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Inspection/certification of the ChemResist® ETFE fluoroplastic lining system from Rudolf Gutbrod GmbH under application of thermal stress and vacuum

Customer: Rudolf Gutbrod GmbH, Im Schwöllbogen 10,
72581 Dettingen/Erms, Germany

Order: Order dated 14 January 2011

Order number: 600 115 575

Subject of the inspection: Inspection of the ChemResist® ETFE lining, applied to a column section (DN = 1000 mm, height = 1000 mm) with two flat covers

Preparation of the column section before application of the lining: Column section thermally degreased at 430 °C, then sand-blasted with aluminium oxide

Inspection conditions: Column section temperature 150 °C; pressure 25 mbar absolute (external overpressure approx. 1 bar); stress period 125 hours (> 5 days)

Start of inspection: 21th January 2011

End of inspection: 26th January 2011

Evaluation: 1st February 2011

State of lining before inspection: Thickness on container 3.6 to 4.2 mm (Ø 4.1 mm), thickness on cover 3.6 to 4.7 mm (Ø 4.2 mm), thickness on base 3.8 to 4.3 mm (Ø 4.0 mm).
The lining was bubble-free and exhibited no signs of contamination or external influences.
The cover and base were sealed against the mechanically-processed flange using PTFE sealing tape (10 x 3.0 mm). The cover and base were each fastened with 28 screws, with a torque of 220 Nm applied to each screw.

Inspection run: Two thermal elements were attached to the container for measuring the container temperature (steel body) and ambient temperature, and were connected to measuring devices. A metal hose was connected to the vacuum pump and a digital manometer through a flange in the cover.

Date: 2011-02-01

Our reference:
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Report No. 600 115 575

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The test results refer exclusively to the units under test.



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After application of an absolute vacuum of 25 mbar, the entire container was placed in a convection oven. The screw connections were retightened after one hour. With applied vacuum, the column section was then heated to 150 °C in the convection oven. The column temperature was reached after 5 hours and then maintained at 150 °C.

Temperature measurement:	Two temperature data loggers – Testo 735-1 and 735-2 (new devices with factory calibration; accuracy ± 0.2 K). A thermal element was inserted into each bore on the flange in order to measure the column section temperature.
Pressure measurement:	Membranovac DM 12 with D/2000 sensor (new device with factory calibration; measurement uncertainty 0.5% from measured value)
Duration of inspection:	The inspection conditions were maintained for 125 hours and recorded for documentation (column section temperature 150 °C; pressure 25 mbar absolute (external overpressure ca. 1 bar); stress period 125 hours (> 5 days)).
State of lining after inspection:	No changes were detected as compared to the new condition before the inspection. In particular, there were no bubbles, cracks or lining detachment, etc.

Inspection results:

Under inspection conditions, the lining exhibited no changes as compared to the new condition.

As such, ChemResist® ETFE fluoroplastic lining meets the following requirements:

- Object temperature 150 °C
- Vacuum 25 mbar absolute
- Stress period of 5 days

Chemical resistance against media was not a part of this inspection.

Filderstadt, 1st February 2011

Authorised assessor

Bernd Ernst



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