.10S		<u>Globe Valve</u>			
12	16	ASTM A403 Gr. 316/316L -WX -Sch. 10S		3	6	VGL0142#12-N2-V	RF
18		ASTM A403 Gr. 316/316L -WX -Sch. 40S		0.75	2	VGL5169#12-N2-V	BW
20		ASTM A403 Gr. 316/316L -WX -Sch. 10S		<u>Wafer Check Valve</u>			
<u>Flanges</u>				8	20	VWC0147-N2-V	RF
0.75	20	ASTM A182 Gr. 316/F316L, Class 150 RF.WN, (Bore to match pipe)					

Special Material Specifications:

Thermowells	NPS 2, Class 300 RF, Flanged, A182 Type 316/316L, see Standard Drawing DD100-L-14-1, 2
Bolting	ASTM A193 Gr. B7M, c/w A194 Gr. 2HM Nuts
Gaskets	Spiral Wound 316 SS, Graphite filled, c/w CS Outer Ring, per ASME B16.20

** SPECIAL NOTES **

1. Use Weldolets for branch connections NPS 0.75" to NPS 2" on headers NPS 3" and larger.
2. Piping connections shall be flanged or butt welded. Socket welds are not permitted.
3. Unions are not permitted, use flanges.
4. Dual certified material pressure temperature ratings are based on the higher ratings of the straight grade material.
5. Class 300 valves shall be used where required on instrument bridges.
6. Full vacuum condition of minus 15 psig (103 Kpa) and temperature range of -50 F (-46 C) to 350 F (177 C)
7. All materials shall comply with NACE MR0103 latest revision, see Appendix B, "Sour Service Supplement" for further information.
8. Vents and Drains per DD100-L-12-1
9. Pressure Instrument Connections per DD100-L-11-1



Piping Material Specifications

Valve Details

Check Valve

VCH0220#12-N2-V

Rev Date 12-Mar-10

SUFFIX: **-N2-V** Valve shall conform to NACE MR0103 latest revision, suitable for Vacuum Service

Check Valve, Class CL800 Butt Weld Ends to SCH40S, Forged Body to, ASTM A182 F316/316L Dual Cert., Bolted Cover, Piston/Lift Type with Spring, API Trim 12, Integral or Welded Hard Faced Seat, Full Port, Design to API-602

NOTES: Pressure / Temperature rating to ASME B16.34

Assigned Pipe Classes: CDH

Check Valve

VCH0246#12-N2-V

Rev Date 12-Mar-10

SUFFIX: **-N2-V** Valve shall conform to NACE MR0103 latest revision, suitable for Vacuum Service

Check Valve, Class 150 RF, Cast Body to, ASTM A351 Gr. CF8M, Bolted Cover, Swing Type, API Trim 12 design to API-600, Welded in Hard Faced Seat, Pres/Temp Rat'g to ASME B16.34

Assigned Pipe Classes: CDH

Gate Valve

VGA0046#12-N2-V

Rev Date 12-Mar-10

SUFFIX: **-N2-V** Valve shall conform to NACE MR0103 latest revision, suitable for Vacuum Service

Gate Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A351 Gr. CF8M, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 12, Integral or Welded in or Renewable Seats, Design to API-600

Assigned Pipe Classes: CDH

Gate Valve

VGA0101#12-N2-V

Rev Date 12-Mar-10

SUFFIX: **-N2-V** Valve shall conform to NACE MR0103 latest revision, suitable for Vacuum Service

Gate Valve, Class CL150 RF to ASME B16.5, Forged Body to, ASTM A182 F316/316L Dual Cert., Bolted Bonnet, OS & Y, Solid Wedge, API Trim 12, Integral or Renewable seat, Regular Port, Design to API-602

Assigned Pipe Classes: CDH

Gate Valve

VGA5032#12-N2-V

Rev Date 12-Mar-10

SUFFIX: **-N2-V** Valve shall conform to NACE MR0103 latest revision, suitable for Vacuum Service

Gate Valve, Class CL 300 RF to ASME B16.5, Forged Body to, ASTM A182 F316/316L Dual Cert., Bolted Bonnet, OS & Y, Solid Wedge, API Trim 12, Integral or Renewable seats, Regular Port, Design to API-602

Assigned Pipe Classes: CDH

Gate Valve

VGA5056#12-N2-V

Rev Date 12-Mar-10

SUFFIX: **-N2-V** Valve shall conform to NACE MR0103 latest revision, suitable for Vacuum Service

Gate Valve, Class CL300 RF to ASME B16.5, Cast Body to, ASTM A351 Gr. CF8M, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 12, Integral or Welded in or Renewable Seats, Hard Faced Seat & Disc, Regular Port, Design to API-600

Assigned Pipe Classes: CDH

Globe Valve

VGL0142#12-N2-V

Rev Date 12-Mar-10

SUFFIX: **-N2-V** Valve shall conform to NACE MR0103 latest revision, suitable for Vacuum Service

Globe Valve, Class CL150 RF to ASME B16.5, Cast Body to, ASTM A351 Gr. CF8M, Bolted Bonnet, OS & Y, API Trim 12 design to API-600, Integral, Welded in or Renewable Seats, Hard Faced Seat

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: CDH

Globe Valve

VGL5169#12-N2-V

Rev Date 12-Mar-10

SUFFIX: **-N2-V** Valve shall conform to NACE MR0103 latest revision, suitable for Vacuum Service

Globe Valve, Class Class CL300 RF to ASME B16.5, Forged Body to, ASTM A182 F316/316L Dual Cert., Bolted Bonnet, OS & Y, API Trim 12, Integral or renewable hard faced seat, Design to API-602

Assigned Pipe Classes: CDH

Wafer Check Valve

VWC0147-N2-V

Rev Date 12-Mar-10

SUFFIX: **-N2-V** Valve shall conform to NACE MR0103 latest revision, suitable for Vacuum Service

Wafer Check Valve, Class Class CL 150 RF to fit between ASME B16.5 flanges, Cast Body to, ASTM A351 Gr. CF8M, Retainerless Style, Dual 316SS Plates, Inconel X750 Spring(s), Lapped Seats, w/Stellite Hard Faced Overlay, Design to API-594

Assigned Pipe Classes: CDH



Piping Material Specifications

Rev: **4**

Service Desc: Firewater Distribution System	Temp: 80 (27) °F(°C)max
Materials: HDPE and C.S. See Note 1,4	Corrosion Allow: 0.0625
Material P&T: 160 PSI @ 0 °F min.	Based on: HDPE material
(1103) Kpa @ (-18) °C min.	Branch Conn Tbl: I
160 PSI @ 80 °F max.	Inspection Class: III
(1103) Kpa @ (27) °C max.	
P.W.H.T. : NO (**14)	Welding Proc: Suncor Firebag STD FB-L-5212 & 5217

Standard Specifications			Valve Specifications		
<u>Pipe</u>			<u>Check Valve</u>		
0.75	2	ASTM A106 Gr. B, Seamless, Sch 80	0.75	2	VCH0231#8-SW **2
3	24	ASTM A106 Gr. B, Seamless, STD. Wt.	3	24	VCH0241#8 RF **2
3	36	HDPE, ASTM F714, Class 150, ASTM D3350 Cell CL PE345464C, FM Approved	<u>Compact Gate Valve</u>		
<u>Fittings</u>			0.75	2	VGA0031#8-SW **2
0.75	2	ASTM A105N, Class 3000 SW	0.75	2	VGA0031#8-SW/TH **2
3	24	ASTM A234 WPB, (Schedule to match Pipe)	<u>Gate Valve</u>		
3	36	HDPE, Fittings ASTM F714 Class 150, ASTM D3350 Cell CL PE345464C, FM Approved, Butt-Fusion Ends **6	3	14	VGA0015 FF **2
<u>Flanges</u>			3	24	VGA0041#8 RF **2
0.75	2	ASTM A105N, Class 150 RF. SW **5	3	6	VGA0041#8-FH FF
3	24	ASTM A105N, Class 150 RF.WN, (Bore to match Pipe) **5	6	24	VGA0047 FF, Post Indicator
3	36	HDPE, CL 150, ASTM D3350 Cell CL PE345464C, FF Stub end with Steel Backing Ring	26	28	VGA5142#8 RF **2
26	36	ASTM A105N, Class 150 FFWN, B16.47-A (Bore to match pipe) **5	<u>Globe Valve</u>		
			0.75	2	VGL0131#8-SW **2
			<u>Specialty Valve</u>		
			6		VSP0301 FF, Hydrant

Special Material Specifications:

<u>Bolting</u>	ASTM A307 Gr.B Machine Bolts, Heavy Hex Head c/w A-563 A Heavy Hex Head Nut, c/w Washers to ASTM F844 ASTM A193 Gr. B7, c/w A194 Gr. 2H Nuts
<u>Gaskets</u>	0.125" thick Full Face Neoprene (for HDPE) **9 Spiral Wound 316SS, Graphite filled, c/w CS Outer Ring, per ASME B16.20 Gaskets 8" and above shall be equipped with inner ring.
<u>Post Indicator</u>	Roto Hammer Floor Stand, c/w gear Operator, for NPS 16 to 28 Canada Valve Model C1242, watertite arrangement **4
<u>Fire Monitor</u>	Class 150 RF 6" inlet, 3" Stang Master stream deluge gun (750 GPM)

**** SPECIAL NOTES ****

1. Corrosion Allowance, Branch Connections, Welding Procedures, and Inspection Class apply only for CS. For HDPE installation and testing specifications see Firebag Std FB-L-5212.
2. These valves shall be used only above ground.
3. All underground Carbon Steel piping shall be internally coated, in-situ with minimum 10 mils DFT of Epoxy coating and externally coated in accordance with Suncor Firebag STD FB-L- 5230.
4. Carbon Steel pipe, fittings& flanges are intended for A/G pumphouse installation and transsition from Buried HDPE to Grade.
5. Use Flat Face flanges and Full Face gaskets on all connections to Cast Iron flanges. For connections to the HDPE system see Suncor FB-L-5212 and the manufacturers instructions.
6. Flanged end fittings are acceptable.
7. All HDPE material shall be FM approved.
8. This specification only applies to the Firewater Pumphouse and the underground distribution piping. This specification shall not be used for above ground or in building firewater systems, except for hydrants, monitors, valves, and other such associated free-standing items contained with this line class.
9. Use HDPE pipe manufacturer approved gaskets.
10. HDPE material to have a Min 2% by weight carbon black for UV protection.
11. Joining of HDPE Pipe by proven Electrofusion Method shall be acceptable subject to strict control of joint quality and integrity by Hydrostatic Testing.

- 12. VGA0047, 18" and greater may be supplied without UL/FM approval.*
- 13. Pressure Instrument Connection per DD100- L-11-1.*
- 14. PWHT required for thickness per ASME B31.3.*



Piping Material Specifications

Valve Details

Check Valve

VCH0231#8-SW

Rev Date 22-Feb-08

Check Valve, Class CL 800 Socketweld, Forged Body to, ASTM A105 N, Bolted Cover, Piston/Lift Type with Spring, API Trim 8, Integral or renewable, Full Port, Design to API-602

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: CA, CAB, CAZ, CBA, CHY, CS, EA, EAB, EDB, ES, HB, HBD

Check Valve

VCH0241#8

Rev Date 17-Feb-08

Check Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Cover, Swing Type, API Trim 8 design to API 600, Integral or Welded Hard Faced Seat

NOTES: Pressure/Temperature Rating to ASME B16.34

Assigned Pipe Classes: ADX, CA, CAB, CAH, CAZ, CBA, CHY, CLF, CS

Gate Valve

VGA0015

Rev Date 19-Jun-06

Gate Valve, Class 150 FF, Cast Iron, ASTM A126 Class B, Bolted Bonnet, OS & Y, Double Disc, Bronze Trim, Parallel Seats, Regular Port, FM or ULC

NOTES: Mueller Model A-2073 or R-2360-6

Assigned Pipe Classes: CHY

Compact Gate Valve

VGA0031#8-SW

Rev Date 04-Apr-08

Compact Gate Valve, Class CL 800 Socketweld, Forged Body to, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 8, Integral or Renewable seats, Regular Port, Design to API-602

Assigned Pipe Classes: CA, CAB, CAZ, CBA, CHY, CS, EA, EAB, EDB, HB, HBD, 662-2, 662-3

Compact Gate Valve

VGA0031#8-SW/TH

Rev Date 04-Apr-08

Compact Gate Valve, Class CL800 Socketweld/Threaded, Forged Carbon Steel, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 8, Integral or renewable hard faced seats, Regular Port, Design to API-602

Assigned Pipe Classes: CA, CAB, CAZ, CBA, CHY, CS, EA, EAB, EDB, HB, HBD, 662-2, 662-3

Gate Valve

VGA0041#8

Rev Date 17-Feb-08

Gate Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 8, Integral or Welded in Seats, Design to API-600

Assigned Pipe Classes: ADX, CA, CAB, CAH, CAZ, CBA, CHY, CS

Gate Valve

VGA0041#8-FH

Rev Date 17-Feb-08

Gate Valve, Class CL 150 FF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, Flexible Wedge, API Trim 8, Integral or Welded in Seats, Design to API-600

NOTES: FH - Fire Hydrant

Assigned Pipe Classes: CHY

Gate Valve

VGA0047

Rev Date 19-Jun-06

Gate Valve, Class 150, Ductile Iron, ASTM A536, Bolted Bonnet, Non-rising Stem, Resilient Seated Wedge, Bronze Trim, Integral, Welded in or Renewable Seats, FM or ULC

NOTES: Epoxy inner and outer body coating; SS bolts, Post Indicators

Assigned Pipe Classes: CHY

Gate Valve

VGA5142#8

Rev Date 22-Feb-08

Gate Valve, Class CL 150 RF to ASME B16.47-A, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, Flexible Wedge, API Trim 8 design to API 600, Integral or Welded in Seats

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: CA, CAB, CHY, CS

Globe Valve

VGL0131#8-SW

Rev Date 23-Jun-06

Globe Valve, Class CL 800 Socketweld, Forged Body to, ASTM A105 N, Bolted Bonnet, OS & Y, Integral or Renewable seats, Hard Faced Seat to API Trim 8, Design to API-602

Assigned Pipe Classes: CA, CAB, CAZ, CBA, CHY, CS, EA, EAB, EDB, HB, HBD

Specialty Valve**VSP0301**

Rev Date 03-Apr-06

Specialty Valve, Class CL300 FF to ASME B16.5, CarbonSteel, 304 SS Trim

NOTES: HYDRANT: Manufacturer: American Darling Industrial Hydrant Model #B-50-B HP; Mueller Canada 2001 2-Hose 2-Pumper 250 PSI pressure rated body, Ductile Iron - ASTM A536 Flanges, Interior parts shall be SS. Below grade bolting shall be SS, Sealed drain, handwheel operator. Two 5" Steamer ports c/w gate v/v's, 125 mm threads c/w gate v/v's and caps, interal and external epoxy coated barrel, red finish, watertight barrel to suite depth of bury, FM approved, UL listed

Assigned Pipe Classes: CHY



Piping Material Specifications

Rev: **4**

Service Desc: <i>Lube, Control, or Seal Oil, Corrosion Inhibitor, Biocide, Oil & Grease Dispersant</i>					Temp: <i>302 (150)</i>	°F(°C)max
Materials: <i>Type 316/316L SS **8</i>			Corrosion Allow: <i>0</i>		Code: <i>ASME B31.3</i>	
Material P&T:	<i>275</i>	PSI @	<i>-20</i>	°F min.	Based on: <i>ASME B16.5 MG 2.2</i>	Branch Conn Tbl: <i>5</i>
	<i>(1896)</i>	Kpa @	<i>(-29)</i>	°C min.		Inspection Class: <i>III</i>
	<i>214</i>	PSI @	<i>302</i>	°F max.		
	<i>(1480)</i>	Kpa @	<i>(150)</i>	°C max.		
P.W.H.T. : <i>NO</i>				Welding Proc: <i>Refer to Suncor Firebag STD FB-L-5217</i>		

Standard Specifications			Valve Specifications		
<u>Pipe</u>			<u>Check Valve</u>		
0.75	2	ASTM A312, Type 316/316L, Seamless, Sch.80S	3	8	VCH0246#10 RF
3	8	ASTM A312, Type 316/316L, Seamless, Sch.40S	0.75	2	VCH5224#10-80S BW, Sch 80S
<u>Fittings</u>			<u>Compact Gate Valve</u>		
0.75	8	ASTM A403 Gr. WP 316/316L-S, (Schedule to match pipe)	0.75	2	VGA5068#10-80S BW, Sch 80S
<u>Flanges</u>			<u>Gate Valve</u>		
0.75	8	ASTM A182 F316/316L, Class 150 RF.WN, (Bore to match pipe)	3	8	VGA0046#10 RF
			1.50	2	VGA0103#10 RF **11
			3	3	VGA5054#10 RF **11
			<u>Globe Valve</u>		
			3	6	VGL0142#10 RF
			0.75	2	VGL5167#10-80S BW, Sch 80S

Special Material Specifications:

<u>Thermowells</u>	NPS 2, Class 300 RF, Flanged, A182 Type 316/316L, see Standard Drawing DD100-L-14-1, 2
<u>Bolting</u>	ASTM A193 Gr. B7, c/w A194 Gr. 2H Nuts
<u>Gaskets</u>	Spiral Wound 316SS, Graphite filled, c/w CS Outer Ring, per ASME B16.20

** SPECIAL NOTES **

- Deleted
- Deleted
- Unions are not permitted, use flanges.
- Deleted
- Connections to tubing shall be with Swagelok fittings.
- Deleted.
- Flexible connections, when approved by the Owner's Engineer, shall be "Type 321SS annular corrugated close pitch bellows overlaid with Type 316SS braid, 18" maximum length, welded to 150 RF.WN flanges".
- Dual certified material pressure/temperature ratings are based on the higher ratings for the straight grade material.
- Internal misalignment or concave root surface are not permitted
- Piping shall be shop cleaned, but not sandblasted nor pickled
- Vents and Drains per DD100-L-12-2.
- Pressure Instrument Connections per DD100-L-11-1



Piping Material Specifications

Valve Details

Check Valve

VCH0246#10

Rev Date 17-Feb-08

Check Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A351 Gr. CF8M, Bolted Cover, Swing Type, horizontal or vertical, API Trim 10 design to API-600, Integral, Welded in or Renewable Seats
NOTES: Pressure/Temperature rating to ASME B16.34
Assigned Pipe Classes: CKX, CKY

Check Valve

VCH5224#10-80S

Rev Date 22-Feb-08

Check Valve, Class CL 800 Buttweld Ends Sch 80S, Forged Body to, ASTM A182 F316/316L Dual Cert., Bolted Cover, Piston/Lift Type with Spring, API Trim 10, Integral or Renewable seats, Full Port, Design to API-602
NOTES: Pressure/Temperature rating to ASME B16.34
Assigned Pipe Classes: CKX

Gate Valve

VGA0046#10

Rev Date 17-Feb-08

Gate Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A351 Gr. CF8M, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 10, Integral, Welded in or Renewable Seats, Design to API-600
Assigned Pipe Classes: CKX, CKY

Gate Valve

VGA0103#10

Rev Date 17-Feb-08

Gate Valve, Class CL 300 RF to ASME B16.5, Forged Body to, ASTM A182 F316/316L Dual Cert., Bolted Bonnet, OS & Y, Solid Wedge, API Trim 10, Integral or Renewable seats, Regular Port, Design to API-602
Assigned Pipe Classes: CKX, CKY

Gate Valve

VGA5054#10

Rev Date 17-Feb-08

Gate Valve, Class CL 300 RF to ASME B16.5, Cast Body to, ASTM A351 Gr. CF8M, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 10, Integral, Welded in or Renewable Seats, Design to API-600
Assigned Pipe Classes: CKX, CKY

Compact Gate Valve

VGA5068#10-80S

Rev Date 17-Feb-08

Compact Gate Valve, Class CL 800 Buttweld Ends Sch 80S, Forged Body to, ASTM A182 F316/316L Dual Cert., Bolted Bonnet, OS & Y, Solid Wedge, API Trim 10, Integral or Renewable seats, Design to API-602
Assigned Pipe Classes: CKX

Globe Valve

VGL0142#10

Rev Date 22-Feb-08

Globe Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A351 Gr. CF8M, Bolted Bonnet, OS & Y, API Trim 10 design to API-600, Integral, Welded in or Renewable Seats
NOTES: Pressure/Temperature rating to ASME B16.34
Assigned Pipe Classes: CKX, CKY

Globe Valve

VGL5167#10-80S

Rev Date 17-Feb-08

Globe Valve, Class CL 800 Buttweld Ends Sch 80S, Forged Body to, ASTM A182 F316/316L Dual Cert., Bolted Bonnet, OS & Y, API Trim 10, Integral or Renewable seats, Design to API-602
Assigned Pipe Classes: CKX



Piping Material Specifications

Rev: **4**

Service Desc: <i>Filtered, Softened, RO Water</i>					Temp: <i>300 (149)</i> °F(°C)max		
Materials: <i>Type 316/316L SS **1</i>				Corrosion Allow: <i>0</i>		Code: <i>ASME B31.3</i>	
Material P&T:	<i>275</i>	PSI @	<i>-20</i>	°F min.	Based on: <i>ASME B16.5 MG 2.2</i>	Branch Conn Tbl: <i>1</i>	
	<i>(1896)</i>	Kpa @	<i>(-29)</i>	°C min.		Inspection Class: <i>IV</i>	
	<i>215</i>	PSI @	<i>300</i>	°F max.			
	<i>(1482)</i>	Kpa @	<i>(149)</i>	°C max.			
P.W.H.T. : <i>NO</i>					Welding Proc: <i>Refer to Suncor Firebag STD FB-L-5217</i>		

Standard Specifications			Valve Specifications		
<u>Pipe</u>			<u>Check Valve</u>		
0.5	2	ASTM A312, Type 316/316L, Seamless, Sch.40S	0.5	2	VCH0219#12-SW Piston
3	12	ASTM A312, Type 316/316L, Seamless, Sch.10S	0.75	2	VCH0223#10-SW Ball
14	24	ASTM A312, Type 316/316L, EFW, Sch.10S	3	18	VCH0246#10 RF
<u>Fittings</u>			<u>Compact Gate Valve</u>		
0.5	2	ASTM A182 F316/316L, Class 3000 SW	0.75	2	VGA0028#10 RF
3	12	ASTM A403 Gr.WP 316/316L-S, (Schedule to match pipe)	0.5	2	VGA0028#10-SW
14	24	ASTM A403 Gr. WP 316/316L - WX, (Schedule to match pipe)	0.5	2	VGA0028#10-SW/TH
<u>Flanges</u>			<u>Gate Valve</u>		
0.75	24	ASTM A182 F316/316L, Class 150 RF.SO.	3	18	VGA0046#10 RF
			1.50	2	VGA0103#10 RF **2
			2	3	VGA5054#10 RF **2
			<u>Globe Valve</u>		
			0.75	2	VGL0126#10-SW
			3	6	VGL0142#10 RF

Special Material Specifications:

<u>Thermowells</u>	NPS 2, Class 300 RF, Flanged, A182 Type 316/316L, see Standard Drawing DD100-L-14-1, 2
<u>Bolting</u>	ASTM A193 Gr. B7, c/w A194 Gr. 2H Nuts
<u>Gaskets</u>	Spiral Wound 316SS, Graphite filled, c/w CS Outer Ring, per ASME B16.20

**** SPECIAL NOTES ****

1. Dual certified material pressure/temperature ratings are based on the higher ratings of the straight grade material.
2. Class 300 valve shall be used where required in Instrument Bridles.
3. Vents and Drains per DD100-L-12-2.
4. Pressure Instrument Connections per DD100-L-11-1.



Piping Material Specifications

Valve Details

Check Valve

VCH0219#12-SW

Rev Date 22-Feb-08

Check Valve, Class CL 800 Socketweld, Forged Body to, ASTM A182 F316/316L Dual Cert., Bolted Cover, Piston/Lift Type with Spring, API Trim 12, Integral or Renewable seats, Full Port, Design to API-602
 NOTES: Pressure/Temperature rating to ASME B16.34
 Assigned Pipe Classes: CKY

Check Valve

VCH0223#10-SW

Rev Date 22-Feb-08

Check Valve, Class CL 800 Socketweld, Forged Body to, ASTM A182 F316/316L Dual Cert., Bolted Cover, Spring-loaded Ball Type, API Trim 10, Integral or Renewable seats, Full Port, Design to API-602
 NOTES: Pressure/Temperature rating to ASME B16.34
 Assigned Pipe Classes: CKY

Check Valve

VCH0246#10

Rev Date 17-Feb-08

Check Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A351 Gr. CF8M, Bolted Cover, Swing Type, horizontal or vertical, API Trim 10 design to API-600, Integral, Welded in or Renewable Seats
 NOTES: Pressure/Temperature rating to ASME B16.34
 Assigned Pipe Classes: CKX, CKY

Compact Gate Valve

VGA0028#10

Rev Date 22-Feb-08

Compact Gate Valve, Class CL 150 RF to ASME B16.5, Forged Body to, ASTM A182 F316/316L Dual Cert., Bolted Bonnet, OS & Y, Solid Wedge, 316 SS Trim, Integral or renewable hard faced seats, Regular Port, Design to API-602
 Assigned Pipe Classes: CKY

Compact Gate Valve

VGA0028#10-SW

Rev Date 17-Feb-08

Compact Gate Valve, Class CL 800 Socketweld, Forged Body to, ASTM A182 F316/316L Dual Cert., Bolted Bonnet, OS & Y, Solid Wedge, API Trim 10, Integral or Renewable seats, Regular Port, Design to API-602
 Assigned Pipe Classes: CKY, HAG

Compact Gate Valve

VGA0028#10-SW/TH

Rev Date 17-Feb-08

Compact Gate Valve, Class CL 800 Socketweld/Threaded, Forged Body to, ASTM A182 F316/316L Dual Cert., Bolted Bonnet, OS & Y, Solid Wedge, API Trim 10, Integral or Renewable seats, Regular Port, Design to API-602
 Assigned Pipe Classes: CKY, HAG

Gate Valve

VGA0046#10

Rev Date 17-Feb-08

Gate Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A351 Gr. CF8M, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 10, Integral, Welded in or Renewable Seats, Design to API-600
 Assigned Pipe Classes: CKX, CKY

Gate Valve

VGA0103#10

Rev Date 17-Feb-08

Gate Valve, Class CL 300 RF to ASME B16.5, Forged Body to, ASTM A182 F316/316L Dual Cert., Bolted Bonnet, OS & Y, Solid Wedge, API Trim 10, Integral or Renewable seats, Regular Port, Design to API-602
 Assigned Pipe Classes: CKX, CKY

Gate Valve

VGA5054#10

Rev Date 17-Feb-08

Gate Valve, Class CL 300 RF to ASME B16.5, Cast Body to, ASTM A351 Gr. CF8M, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 10, Integral, Welded in or Renewable Seats, Design to API-600
 Assigned Pipe Classes: CKX, CKY

Globe Valve

VGL0126#10-SW

Rev Date 19-Mar-08

Globe Valve, Class CL 800 Socketweld, Forged Body to, ASTM A182Gr 316/316L Dual Cert, Bolted Bonnet, OS & Y, API Trim 10, Integral or Renewable seats, Design to API-602
 Assigned Pipe Classes: CKY

Globe Valve

VGL0142#10

Rev Date 22-Feb-08

Globe Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A351 Gr. CF8M, Bolted Bonnet, OS & Y, API Trim 10 design to API-600, Integral, Welded in or Renewable Seats
 NOTES: Pressure/Temperature rating to ASME B16.34
 Assigned Pipe Classes: CKX, CKY



Piping Material Specifications

Rev: **4a**

Service Desc: Sour Water, Hydrocarbons with H2S **1	Temp: 800 (427) °F(°C)max
Materials: Carbon Steel **1, 20, 31	Corrosion Allow: 0.125
Code: ASME B31.3 / CSA Z662	
Material P&T: 285 PSI @ Note 9 °F min.	Based on: ASME B16.5 MG 1.1
Note 12 (1965) Kpa @ Note 9 °C min.	Branch Conn Tbl: I
80 PSI @ 800 °F max.	Inspection Class: III **21
(552) Kpa @ (427) °C max.	
P.W.H.T.: NO (**3, 7, 27)	Welding Proc: Refer to Suncor Firebag STD FB-L-5217 **29

Standard Specifications			Valve Specifications		
Pipe			Butterfly Valve Full Body Lug Style		
0.75	2	ASTM A106 Gr. B, Seamless, Sch 80 **28	3	24	VBU1516-N3 RF
3	24	ASTM A106 Gr. B, Seamless, STD. Wt. **28	26	60	VBU5516-N3 RF
26	60	ASTM A672 Cl 22 Gr. C60, (Wall thickness calculated per Attachment L) **28	Butterfly Valve, Double Flanged		
Fittings			26	60	VBU1523-N3-V RF **6
0.75	2	ASTM A105N, Class 3000 SW	Check Valve		
3	24	ASTM A234 WPB, STD. Wt.	0.75	2	VCH0231#12-SW-N3
26	60	ASTM A234 WPB-W, (100%RT) (Schedule to match Pipe)	3	4	VCH0241#10-N3 RF
Flanges			Check Valve, Wafer Style		
0.75	2	ASTM A105N, Class 150 RF. SW	6	24	VWC0157-N3 RF
3	24	ASTM A105N, Class 150 RF. WN., STD. Wt.	26	60	VWC5157-N3 RF
26	60	ASTM A105N, Class 150 RF. WN., B16.47-A, (Bore to match pipe)	Combination Gate Valve		
			4	24	VGA6000#10-N3 RF
			Compact Gate Valve		
			0.75	2	VGA0037#10-SW/TH-N3
			0.75	2	VGA0037#10-SW-N3
			Gate Valve		
			3	24	VGA0041#10-N3 RF
			2	3	VGA0054#12-N3 RF **5
			0.75	2	VGA0113#10-N3 RF
			0.75	2	VGA0313#10-N3 RF **5
			26	36	VGA5141#10-N3 RF
			Globe Valve		
			0.75	2	VGL0137#10-SW-N3
			3	8	VGL0141#10-N3 RF

Special Material Specifications:

Thermowells	NPS 2, Class 300 RF, Flanged, A105N, see Standard Drawing DD100-L-14-1, 2
Bolting	ASTM A193 Gr. B7M, c/w A194 Gr. 2HM Nuts
Gaskets	Spiral Wound 316SS, Graphite filled, c/w CS Outer Ring, per ASME/ANSI B16.20

** SPECIAL NOTES **

For ASME B31.3 design, Notes 1.-12. shall apply:

1. All materials for use in 'Oil and Gas Production Environments' shall comply with NACE MR0175 latest revision, see Appendix BI, "Sour Service Supplement" for further information. All materials for use in 'Petroleum Refining Environments' shall comply with NACE MR0103 latest revision, see Appendix B. All piping systems using this pipe class shall then be identified with the appropriate NACE reference, approved by the Owners Engineer, and noted in the project documentation. Material selection shall be carefully reviewed for service and design conditions with respect to the appropriate NACE documents. For material requirements not included in this pipe class, including valves, alternate pipe classes with more suitable materials shall be considered.

2. Deleted.

3. Hardness control requirements of NACE SP0472 shall be met for all welds in this class as referenced in Suncor Firebag STD FB-L-5217.

4. Deleted

5. Class 300 valve shall be used where required on instrument bridles.

6. Valve shall be used only where tight shut off is identified on P&ID.

7. PWHT required for thickness per ASME B31.3.
8. Positive Isolation required per drawings DD100-L-31-1, 2 and 3.
9. This piping material class has a Minimum Design Metal Temperature (MDMT) of -20°F (-29°C) at the full flange rated pressure of 285 psig (1965 kPag). This piping material class may be used for applications with a MDMT of -50°F (-46°C) for design pressures of 180 psig (1241 kPag) or lower (See FIG. 323.2.2B of ASME B31.3). Based on a MDMT temperature reduction of delta 30°F, the allowable stress per ASME B31.3 is reduced by 30% (or 6000 psi).
10. Vents and Drains per DD100-L-12-1
11. Pressure Instrument Connection per DD100-L-11-1.
12. The maximum temperature for this pipe class is based on general carbon steel material limitations. For sour service systems identified under NACE MR0175 'Oil and Gas Production Environments', the maximum design temperature shall be restricted to the material and service requirements defined under NACE MR0175 / ISO 15156 latest edition.

For CSA Z662-07 design, Notes 20.-31. shall apply in addition to Note 12.:

20. All non CSA materials shall comply with the requirements of the sour service clause referenced in the applicable CSA Z245 standards: CSA Z245.1 Steel Pipe, CSA Z245.11 Steel Fittings, CSA Z245.12 Steel Flanges, CSA Z245.15 Steel Valves. Where no applicable CSA standard exists, the material requirements of NACE MR0175 / ISO 15156 (latest edition) apply. Note, all valves in this line class shall conform to NACE MR0175 / ISO 15156, latest edition. Sour service requirements shall be in accordance with Firebag Technical Note FB-PE6-TN008.
21. Inspection and Non-Destructive examination testing shall be carried out per CSA Z662-07. (1) All welds meeting the definition per CSA Z662-07 Clause 16.6.8, shall have 100% RT/UT for all butt weld joints and 100% MT/PT for all socket weld joints. For all welds excluded from the definition per Clause 16.6.8, there shall be a minimum 15% RT/UT for all butt weld joints and 15% MT/PT for all socket weld joints per CSA Z662-07, Clause 7.10.3 & 7.10.4. (2) Visual examination shall be carried out on 100% of the weld joint and components. (3) 100% MT/PT shall be carried out on all branch connection welds.
22. Use sockolet for 2" NPS and below for branch connections to headers. Use weldolets for 3" NPS and above branch connections to headers.
23. For Vents, Drains and Instrument Connections use ASME B31.3 materials per Piping Material Specification Class CLC.
24. Shop and field hardness control by NACE SP0472 as referred in Suncor Firebag STD FB-L-5217. Weld hardness shall meet the requirements of CSA Z662-07 Clause 16.6.4.
25. Where pipe bends are required, they shall be specified by tagged piping specialty item and approved by owner's Engineer.
26. Positive Isolation required per drawings DD100-31-1, 2 and 3.
27. Stress Relieving (PWHT) required for thickness per CSA Z662-07, Clause 7.9.16.
28. Pipe shall be used in Category I applications only, as defined in CSA Z662-07, Clause 5.2.2.
29. Welding shall meet the requirements of CSA Z662-07, Clause 7.
30. Valves with suffix 'N3' may be substituted with suffix 'N1' for use in design under CSA Z662-07.
31. Material selection shall be carefully reviewed for service and design conditions under NACE MR0175 / ISO 15156 latest revision. For material requirements not included in this pipe class, including valves, alternate pipe classes with more suitable materials shall be considered.



