



HYDROSTEEL[®] 6000

Portable, Rapid Identification of Corrosion Hotspots



Totally non-intrusive, Hydrosteel 6000 is the first flux monitor to measure active corrosion in steel pipes and vessels in petrochemical service at temperatures up to 500 °C, 930 °F.

Features:

- Rapid, reliable and repeatable measurement of hydrogen flux as an indicator of active corrosion
- Totally non-intrusive, testing does not require shut down and will not damage the steel
- Enables measurements on steel up to 500 °C, 930 °F
- Intrinsically safe for use in flammable areas
- Probes freely adapt to curved surfaces from 3.5 in diameter to flat
- Operates in any orientation, e.g. at base of pipe and vessels where corrodents puddle
- Little or no test surface preparation required
- No costly consumables required (such as adhesives, liquids or greases)
- Portable and light-weight
- Simple to use
- Data logging and PC software for results analysis



Advanced Gas Sensing Technologies
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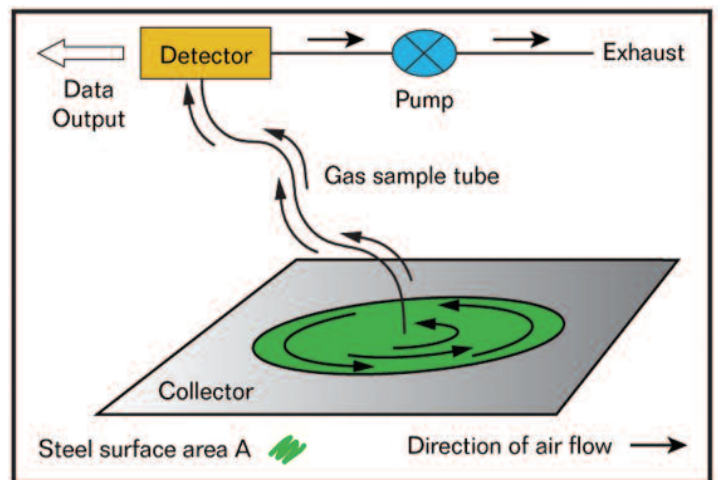
Hydrosteel 6000 is the ultimate portable tool for monitoring active sour, HF and high temperature corrosion and active risk of diffusible hydrogen damage to steel. Hydrosteel measurements of hydrogen flux are used to identify the time and location of these corrosion scenarios. Data is used to confirm effective process control and inhibitor control of corrosion, aiding decisions relating to feedstock blending, service life, cost-effective corrosion control programmes, production downtime and plant safety.

Hydrosteel 6000 is completely non-intrusive and intrinsically safe for use in flammable areas. Only minimal test surface preparation is required, and no consumables such as greases are needed, enabling reliable measurements to be made within 60 seconds.

Measurements can be taken at temperatures up to 500°C, 930 °F allowing high temperature active corrosion to be swiftly detected and monitored. Probes can be applied to pipes as small as 3.5 inches diameter to large vessels and flat surfaces at any orientation (e.g. at the 6 o'clock position).



How Hydrosteel works



A flexible Hydrosteel 'collector plate' is attached to a steel pipe or vessel magnetically or with strapping. Referring to the schematic, hydrogen gas fluxing from the steel surface under the collector plate, and from there into a highly sensitive hydrogen analyser where the concentration of hydrogen in the air stream is registered. Because hydrogen in air is highly diffusible the background hydrogen level is usually low and stable, and enrichment in hydrogen concentration brought about by the collection of flux provides a dependable way of measuring.

Applications include:

- Identification of corrosion hotspots
- Optimisation of corrosion control measures and inhibitor programs
- Monitoring of sour, HF acid and high temperature corrosion
- Risk Based Inspection of active hydrogen damage
- Testing the integrity of internal protective coatings
- Inform economics of feedstock cost versus high temperature corrosivity
- Optimisation of hydrogen bake-outs and controlled cooling of large vessels

LT-R Probe



The LT-R probe is a low temperature, roaming probe 6 inches in diameter, enabling spot measurements of flux within 60 seconds. It attaches to the steel magnetically, and with the aid of a strap for smaller pipes. The probe can be attached to steel surfaces as small as 3.5 inches in diameter and at temperatures up to 130°C, 270°F. Each collector plate can be used for up to 500 individual spot measurements. Extension poles are also supplied for use with the LT-R to provide extended reach on pipe trains. Applications of the LT-R include identifying the time and location of corrosion hotspots. Probe readings are used to verify the causes and control of corrosion, either by undertaking frequent measurements, or using the 36 hr monitoring capability of the instrument.

