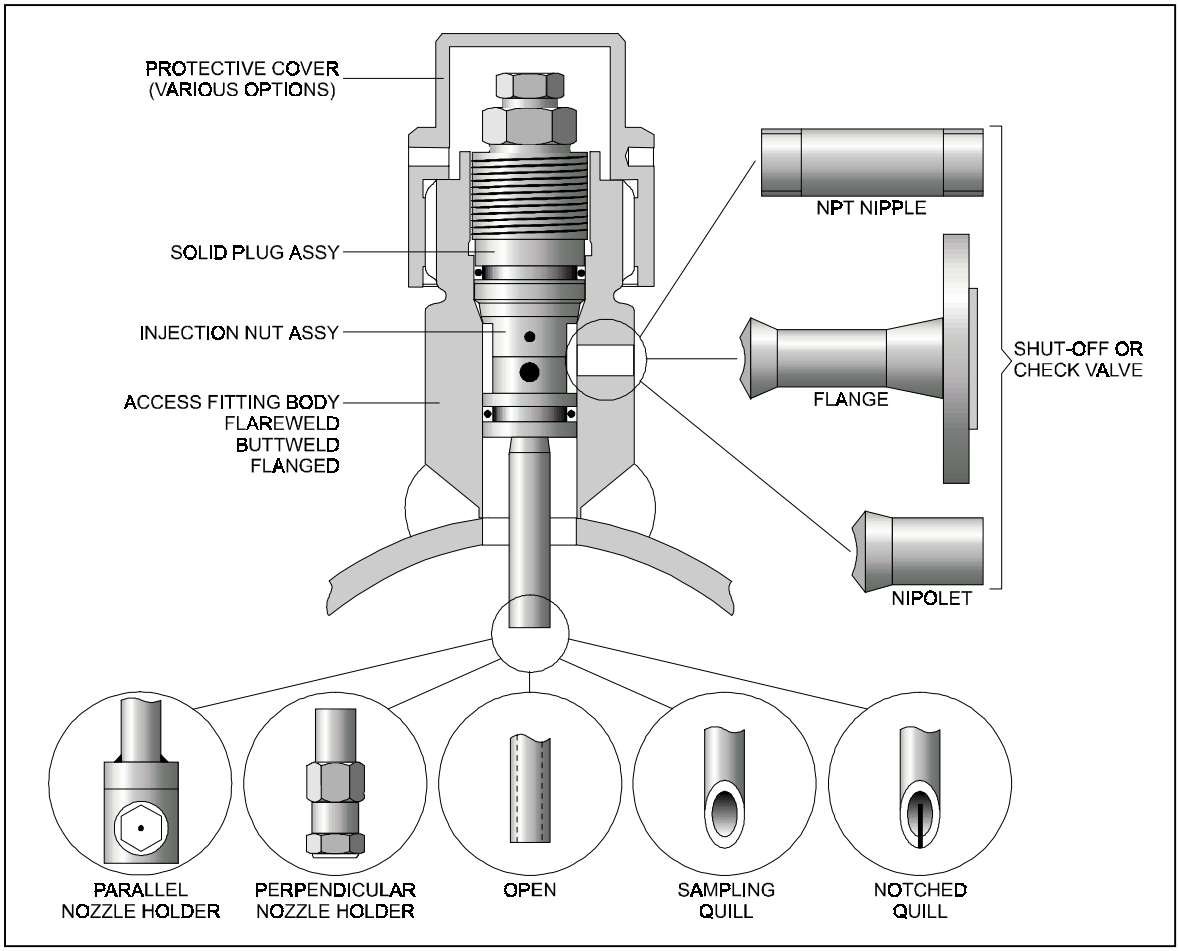
CHEMICAL INJECTION & SAMPLING EQUIPMENT
for the 2” high pressure (AC Series) access system

GL008.1

The injection of chemical treatments and sampling of process fluids are two major requirements for any corrosion control system. The Cormon range of injection and sampling equipment provides this capability and allows servicing on-line. Retrieval tools and some spare parts are common with the corrosion monitoring equipment using the same access system. Costs can therefore be reduced.



ACCESS FITTINGS with a side tee are the standard for injection and sampling applications, as they allow the insert assembly to be serviced without dismantling feeder pipework. If existing non-tee fittings are to be used, please refer to Cormon data sheet CMEF.009 for Tee-less © equipment.