Piping Material Specifications

Valve Details

Butterfly Valve Full Body Lug SUFFIX: **-N3 Valve to conform to NACE MR0175 and NACE MR0103 latest revision**

VBUI516-N3 Butterfly Valve Full Body Lug Style, Class CL 150 RF to fit between ASME B16.5 flanges, Cast Body to, ASTM A216 Gr WCB, 316 SS Disk and Shaft, Metal Seated, Design to API-609
Rev Date 16-Mar-10
Assigned Pipe Classes: CLC

Butterfly Valve, Double Flange SUFFIX: **-N3-V Valve shall conform to NACE MR0175 and NACE MR0103 latest revision, suitable for Vacuum service**

VBUI523-N3-V Butterfly Valve, Double Flanged, Class CL 150 RF to ASME B16.47-A, Cast Body to, ASTM A216 Gr WCB, Stainless Steel Shaft, Carbon Steel Disc Triple Offset, bi-directional shut-off, Stellite Seat, Design to API-609
Rev Date 16-Mar-10
NOTES: Testing to API 598 □ Additional Backseat test zero leakage, bi-directional, dry instrument air medium, duration 5 min., 1.1 design pressure, 10 cycles □ - V : This Valve is intended for Vacuum service
Assigned Pipe Classes: CLC

Butterfly Valve Full Body Lug SUFFIX: **-N3 Valve to conform to NACE MR0175 and NACE MR0103 latest revision**

VBUI5516-N3 Butterfly Valve Full Body Lug Style, Class 150 RF to fit between ASME B16.47-A flanges, Cast Body to, ASTM A216 Gr WCB, 316 SS Disk and Shaft, Metal Seated, Design to API-609
Rev Date 16-Mar-10
Assigned Pipe Classes: CLC

Check Valve SUFFIX: **-N3 Valve to conform to NACE MR0175 and NACE MR0103 latest revision**

VCH0231#12-SW-N3 Check Valve, Class CL 800 Socketweld, Forged Body to, ASTM A105 N, Bolted Cover, Piston/Lift Type with Spring, API Trim 12, Integral or Renewable seats, Hard Faced Seat, Full Port, Design to API-602
Rev Date 16-Mar-10
NOTES: Pressure/Temperature rating to ASME B16.34
Assigned Pipe Classes: CLC, EDE, ELC

Check Valve SUFFIX: **-N3 Valve to conform to NACE MR0175 and NACE MR0103 latest revision**

VCH0241#10-N3 Check Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Cover, Swing Type, API Trim 10 design to API-600, Integral or Welded in Seats
Rev Date 16-Mar-10
NOTES: Pressure/Temperature rating to ASME B16.34
Assigned Pipe Classes: CLC

Compact Gate Valve SUFFIX: **-N3 Valve to conform to NACE MR0175 and NACE MR0103 latest revision**

VGA0037#10-SW/TH-N3 Compact Gate Valve, Class CL 800 Socketweld/Threaded, Forged Body to, ASTM A105 N, Welded Bonnet, OS & Y, Solid Wedge, API Trim 10, Integral or Renewable seats, Regular Port, Design to API-602
Rev Date 16-Mar-10
Assigned Pipe Classes: CLC

Compact Gate Valve SUFFIX: **-N3 Valve to conform to NACE MR0175 and NACE MR0103 latest revision**

VGA0037#10-SW-N3 Compact Gate Valve, Class CL 800 Socketweld, Forged Body to, ASTM A105 N, Welded Bonnet, OS & Y, Solid Wedge, API Trim 10, Integral or Renewable seats, Regular Port, Design to API-602
Rev Date 16-Mar-10
Assigned Pipe Classes: CLC

Gate Valve SUFFIX: **-N3 Valve to conform to NACE MR0175 and NACE MR0103 latest revision**

VGA0041#10-N3 Gate Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 10, Integral or Welded in Seats, Design to API-600
Rev Date 16-Mar-10
Assigned Pipe Classes: CLC

Gate Valve SUFFIX: **-N3 Valve to conform to NACE MR0175 and NACE MR0103 latest revision**

VGA0054#12-N3 Gate Valve, Class CL 300 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 12, Integral or Welded in Seats, Design to API-600
Rev Date 16-Mar-10
NOTES: For valves larger than 24" NPS flanges shall be ASME B16.47 Series A
Assigned Pipe Classes: CLC, EDE, ELC

Gate Valve SUFFIX: **-N3 Valve to conform to NACE MR0175 and NACE MR0103 latest revision**

VGA0113#10-N3 Gate Valve, Class CL 150 RF to ASME B16.5, Forged Body w/integral flanges, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 10, Integral or Renewable seats, Regular Port, Design to API-602
Rev Date 16-Mar-10
Assigned Pipe Classes: CLC

Gate Valve SUFFIX: **-N3 Valve to conform to NACE MR0175 and NACE MR0103 latest revision**

VGA0313#10-N3 Gate Valve, Class CL 300 RF to ASME B16.5, Forged Body w/integral flanges, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 10, Integral or Renewable seats, Regular Port, Design to API-602
Rev Date 16-Mar-10
Assigned Pipe Classes: CLC

Gate Valve**VGA5141#10-N3**

Rev Date 16-Mar-10

SUFFIX: -N3 Valve to conform to NACE MR0175 and NACE MR0103 latest revision

Gate Valve, Class CL 150 RF to ASME B16.47-A, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, Flexible Wedge, API Trim 10 design to API-600, Integral or Welded in Seats

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: CLC

Combination Gate Valve**VGA6000#10-N3**

Rev Date 16-Mar-10

SUFFIX: -N3 Valve to conform to NACE MR0175 and NACE MR0103 latest revision

Combination Gate Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 10, Integral, Welded in or Renewable Seats, Design to API-600

NOTES: Combination Gate valve with 3/4" drain valve □ Gate Valve to Tag No. VGA0041#10-N Integral with 3/4" drain valve to Tag No. VGA0037#10-SW/TH-N. Integral Drain Connection shall be Full Penetration Weld and shall be Gusseted to the main valve body with 2 Gu

Assigned Pipe Classes: CLC

Globe Valve**VGL0137#10-SW-N3**

Rev Date 16-Mar-10

SUFFIX: -N3 Valve to conform to NACE MR0175 and NACE MR0103 latest revision

Globe Valve, Class CL 800 Socketweld, Forged Body to, ASTM A105 N, Welded Bonnet, OS & Y, API Trim 10, Integral or Renewable seats, Design to API-602

Assigned Pipe Classes: CLC

Globe Valve**VGL0141#10-N3**

Rev Date 16-Mar-10

SUFFIX: -N3 Valve to conform to NACE MR0175 and NACE MR0103 latest revision

Globe Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, API Trim 10 design to API-600, Integral or Welded in Seats

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: CLC

Check Valve, Wafer Style**VWC0157-N3**

Rev Date 16-Mar-10

SUFFIX: -N3 Valve to conform to NACE MR0175 and NACE MR0103 latest revision

Check Valve, Wafer Style, Class CL 150 RF to fit between ASME B16.5 flanges, Cast Body to, ASTM A216 Gr WCB, Retainerless Style, Dual 317SS Plates, Inconel X750 Spring(s), Lapped Seats, w/Stellite Hard Faced Overlay, Design to API-594

Assigned Pipe Classes: CLC

Check Valve, Wafer Style**VWC5157-N3**

Rev Date 16-Mar-10

SUFFIX: -N3 Valve to conform to NACE MR0175 and NACE MR0103 latest revision

Check Valve, Wafer Style, Class 150 RF to fit between ASME B16.47-A flanges, Cast Body to, ASTM A216 Gr WCB, Retainerless Style, Dual 316SS Plates, Inconel X750 Spring(s), Lapped Seats, w/Stellite Hard Faced Overlay, Design to API-594

Assigned Pipe Classes: CLC



Piping Material Specifications

Rev: **4**

Service Desc: <i>Liquid Sulphur</i>				Temp: <i>400 (204)</i> °F(°C)max	
Materials: <i>Carbon Steel</i>		Corrosion Allow: <i>0.125</i>		Code: <i>ASME B31.3</i>	
Material P&T:	<i>285</i>	PSI @	<i>-20</i>	°F min.	Based on: <i>ASME B16.5 MG 1.1</i> Branch Conn Tbl: <i>DD100-L-09-1,2&3</i> Inspection Class: <i>III</i>
	<i>(1965)</i>	Kpa @	<i>(-29)</i>	°C min.	
	<i>200</i>	PSI @	<i>400</i>	°F max.	
	<i>(1379)</i>	Kpa @	<i>(204)</i>	°C max.	
P.W.H.T. : <i>NO (**8)</i>				Welding Proc: <i>Refer to Suncor Firebag STD FB-L-5217</i>	

Standard Specifications			Valve Specifications		
<u>Pipe</u>			<u>Check Valve</u>		
0.75	2	ASTM A106 Gr. B, Seamless, Sch 80 **1	3	10	VCH0241#8 RF **6
3	24	ASTM A106 Gr. B, Seamless, Sch STD WT	<u>Compact Gate Valve</u>		
26	48	ASTM A672 Cl 22 Gr.C60, (Wall thickness calculated per Attachment L)	0.75	2	VGA0037#8-SW **1
			0.75	2	VGA0037#8-SW/TH **1
<u>Fittings</u>			<u>Plug Valve</u>		
0.75	2	ASTM A105N, Class 3000 SW **1	3	10	VPL0568 RF **5
3	24	ASTM A234 WPB, (Schedule to match Pipe) **3			
26	48	ASTM A234 Gr.WPB-W (100%RT) (Schedule to match pipe)			
<u>Flanges</u>					
0.75	2	ASTM A105N, Class 150 RF. SW **1			
3	24	ASTM A105N, Class 150 RF. Slip-on			
3	24	ASTM A105N, Class 150 RF. Reduced Slip-on			
26	48	ASTM A105N, Class 150 RF. Reduced Slip-on			

Special Material Specifications:

<u>Bolting</u>	ASTM A193 Gr. B7, c/w A194 Gr. 2H Nuts
<u>Gaskets</u>	Spiral Wound 316 SS, Graphite filled, c/w CS Outer Ring, per ASME B16.20

** SPECIAL NOTES **

1. All items NPS 3/4 and 2 shall be used only for steam and condensate connections.
2. All items NPS 3 to 48 are the process pipe size. The jacketing pipe shall be one pipe size larger.
3. All changes in direction shall be made with flanged and jacketed crosses for rodding.
4. The maximum distance between break-out flanges shall be 80 ft.
5. Valve to be supplied with full jacket.
6. Valve to have Contro-Trace jacket.
7. Details for jacketed piping to Suncor Firebag STD DD100-L-09-1, 2 & 3.
8. PWHT required for thickness per ASME B31.3.
9. Vents and Drains per DD100-L-12-1
10. Pressure Instrument Connections per DD100-L-11-1



Piping Material Specifications

Valve Details

Check Valve

VCH0241#8

Rev Date 17-Feb-08

Check Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Cover, Swing Type, API Trim 8 design to API 600, Integral or Welded Hard Faced Seat

NOTES: Pressure/Temperature Rating to ASME B16.34

Assigned Pipe Classes: ADX, CA, CAB, CAH, CAZ, CBA, CHY, CLF, CS

Compact Gate Valve

VGA0037#8-SW

Rev Date 17-Feb-08

Compact Gate Valve, Class CL800 Socketweld, Forged Carbon Steel, ASTM A105, Welded Bonnet, OS & Y, Solid Wedge, API Trim 8, Welded in Hard Faced Seat, Regular Port, Design to API-602

Assigned Pipe Classes: CLF, ES

Compact Gate Valve

VGA0037#8-SW/TH

Rev Date 17-Feb-08

Compact Gate Valve, Class CL800 Socketweld/Threaded, Forged Carbon Steel, ASTM A105, Welded Bonnet, OS & Y, Solid Wedge, API Trim 8, Welded in Hard Faced Seat, Regular Port, Design to API-602

Assigned Pipe Classes: CLF, ES

Plug Valve

VPL0568

Rev Date 03-Jan-08

Plug Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Full Jacket, Tertiary Top Seal, Lockable, Non-Lubricated, Tapered Pug, PTFE sleeve, Design to API-607

NOTES: XOMOX Fig. #067FJ or #067FJ-EG or equal w/3/4" steam connections

Assigned Pipe Classes: CLF



Piping Material Specifications

Rev: **4a**

Service Desc: <i>Sour Mildly Corrosive Hydrocarbon Vapour and Vacuum Service</i>					Temp: <i>500F(260C)</i> °F(°C)max	
Materials: <i>Carbon Steel **1</i>			Corrosion Allow: <i>0.125</i>		Code: <i>ASME B31.3</i>	
Material P&T:	<i>285</i>	PSI @	<i>-20</i>	°F min.	Based on: <i>ASME B16.5 MG 1.1</i>	Branch Conn Tbl: <i>I</i>
	<i>1965</i>	Kpa @	<i>-29</i>	°C min.		Inspection Class: <i>III</i>
	<i>170</i>	PSI @	<i>500</i>	°F max.		
	<i>1172</i>	Kpa @	<i>260</i>	°C max.		
P.W.H.T. : <i>NO (**1, 2, 5)</i>				Welding Proc: <i>Refer to Suncor Firebag STD FB-L 5217</i>		

Standard Specifications

<u>Pipe</u>		
0.75	2	<i>ASTM A106 Gr. B, Seamless, Sch 80</i>
3	20	<i>ASTM A106 Gr. B, Seamless, Sch STD WT</i>
<u>Fittings</u>		
0.75	2	<i>ASTM A105N, Class 3000 SW</i>
3	20	<i>ASTM A234 WPB, STD. Wt.</i>
<u>Flanges</u>		
0.75	2	<i>ASTM A105N, Class 150 RF. SW</i>
3	20	<i>ASTM A105N, Class 150 RF. WN, STD. Wt.</i>

Valve Specifications

<u>Butterfly Valve Full Body Lug Style</u>					
3	20	VBU1516-N2-V			RF
<u>Check Valve</u>					
0.75	2	VCH0231#12-SW-N2-V			
3	4	VCH0241#10-N2-V			RF
<u>Check Valve, Wafer Style</u>					
6	20	VWC0157-N2-V			RF
<u>Combination Gate Valve</u>					
4	20	VGA6000#10-N2-V			RF
<u>Compact Gate Valve</u>					
0.75	2	VGA0037#10-SW/TH-N2-V			
0.75	2	VGA0037#10-SW-N2-V			
<u>Gate Valve</u>					
3	20	VGA0041#10-N2-V			RF
3	3	VGA0054#12-N2-V			RF **3
0.75	2	VGA0113#10-N2-V			RF
0.75	2	VGA0313#10-N2-V			RF **3
<u>Globe Valve</u>					
0.75	2	VGL0137#10-SW-N2-V			
3	8	VGL0141#10-N2-V			RF

Special Material Specifications:

Thermowells	NPS 2, Class 300 RF, Flanged, A105N, see Standard Drawing DD100-L-14-1, 2
Bolting	ASTM A193 Gr. B7M, c/w A194 Gr. 2HM Nuts
Gaskets	Spiral Wound 316 SS, Graphite filled, c/w CS Outer Ring, per ASME B16.20

** SPECIAL NOTES **

1. All materials shall comply with NACE MR0103 latest revision, see Appendix B, "Sour Service Supplement" for further information.
2. Hardness control requirements of NACE RP0472 shall be met for all welds in this class as referenced in Suncor Firebag STD FB-L-5217.
3. Class 300 valve shall be used where required on instrument bridles.
4. Full vacuum condition of minus 15 psig (103 Kpa) and temperature range of -20 F (-29 C) to 500 F (260 C)
5. PWHT required for thickness per ASME B31.3.
6. Vents and Drains per DD100-L-12-1
7. Pressure Instrument Connections per DD100-L-11-1



Piping Material Specifications

Valve Details

<u>Butterfly Valve Full Body Lug</u>	SUFFIX: -N2-V Valve shall conform to NACE MR0103 latest revision, suitable for Vacuum Service
VBU1516-N2-V	Butterfly Valve Full Body Lug Style, Class CL 150 RF to fit between ASME B16.5 flanges, Cast Body to, ASTM A216 Gr WCB, 316 SS Disc and Shaft, Metal Seated, Design to API-609
Rev Date 12-Mar-10	Assigned Pipe Classes: CLH
<u>Check Valve</u>	SUFFIX: -N2-V Valve shall conform to NACE MR0103 latest revision, suitable for Vacuum Service
VCH0231#12-SW-N2-V	Check Valve, Class Class CL 800 Socketweld, Forged Body to, ASTM A105 N, Bolted Cover, Piston/Lift Type with Spring, API Trim 12, Integral or Renewable seats, Hard Faced Seat, Full Port, Design to API-602
Rev Date 12-Mar-10	Assigned Pipe Classes: CLH
<u>Check Valve</u>	SUFFIX: -N2-V Valve shall conform to NACE MR0103 latest revision, suitable for Vacuum Service
VCH0241#10-N2-V	Check Valve, Class Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Cover, Swing Type, API Trim 10 design to API-600, Integral or Welded in Seats
Rev Date 12-Mar-10	NOTES: Pressure/Temperature rating to ASME B16.34 Assigned Pipe Classes: CLH
<u>Compact Gate Valve</u>	SUFFIX: -N2-V Valve shall conform to NACE MR0103 latest revision, suitable for Vacuum Service
VGA0037#10-SW/TH-N2-V	Compact Gate Valve, Class Class CL 800 Socketweld/Threaded, Forged Body to, ASTM A105 N, Welded Bonnet, OS & Y, Solid Wedge, API Trim 10, Integral or Renewable seats, Regular Port, Design to API-602
Rev Date 12-Mar-10	Assigned Pipe Classes: CLH
<u>Compact Gate Valve</u>	SUFFIX: -N2-V Valve shall conform to NACE MR0103 latest revision, suitable for Vacuum Service
VGA0037#10-SW-N2-V	Compact Gate Valve, Class Class CL 800 Socketweld, Forged Body to, ASTM A105N, Welded Bonnet, OS & Y, Solid Wedge, API Trim 10, Integral or Renewable seats, Regular Port, Design to API-602
Rev Date 12-Mar-10	Assigned Pipe Classes: CLH
<u>Gate Valve</u>	SUFFIX: -N2-V Valve shall conform to NACE MR0103 latest revision, suitable for Vacuum Service
VGA0041#10-N2-V	Gate Valve, Class Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 10, Integral or Welded in Seats, Design to API-600
Rev Date 12-Mar-10	Assigned Pipe Classes: CLH
<u>Gate Valve</u>	SUFFIX: -N2-V Valve shall conform to NACE MR0103 latest revision, suitable for Vacuum Service
VGA0054#12-N2-V	Gate Valve, Class Class CL 300 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 12, Integral or Welded in Seats, Regular Port, Design to API-600
Rev Date 12-Mar-10	Assigned Pipe Classes: CLH
<u>Gate Valve</u>	SUFFIX: -N2-V Valve shall conform to NACE MR0103 latest revision, suitable for Vacuum Service
VGA0113#10-N2-V	Gate Valve, Class Class CL 150 RF to ASME B16.5, Forged Body to, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 10, Integral or Renewable seats, Regular Port, Design to API-602
Rev Date 12-Mar-10	Assigned Pipe Classes: CLH
<u>Gate Valve</u>	SUFFIX: -N2-V Valve shall conform to NACE MR0103 latest revision, suitable for Vacuum Service
VGA0313#10-N2-V	Gate Valve, Class Class CL300 RF to ASME B16.5, Forged Body to, ASTM A105N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 10, Integral or Renewable seats, Regular Port, Design to API-602
Rev Date 12-Mar-10	Assigned Pipe Classes: CLH

Combination Gate Valve**VGA6000#10-N2-V**

Rev Date 12-Mar-10

SUFFIX: -N2-V Valve shall conform to NACE MR0103 latest revision, suitable for Vacuum Service

Combination Gate Valve, Class Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 10, Integral, Welded in or Renewable Seats, Design to API-600

NOTES: Combination Gate Valve with 3/4" drain valve, Gate valve to Tag number VGA0041#10-N-V Integral with 3/4" drain valve to Tag number VGA0037#10-SW/TH-N-V, Integral Drain connection shall be full penetration Weld and shall be gusseted to the main valve body

Assigned Pipe Classes: CLH

Globe Valve**VGL0137#10-SW-N2-V**

Rev Date 12-Mar-10

SUFFIX: -N2-V Valve shall conform to NACE MR0103 latest revision, suitable for Vacuum Service

Globe Valve, Class Class CL 800 Socketweld, Forged Body to, ASTM A105 N, Welded Bonnet, OS & Y, API Trim 10, Integral or Renewable seats, Design to API-602

Assigned Pipe Classes: CLH

Globe Valve**VGL0141#10-N2-V**

Rev Date 12-Mar-10

SUFFIX: -N2-V Valve shall conform to NACE MR0103 latest revision, suitable for Vacuum Service

Globe Valve, Class Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, API Trim 10 design to API-600, Integral or Welded in Seats

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: CLH

Check Valve, Wafer Style**VWC0157-N2-V**

Rev Date 12-Mar-10

SUFFIX: -N2-V Valve shall conform to NACE MR0103 latest revision, suitable for Vacuum Service

Check Valve, Wafer Style, Class Class CL 150 RF to fit between ASME B16.5 flanges, Cast Body to, ASTM A216 Gr WCB, Retainerless Style, Dual 316SS Plates, Inconel X750 Spring(s), Lapped Seats, w/Stellite Hard Faced Overlay, Design to API-594

Assigned Pipe Classes: CLH



Piping Material Specifications

Rev: **4**

Service Desc: <i>Steam, Condensate, Boiler Feed Water</i>				Temp: <i>800 (427)</i> °F(°C)max		
Materials: <i>Carbon Steel</i>		Corrosion Allow: <i>0.0625</i>		Code: <i>ASME B31.3</i>		
Material P&T:	<i>285</i>	PSI @	<i>-20</i>	°F min.	Based on: <i>ASME B16.5 MG 1.1</i>	Branch Conn Tbl: <i>I</i>
	<i>(1965)</i>	Kpa @	<i>(-29)</i>	°C min.		Inspection Class: <i>III</i>
	<i>80</i>	PSI @	<i>800</i>	°F max.		
	<i>(552)</i>	Kpa @	<i>(427)</i>	°C max.		
P.W.H.T. : <i>NO (**10)</i>				Welding Proc: <i>Refer to Suncor Firebag STD FB-L-5217</i>		

Standard Specifications			Valve Specifications		
<u>Pipe</u>			<u>Check Valve</u>		
0.75	2	ASTM A106 Gr. B, Seamless, Sch 80	0.75	2	VCH0231#8-SW
3	24	ASTM A106 Gr. B, Seamless, STD. Wt.	3	6	VCH0241#8 RF
26	30	API 5L Gr. B PSL-2 DSAW, 0.375" Wall	<u>Check Valve, Wafer Style</u>		
36	48	API 5L Gr. B. PSL-2, DSAW, (Wall thickness calculated per attachment L)	8	24	VWC0151 RF
<u>Fittings</u>			26	30	VWC0163 RF
0.75	2	ASTM A105N, Class 3000 SW	<u>Compact Gate Valve</u>		
3	24	ASTM A234 WPB, STD. Wt.	0.75	2	VGA0031#8-SW **1
26	30	ASTM A234 WPB-W, (100%RT), 0.375" Wall	0.75	2	VGA0031#8-SW/TH **1
36	48	ASTM A234 Gr.WPB-W (100%RT) (Schedule to match pipe)	<u>Gate Valve</u>		
<u>Flanges</u>			3	24	VGA0041#8 RF
0.75	2	ASTM A105N, Class 150 RF. SW	3	4	VGA0054#8 RF **4
3	24	ASTM A105, Class 150 RF.WN, STD.Wt.	0.75	2	VGA0111#8 RF
26	30	ASTM A105, Class 150 RF.WN, B16.47-A, 0.375" Wall	0.75	2	VGA0315#8 RF **4
36	48	ASTM A105N, Class 150 RF.WN, B16.47-A (Bore to match pipe)	26	48	VGA5142#8 RF
			<u>Globe Valve</u>		
			0.75	2	VGL0131#8-SW
			3	12	VGL0141#8 RF
			<u>Stop Check Valve, Angle Pattern</u>		
			3	12	VSC0850#5-C RF
			<u>Stop Check Valve, Straight Pattern</u>		
			3	12	VSC0851#5-C RF

Special Material Specifications:

<u>Thermowells</u>	NPS 2, Class 300 RF, Flanged, A105N, see Standard Drawing DD100-L-14-1, 2
<u>Bolting</u>	ASTM A193 Gr. B7, c/w A194 Gr. 2H Nuts
<u>Gaskets</u>	Spiral Wound 316SS, Graphite filled, c/w CS Outer Ring, per ASME B16.20

** SPECIAL NOTES **

- Deleted
- Deleted
- Deleted
- Class 300 shall be used where required on Instrument bridles.
- Deleted
- Deleted
- Vents and Drains per DD100- L-12-1.
- Pressure Instrument Connections per DD100- L-11-1.
- PWHT required for thickness per ASME B31.3.



Piping Material Specifications

Valve Details

Check Valve

VCH0231#8-SW

Rev Date 22-Feb-08

Check Valve, Class CL 800 Socketweld, Forged Body to, ASTM A105 N, Bolted Cover, Piston/Lift Type with Spring, API Trim 8, Integral or renewable, Full Port, Design to API-602

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: CA, CAB, CAZ, CBA, CHY, CS, EA, EAB, EDB, ES, HB, HBD

Check Valve

VCH0241#8

Rev Date 17-Feb-08

Check Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Cover, Swing Type, API Trim 8 design to API 600, Integral or Welded Hard Faced Seat

NOTES: Pressure/Temperature Rating to ASME B16.34

Assigned Pipe Classes: ADX, CA, CAB, CAH, CAZ, CBA, CHY, CLF, CS

Compact Gate Valve

VGA0031#8-SW

Rev Date 04-Apr-08

Compact Gate Valve, Class CL 800 Socketweld, Forged Body to, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 8, Integral or Renewable seats, Regular Port, Design to API-602

Assigned Pipe Classes: CA, CAB, CAZ, CBA, CHY, CS, EA, EAB, EDB, HB, HBD, 662-2, 662-3

Compact Gate Valve

VGA0031#8-SW/TH

Rev Date 04-Apr-08

Compact Gate Valve, Class CL800 Socketweld/Threaded, Forged Carbon Steel, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 8, Integral or renewable hard faced seats, Regular Port, Design to API-602

Assigned Pipe Classes: CA, CAB, CAZ, CBA, CHY, CS, EA, EAB, EDB, HB, HBD, 662-2, 662-3

Gate Valve

VGA0041#8

Rev Date 17-Feb-08

Gate Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 8, Integral or Welded in Seats, Design to API-600

Assigned Pipe Classes: ADX, CA, CAB, CAH, CAZ, CBA, CHY, CS

Gate Valve

VGA0054#8

Rev Date 17-Feb-08

Gate Valve, Class CL 300 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 8, Integral or Welded in Seats, Design to API-600

Assigned Pipe Classes: CA, CAB, CAH, CAZ, CBA, CS, EA, EAB, EDB, ES, 662-3

Gate Valve

VGA0111#8

Rev Date 17-Feb-08

Gate Valve, Class CL 150 RF to ASME B16.5, Forged Body w/integral flanges, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 8, Integral or Renewable seats, Regular Port, Design to API-602

Assigned Pipe Classes: CA, CAB, CAH, CBA, CS

Gate Valve

VGA0315#8

Rev Date 17-Feb-08

Gate Valve, Class CL 300 RF to ASME B16.5, Forged Body w/integral flanges, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 8, Integral or Renewable seats, Regular Port, Design to API-602

Assigned Pipe Classes: CA, CAB, CAH, CBA, CS, EA, EAB, EDB, ES

Gate Valve

VGA5142#8

Rev Date 22-Feb-08

Gate Valve, Class CL 150 RF to ASME B16.47-A, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, Flexible Wedge, API Trim 8 design to API 600, Integral or Welded in Seats

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: CA, CAB, CHY, CS

Globe Valve

VGL0131#8-SW

Rev Date 23-Jun-06

Globe Valve, Class CL 800 Socketweld, Forged Body to, ASTM A105 N, Bolted Bonnet, OS & Y, Integral or Renewable seats, Hard Faced Seat to API Trim 8, Design to API-602

Assigned Pipe Classes: CA, CAB, CAZ, CBA, CHY, CS, EA, EAB, EDB, HB, HBD

Globe Valve

VGL0141#8

Rev Date 22-Feb-08

Globe Valve, Class CL 150 RF to ASME B16.5, Cast Carbon Steel, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, Plug Type Disc, API Trim 8 design to API 600, Integral or Welded in Seats

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: ADX, CA, CAB, CAH, CAZ, CBA, CS

Stop Check Valve, Angle Patte SUFFIX: -C ASME SA Material**VSC0850#5-C**

Rev Date 17-Feb-08

Stop Check Valve, Angle Pattern, Class CL 300 RF to ASME B16.5, Cast Body to, ASME SA216 Gr WCB, Bolted Bonnet, API Trim 5 design to API-600, Integral or Welded in Seats, Hard Faced Seat & Disc, Design to ASME B16.34

NOTES: Edwards Figure No. 303 or equal

Assigned Pipe Classes: CS

Stop Check Valve, Straight Pat SUFFIX: -C ASME SA Material**VSC0851#5-C**

Rev Date 19-Mar-08

Stop Check Valve, Straight Pattern, Class CL 300 RF to ASME B16.5, Cast Body to, ASME SA216 Gr WCB, Bolted Bonnet, OS & Y, Body guided disc, API Trim 5 design to API-600, Integral or Renewable seats, Full Port

Assigned Pipe Classes: CS, CSA, ESA

Check Valve, Wafer Style**VWC0151**

Rev Date 19-Jun-06

Check Valve, Wafer Style, Class CL 150 RF to fit between ASME B16.5 flanges, Cast Body to, ASTM A216 Gr WCB, Retainerless Style, Dual Carbon Steel Plates, Inconel X750 Spring(s), Lapped Seats, w/Stellite Hard Faced Overlay, Design to API-594

Assigned Pipe Classes: AEA, CA, CAB, CAZ, CS

Check Valve, Wafer Style**VWC0163**

Rev Date 06-Nov-07

Check Valve, Wafer Style, Class 150 RF to fit between ASME B16.47-A flanges, Cast Body to, ASTM A216 Gr WCB, Retainerless Style, Dual Carbon Steel Plates, Inconel X750 Spring(s), Lapped Seats, w/Stellite Hard Faced Overlay, Design to API-594

Assigned Pipe Classes: CA, CAB, CS



Piping Material Specifications

Rev: **4**

Service Desc:	Steam, Condensate, BFW, Blowdown Drains & Boiler Fuel ASME I BEP				Temp:	800 (427)	°F(°C)max
Materials:	Carbon Steel (SA material)		Corrosion Allow:	0.0625	Code:	B31.1 (BEP)	
Material P&T:	285	PSI @	-20	°F min.	Based on:	ASME B16.5 MG 1.1	Branch Conn Tbl: I
	(1965)	Kpa @	(-29)	°C min.			Inspection Class: I
	80	PSI @	800	°F max.			
	(552)	Kpa @	(427)	°C max.			
P.W.H.T. :	NO (**11)				Welding Proc:	Refer to Suncor Firebag STD FB-L-5217	

Standard Specifications				Valve Specifications			
<u>Pipe</u>				<u>Ball Valve</u>			
0.75	2	ASME SA106 Gr. B, Seamless, Sch 80		3	8	VBA0151	RF **1,5
3	24	ASME SA106 Gr. B, Seamless, STD. Wt.		3	24	VBA0153	RF **5,8
26	54	API 5L Gr. B. PSL-2, DSAW, STD. Wt.		0.75	2	VBA0617-SW	**5,8
<u>Fittings</u>				<u>Check Valve</u>			
0.75	2	ASME SA105, Class 3000 SW		0.75	2	VCH0231#8-SW-C	
3	24	ASME SA234 WPB, (Schedule to match Pipe)		3	6	VCH0241#8-C	RF
26	54	ASME SA234 WPB-W, (100%RT) (Schedule to match Pipe)		<u>Compact Gate Valve</u>			
<u>Flanges</u>				0.75	2	VGA0031#8-SW-C	**5
0.75	2	ASME SA105, Class 150 RF. SW		<u>Gate Valve</u>			
3	24	ASME SA105, Class 150 RF.WN, (Bore to match pipe)		3	24	VGA0041#8-C	RF
26	54	ASME SA105, Class 150 RF.WN, B16.47-A, (Bore to match pipe)		3	3	VGA0054#8-C	RF **6
				0.75	2	VGA0111#8-C	RF
				0.75	2	VGA0315#8-C	RF **6
				<u>Globe Valve</u>			
				0.75	2	VGL0131#5-SW-C	
				3	8	VGL0141#5-C	RF
				<u>Plug Valve</u>			
				3	8	VPL0345-C	RF
				<u>Stop Check Valve, Angle Pattern</u>			
				3	12	VSC0852#5-C	RF **5
				<u>Stop Check Valve, Straight Pattern</u>			
				3	12	VSC0851#5-C	RF **5

Special Material Specifications:

<u>Thermowells</u>	NPS 2, Class 300 RF, Flanged, SA105, see Standard Drawing DD100-L-14-1, 2
<u>Bolting</u>	ASME SA193 Gr. B7, c/w SA194 Gr. 2H Nuts
<u>Gaskets</u>	Spiral Wound 316SS, Graphite filled, c/w CS Outer Ring, per ASME B16.20

**** SPECIAL NOTES ****

1. Soft seated valves have limited pressure/temperature rating. Maximum temperture shall not exceed 400 F (204 C)
2. Deleted.
3. Wall thickness readings shall be made per Work Practice, PMW0018A, "Baseline Ultrasonic Survey".
4. Deleted
5. Blow-off, stop check and ball valves shall be used as specified by the Owner's Engineer.
6. Class 300 valve shall be used where required on instrument bridles.
7. Deleted
8. Use Metal Seated Ball Valves for temperatures greater than 400 F (204 C).
9. Vents and Drains per DD100-L-12-1
10. Pressure Instrument Connections per DD100-L-11-1
11. PWHT required for thickness per ASME B31.1



Piping Material Specifications

Valve Details

Ball Valve

VBA0151

Rev Date 02-Jan-08

Ball Valve, Class CL150 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Split body, Blow-out proof stem, 316 SS Ball and Stem, PTFE Seats and Body Gasket, Regular Port, Design to API-608 and/or ASME B16.34

NOTES: Valve shall be fire tested to API-607; Maximum temperature 350 F.

Assigned Pipe Classes: ADX, AEA, CA, CAB, CAF, CAZ, CBA, CSA

Ball Valve

VBA0153

Rev Date 19-Jun-06

Ball Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Split body, Blow-out proof stem, 316 SS Ball and Stem, Metal Seats, 316 SS Spiral Wound Body Gasket, Regular Port, Design to API-608 and/or ASME B16.34

NOTES: Valve shall be fire tested to API-607, for use in temperatures above 400 F.

Assigned Pipe Classes: CAB, CAF, CSA

Ball Valve

VBA0617-SW

Rev Date 19-Jun-06

Ball Valve, Class CL 600 Socketweld, Forged Body to, ASTM A105 N, Removable ends for socketwelding, Blow-out proof, 316 SS Ball and Stem, Metal Seated, Regular Port, Design to API-608

NOTES: Fire tested to API-607. Alternatively valves may be supplied with ASTM A106 Gr. B Sch 160 nipples 150 mm (6 in.) long at each end for welding. For use in temperatures above 400 F

Assigned Pipe Classes: CAB, CAF, CSA

Check Valve

VCH0231#8-SW-C

Rev Date 10-Jun-08

SUFFIX: -C ASME SA Material

Check Valve, Class CL 800 Socketweld, Forged Body to, ASME SA105 N, Bolted Cover, Piston/Lift Type with Spring, API Trim 8, Integral or Renewable seats, Hard Faced Seat, Full Port, Design to API-602

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: CSA

Check Valve

VCH0241#8-C

Rev Date 17-Feb-08

SUFFIX: -C ASME SA Material

Check Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASME SA216 Gr WCB, Bolted Cover, Swing Type, API Trim 8 design to API 600, Integral or Welded Hard Faced Seat

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: CSA

Compact Gate Valve

VGA0031#8-SW-C

Rev Date 17-Feb-08

SUFFIX: -C ASME SA Material

Compact Gate Valve, Class CL 800 Socketweld, Forged Body to, ASME SA105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 8, Integral or Renewable seats, Regular Port, Design to API-602

Assigned Pipe Classes: CSA

Gate Valve

VGA0041#8-C

Rev Date 17-Feb-08

SUFFIX: -C ASME SA Material

Gate Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASME SA216 Gr WCB, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 8, Integral or Welded in Seats, Design to API-600

Assigned Pipe Classes: CSA

Gate Valve

VGA0054#8-C

Rev Date 17-Feb-08

SUFFIX: -C ASME SA Material

Gate Valve, Class CL 300 RF to ASME B16.5, Cast Body to, ASME SA216 Gr WCB, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 8, Integral or Welded in Seats, Design to API-600

Assigned Pipe Classes: CSA, ESA

Gate Valve

VGA0111#8-C

Rev Date 17-Feb-08

SUFFIX: -C ASME SA Material

Gate Valve, Class CL 150 RF to ASME B16.5, Forged Body w/integral flanges, ASME SA105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 8, Integral or Renewable seats, Regular Port, Design to API-602

Assigned Pipe Classes: CSA

Gate Valve

VGA0315#8-C

Rev Date 17-Feb-08

SUFFIX: -C ASME SA Material

Gate Valve, Class CL 300 RF to ASME B16.5, Forged Body w/integral flanges, ASME SA105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 8, Integral or renewable hard faced seats, Regular Port, Design to API-602

Assigned Pipe Classes: CSA, ESA

Globe Valve

VGL0131#5-SW-C

Rev Date 17-Feb-08

SUFFIX: -C ASME SA Material

Globe Valve, Class CL 800 Socketweld, Forged Body to, ASME SA105 N, Bolted Bonnet, OS & Y, API Trim 5, Integral or renewable hard faced seats, Hard Faced Disc, Design to API-602

Assigned Pipe Classes: CSA

Globe Valve

VGL0141#5-C

Rev Date 22-Feb-08

SUFFIX: -C ASME SA Material

Globe Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASME SA216 Gr WCB, Bolted Bonnet, OS & Y, API Trim 5 design to API-600, Integral or Welded in Seats

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: CSA

Plug Valve

VPL0345-C

Rev Date 19-Jun-06

Plug Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, 3-way, Tapered Plug

NOTES: Short pattern, c/w wrench, Nordstrom Fig.#5105, or equal

Assigned Pipe Classes: CSA

Stop Check Valve, Straight Pat SUFFIX: -C ASME SA Material

VSC0851#5-C

Rev Date 19-Mar-08

Stop Check Valve, Straight Pattern, Class CL 300 RF to ASME B16.5, Cast Body to, ASME SA216 Gr WCB, Bolted Bonnet, OS & Y, Body guided disc, API Trim 5 design to API-600, Integral or Renewable seats, Full Port

Assigned Pipe Classes: CS, CSA, ESA

Stop Check Valve, Angle Patte SUFFIX: -C ASME SA Material

VSC0852#5-C

Rev Date 19-Mar-08

Stop Check Valve, Angle Pattern, Class CL 300 RF to ASME B16.5, Cast Body to, ASME SA216 Gr WCB, Bolted Bonnet, Plug Type Body Guided Disc, API Trim 5 design to API-600, Integral or Welded in Seats, Hard Faced Seat & Disc, Design to ASME B16.34

Assigned Pipe Classes: CSA, ES, ESA



Piping Material Specifications

Rev: **4**

Service Desc: <i>Carbonate Solution + CO2, Hydrogen + Wet CO2</i>					Temp: <i>400 (204)</i>	°F(°C)max
Materials: <i>Type 304/304L SS **2</i>			Corrosion Allow: <i>0.031</i>		Code: <i>ASME B31.3</i>	
Material P&T:	<i>275</i>	PSI @	<i>-20</i>	°F min.	Based on: <i>ASME B16.5 MG 2.1</i>	Branch Conn Tbl: <i>I</i>
	<i>(1896)</i>	Kpa @	<i>(-29)</i>	°C min.		Inspection Class: <i>III</i>
	<i>190</i>	PSI @	<i>400</i>	°F max.		
	<i>(1310)</i>	Kpa @	<i>(204)</i>	°C max.		
P.W.H.T. : <i>NO</i>				Welding Proc: <i>Refer to Suncor Firebag STD FB-L-5217</i>		

Standard Specifications

Valve Specifications

<u>Pipe</u> 0.75 2 ASTM A312 Type 304/304L, Seamless, Sch. 40S 3 16 ASTM A312 Type 304/304L, Seamless, Sch. 10S <u>Fittings</u> 0.75 2 ASTM A182 F304/304L, Class 3000 SW 3 16 ASTM A403 Gr. WP304/304L-S, (Schedule to match pipe) <u>Flanges</u> 0.75 2 ASTM A182 F304/304L, Class 150 RF.SW **1 3 16 ASTM A182 F304/304L, Class 150 RF.WN, (Bore to match pipe) **1					<u>Check Valve</u> 0.75 2 VCH0216#10-SW 3 16 VCH0246#10-H RF <u>Compact Gate Valve</u> 0.75 2 VGA5034#10-SW 0.75 2 VGA5034#10-SW/TH <u>Gate Valve</u> 3 16 VGA0046#10-H RF 0.75 2 VGA0102#10-H RF 1.50 2 VGA0103#10-H RF **4 3 3 VGA5054#10-H RF **4 <u>Globe Valve</u> 0.75 2 VGL0130#10-SW 3 6 VGL0149#10-H RF				
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Special Material Specifications:

<u>Thermowells</u>	NPS 2, Class 300 RF, Flanged, A182 Type 304/304L, see Standard Drawing DD100-L-14-1, 2 **1
<u>Bolting</u>	ASTM A193 Gr. B7, c/w A194 Gr. 2H Nuts
<u>Gaskets</u>	Spiral Wound 316SS, Graphite filled, c/w CS Outer Ring, per ASME B16.20

** SPECIAL NOTES **

1. All flange faces shall have a surface finish of 125-150 microinch.
2. Dual certified material pressure/temperature ratings are based on the higher ratings of the straight grade material.
3. Deleted
4. Class 300 valves shall be used where required on instrument bridles.
5. Positive Isolation required per drawings DD100-L-31-1, 2 and 3.
6. Vents and Drains per DD100-L-12-1
7. Pressure Instrument Connections per DD100-L-11-1



Piping Material Specifications

Valve Details

Check Valve

VCH0216#10-SW

Rev Date 22-Feb-08

Check Valve, Class CL 800 Socketweld, Forged Body to, ASTM A182 F316/316L Dual Cert., Bolted Cover, Spring-loaded Ball Type, API Trim 10, Integral or Renewable seats, Full Port, Design to API-602

NOTES: Valve to be suitable for Hydrogen Service. Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: CXX, EXX

Check Valve

VCH0246#10-H

Rev Date 17-Feb-08

SUFFIX: -H Suitable for Hydrogen service and a flange facing of 125 -150 microinch

Check Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A351 Gr. CF8M, Bolted Cover, Swing Type, horizontal or vertical, API Trim 10 design to API-600, Integral, Welded in or Renewable Seats, Stellite Seat

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: CXX

Gate Valve

VGA0046#10-H

Rev Date 17-Feb-08

SUFFIX: -H Suitable for Hydrogen service and a flange facing of 125 -150 microinch

Gate Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A351 Gr. CF8M, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 10, Integral, Welded in or Renewable Seats, Design to API-600

Assigned Pipe Classes: CXX, CKY

Gate Valve

VGA0102#10-H

Rev Date 17-Feb-08

SUFFIX: -H Suitable for Hydrogen service and a flange facing of 125 -150 microinch

Gate Valve, Class CL 150 RF to ASME B16.5, Forged Body w/integral flanges, ASTM A182 F316/316L Dual Cert., Bolted Bonnet, OS & Y, Solid Wedge, API Trim 10, Integral or Renewable seats, Regular Port, Design to API-602

Assigned Pipe Classes: CXX

Gate Valve

VGA0103#10-H

Rev Date 17-Feb-08

SUFFIX: -H Suitable for Hydrogen service and a flange facing of 125 -150 microinch

Gate Valve, Class CL 300 RF to ASME B16.5, Forged Body w/integral flanges, ASTM A182 F316/316L Dual Cert., Bolted Bonnet, OS & Y, Solid Wedge, API Trim 10, Integral or Renewable seats, Regular Port, Design to API-602

Assigned Pipe Classes: CXX, EXX

Compact Gate Valve

VGA5034#10-SW

Rev Date 17-Feb-08

Compact Gate Valve, Class CL 800 Socketweld, Forged Body to, ASTM A182 F316/316L Dual Cert., Bolted Bonnet, OS & Y, Solid Wedge, API Trim 10, Integral or Renewable seats, Regular Port, Design to API-602

NOTES: Valve shall be suitable for Hydrogen Service

Assigned Pipe Classes: CXX, EXX

Compact Gate Valve

VGA5034#10-SW/TH

Rev Date 17-Feb-08

Compact Gate Valve, Class CL 800 Socketweld/Threaded, Forged Body to, ASTM A182 F316/316L Dual Cert., Bolted Bonnet, OS & Y, Solid Wedge, API Trim 10, Integral or Renewable seats, Regular Port, Design to API-602

NOTES: Valve shall be suitable for Hydrogen Service

Assigned Pipe Classes: CXX, EXX

Gate Valve

VGA5054#10-H

Rev Date 17-Feb-08

SUFFIX: -H Suitable for Hydrogen service and a flange facing of 125 -150 microinch

Gate Valve, Class CL 300 RF to ASME B16.5, Cast Body to, ASTM A351 Gr. CF8M, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 10, Integral, Welded in or Renewable Seats, Design to API-600

Assigned Pipe Classes: CXX, EXX

Globe Valve

VGL0130#10-SW

Rev Date 17-Feb-08

Globe Valve, Class CL 800 Socketweld, Forged Body to, ASTM A182 F316/316L Dual Cert., Bolted Bonnet, OS & Y, API Trim 10, Integral or Renewable seats, Design to API-602

NOTES: Valve shall be suitable for Hydrogen Service

Assigned Pipe Classes: CXX, EXX

Globe Valve

VGL0149#10-H

Rev Date 22-Feb-08

SUFFIX: -H Suitable for Hydrogen service and a flange facing of 125 -150 microinch

Globe Valve, Class CL 150 RF to ASME B16.5, Cast Body to, ASTM A351 Gr. CF8M, Bolted Bonnet, OS & Y, API Trim 10 design to API-600, Integral, Welded in or Renewable Seats

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: CXX



Piping Material Specifications

Rev: **4**

Service Desc: <i>Hydrocarbon Vapours, Fuel Gas</i>				Temp: <i>400 (204)</i> °F(°C)max	
Materials: <i>Carbon Steel</i>		Corrosion Allow: <i>0.0625</i>		Code: <i>ASME B31.3</i>	
Material P&T:	<i>740</i>	PSI @	<i>-20</i>	°F min.	Based on: <i>ASME B16.5 MG 1.1</i>
	<i>(5102)</i>	Kpa @	<i>(-29)</i>	°C min.	
	<i>635</i>	PSI @	<i>400</i>	°F max.	Branch Conn Tbl: <i>4</i>
	<i>(4378)</i>	Kpa @	<i>(204)</i>	°C max.	
P.W.H.T. : <i>NO (**6)</i>				Welding Proc: <i>Refer to Suncor Firebag STD FB-L-5217</i>	
Inspection Class: <i>III</i>					

Standard Specifications			Valve Specifications		
<u>Pipe</u>			<u>Ball Valve</u>		
0.75	2	ASTM A106 Gr. B, Seamless, Sch 80	3	12	VBA0301 RF **I
3	14	ASTM A106 Gr. B, Seamless, STD. Wt.	12	12	VBA0303 RF
16	24	ASTM A106 Gr. B, Seamless, (wall thickness calculated per attachment L)	0.75	2	VBA0602-TH **I
<u>Fittings</u>			8	8	VBA5206 RF
0.75	2	ASTM A105N, Class 3000 SW	<u>Check Valve</u>		
3	24	ASTM A234 WPB, (Schedule to match Pipe)	0.75	2	VCH0231#8-SW
<u>Flanges</u>			3	6	VCH0254#8 RF
0.75	2	ASTM A105N, Class 300 RF. SW	<u>Check Valve, Wafer Style</u>		
3	24	ASTM A105N, Class 300 RF.WN, (Bore to match Pipe)	8	24	VWC0301 RF
			<u>Compact Gate Valve</u>		
			0.75	2	VGA0031#8-SW
			0.75	2	VGA0031#8-SW/TH
			<u>Gate Valve</u>		
			3	24	VGA0054#8 RF
			0.75	2	VGA0315#8 RF
			<u>Globe Valve</u>		
			0.75	2	VGL0131#8-SW
			3	8	VGL0151#8 RF
			<u>Plug Valve</u>		
			6	6	VPL0360 RF

Special Material Specifications:

<u>Thermowells</u>	NPS 2, Class 300 RF, Flanged, A105N, see Standard Drawing DD100-L-14-1, 2
<u>Bolting</u>	ASTM A193 Gr. B7, c/w A194 Gr. 2H Nuts
<u>Gaskets</u>	Spiral Wound 316SS, Graphite filled, c/w CS Outer Ring, per ASME B16.20

**** SPECIAL NOTES ****

1. Soft seated valves have limited pressure/temperature ratings. Maximum temperature shall not exceed 400 F (204 C)..
2. Deleted
3. Refer to section 4.1.4 of FB-L-5202 specification for MDMT guidelines.
4. Vents and Drains per DD100-L-12-1
5. Pressure Instrument Connections per DD100-L-11-1.
6. PWHT required for thickness per ASME B31.3.