HT-R Probe



The high temperature HT-R probe is 2.25 inches in diameter and magnetically attachable to the steel surface. It can be applied to any steel surface greater than 8 inches in diameter and

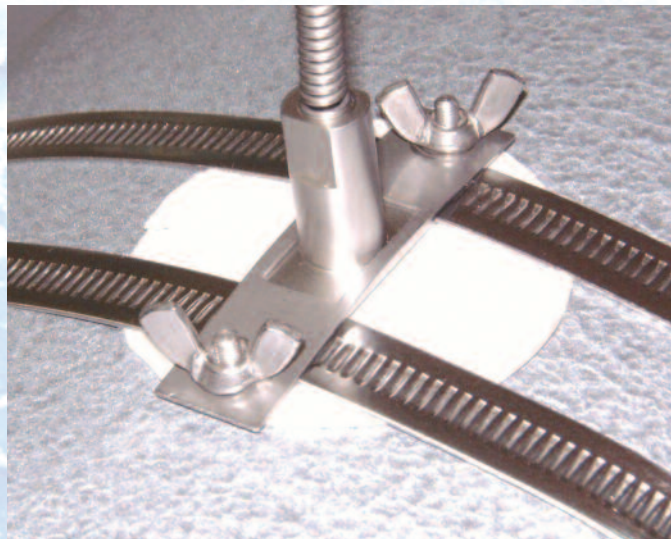
at temperatures up to 500 °C, 930 °F. Each replaceable probe plate can be used for up to 150 individual spot measurements. The HT-R probe has been specifically designed for insertion into inspection ports and is optimised for initial hydrogen flux inspection and mapping surveys of high temperature acid corrosion caused by naphthenic acid and thiols.

AT-S Probe



The all temperature stationary AT-S probe is 6 inches in diameter. It has been designed for semi-permanent installation at a site and is attached to a steel surface using banding. The AT-S probe is ideally attached at a site that requires frequent monitoring, ensuring consistent measurements time and again. These probes can be fixed to any steel surface greater than 8 inches in diameter and at temperatures up to 500°C, 930°F.

HT-S Probe



The high temperature stationary HT-S probe is 2.25 inches in diameter and is attached with banding to steel surfaces. The probe's small diameter enables measurements at pipe bends where corrosion can be significant. Again, this probe is designed for semi-permanent installation allowing repeat monitoring at a particular site of concern. The HT-S probe can be attached to any steel surface greater than 3.5 inches in diameter and up to 500°C, 930°F. They are used in routine surveys of sour, HF and naphthenic acid corrosion, in particular with a view of routinely assessing the corrosivity of crude blends at high criticality sites in refinery units.

Hydrosteel 6000



The Hydrosteel Complete Kit includes both the low temperature and high temperature probes, giving you everything you need to begin monitoring active corrosion. The Kit also includes a one year Gold Replacement Service* giving you total piece of mind that you will always have an instrument available for measurements.

*A Gold Replacement Service is an annual replacement service whereby you return your instrument for service and/or calibration and are supplied with a new condition replacement instrument with a full calibration and additional twelve-month warranty. Instruments can be returned to Ion Science, or your local Authorised Service Centre.

Hydrosteel 7000



Hydrosteel technology is also available in a fixed monitor, Hydrosteel 7000, used for continuous corrosion measurements at highly critical sites.

Easy to install and non-intrusive, Hydrosteel 7000 can be permanently attached to steel in petrochemical service up to 500 °C, 930 °F. Data is stored internally and communicated via a 4-20 mA output every 10 minutes, ensuring immediate awareness of any change in active corrosion.

Dependent upon application Hydrosteel 7000 can give a direct corrosion rate indication in mm/yr or mils/yr. Specialised software collates information regarding the hydrogen flux and steel type, temperature and thickness to calculate a corrosion rate in real-time.

TECHNICAL SPECIFICATION

MEASUREMENT PRINCIPLE

Hydrogen collection and analysis

INTRINSICALLY SAFE APPROVALS

II 2 G EEx ia IIC T4 -20 °C ≤ Ta ≤ 60 °C

Baseefa 02ATEX0093

OPERATION

Battery Type: 4 x Alkaline AA. Typically 30 hours life DC input 6 volts

SENSITIVITY

± 1 pL/cm²/s (Note: 1 pL = 10⁻¹² litres at s.t.p.)

DYNAMIC RANGE

0 to 15,000 pL/cm²/s

ACCURACY

± 10% display reading ± one digit

RESPONSE

T90 = 50 seconds

CALIBRATION

Certified to international UKAS/NIST standards

Yearly calibration required

COMMUNICATION

Bi-directional using IR port

DATA LOGGING

Over 40,000 data points with time & date stamp

PC SOFTWARE

Microsoft Windows and Vista compatible

TEMPERATURE

Analyzer: -20 to 50 °C, -13 to 120 °F

LT-R probe: steel surface up to 150 °C, 300 °F

HT-R probe: steel surface up to 500 °C, 930 °F

AT-S probe: steel surface up to 500 °C, 930 °F

HT-S probe: steel surface up to 500 °C, 930 °F

Storage < 20 °C, < 70 °F

GAS CONDUIT

Standard lengths available:

LT-R and HT-R 1 - 10m

LT-R only 2m

DIMENSIONS

Analyzer: 13.5 x 2.3 x 2 in., (34 x 6 x 5 cm)

LT-R and AT-S probes: 6 in., (15 cm) diameter

HT-R and HT-S probes: 2.25 in., (5.7 cm) diameter

WEIGHT

Analyzer: 1 lb, 450 g

LT-R probe: 14 oz, 397 g

HT-R probe: 11 oz, 312 g

STEEL CURVATURE RANGE

Minimum diameters

LT-R and HT-S probes: 3.5 in., 9 cm

HT-R and AT-S probes: 8 in., 20 cm

EMC tested EN50081-1 & EN50082-1 July 98



For further information and ordering please call:
Tel: +44 (0) 1763 208 503
Email: info@ionscience.com
www.ionscience.com

ION SCIENCE LIMITED
The Way, Fowlmere, Cambs. SG8 7UJ, UK