The tee can be either an NPT thread, a welded plain nipple (Nipolet) or a welded flange. Threaded tees are not always acceptable in sour service. Tee fittings are available in all mounting styles: flarweld, buttweld and flanged. The inclusion of the tee often increases the fitting height which must be taken into account when selecting the injection/sampling accessories, for full details of the product code system for access fittings please refer to data sheet CMEF.007

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INSERT COMPONENTS: the insert assembly consists of a ***solid plug assembly***, an ***injection nut*** and a ***tube*** or ***quill*** selected to meet the specific requirement. For detailed information on solid plugs see data sheet CMEF.007.

The injection nut is sized for the access fitting height and tube/quill diameter - see below. The tube or quill is mounted into the injection nut body and must be selected to deliver the necessary volume of fluid to the selected point in the line.

INJECTION OPTIONS: the injection fluid can be drip fed or atomised, though atomisation is only useful for injection into gas filled spaces or treating gas systems. Both methods of injection can be either top or middle of line, usually referred to as ***perpendicular*** and ***parallel*** (to line flow) injection respectively. Top of line can be specified as flush for piggable lines.

DRIP FEED TUBES & QUILLS: for perpendicular drip feeds a plain end tube is used. This method relies on the natural turbulence in the flow to disperse the feed and may not be suitable when complete dispersal of a small volume of chemical is needed. Parallel injection uses a notched quill design at the centre of the line which creates an artificial turbulence in the fluid flow to disperse the treatment chemical more effectively. The term quill is derived from the diagonally cut end of the tube which resembles a quill pen. As the both designs may be used in fast fluid flows it is necessary to take into account the strength and wake frequency of the design. Quill and tube diameters are otherwise selected to suit the rate of injection. Standard sizes range between 1/8” and 3/4”.

ATOMISING NOZZLES & TUBES: perpendicular atomising nozzles are screwed into the end of an injection tube of the required length. Parallel nozzles require a tube with a mounting block holder. Nozzles are selected for the required flow rate at a given pressure difference across the nozzle - known as delta p (ΔP). The tube diameter must be capable of delivering the required flow and withstanding the system pressures and forces.

SAMPLING: it is often necessary to obtain samples of the line fluid for laboratory analysis in support of the system management. If there is a pressure drop across an open tube type injection point and the outside pressure is the lower, the system will act as a siphon and allow fluid to be sampled. Plain end and quill end tubes can be used in this way, although quills are not notched as the object is to sample the natural flow as accurately as possible.

EXTERNAL COMPONENTS: the outer end of a tee must be fitted with pressure control equipment such as a check or shut-off valve - ***without this there is no pressure barrier***. Valves are attached to the tee by a threaded nipple, welding or a flange. The plain nipple type tee can also be used with compression fittings. Usual practice is to fit a shut-off valve at the tee and then connect the feed or sample line to the valve, enabling the fitting to be isolated as near to the line as possible. Many injection systems are also fitted with check valves, which provide an additional barrier and can assist with getting the proper performance from atomising nozzles. Sophisticated combined check/isolation valves and double block-and-bleed valves are also available. Because of the wide range of options it is only possible to give limited details in this data sheet, please contact Cormon for information specific to your requirement.

All access points should be fitted with a ***protective cover*** that meets the requirements of the location. the options range from simple dust caps to secondary barrier designs with valve and gauge assemblies. Please refer to Cormon data sheet CMEF.008 for details.

SELECTING AND SIZING A SYSTEM

Step One: Select an access fitting, solid plug and cover from the appropriate data sheets, taking into account the tee style, mounting and material requirements. Derive the product codes from the table..

Step Two: Select an injection nut. From table 1 identify the fitting height and select the correct length nut. Select the material that meets the application requirements. This is most often 316ss with viton O rings and GF Teflon anti-extrusion rings, but other materials may be necessary. Compatibility with the plug assembly and fitting materials is required. Derive the product code from the table in the product code sheet.

Fitting Height		Nut Length	
5.25”	133mm	1.75”	45mm
6.25”	159mm	2.75”	70mm
7.25”	184mm	3.75”	95mm
8.25”	210mm	5.50”	140mm
9.25”	235mm	5.50”	140mm

Table 1

Step Three: Select the Quill/Tube/Nozzle configuration and diameter required. Table 2. gives a guide to the acceptable rate of flow for each tube diameter.

Sched 40 Tube NB	LITRES/Min @ 2.17 psi ΔP	U.S. GALS/Min (=0.15 kg/cm2)
1/4”	20	5.3
1/2”	65	17
3/4”	115	30

Table 2.