Piping Material Specifications

Valve Details

Ball Valve

VBA0301

Rev Date 17-Sep-07

Ball Valve, Class CL 300 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Split body, Blow-out proof stem, 316 SS Ball and Stem, PTFE Seats and Body Gasket, Regular Port, Design to API-608 and/or ASME B16.34

NOTES: Firesafe per API-607; Maximum temperature 350 F;

Assigned Pipe Classes: EA

Ball Valve

VBA0303

Rev Date 19-Jun-06

Ball Valve, Class CL 300 RF to ASME B16.5, Forged Body to, ASTM A350 Gr.LF2 CL 1, Split body, Blow-out proof stem, 316 SS Ball and Stem, Renewable Seats, PTFE Seats and Seals, Full Port, API 6D & ASME B16.34

NOTES: Fire Safe to API-607

CSA Z245.15-01 Category II -45C

Assigned Pipe Classes: EA

Ball Valve

VBA0602-TH

Rev Date 30-Oct-06

Ball Valve, Class CL 600 Threaded, Forged Body to, ASTM A105 N, Blow-out proof stem, 316 SS Ball and Stem, RTFE seats, Regular Port, Design to API-608

NOTES: Firesafe per API-607; Maximum temperature 350 F

Assigned Pipe Classes: ADX, CA, CAF, CAZ, EA

Ball Valve

VBA5206

Rev Date 19-Jun-06

Ball Valve, Class CL 300 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Split body, Blow-out proof stem, 316 SS Ball and Stem, PTFE Seats and Body Gasket, Regular Port, Design to API-608 and/or ASME B16.34

NOTES: Fire tested to API 607; Trunnion mounted; Size range 2" - 12"

Assigned Pipe Classes: EA

Check Valve

VCH0231#8-SW

Rev Date 22-Feb-08

Check Valve, Class CL 800 Socketweld, Forged Body to, ASTM A105 N, Bolted Cover, Piston/Lift Type with Spring, API Trim 8, Integral or renewable, Full Port, Design to API-602

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: CA, CAB, CAZ, CBA, CHY, CS, EA, EAB, EDB, ES, HB, HBD

Check Valve

VCH0254#8

Rev Date 17-Feb-08

Check Valve, Class CL 300 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Cover, Swing Type Carbon Steel Disc, API Trim 8 design to API 600, Integral or Welded in Seats, Hard Faced Seat

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: EA, EAB, EDB, ES

Compact Gate Valve

VGA0031#8-SW

Rev Date 04-Apr-08

Compact Gate Valve, Class CL 800 Socketweld, Forged Body to, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 8, Integral or Renewable seats, Regular Port, Design to API-602

Assigned Pipe Classes: CA, CAB, CAZ, CBA, CHY, CS, EA, EAB, EDB, HB, HBD, 662-2, 662-3

Compact Gate Valve

VGA0031#8-SW/TH

Rev Date 04-Apr-08

Compact Gate Valve, Class CL800 Socketweld/Threaded, Forged Carbon Steel, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 8, Integral or renewable hard faced seats, Regular Port, Design to API-602

Assigned Pipe Classes: CA, CAB, CAZ, CBA, CHY, CS, EA, EAB, EDB, HB, HBD, 662-2, 662-3

Gate Valve

VGA0054#8

Rev Date 17-Feb-08

Gate Valve, Class CL 300 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 8, Integral or Welded in Seats, Design to API-600

Assigned Pipe Classes: CA, CAB, CAH, CAZ, CBA, CS, EA, EAB, EDB, ES, 662-3

Gate Valve

VGA0315#8

Rev Date 17-Feb-08

Gate Valve, Class CL 300 RF to ASME B16.5, Forged Body w/integral flanges, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 8, Integral or Renewable seats, Regular Port, Design to API-602

Assigned Pipe Classes: CA, CAB, CAH, CBA, CS, EA, EAB, EDB, ES

Globe Valve**VGL0131#8-SW**

Rev Date 23-Jun-06

Globe Valve, Class CL 800 Socketweld, Forged Body to, ASTM A105 N, Bolted Bonnet, OS & Y, Integral or Renewable seats, Hard Faced Seat to API Trim 8, Design to API-602

Assigned Pipe Classes: CA, CAB, CAZ, CBA, CHY, CS, EA, EAB, EDB, HB, HBD

Globe Valve**VGL0151#8**

Rev Date 22-Feb-08

Globe Valve, Class CL 300 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, API Trim 8 design to API 600, Integral or Welded in Seats, Hard Faced Seat

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: EA, EAB, EDB, ES

Plug Valve**VPL0360**

Rev Date 19-Jun-06

Plug Valve, Class CL 300 RF to ASME B16.5, Cast Body to, ASTM A352 Gr. LCC, Tapered Plug, 410 SS, Regular Port

NOTES: Low Temp Nitrile Seals & O-Rings; Safety Bleed DTR Pressure Relief System; Gear Operated

Assigned Pipe Classes: EA

Check Valve, Wafer Style**VWC0301**

Rev Date 19-Jun-06

Check Valve, Wafer Style, Class CL 300 RF to fit between ASME B16.5 flanges, Cast Body to, ASTM A216 Gr WCB, Retainerless Style, Dual Carbon Steel Plates, Inconel X750 Spring(s), Lapped Seats, w/Stellite Hard Faced Overlay, Design to API-594

NOTES: For valves 26" NPS and larger flange connections to comply with ASME B16.47 Series A

Assigned Pipe Classes: EA, EAB, EDB, ES



Piping Material Specifications

Rev: **4**

Service Desc: <i>General Hydrocarbons</i>				Temp: <i>800 (427)</i> °F(°C)max	
Materials: <i>Carbon Steel</i>		Corrosion Allow: <i>0.0625</i>		Code: <i>ASME B31.3</i>	
Material P&T:	<i>740</i>	PSI @	<i>-20</i>	°F min.	Based on: <i>ASME B16.5 MG 1.1</i>
	<i>(5102)</i>	Kpa @	<i>(-29)</i>	°C min.	
	<i>410</i>	PSI @	<i>800</i>	°F max.	Branch Conn Tbl: <i>4</i>
	<i>(2827)</i>	Kpa @	<i>(427)</i>	°C max.	
P.W.H.T. : <i>NO (**6)</i>				Welding Proc: <i>Refer to Suncor Firebag STD FB-L-5217</i>	
Inspection Class: <i>III</i>					

Standard Specifications			Valve Specifications		
<u>Pipe</u>			<u>Ball Valve</u>		
0.75	2	ASTM A106 Gr. B, Seamless, Sch 80	0.75	2	VBA0616 SW
3	14	ASTM A106 Gr. B, Seamless, STD. Wt.	<u>Ball Valve, Trunnion-mounted</u>		
16	24	ASTM A106 Gr. B, Seamless, (wall thickness calculated per attachment L)	12	24	VBA0320 RF
26	48	API 5L GR B PSL-2, DSAW, (wall thickness calculated per attachment L)	<u>Check Valve</u>		
<u>Fittings</u>			0.75	2	VCH0231#8-SW
0.75	2	ASTM A105N, Class 3000 SW	3	6	VCH0254#8 RF
3	24	ASTM A234 WPB, (Schedule to match Pipe)	<u>Check Valve, Wafer Style</u>		
26	48	ASTM A234 Gr. WPB-W (100%RT) (Schedule to match pipe)	8	24	VWC0301 RF
<u>Flanges</u>			26	48	VWC0307 RF
0.75	2	ASTM A105N, Class 300 RF. SW	<u>Compact Gate Valve</u>		
3	24	ASTM A105N, Class 300 RF. WN, (Bore to match Pipe)	0.75	2	VGA0031#8-SW
26	48	ASTM A105N, Class 300 RF. WN B16.47-A (Bore to match pipe)	0.75	2	VGA0031#8-SW/TH
			<u>Gate Valve</u>		
			3	24	VGA0054#8 RF
			26	48	VGA0057#8 RF
			0.75	2	VGA0315#8 RF
			<u>Globe Valve</u>		
			0.75	2	VGL0131#8-SW
			3	8	VGL0151#8 RF

Special Material Specifications:

<u>Thermowells</u>	NPS 2, Class 300 RF, Flanged, A105N, see Standard Drawing DD100-L-14-1, 2
<u>Bolting</u>	ASTM A193 Gr. B7, c/w A194 Gr. 2H Nuts
<u>Gaskets</u>	Spiral Wound 316SS, Graphite filled, c/w CS Outer Ring, per ASME B16.20

**** SPECIAL NOTES ****

- Deleted.
- Do not use in services where "coking" or "plugging" is common. For these services use a SW/TH or RF valve.
- Refer to section 4.1.4 of FB-L-5202 specification for MDMT guidelines.
- Vents and Drains per DD100-L-12-1
- Pressure Instrument Connections per DD100-L-11-1.
- PWHT required for thickness per ASME B31.3.



Piping Material Specifications

Valve Details

Ball Valve, Trunnion-mounted

VBA0320

Rev Date 19-Jun-06

Ball Valve, Trunnion-mounted, Class CL 300 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Split body, Blow-out proof stem, 316 SS Ball and Stem, Renewable Seats, Metal Seated, Full Port, API 6D & ASME B16.34

NOTES: Upon review and approval by Suncor, forged body to A-105 may replace A-216 for the body.

Assigned Pipe Classes: EAB

Ball Valve

VBA0616

Rev Date 19-Jun-06

Ball Valve, Class CL 600 Socketweld, Forged Carbon Steel, ASTM A105 N, Blow-out proof, 410 SS Ball, Stem & Seat to ASTM A276 Gr. 410, Renewable Seats, Regular Port, Design to API-608

NOTES: Fire tested to API-607

Stem Packing - Chesterton 1600

Bolting - A193 Gr B16

Bonnet Gasket - Spiral Wound 316 SS

Assigned Pipe Classes: CAB, EAB

Check Valve

VCH0231#8-SW

Rev Date 22-Feb-08

Check Valve, Class CL 800 Socketweld, Forged Body to, ASTM A105 N, Bolted Cover, Piston/Lift Type with Spring, API Trim 8, Integral or renewable, Full Port, Design to API-602

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: CA, CAB, CAZ, CBA, CHY, CS, EA, EAB, EDB, ES, HB, HBD

Check Valve

VCH0254#8

Rev Date 17-Feb-08

Check Valve, Class CL 300 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Cover, Swing Type Carbon Steel Disc, API Trim 8 design to API 600, Integral or Welded in Seats, Hard Faced Seat

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: EA, EAB, EDB, ES

Compact Gate Valve

VGA0031#8-SW

Rev Date 04-Apr-08

Compact Gate Valve, Class CL 800 Socketweld, Forged Body to, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 8, Integral or Renewable seats, Regular Port, Design to API-602

Assigned Pipe Classes: CA, CAB, CAZ, CBA, CHY, CS, EA, EAB, EDB, HB, HBD, 662-2, 662-3

Compact Gate Valve

VGA0031#8-SW/TH

Rev Date 04-Apr-08

Compact Gate Valve, Class CL800 Socketweld/Threaded, Forged Carbon Steel, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 8, Integral or renewable hard faced seats, Regular Port, Design to API-602

Assigned Pipe Classes: CA, CAB, CAZ, CBA, CHY, CS, EA, EAB, EDB, HB, HBD, 662-2, 662-3

Gate Valve

VGA0054#8

Rev Date 17-Feb-08

Gate Valve, Class CL 300 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 8, Integral or Welded in Seats, Design to API-600

Assigned Pipe Classes: CA, CAB, CAH, CAZ, CBA, CS, EA, EAB, EDB, ES, 662-3

Gate Valve

VGA0057#8

Rev Date 22-Feb-08

Gate Valve, Class CL 300 RF to ASME B16.47-A, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 8 design to API 600, Integral or Welded in Seats

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: EAB, EDB

Gate Valve

VGA0315#8

Rev Date 17-Feb-08

Gate Valve, Class CL 300 RF to ASME B16.5, Forged Body w/integral flanges, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 8, Integral or Renewable seats, Regular Port, Design to API-602

Assigned Pipe Classes: CA, CAB, CAH, CBA, CS, EA, EAB, EDB, ES

Globe Valve

VGL0131#8-SW

Rev Date 23-Jun-06

Globe Valve, Class CL 800 Socketweld, Forged Body to, ASTM A105 N, Bolted Bonnet, OS & Y, Integral or Renewable seats, Hard Faced Seat to API Trim 8, Design to API-602

Assigned Pipe Classes: CA, CAB, CAZ, CBA, CHY, CS, EA, EAB, EDB, HB, HBD

Globe Valve**VGL0151#8**

Rev Date 22-Feb-08

Globe Valve, Class CL 300 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, API Trim 8 design to API 600, Integral or Welded in Seats, Hard Faced Seat

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: EA, EAB, EDB, ES

Check Valve, Wafer Style**VWC0301**

Rev Date 19-Jun-06

Check Valve, Wafer Style, Class CL 300 RF to fit between ASME B16.5 flanges, Cast Body to, ASTM A216 Gr WCB, Retainerless Style, Dual Carbon Steel Plates, Inconel X750 Spring(s), Lapped Seats, w/Stellite Hard Faced Overlay, Design to API-594

NOTES: For valves 26" NPS and larger flange connections to comply with ASME B16.47 Series A

Assigned Pipe Classes: EA, EAB, EDB, ES

Check Valve, Wafer Style**VWC0307**

Rev Date 05-Jul-06

Check Valve, Wafer Style, Class CL 300 RF to fit between ASME B16.47-A flanges, Cast Body to, ASTM A216 Gr WCB, Retainerless Style, Dual Carbon Steel Plates, Inconel X750 Spring(s), Lapped Seats, w/Stellite Hard Faced Overlay, Design to API-594

Assigned Pipe Classes: EAB, EDB



Piping Material Specifications

Rev: **4**

Service Desc: <i>Chemical Injection; Cogen fuel gas downstream of filter</i>				Temp: <i>800 (427)</i> °F(°C)max	
Materials: <i>Type 316/316L Stainless Steel</i>		Corrosion Allow: <i>0.0625</i>		Code: <i>ASME B31.3</i>	
Material P&T:	<i>720</i>	PSI @	<i>-50</i>	°F min.	Based on: <i>ASME B16.5 MG 2.2</i> Branch Conn Tbl: <i>4</i>
	<i>(4964)</i>	Kpa @	<i>(-46)</i>	°C min.	
	<i>420</i>	PSI @	<i>800</i>	°F max.	
	<i>(2896)</i>	Kpa @	<i>(427)</i>	°C max.	
P.W.H.T. : <i>NO</i>				Welding Proc: <i>Refer to Suncor Firebag STD FB-L-5217</i>	
Inspection Class: <i>III</i>					

Standard Specifications			Valve Specifications		
<u>Pipe</u>			<u>Check Valve</u>		
0.75	2	ASTM A312, Type 316/316L, Seamless, Sch.80S	0.75	2	VCH0218#12-SW
3	24	ASTM A312 Type 316/316L, Seamless, (wall thickness calculated per attachment L)	3	6	VCH5255#12 RF **4
<u>Fittings</u>			<u>Check Valve, Wafer Style</u>		
0.75	2	ASTM A182 F316/316L, Class 3000 SW	8	24	VWC5154 RF **4
3	24	ASTM A403 Gr. 316/316L WP-WX, (Schedule to match pipe)	<u>Compact Gate Valve</u>		
<u>Flanges</u>			0.75	2	VGA0028#12-SW
0.75	2	ASTM A182 F316/316L, Class 300 RF.SW	0.75	2	VGA0028#12-SW/TH
3	24	ASTM A182 F316/316L, Class 300 RF.WN (Bore to match pipe)	<u>Gate Valve</u>		
			0.75	2	VGA5032#12 RF
			3	24	VGA5054#12 RF **4
			<u>Globe Valve</u>		
			0.75	2	VGL0126#12-SW
			3	8	VGL5156#12 RF **4

Special Material Specifications:

<u>Thermowells</u>	NPS 2, Class 300 RF, Flanged, A182 Type 316/316L, see Standard Drawing DD100-L-14-1, 2
<u>Bolting</u>	ASTM A193 Gr. B7, c/w A194 Gr. 2H Nuts
<u>Gaskets</u>	Spiral Wound 316SS, Graphite filled, c/w CS Outer Ring, per ASME B16.20

**** SPECIAL NOTES ****

- Unions are not permitted, use flanges.
- Deleted
- Deleted
- Minimum 2.5% Mo content may be waived for these valves. A Suncor technical deviation is required to confirm the removal of this requirement.
- Deleted
- Vents and Drains per DD100-L-12-1
- Pressure Instrument Connections per DD100-L-11-1.



Piping Material Specifications

Valve Details

Check Valve

VCH0218#12-SW

Rev Date 17-Feb-08

Check Valve, Class CL 800 Socketweld, Forged Body to, ASTM A182 F316/316L Dual Cert., Bolted Cover, Spring-loaded Ball Type, API Trim 12, Integral or Renewable seats, Full Port, Design to API-602
Assigned Pipe Classes: CAG, EAG, HAG

Check Valve

VCH5255#12

Rev Date 17-Feb-08

Check Valve, Class CL 300 RF to ASME B16.5, Cast Body to, ASTM A351 Gr. CF8M, Bolted Cover, Swing Type, API Trim 12 design to API-600, Integral or Welded in Seats, Hard Faced Seat
NOTES: Pressure/Temperature rating to ASME B16.34
Casting to have a 2.5% minimum Molybdenum Content; 317 Stainless Steel is an acceptable substitute
Assigned Pipe Classes: EAG

Compact Gate Valve

VGA0028#12-SW

Rev Date 17-Feb-08

Compact Gate Valve, Class CL 800 Socketweld, Forged Body to, ASTM A182 F316/316L Dual Cert., Bolted Bonnet, OS & Y, Solid Wedge, API Trim 12, Integral or Renewable seats, Regular Port, Design to API-602
Assigned Pipe Classes: CAG, EAG

Compact Gate Valve

VGA0028#12-SW/TH

Rev Date 17-Feb-08

Compact Gate Valve, Class CL 800 Socketweld/Threaded, Forged Body to, ASTM A182 F316/316L Dual Cert., Bolted Bonnet, OS & Y, Solid Wedge, API Trim 12, Integral or Renewable seats, Regular Port, Design to API-602
Assigned Pipe Classes: CAG, EAG

Gate Valve

VGA5032#12

Rev Date 19-Jun-06

Gate Valve, Class CL 300 RF to ASME B16.5, Forged Body w/integral flanges, ASTM A182 F316/316L Dual Cert., Bolted Bonnet, OS & Y, Solid Wedge, Integral or Renewable seats, Hard faced Seat & Disc, API Trim 12, Regular Port, Design to API-602
Assigned Pipe Classes: CAG, EAG

Gate Valve

VGA5054#12

Rev Date 17-Feb-08

Gate Valve, Class CL 300 RF to ASME B16.5, Cast Body to, ASTM A351 Gr. CF8M, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 12, Integral, Welded in or Renewable Seats, Full Port, Design to API-600
NOTES: Casting to have a 2.5% minimum Molybdenum content; 317 is a suitable substitute.
Assigned Pipe Classes: EAG

Globe Valve

VGL0126#12-SW

Rev Date 02-May-08

Globe Valve, Class CL 800 Socketweld, Forged Body to, ASTM A182 F316/316L Dual Cert., Bolted Bonnet, OS & Y, API Trim 12, Integral or Renewable seats, Design to API-602
Assigned Pipe Classes: CAG, EAG, HAG, HH

Globe Valve

VGL5156#12

Rev Date 22-Feb-08

Globe Valve, Class CL 300 RF to ASME B16.5, Cast Body to, ASTM A351 Gr. CF8M, Bolted Bonnet, OS & Y, Plug Type Disc, API Trim 12 design to API-600, Integral, Welded in or Renewable Seats
NOTES: Casting to have a 2.5% minimum Molybdenum content, 317 is an acceptable substitute
Pressure/Temperature rating to ASME B16.34
Assigned Pipe Classes: EAG

Check Valve, Wafer Style

VWC5154

Rev Date 19-Jun-06

Check Valve, Wafer Style, Class CL 300 RF to fit between ASME B16.5 flanges, Cast Body to, ASTM A351 Gr. CF8M, Retainerless Style, Dual 316SS Plates, Inconel X750 Spring(s), Lapped Seats, w/Stellite Hard Faced Overlay, Design to API-594
NOTES: Casting to have a minimum 2.5% Molybdenum content; 317 is an acceptable substitute
Assigned Pipe Classes: EAG



Piping Material Specifications

Rev: **4**

Service Desc: <i>Hydrocarbon, very corrosive, with Naphthenic Acid</i>					Temp: <i>800 (427)</i>	°F(°C)max
Materials: <i>Type 317L SS</i>		Corrosion Allow: <i>0.0625</i>			Code: <i>ASME B31.3</i>	
Material P&T:	<i>600</i>	PSI @	<i>-20</i>	°F min.	Based on: <i>ASME B16.5 MG 2.3</i>	Branch Conn Tbl: <i>4</i>
	<i>(4137)</i>	Kpa @	<i>(-29)</i>	°C min.		Inspection Class: <i>III</i>
	<i>345</i>	PSI @	<i>800</i>	°F max.		
	<i>(2379)</i>	Kpa @	<i>(427)</i>	°C max.		
P.W.H.T. : <i>NO</i>				Welding Proc: <i>Refer to Suncor Firebag STD FB-L-5217</i>		

Standard Specifications			Valve Specifications		
<u>Pipe</u>			<u>Check Valve</u>		
0.75	6	ASTM A312 Type 317L, Seamless, Sch. 80S	0.75	2	VCH0222-SW
8	24	ASTM A312 Type 317L, Seamless, (wall thickness calculated per attachment L) **2	3	6	VCH5254 RF
<u>Fittings</u>			<u>Check Valve, Wafer Style</u>		
0.75	2	ASTM A182 F317L, Class 3000 SW **1	8	24	VWC0308 RF
3	6	ASTM A403 Gr. WP 317L Sch. 80S	<u>Compact Gate Valve</u>		
8	24	ASTM A403 Gr. WP-WX 317L, (Schedule to match pipe) **3	0.75	2	VGA0020-SW
<u>Flanges</u>			0.75	2	VGA0020-SW/TH
0.75	2	ASTM A182 F317L, Class 300 RF.SW.	<u>Gate Valve</u>		
3	24	ASTM A182 F317L, Class 300 RF.WN, (Bore to match pipe)	3	24	VGA5057 RF
			1.5	2	VGA5058 RF
			<u>Globe Valve</u>		
			0.75	2	VGL0128-SW
			3	12	VGL0155 RF

Special Material Specifications:

<u>Thermowells</u>	NPS 2, Class 300 RF, Flanged, A182 Type 317L, see Standard Drawing DD100-L-14-1, 2
<u>Bolting</u>	ASTM A193 Gr. B16, c/w A194 Gr. 4 Nuts
<u>Gaskets</u>	Spiral Wound 317SS, Graphite filled, c/w CS Outer Ring, per ASME B16.20

**** SPECIAL NOTES ****

- Unions are not permitted.
- With Owner's Engineers approval, NPS 12 to 24 pipe rolled from clad plate may be used as listed in Oil Sands Spec CAP. Pipe wall thickness shall be calculated per ASME B31.3.
- With Owner's Engineers approval, Clad or weld-overlayed fittings as listed in CAP may be used with wall thickness matching the pipe.
- Deleted.
- Vents and Drains per DD100-L-12-1
- Pressure Instrument Connections per DD100-L-11-1.
- Positive Isolation required per drawings DD100-L-31-1, 2, and 3.



Piping Material Specifications

Valve Details

Check Valve

VCH0222-SW

Rev Date 22-Feb-08

Check Valve, Class CL 800 Socketweld, Forged Body to, ASTM A182 F317L, Bolted Cover, Ball Type, 317 SS Trim, Integral or renewable hard faced seats, Full Port, Design to API-602

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: CCH, EAH

Check Valve

VCH5254

Rev Date 17-Feb-08

Check Valve, Class CL 300 RF to ASME B16.5, Cast Body to, ASTM A351 Gr. CG8M, Bolted Cover, Swing Type, 317 SS Trim design to API-600, Integral or Welded Hard Faced Seat

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: EAH

Compact Gate Valve

VGA0020-SW

Rev Date 17-Feb-08

Compact Gate Valve, Class CL 800 Socketweld, Forged Body to, ASTM A182 F317L, Bolted Bonnet, OS & Y, Solid Wedge, 317 SS Trim, Integral or renewable hard faced seat, Regular Port, Design to API-602

Assigned Pipe Classes: CCH, EAH

Compact Gate Valve

VGA0020-SW/TH

Rev Date 17-Feb-08

Compact Gate Valve, Class CL 800 Socketweld/Threaded, Forged Body to, ASTM A182 F317L, Bolted Bonnet, OS & Y, Solid Wedge, 317 SS Trim, Integral or renewable hard faced seats, Regular Port, Design to API-602

Assigned Pipe Classes: CCH, EAH

Gate Valve

VGA5057

Rev Date 17-Feb-08

Gate Valve, Class CL 300 RF to ASME B16.5, Cast Body to, ASTM A351 Gr. CG8M, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, 317 SS Trim, Integral, Welded in or Renewable Seats, Hard Faced Stellite Seat, Design to API-600

Assigned Pipe Classes: CCH, EAH

Gate Valve

VGA5058

Rev Date 17-Feb-08

Gate Valve, Class CL 300 RF to ASME B16.5, Forged Body w/integral flanges, ASTM A182 F317L, Bolted Bonnet, OS & Y, Solid Wedge, 317 SS Trim, Integral or renewable hard faced seats, Regular Port, Design to API-602

Assigned Pipe Classes: CCH, EAH

Globe Valve

VGL0128-SW

Rev Date 17-Feb-08

Globe Valve, Class CL 800 Socketweld, Forged Body to, ASTM A182 F317L, Bolted Bonnet, OS & Y, 317 SS Trim, Integral or renewable hard faced seats, Design to API-602

Assigned Pipe Classes: CCH, EAH

Globe Valve

VGL0155

Rev Date 22-Feb-08

Globe Valve, Class CL 300 RF to ASME B16.5, Cast Body to, ASTM A351 Gr. CG8M, Bolted Bonnet, OS & Y, Integral, Welded in or Renewable Seats, Hard Faced Seat

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: EAH

Check Valve, Wafer Style

VWC0308

Rev Date 20-Jun-06

Check Valve, Wafer Style, Class CL 300 RF to fit between ASME B16.5 flanges, Cast Body to, ASTM A351 Gr. CG8M, Retainerless Style, Dual 317SS Plates, Inconel X750 Spring(s), Lapped Seats, w/Stellite Hard Faced Overlay, Design to API-594

Assigned Pipe Classes: EAH



Piping Material Specifications

Rev: **4a**

Service Desc: Natural Gas (Rich Fuel Gas) (Sour)	Temp: 400 (204) °F(°C)max
Materials: Low Temperature Carbon Steel **5, 20, 30	Corrosion Allow: 0.125
Material P&T: 740 PSI @ -50 °F min.	Based on: ASME B16.5 MG 1.1
Note 10 (5102) Kpa @ (-46) °C min.	Branch Conn Tbl: 4
635 PSI @ 400 °F max.	Inspection Class: III **21
(4378) Kpa @ (204) °C max.	
P.W.H.T.: NO (**5, 6, 9, 27)	Welding Proc: Refer to Suncor Firebag STD FB-L-5217 **29

Standard Specifications			Valve Specifications		
Pipe			Check Valve		
0.75	0.75	ASTM A333 Gr.6, Seamless, Sch. 160 **28	0.75	2	VCH0240#12-SW-N3
1	2	ASTM A333 Gr.6, Seamless, Sch. 80 **28	3	6	VCH0260#12-N3 RF
3	12	ASTM A333 Gr.6, Seamless, XS **28	Compact Gate Valve		
14	24	ASTM A333 Gr.6, Seamless, (wall thickness calculated per attachment L) **28	0.75	2	VGA0030#12-SW/TH-N3 **3
Fittings			0.75	2	VGA0030#12-SW-N3
0.75	0.75	ASTM A350 LF2 CL 1, Class 6000 SW	Gate Valve		
1	2	ASTM A350 LF2 CL 1, Class 3000 SW	3	24	VGA0305#12-N3 RF
3	24	ASTM A420 WPL6, (Schedule to match pipe)	Globe Valve		
Flanges			0.75	2	VGL0140#12-SW-N3
0.75	2	ASTM A350 LF2 CL 1, Class 300 RF.SW.	3	8	VGL0160#12-N3 RF
3	24	ASTM A350 LF2 CL 1, Class 300 RF.WN., (Bore to match pipe)	Wafer Check Valve		
			8	16	VWC0309-N3 RF Wafer

Special Material Specifications:

Thermowells	NPS 2, Class 300 RF, Flanged, A350 LF2 CL 1, see Standard Drawing DD100-L-14-1, 2
Bolting	ASTM A193 Gr. B7M, c/w A194 Gr. 2HM Nuts
Gaskets	Spiral Wound 316SS, Graphite filled, c/w CS Outer Ring, per ASME B16.20

** SPECIAL NOTES **

For ASME B31.3 design, Notes 1.-10. shall apply:

1. All weld procedures shall include impact testing per ASME B31.3.
2. Deleted.
3. Gate valves to be used for Pressure Connections.
4. Deleted.
5. All materials for use in 'Oil and Gas Production Environments' shall comply with NACE MR0175 latest revision, see Appendix B1, "Sour Service Supplement" for further information. All materials for use in 'Petroleum Refining Environments' shall comply with NACE MR0103 latest revision, see Appendix B. All piping systems using this pipe class shall then be identified with the appropriate NACE reference, approved by the Owners Engineer, and noted in the project documentation. Material selection shall be carefully reviewed for service and design conditions with respect to the appropriate NACE documents. For material requirements not included in this pipe class, including valves, alternate pipe classes with more suitable materials shall be considered.
6. Hardness control requirements of NACE SP0472 shall be met for all welds in this class as referenced in Suncor Firebag STD FB-L-5217.
7. Vents and Drains per DD100-L-12-1.
8. Pressure Instrument Connections per DD100-L-11-1.
9. PWHT required for thickness per ASME B31.3.
10. The maximum temperature for this pipe class is based on general carbon steel material limitations. For sour service systems identified under NACE MR0175 'Oil and Gas Production Environments', the maximum design temperature shall be restricted to the material and service requirements defined under NACE MR0175 / ISO 15156 latest edition.

For CSA Z662-07 design, Notes 20.-30. shall apply in addition to Note 10.:

20. All non CSA materials shall comply with the requirements of the sour service clause referenced in the applicable CSA Z245 standards: CSA Z245.1 Steel Pipe, CSA Z245.11 Steel Fittings, CSA Z245.12 Steel Flanges, CSA Z245.15 Steel Valves. Where no applicable CSA standard exists, the material requirements of NACE MR0175 / ISO 15156 (latest edition) apply. Note, all valves in this line class shall conform to NACE MR0175 / ISO 15156, latest edition. Sour service requirements shall be in accordance with Firebag Technical Note FB-PE6-TN008.

21. Inspection and Non-Destructive examination testing shall be carried out per CSA Z662-07. (1) All welds meeting the definition per CSA Z662-07 Clause 16.6.8, shall have 100% RT/UT for all butt weld joints and 100% MT/PT for all socket weld joints. For all welds excluded from the definition per Clause 16.6.8, there shall be a minimum 15% RT/UT for all butt weld joints and 15% MT/PT for all socket weld joints per CSA Z662-07, Clause 7.10.3 & 7.10.4. (2) Visual examination shall be carried out on 100% of the weld joint and components. (3) 100% MT/PT shall be carried out on all branch connection welds.
22. Use sockolet for 2" NPS and below for branch connections to headers. Use weldolets for 3" NPS and above branch connections to headers.
23. For Vents, Drains and Instrument Connections use ASME B31.3 materials per Piping Material Specification Class EAI.
24. Shop and field hardness control by NACE SP0472 as referred in Suncor Firebag STD FB-L-5217. Weld hardness shall meet the requirements of CSA Z662-07 Clause 16.6.4.
25. Where pipe bends are required, they shall be specified by tagged piping specialty item and approved by owner's Engineer.
26. Positive Isolation required per drawings DD100-31-1, 2 and 3.
27. Stress Relieving (PWHT) required for thickness per CSA Z662-07, Clause 7.9.16.
28. Pipe shall be used in Category I applications only, as defined in CSA Z662-07, Clause 5.2.2.
29. Valves with suffix 'N3' may be substituted with suffix 'N1' for use in design under CSA Z662-07.
30. Material selection shall be carefully reviewed for service and design conditions under NACE MR0175 / ISO 15156 latest revision. For material requirements not included in this pipe class, including valves, alternate pipe classes with more suitable materials shall be considered.



