

# Inspection of jacketed insulation for moisture and water



## Background

Piping and production vessels are very often protected by insulation. Aluminium or steel jackets normally protect insulated outdoor installations of chemical and petrochemical production plants.

Leaks in the metallic insulation cover arise with time and water or moisture penetrates to inside the jacketed skin, where it may accumulate at locations far away from its entrance point. Such locations with trapped moisture and water are very difficult to identify by visual methods. Moisture inside insulation intensifies the risk of corrosion attacks and such attacks could at worst cause expensive downtime.

## Moisture Detection

FORCE Technology has developed a sensor (Moisture Probe) for manual non-destructive inspection of insulation behind metal-jacketed skin for content of moisture and water.

The Moisture Probe is intended for quick and reliable inspection of:

- Insulated horizontal piping
- T-connections and other connection types on vertical piping
- Insulated production vessels.

## Advantages

Inspection of insulated installations with the Moisture Probe has the following advantages:

- Detection is done without removal of the metal jacket
- Very short detection time
- The result is shown instantly
- Sectors of the installation with moisture in the insulation can be marked concurrently
- Removal of jackets and insulation in order to examine for external corrosion is only done where moisture and water has been identified.



*Moisture Probe with scanner head and terminal*

## Moisture Probe

The Moisture Probe is a hand-held instrument. It is battery powered and easy to operate. The instrument includes the hand-held probe head and a hand-held terminal for data processing and data presentation. Data can be transferred from terminal memory to a pc.

## Manual Inspection

Inspection for water and moisture in the insulation material is performed with the probe head held on the external side of the metallic protection. Measurement is performed in a network of positions on the installation to be examined. In a measuring position do the probe detect for water and moisture below an area of 10 x 15 cm and depth range of 3 – 5 cm. The measurement is accomplished in few seconds and the result shown simultaneously on the display of the terminal. Measurement start and measurement stop is controlled from the terminal that also stores the data in its memory.

## Sensor Technology

By combining a neutron source with a special detector configuration it is possible to design a sensor that is very sensitive to materials with a high content of hydrogen atoms (like water and hydrocarbons) and at the same time almost insensitive to metals. Based on this FORCE Technology has successfully developed a sensor that can detect water inside insulation covered by a metal jacket.



*External corrosion appears after removal of the jacketed insulation*

## Inspection service

As a company offering advanced non-destructing inspection service world wide, FORCE Technology provides inspection with the Moisture Probe. Inspectors from FORCE have expertise in such inspection and they do also have the necessary qualifications for safe handling of the instrumentation that contains an ionizing radiation source. Prior to inspection it is arranged how it should be reported if the inspection identifies locations of the installation as having moisture or water inside the insulation. Such locations could be labelled on-site and reported in the customers reference system. Inspection with the Moisture Probe does not require sections of the plant to be cordoned off due to radiation hazards.



## Subsequent inspection

FORCE Technology can as a subsequent service to moisture inspection offer inspection for external corrosion and loss of material at locations where an installation has been hidden in a critically wet environment.



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