To calculate the tube/quill length, firstly calculate the basic dimension (K) from:

(H + MF + FG + WG) - (P + N) = K

Where

H	The access fitting height (mm)
MF	The mating flange height (mm)(for flanged fittings only)
FG	The flange gap allowance 1.6mm (for flanged fittings only)
WG	The weld gap allowance 1.6mm
P	The solid plug length (64mm)
N	The nut length (mm) as selected from table 1.

Remember that MF & FG are only required for flanged fittings. The result (K) is the distance from the base of the injection nut to the OD of the pipe. This dimension is used in calculating tube/quill lengths as follows. When the style and length are known, a product code can be derived from the product code sheet. See page 4

Open Tube and Quills (all dimensions in mm)

Middle of line	K + 1/2 Pipe OD + Thread Make-up (Table 3)
Flush	K + Pipe wall thickness + Thread make-up (Table 3)
Top of line	Flush length + projection distance required.

Thread	Make-up allowance
1/4” NPT	10 mm
1/2” NPT	13 mm
3/4” NPT	14 mm

Table 3

Atomising Nozzles (1/4” tube only)

Middle of line parallel	K + 1/2 Pipe OD + 10mm
Flush	K + Pipe wall thickness - 22mm

Cormon will assist with the design of injection systems, to do so we need the following information:

Target System Data	Injection Data
Pipe/vessel diameter,material & wall thickness	Fluid viscosity
Line pressure	Fluid density
Fluid viscosity	Fluid temperature
Fluid density	Injection pressure or ΔP
Mass or Volume flow rate	Mass or volume injection rate
Operating temperature	Injection fluid type

Product Code System

Accessories AC Injection

A I							
SYSTEM	**ITEM**		**PRESSURE**		**CONNECTION**		**MATERIAL**
Injection & sampling for 2” access system	**V**	Shut-off valve	**6**	6000 psi	**T1**	¼ NPT	**B03** 316SS
	C	Check valve			**T2**	½ NPT	
					T3	¾ NPT	See materials code list for other materials
					T4	1 NPT	
	F	Nipple fitting	**2**	2000 psi	**T1**	¼ NPT	*Insert the codes selected into the boxes above to create a Product Order Code:* ***AI V 6 T2 B03*** *for example*
			4	4000 psi	**T2**	½ NPT	
			6	6000 psi	**T3**	¾ NPT	
					T4	1 NPT	
	G	Gauge	**2**	2000 psi	**T1**	¼ NPT	
			4	4000 psi			
			6	6000 psi			

Injection & Sampling Nuts

A I	N					
SYSTEM	**ITEM**	**LENGTH**		**THREAD**		**MATERIAL**
Injection & sampling for 2” access system	Injection nut	**S**	1.75” / 45mm	**250**	¼ NPT	**B03** 316ss
		M	2.75” / 70mm	**500**	½ NPT	
		L	3.75” / 95mm	**750**	¾ NPT	**Note 1**
		V	5.5” / 140mm			**Note 2**
Note 1 Other materials available see materials code list **Note 2** Seal material is Viton® with PTFE anti-extrusion ring. For alternatives order standard and replacement O ring kit – see spare parts below.						
Insert the codes selected into the boxes above to create a Product Order Code: ***AI N S 250 B03*** *for example*						

Injection Tubes

A I	T						
SYSTEM	**ITEM**	**SIZE**		**TYPE**		**LENGTH**	**MATERIAL**
Injection & sampling for 2” access system	Tube	**250**	¼” NB	**OP**	Open plain end	Length in mm three figures eg **045**	**B03** 316ss
		500	½” NB	**NQ**	Notched quill		
		750	¾“ NB	**SQ**	Sampling quill		See materials code list for other materials
		250	¼“ NB	**HP**	Holder for parallel nozzle		
				NT	Threaded for perpendicular nozzle		
Insert the codes selected into the boxes above to create a Product Order Code: ***AI T 250 OP 165 B03*** *for example*							

Spare Parts for Injection Nuts

Viton® O Ring	**AIA OR N03**
Low temp.nitrile O ring	**AIA OR N07**
Kalrez® O ring	**AIA OR N04**
PTFE O ring	**AIA OR N06**
Set screw 316ss	**AAC SS B03**
Anti extrusion kit (PTFE)	**AIA BR N06**