Piping Material Specifications

Valve Details

Check Valve

VCH0240#12-SW-N3

Rev Date 16-Mar-10

SUFFIX: -N3 Valve to conform to NACE MR0175 and NACE MR0103 latest revision

Check Valve, Class CL 800 Socketweld, Forged Body to, ASTM A350 Gr.LF2 CL 1, Bolted Cover, Piston/Lift Type with Spring, API Trim 12, Integral or renewable hard faced seat, Full Port, Design to API-602
NOTES: Bolting and bonnet gasket to be suitable for -50 F (-46 C) □ Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: EAI

Check Valve

VCH0260#12-N3

Rev Date 16-Mar-10

SUFFIX: -N3 Valve to conform to NACE MR0175 and NACE MR0103 latest revision

Check Valve, Class CL 300 RF to ASME B16.5, Cast Body to, ASTM A352 Gr. LCC, Bolted Cover, Swing Type, API Trim 12 design to API-600, Integral or Welded in Seats
NOTES: Teflon bonnet gasket; Maximum temperature 350 F □ Pressure/Temperature rating to ASME B16.34 □ Bolting and bonnet gasket to be suitable for -50 F (-46 C)

Assigned Pipe Classes: EAI

Compact Gate Valve

VGA0030#12-SW/TH-N3

Rev Date 16-Mar-10

SUFFIX: -N3 Valve to conform to NACE MR0175 and NACE MR0103 latest revision

Compact Gate Valve, Class CL800 Socketweld/Threaded, Forged Carbon Steel, ASTM A350 Gr.LF2 CL 1, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 12, Integral or renewable hard faced seat, Regular Port, Design to API-602

NOTES: Teflon bonnet gasket and packing; Maximum temperature 350 F

Assigned Pipe Classes: EAI

Compact Gate Valve

VGA0030#12-SW-N3

Rev Date 16-Mar-10

SUFFIX: -N3 Valve to conform to NACE MR0175 and NACE MR0103 latest revision

Compact Gate Valve, Class CL 800 Socketweld, Forged Body to, ASTM A350 Gr.LF2 CL 1, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 12, Integral or Renewable seats, Regular Port, Design to API-602
NOTES: Bolting & bonnet gasket and packing to be suitable for -50 F (-46 C)

Assigned Pipe Classes: EAI

Gate Valve

VGA0305#12-N3

Rev Date 16-Mar-10

SUFFIX: -N3 Valve to conform to NACE MR0175 and NACE MR0103 latest revision

Gate Valve, Class CL 300 RF to ASME B16.5, Cast Body to, ASTM A352 Gr. LCC, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 12, Integral or Welded in Seats, Regular Port, Design to API-600
NOTES: Bolting & bonnet gasket and packing to be suitable for -50 F (-46 C);

Assigned Pipe Classes: EAI

Globe Valve

VGL0140#12-SW-N3

Rev Date 16-Mar-10

SUFFIX: -N3 Valve to conform to NACE MR0175 and NACE MR0103 latest revision

Globe Valve, Class CL 800 Socketweld, Forged Body to, ASTM A350 Gr.LF2 CL 1, Bolted Bonnet, OS & Y, API Trim 12, Integral or Renewable seats, Design to API-602
NOTES: Bolting & bonnet gasket and packing to be suitable for -50 F (-46 C)

Assigned Pipe Classes: EAI

Globe Valve

VGL0160#12-N3

Rev Date 16-Mar-10

SUFFIX: -N3 Valve to conform to NACE MR0175 and NACE MR0103 latest revision

Globe Valve, Class CL 300 RF to ASME B16.5, Cast Body to, ASTM A352 Gr. LCC, Bolted Bonnet, OS & Y, API Trim 12 design to API-600, Integral or Welded in Seats
NOTES: Bolting & bonnet gasket and packing to be suitable for -50 F (-46 C) □ Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: EAI

Wafer Check Valve

VWC0309-N3

Rev Date 16-Mar-10

SUFFIX: -N3 Valve to conform to NACE MR0175 and NACE MR0103 latest revision

Wafer Check Valve, Class CL 300 RF to fit between ASME B16.5 flanges, Cast Body to, ASTM A352 Gr. LCC, Retainerless Style, Dual 316SS Plates, Inconel X750 Spring(s), Lapped Seats, w/Stellite Hard Faced Overlay, Design to API-594

NOTES: Valve to be suitable for -50 F (-46 C)

Assigned Pipe Classes: CCH, EAI



Piping Material Specifications

Rev: **4**

Service Desc: <i>Natural Gas and Nitrogen, Propane & LT Hydrocarbons **4</i>					Temp: <i>400 (204)</i>	°F(°C)max
Materials: <i>Low Temperature Carbon Steel</i>			Corrosion Allow: <i>0.0625</i>		Code: <i>ASME B31.3</i>	
Material P&T:	<i>740</i>	PSI @	<i>-50</i>	°F min.	Based on: <i>ASME B16.5 MG 1.1</i>	Branch Conn Tbl: <i>4</i>
	<i>(5102)</i>	Kpa @	<i>(-46)</i>	°C min.		Inspection Class: <i>III</i>
	<i>635</i>	PSI @	<i>400</i>	°F max.		
	<i>(4378)</i>	Kpa @	<i>(204)</i>	°C max.		
P.W.H.T. : <i>NO (**7)</i>				Welding Proc: <i>Refer to Suncor Firebag STD FB-L-5217</i>		

Standard Specifications			Valve Specifications		
<u>Pipe</u>			<u>Ball Valve</u>		
0.75	2	ASTM A333 Gr.6, Seamless, Sch. 80	3	20	VBA0302 RF **2
3	14	ASTM A333 Gr.6, Seamless, STD. Wt.	0.75	2	VBA0607-TH **2
16	24	ASTM A333 Gr.6, Seamless, (wall thickness calculated per attachment L)	<u>Check Valve</u>		
<u>Fittings</u>			0.75	2	VCH0240#12-SW
0.75	2	ASTM A350 LF2 CL 1, Class 3000 SW	3	6	VCH0260#12 RF
3	24	ASTM A420 WPL6, (Schedule to match pipe)	<u>Check Valve, Wafer Style</u>		
<u>Flanges</u>			8	16	VWC0309 RF
0.75	2	ASTM A350 LF2 CL 1, Class 300 RF.SW.	<u>Compact Gate Valve</u>		
3	24	ASTM A350 LF2 CL 1, Class 300 RF.WN., (Bore to match pipe)	0.75	2	VGA0030#12-SW
			0.75	2	VGA0030#12-SW/TH
			<u>Gate Valve</u>		
			3	24	VGA0305#12 RF
			0.75	2	VGA0310#12 RF
			<u>Globe Valve</u>		
			0.75	2	VGL0140#12-SW
			3	8	VGL0160#12 RF

Special Material Specifications:

<u>Thermowells</u>	NPS 2, Class 300 RF, Flanged, A350 LF2 CL 1, see Standard Drawing DD100-L-14-1, 2
<u>Bolting</u>	ASTM A320 Gr. L7, c/w A194 Gr. 4 Nuts
<u>Gaskets</u>	Spiral Wound 316SS, Graphite filled, c/w CS Outer Ring, per ASME B16.20

** SPECIAL NOTES **

1. All weld procedures shall include impact testing per ASME B31.3.
2. Soft seated valves have limited pressure/temperature ratings. Maximum temperature shall not exceed 400 F (204 C).
3. Deleted.
4. This line class shall be used for Propane and other LT Hydrocarbons at the discretion of Owner's Engineer.
5. Vents and Drains per DD100-L-12-1.
6. Pressure Instrument Connections per DD100-L-11-1.
7. PWHT required for thickness per ASME B31.3.



Piping Material Specifications

Valve Details

Ball Valve

VBA0302

Rev Date 17-Sep-07

Ball Valve, Class CL 300 RF to ASME B16.5, Cast Body to, ASTM A352 Gr. LCC, Split body, Blow-out proof stem, 316 SS Ball and Stem, Reduced Port
 NOTES: Teflon Packing, bolting and bonnet gasket to be suitable for -50 F (-46 C); Fire Tested to API-607;
 Assigned Pipe Classes: EAX

Ball Valve

VBA0607-TH

Rev Date 23-Jun-06

Ball Valve, Class CL600 Threaded, Forged Carbon Steel, ASTM A350 Gr.LF2 CL 1, Blow-out proof stem, 316 SS Trim, Vespel or Peek seats, Regular Port, Design to API-608
 NOTES: Firesafe per API-607; Maximum temperature 350 F
 Assigned Pipe Classes: CB, EAX

Check Valve

VCH0240#12-SW

Rev Date 19-Mar-08

Check Valve, Class CL 800 Socketweld, Forged Body to, ASTM A350 Gr.LF2 CL 1, Bolted Cover, Piston/Lift Type with Spring, API Trim 12, Integral or Renewable seats, Full Port, Design to API-602
 NOTES: Bolting and bonnet gasket to be suitable for -50 F (-46 C)
 Pressure/Temperature rating to ASME B16.34
 Assigned Pipe Classes: CAX, CB, EAX, HAX

Check Valve

VCH0260#12

Rev Date 17-Feb-08

Check Valve, Class CL 300 RF to ASME B16.5, Cast Body to, ASTM A352 Gr. LCC, Bolted Cover, Swing Type, API Trim 12 design to API-600, Integral or Welded in Seats
 NOTES: Teflon bonnet gasket; Maximum temperature 350 F
 Pressure/Temperature rating to ASME B16.34
 Bolting and bonnet gasket to be suitable for -50 F (-46 C)
 Assigned Pipe Classes: EAX

Compact Gate Valve

VGA0030#12-SW

Rev Date 17-Feb-08

Compact Gate Valve, Class CL 800 Socketweld, Forged Body to, ASTM A350 Gr.LF2 CL 1, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 12, Integral or Renewable seats, Regular Port, Design to API-602
 NOTES: Bolting & bonnet gasket and packing to be suitable for -50 F (-46 C)
 Assigned Pipe Classes: CAX, CB, EAX, HAX

Compact Gate Valve

VGA0030#12-SW/TH

Rev Date 17-Feb-08

Compact Gate Valve, Class CL800 Socketweld/Threaded, Forged Carbon Steel, ASTM A350 Gr.LF2 CL 1, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 12, Integral or renewable hard faced seats, Regular Port, Design to API-602
 NOTES: Teflon bonnet gasket and packing; Maximum temperature 350 F
 Assigned Pipe Classes: CAX, CB, EAX, HAX

Gate Valve

VGA0305#12

Rev Date 17-Feb-08

Gate Valve, Class CL 300 RF to ASME B16.5, Cast Body to, ASTM A352 Gr. LCC, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 12, Integral or Welded in Seats, Regular Port, Design to API-600
 NOTES: Bolting & bonnet gasket and packing to be suitable for -50 F (-46 C);
 Assigned Pipe Classes: CAX, CB, EAX

Gate Valve

VGA0310#12

Rev Date 17-Feb-08

Gate Valve, Class CL 300 RF to ASME B16.5, Forged Body w/integral flanges, ASTM A350 Gr.LF2 CL 1, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 12, Integral or Renewable seats, Regular Port, Design to API-602
 NOTES: Bolting & bonnet gasket and packing to be suitable for -50 F (-46 C)
 Assigned Pipe Classes: CAX, CB, EAX

Globe Valve

VGL0140#12-SW

Rev Date 17-Feb-08

Globe Valve, Class CL 800 Socketweld, Forged Body to, ASTM A350 Gr.LF2 CL 1, Bolted Bonnet, OS & Y, API Trim 12, Integral or Renewable seats, Design to API-602
 NOTES: Bolting & bonnet gasket and packing to be suitable for -50 F (-46 C)
 Assigned Pipe Classes: CAX, CB, EAX, HAX

Globe Valve**VGL0160#12**

Rev Date 22-Feb-08

Globe Valve, Class CL 300 RF to ASME B16.5, Cast Body to, ASTM A352 Gr. LCC, Bolted Bonnet, OS & Y, API Trim 12 design to API-600, Integral or Welded in Seats

NOTES: Bolting & bonnet gasket and packing to be suitable for -50 F (-46 C)

Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: EAX

Check Valve, Wafer Style**VWC0309**

Rev Date 19-Jun-06

Check Valve, Wafer Style, Class CL 300 RF to fit between ASME B16.5 flanges, Cast Body to, ASTM A352 Gr. LCC, Retainerless Style, Dual 316SS Plates, Inconel X750 Spring(s), Lapped Seats, w/Stellite Hard Faced Overlay, Design to API-594

NOTES: Valve to be suitable for -50 F (-46 C)

Assigned Pipe Classes: EAX



Piping Material Specifications

Rev: **4**

Service Desc: <i>General Hydrocarbons, with Sulphur (<0.2 Wt%)</i>					Temp: <i>800 (427)</i> °F(°C)max	
Materials: <i>Carbon Steel</i>		Corrosion Allow: <i>0.125</i>			Code: <i>ASME B31.3</i>	
Material P&T:	<i>740</i>	PSI @	<i>-20</i>	°F min.	Based on: <i>ASME B16.5 MG 1.1</i>	Branch Conn Tbl: <i>4</i>
	<i>(5102)</i>	Kpa @	<i>(-29)</i>	°C min.		Inspection Class: <i>III</i>
	<i>410</i>	PSI @	<i>800</i>	°F max.		
	<i>(2827)</i>	Kpa @	<i>(427)</i>	°C max.		
P.W.H.T. : <i>NO (**6)</i>					Welding Proc: <i>Refer to Suncor Firebag STD FB-L-5217</i>	

Standard Specifications

Valve Specifications

Pipe

0.75	0.75	ASTM A106 Gr. B, Seamless, Sch. 160
1	2	ASTM A106 Gr. B, Seamless, Sch 80
3	10	ASTM A106 Gr. B, Seamless, STD. Wt.
12	24	ASTM A106 Gr. B, Seamless, (wall thickness calculated per attachment L)
26	48	API 5L GR B PSL-2, DSAW, (wall thickness calculated per attachment L)

Fittings

0.75	0.75	ASTM A105N, Class 6000 SW
1	2	ASTM A105N, Class 3000 SW
3	24	ASTM A234 WPB, (Schedule to match Pipe)
26	48	ASTM A234 Gr. WPB-W (100%RT) (Schedule to match pipe)

Flanges

0.75	2	ASTM A105N, Class 300 RF. SW
3	24	ASTM A105N, Class 300 RF. WN, (Bore to match Pipe)
26	48	ASTM A105N, Class 300 RF. WN B16.47-A (Bore to match pipe)

Check Valve

0.75	2	VCH0231#8-SW	
3	6	VCH0254#8	RF

Check Valve, Wafer Style

8	24	VWC0301	
26	48	VWC0307	RF

Compact Gate Valve

0.75	2	VGA0031#8-SW	
0.75	2	VGA0031#8-SW/TH	

Gate Valve

3	24	VGA0054#8	RF
26	48	VGA0057#8	RF
0.75	2	VGA0315#8	RF

Globe Valve

0.75	2	VGL0131#8-SW	
3	8	VGL0151#8	RF

Special Material Specifications:

<u>Thermowells</u>	NPS 2, Class 300 RF, Flanged, A105N, see Standard Drawing DD100-L-14-1, 2
<u>Bolting</u>	ASTM A193 Gr. B7, c/w A194 Gr. 2H Nuts
<u>Gaskets</u>	Spiral Wound 316SS, Graphite filled, c/w CS Outer Ring, per ASME B16.20

** SPECIAL NOTES **

1. Deleted.
2. Refer to section 4.1.4 of Specification FB-L-5202 for MDMT guidelines.
3. Positive Isolation required per drawings DD100-L-31-1, 2 and 3.
4. Vents and Drains per DD100-L-12-1
5. Pressure Instrument Connections per DD100-L-11-1.
6. PWHT required for thickness per ASME B31.3.



Piping Material Specifications

Valve Details

Check Valve

VCH0231#8-SW

Rev Date 22-Feb-08

Check Valve, Class CL 800 Socketweld, Forged Body to, ASTM A105 N, Bolted Cover, Piston/Lift Type with Spring, API Trim 8, Integral or renewable, Full Port, Design to API-602

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: CA, CAB, CAZ, CBA, CHY, CS, EA, EAB, EDB, ES, HB, HBD

Check Valve

VCH0254#8

Rev Date 17-Feb-08

Check Valve, Class CL 300 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Cover, Swing Type Carbon Steel Disc, API Trim 8 design to API 600, Integral or Welded in Seats, Hard Faced Seat

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: EA, EAB, EDB, ES

Compact Gate Valve

VGA0031#8-SW

Rev Date 04-Apr-08

Compact Gate Valve, Class CL 800 Socketweld, Forged Body to, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 8, Integral or Renewable seats, Regular Port, Design to API-602

Assigned Pipe Classes: CA, CAB, CAZ, CBA, CHY, CS, EA, EAB, EDB, HB, HBD, 662-2, 662-3

Compact Gate Valve

VGA0031#8-SW/TH

Rev Date 04-Apr-08

Compact Gate Valve, Class CL800 Socketweld/Threaded, Forged Carbon Steel, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 8, Integral or renewable hard faced seats, Regular Port, Design to API-602

Assigned Pipe Classes: CA, CAB, CAZ, CBA, CHY, CS, EA, EAB, EDB, HB, HBD, 662-2, 662-3

Gate Valve

VGA0054#8

Rev Date 17-Feb-08

Gate Valve, Class CL 300 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 8, Integral or Welded in Seats, Design to API-600

Assigned Pipe Classes: CA, CAB, CAH, CAZ, CBA, CS, EA, EAB, EDB, ES, 662-3

Gate Valve

VGA0057#8

Rev Date 22-Feb-08

Gate Valve, Class CL 300 RF to ASME B16.47-A, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 8 design to API 600, Integral or Welded in Seats

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: EAB, EDB

Gate Valve

VGA0315#8

Rev Date 17-Feb-08

Gate Valve, Class CL 300 RF to ASME B16.5, Forged Body w/integral flanges, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 8, Integral or Renewable seats, Regular Port, Design to API-602

Assigned Pipe Classes: CA, CAB, CAH, CBA, CS, EA, EAB, EDB, ES

Globe Valve

VGL0131#8-SW

Rev Date 23-Jun-06

Globe Valve, Class CL 800 Socketweld, Forged Body to, ASTM A105 N, Bolted Bonnet, OS & Y, Integral or Renewable seats, Hard Faced Seat to API Trim 8, Design to API-602

Assigned Pipe Classes: CA, CAB, CAZ, CBA, CHY, CS, EA, EAB, EDB, HB, HBD

Globe Valve

VGL0151#8

Rev Date 22-Feb-08

Globe Valve, Class CL 300 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, API Trim 8 design to API 600, Integral or Welded in Seats, Hard Faced Seat

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: EA, EAB, EDB, ES

Check Valve, Wafer Style

VWC0301

Rev Date 19-Jun-06

Check Valve, Wafer Style, Class CL 300 RF to fit between ASME B16.5 flanges, Cast Body to, ASTM A216 Gr WCB, Retainerless Style, Dual Carbon Steel Plates, Inconel X750 Spring(s), Lapped Seats, w/Stellite Hard Faced Overlay, Design to API-594

NOTES: For valves 26" NPS and larger flange connections to comply with ASME B16.47 Series A

Assigned Pipe Classes: EA, EAB, EDB, ES

Check Valve, Wafer Style**VWC0307**

Rev Date 05-Jul-06

Check Valve, Wafer Style, Class CL 300 RF to fit between ASME B16.47-A flanges, Cast Body to, ASTM A216 Gr WCB, Retainerless Style, Dual Carbon Steel Plates, Inconel X750 Spring(s), Lapped Seats, w/Stellite Hard Faced Overlay, Design to API-594
Assigned Pipe Classes: EAB, EDB



Piping Material Specifications

Rev: **4**

Service Desc: <i>Hydrocarbons, very corrosive</i>				Temp: <i>800 (427)</i> °F(°C)max	
Materials: <i>Carbon Steel</i>		Corrosion Allow: <i>0.1875</i>		Code: <i>ASME B31.3</i>	
Material P&T:	<i>740</i>	PSI @	<i>-20</i>	°F min.	Based on: <i>ASME B16.5 MG 1.1</i>
	<i>(5102)</i>	Kpa @	<i>(-29)</i>	°C min.	
	<i>410</i>	PSI @	<i>800</i>	°F max.	Branch Conn Tbl: <i>4</i>
	<i>(2827)</i>	Kpa @	<i>(427)</i>	°C max.	
P.W.H.T. : <i>NO (**5)</i>				Welding Proc: <i>Refer to Suncor Energy STD FB-L-5217</i>	
Inspection Class: <i>III</i>					

Standard Specifications			Valve Specifications		
<u>Pipe</u>			<u>Check Valve</u>		
0.75	0.75	ASTM A106 Gr. B, Seamless, Sch.XXS	0.75	2	VCH0229#12-SW
1	2	ASTM A106 Gr. B, Seamless, Sch. 160	3	6	VCH0254#12 RF
3	8	ASTM A106 Gr. B, Seamless, Sch XS	<u>Check Valve, Wafer Style</u>		
10	24	ASTM A106 Gr. B, Seamless, (wall thickness calculated per attachment L)	8	24	VWC0313 RF
<u>Fittings</u>			<u>Compact Gate Valve</u>		
0.75	0.75	ASTM A105N, Class 9000 SW	0.75	2	VGA0037#12-SW
1	2	ASTM A105N, Class 6000, SW	0.75	2	VGA0037#12-SW/TH
3	24	ASTM A234 WPB, (Schedule to match Pipe)	<u>Gate Valve</u>		
<u>Flanges</u>			3	24	VGA0054#12 RF
0.75	2	ASTM A105N, Class 300 RF. SW	0.75	2	VGA0312#12 RF
3	24	ASTM A105N, Class 300 RF.WN, (Bore to match Pipe)	<u>Globe Valve</u>		
			0.75	2	VGL0137#12-SW
			3	8	VGL0154#12 RF

Special Material Specifications:

<u>Thermowells</u>	NPS 2, Class 300 RF, Flanged, A105N, see Standard Drawing DD100-L-14-1, 2
<u>Bolting</u>	ASTM A193 Gr. B7, c/w A194 Gr. 2H Nuts
<u>Gaskets</u>	Spiral Wound 316SS, Graphite filled, c/w CS Outer Ring, per ASME B16.20

** SPECIAL NOTES **

1. Deleted.
2. Positive Isolation required per drawings DD100-L-31-1, 2 and 3.
3. Vents and Drains per DD100-L-12-1.
4. Pressure Instrument Connections per DD100-L-11-1.
5. PWHT required for thickness per ASME B31.3.



Piping Material Specifications

Valve Details

Check Valve

VCH0229#12-SW

Rev Date 22-Feb-08

Check Valve, Class CL 800 Socketweld, Forged Body to, ASTM A105 N, Welded Cover, Piston/Lift Type with Spring, API Trim 12, Integral or renewable, Hard Faced Seat, Full Port, Design to API-602

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: EDC

Check Valve

VCH0254#12

Rev Date 17-Feb-08

Check Valve, Class CL 300 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Cover, Swing Type, API Trim 12 design to API-600, Integral or Welded in Seats, Hard Faced Seat

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: EDC

Compact Gate Valve

VGA0037#12-SW

Rev Date 17-Feb-08

Compact Gate Valve, Class CL 800 Socketweld, Forged Body to, ASTM A105 N, Welded Bonnet, OS & Y, Solid Wedge, API Trim 12, Integral or Renewable seats, Regular Port, Design to API-602

Assigned Pipe Classes: EDC

Compact Gate Valve

VGA0037#12-SW/TH

Rev Date 17-Feb-08

Compact Gate Valve, Class CL 800 Socketweld/Threaded, Forged Body to, ASTM A105 N, Welded Bonnet, OS & Y, Solid Wedge, API Trim 12, Integral or Renewable seats, Regular Port, Design to API-602

Assigned Pipe Classes: EDC

Gate Valve

VGA0054#12

Rev Date 10-Jun-08

Gate Valve, Class CL300 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 12, Integral or Welded in Seats, Design to API-600

Assigned Pipe Classes: CAF, CBF, EDC

Gate Valve

VGA0312#12

Rev Date 17-Feb-08

Gate Valve, Class CL 300 RF to ASME B16.5, Forged Body w/integral flanges, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 12, Integral or Renewable seats, Regular Port, Design to API-602

Assigned Pipe Classes: CAF, CBF, EDC

Globe Valve

VGL0137#12-SW

Rev Date 19-Jun-06

Globe Valve, Class CL 800 Socketweld, Forged Body to, ASTM A105 N, Welded Bonnet, OS & Y, Integral or renewable, Hard Faced Seat to API Trim 12, Design to API-602

Assigned Pipe Classes: EDC

Globe Valve

VGL0154#12

Rev Date 22-Feb-08

Globe Valve, Class CL 300 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, API Trim 12 design to API-600, Integral, Welded in or Renewable Seats, Hard Faced Seat

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: EDC

Check Valve, Wafer Style

VWC0313

Rev Date 19-Jun-06

Check Valve, Wafer Style, Class CL 300 RF to fit between ASME B16.5 flanges, Cast Body to, ASTM A216 Gr WCB, Retainerless Style, Dual 316SS Plates, Inconel X750 Spring(s), Lapped Seats, w/Stellite Hard Faced Overlay, Design to API-594

Assigned Pipe Classes: EDC



Piping Material Specifications

Rev: **4a**

Service Desc: General Hydrocarbons with H2S **3,4	Temp: 800 (427) °F(°C)max
Materials: Carbon Steel **3, 20, 31	Corrosion Allow: 0.125
Code: ASME B31.3 / CSA Z662	
Material P&T: 740 PSI @ -20 °F min.	Based on: ASME B16.5 MG 1.1
Note 9 (5102) Kpa @ (-29) °C min.	Branch Conn Tbl: 4
410 PSI @ 800 °F max.	Inspection Class: III **21
(2827) Kpa @ (427) °C max.	
P.W.H.T.: NO (**3, 4, 5, 27)	Welding Proc: Refer to Suncor Firebag STD FB-L-5217 **29

Standard Specifications

<u>Pipe</u>		
0.75	0.75	ASTM A106 Gr. B, Seamless, Sch. 160 **28
1	2	ASTM A106 Gr. B, Seamless, Sch 80 **28
3	12	ASTM A106 Gr. B, Seamless, Sch. XS. **28
14	24	ASTM A106 Gr. B, Seamless, (wall thickness calculated per attachment L) **28
26	48	ASTM A672 Cl 22 Gr. C60, (Wall thickness calculated per Attachment L) **28
<u>Fittings</u>		
0.75	0.75	ASTM A105N, Class 6000 SW
1	2	ASTM A105N, Class 3000 SW
3	24	ASTM A234 WPB, (Schedule to match Pipe)
26	48	ASTM A234 Gr. WPB-W (100%RT) (Schedule to match pipe)
<u>Flanges</u>		
0.75	2	ASTM A105N, Class 300 RF. SW
3	24	ASTM A105N, Class 300 RF.WN, (Bore to match Pipe)
26	48	ASTM A105N, Class 300 RF.WN B16.47-A (Bore to match pipe)

Valve Specifications

<u>Check Valve</u>			
0.75	2	VCH0231#12-SW-N3	
3	6	VCH0254#12-N3	RF
<u>Check Valve, Wafer Style</u>			
8	24	VWC0304-N3	RF
<u>Compact Gate Valve</u>			
0.75	2	VGA0037#12-SW/TH-N3	
0.75	2	VGA0037#12-SW-N3	
<u>Gate Valve</u>			
3	24	VGA0054#12-N3	RF
30	48	VGA0301#12-N3	RF
<u>Globe Valve</u>			
0.75	2	VGL0137#12-SW-N3	
3	8	VGL0154#12-N3	RF

Special Material Specifications:

Thermowells	NPS 2, Class 300 RF, Flanged, A105N, see Standard Drawing DD100-L-14-1, 2
Bolting	ASTM A193 Gr. B7M, c/w A194 Gr. 2HM Nuts
Gaskets	Spiral Wound 316SS, Graphite filled, c/w CS Outer Ring, per ASME B16.20

** SPECIAL NOTES **

For ASME B31.3 design, Notes 1.-9. shall apply:

1. Refer to section 4.1.4 of Specification FB-L-5202 for MDMT guidelines.
2. Deleted.
3. All materials for use in 'Oil and Gas Production Environments' shall comply with NACE MR0175 latest revision, see Appendix B1, "Sour Service Supplement" for further information. All materials for use in 'Petroleum Refining Environments' shall comply with NACE MR0103 latest revision, see Appendix B. All piping systems using this pipe class shall then be identified with the appropriate NACE reference, approved by the Owners Engineer, and noted in the project documentation. Material selection shall be carefully reviewed for service and design conditions with respect to the appropriate NACE documents. For material requirements not included in this pipe class, including valves, alternate pipe classes with more suitable materials shall be considered.
4. Hardness control requirements of NACE SP0472 shall be met for all welds in this class as referenced in Suncor Firebag STD FB-L-5217.
5. PWHT required for thickness per ASME B31.3.
6. Positive Isolation required per drawing DD100-L-31-1, 2 and 3.
7. Vents and Drains per DD100-L-12-1.
8. Pressure Instrument Connections per DD100-L-11-1.
9. The maximum temperature for this pipe class is based on general carbon steel material limitations. For sour service systems identified under NACE MR0175 'Oil and Gas Production Environments', the maximum design temperature shall be restricted to the material and service requirements defined under NACE MR0175 / ISO 15156 latest edition.

For CSA Z662-07 design, Notes 20.-31. shall apply in addition to Note 9.:

20. All non CSA materials shall comply with the requirements of the sour service clause referenced in the applicable CSA Z245 standards: CSA Z245.1 Steel Pipe, CSA Z245.11 Steel Fittings, CSA Z245.12 Steel Flanges, CSA Z245.15 Steel Valves. Where no applicable CSA standard exists, the material requirements of NACE MR0175 / ISO 15156 (latest edition) apply. Note, all valves in this line class shall conform to NACE MR0175 / ISO 15156, latest edition. Sour service requirements shall be in accordance with Firebag Technical Note FB-PE6-TN008.
21. Inspection and Non-Destructive examination testing shall be carried out per CSA Z662-07. (1) All welds meeting the definition per CSA Z662-07 Clause 16.6.8, shall have 100% RT/UT for all butt weld joints and 100% MT/PT for all socket weld joints. For all welds excluded from the definition per Clause 16.6.8, there shall be a minimum 15% RT/UT for all butt weld joints and 15% MT/PT for all socket weld joints per CSA Z662-07, Clause 7.10.3 & 7.10.4. (2) Visual examination shall be carried out on 100% of the weld joint and components. (3) 100% MT/PT shall be carried out on all branch connection welds.
22. Use socket for 2" NPS and below for branch connections to headers. Use weldolet for 3" NPS and above branch connections to headers.
23. For Vents, Drains and Instrument Connections use ASME B31.3 materials per Piping Material Specification Class EDE.
24. Shop and field hardness control by NACE SP0472 as referred in Suncor Firebag STD FB-L-5217. Weld hardness shall meet the requirements of CSA Z662-07 Clause 16.6.4.
25. Where pipe bends are required, they shall be specified by tagged piping specialty item and approved by owner's Engineer.
26. Positive Isolation required per drawings DD100-31-1, 2 and 3.
27. Stress Relieving (PWHT) required for thickness per CSA Z662-07, Clause 7.9.16.
28. Pipe shall be used in Category I applications only, as defined in CSA Z662-07, Clause 5.2.2.
29. Welding shall meet the requirements of CSA Z662-07, Clause 7.
30. Valves with suffix 'N3' may be substituted with suffix 'N1' for use in design under CSA Z662-07.
31. Material selection shall be carefully reviewed for service and design conditions under NACE MR0175 / ISO 15156 latest revision. For material requirements not included in this pipe class, including valves, alternate pipe classes with more suitable materials shall be considered.



Piping Material Specifications

Valve Details

Check Valve

VCH0231#12-SW-N3

Rev Date 16-Mar-10

SUFFIX: **-N3 Valve to conform to NACE MR0175 and NACE MR0103 latest revision**

Check Valve, Class CL 800 Socketweld, Forged Body to, ASTM A105 N, Bolted Cover, Piston/Lift Type with Spring, API Trim 12, Integral or Renewable seats, Hard Faced Seat, Full Port, Design to API-602

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: CLC, EDE, ELC

Check Valve

VCH0254#12-N3

Rev Date 16-Mar-10

SUFFIX: **-N3 Valve to conform to NACE MR0175 and NACE MR0103 latest revision**

Check Valve, Class CL 300 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Cover, Swing Type, API Trim 12 design to API-600, Integral or Welded in Seats, Hard Faced Seat

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: EDE, ELC

Compact Gate Valve

VGA0037#12-SW/TH-N3

Rev Date 16-Mar-10

SUFFIX: **-N3 Valve to conform to NACE MR0175 and NACE MR0103 latest revision**

Compact Gate Valve, Class CL 800 Socketweld/Threaded, Forged Body to, ASTM A105 N, Welded Bonnet, OS & Y, Solid Wedge, API Trim 12, Integral or Renewable seats, Regular Port, Design to API-602

Assigned Pipe Classes: EDE, ELC

Compact Gate Valve

VGA0037#12-SW-N3

Rev Date 16-Mar-10

SUFFIX: **-N3 Valve to conform to NACE MR0175 and NACE MR0103 latest revision**

Compact Gate Valve, Class CL 800 Socketweld/Threaded, Forged Body to, ASTM A105 N, Welded Bonnet, OS & Y, Solid Wedge, API Trim 12, Integral or Renewable seats, Regular Port, Design to API-602

Assigned Pipe Classes: EDE, ELC

Gate Valve

VGA0054#12-N3

Rev Date 16-Mar-10

SUFFIX: **-N3 Valve to conform to NACE MR0175 and NACE MR0103 latest revision**

Gate Valve, Class CL 300 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 12, Integral or Welded in Seats, Design to API-600

NOTES: For valves larger than 24" NPS flanges shall be ASME B16.47 Series A

Assigned Pipe Classes: CLC, EDE, ELC

Gate Valve

VGA0301#12-N3

Rev Date 16-Mar-10

SUFFIX: **-N3 Valve to conform to NACE MR0175 and NACE MR0103 latest revision**

Gate Valve, Class CL 300 RF to ASME B16.47-A, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, Flexible Wedge, API Trim 12 design to API-600, Integral or Welded in Seats, Design to ASME B16.34

Assigned Pipe Classes: EDE, ELC

Globe Valve

VGL0137#12-SW-N3

Rev Date 16-Mar-10

SUFFIX: **-N3 Valve to conform to NACE MR0175 and NACE MR0103 latest revision**

Globe Valve, Class CL 800 Socketweld, Forged Body to, ASTM A105 N, Welded Bonnet, OS & Y, Integral or renewable, Hard Faced Seat to API Trim 12, Design to API-602

Assigned Pipe Classes: EDE, ELC

Globe Valve

VGL0154#12-N3

Rev Date 16-Mar-10

SUFFIX: **-N3 Valve to conform to NACE MR0175 and NACE MR0103 latest revision**

Globe Valve, Class CL 300 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, API Trim 12 design to API-600, Integral or Welded in Seats, Hard Faced Seat

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: EDE, ELC

Check Valve, Wafer Style

VWC0304-N3

Rev Date 16-Mar-10

SUFFIX: **-N3 Valve to conform to NACE MR0175 and NACE MR0103 latest revision**

Check Valve, Wafer Style, Class CL 300 RF to fit between ASME B16.5 flanges, Cast Body to, ASTM A216 Gr WCB, Retainerless Style, Dual 316SS Plates, Inconel X750 Spring(s), Lapped Seats, w/Stellite Hard Faced Overlay, Design to API-594

Assigned Pipe Classes: EDE, ELC



Piping Material Specifications

Rev: **4**

Service Desc: <i>CO2 (Wet)</i>				Temp: <i>350 (177)</i> °F(°C)max	
Materials: <i>Carbon Steel (Galvanized)</i>			Corrosion Allow: <i>0</i>		Code: <i>ASME B31.3</i>
Material P&T:	<i>740</i>	PSI @	<i>-20</i>	°F min.	Based on: <i>ASME B16.5 MG 1.1</i> Branch Conn Tbl: <i>I</i> Inspection Class: <i>III</i>
	<i>(5102)</i>	Kpa @	<i>(-29)</i>	°C min.	
	<i>645</i>	PSI @	<i>350</i>	°F max.	
	<i>(4447)</i>	Kpa @	<i>(177)</i>	°C max.	
P.W.H.T. : <i>NO (**6)</i>			Welding Proc: <i>Refer to Suncor Firebag STD FB-L-5217</i>		

Standard Specifications			Valve Specifications		
<u>Pipe</u>			<u>Compact Gate Valve</u>		
0.75	2	ASTM A106, Gr. B, Sch. 160, Galvanized **1	0.75	1	VGA0026#10-TH
3	6	ASTM A106 Gr. B, Seamless, STD. Wt. **2			
<u>Fittings</u>					
0.75	2	ASTM A105N, Class 3000, TH. Galvanized			
3	6	ASTM A234 WPB, STD. Wt. **2			
<u>Flanges</u>					
0.75	2	ASTM A105N, Class 300 RF.TH., Galvanized			
3	6	ASTM A105N, Class 300 RF.WN, (Bore to match Pipe)			

Special Material Specifications:

<u>Bolting</u>	ASTM A193 Gr. B7, c/w A194 Gr. 2H Nuts
<u>Gaskets</u>	Spiral Wound 316SS, Graphite filled, c/w CS Outer Ring, per ASME B16.20

** SPECIAL NOTES **

1. ASTM A53 Type F, galvanized is also acceptable.
2. To be Hot Dipped Galvanized after welding. Both internal and external surfaces are to be prepared to SSPC SP6 prior to galvanizing.
3. Deleted.
4. Vents and Drains per DD100-L-12-1.
5. Pressure Instrument Connections per DD100-L-11-1.
6. PWHT required for thickness per ASME B31.3.



Piping Material Specifications

Valve Details

Compact Gate Valve

VGA0026#10-TH

Rev Date 17-Feb-08

Compact Gate Valve, Class CL 800 Threaded, Forged Body to, ASTM A182 F316/316L Dual Cert., Bolted Bonnet, OS & Y, Solid Wedge, API Trim 10, Integral or Renewable seats, Regular Port, Design to API-602
Assigned Pipe Classes: ADA, AEX, EDX



Piping Material Specifications

Rev: **4a**

Service Desc: Sour Water and Hydrocarbons with H2S **1				Temp: 800 (427) °F(°C)max	
Materials: Carbon Steel **1, 20, 31		Corrosion Allow: 0.125		Code: ASME B31.3 / CSA Z662	
Material P&T: 740	PSI @	-20	°F min.	Based on: ASME B16.5 MG 1.1	Branch Conn Tbl: 4
Note 9 (5102)	Kpa @	(-29)	°C min.		Inspection Class: III **21
410	PSI @	800	°F max.		
(2827)	Kpa @	(427)	°C max.		
P.W.H.T.: NO (**1, 2, 5, 27)				Welding Proc: Refer to Suncor Firebag STD FB-L-5217 **29	

Standard Specifications				Valve Specifications			
Pipe				Butterfly Valve, Double Flanged			
0.75	0.75	ASTM A106 Gr. B, Seamless, Sch. 160	**28	3	24	VBU3009-N3	RF
1	2	ASTM A106 Gr. B, Seamless, Sch 80	**28	Check Valve			
3	12	ASTM A106 Gr. B, Seamless, XS	**28	0.75	2	VCH0231#12-SW-N3	
14	24	ASTM A106 Gr. B, Seamless, (wall thickness calculated per attachment L)	**28	3	6	VCH0254#12-N3	RF
26	48	ASTM A672 Cl 22 Gr. C60, (Wall thickness calculated per Attachment L)	**28	Check Valve, Wafer Style			
Fittings				8	24	VWC0304-N3	RF
0.75	0.75	ASTM A105N, Class 6000 SW		Compact Gate Valve			
1	2	ASTM A105N, Class 3000 SW		0.75	2	VGA0037#12-SW/TH-N3	
3	24	ASTM A234 WPB, (Schedule to match Pipe)		0.75	2	VGA0037#12-SW-N3	
26	48	ASTM A234 Gr. WPB-W (100%RT) (Schedule to match pipe)		Gate Valve			
Flanges				3	24	VGA0054#12-N3	RF
0.75	2	ASTM A105N, Class 300 RF. SW		30		VGA0301#12-N3	RF
3	24	ASTM A105N, Class 300 RF. WN, (Bore to match Pipe)		0.75	2	VGA0316#12-N3	RF
26	48	ASTM A105N, Class 300 RF. WN B16.47-A (Bore to match pipe)		Globe Valve			
				0.75	2	VGL0137#12-SW-N3	
				3	8	VGL0154#12-N3	RF

Special Material Specifications:

Thermowells	NPS 2, Class 300 RF, Flanged, A105N, see Standard Drawing DD100-L-14-1, 2
Bolting	ASTM A193 Gr. B7M, c/w A194 Gr. 2HM Nuts
Gaskets	Spiral Wound 316SS, Graphite filled, c/w CS Outer Ring, per ASME B16.20

** SPECIAL NOTES **

For ASME B31.3 design, Notes 1.-9. shall apply:

- All materials for use in 'Oil and Gas Production Environments' shall comply with NACE MR0175 latest revision, see Appendix B1, "Sour Service Supplement" for further information. All materials for use in 'Petroleum Refining Environments' shall comply with NACE MR0103 latest revision, see Appendix B. All piping systems using this pipe class shall then be identified with the appropriate NACE reference, approved by the Owners Engineer, and noted in the project documentation. Material selection shall be carefully reviewed for service and design conditions with respect to the appropriate NACE documents. For material requirements not included in this pipe class, including valves, alternate pipe classes with more suitable materials shall be considered.
- Hardness control requirements of NACE SP0472 shall be met for all welds in this class as referenced in Suncor Firebag FB-L-5217.
- Refer to section 4.1.4 of Specification FB-L-5202 for MDMT guidelines.
- Deleted.
- PWHT required for thickness per ASME B31.3.
- Positive Isolation required per drawing DD100-L-31-1, 2 and 3.
- Vents and Drains per DD100-L-12-1.
- Pressure Instrument Connections per DD100-L-11-1.
- The maximum temperature for this pipe class is based on general carbon steel material limitations. For sour service systems identified under NACE MR0175 'Oil and Gas Production Environments', the maximum design temperature shall be restricted to the material and service requirements defined under NACE MR0175 / ISO 15156 latest edition.

For CSA Z662-07 design, Notes 20.-31. shall apply in addition to Note 9.:

20. All non CSA materials shall comply with the requirements of the sour service clause referenced in the applicable CSA Z245 standards: CSA Z245.1 Steel Pipe, CSA Z245.11 Steel Fittings, CSA Z245.12 Steel Flanges, CSA Z245.15 Steel Valves. Where no applicable CSA standard exists, the material requirements of NACE MR0175 / ISO 15156 (latest edition) apply. Note, all valves in this line class shall conform to NACE MR0175 / ISO 15156, latest edition. Sour service requirements shall be in accordance with Firebag Technical Note FB-PE6-TN008.
21. Inspection and Non-Destructive examination testing shall be carried out per CSA Z662-07. (1) All welds meeting the definition per CSA Z662-07 Clause 16.6.8, shall have 100% RT/UT for all butt weld joints and 100% MT/PT for all socket weld joints. For all welds excluded from the definition per Clause 16.6.8, there shall be a minimum 15% RT/UT for all butt weld joints and 15% MT/PT for all socket weld joints per CSA Z662-07, Clause 7.10.3 & 7.10.4. (2) Visual examination shall be carried out on 100% of the weld joint and components. (3) 100% MT/PT shall be carried out on all branch connection welds.
22. Use sockolet for 2" NPS and below for branch connections to headers. Use weldolets for 3" NPS and above branch connections to headers.
23. For Vents, Drains and Instrument Connections use ASME B31.3 materials per Piping Material Specification Class ELC.
24. Shop and field hardness control by NACE SP0472 as referred in Suncor Firebag STD FB-L-5217. Weld hardness shall meet the requirements of CSA Z662-07 Clause 16.6.4.
25. Where pipe bends are required, they shall be specified by tagged piping specialty item and approved by owner's Engineer.
26. Positive Isolation required per drawings DD100-31-1, 2 and 3.
27. Stress Relieving (PWHT) required for thickness per CSA Z662-07, Clause 7.9.16.
28. Pipe shall be used in Category I applications only, as defined in CSA Z662-07, Clause 5.2.2.
29. Welding shall meet the requirements of CSA Z662-07, Clause 7.
30. Valves with suffix 'N3' may be substituted with suffix 'N1' for use in design under CSA Z662-07.
31. Material selection shall be carefully reviewed for service and design conditions under NACE MR0175 / ISO 15156 latest revision. For material requirements not included in this pipe class, including valves, alternate pipe classes with more suitable materials shall be considered.



Piping Material Specifications

Valve Details

<u>Butterfly Valve, Double Flange</u>	SUFFIX: -N3 Valve to conform to NACE MR0175 and NACE MR0103 latest revision
VBU3009-N3 Rev Date 16-Mar-10	Butterfly Valve, Double Flanged, Class CL 300 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Stainless Steel Disk and Shaft, Triple Offset, bi-directional shut-off, Stellite Seat, Design to API-609 NOTES: Testing to API-598; Additional backseat test zero leakage, bi-directional, dry instrument air medium, duration 5 minutes, 1.1 design pressure, 10 cycles Assigned Pipe Classes: ELC
<u>Check Valve</u>	SUFFIX: -N3 Valve to conform to NACE MR0175 and NACE MR0103 latest revision
VCH0231#12-SW-N3 Rev Date 16-Mar-10	Check Valve, Class CL 800 Socketweld, Forged Body to, ASTM A105 N, Bolted Cover, Piston/Lift Type with Spring, API Trim 12, Integral or Renewable seats, Hard Faced Seat, Full Port, Design to API-602 NOTES: Pressure/Temperature rating to ASME B16.34 Assigned Pipe Classes: CLC, EDE, ELC
<u>Check Valve</u>	SUFFIX: -N3 Valve to conform to NACE MR0175 and NACE MR0103 latest revision
VCH0254#12-N3 Rev Date 16-Mar-10	Check Valve, Class CL 300 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Cover, Swing Type, API Trim 12 design to API-600, Integral or Welded in Seats, Hard Faced Seat NOTES: Pressure/Temperature rating to ASME B16.34 Assigned Pipe Classes: EDE, ELC
<u>Compact Gate Valve</u>	SUFFIX: -N3 Valve to conform to NACE MR0175 and NACE MR0103 latest revision
VGA0037#12-SW/TH-N3 Rev Date 16-Mar-10	Compact Gate Valve, Class CL 800 Socketweld/Threaded, Forged Body to, ASTM A105 N, Welded Bonnet, OS & Y, Solid Wedge, API Trim 12, Integral or Renewable seats, Regular Port, Design to API-602 Assigned Pipe Classes: EDE, ELC
<u>Compact Gate Valve</u>	SUFFIX: -N3 Valve to conform to NACE MR0175 and NACE MR0103 latest revision
VGA0037#12-SW-N3 Rev Date 16-Mar-10	Compact Gate Valve, Class CL 800 Socketweld/Threaded, Forged Body to, ASTM A105 N, Welded Bonnet, OS & Y, Solid Wedge, API Trim 12, Integral or Renewable seats, Regular Port, Design to API-602 Assigned Pipe Classes: EDE, ELC
<u>Gate Valve</u>	SUFFIX: -N3 Valve to conform to NACE MR0175 and NACE MR0103 latest revision
VGA0054#12-N3 Rev Date 16-Mar-10	Gate Valve, Class CL 300 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 12, Integral or Welded in Seats, Design to API-600 NOTES: For valves larger than 24" NPS flanges shall be ASME B16.47 Series A Assigned Pipe Classes: CLC, EDE, ELC
<u>Gate Valve</u>	SUFFIX: -N3 Valve to conform to NACE MR0175 and NACE MR0103 latest revision
VGA0301#12-N3 Rev Date 16-Mar-10	Gate Valve, Class CL 300 RF to ASME B16.47-A, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, Flexible Wedge, API Trim 12 design to API-600, Integral or Welded in Seats, Design to ASME B16.34 Assigned Pipe Classes: EDE, ELC
<u>Gate Valve</u>	SUFFIX: -N3 Valve to conform to NACE MR0175 and NACE MR0103 latest revision
VGA0316#12-N3 Rev Date 16-Mar-10	Gate Valve, Class CL 300 RF to ASME B16.5, Forged Body w/integral flanges, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 12, Integral or Renewable seats, Regular Port, Design to API-602 Assigned Pipe Classes: ELC
<u>Globe Valve</u>	SUFFIX: -N3 Valve to conform to NACE MR0175 and NACE MR0103 latest revision
VGL0137#12-SW-N3 Rev Date 16-Mar-10	Globe Valve, Class CL 800 Socketweld, Forged Body to, ASTM A105 N, Welded Bonnet, OS & Y, Integral or renewable, Hard Faced Seat to API Trim 12, Design to API-602 Assigned Pipe Classes: EDE, ELC
<u>Globe Valve</u>	SUFFIX: -N3 Valve to conform to NACE MR0175 and NACE MR0103 latest revision
VGL0154#12-N3 Rev Date 16-Mar-10	Globe Valve, Class CL 300 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, API Trim 12 design to API-600, Integral or Welded in Seats, Hard Faced Seat NOTES: Pressure/Temperature rating to ASME B16.34 Assigned Pipe Classes: EDE, ELC
<u>Check Valve, Wafer Style</u>	SUFFIX: -N3 Valve to conform to NACE MR0175 and NACE MR0103 latest revision
VWC0304-N3 Rev Date 16-Mar-10	Check Valve, Wafer Style, Class CL 300 RF to fit between ASME B16.5 flanges, Cast Body to, ASTM A216 Gr WCB, Retainerless Style, Dual 316SS Plates, Inconel X750 Spring(s), Lapped Seats, w/Stellite Hard Faced Overlay, Design to API-594 Assigned Pipe Classes: EDE, ELC



Piping Material Specifications

Rev: **4**

Service Desc: <i>Steam, Condensate, and Boiler Feed Water</i>				Temp: <i>800 (427)</i> °F(°C)max	
Materials: <i>Carbon Steel</i>		Corrosion Allow: <i>0.0625</i>		Code: <i>ASME B31.3</i>	
Material P&T:	<i>740</i>	PSI @	<i>-20</i>	°F min.	Based on: <i>ASME B16.5 MG 1.1</i> Branch Conn Tbl: <i>4</i> Inspection Class: <i>III</i>
	<i>(5102)</i>	Kpa @	<i>(-29)</i>	°C min.	
	<i>410</i>	PSI @	<i>800</i>	°F max.	
	<i>(2827)</i>	Kpa @	<i>(427)</i>	°C max.	
P.W.H.T. : <i>NO (**11)</i>				Welding Proc: <i>Refer to Suncor Firebag STD FB-L-5217</i>	

Standard Specifications			Valve Specifications		
<u>Pipe</u>			<u>Check Valve</u>		
0.75	2	ASTM A106 Gr. B, Seamless, Sch 80	0.75	2	VCH0231#8-SW
3	8	ASTM A106 Gr. B, Seamless, STD. Wt.	3	6	VCH0254#8 RF
10	24	ASTM A106 Gr. B, Seamless, (wall thickness calculated per attachment L)	<u>Check Valve, Wafer Style</u>		
26	42	API 5L GR B PSL-2, DSAW, (wall thickness calculated per attachment L)	8	24	VWC0301 RF
<u>Fittings</u>			<u>Compact Gate Valve</u>		
0.75	2	ASTM A105N, Class 3000 SW	0.75	2	VGA0037#8-SW
3	24	ASTM A234 WPB, (Schedule to match Pipe)	0.75	2	VGA0037#8-SW/TH
26	42	ASTM A234 Gr.WPB-W (100%RT) (Schedule to match pipe)	<u>Gate Valve</u>		
<u>Flanges</u>			3	24	VGA0054#8 RF
0.75	2	ASTM A105N, Class 300 RF. SW	0.75	2	VGA0315#8 RF
3	24	ASTM A105N, Class 300 RF.WN, (Bore to match Pipe)	26	42	VGA5144#8 RF
26	42	ASTM A105N, Class 300 RF.WN B16.47-A (Bore to match pipe)	<u>Globe Valve</u>		
			0.75	2	VGL0137#8-SW
			3	8	VGL0151#8 RF
			<u>Stop Check Valve, Angle Pattern</u>		
			3	12	VSC0852#5-C RF **3
			<u>Stop Check Valve, Straight Pattern</u>		
			3	12	VSC0853#5-C-STD BW, Sch STD **3

Special Material Specifications:

<u>Thermowells</u>	NPS 2, Class 300 RF, Flanged, A105N, see Standard Drawing DD100-L-14-1, 2
<u>Bolting</u>	ASTM A193 Gr. B7, c/w A194 Gr. 2H Nuts
<u>Gaskets</u>	Spiral Wound 316SS, Graphite filled, c/w CS Outer Ring, per ASME B16.20

** SPECIAL NOTES **

- Deleted.
- Deleted.
- Blow-off and Stop Check valves shall be used as specified by the Owner (Energy Services).
- Wall thickness readings shall be made per Work Practice, PMW0018A, "Baseline Ultrasonic Survey".
- Refer to section 4.1.4 of Specification FB-L-5202 for MDMT guidelines (ASME B31.3 only).
- 1-1/2 NPS Thermowells shall be specific to Energy Services.
- For Non-Boiler external piping. ASME B31.3 is to be used. For B31.1 piping use ESA.
- Deleted.
- Vents and Drains per DD100-L-12-1.
- Pressure Instrument Connections per DD100-L-11-1.
- PWHT required for thickness per ASME B31.3.



Piping Material Specifications

Valve Details

Check Valve

VCH0231#8-SW

Rev Date 22-Feb-08

Check Valve, Class CL 800 Socketweld, Forged Body to, ASTM A105 N, Bolted Cover, Piston/Lift Type with Spring, API Trim 8, Integral or renewable, Full Port, Design to API-602

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: CA, CAB, CAZ, CBA, CHY, CS, EA, EAB, EDB, ES, HB, HBD

Check Valve

VCH0254#8

Rev Date 17-Feb-08

Check Valve, Class CL 300 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Cover, Swing Type Carbon Steel Disc, API Trim 8 design to API 600, Integral or Welded in Seats, Hard Faced Seat

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: EA, EAB, EDB, ES

Compact Gate Valve

VGA0037#8-SW

Rev Date 17-Feb-08

Compact Gate Valve, Class CL800 Socketweld, Forged Carbon Steel, ASTM A105, Welded Bonnet, OS & Y, Solid Wedge, API Trim 8, Welded in Hard Faced Seat, Regular Port, Design to API-602

Assigned Pipe Classes: CLF, ES

Compact Gate Valve

VGA0037#8-SW/TH

Rev Date 17-Feb-08

Compact Gate Valve, Class CL800 Socketweld/Threaded, Forged Carbon Steel, ASTM A105, Welded Bonnet, OS & Y, Solid Wedge, API Trim 8, Welded in Hard Faced Seat, Regular Port, Design to API-602

Assigned Pipe Classes: CLF, ES

Gate Valve

VGA0054#8

Rev Date 17-Feb-08

Gate Valve, Class CL 300 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 8, Integral or Welded in Seats, Design to API-600

Assigned Pipe Classes: CA, CAB, CAH, CAZ, CBA, CS, EA, EAB, EDB, ES, 662-3

Gate Valve

VGA0315#8

Rev Date 17-Feb-08

Gate Valve, Class CL 300 RF to ASME B16.5, Forged Body w/integral flanges, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 8, Integral or Renewable seats, Regular Port, Design to API-602

Assigned Pipe Classes: CA, CAB, CAH, CBA, CS, EA, EAB, EDB, ES

Gate Valve

VGA5144#8

Rev Date 22-Feb-08

Gate Valve, Class CL 300 RF to ASME B16.47-A, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, Flexible Wedge, API Trim 8 design to API 600, Integral or Welded in Seats

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: ES

Globe Valve

VGL0137#8-SW

Rev Date 19-Jun-06

Globe Valve, Class CL 800 Socketweld, Forged Body to, ASTM A105 N, Welded Bonnet, OS & Y, Integral or Renewable seats, Hard Faced Seat to API Trim 8, Design to API-602

Assigned Pipe Classes: ES

Globe Valve

VGL0151#8

Rev Date 22-Feb-08

Globe Valve, Class CL 300 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, API Trim 8 design to API 600, Integral or Welded in Seats, Hard Faced Seat

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: EA, EAB, EDB, ES

Stop Check Valve, Angle Patte SUFFIX: -C ASME SA Material

VSC0852#5-C

Rev Date 19-Mar-08

Stop Check Valve, Angle Pattern, Class CL 300 RF to ASME B16.5, Cast Body to, ASME SA216 Gr WCB, Bolted Bonnet, Plug Type Body Guided Disc, API Trim 5 design to API-600, Integral or Welded in Seats, Hard Faced Seat & Disc, Design to ASME B16.34

Assigned Pipe Classes: CSA, ES, ESA

Stop Check Valve, Straight Pat SUFFIX: -C ASME SA Material

VSC0853#5-C-STD

Rev Date 01-Apr-08

Stop Check Valve, Straight Pattern, Class CL 300 Buttweld Ends Sch STD, Cast Body to, ASME SA216 Gr WCB, Bolted Bonnet, API Trim 5 design to API-600, Integral or Welded in Seats, Hard Faced Seat & Disc, Design to ASME B16.34

Assigned Pipe Classes: ES

Check Valve, Wafer Style**VWC0301**

Rev Date 19-Jun-06

Check Valve, Wafer Style, Class CL 300 RF to fit between ASME B16.5 flanges, Cast Body to, ASTM A216 Gr WCB, Retainerless Style, Dual Carbon Steel Plates, Inconel X750 Spring(s), Lapped Seats, w/Stellite Hard Faced Overlay, Design to API-594

NOTES: For valves 26" NPS and larger flange connections to comply with ASME B16.47 Series A

Assigned Pipe Classes: EA, EAB, EDB, ES



Piping Material Specifications

Rev: **4**

Service Desc:	Steam, Condensate, and BFW, Blowdown Drains & Boiler Fuel ASME I BEP			Temp:	800 (427)	°F(°C)max
Materials:	Carbon Steel (SA material)			Corrosion Allow:	0.0625	Code: B31.1 (BEP)
Material P&T:	740	PSI @	-20	°F min.	Based on:	ASME B16.5 MG 1.1
	(5102)	Kpa @	(-29)	°C min.	Branch Conn Tbl:	4
	410	PSI @	800	°F max.	Inspection Class:	I
	(2827)	Kpa @	(427)	°C max.		
P.W.H.T. :	NO (**10)			Welding Proc:	Refer to Suncor Firebag STD FB-L-5217	

Standard Specifications			Valve Specifications		
<u>Pipe</u>			<u>Ball Valve</u>		
0.75	2	ASME SA106 Gr. B, Seamless, Sch 80	3	8	VBA0301-C RF **1,5
3	8	ASME SA106 Gr. B, Seamless, STD. Wt.	3	8	VBA0307-C RF **7
10	24	ASME SA106 Gr. B, Seamless, (wall thickness calculated per attachment L)	<u>Check Valve</u>		
<u>Fittings</u>			0.75	2	VCH0234#8-SW-C
0.75	2	ASME SA105N, Class 3000 SW	3	8	VCH0254#8-C RF
3	24	ASME SA234 WPB, (Schedule to match Pipe)	<u>Check Valve, Wafer Style</u>		
<u>Flanges</u>			8	24	VWC0301-C RF
0.75	2	ASME SA105N, Class 300 RF. SW	<u>Compact Gate Valve</u>		
3	24	ASME SA105N, Class 300 RF.WN, (Bore to match Pipe)	0.75	2	VGA0037#8-SW/TH-C
			0.75	2	VGA0037#8-SW-C
			<u>Gate Valve</u>		
			3	24	VGA0054#8-C RF
			0.75	2	VGA0315#8-C RF
			<u>Globe Valve</u>		
			0.75	2	VGL0137#5-SW-C
			3	8	VGL0151#8-C RF
			<u>Stop Check Valve, Angle Pattern</u>		
			3	12	VSC0852#5-C RF **5
			<u>Stop Check Valve, Straight Pattern</u>		
			3	12	VSC0851#5-C RF **5

Special Material Specifications:

<u>Thermowells</u>	NPS 2, Class 300 RF, Flanged, SA105, see Standard Drawing DD100-L-14-1, 2
<u>Bolting</u>	ASME SA193 Gr. B7, c/w SA194 Gr. 2H Nuts
<u>Gaskets</u>	Spiral Wound 316SS, Graphite filled, c/w CS Outer Ring, per ASME B16.20

**** SPECIAL NOTES ****

1. Soft seated valves have limited pressure/temperature ratings. Maximum temperature shall not exceed 400 F (204 C).
2. Deleted.
3. Wall thickness readings shall be made per Work Practice, PMW0018A, "Baseline Ultrasonic Survey".
4. Deleted.
5. Blow-off, stop check and ball valves shall be used as specified by the Owner's engineer.
6. Positive Isolation required per drawings DD100-L-31-1, 2 and 3.
7. Use Metal Seated Valves for temperatures over 400 F (204 C).
8. Vents and Drains per DD100-L-12-1.
9. Pressure Instrument Connections per DD100-L-11-1.
10. PWHT required for thickness per ASME B31.1



Piping Material Specifications

Valve Details

Ball Valve

VBA0301-C

Rev Date 19-Jun-06

SUFFIX: -C ASME SA Material

Ball Valve, Class CL 300 RF to ASME B16.5, Cast Body to, ASME SA216 Gr WCB, Split body, Blow-out proof stem, 316 SS Ball and Stem, PTFE Seats and Body Gasket, Regular Port, Design to API-608 and/or ASME B16.34

NOTES: Fire tested to API-607; Do not use PTFE seats at temperatures above 400 F.

Assigned Pipe Classes: ESA

Ball Valve

VBA0307-C

Rev Date 19-Jun-06

SUFFIX: -C ASME SA Material

Ball Valve, Class CL 300 RF to ASME B16.5, Cast Body to, ASME SA216 Gr WCB, Split body, Blow-out proof stem, 316 SS Ball and Stem, Metal Seated, 316 SS Spiral Wound Body Gasket, Regular Port, Design to API-608 and/or ASME B16.34

NOTES: Fire tested to API-607; For use in temperatures above 400 F

Assigned Pipe Classes: ESA

Check Valve

VCH0234#8-SW-C

Rev Date 19-Mar-08

SUFFIX: -C ASME SA Material

Check Valve, Class CL 800 Socketweld, Forged Body to, ASME SA105 N, Welded Cover, Piston/Lift Type with Spring, API Trim 8, Integral or Renewable seats, Hard Faced Seat, Design to API-602

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: ESA

Check Valve

VCH0254#8-C

Rev Date 17-Feb-08

Check Valve, Class CL 300 RF to ASME B16.5, Cast Body to, ASME SA216 Gr WCB, Bolted Cover, Swing Type Carbon Steel Disc, API Trim 8 design to API 600, Integral or Welded in Seats, Hard Faced Seat & Disc

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: ESA

Compact Gate Valve

VGA0037#8-SW/TH-C

Rev Date 17-Feb-08

SUFFIX: -C ASME SA Material

Compact Gate Valve, Class CL800 Socketweld/Threaded, Forged Carbon Steel, ASME SA105, Welded Bonnet, OS & Y, Solid Wedge, API Trim 8, Welded in Hard Faced Seat, Regular Port, Design to API-602

Assigned Pipe Classes: ESA

Compact Gate Valve

VGA0037#8-SW-C

Rev Date 17-Feb-08

SUFFIX: -C ASME SA Material

Compact Gate Valve, Class CL800 Socketweld, Forged Carbon Steel, ASME SA105, Welded Bonnet, OS & Y, Solid Wedge, API Trim 8, Welded in Hard Faced Seat, Regular Port, Design to API-602

Assigned Pipe Classes: ESA

Gate Valve

VGA0054#8-C

Rev Date 17-Feb-08

SUFFIX: -C ASME SA Material

Gate Valve, Class CL 300 RF to ASME B16.5, Cast Body to, ASME SA216 Gr WCB, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 8, Integral or Welded in Seats, Design to API-600

Assigned Pipe Classes: CSA, ESA

Gate Valve

VGA0315#8-C

Rev Date 17-Feb-08

SUFFIX: -C ASME SA Material

Gate Valve, Class CL 300 RF to ASME B16.5, Forged Body w/integral flanges, ASME SA105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 8, Integral or renewable hard faced seats, Regular Port, Design to API-602

Assigned Pipe Classes: CSA, ESA

Globe Valve

VGL0137#5-SW-C

Rev Date 17-Feb-08

SUFFIX: -C ASME SA Material

Globe Valve, Class CL 800 Socketweld, Forged Body to, ASME SA105 N, Welded Bonnet, OS & Y, API Trim 5, Integral or renewable hard faced seats, Hard Faced Disc, Design to API-602

Assigned Pipe Classes: ESA

Globe Valve

VGL0151#8-C

Rev Date 22-Feb-08

SUFFIX: -C ASME SA Material

Globe Valve, Class CL 300 RF to ASME B16.5, Cast Body to, ASME SA216 Gr WCB, Bolted Bonnet, OS & Y, API Trim 8 design to API 600, Renewable Hard Faced Seat

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: ESA

Stop Check Valve, Straight Pat SUFFIX: -C ASME SA Material**VSC0851#5-C**

Rev Date 19-Mar-08

Stop Check Valve, Straight Pattern, Class CL 300 RF to ASME B16.5, Cast Body to, ASME SA216 Gr WCB, Bolted Bonnet, OS & Y, Body guided disc, API Trim 5 design to API-600, Integral or Renewable seats, Full Port

Assigned Pipe Classes: CS, CSA, ESA

Stop Check Valve, Angle Patte SUFFIX: -C ASME SA Material**VSC0852#5-C**

Rev Date 19-Mar-08

Stop Check Valve, Angle Pattern, Class CL 300 RF to ASME B16.5, Cast Body to, ASME SA216 Gr WCB, Bolted Bonnet, Plug Type Body Guided Disc, API Trim 5 design to API-600, Integral or Welded in Seats, Hard Faced Seat & Disc, Design to ASME B16.34

Assigned Pipe Classes: CSA, ES, ESA

Check Valve, Wafer Style**VWC0301-C**

Rev Date 23-Jun-06

Check Valve, Wafer Style, Class CL 300 RF to fit between ASME B16.5 flanges, Cast Body to, ASME SA216 Gr WCB, Retainerless Style, Dual Carbon Steel Plates, Inconel X750 Spring(s), Lapped Seats, w/Stellite Hard Faced Overlay, Design to API-594

NOTES: For valves 26" NPS and larger flange connections to comply with ASME B16.47 Series A

Assigned Pipe Classes: ESA



Piping Material Specifications

Rev: **4**

Service Desc: <i>Hydrogen + Wet CO2</i>				Temp: <i>550 (288)</i> °F(°C)max	
Materials: <i>304/304L SS **4</i>			Corrosion Allow: <i>0.031</i>		Code: <i>ASME B31.3</i>
Material P&T:	<i>720</i>	PSI @	<i>-20</i>	°F min.	Based on: <i>ASME B16.5 MG 2.1</i> Branch Conn Tbl: <i>4</i> Inspection Class: <i>III</i>
	<i>(4964)</i>	Kpa @	<i>(-29)</i>	°C min.	
	<i>453</i>	PSI @	<i>550</i>	°F max.	
	<i>(3125)</i>	Kpa @	<i>(288)</i>	°C max.	
P.W.H.T. : <i>NO (**9)</i>			Welding Proc: <i>Refer to Suncor Firebag STD FB-L-5217</i>		

Standard Specifications			Valve Specifications		
<u>Pipe</u>			<u>Butterfly Valve, Wafer Style</u>		
0.75	2	ASTM A312 Type 304/304L, Seamless, Sch. 80S	3	24	VBV3008-H RF **3
3	10	ASTM A312 Type 304/304L, Seamless, Sch. 40S	<u>Check Valve</u>		
12	24	ASTM A312 Type 304/304L, Seamless, (wall thickness calculated per attachment L)	0.75	2	VCH0216#10-SW
<u>Fittings</u>			3	6	VCH5253#10-H RF
0.75	2	ASTM A182 F304/304L, Class 3000 SW	<u>Check Valve, Wafer Style</u>		
3	24	ASTM A403 Gr. WP 304/304L-S, (Schedule to match pipe)	8	24	VWC0312-H RF
<u>Flanges</u>			<u>Compact Gate Valve</u>		
0.75	2	ASTM A182 F304/304L, Class 300 RF.SW **1	0.75	2	VGA5034#10-SW
3	24	ASTM A182 F304/304L, Class 300 RF.WN, (Bore to match pipe) **1	0.75	2	VGA5034#10-SW/TH
			<u>Gate Valve</u>		
			0.75	2	VGA0103#10-H RF
			3	24	VGA5054#10-H RF
			<u>Globe Valve</u>		
			0.75	2	VGL0130#10-SW
			3	8	VGL0156#10-H RF

Special Material Specifications:

<u>Thermowells</u>	NPS 2, Class 300 RF, Flanged, A182 Type 304/304L, see Standard Drawing DD100-L-14-1, 2 **1
<u>Bolting</u>	ASTM A193 Gr. B16, c/w A194 Gr. 4 Nuts
<u>Gaskets</u>	Spiral Wound 316SS, Graphite filled, c/w CS Outer Ring, per ASME B16.20

**** SPECIAL NOTES ****

1. All flange faces shall have a surface finish of 125-150 microinch.
2. Unions are not permitted, use flanges.
3. Soft seated valves have limited pressure/temperature ratings. Maximum Temperature shall not exceed 400 F (204 C).
4. Dual certified material pressure/temperature ratings are based on the higher ratings of the straight grade material.
5. Deleted
6. Positive Isolation required per drawings DD100-L-31-1, 2 and 3.
7. Vents and Drains per DD100-L-12-1.
8. Pressure Instrument Connections per DD100-L-11-1.
9. PWHT required for thickness per ASME B31.3.



Piping Material Specifications

Valve Details

Butterfly Valve, Wafer Style

VBU3008-H

Rev Date 18-Sep-07

SUFFIX: -H Suitable for Hydrogen service and a flange facing of 125 -150 microinch

Butterfly Valve, Wafer Style, Class CL 300 RF to fit between ASME B16.5 flanges, Cast Body to, ASTM A351 Gr. CF8M, Graphite Bushing, 316 SS Disk and Shaft, PTFE Seats, Design to API-609

NOTES: Maximum temperature 350 F; Valve shall be suitable for Hydrogen Service

Assigned Pipe Classes: EXX

Check Valve

VCH0216#10-SW

Rev Date 22-Feb-08

Check Valve, Class CL 800 Socketweld, Forged Body to, ASTM A182 F316/316L Dual Cert., Bolted Cover, Spring-loaded Ball Type, API Trim 10, Integral or Renewable seats, Full Port, Design to API-602

NOTES: Valve to be suitable for Hydrogen Service. Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: CXX, EXX

Check Valve

VCH5253#10-H

Rev Date 17-Feb-08

SUFFIX: -H Suitable for Hydrogen service and a flange facing of 125 -150 microinch

Check Valve, Class CL 300 RF to ASME B16.5, Cast Body to, ASTM A351 Gr. CF8M, Bolted Cover, Swing Type, API Trim 10 design to API-600, Integral or Welded in Seats

NOTES: Pressure/Temperature to ASME B16.34

Assigned Pipe Classes: EXX

Gate Valve

VGA0103#10-H

Rev Date 17-Feb-08

SUFFIX: -H Suitable for Hydrogen service and a flange facing of 125 -150 microinch

Gate Valve, Class CL 300 RF to ASME B16.5, Forged Body w/integral flanges, ASTM A182 F316/316L Dual Cert., Bolted Bonnet, OS & Y, Solid Wedge, API Trim 10, Integral or Renewable seats, Regular Port, Design to API-602

Assigned Pipe Classes: CXX, EXX

Compact Gate Valve

VGA5034#10-SW

Rev Date 17-Feb-08

Compact Gate Valve, Class CL 800 Socketweld, Forged Body to, ASTM A182 F316/316L Dual Cert., Bolted Bonnet, OS & Y, Solid Wedge, API Trim 10, Integral or Renewable seats, Regular Port, Design to API-602

NOTES: Valve shall be suitable for Hydrogen Service

Assigned Pipe Classes: CXX, EXX

Compact Gate Valve

VGA5034#10-SW/TH

Rev Date 17-Feb-08

Compact Gate Valve, Class CL 800 Socketweld/Threaded, Forged Body to, ASTM A182 F316/316L Dual Cert., Bolted Bonnet, OS & Y, Solid Wedge, API Trim 10, Integral or Renewable seats, Regular Port, Design to API-602

NOTES: Valve shall be suitable for Hydrogen Service

Assigned Pipe Classes: CXX, EXX

Gate Valve

VGA5054#10-H

Rev Date 17-Feb-08

SUFFIX: -H Suitable for Hydrogen service and a flange facing of 125 -150 microinch

Gate Valve, Class CL 300 RF to ASME B16.5, Cast Body to, ASTM A351 Gr. CF8M, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 10, Integral, Welded in or Renewable Seats, Design to API-600

Assigned Pipe Classes: CXX, EXX

Globe Valve

VGL0130#10-SW

Rev Date 17-Feb-08

Globe Valve, Class CL 800 Socketweld, Forged Body to, ASTM A182 F316/316L Dual Cert., Bolted Bonnet, OS & Y, API Trim 10, Integral or Renewable seats, Design to API-602

NOTES: Valve shall be suitable for Hydrogen Service

Assigned Pipe Classes: CXX, EXX

Globe Valve

VGL0156#10-H

Rev Date 22-Feb-08

SUFFIX: -H Suitable for Hydrogen service and a flange facing of 125 -150 microinch

Globe Valve, Class CL 300 RF to ASME B16.5, Cast Body to, ASTM A351 Gr. CF8M, Bolted Bonnet, OS & Y, Plug Type Disc, API Trim 10 design to API-600, Integral, Welded in or Renewable Seats

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: EXX

Check Valve, Wafer Style

VWC0312-H

Rev Date 19-Jun-06

SUFFIX: -H Suitable for Hydrogen service and a flange facing of 125 -150 microinch

Check Valve, Wafer Style, Class CL 300 RF to fit between ASME B16.5 flanges, Cast Body to, ASTM A351 Gr. CF8M, Retainerless Style, Dual 316SS Plates, Inconel X750 Spring(s), Lapped Seats, w/Stellite Hard Faced Overlay, Design to API-594

Assigned Pipe Classes: EXX



Piping Material Specifications

Rev: **4**

Service Desc: <i>Chemical Injection</i>				Temp: <i>650 (343)</i> °F(°C)max	
Materials: <i>Type 316/316L Stainless Steel</i>			Corrosion Allow: <i>0.0625</i>		Code: <i>ASME B31.3</i>
Material P&T:	<i>1440</i>	PSI @	<i>-50</i>	°F min.	Based on: <i>ASME B16.5 MG 2.3</i>
	<i>(9929)</i>	Kpa @	<i>(-46)</i>	°C min.	
	<i>885</i>	PSI @	<i>650</i>	°F max.	Branch Conn Tbl: <i>4</i>
	<i>(6102)</i>	Kpa @	<i>(343)</i>	°C max.	
Inspection Class: <i>III</i>					
P.W.H.T. : <i>NO</i>			Welding Proc: <i>Refer to Suncor Firebag STD FB-L-5217</i>		

Standard Specifications			Valve Specifications		
<u>Pipe</u>			<u>Check Valve</u>		
0.75	2	ASTM A312, Type 316/316L, Seamless, Sch.80S	0.75	2	VCH0218#12-SW
<u>Fittings</u>			<u>Compact Gate Valve</u>		
0.75	2	ASTM A182 F316/316L, Class 3000 SW	0.75	2	VGA0028#10-SW
<u>Flanges</u>			0.75	2	VGA0028#10-SW/TH
0.75	2	ASTM A182 F316/316L, Class 600 RF.SW	<u>Globe Valve</u>		
			0.75	2	VGL0126#12-SW

Special Material Specifications:

<u>Bolting</u>	ASTM A193 Gr. B7, c/w A194 Gr. 2H Nuts
<u>Gaskets</u>	Spiral Wound 316SS, Graphite filled, c/w CS Outer Ring, per ASME B16.20

** SPECIAL NOTES **

1. Unions are not permitted, use flanges.
2. Deleted.
3. Dual certified material pressure/temperature ratings are based on the higher ratings of the straight grade.
4. Positive Isolation required per drawings DD100-L-31-1, 2 and 3.
5. Vents and Drains per DD100-L-12-1.
6. Pressure Instrument Connections per DD100-L-11-1.



Piping Material Specifications

Valve Details

Check Valve

VCH0218#12-SW

Rev Date 17-Feb-08

Check Valve, Class CL 800 Socketweld, Forged Body to, ASTM A182 F316/316L Dual Cert., Bolted Cover, Spring-loaded Ball Type, API Trim 12, Integral or Renewable seats, Full Port, Design to API-602
Assigned Pipe Classes: CAG, EAG, HAG

Compact Gate Valve

VGA0028#10-SW

Rev Date 17-Feb-08

Compact Gate Valve, Class CL 800 Socketweld, Forged Body to, ASTM A182 F316/316L Dual Cert., Bolted Bonnet, OS & Y, Solid Wedge, API Trim 10, Integral or Renewable seats, Regular Port, Design to API-602
Assigned Pipe Classes: CKY, HAG

Compact Gate Valve

VGA0028#10-SW/TH

Rev Date 17-Feb-08

Compact Gate Valve, Class CL 800 Socketweld/Threaded, Forged Body to, ASTM A182 F316/316L Dual Cert., Bolted Bonnet, OS & Y, Solid Wedge, API Trim 10, Integral or Renewable seats, Regular Port, Design to API-602
Assigned Pipe Classes: CKY, HAG

Globe Valve

VGL0126#12-SW

Rev Date 02-May-08

Globe Valve, Class CL 800 Socketweld, Forged Body to, ASTM A182 F316/316L Dual Cert., Bolted Bonnet, OS & Y, API Trim 12, Integral or Renewable seats, Design to API-602
Assigned Pipe Classes: CAG, EAG, HAG, HH



Piping Material Specifications

Rev: **4**

Service Desc: <i>Natural Gas, Nitrogen, Propane and LT Hydrocarbons **8</i>					Temp: <i>400 (204)</i> °F(°C)max	
Materials: <i>Low Temperature Carbon Steel</i>			Corrosion Allow: <i>0.0625</i>		Code: <i>ASME B31.3</i>	
Material P&T:	<i>1480</i>	PSI @	<i>-50</i>	°F min.	Based on: <i>ASME B16.5 MG 1.1</i>	Branch Conn Tbl: <i>4</i>
	<i>(10,205)</i>	Kpa @	<i>(-46)</i>	°C min.		Inspection Class: <i>III</i>
	<i>1265</i>	PSI @	<i>400</i>	°F max.		
	<i>(8722)</i>	Kpa @	<i>(204)</i>	°C max.		
P.W.H.T. : <i>NO (**11)</i>				Welding Proc: <i>Refer to Suncor Firebag STD FB-L-5217</i>		

Standard Specifications			Valve Specifications		
<u>Pipe</u>			<u>Ball Valve</u>		
0.75	2	ASTM A333 Gr.6, Seamless, Sch. 80	3	24	VBA0601 RF **2
3	24	ASTM A333 Gr.6, Seamless, (wall thickness calculated per attachment L)	0.75	2	VBA0607-SW **2,5
<u>Fittings</u>			<u>Check Valve</u>		
0.75	2	ASTM A350 LF2 CL 1, Class 3000 SW **3	0.75	2	VCH0240#12-SW
3	24	ASTM A420 WPL6, (Schedule to match pipe)	3	6	VCH0267#12 RF
<u>Flanges</u>			<u>Check Valve, Wafer Style</u>		
0.75	2	ASTM A350 LF2 CL 1, Class 600 RF.SW.	8	24	VWC0606 RF
3	24	ASTM A350 LF2 CL 1, Class 600 RF.WN., (Bore to match pipe)	<u>Compact Gate Valve</u>		
			0.75	2	VGA0030#12-SW **5
			0.75	2	VGA0030#12-SW/TH
			<u>Gate Valve</u>		
			0.75	2	VGA0608#12 RF
			3	24	VGA5065#12 RF
			<u>Globe Valve</u>		
			0.75	2	VGL0140#12-SW **5
			3	6	VGL0162#12 RF

Special Material Specifications:

<u>Thermowells</u>	NPS 2, Class 600 RF, Flanged, A350 LF2 CL 1, see Standard Drawing DD100-L-14-1, 2
<u>Bolting</u>	ASTM A320 Gr. L7, c/w A194 Gr. 4 Nuts
<u>Gaskets</u>	Spiral Wound 316SS, Graphite filled, c/w CS Outer Ring, per ASME B16.20

** SPECIAL NOTES **

1. All weld procedures shall include impact testing per ASME B31.3.
2. Soft seated valves have limited pressure/temperature ratings. Maximum temperature shall not exceed 400 F (204 C).
3. Unions are not permitted, use flanges.
4. Wall thickness readings shall be made per Work Practice PMW0018A, "Baseline Ultrasonic Survey".
5. Ball, Globe, or Gate valves NPS 3/4 to 2 shall be used as specified by the Owner.
6. Deleted.
7. Positive Isolation required per drawings DD100-L-31-1, 2 and 3.
8. This line class shall be used for Propane and other Lt. Hydrocarbons at the discretion of Owner's Engineer.
9. Vents and Drains per DD100-L-12-1.
10. Pressure Instrument Connections per DD100-L-11-1.
11. PWHT required for thickness per ASME B31.3.



Piping Material Specifications

Valve Details

Ball Valve

VBA0601

Rev Date 17-Sep-07

Ball Valve, Class CL 600 RF to ASME B16.5, Cast Body to, ASTM A352 Gr. LCC, Split body, Blow-out proof stem, PTFE Seats and Body Gasket, Reduced Port
 NOTES: Teflon Packing, Bolting and Bonnet gasket to be suitable for -50 F (-46 C); Fire tested to API-607;
 Assigned Pipe Classes: HAX

Ball Valve

VBA0607-SW

Rev Date 19-Jun-06

Ball Valve, Class CL 600 Socketweld, Forged Body to, ASTM A350 Gr.LF2 CL 1, Blow-out proof stem, 316 SS Ball and Stem, RTFE seats, Regular Port, Design to API-608
 NOTES: Fire tested to API-607; Bolting, packing & seats to be suitable for -50 F (-46 C); Valves require a ASTM A333 Gr. 6, Sch 160 Nipple 150 mm (6 in) long at each end for welding; Maximum temperature 350 F
 Assigned Pipe Classes: CAX, CB, HAX

Check Valve

VCH0240#12-SW

Rev Date 19-Mar-08

Check Valve, Class CL 800 Socketweld, Forged Body to, ASTM A350 Gr.LF2 CL 1, Bolted Cover, Piston/Lift Type with Spring, API Trim 12, Integral or Renewable seats, Full Port, Design to API-602
 NOTES: Bolting and bonnet gasket to be suitable for -50 F (-46 C)
 Pressure/Temperature rating to ASME B16.34
 Assigned Pipe Classes: CAX, CB, EAX, HAX

Check Valve

VCH0267#12

Rev Date 22-Feb-08

Check Valve, Class CL 600 RF to ASME B16.5, Cast Body to, ASTM A352 Gr. LCC, Bolted Cover, Swing Type, API Trim 12 design to API-600, Integral or Welded in Seats, Hard Faced Seat
 NOTES: Bolting and bonnet gasket to be suitable for -50 F (-46 C)
 Pressure/Temperature rating to ASME B16.34
 Assigned Pipe Classes: HAX

Compact Gate Valve

VGA0030#12-SW

Rev Date 17-Feb-08

Compact Gate Valve, Class CL 800 Socketweld, Forged Body to, ASTM A350 Gr.LF2 CL 1, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 12, Integral or Renewable seats, Regular Port, Design to API-602
 NOTES: Bolting & bonnet gasket and packing to be suitable for -50 F (-46 C)
 Assigned Pipe Classes: CAX, CB, EAX, HAX

Compact Gate Valve

VGA0030#12-SW/TH

Rev Date 17-Feb-08

Compact Gate Valve, Class CL800 Socketweld/Threaded, Forged Carbon Steel, ASTM A350 Gr.LF2 CL 1, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 12, Integral or renewable hard faced seats, Regular Port, Design to API-602
 NOTES: Teflon bonnet gasket and packing; Maximum temperature 350 F
 Assigned Pipe Classes: CAX, CB, EAX, HAX

Gate Valve

VGA0608#12

Rev Date 17-Feb-08

Gate Valve, Class CL 600 RF to ASME B16.5, Forged Body w/integral flanges, ASTM A350 Gr.LF2 CL 1, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 12, Integral or Renewable seats, Regular Port, Design to API-602
 NOTES: Bolting & bonnet gasket and packing to be suitable for -50 F (-46 C)
 Assigned Pipe Classes: HAX

Gate Valve

VGA5065#12

Rev Date 17-Feb-08

Gate Valve, Class CL 600 RF to ASME B16.5, Cast Body to, ASTM A352 Gr. LCC, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 12, Integral or Welded in Seats, Design to API-600
 NOTES: Bolting & bonnet gasket and packing to be suitable for -50 F (-46 C)
 Assigned Pipe Classes: HAX

Globe Valve

VGL0140#12-SW

Rev Date 17-Feb-08

Globe Valve, Class CL 800 Socketweld, Forged Body to, ASTM A350 Gr.LF2 CL 1, Bolted Bonnet, OS & Y, API Trim 12, Integral or Renewable seats, Design to API-602
 NOTES: Bolting & bonnet gasket and packing to be suitable for -50 F (-46 C)
 Assigned Pipe Classes: CAX, CB, EAX, HAX

Globe Valve**VGL0162#12**

Rev Date 22-Feb-08

Globe Valve, Class CL 600 RF to ASME B16.5, Cast Body to, ASTM A352 Gr. LCC, Bolted Bonnet, OS & Y, API Trim 12 design to API-600, Integral or Welded in Seats

NOTES: Bolting & bonnet gasket and packing to be suitable for -50 F (-46 C)

Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: HAX

Check Valve, Wafer Style**VWC0606**

Rev Date 19-Jun-06

Check Valve, Wafer Style, Class CL 600 RF to fit between ASME B16.5 flanges, Cast Body to, ASTM A352 Gr. LCC, Retainerless Style, Dual 316SS Plates, Inconel X750 Spring(s), Lapped Seats, w/Stellite Hard Faced Overlay, Design to API-594

NOTES: Valve to be suitable for -50 F (-46 C)

Assigned Pipe Classes: HAX



Piping Material Specifications

Rev: **4**

Service Desc: <i>General Hydrocarbon</i>				Temp: <i>800 (427)</i> °F(°C)max	
Materials: <i>Carbon Steel</i>		Corrosion Allow: <i>0.0625</i>		Code: <i>ASME B31.3</i>	
Material P&T:	<i>1480</i>	PSI @	<i>-20</i>	°F min.	Based on: <i>ASME B16.5 MG 1.1</i>
	<i>(10,205)</i>	Kpa @	<i>(-29)</i>	°C min.	
	<i>825</i>	PSI @	<i>800</i>	°F max.	
	<i>(5688)</i>	Kpa @	<i>(427)</i>	°C max.	
P.W.H.T. : <i>NO (**8)</i>				Welding Proc: <i>Refer to Suncor Firebag STD FB-L-5217</i>	
Branch Conn Tbl: <i>4</i>					
Inspection Class: <i>III</i>					

Standard Specifications			Valve Specifications		
<u>Pipe</u>			<u>Check Valve</u>		
0.75	2	ASTM A106 Gr. B, Seamless, Sch 80	0.75	2	VCH0231#8-SW
3	24	ASTM A106 Gr. B, Seamless, (wall thickness calculated per attachment L)	3	6	VCH0264#8 RF
26	36	ASTM A672 Cl 22 Gr.C60, (Wall thickness calculated per Attachment L)	<u>Check Valve, Wafer Style</u>		
<u>Fittings</u>			8	24	VWC0605 RF
0.75	2	ASTM A105N, Class 3000 SW	<u>Compact Gate Valve</u>		
3	24	ASTM A234 WPB, (Schedule to match Pipe)	0.75	2	VGA0031#8-SW
26	36	ASTM A234 Gr.WPB-W (100%RT) (Schedule to match pipe)	0.75	2	VGA0031#8-SW/TH
<u>Flanges</u>			<u>Gate Valve</u>		
0.75	2	ASTM A105N, Class 600 RF. SW	3	24	VGA0064#8 RF
3	24	ASTM A105N, Class 600 RF.WN, (Bore to match Pipe)	0.75	2	VGA0319#8 RF
26	36	ASTM A105N, Class 600 RF.WN, B16.47-A (Bore to match Pipe)	<u>Globe Valve</u>		
			0.75	2	VGL0131#8-SW
			3	6	VGL0161#8 RF

Special Material Specifications:

<u>Thermowells</u>	NPS 2, Class 600 RF, Flanged, A105N, see Standard Drawing DD100-L-14-1, 2
<u>Bolting</u>	ASTM A193 Gr. B7, c/w A194 Gr. 2H Nuts
<u>Gaskets</u>	Spiral Wound 316SS, Graphite filled, c/w CS Outer Ring, per ASME B16.20

** SPECIAL NOTES **

- Unions are not permitted, use flanges.
- Deleted.
- Wall thickness readings shall be made per Work Practice PMW0018A, "Baseline Ultrasonic Survey".
- Refer to section 4.1.4 of Specification FB-L-5202 for MDMT guidelines.
- Positive Isolation required per drawings DD100-L-31-1, 2 and 3.
- Vents and Drains per DD100-L-12-1.
- Pressure Instrument Connections per DD100-L-11-1.
- PWHT required for thickness per ASME B31.3.



Piping Material Specifications

Valve Details

Check Valve

VCH0231#8-SW

Rev Date 22-Feb-08

Check Valve, Class CL 800 Socketweld, Forged Body to, ASTM A105 N, Bolted Cover, Piston/Lift Type with Spring, API Trim 8, Integral or renewable, Full Port, Design to API-602

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: CA, CAB, CAZ, CBA, CHY, CS, EA, EAB, EDB, ES, HB, HBD

Check Valve

VCH0264#8

Rev Date 17-Feb-08

Check Valve, Class CL 600 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Cover, Swing Type, API Trim 8 design to API 600, Integral or Welded in Seats, Hard Faced Seat

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: HB, HBD

Compact Gate Valve

VGA0031#8-SW

Rev Date 04-Apr-08

Compact Gate Valve, Class CL 800 Socketweld, Forged Body to, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 8, Integral or Renewable seats, Regular Port, Design to API-602

Assigned Pipe Classes: CA, CAB, CAZ, CBA, CHY, CS, EA, EAB, EDB, HB, HBD, 662-2, 662-3

Compact Gate Valve

VGA0031#8-SW/TH

Rev Date 04-Apr-08

Compact Gate Valve, Class CL800 Socketweld/Threaded, Forged Carbon Steel, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 8, Integral or renewable hard faced seats, Regular Port, Design to API-602

Assigned Pipe Classes: CA, CAB, CAZ, CBA, CHY, CS, EA, EAB, EDB, HB, HBD, 662-2, 662-3

Gate Valve

VGA0064#8

Rev Date 04-Apr-08

Gate Valve, Class CL 600 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 8, Integral or Welded in Seats, Design to API-600

Assigned Pipe Classes: HB, HBD, 662-2

Gate Valve

VGA0319#8

Rev Date 17-Feb-08

Gate Valve, Class CL 600 RF to ASME B16.5, Forged Body w/integral flanges, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 8, Integral or Renewable seats, Design to API-602

Assigned Pipe Classes: HB, HBD

Globe Valve

VGL0131#8-SW

Rev Date 23-Jun-06

Globe Valve, Class CL 800 Socketweld, Forged Body to, ASTM A105 N, Bolted Bonnet, OS & Y, Integral or Renewable seats, Hard Faced Seat to API Trim 8, Design to API-602

Assigned Pipe Classes: CA, CAB, CAZ, CBA, CHY, CS, EA, EAB, EDB, HB, HBD

Globe Valve

VGL0161#8

Rev Date 22-Feb-08

Globe Valve, Class CL 600 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, Plug Type Body Guided Disc, API Trim 8 design to API 600, Integral or Welded in Seats

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: HB, HBD

Check Valve, Wafer Style

VWC0605

Rev Date 19-Jun-06

Check Valve, Wafer Style, Class CL 600 RF to fit between ASME B16.5 flanges, Cast Body to, ASTM A216 Gr WCB, Retainerless Style, Dual Carbon Steel Plates, Inconel X750 Spring(s), Lapped Seats, w/Stellite Hard Faced Overlay, Design to API-594

Assigned Pipe Classes: HB, HBD, HS



Piping Material Specifications

Rev: **4a**

Service Desc: General Hydrocarbons with H2 and H2S **1,3	Temp: 800 (427) °F(°C)max
Materials: Carbon Steel **1, 20, 31	Corrosion Allow: 0.0625
Material P&T: 1480 PSI @ -20 °F min.	Based on: ASME B16.5 MG 1.1
Note 13 (10,205) Kpa @ (-29) °C min.	Branch Conn Tbl: 4
825 PSI @ 800 °F max.	Inspection Class: III **21
(5688) Kpa @ (427) °C max.	
P.W.H.T.: NO (**1, 5, 9, 27)	Welding Proc: Refer to Suncor Firebag STD FB-L-5217 **29

Standard Specifications			Valve Specifications		
Pipe			Check Valve		
0.75	2	ASTM A106 Gr. B, Seamless, Sch 80 **28	0.75	2	VCH0233#12-SW-N3
3	24	ASTM A106 Gr. B, Seamless, (wall thickness calculated per attachment L) **28	3	6	VCH0602#12-N3-H RF
Fittings			Check Valve, Wafer Style		
0.75	2	ASTM A105N, Class 3000 SW **2	8	24	VWC0610-N3-H RF
3	24	ASTM A234 WPB, (Schedule to match Pipe)	Compact Gate Valve		
Flanges			0.75	2	VGA0038#12-SW/TH-N3
0.75	2	ASTM A105N, Class 600 RF. SW **4	0.75	2	VGA0038#12-SW-N3
3	24	ASTM A105N, Class 600 RF.WN, (Bore to match Pipe) **4	Gate Valve		
			0.75	2	VGA0601#12-N3-H RF
			3	24	VGA0605#12-N3-H RF
			Globe Valve		
			0.75	2	VGL0134#12-SW-N3
			3	6	VGL0600#12-N3-H RF

Special Material Specifications:

Thermowells	NPS 2, Class 600 RF, Flanged, A105N, see Standard Drawing DD100-L-14-1, 2
Bolting	ASTM A193 Gr. B7M, c/w A194 Gr. 2HM Nuts
Gaskets	Spiral Wound 316SS, Graphite filled, c/w CS Outer Ring, per ASME B16.20

** SPECIAL NOTES **

For ASME B31.3 design, Notes 1.-13. shall apply:

1. All materials for use in 'Oil and Gas Production Environments' shall comply with NACE MR0175 latest revision, see Appendix B1, "Sour Service Supplement" for further information. All materials for use in 'Petroleum Refining Environments' shall comply with NACE MR0103 latest revision, see Appendix B. All piping systems using this pipe class shall then be identified with the appropriate NACE reference, approved by the Owners Engineer, and noted in the project documentation. Material selection shall be carefully reviewed for service and design conditions with respect to the appropriate NACE documents. For material requirements not included in this pipe class, including valves, alternate pipe classes with more suitable materials shall be considered.

2. Unions are not permitted, use flanges.

3. The use of this line class is subject to the Hydrogen partial pressure/temperature limitations shown in API-941.

4. All flange facings shall have a surface finish of 125-150 micro inch.

5. Hardness control requirements of NACE SP0472 shall be met for all welds in this class as referenced in Suncor Firebag FB-L-5217.

6. Refer to section 4.1.4 of Specification FB-L-5202 for MDMT guidelines.

7. Deleted.

8. Wall thickness readings shall be made per Work Practice PMW0018A, "Baseline Ultrasonic Survey".

9. PWHT required for thickness per ASME B31.3.

10. Positive Isolation required per drawings DD100-L-31-1, 2 and 3.

11. Vents and Drains per DD100-L-12-2.

12. Pressure Instrument Connections per DD100-L-11-1.

13. The maximum temperature for this pipe class is based on general carbon steel material limitations. For sour service systems identified under NACE MR0175 'Oil and Gas Production Environments', the maximum design temperature shall be restricted to the material and service requirements defined under NACE MR0175 / ISO 15156 latest edition.

For CSA Z662-07 design, Notes 20.-31. shall apply in addition to Notes 2.-4., & 13.:

20. All non CSA materials shall comply with the requirements of the sour service clause referenced in the applicable CSA Z245 standards: CSA

Z245.1 Steel Pipe, CSA Z245.11 Steel Fittings, CSA Z245.12 Steel Flanges, CSA Z245.15 Steel Valves. Where no applicable CSA standard exists, the material requirements of NACE MR0175 / ISO 15156 (latest edition) apply. Note, all valves in this line class shall conform to NACE MR0175 / ISO 15156, latest edition. Sour service requirements shall be in accordance with Firebag Technical Note FB-PE6-TN008.

21. Inspection and Non-Destructive examination testing shall be carried out per CSA Z662-07. (1) All welds meeting the definition per CSA Z662-07 Clause 16.6.8, shall have 100% RT/UT for all butt weld joints and 100% MT/PT for all socket weld joints. For all welds excluded from the definition per Clause 16.6.8, there shall be a minimum 15% RT/UT for all butt weld joints and 15% MT/PT for all socket weld joints per CSA Z662-07, Clause 7.10.3 & 7.10.4. (2) Visual examination shall be carried out on 100% of the weld joint and components. (3) 100% MT/PT shall be carried out on all branch connection welds.

22. Use sockolet for 2" NPS and below for branch connections to headers. Use weldolets for 3" NPS and above branch connections to headers.

23. For Vents, Drains and Instrument Connections use ASME B31.3 materials per Piping Material Specification Class HBA.

24. Shop and field hardness control by NACE SP0472 as referred in Suncor Firebag STD FB-L-5217. Weld hardness shall meet the requirements of CSA Z662-07 Clause 16.6.4.

25. Where pipe bends are required, they shall be specified by tagged piping specialty item and approved by owner's Engineer.

26. Positive Isolation required per drawings DD100-31-1, 2 and 3.

27. Stress Relieving (PWHT) required for thickness per CSA Z662-07, Clause 7.9.16.

28. Pipe shall be used in Category I applications only, as defined in CSA Z662-07, Clause 5.2.2.

29. Welding shall meet the requirements of CSA Z662-07, Clause 7.

30. Valves with suffix 'N3' may be substituted with suffix 'N1' for use in design under CSA Z662-07.

31. Material selection shall be carefully reviewed for service and design conditions under NACE MR0175 / ISO 15156 latest revision. For material requirements not included in this pipe class, including valves, alternate pipe classes with more suitable materials shall be considered.



Piping Material Specifications

Valve Details

<u>Check Valve</u> VCH0233#12-SW-N3 Rev Date 16-Mar-10	SUFFIX: -N3 Valve to conform to NACE MR0175 and NACE MR0103 latest revision Check Valve, Class CL 800 Socketweld, Forged Body to, ASTM A105 N, Welded Cover, Piston/Lift Type with Spring, API Trim 12, Integral or renewable, Hard Faced Seat, Full Port, Design to API-602 NOTES: Valve to be suitable for Hydrogen service □ Pressure/Temperature rating to ASME B16.34 Assigned Pipe Classes: HBA, HBE
<u>Check Valve</u> VCH0602#12-N3-H Rev Date 16-Mar-10	SUFFIX: -N3-H Valve shall conform to NACE MR0175 and NACE MR0103 latest revision, suitable for Hydrogen service with Flange facing of 125-150 microinch Check Valve, Class CL 600 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Cover, Swing Type, API Trim 12 design to API-600, Integral or Welded in Seats, Hard Faced Seat NOTES: Pressure/Temperature rating to ASME B16.34 Assigned Pipe Classes: HBA, HBE
<u>Compact Gate Valve</u> VGA0038#12-SW/TH-N3 Rev Date 16-Mar-10	SUFFIX: -N3 Valve to conform to NACE MR0175 and NACE MR0103 latest revision Compact Gate Valve, Class CL 800 Socketweld/Threaded, Forged Body to, ASTM A105 N, Welded Bonnet, OS & Y, Solid Wedge, API Trim 12, Integral or renewable, Reduced Port, Design to API-602 Assigned Pipe Classes: HBA, HBE
<u>Compact Gate Valve</u> VGA0038#12-SW-N3 Rev Date 16-Mar-10	SUFFIX: -N3 Valve to conform to NACE MR0175 and NACE MR0103 latest revision Compact Gate Valve, Class CL 800 Socketweld, Forged Body to, ASTM A105 N, Welded Bonnet, OS & Y, Solid Wedge, API Trim 12, Integral or Renewable seats, Regular Port, Design to API-602 NOTES: Valve to be suitable for Hydrogen service Assigned Pipe Classes: HBA, HBE
<u>Gate Valve</u> VGA0601#12-N3-H Rev Date 16-Mar-10	SUFFIX: -N3-H Valve shall conform to NACE MR0175 and NACE MR0103 latest revision, suitable for Hydrogen service with Flange facing of 125-150 microinch Gate Valve, Class CL 600 RF to ASME B16.5, Forged Body to, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 12, Integral or Renewable seats, Design to API-602 Assigned Pipe Classes: HBA
<u>Gate Valve</u> VGA0605#12-N3-H Rev Date 16-Mar-10	SUFFIX: -N3-H Valve shall conform to NACE MR0175 and NACE MR0103 latest revision, suitable for Hydrogen service with Flange facing of 125-150 microinch Gate Valve, Class CL 600 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 12, Welded in or Renewable Seats, Design to API-600 Assigned Pipe Classes: HBA, HBE
<u>Globe Valve</u> VGL0134#12-SW-N3 Rev Date 16-Mar-10	SUFFIX: -N3 Valve to conform to NACE MR0175 and NACE MR0103 latest revision Globe Valve, Class CL 800 Socketweld, Forged Body to, ASTM A105 N, Welded Bonnet, OS & Y, API Trim 12, Integral or Renewable seats, Design to API-602 NOTES: Valve to be suitable for Hydrogen service Assigned Pipe Classes: HBA, HBE
<u>Globe Valve</u> VGL0600#12-N3-H Rev Date 16-Mar-10	SUFFIX: -N3-H Valve shall conform to NACE MR0175 and NACE MR0103 latest revision, suitable for Hydrogen service with Flange facing of 125-150 microinch Globe Valve, Class CL 600 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, API Trim 12 design to API-600, Integral, Welded in or Renewable Seats NOTES: Pressure/Temperature rating to ASME B16.34 Assigned Pipe Classes: HBA, HBE
<u>Check Valve, Wafer Style</u> VWC0610-N3-H Rev Date 16-Mar-10	SUFFIX: -N3-H Valve shall conform to NACE MR0175 and NACE MR0103 latest revision, suitable for Hydrogen service with Flange facing of 125-150 microinch Check Valve, Wafer Style, Class CL 600 RF to fit between ASME B16.5 flanges, Cast Body to, ASTM A216 Gr WCB, Retainerless Style, Dual 316SS Plates, Inconel X750 Spring(s), Lapped Seats, w/Stellite Hard Faced Overlay, Design to API-594 Assigned Pipe Classes: HBA, HBE



Piping Material Specifications

Rev: **4**

Service Desc:	General Hydrocarbon & Hydrocarbons with Sulphur <0.2 Wt%			Temp:	800 (427)	°F(°C)max
Materials:	Carbon Steel			Corrosion Allow:	0.125	Code: ASME B31.3
Material P&T:	1480	PSI @	-20	°F min.	Based on:	ASME B16.5 MG 1.1
	(10,205)	Kpa @	(-29)	°C min.	Branch Conn Tbl:	4
	825	PSI @	800	°F max.	Inspection Class:	III
	(5688)	Kpa @	(427)	°C max.		
P.W.H.T. :	NO (**8)			Welding Proc:	Refer to Suncor Firebag STD FB-L-5217	

Standard Specifications

Valve Specifications

<u>Pipe</u> 0.75 2 ASTM A106 Gr. B, Seamless, Sch. 160 3 24 ASTM A106 Gr. B, Seamless, (wall thickness calculated per attachment L) 26 48 API 5L GR B PSL-2, DSAW, (wall thickness calculated per attachment L)				<u>Check Valve</u> 0.75 2 VCH0231#8-SW 3 6 VCH0264#8 RF			
<u>Fittings</u> 0.75 2 ASTM A105N, Class 6000 SW **I 3 24 ASTM A234 WPB, (Schedule to match Pipe) 26 48 ASTM A234 Gr. WPB-W (100%RT) (Schedule to match pipe)				<u>Check Valve, Wafer Style</u> 8 24 VWC0605 RF 26 48 VWC0609 RF			
<u>Flanges</u> 0.75 2 ASTM A105N, Class 600 RF. SW 3 24 ASTM A105N, Class 600 RF. WN, (Bore to match Pipe) 26 48 ASTM A105N, Class 600 RF. WN, ASME B16.47-A (Bore to match Pipe)				<u>Compact Gate Valve</u> 0.75 2 VGA0031#8-SW 0.75 2 VGA0031#8-SW/TH			
				<u>Gate Valve</u> 3 24 VGA0064#8 RF 26 48 VGA0068#8 RF 0.75 2 VGA0319#8 RF			
				<u>Globe Valve</u> 0.75 2 VGL0131#8-SW 3 6 VGL0161#8 RF			

Special Material Specifications:

<u>Thermowells</u>	NPS 2, Class 600 RF, Flanged, A105N, see Standard Drawing DD100-L-14-1, 2
<u>Bolting</u>	ASTM A193 Gr. B7, c/w A194 Gr. 2H Nuts
<u>Gaskets</u>	Spiral Wound 316SS, Graphite filled, c/w CS Outer Ring, per ASME B16.20

** SPECIAL NOTES **

- Unions are not permitted, use flanges.
- Deleted.
- Wall thickness readings shall be made per Work Practice PMW0018A, "Baseline Ultrasonic Survey".
- Refer to section 4.1.4 of Specification FB-L-5202 for MDMT guidelines.
- Positive Isolation required per drawings DD100-L-31-1, 2 and 3
- Vents and Drains per DD100-L-12-1.
- Pressure Instrument Connections per DD100-L-11-1.
- PWHT required for thickness per ASME B31.3.



Piping Material Specifications

Valve Details

Check Valve

VCH0231#8-SW

Rev Date 22-Feb-08

Check Valve, Class CL 800 Socketweld, Forged Body to, ASTM A105 N, Bolted Cover, Piston/Lift Type with Spring, API Trim 8, Integral or renewable, Full Port, Design to API-602

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: CA, CAB, CAZ, CBA, CHY, CS, EA, EAB, EDB, ES, HB, HBD

Check Valve

VCH0264#8

Rev Date 17-Feb-08

Check Valve, Class CL 600 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Cover, Swing Type, API Trim 8 design to API 600, Integral or Welded in Seats, Hard Faced Seat

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: HB, HBD

Compact Gate Valve

VGA0031#8-SW

Rev Date 04-Apr-08

Compact Gate Valve, Class CL 800 Socketweld, Forged Body to, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 8, Integral or Renewable seats, Regular Port, Design to API-602

Assigned Pipe Classes: CA, CAB, CAZ, CBA, CHY, CS, EA, EAB, EDB, HB, HBD, 662-2, 662-3

Compact Gate Valve

VGA0031#8-SW/TH

Rev Date 04-Apr-08

Compact Gate Valve, Class CL800 Socketweld/Threaded, Forged Carbon Steel, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 8, Integral or renewable hard faced seats, Regular Port, Design to API-602

Assigned Pipe Classes: CA, CAB, CAZ, CBA, CHY, CS, EA, EAB, EDB, HB, HBD, 662-2, 662-3

Gate Valve

VGA0064#8

Rev Date 04-Apr-08

Gate Valve, Class CL 600 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 8, Integral or Welded in Seats, Design to API-600

Assigned Pipe Classes: HB, HBD, 662-2

Gate Valve

VGA0068#8

Rev Date 04-Apr-08

Gate Valve, Class CL 600 RF to ASME B16.47-A, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 8 design to API 600, Integral or Welded in Seats

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: HBD

Gate Valve

VGA0319#8

Rev Date 17-Feb-08

Gate Valve, Class CL 600 RF to ASME B16.5, Forged Body w/integral flanges, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 8, Integral or Renewable seats, Design to API-602

Assigned Pipe Classes: HB, HBD

Globe Valve

VGL0131#8-SW

Rev Date 23-Jun-06

Globe Valve, Class CL 800 Socketweld, Forged Body to, ASTM A105 N, Bolted Bonnet, OS & Y, Integral or Renewable seats, Hard Faced Seat to API Trim 8, Design to API-602

Assigned Pipe Classes: CA, CAB, CAZ, CBA, CHY, CS, EA, EAB, EDB, HB, HBD

Globe Valve

VGL0161#8

Rev Date 22-Feb-08

Globe Valve, Class CL 600 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, Plug Type Body Guided Disc, API Trim 8 design to API 600, Integral or Welded in Seats

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: HB, HBD

Check Valve, Wafer Style

VWC0605

Rev Date 19-Jun-06

Check Valve, Wafer Style, Class CL 600 RF to fit between ASME B16.5 flanges, Cast Body to, ASTM A216 Gr WCB, Retainerless Style, Dual Carbon Steel Plates, Inconel X750 Spring(s), Lapped Seats, w/Stellite Hard Faced Overlay, Design to API-594

Assigned Pipe Classes: HB, HBD, HS

Check Valve, Wafer Style

VWC0609

Rev Date 05-Jul-06

Check Valve, Wafer Style, Class CL 600 RF to fit between ASME B16.47-A flanges, Cast Body to, ASTM A216 Gr WCB, Retainerless Style, Dual Carbon Steel Plates, Inconel X750 Spring(s), Lapped Seats, w/Stellite Hard Faced Overlay, Design to API-594

Assigned Pipe Classes: HBD



Piping Material Specifications

Rev: **4a**

Service Desc: General Hydrocarbons with H2 and H2S **1, 3	Temp: 800 (427) °F(°C)max
Materials: Carbon Steel **1, 20, 31	Corrosion Allow: 0.125
Material P&T: 1480 PSI @ -20 °F min.	Based on: ASME B16.5 MG 1.1
Note 13 (10,205) Kpa @ (-29) °C min.	Branch Conn Tbl: 4
825 PSI @ 800 °F max.	Inspection Class: III **21
(5688) Kpa @ (427) °C max.	
P.W.H.T.: NO (**1, 5, 9, 27)	Welding Proc: Refer to Suncor Firebag STD FB-L-5217 **29

Standard Specifications

<u>Pipe</u>		
0.75	2	ASTM A106 Gr. B, Seamless, Sch. 160 **28
3	24	ASTM A106 Gr. B, Seamless, (wall thickness calculated per attachment L) **28
26	48	ASTM A672 Cl 22 Gr. C60, (Wall thickness calculated per Attachment L) **28
<u>Fittings</u>		
0.75	2	ASTM A105N, Class 6000 SW **2
3	24	ASTM A234 WPB, (Schedule to match Pipe)
26	48	ASTM A234 Gr. WPB-W (100%RT) (Schedule to match pipe)
<u>Flanges</u>		
0.75	2	ASTM A105N, Class 600 RF. SW **4
3	24	ASTM A105N, Class 600 RF. WN, (Bore to match Pipe) **4
26	48	ASTM A105N, Class 600 RF. WN, ASME B16.47-A (Bore to match Pipe)

Valve Specifications

<u>Check Valve</u>		
0.75	2	VCH0233#12-SW- N3
3	6	VCH0602#12- N3-H RF
<u>Check Valve, Wafer Style</u>		
8	24	VWC0610- N3-H RF
<u>Compact Gate Valve</u>		
0.75	2	VGA0038#12-SW/TH- N3
0.75	2	VGA0038#12-SW- N3
<u>Gate Valve</u>		
2	24	VGA0605#12- N3-H RF
26	30	VGA0610#12- N3-H RF
<u>Globe Valve</u>		
0.75	2	VGL0134#12-SW- N3
3	6	VGL0600#12- N3-H RF

Special Material Specifications:

Thermowells	NPS 2, Class 600 RF, Flanged, A105N, see Standard Drawing DD100-L-14-1, 2
Bolting	ASTM A193 Gr. B7M, c/w A194 Gr. 2HM Nuts
Gaskets	Spiral Wound 316SS, Graphite filled, c/w CS Outer Ring, per ASME B16.20

** SPECIAL NOTES **

For ASME B31.3 design, Notes 1.-13. shall apply:

1. All materials for use in 'Oil and Gas Production Environments' shall comply with NACE MR0175 latest revision, see Appendix B1, "Sour Service Supplement" for further information. All materials for use in 'Petroleum Refining Environments' shall comply with NACE MR0103 latest revision, see Appendix B. All piping systems using this pipe class shall then be identified with the appropriate NACE reference, approved by the Owners Engineer, and noted in the project documentation. Material selection shall be carefully reviewed for service and design conditions with respect to the appropriate NACE documents. For material requirements not included in this pipe class, including valves, alternate pipe classes with more suitable materials shall be considered.
2. Unions are not permitted, use flanges.
3. The use of this line class is subject to the Hydrogen partial pressure/temperature limitations shown in API-941.
4. All flange facings shall have a surface finish of 125-150 micro inch.
5. Hardness control requirements of NACE SP0472 shall be met for all welds in this class as referenced in Suncor Firebag FB-L-5217.
6. Deleted.
7. Refer to section 4.1.4 of Specification FB-L-5202 for MDMT guidelines.
8. Wall thickness readings shall be made per Work Practice PMW0018A, "Baseline Ultrasonic Survey".
9. PWHT required for thickness per ASME B31.3.
10. Positive Isolation required per drawings DD100-31-1, 2 and 3.
11. Vents and Drains per DD100-L-12-1.
12. Pressure Instrument Connections per DD100-L-11-1.
13. The maximum temperature for this pipe class is based on general carbon steel material limitations. For sour service systems identified under NACE MR0175 'Oil and Gas Production Environments', the maximum design temperature shall be restricted to the material and service requirements defined under NACE MR0175 / ISO 15156 latest edition.

For CSA Z662-07 design, Notes 20.-31. shall apply in addition to Notes 2.-4., & 13.:

20. All non CSA materials shall comply with the requirements of the sour service clause referenced in the applicable CSA Z245 standards: CSA Z245.1 Steel Pipe, CSA Z245.11 Steel Fittings, CSA Z245.12 Steel Flanges, CSA Z245.15 Steel Valves. Where no applicable CSA standard exists, the material requirements of NACE MR0175 / ISO 15156 (latest edition) apply. Note, all valves in this line class shall conform to NACE MR0175 / ISO 15156, latest edition. Sour service requirements shall be in accordance with Firebag Technical Note FB-PE6-TN008.
21. Inspection and Non-Destructive examination testing shall be carried out per CSA Z662-07. (1) All welds meeting the definition per CSA Z662-07 Clause 16.6.8, shall have 100% RT/UT for all butt weld joints and 100% MT/PT for all socket weld joints. For all welds excluded from the definition per Clause 16.6.8, there shall be a minimum 15% RT/UT for all butt weld joints and 15% MT/PT for all socket weld joints per CSA Z662-07, Clause 7.10.3 & 7.10.4. (2) Visual examination shall be carried out on 100% of the weld joint and components. (3) 100% MT/PT shall be carried out on all branch connection welds.
22. Use socket for 2" NPS and below for branch connections to headers. Use weldolet for 3" NPS and above branch connections to headers.
23. For Vents, Drains and Instrument Connections use ASME B31.3 materials per Piping Material Specification Class HBE.
24. Shop and field hardness control by NACE SP0472 as referred in Suncor Firebag STD FB-L-5217. Weld hardness shall meet the requirements of CSA Z662-07 Clause 16.6.4.
25. Where pipe bends are required, they shall be specified by tagged piping specialty item and approved by owner's Engineer.
26. Positive Isolation required per drawings DD100-31-1, 2 and 3.
27. Stress Relieving (PWHT) required for thickness per CSA Z662-07, Clause 7.9.16.
28. Pipe shall be used in Category I applications only, as defined in CSA Z662-07, Clause 5.2.2.
29. Welding shall meet the requirements of CSA Z662-07, Clause 7.
30. Valves with suffix 'N3' may be substituted with suffix 'N1' for use in design under CSA Z662-07.
31. Material selection shall be carefully reviewed for service and design conditions under NACE MR0175 / ISO 15156 latest revision. For material requirements not included in this pipe class, including valves, alternate pipe classes with more suitable materials shall be considered.



Piping Material Specifications

Valve Details

<u>Check Valve</u> VCH0233#12-SW-N3 Rev Date 16-Mar-10	SUFFIX: -N3 Valve to conform to NACE MR0175 and NACE MR0103 latest revision Check Valve, Class CL 800 Socketweld, Forged Body to, ASTM A105 N, Welded Cover, Piston/Lift Type with Spring, API Trim 12, Integral or renewable, Hard Faced Seat, Full Port, Design to API-602 NOTES: Valve to be suitable for Hydrogen service □ Pressure/Temperature rating to ASME B16.34 Assigned Pipe Classes: HBA, HBE
<u>Check Valve</u> VCH0602#12-N3-H Rev Date 16-Mar-10	SUFFIX: -N3-H Valve shall conform to NACE MR0175 and NACE MR0103 latest revision, suitable for Hydrogen service with Flange facing of 125-150 microinch Check Valve, Class CL 600 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Cover, Swing Type, API Trim 12 design to API-600, Integral or Welded in Seats, Hard Faced Seat NOTES: Pressure/Temperature rating to ASME B16.34 Assigned Pipe Classes: HBA, HBE
<u>Compact Gate Valve</u> VGA0038#12-SW/TH-N3 Rev Date 16-Mar-10	SUFFIX: -N3 Valve to conform to NACE MR0175 and NACE MR0103 latest revision Compact Gate Valve, Class CL 800 Socketweld/Threaded, Forged Body to, ASTM A105 N, Welded Bonnet, OS & Y, Solid Wedge, API Trim 12, Integral or renewable, Reduced Port, Design to API-602 Assigned Pipe Classes: HBA, HBE
<u>Compact Gate Valve</u> VGA0038#12-SW-N3 Rev Date 16-Mar-10	SUFFIX: -N3 Valve to conform to NACE MR0175 and NACE MR0103 latest revision Compact Gate Valve, Class CL 800 Socketweld, Forged Body to, ASTM A105 N, Welded Bonnet, OS & Y, Solid Wedge, API Trim 12, Integral or Renewable seats, Regular Port, Design to API-602 NOTES: Valve to be suitable for Hydrogen service Assigned Pipe Classes: HBA, HBE
<u>Gate Valve</u> VGA0605#12-N3-H Rev Date 16-Mar-10	SUFFIX: -N3-H Valve shall conform to NACE MR0175 and NACE MR0103 latest revision, suitable for Hydrogen service with Flange facing of 125-150 microinch Gate Valve, Class CL 600 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 12, Welded in or Renewable Seats, Design to API-600 Assigned Pipe Classes: HBA, HBE
<u>Gate Valve</u> VGA0610#12-N3-H Rev Date 16-Mar-10	SUFFIX: -N3-H Valve shall conform to NACE MR0175 and NACE MR0103 latest revision, suitable for Hydrogen service with Flange facing of 125-150 microinch Gate Valve, Class CL 600 RF to ASME B16.47-A, Cast Body to, ASTM A216 Gr WCB, Pressure Sealed Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 12 design to API-600, Integral or Welded in or Renewable Seats, Regular Port NOTES: Pressure/Temperature rating to ASME B16.34 Assigned Pipe Classes: HBE
<u>Globe Valve</u> VGL0134#12-SW-N3 Rev Date 16-Mar-10	SUFFIX: -N3 Valve to conform to NACE MR0175 and NACE MR0103 latest revision Globe Valve, Class CL 800 Socketweld, Forged Body to, ASTM A105 N, Welded Bonnet, OS & Y, API Trim 12, Integral or Renewable seats, Design to API-602 NOTES: Valve to be suitable for Hydrogen service Assigned Pipe Classes: HBA, HBE
<u>Globe Valve</u> VGL0600#12-N3-H Rev Date 16-Mar-10	SUFFIX: -N3-H Valve shall conform to NACE MR0175 and NACE MR0103 latest revision, suitable for Hydrogen service with Flange facing of 125-150 microinch Globe Valve, Class CL 600 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, API Trim 12 design to API-600, Integral, Welded in or Renewable Seats NOTES: Pressure/Temperature rating to ASME B16.34 Assigned Pipe Classes: HBA, HBE
<u>Check Valve, Wafer Style</u> VWC0610-N3-H Rev Date 16-Mar-10	SUFFIX: -N3-H Valve shall conform to NACE MR0175 and NACE MR0103 latest revision, suitable for Hydrogen service with Flange facing of 125-150 microinch Check Valve, Wafer Style, Class CL 600 RF to fit between ASME B16.5 flanges, Cast Body to, ASTM A216 Gr WCB, Retainerless Style, Dual 316SS Plates, Inconel X750 Spring(s), Lapped Seats, w/Stellite Hard Faced Overlay, Design to API-594 Assigned Pipe Classes: HBA, HBE



Piping Material Specifications

Rev: **4**

Service Desc: <i>General Hydrocarbons & Boiler Feed Water Chemicals</i>					Temp: <i>850 (454)</i>	°F(°C)max
Materials: <i>Type 316/316L SS **5</i>			Corrosion Allow: <i>0.0625</i>		Code: <i>ASME B31.3</i>	
Material P&T:	<i>1440</i>	PSI @	<i>-20</i>	°F min.	Based on: <i>ASME B16.5 MG 2.2</i>	Branch Conn Tbl: <i>Note 2</i>
	<i>(9929)</i>	Kpa @	<i>(-29)</i>	°C min.		Inspection Class: <i>II</i>
	<i>835</i>	PSI @	<i>850</i>	°F max.		
	<i>(5757)</i>	Kpa @	<i>(454)</i>	°C max.		
P.W.H.T. : <i>NO</i>				Welding Proc: <i>Refer to Suncor Firebag STD FB-L-5217</i>		

Standard Specifications

Valve Specifications

<u>Pipe</u>				<u>Check Valve</u>			
0.75	2	ASTM A312, Type 316/316L, Seamless, Sch.80S		0.75	2	VCH0238#12-SW	**6
3	24	ASTM A312 Type 316/316L, Seamless, (wall thickness calculated per attachment L)		3	6	VCH0266#12	RF
				0.75	2	VCH0820#12-80S	BW, Sch 80S
<u>Fittings</u>				<u>Check Valve, Wafer Style</u>			
0.75	2	ASTM A182 F316/316L, Class 3000 SW **1,6		8	24	VWC0603	RF
0.75	24	ASTM A403 Gr. WP 316/316L-S, (Schedule to match pipe)		<u>Compact Gate Valve</u>			
<u>Flanges</u>				0.75	2	VGA0026#12-SW	**6
0.75	2	ASTM A182 F316/316L, Class 600 RF.SW **6		0.75	2	VGA0026#12-SW/TH	**6
0.75	24	ASTM A182 F316/316L, Class 600 RF.WN, (Bore to match pipe)		0.75	2	VGA0820#12-80S	BW, Sch 80S
				<u>Gate Valve</u>			
				3	24	VGA0066#12	RF
				<u>Globe Valve</u>			
				0.75	2	VGL0126#12-SW	**6
				3	6	VGL0166#12	RF
				0.75	2	VGL0820#12-80S	BW, Sch 80S

Special Material Specifications:

<u>Thermowells</u>	NPS 2, Class 600 RF, Flanged, A182 Type 316/316L, see Standard Drawing DD100-L-14-1, 2
<u>Bolting</u>	ASTM A193 Gr. B16, c/w A194 Gr. 4 Nuts
<u>Gaskets</u>	Spiral Wound 316SS, Graphite filled, c/w CS Outer Ring, per ASME B16.20 **7 Spiral Wound 316SS, Thermiculite filled, c/w 316SS Outer Ring, per ASME B16.20 **7

** SPECIAL NOTES **

- Unions are not permitted, use flanges.
- For SW fabrication use branch table 4, for BW fabrication use branch table 5.
- Weld metal shall have a ferrite content of 5 - 10% (per a Seven gauge).
- Wall thickness readings shall be made per Work Practice PMW0018A, "Baseline Ultrasonic Survey".
- Dual certified material pressure/temperature ratings are based on the higher ratings of the straight grade.
- For design temperatures above 800 F (427 C) use BW instead of SW.
- For design temperatures above 800 F (427 C) use SPWD Thermiculite filled gaskets.
- Deleted.
- Positive Isolation required per drawings DD100-L-31-1, 2 and 3
- Vents and Drains per DD100-L-12-1.
- Pressure Instrument Connections per DD100-L-11-1.



Piping Material Specifications

Valve Details

Check Valve

VCH0238#12-SW

Rev Date 22-Feb-08

Check Valve, Class CL 800 Socketweld, Forged Body to, ASTM A182Gr 316/316L Dual Cert, Bolted Cover, Piston/Lift Type with Spring, API Trim 12, Integral or Renewable seats, Hard Faced Seat, Full Port, Design to API-602

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: HH

Check Valve

VCH0266#12

Rev Date 17-Feb-08

Check Valve, Class CL 600 RF to ASME B16.5, Cast Body to, ASTM A351 Gr. CF8M, Bolted Cover, Swing Type, API Trim 12 design to API-600, Integral or Welded in Seats, Hard Faced Seat

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: HH

Check Valve

VCH0820#12-80S

Rev Date 22-Feb-08

Check Valve, Class CL 800 Buttweld Ends Sch 80S, Forged Body to, ASTM A182 F316/316L Dual Cert., Bolted Cover, Piston/Lift Type with Spring, API Trim 12, Integral or renewable hard faced seats, Full Port, Design to API-602

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: HH

Compact Gate Valve

VGA0026#12-SW

Rev Date 17-Feb-08

Compact Gate Valve, Class CL 800 Socketweld, Forged Body to, ASTM A182 F316/316L Dual Cert., Bolted Bonnet, OS & Y, Solid Wedge, API Trim 12, Integral or Renewable seats, Regular Port, Design to API-602

Assigned Pipe Classes: HH

Compact Gate Valve

VGA0026#12-SW/TH

Rev Date 17-Feb-08

Compact Gate Valve, Class CL800 Socketweld/Threaded, Forged 316L SS, ASTM A182 F316L, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 12, Integral or renewable hard faced seats, Regular Port, Design to API-602

Assigned Pipe Classes: HH

Gate Valve

VGA0066#12

Rev Date 17-Feb-08

Gate Valve, Class CL 600 RF to ASME B16.5, Cast Body to, ASTM A351 Gr. CF8M, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 12, Integral or Welded in Seats, Design to API-600

Assigned Pipe Classes: HH

Compact Gate Valve

VGA0820#12-80S

Rev Date 17-Feb-08

Compact Gate Valve, Class CL 800 Buttweld Ends Sch 80S, Forged Body to, ASTM A182 F316/316L Dual Cert., Bolted Bonnet, OS & Y, Solid Wedge, API Trim 12, Integral or Renewable seats, Design to API-602

Assigned Pipe Classes: HH

Globe Valve

VGL0126#12-SW

Rev Date 02-May-08

Globe Valve, Class CL 800 Socketweld, Forged Body to, ASTM A182 F316/316L Dual Cert., Bolted Bonnet, OS & Y, API Trim 12, Integral or Renewable seats, Design to API-602

Assigned Pipe Classes: CAG, EAG, HAG, HH

Globe Valve

VGL0166#12

Rev Date 22-Feb-08

Globe Valve, Class CL 600 RF to ASME B16.5, Cast Body to, ASTM A351 Gr. CF8M, Bolted Bonnet, OS & Y, API Trim 12 design to API-600, Integral or Welded in Seats

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: HH

Globe Valve

VGL0820#12-80S

Rev Date 17-Feb-08

Globe Valve, Class CL 800 Buttweld Ends Sch 80S, Forged Body to, ASTM A182 F316/316L Dual Cert., Bolted Bonnet, OS & Y, API Trim 12, Integral or Renewable seats, Design to API-602

Assigned Pipe Classes: HH

Class:

HH

Check Valve, Wafer Style

VWC0603

Rev Date 19-Jun-06

Check Valve, Wafer Style, Class CL 600 RF to fit between ASME B16.5 flanges, Cast Body to, ASTM A351
Gr. CF8M, Retainerless Style, Dual 316SS Plates, Inconel X750 Spring(s), Lapped Seats, w/Stellite Hard
Faced Overlay, Design to API-594
Assigned Pipe Classes: HH



Piping Material Specifications

Rev: **4**

Service Desc:	Steam, Condensate, and Boiler Feed Water **1			Temp:	800 (427)	°F(°C)max
Materials:	Carbon Steel			Corrosion Allow:	0.0625	Code: ASME B31.3
Material P&T:	1480	PSI @	-20	°F min.	Based on:	ASME B16.5 MG 1.1
	(10,205)	Kpa @	(-29)	°C min.	Branch Conn Tbl:	4
	825	PSI @	800	°F max.	Inspection Class:	III
	(5688)	Kpa @	(427)	°C max.		
P.W.H.T. :	NO (**9)			Welding Proc:	Refer to Suncor Firebag STD FB-L-5217	

Standard Specifications				Valve Specifications			
<u>Pipe</u>				<u>Check Valve</u>			
0.75	4	ASTM A106 Gr. B, Seamless, Sch 80		3	6	VCH0264#5	RF
6	24	ASTM A106 Gr. B, Seamless, (wall thickness calculated per attachment L)		0.75	2	VCH1275#5-SW	
30	36	API 5L GR B PSL-2, DSAW, (wall thickness calculated per attachment L)		<u>Check Valve, Wafer Style</u>			
				8	24	VWC0605	RF
<u>Fittings</u>				<u>Compact Gate Valve</u>			
0.75	2	ASTM A105N, Class 3000 SW		0.75	2	VGA1001#5-SW	
3	24	ASTM A234 WPB, (Schedule to match Pipe)		0.75	2	VGA1001#5-SW/TH	
30	36	ASTM A234 Gr. WPB-W (100%RT) (Schedule to match pipe)		<u>Gate Valve</u>			
				3	24	VGA0063#5	RF
<u>Flanges</u>				0.75	2	VGA0322#5	RF
0.75	2	ASTM A105N, Class 600 RF. SW		<u>Globe Valve</u>			
3	24	ASTM A105N, Class 600 RF. WN, (Bore to match Pipe)		3	8	VGL0161#5	RF
30	36	ASTM A105N, Class 600 RF. WN, ASME B16.47-A (Bore to match Pipe)		<u>Globe Valve, Y Pattern</u>			
				0.75	2	VGL1174#5-SW	

Special Material Specifications:

<u>Thermowells</u>	NPS 2, Class 600 RF, Flanged, A105N, see Standard Drawing DD100-L-14-1, 2
<u>Bolting</u>	ASTM A193 Gr. B7, c/w A194 Gr. 2H Nuts
<u>Gaskets</u>	Spiral Wound 316SS, Graphite filled, c/w CS Outer Ring, per ASME B16.20

** SPECIAL NOTES **

1. For ASME B31.1 code materials use Oil Sands Spec HSC.
2. Unions are not permitted, use flanges.
3. Positive Isolation required per drawings DD100-L-31-1, 2 and 3.
4. Wall thickness readings shall be made per Work Practice PMW0018A, "Baseline Ultrasonic Survey".
5. Deleted
6. Deleted.
7. Vents and Drains per DD100-L-12-1.
8. Pressure Instrument Connections per DD100-L-11-1.
9. PWHT required for thickness per ASME B31.3.



Piping Material Specifications

Valve Details

Check Valve

VCH03264#5

Rev Date 17-Feb-08

Check Valve, Class CL 600 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Cover, Swing Type Carbon Steel Disc, API Trim 5 design to API-600, Integral or Welded in Seats, Hard Faced Seat

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: HS

Check Valve

VCH1275#5-SW

Rev Date 22-Feb-08

Check Valve, Class CL 1500 Socketweld, Forged Body to, ASTM A105 N, Bolted Cover, Piston/Lift Type with Spring, API Trim 5, Integral or Renewable seats, Hard Faced Seat & Disc, Full Port, Design to API-602

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: HS, RSA, RSB

Gate Valve

VGA0063#5

Rev Date 22-Feb-08

Gate Valve, Class CL600 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 5, Integral or Welded in Seats, Design to API-600

NOTES: Body may also be forged Carbon Steel to ASTM A105N

Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: HS

Gate Valve

VGA0322#5

Rev Date 17-Feb-08

Gate Valve, Class CL 600 RF to ASME B16.5, Forged Body w/integral flanges, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 5, Integral or Renewable seats, Regular Port, Design to API-602

Assigned Pipe Classes: HS

Compact Gate Valve

VGA1001#5-SW

Rev Date 17-Feb-08

Compact Gate Valve, Class CL 1500 Socketweld, Forged Body to, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 5, Integral or Renewable seats, Regular Port, Design to API-602

Assigned Pipe Classes: HS, RSA, RSB, 662-1, 662-5

Compact Gate Valve

VGA1001#5-SW/TH

Rev Date 17-Feb-08

Compact Gate Valve, Class CL 1500 Socketweld/Threaded, Forged Body to, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 5, Integral or Renewable seats, Regular Port, Design to API-602

Assigned Pipe Classes: HS, RSA, RSB

Globe Valve

VGL0161#5

Rev Date 22-Feb-08

Globe Valve, Class CL 600 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, API Trim 5 design to API-600, Integral or Welded in Seats, Hard Faced Seat & Disc

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: HS

Globe Valve, Y Pattern

VGL1174#5-SW

Rev Date 22-Feb-08

Globe Valve, Y Pattern, Class CL 1500 Socketweld, Forged Body to, ASTM A105 N, bonnetless, API Trim 5, Integral or Renewable seats, Hard Faced Seat & Disc, Design to API-602

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: HS, RSA, RSB, 662-1, 662-5

Check Valve, Wafer Style

VWC0605

Rev Date 19-Jun-06

Check Valve, Wafer Style, Class CL 600 RF to fit between ASME B16.5 flanges, Cast Body to, ASTM A216 Gr WCB, Retainerless Style, Dual Carbon Steel Plates, Inconel X750 Spring(s), Lapped Seats, w/Stellite Hard Faced Overlay, Design to API-594

Assigned Pipe Classes: HB, HBD, HS



Piping Material Specifications

Rev: **4**

Service Desc: General Hydrocarbon	Temp: 300 (149) °F(°C)max
Materials: Low Temperature Carbon Steel	Corrosion Allow: 0.0625
Code: ASME B31.3	
Material P&T: 2220 PSI @ -50 °F min. (15,307) Kpa @ (-46) °C min. 1965 PSI @ 300 °F max. (13,549) Kpa @ (149) °C max.	Based on: ASME B16.5 MG 1.1 Branch Conn Tbl: 4 Inspection Class: II
P.W.H.T. : NO (**9)	Welding Proc: Refer to Suncor Firebag STD FB-L-5217

Standard Specifications	Valve Specifications
<u>Pipe</u> 0.75 3 ASTM A333 Gr.6, Seamless, Sch. 80 4 24 ASTM A333 Gr.6, Seamless, (wall thickness calculated per attachment L) <u>Fittings</u> 0.75 2 ASTM A350 LF2 CL 1, Class 3000 SW **2 3 24 ASTM A420 WPL6, (Schedule to match pipe) <u>Flanges</u> 0.75 2 ASTM A350 LF2 CL 1, Class 1500 RF.SW. **1,2 3 24 ASTM A350 LF2 CL 1, Class 900 RF.WN. (Bore to match pipe) **1	<u>Check Valve</u> 3 8 VCH0279#12 RF 0.75 2 VCH0289#12-SW <u>Compact Gate Valve</u> 0.75 2 VGA0075#12-SW 0.75 2 VGA0075#12-SW/TH 0.75 2 VGA1091#12 RF <u>Gate Valve</u> 3 24 VGA0080#12 RF <u>Globe Valve</u> 3 8 VGL1151#12 RF 0.75 2 VGL1198#12-SW <u>Wafer Check Valve</u> 10 24 VWC0914#12

Special Material Specifications:

<u>Thermowells</u>	NPS 2, Class 1500 RF, Flanged, A350 LF2 CL 1, see Standard Drawing DD100-L-14-1, 2 **1
<u>Bolting</u>	ASTM A320 Gr. L7, c/w A194 Gr. 4 Nuts
<u>Gaskets</u>	Spiral Wound 316SS, Graphite filled, c/w CS Outer Ring, per ASME B16.20, and Inner Ring per FB-L-5202, para 4.9.1

** SPECIAL NOTES **

1. All flange facings shall have a surface finish of 125-150 micro inch.
2. Unions are not permitted, use flanges.
3. Deleted.
4. All weld procedures shall include impact testing per ASME B31.3.
5. Deleted.
6. Positive Isolation required per drawing DD100-L-31-1, 2 and 3.
7. Vents and Drains per DD100-L-12-1.
8. Pressure Instrument Connections per DD100-L-11-3.
9. PWHT required for thickness per ASME B31.3.



Piping Material Specifications

Valve Details

Check Valve

VCH0279#12

Rev Date 22-Feb-08

Check Valve, Class CL 900 RF to ASME B16.5, Cast Body to, ASTM A352 Gr. LCC, Bolted Cover, Swing Type, API Trim 12 design to API-600, Integral or renewable hard faced seats

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: LAX

Check Valve

VCH0289#12-SW

Rev Date 17-Feb-08

Check Valve, Class CL 1500 Socketweld, Forged Body to, ASTM A350 Gr.LF2 CL 1, Bolted Cover, Piston/Lift Type with Spring, API Trim 12, Integral or Welded in Seats, Design to API-602

Assigned Pipe Classes: LAX, RAX

Compact Gate Valve

VGA0075#12-SW

Rev Date 17-Feb-08

Compact Gate Valve, Class CL 1500 Socketweld, Forged Body to, ASTM A350 Gr.LF2 CL 1, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 12, Integral or Welded in Seats, Regular Port, Design to API-602

Assigned Pipe Classes: LAX, RAX

Compact Gate Valve

VGA0075#12-SW/TH

Rev Date 17-Feb-08

Compact Gate Valve, Class CL 1500 Socketweld/Threaded, Forged Body to, ASTM A350 Gr.LF2 CL 1, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 12, Integral or Welded in Seats, Regular Port, Design to API-602

Assigned Pipe Classes: LAX, RAX

Gate Valve

VGA0080#12

Rev Date 17-Feb-08

Gate Valve, Class CL 900 RF to ASME B16.5, Cast Body to, ASTM A352 Gr. LCC, Bolted Bonnet, OS & Y, Flexible Wedge, API Trim 12, Integral or Welded in Seats, Design to API-600

Assigned Pipe Classes: LAX

Compact Gate Valve

VGA1091#12

Rev Date 17-Feb-08

Compact Gate Valve, Class CL 1500 RF to ASME B16.5, Forged Body w/integral flanges, ASTM A350 Gr.LF2 CL 1, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 12, Integral or Welded in Seats, Design to API-602

Assigned Pipe Classes: LAX, RAX

Globe Valve

VGL1151#12

Rev Date 22-Feb-08

Globe Valve, Class CL 900 RF to ASME B16.5, Cast Body to, ASTM A352 Gr. LCC, Bolted Bonnet, OS & Y, API Trim 12 design to API-600, Integral or Welded in Seats

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: LAX

Globe Valve

VGL1198#12-SW

Rev Date 17-Feb-08

Globe Valve, Class CL 1500 Socketweld, Forged Body to, ASTM A350 Gr.LF2 CL 1, Bolted Bonnet, OS & Y, API Trim 12, Integral or Welded in Seats, Design to API-602

Assigned Pipe Classes: LAX, RAX

Wafer Check Valve

VWC0914#12

Rev Date 19-Mar-08

Wafer Check Valve, Class CL900 RF to fit between ASME B16.5 flanges, Cast Body to, ASTM A352 Gr. LCC, Body with Hinge and Stop Pin, Dual Disc, API Trim 12, Integral Hard Faced Seats, API - 594

Assigned Pipe Classes: LAX



Piping Material Specifications

Rev: **4**

Service Desc: <i>General Hydrocarbon with Hydrogen **1</i>				Temp: <i>800 (427)</i>	°F(°C)max		
Materials: <i>Carbon Steel</i>		Corrosion Allow: <i>0.0625</i>		Code: <i>ASME B31.3</i>			
Material P&T:	<i>2220</i>	PSI @	<i>-20</i>	°F min.	Based on: <i>ASME B16.5 MG 1.1</i>	Branch Conn Tbl: <i>4</i>	Inspection Class: <i>II</i>
	<i>(15,307)</i>	Kpa @	<i>(-29)</i>	°C min.			
	<i>1235</i>	PSI @	<i>800</i>	°F max.			
	<i>(8515)</i>	Kpa @	<i>(427)</i>	°C max.			
	P.W.H.T. : <i>NO (**13)</i>						

Standard Specifications	Valve Specifications
<u>Pipe</u> 0.75 2 ASTM A106 Gr. B, Seamless, Sch 80 3 24 ASTM A106 Gr. B, Seamless, (wall thickness calculated per attachment L) <u>Fittings</u> 0.75 2 ASTM A105N, Class 3000 SW **3 3 24 ASTM A234 WPB, (Schedule to match Pipe) <u>Flanges</u> 0.75 2 ASTM A105N, Class 1500 RF. SW **2 3 24 ASTM A105N, Class 900 RF.WN, (Bore to match Pipe) **2	<u>Check Valve</u> 3 6 VCH1241#8-H RF 0.75 2 VCH1290#8-SW <u>Check Valve, Wafer Style</u> 8 24 VWC0907-H RF <u>Compact Gate Valve</u> 0.75 2 VGA1063#8-SW 0.75 2 VGA1063#8-SW/TH <u>Gate Valve</u> 0.75 2 VGA1009#8-H RF 3 24 VGA1041#8-H RF <u>Globe Valve</u> 0.75 2 VGL0139#5-SW 3 6 VGL1186#5 RF <u>Globe Valve, Y Pattern</u> 0.75 2 VGL1175#5-SW **5

Special Material Specifications:

<u>Thermowells</u>	NPS 2, Class 1500 RF, Flanged, A105N, see Standard Drawing DD100-L-14-1, 2 **2
<u>Bolting</u>	ASTM A193 Gr. B7, c/w A194 Gr. 2H Nuts
<u>Gaskets</u>	Spiral Wound 316SS, Graphite filled, c/w CS Outer Ring, per ASME B16.20, and Inner Ring per FB-L-5202, para 4.9.1

** SPECIAL NOTES **

1. The use of this line class is subject to the Hydrogen partial pressure/temperature limitations shown in API-941.
2. All flange faces shall have a surface finish of 125-150 micro inch.
3. Unions are not permitted, use flanges.
4. Deleted.
5. The Y-pattern VGL1175#5 shall be used only where specified on the P&ID by the Owners Engineer.
6. Wall thickness readings shall be made per Work Practice, PMW 0018A, "Baseline Ultrasonic Survey".
7. Refer to section 4.1.4 of Specification FB-L-5202 for MDMT guidelines.
8. Deleted.
9. Positive Isolation required per drawings DD100-L-31-1, 2 and 3.
10. Deleted.
11. Vents and Drains per DD100-L-12-1.
12. Pressure Instrument Connections per DD100-L-11-3.
13. PWHT required for thickness per ASME B31.3.



Piping Material Specifications

Valve Details

Check Valve

VCH1241#8-H

Rev Date 17-Feb-08

SUFFIX: -H Suitable for Hydrogen service and a flange facing of 125 -150 microinch

Check Valve, Class CL 900 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Pressure Sealed Cover, Tilting Disc, API Trim 8 design to API 600, Integral or Welded in Seats, Hard Faced Seat

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: LDA

Check Valve

VCH1290#8-SW

Rev Date 22-Feb-08

Check Valve, Class CL 1500 Socketweld, Forged Body to, ASTM A105 N, Welded Cover, Piston/Lift Type with Spring, API Trim 8, Integral or Renewable seats, Hard Faced Seat, Full Port, Design to API-602

NOTES: Pressure/Temperature rating to ASME B16.34. Valve to be suitable for Hydrogen service.

Assigned Pipe Classes: LDA

Gate Valve

VGA1009#8-H

Rev Date 17-Feb-08

SUFFIX: -H Suitable for Hydrogen service and a flange facing of 125 -150 microinch

Gate Valve, Class CL 1500 RF to ASME B16.5, Forged Body w/integral flanges, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 8, Integral or Renewable seats, Design to API-602

Assigned Pipe Classes: LDA

Gate Valve

VGA1041#8-H

Rev Date 17-Feb-08

SUFFIX: -H Suitable for Hydrogen service and a flange facing of 125 -150 microinch

Gate Valve, Class CL 900 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Pressure Sealed Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 8, Integral or Welded in Seats, Design to API-600

Assigned Pipe Classes: LDA

Compact Gate Valve

VGA1063#8-SW

Rev Date 17-Feb-08

Compact Gate Valve, Class CL 1500 Socketweld, Forged Body to, ASTM A105 N, Welded Bonnet, OS & Y, Solid Wedge, API Trim 8, Integral or Renewable seats, Design to API-602

NOTES: Valve to be suitable for Hydrogen service.

Assigned Pipe Classes: LDA

Compact Gate Valve

VGA1063#8-SW/TH

Rev Date 17-Feb-08

Compact Gate Valve, Class CL 1500 Socketweld/Threaded, Forged Body to, ASTM A105 N, Welded Bonnet, OS & Y, Solid Wedge, API Trim 8, Integral or renewable, Regular Port, Design to API-602

NOTES: Valve to be suitable for Hydrogen service

Assigned Pipe Classes: LDA

Globe Valve

VGL0139#5-SW

Rev Date 17-Feb-08

Globe Valve, Class CL 1500 Socketweld, Forged Body to, ASTM A105 N, Welded Bonnet, OS & Y, API Trim 5, Integral or Renewable seats, Design to API-602

NOTES: Valve to be suitable for Hydrogen service

Assigned Pipe Classes: LDA

Globe Valve, Y Pattern

VGL1175#5-SW

Rev Date 17-Feb-08

Globe Valve, Y Pattern, Class CL 1500 Socketweld, Forged Body to, ASTM A105 N, Welded Bonnet, OS & Y, API Trim 5, Integral or Renewable seats, Design to API-602

NOTES: Valve to be suitable for Hydrogen service

Assigned Pipe Classes: LDA

Globe Valve

VGL1186#5

Rev Date 22-Feb-08

Globe Valve, Class CL 900 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Pressure Sealed Bonnet, OS & Y, API Trim 5 design to API-600, Integral or Welded in Seats

NOTES: Valve to be suitable for Hydrogen service

Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: LDA

Check Valve, Wafer Style

VWC0907-H

Rev Date 19-Jun-06

SUFFIX: -H Suitable for Hydrogen service and a flange facing of 125 -150 microinch

Check Valve, Wafer Style, Class CL 900 RF to fit between ASME B16.5 flanges, Cast Body to, ASTM A216 Gr WCB, Retainerless Style, Dual Carbon Steel Plates, Inconel X750 Spring(s), Lapped Seats, w/Stellite Hard Faced Overlay, Design to API-594

Assigned Pipe Classes: LDA



Piping Material Specifications

Rev: **4a**

Service Desc: General Hydrocarbon with H2 & H2S **3				Temp: 800 (427) °F(°C)max	
Materials: Carbon Steel **1, 20, 31		Corrosion Allow: 0.125		Code: ASME B31.3 / CSA Z662	
Material P&T: 2220	PSI @ -20	°F min.	Based on: ASME B16.5 MG 1.1	Branch Conn Tbl: 4	
Note 15 (15,307)	Kpa @ (-29)	°C min.		Inspection Class: II **21	
1235	PSI @ 800	°F max.			
(8515)	Kpa @ (427)	°C max.			
P.W.H.T.: NO (**1, 6, 10, 27)			Welding Proc: Refer to Suncor Firebag STD FB-L-5217 **29		

Standard Specifications			Valve Specifications		
Pipe			Check Valve		
0.75	1.5	ASTM A106 Gr. B, Seamless, Sch. 160 **28	3	6	VCH0278#12-N3-H RF
2	24	ASTM A106 Gr. B, Seamless, (wall thickness calculated per attachment L) **28	0.75	2	VCH1291#12-SW-N3
Fittings			Check Valve, Wafer Style		
0.75	2	ASTM A105N, Class 6000 SW	8	24	VWC0900-N3-H RF
3	24	ASTM A234 WPB, (Schedule to match Pipe)	Compact Gate Valve		
Flanges			0.75	2	VGA1064#12-SW/TH-N3
0.75	2	ASTM A105N, Class 1500 RF. SW **4	0.75	2	VGA1064#12-SW-N3
3	24	ASTM A105N, Class 900 RF.WN, (Bore to match Pipe) **4	Gate Valve		
			3	24	VGA0900#12-N3-H RF
			0.75	2	VGA1097#12-N3-H RF
			Globe Valve		
			3	6	VGL0180#12-N3-H RF
			Globe Valve, Y Pattern		
			0.75	2	VGL1175#12-SW-N3

Special Material Specifications:

Thermowells	NPS 2, Class 1500 RF, Flanged, A105N, see Standard Drawing DD100-L-14-1, 2 **4
Bolting	ASTM A193 Gr. B7M, c/w A194 Gr. 2HM Nuts
Gaskets	Spiral Wound 316SS, Graphite filled, c/w CS Outer Ring, per ASME B16.20, and Inner Ring per FB-L-5202, para 4.9.1

** SPECIAL NOTES **

For ASME B31.3 design, Notes 1.-15. shall apply:

1. All materials for use in 'Oil and Gas Production Environments' shall comply with NACE MR0175 latest revision, see Appendix B1, "Sour Service Supplement" for further information. All materials for use in 'Petroleum Refining Environments' shall comply with NACE MR0103 latest revision, see Appendix B. All piping systems using this pipe class shall then be identified with the appropriate NACE reference, approved by the Owners Engineer, and noted in the project documentation. Material selection shall be carefully reviewed for service and design conditions with respect to the appropriate NACE documents. For material requirements not included in this pipe class, including valves, alternate pipe classes with more suitable materials shall be considered.
2. Unions are not permitted, use flanges.
3. The use of this line class is subjected to the Hydrogen partial pressure/temperature limitations shown in API-941.
4. All flange facings shall have a surface finish of 125-150 micro inch.
5. Deleted.
6. Hardness control requirements of NACE SP0472 shall be met for all welds in this class as referenced in Suncor Firebag STD FB-L-5217.
7. Refer to section 4.1.4 of Specification FB-L-5202 for MDMT guidelines.
8. Deleted.
9. Wall thickness readings shall be made per Work Practice PMW0018A, "Baseline Ultrasonic Survey".
10. PWHT required for thickness per ASME B31.3.
11. Positive Isolation required per drawings DD100-L-31-1, 2 and 3.
12. Deleted.
13. Vents and Drains per DD100-L-12-2.
14. Pressure Instrument Connections per DD100-L-11-3.
15. The maximum temperature for this pipe class is based on general carbon steel material limitations. For sour service systems identified under NACE MR0175 'Oil and Gas Production Environments', the maximum design temperature shall be restricted to the material and service requirements defined under NACE MR0175 / ISO 15156 latest edition.

For CSA Z662-07 design, Notes 20.-31. shall apply in addition to Notes 2.-4., & 15.:

20. All non CSA materials shall comply with the requirements of the sour service clause referenced in the applicable CSA Z245 standards: CSA Z245.1 Steel Pipe, CSA Z245.11 Steel Fittings, CSA Z245.12 Steel Flanges, CSA Z245.15 Steel Valves. Where no applicable CSA standard exists, the material requirements of NACE MR0175 / ISO 15156 (latest edition) apply. Note, all valves in this line class shall conform to NACE MR0175 / ISO 15156, latest edition. Sour service requirements shall be in accordance with Firebag Technical Note FB-PE6-TN008.
21. Inspection and Non-Destructive examination testing shall be carried out per CSA Z662-07. (1) All welds meeting the definition per CSA Z662-07 Clause 16.6.8, shall have 100% RT/UT for all butt weld joints and 100% MT/PT for all socket weld joints. For all welds excluded from the definition per Clause 16.6.8, there shall be a minimum 15% RT/UT for all butt weld joints and 15% MT/PT for all socket weld joints per CSA Z662-07, Clause 7.10.3 & 7.10.4. (2) Visual examination shall be carried out on 100% of the weld joint and components. (3) 100% MT/PT shall be carried out on all branch connection welds.
22. Use sockolet for 2" NPS and below for branch connections to headers. Use weldolet for 3" NPS and above branch connections to headers.
23. For Vents, Drains and Instrument Connections use ASME B31.3 materials per Piping Material Specification Class LLC.
24. Shop and field hardness control by NACE SP0472 as referred in Suncor Firebag STD FB-L-5217. Weld hardness shall meet the requirements of CSA Z662-07 Clause 16.6.4.
25. Where pipe bends are required, they shall be specified by tagged piping specialty item and approved by owner's Engineer.
26. Positive Isolation required per drawings DD100-31-1, 2 and 3.
27. Stress Relieving (PWHT) required for thickness per CSA Z662-07, Clause 7.9.16.
28. Pipe shall be used in Category I applications only, as defined in CSA Z662-07, Clause 5.2.2.
29. Welding shall meet the requirements of CSA Z662-07, Clause 7.
30. Valves with suffix 'N3' may be substituted with suffix 'N1' for use in design under CSA Z662-07.
31. Material selection shall be carefully reviewed for service and design conditions under NACE MR0175 / ISO 15156 latest revision. For material requirements not included in this pipe class, including valves, alternate pipe classes with more suitable materials shall be considered.



Piping Material Specifications

Valve Details

Check Valve

VCH0278#12-N3-H

Rev Date 16-Mar-10

SUFFIX: -N3-H Valve shall conform to NACE MR0175 and NACE MR0103 latest revision, suitable for Hydrogen service with Flange facing of 125-150 microinch

Check Valve, Class CL 900 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Pressure Sealed Cover, Tilting Disc, API Trim 12 design to API-600, Integral or Welded Hard Faced Seat

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: LLC

Check Valve

VCH1291#12-SW-N3

Rev Date 16-Mar-10

SUFFIX: -N3 Valve to conform to NACE MR0175 and NACE MR0103 latest revision

Check Valve, Class CL 1500 Socketweld, Forged Body to, ASTM A105 N, Welded Cover, Piston/Lift Type with Spring, API Trim 12, Integral or Renewable seats, Hard Faced Seat & Disc, Full Port, Design to API-602

NOTES: Valve to be suitable for Hydrogen service □ Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: LLC

Gate Valve

VGA0900#12-N3-H

Rev Date 16-Mar-10

SUFFIX: -N3-H Valve shall conform to NACE MR0175 and NACE MR0103 latest revision, suitable for Hydrogen service with Flange facing of 125-150 microinch

Gate Valve, Class CL 900 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Pressure Sealed Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 12, Integral or Welded in Seats, Design to API-600

Assigned Pipe Classes: LLC

Compact Gate Valve

VGA1064#12-SW/TH-N3

Rev Date 16-Mar-10

SUFFIX: -N3 Valve to conform to NACE MR0175 and NACE MR0103 latest revision

Compact Gate Valve, Class CL 1500 Socketweld/Threaded, Forged Carbon Steel, ASTM A105 N, Welded Bonnet, OS & Y, Solid Wedge, API Trim 12, Integral or renewable, Regular Port, Design to API-602

NOTES: Valve to be suitable for use in Hydrogen service

Assigned Pipe Classes: LLC

Compact Gate Valve

VGA1064#12-SW-N3

Rev Date 16-Mar-10

SUFFIX: -N3 Valve to conform to NACE MR0175 and NACE MR0103 latest revision

Compact Gate Valve, Class CL 1500 Socketweld, Forged Body to, ASTM A105 N, Welded Bonnet, OS & Y, Solid Wedge, API Trim 12, Integral or Renewable seats, Design to API-602

NOTES: Valve to be suitable for Hydrogen service.

Assigned Pipe Classes: LLC

Gate Valve

VGA1097#12-N3-H

Rev Date 16-Mar-10

SUFFIX: -N3-H Valve shall conform to NACE MR0175 and NACE MR0103 latest revision, suitable for Hydrogen service with Flange facing of 125-150 microinch

Gate Valve, Class CL 1500 RF to ASME B16.5, Forged Body w/integral flanges, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 12, Integral or Renewable seats, Design to API-602

Assigned Pipe Classes: LLC

Globe Valve

VGL0180#12-N3-H

Rev Date 16-Mar-10

SUFFIX: -N3-H Valve shall conform to NACE MR0175 and NACE MR0103 latest revision, suitable for Hydrogen service with Flange facing of 125-150 microinch

Globe Valve, Class CL 900 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Pressure Sealed Bonnet, OS & Y, Body guided disc, API Trim 12 design to API-600, Integral or Welded in Seats

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: LLC

Globe Valve, Y Pattern

VGL1175#12-SW-N3

Rev Date 16-Mar-10

SUFFIX: -N3 Valve to conform to NACE MR0175 and NACE MR0103 latest revision

Globe Valve, Y Pattern, Class CL 1500 Socketweld, Forged Body to, ASTM A105 N, Welded Bonnet, OS & Y, API Trim 12, Integral or Renewable seats, Design to API-602

NOTES: Valve to be suitable for Hydrogen service □ Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: LLC

Check Valve, Wafer Style

VWC0900-N3-H

Rev Date 16-Mar-10

SUFFIX: -N3-H Valve shall conform to NACE MR0175 and NACE MR0103 latest revision, suitable for Hydrogen service with Flange facing of 125-150 microinch

Check Valve, Wafer Style, Class CL 900 RF to fit between ASME B16.5 flanges, Cast Body to, ASTM A216 Gr WCB, Retainerless Style, Dual 316SS Plates, Inconel X750 Spring(s), Lapped Seats, w/Stellite Hard Faced Overlay, Design to API-594

Assigned Pipe Classes: LLC



Piping Material Specifications

Rev: **4**

Service Desc: General Hydrocarbons with Sulphur 0.02 to 1.0 Wt% and Jet Water	Temp: 800 (427) °F(°C)max
Materials: Carbon Steel	Corrosion Allow: 0.0625
Code: ASME B31.3	
Material P&T: 3705 PSI @ -20 °F min.	Based on: ASME B16.5 MG 1.1
(25,546) Kpa @ (-29) °C min.	Branch Conn Tbl: 4
2060 PSI @ 800 °F max.	Inspection Class: II
(14,207) Kpa @ (427) °C max.	
P.W.H.T. : NO (**12)	Welding Proc: Refer to Suncor Firebag STD FB-L-5217

Standard Specifications	Valve Specifications
<u>Pipe</u> 0.75 1.5 ASTM A106 Gr. B, Seamless, Sch. 160 2 24 ASTM A106 Gr. B, Seamless, (wall thickness calculated per attachment L) <u>Fittings</u> 0.75 2 ASTM A105, Class 6000 SW 3 24 ASTM A234 WPB, (Schedule to match Pipe) <u>Flanges</u> 0.75 2 ASTM A105N, Class 1500 RF. SW 3 24 ASTM A105N, Class 1500 RF.WN, (Bore to match Pipe)	<u>Check Valve</u> 0.75 2 VCH0236#8-SW 3 6 VCH0281#8 RF 6 6 VCH0282#8-120 BW, Sch 120 **5 3 4 VCH0282#8-80 BW, Sch 80 **5 <u>Check Valve, Wafer Style</u> 6 24 VWC1501 RF <u>Compact Gate Valve</u> 0.75 2 VGA0033#8-SW 0.75 2 VGA0033#8-SW-TH <u>Gate Valve</u> 3 24 VGA0081#8 RF 8 24 VGA0085#8-100 BW, Sch 100 **5 6 6 VGA0085#8-120 BW, Sch 120 **5 3 4 VGA0085#8-80 BW, Sch 80 **5 0.75 2 VGA1081#8 RF <u>Globe Valve</u> 0.75 2 VGL0194#5-SW 3 6 VGL1162#5 RF 6 6 VGL1196#5-120 BW, Sch 120 **5 3 4 VGL1196#5-80 BW, Sch 80 **5 <u>Plug Valve</u> 3 24 VPL0383 RF **3

Special Material Specifications:

<u>Thermowells</u>	NPS 2, Class 1500 RF, Flanged, A105N, see Standard Drawing DD100-L-14-1, 2
<u>Bolting</u>	ASTM A193 Gr. B7, c/w A194 Gr. 2H Nuts
<u>Gaskets</u>	Spiral Wound 316SS, Graphite filled, c/w CS Outer Ring, per ASME B16.20, and Inner Ring per FB-L-5202, para 4.9.1

**** SPECIAL NOTES ****

- Deleted.
- Unions are not permitted, use flanges.
- Plug valve to be used only in Coke cutting Jet Water.
- Wall thickness readings shall be made per Work Practice PMW0018A, "Baseline Ultrasonic Survey".
- RF valves preferred. BW valves may be used subject to approval of the Owner's Engineer.
- Refer to section 4.1.4 of Specification FB-L-5202 for MDMT guidelines.
- Deleted.
- Positive Isolation required per drawings DD100-L-31-1, 2 and 3.
- Deleted.
- Vents and Drains per DD100-L-12-2.
- Pressure Instrument Connections per DD100-L-11-3.
- PWHT required for thickness per ASME B31.3.



Piping Material Specifications

Valve Details

Check Valve

VCH0236#8-SW

Rev Date 22-Feb-08

Check Valve, Class CL 1500 Socketweld, Forged Body to, ASTM A105 N, Bolted Cover, Ball Type with Spring, API Trim 8, Integral or Renewable seats, Hard Faced Seat & Disc, Full Port, Design to API-602
NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: RAA

Check Valve

VCH0281#8

Rev Date 17-Feb-08

Check Valve, Class CL 1500 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Cover, Swing Type, API Trim 8 design to API 600, Integral or Welded in Seats, Hard Faced Seat
NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: RAA

Check Valve

VCH0282#8-120

Rev Date 19-Mar-08

Check Valve, Class CL 1500 Butt weld Ends Sch 120, Cast Body to, ASTM A216 Gr WCB, Bolted Cover, Swing Type, API Trim 8 design to API 600, Integral or Welded Hard Faced Seat
NOTES: Pressure/Temperature rating to ASME B16.34. Butt weld ends to ASME B16.25

Assigned Pipe Classes: RAA

Check Valve

VCH0282#8-80

Rev Date 19-Mar-08

Check Valve, Class CL 1500 Butt weld Ends Sch 80, Cast Body to, ASTM A216 Gr WCB, Bolted Cover, Swing Type, API Trim 8 design to API 600, Integral or Welded Hard Faced Seat
NOTES: Pressure/Temperature rating to ASME B16.34. Butt weld ends to ASME B16.25.

Assigned Pipe Classes: RAA

Compact Gate Valve

VGA0033#8-SW

Rev Date 17-Feb-08

Compact Gate Valve, Class CL 1500 Socketweld, Forged Body to, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 8, Integral or Renewable seats, Design to API-602

Assigned Pipe Classes: RAA

Compact Gate Valve

VGA0033#8-SW-TH

Rev Date 17-Feb-08

Compact Gate Valve, Class CL 1500 Socketweld/Threaded, Forged Body to, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 8, Integral or renewable, Regular Port, Design to API-602

Assigned Pipe Classes: RAA

Gate Valve

VGA0081#8

Rev Date 17-Feb-08

Gate Valve, Class CL 1500 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 8, Integral or Welded in Seats, Design to API-600

Assigned Pipe Classes: RAA

Gate Valve

VGA0085#8-100

Rev Date 17-Feb-08

Gate Valve, Class CL 1500 Butt weld Ends Sch 100, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 8, Integral or Welded in Seats, Design to API-600

NOTES: Butt weld ends to ASME B16.25

Assigned Pipe Classes: RAA

Gate Valve

VGA0085#8-120

Rev Date 17-Feb-08

Gate Valve, Class CL 1500 Butt weld Ends Sch 120, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 8, Integral or Welded in Seats, Design to API-600

NOTES: Butt weld ends to ASME B16.25

Assigned Pipe Classes: RAA

Gate Valve

VGA0085#8-80

Rev Date 17-Feb-08

Gate Valve, Class CL 1500 Butt weld Ends Sch 80, Cast Body to, ASTM A216 Gr WCB, Bolted Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 8, Integral or Welded in Seats, Design to API-600

NOTES: Butt weld ends to ASME B16.25

Assigned Pipe Classes: RAA

Gate Valve

VGA1081#8

Rev Date 17-Feb-08

Gate Valve, Class CL 1500 RF to ASME B16.5, Forged Body w/integral flanges, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 8, Integral or Renewable seats, Design to API-602

Assigned Pipe Classes: RAA

Globe Valve

VGL0194#5-SW

Rev Date 17-Feb-08

Globe Valve, Class CL 1500 Socketweld, Forged Body to, ASTM A105 N, Bolted Bonnet, OS & Y, API Trim 5, Integral or Renewable seats, Design to API-602
Assigned Pipe Classes: RAA

Globe Valve

VGL1162#5

Rev Date 22-Feb-08

Globe Valve, Class CL 1500 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Pressure Sealed Bonnet, OS & Y, Body guided disc, API Trim 5 design to API-600, Integral or Welded in Seats
NOTES: Pressure/Temperature rating to ASME B16.34
Assigned Pipe Classes: RAA, RSA, RSB

Globe Valve

VGL1196#5-120

Rev Date 22-Feb-08

Globe Valve, Class CL 1500 Buttweld Ends Sch 120, Cast Body to, ASTM A216 Gr WCB, Pressure Sealed Bonnet, OS & Y, API Trim 5 design to API-600, Integral or Welded in Seats
NOTES: Buttweld ends to ASME B16.25
Pressure/Temperature rating to ASME B16.34
Assigned Pipe Classes: RAA, RSA

Globe Valve

VGL1196#5-80

Rev Date 22-Feb-08

Globe Valve, Class CL 1500 Buttweld Ends Sch 80, Cast Body to, ASTM A216 Gr WCB, Pressure Sealed Bonnet, OS & Y, API Trim 5 design to API-600, Integral or Welded in Seats
NOTES: Buttweld ends to ASME B16.25
Pressure/Temperature rating to ASME B16.34
Assigned Pipe Classes: RAA

Plug Valve

VPL0383

Rev Date 19-Jun-06

Plug Valve, Class CL 1500 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Tapered Plug, Regular Port
NOTES: Molydisulfide coated plug, Nordstrom Fig. #K3049A.
Assigned Pipe Classes: RAA

Check Valve, Wafer Style

VWC1501

Rev Date 02-Nov-06

Check Valve, Wafer Style, Class CL 1500 RF to fit between ASME B16.5 flanges, Cast Body to, ASTM A216 Gr WCB, Retainerless Style, Dual Carbon Steel Plates, Inconel X750 Spring(s), Lapped Seats, w/Stellite Hard Faced Overlay, Design to API-594
Assigned Pipe Classes: RAA, RSA, RSB



Piping Material Specifications

Rev: **4**

Service Desc: <i>General Hydrocarbon</i>				Temp: <i>300 (149)</i> °F(°C)max	
Materials: <i>Low Temperature Carbon Steel</i>		Corrosion Allow: <i>0.0625</i>		Code: <i>ASME B31.3</i>	
Material P&T:	<i>3705</i>	PSI @	<i>-50</i>	°F min.	Based on: <i>ASME B16.5 MG 1.1</i> Branch Conn Tbl: <i>4</i> Inspection Class: <i>II</i>
	<i>(25,546)</i>	Kpa @	<i>(-46)</i>	°C min.	
	<i>3270</i>	PSI @	<i>300</i>	°F max.	
	<i>(22,547)</i>	Kpa @	<i>(149)</i>	°C max.	
P.W.H.T. : <i>NO (**9)</i>				Welding Proc: <i>Refer to Suncor Firebag STD FB-L-5217</i>	

Standard Specifications			Valve Specifications		
<u>Pipe</u>			<u>Check Valve</u>		
0.75	3	ASTM A333 Gr.6, Seamless, Sch. 160	0.75	2	VCH0289#12-SW
4	24	ASTM A333 Gr.6, Seamless, (wall thickness calculated per attachment L)	3	8	VCH1280#12 RF
<u>Fittings</u>			<u>Compact Gate Valve</u>		
0.75	2	ASTM A350 LF2 CL 1, Class 6000 SW **2	0.75	2	VGA0075#12-SW
3	24	ASTM A420 WPL6, (Schedule to match pipe)	0.75	2	VGA0075#12-SW/TH
<u>Flanges</u>			0.75	2	VGA1091#12 RF
0.75	2	ASTM A350 LF2 CL 1, Class 1500 RF.SW. **1,2	<u>Gate Valve</u>		
3	24	ASTM A350 LF2 CL 1, Class 1500 RF.WN. (Bore to match pipe) **1	3	24	VGA1580#12 RF
			<u>Globe Valve</u>		
			0.75	2	VGL1198#12-SW
			3	8	VGL1551#12 RF

Special Material Specifications:

<u>Thermowells</u>	NPS 2, Class 1500 RF, Flanged, A350 LF2 CL 1, see Standard Drawing DD100-L-14-1, 2
<u>Bolting</u>	ASTM A320 Gr. L7, c/w A194 Gr. 4 Nuts
<u>Gaskets</u>	Spiral Wound 316SS, Graphite filled, c/w CS Outer Ring, per ASME B16.20, and Inner Ring per FB-L-5202, para 4.9.1

** SPECIAL NOTES **

1. Deleted.
2. Unions are not permitted, use flanges.
3. Deleted.
4. All weld procedures shall include impact testing per ASME B31.3.
5. Deleted.
6. Positive Isolation required per drawing DD100-L-31-1, 2 and 3.
7. Vents and Drains per DD100-L-12-1.
8. Pressure Instrument Connections per DD100-L-11-1.
9. PWHT required for thickness per ASME B31.3.



Piping Material Specifications

Valve Details

Check Valve

VCH0289#12-SW

Rev Date 17-Feb-08

Check Valve, Class CL 1500 Socketweld, Forged Body to, ASTM A350 Gr.LF2 CL 1, Bolted Cover, Piston/Lift Type with Spring, API Trim 12, Integral or Welded in Seats, Design to API-602
Assigned Pipe Classes: LAX, RAX

Check Valve

VCH1280#12

Rev Date 19-Jun-06

Check Valve, Class CL 1500 RF to ASME B16.5, Cast Body to, ASTM A352 Gr. LCC, Bolted Cover, Swing Type, API Trim 12, Integral or Welded in Seats, Design to API-600
Assigned Pipe Classes: RAX

Compact Gate Valve

VGA0075#12-SW

Rev Date 17-Feb-08

Compact Gate Valve, Class CL 1500 Socketweld, Forged Body to, ASTM A350 Gr.LF2 CL 1, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 12, Integral or Welded in Seats, Regular Port, Design to API-602
Assigned Pipe Classes: LAX, RAX

Compact Gate Valve

VGA0075#12-SW/TH

Rev Date 17-Feb-08

Compact Gate Valve, Class CL 1500 Socketweld/Threaded, Forged Body to, ASTM A350 Gr.LF2 CL 1, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 12, Integral or Welded in Seats, Regular Port, Design to API-602
Assigned Pipe Classes: LAX, RAX

Compact Gate Valve

VGA1091#12

Rev Date 17-Feb-08

Compact Gate Valve, Class CL 1500 RF to ASME B16.5, Forged Body w/integral flanges, ASTM A350 Gr.LF2 CL 1, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 12, Integral or Welded in Seats, Design to API-602
Assigned Pipe Classes: LAX, RAX

Gate Valve

VGA1580#12

Rev Date 17-Feb-08

Gate Valve, Class CL 1500 RF to ASME B16.5, Cast Body to, ASTM A352 Gr. LCC, Bolted Bonnet, OS & Y, Flexible Wedge, API Trim 12, Integral or Renewable seats, Design to API-600
Assigned Pipe Classes: RAX

Globe Valve

VGL1198#12-SW

Rev Date 17-Feb-08

Globe Valve, Class CL 1500 Socketweld, Forged Body to, ASTM A350 Gr.LF2 CL 1, Bolted Bonnet, OS & Y, API Trim 12, Integral or Welded in Seats, Design to API-602
Assigned Pipe Classes: LAX, RAX

Globe Valve

VGL1551#12

Rev Date 22-Feb-08

Globe Valve, Class CL 1500 RF to ASME B16.5, Cast Body to, ASTM A352 Gr. LCC, Bolted Bonnet, OS & Y, Plug Type Body Guided Disc, API Trim 12 design to API-600, Integral or Welded in Seats
NOTES: Pressure/Temperature rating to ASME B16.34
Assigned Pipe Classes: RAX



Piping Material Specifications

Rev: **4**

Service Desc: Steam, Condensate	Temp: 800 (427) °F(°C)max
Materials: Carbon Steel	Corrosion Allow: 0.0625
Code: ASME B31.3	
Material P&T: 3705 PSI @ -20 °F min.	Based on: ASME B16.5 MG 1.1
(25,546) Kpa @ (-29) °C min.	Branch Conn Tbl: 4
2055 PSI @ 800 °F max.	Inspection Class: II
(14,169) Kpa @ (427) °C max.	
P.W.H.T. : NO (**9)	Welding Proc: Refer to Suncor Firebag STD FB-L-5217

Standard Specifications	Valve Specifications
<u>Pipe</u> 0.75 1.5 ASTM A106 Gr. B, Seamless, Sch. 160 2 24 ASTM A106 Gr. B, Seamless, (wall thickness calculated per attachment L) 26 42 API 5L GR B PSL-2, DSAW, (wall thickness calculated per attachment L) <u>Fittings</u> 0.75 2 ASTM A105N, Class 6000 SW **2 3 24 ASTM A234 WPB, (Schedule to match Pipe) 26 42 ASTM A234 Gr. WPB-W (100%RT) (Schedule to match pipe) <u>Flanges</u> 0.75 2 ASTM A105N, Class 1500 RF. SW 3 24 ASTM A105N, Class 1500 RF. WN, (Bore to match Pipe)	<u>Check Valve</u> 3 24 VCH1266#5 RF **1 4 24 VCH1268#5-120 BW, Sch 120 **1 3 3 VCH1268#5-160 BW, Sch 160 **2 0.75 2 VCH1275#5-SW <u>Check Valve, Wafer Style</u> 6 24 VWC1501 RF <u>Compact Gate Valve</u> 0.75 2 VGA1001#5-SW 0.75 2 VGA1001#5-SW/TH <u>Gate Valve</u> 3 24 VGA1061#5 RF 4 24 VGA1077#5-120 BW, Sch 120 3 3 VGA1077#5-160 BW, Sch 160 0.75 2 VGA1105#5 RF <u>Globe Valve</u> 3 6 VGL1162#5 RF 4 6 VGL1196#5-120 BW, Sch 120 3 3 VGL1196#5-160 BW, Sch 160 <u>Globe Valve, Y Pattern</u> 0.5 2 VGL1174#5-SW **6 2 2 VGL1504#5 RF

Special Material Specifications:

<u>Thermowells</u>	NPS 2, Class 1500 RF, Flanged, A105N, see Standard Drawing DD100-L-14-1, 2
<u>Bolting</u>	ASTM A193 Gr. B7, c/w A194 Gr. 2H Nuts
<u>Gaskets</u>	Spiral Wound 316SS, Graphite filled, c/w CS Outer Ring, per ASME B16.20, and Inner Ring per FB-L-5202, para 4.9.1

**** SPECIAL NOTES ****

- For NPS 8 to 24 wafer check valves are preferred.
- Unions are not permitted, use flanges.
- Refer to section 4.1.4 of Specification FB-L-5202 for MDMT guidelines.
- Deleted.
- Positive Isolation required per drawings DD100-L-31-1, 2 and 3.
- Use Valve VGL1174#5 for external Bonnet vent and By-pass piping.
- Vents and Drains per DD100-L-12-1.
- Pressure Instrument Connections per DD100-L-11-3.
- PWHT required for thickness per ASME B31.3.



Piping Material Specifications

Valve Details

Check Valve

VCH1266#5

Rev Date 17-Feb-08

Check Valve, Class CL 1500 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Pressure Sealed Cover, Tilting Disc, API Trim 5 design to API-600, Integral or Welded in Seats, Hard Faced Seat & Disc
NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: RSA, RSB

Check Valve

VCH1268#5-120

Rev Date 17-Feb-08

Check Valve, Class CL 1500 Butt weld Ends Sch 120, Cast Body to, ASTM A216 Gr WCB, Pressure Sealed Cover, Tilting Disc, API Trim 5 design to API-600, Integral or Welded in Seats, Hard Faced Seat & Disc
NOTES: Pressure/Temperature rating to ASME B16.34. Butt weld ends to ASME B16.25

Assigned Pipe Classes: RSA

Check Valve

VCH1268#5-160

Rev Date 17-Feb-08

Check Valve, Class CL 1500 Butt weld Ends Sch 160, Cast Body to, ASTM A216 Gr WCB, Pressure Sealed Cover, Tilting Disc, API Trim 5 design to API-600, Integral or Welded in Seats, Hard Faced Seat & Disc
NOTES: Pressure/Temperature rating to ASME B16.34. Butt weld ends to ASME B16.25

Assigned Pipe Classes: RSA, RSB

Check Valve

VCH1275#5-SW

Rev Date 22-Feb-08

Check Valve, Class CL 1500 Socket weld, Forged Body to, ASTM A105 N, Bolted Cover, Piston/Lift Type with Spring, API Trim 5, Integral or Renewable seats, Hard Faced Seat & Disc, Full Port, Design to API-602
NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: HS, RSA, RSB

Compact Gate Valve

VGA1001#5-SW

Rev Date 17-Feb-08

Compact Gate Valve, Class CL 1500 Socket weld, Forged Body to, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 5, Integral or Renewable seats, Regular Port, Design to API-602

Assigned Pipe Classes: HS, RSA, RSB, 662-1, 662-5

Compact Gate Valve

VGA1001#5-SW/TH

Rev Date 17-Feb-08

Compact Gate Valve, Class CL 1500 Socket weld/Threaded, Forged Body to, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 5, Integral or Renewable seats, Regular Port, Design to API-602

Assigned Pipe Classes: HS, RSA, RSB

Gate Valve

VGA1061#5

Rev Date 22-Feb-08

Gate Valve, Class CL 1500 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Pressure Sealed Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 5, Integral or Welded in Seats, Design to API-600
NOTES: Valve body shall have two bosses to accommodate by-pass piping and bonnet relief to have one boss. By-pass line size shall be in accordance with ASME B16.34. BW end wall schedule to be specified and suffix added per 6.1.4. External valved bonnet vent piping and/or valved integral by-pass is required complete with Y-Pattern Globe Valves, Class 1500 SW, Tag No. VGL1174#5-SW (NPS 1/2" for NPS 3" thru 4", NPS 3/4" for 6" thru 8", and NPS 1" for NPS 10" and larger) By-pass / bonnet vent piping and valve arrangement shall be in accordance with details shown in Suncor Technical Standard 0203 Appendix B.- "By-pass and bonnet relief configurations for valves in HP Steam and Boiler Feed Water." The piping and valve arrangement for each valve shall be treated as a Specialty Piping Item with data sheet also providing details of the configuration for each in-line valve. This data sheet shall be the responsibility of the involved EPC. The valve vendor shall be responsible for the hook-up and of the auxiliary piping to the in-line valve prior to shipment.

Assigned Pipe Classes: RSA, RSB

Gate Valve

VGA1077#5-120

Rev Date 22-Apr-08

Gate Valve, Class CL 1500 Buttweld Ends to match Pipe, Cast Body to, ASTM A216 Gr WCB, Pressure Sealed Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 5, Integral or Welded in Seats, Design to API-600
 NOTES: Valve body shall have two bosses to accommodate by-pass piping and bonnet relief to have one boss. By-pass line size shall be in accordance with ASME B16.34. BW end wall schedule to be specified and suffix added per 6.1.4. External valved bonnet vent piping and/or valved integral by-pass is required complete with Y-Pattern Globe Valves, Class 1500 SW, Tag No. VGL1174#5-SW (NPS 1/2" for NPS 3" thru 4", NPS 3/4" for 6" thru 8", and NPS 1" for NPS 10" and larger) By-pass / bonnet vent piping and valve arrangement shall be in accordance with details shown in Suncor Technical Standard 0203 Appendix B.- "By-pass and bonnet relief configurations for valves in HP Steam and Boiler Feed Water." The piping and valve arrangement for each valve shall be treated as a Specialty Piping Item with data sheet also providing details of the configuration for each in-line valve. This data sheet shall be the responsibility of the involved EPC. The valve vendor shall be responsible for the hook-up and of the auxiliary piping to the in-line valve prior to shipment.

Assigned Pipe Classes: RSA, 662-5

Gate Valve

VGA1077#5-160

Rev Date 02-Mar-08

Gate Valve, Class CL 1500 Buttweld Ends Sch 160, Cast Body to, ASTM A216 Gr WCB, Pressure Sealed Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 5, Integral or Welded in Seats, Design to API-600
 NOTES: Valve body shall have two bosses to accommodate by-pass piping and bonnet relief to have one boss. By-pass line size shall be in accordance with ASME B16.34. BW end wall schedule to be specified and suffix added per 6.1.4. External valved bonnet vent piping and/or valved integral by-pass is required complete with Y-Pattern Globe Valves, Class 1500 SW, Tag No. VGL1174#5-SW (NPS 1/2" for NPS 3" thru 4", NPS 3/4" for 6" thru 8", and NPS 1" for NPS 10" and larger) By-pass / bonnet vent piping and valve arrangement shall be in accordance with details shown in Suncor Technical Standard 0203 Appendix B.- "By-pass and bonnet relief configurations for valves in HP Steam and Boiler Feed Water." The piping and valve arrangement for each valve shall be treated as a Specialty Piping Item with data sheet also providing details of the configuration for each in-line valve. This data sheet shall be the responsibility of the involved EPC. The valve vendor shall be responsible for the hook-up and of the auxiliary piping to the in-line valve prior to shipment.

Assigned Pipe Classes: RSA, RSB

Gate Valve

VGA1105#5

Rev Date 02-Nov-06

Gate Valve, Class CL 1500 RF to ASME B16.5, Forged Body w/integral flanges, ASTM A105 N, Welded Bonnet, OS & Y, Solid Wedge, Integral or Renewable seats, Hard faced Seat & Disc, API Trim 5, Design to API-602

Assigned Pipe Classes: RSA, RSB

Globe Valve

VGL1162#5

Rev Date 22-Feb-08

Globe Valve, Class CL 1500 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Pressure Sealed Bonnet, OS & Y, Body guided disc, API Trim 5 design to API-600, Integral or Welded in Seats
 NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: RAA, RSA, RSB

Globe Valve, Y Pattern

VGL1174#5-SW

Rev Date 22-Feb-08

Globe Valve, Y Pattern, Class CL 1500 Socketweld, Forged Body to, ASTM A105 N, bonnetless, API Trim 5, Integral or Renewable seats, Hard Faced Seat & Disc, Design to API-602
 NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: HS, RSA, RSB, 662-1, 662-5

Globe Valve

VGL1196#5-120

Rev Date 22-Feb-08

Globe Valve, Class CL 1500 Buttweld Ends Sch 120, Cast Body to, ASTM A216 Gr WCB, Pressure Sealed Bonnet, OS & Y, API Trim 5 design to API-600, Integral or Welded in Seats
 NOTES: Buttweld ends to ASME B16.25

Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: RAA, RSA

Globe Valve

VGL1196#5-160

Rev Date 22-Feb-08

Globe Valve, Class CL 1500 Buttweld Ends Sch 160, Cast Body to, ASTM A216 Gr WCB, Pressure Sealed Bonnet, OS & Y, API Trim 5 design to API-600, Integral or Welded in Seats
 NOTES: Buttweld ends to ASME B16.25

Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: RSA, RSB

Globe Valve, Y Pattern**VGL1504#5**

Rev Date 17-Feb-08

Globe Valve, Y Pattern, Class CL 1500 RF to ASME B16.5, Forged Carbon Steel, ASTM A105 N, bonnetless, OS & Y, Plug Type Body Guided Disc, API Trim 5, Integral Hard Faced Seat & Disc, Design to API-602

Assigned Pipe Classes: RSA, RSB

Check Valve, Wafer Style**VWC1501**

Rev Date 02-Nov-06

Check Valve, Wafer Style, Class CL 1500 RF to fit between ASME B16.5 flanges, Cast Body to, ASTM A216 Gr WCB, Retainerless Style, Dual Carbon Steel Plates, Inconel X750 Spring(s), Lapped Seats, w/Stellite Hard Faced Overlay, Design to API-594

Assigned Pipe Classes: RAA, RSA, RSB



Piping Material Specifications

Rev: **4**

Service Desc: Boiler Feed Water	Temp: 800 (427) °F(°C)max
Materials: Carbon Steel	Corrosion Allow: 0.0625
Code: ASME B31.3	
Material P&T: 3705 PSI @ -20 °F min.	Based on: ASME B16.5 MG 1.1
(25,546) Kpa @ (-29) °C min.	Branch Conn Tbl: 4
2055 PSI @ 800 °F max.	Inspection Class: II
(14169) Kpa @ (427) °C max.	
P.W.H.T. : NO (**12)	Welding Proc: Refer to Suncor Firebag STD FB-L-5217

Standard Specifications

Valve Specifications

<u>Pipe</u>			<u>Check Valve</u>		
0.75	1.5	ASTM A106 Gr. B, Seamless, Sch. 160	3	24	VCH1266#5 RF **2
2	24	ASTM A106 Gr. B, Seamless, (wall thickness calculated per attachment L)	8	24	VCH1268#5-140 BW, Sch 140 **2
26	42	API 5L GR B PSL-2, DSAW, (wall thickness calculated per attachment L)	3	6	VCH1268#5-160 BW, Sch 160 **2
<u>Fittings</u>			0.75	2	VCH1275#5-SW
0.75	2	ASTM A105N, Class 6000 SW **3	<u>Check Valve, Wafer Style</u>		
3	24	ASTM A234 WPB, (Schedule to match Pipe)	6	24	VWC1501 RF
26	42	ASTM A234 Gr. WPB-W (100%RT) (Schedule to match pipe)	<u>Compact Gate Valve</u>		
<u>Flanges</u>			0.75	2	VGA1001#5-SW **1
0.75	2	ASTM A105N, Class 1500 RF. SW	0.75	2	VGA1001#5-SW/TH
3	24	ASTM A105N, Class 1500 RF. WN, (Bore to match Pipe)	<u>Gate Valve</u>		
			3	24	VGA1061#5 RF
			8	24	VGA1077#5-140 BW, Sch 140
			3	6	VGA1077#5-160 BW, Sch 160
			0.75	2	VGA1105#5 RF
			<u>Globe Valve</u>		
			3	6	VGL1162#5 RF
			3	6	VGL1196#5-160 BW, Sch 160
			<u>Globe Valve, Y Pattern</u>		
			0.75	2	VGL1174#5-SW **13
			2	2	VGL1504#5 RF

Special Material Specifications:

<u>Thermowells</u>	NPS 2, Class 1500 RF, Flanged, A105N, see Standard Drawing DD100-L-14-1, 2
<u>Bolting</u>	ASTM A193 Gr. B7, c/w A194 Gr. 2H Nuts
<u>Gaskets</u>	Spiral Wound 316SS, Graphite filled, c/w CS Outer Ring, per ASME B16.20, and Inner Ring per FB-L-5202, para 4.9.1

** SPECIAL NOTES **

1. Y-pattern globe valves are preferred.
2. For NPS 8 to 24 wafer check valves are preferred.
3. Unions are not permitted, use flanges.
4. Deleted.
5. Refer to section 4.1.4 of Specification FB-L-5202 for MDMT guidelines.
6. Deleted.
7. Positive Isolation required per drawings DD100-L-31-1, 2 and 3.
8. Deleted.
9. Vents and Drains per DD100-L-12-1.
10. Pressure Instrument Connections per DD100-L-11-3.
11. This piping spec class is Firebag specific.
12. PWHT required for thickness per ASME B31.3.
13. Use Valve VGL1174#5 for external Bonnet vent and By-pass piping.



Piping Material Specifications

Valve Details

Check Valve

VCH1266#5

Rev Date 17-Feb-08

Check Valve, Class CL 1500 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Pressure Sealed Cover, Tilting Disc, API Trim 5 design to API-600, Integral or Welded in Seats, Hard Faced Seat & Disc
NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: RSA, RSB

Check Valve

VCH1268#5-140

Rev Date 17-Feb-08

Check Valve, Class CL 1500 Butt weld Ends Sch 140, Cast Body to, ASTM A216 Gr WCB, Pressure Sealed Cover, Tilting Disc, API Trim 5 design to API-600, Integral or Welded in Seats, Hard Faced Seat & Disc
NOTES: Pressure/Temperature rating to ASME B16.34. Butt weld ends to ASME B16.25

Assigned Pipe Classes: RSB

Check Valve

VCH1268#5-160

Rev Date 17-Feb-08

Check Valve, Class CL 1500 Butt weld Ends Sch 160, Cast Body to, ASTM A216 Gr WCB, Pressure Sealed Cover, Tilting Disc, API Trim 5 design to API-600, Integral or Welded in Seats, Hard Faced Seat & Disc
NOTES: Pressure/Temperature rating to ASME B16.34. Butt weld ends to ASME B16.25

Assigned Pipe Classes: RSA, RSB

Check Valve

VCH1275#5-SW

Rev Date 22-Feb-08

Check Valve, Class CL 1500 Socket weld, Forged Body to, ASTM A105 N, Bolted Cover, Piston/Lift Type with Spring, API Trim 5, Integral or Renewable seats, Hard Faced Seat & Disc, Full Port, Design to API-602
NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: HS, RSA, RSB

Compact Gate Valve

VGA1001#5-SW

Rev Date 17-Feb-08

Compact Gate Valve, Class CL 1500 Socket weld, Forged Body to, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 5, Integral or Renewable seats, Regular Port, Design to API-602

Assigned Pipe Classes: HS, RSA, RSB, 662-1, 662-5

Compact Gate Valve

VGA1001#5-SW/TH

Rev Date 17-Feb-08

Compact Gate Valve, Class CL 1500 Socket weld/Threaded, Forged Body to, ASTM A105 N, Bolted Bonnet, OS & Y, Solid Wedge, API Trim 5, Integral or Renewable seats, Regular Port, Design to API-602

Assigned Pipe Classes: HS, RSA, RSB

Gate Valve

VGA1061#5

Rev Date 22-Feb-08

Gate Valve, Class CL 1500 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Pressure Sealed Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 5, Integral or Welded in Seats, Design to API-600
NOTES: Valve body shall have two bosses to accommodate by-pass piping and bonnet relief to have one boss. By-pass line size shall be in accordance with ASME B16.34. BW end wall schedule to be specified and suffix added per 6.1.4. External valved bonnet vent piping and/or valved integral by-pass is required complete with Y-Pattern Globe Valves, Class 1500 SW, Tag No. VGL1174#5-SW (NPS 1/2" for NPS 3" thru 4", NPS 3/4" for 6" thru 8", and NPS 1" for NPS 10" and larger) By-pass / bonnet vent piping and valve arrangement shall be in accordance with details shown in Suncor Technical Standard 0203 Appendix B.- "By-pass and bonnet relief configurations for valves in HP Steam and Boiler Feed Water." The piping and valve arrangement for each valve shall be treated as a Specialty Piping Item with data sheet also providing details of the configuration for each in-line valve. This data sheet shall be the responsibility of the involved EPC. The valve vendor shall be responsible for the hook-up and of the auxiliary piping to the in-line valve prior to shipment.

Assigned Pipe Classes: RSA, RSB

Gate Valve**VGA1077#5-140**

Rev Date 17-Feb-08

Gate Valve, Class CL 1500 Buttweld Ends Sch 140, Cast Body to, ASTM A216 Gr WCB, Pressure Sealed Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 5, Integral or Welded in Seats, Design to API-600

NOTES: Valve body shall have two bosses to accommodate by-pass piping and bonnet relief to have one boss. By-pass line size shall be in accordance with ASME B16.34. BW end wall schedule to be specified and suffix added per 6.1.4. External valved bonnet vent piping and/or valved integral by-pass is required complete with Y-Pattern Globe Valves, Class 1500 SW, Tag No. VGL1174#5-SW (NPS 1/2" for NPS 3" thru 4", NPS 3/4" for 6" thru 8", and NPS 1" for NPS 10" and larger) By-pass / bonnet vent piping and valve arrangement shall be in accordance with details shown in Suncor Technical Standard 0203 Appendix B.- "By-pass and bonnet relief configurations for valves in HP Steam and Boiler Feed Water." The piping and valve arrangement for each valve shall be treated as a Specialty Piping Item with data sheet also providing details of the configuration for each in-line valve. This data sheet shall be the responsibility of the involved EPC. The valve vendor shall be responsible for the hook-up and of the auxiliary piping to the in-line valve prior to shipment.

Assigned Pipe Classes: RSB

Gate Valve**VGA1077#5-160**

Rev Date 02-Mar-08

Gate Valve, Class CL 1500 Buttweld Ends Sch 160, Cast Body to, ASTM A216 Gr WCB, Pressure Sealed Bonnet, OS & Y, Flexible or Solid Wedge, API Trim 5, Integral or Welded in Seats, Design to API-600

NOTES: Valve body shall have two bosses to accommodate by-pass piping and bonnet relief to have one boss. By-pass line size shall be in accordance with ASME B16.34. BW end wall schedule to be specified and suffix added per 6.1.4. External valved bonnet vent piping and/or valved integral by-pass is required complete with Y-Pattern Globe Valves, Class 1500 SW, Tag No. VGL1174#5-SW (NPS 1/2" for NPS 3" thru 4", NPS 3/4" for 6" thru 8", and NPS 1" for NPS 10" and larger) By-pass / bonnet vent piping and valve arrangement shall be in accordance with details shown in Suncor Technical Standard 0203 Appendix B.- "By-pass and bonnet relief configurations for valves in HP Steam and Boiler Feed Water." The piping and valve arrangement for each valve shall be treated as a Specialty Piping Item with data sheet also providing details of the configuration for each in-line valve. This data sheet shall be the responsibility of the involved EPC. The valve vendor shall be responsible for the hook-up and of the auxiliary piping to the in-line valve prior to shipment.

Assigned Pipe Classes: RSA, RSB

Gate Valve**VGA1105#5**

Rev Date 02-Nov-06

Gate Valve, Class CL 1500 RF to ASME B16.5, Forged Body w/integral flanges, ASTM A105 N, Welded Bonnet, OS & Y, Solid Wedge, Integral or Renewable seats, Hard faced Seat & Disc, API Trim 5, Design to API-602

Assigned Pipe Classes: RSA, RSB

Globe Valve**VGL1162#5**

Rev Date 22-Feb-08

Globe Valve, Class CL 1500 RF to ASME B16.5, Cast Body to, ASTM A216 Gr WCB, Pressure Sealed Bonnet, OS & Y, Body guided disc, API Trim 5 design to API-600, Integral or Welded in Seats

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: RAA, RSA, RSB

Globe Valve, Y Pattern**VGL1174#5-SW**

Rev Date 22-Feb-08

Globe Valve, Y Pattern, Class CL 1500 Socketweld, Forged Body to, ASTM A105 N, bonnetless, API Trim 5, Integral or Renewable seats, Hard Faced Seat & Disc, Design to API-602

NOTES: Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: HS, RSA, RSB, 662-1, 662-5

Globe Valve**VGL1196#5-160**

Rev Date 22-Feb-08

Globe Valve, Class CL 1500 Buttweld Ends Sch 160, Cast Body to, ASTM A216 Gr WCB, Pressure Sealed Bonnet, OS & Y, API Trim 5 design to API-600, Integral or Welded in Seats

NOTES: Buttweld ends to ASME B16.25

Pressure/Temperature rating to ASME B16.34

Assigned Pipe Classes: RSA, RSB

Globe Valve, Y Pattern**VGL1504#5**

Rev Date 17-Feb-08

Globe Valve, Y Pattern, Class CL 1500 RF to ASME B16.5, Forged Carbon Steel, ASTM A105 N, bonnetless, OS & Y, Plug Type Body Guided Disc, API Trim 5, Integral Hard Faced Seat & Disc, Design to API-602

Assigned Pipe Classes: RSA, RSB

Check Valve, Wafer Style**VWC1501**

Rev Date 02-Nov-06

Check Valve, Wafer Style, Class CL 1500 RF to fit between ASME B16.5 flanges, Cast Body to, ASTM A216 Gr WCB, Retainerless Style, Dual Carbon Steel Plates, Inconel X750 Spring(s), Lapped Seats, w/Stellite Hard Faced Overlay, Design to API-594

Assigned Pipe Classes: RAA, RSA, RSB