Test Report no. A1742033-01 (eng)

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Project / Plant:	Building entry system Hauff MSH-FW with the outer sealing element module 1 and outer sealing element module 2, installed in a wall sleeve of a test block with exterior waterproofing PCI Pecimor 2K (waterproofing class W2.1E according to DIN 18533-1)
Order date:	20 December 2017
Product description:	Building entry system Hauff MSH-FW with the outer sealing element module 1 and outer sealing element module 2
Order:	≥ 1,0 bar water tightness test for 28 days
Number of samples / tests:	1 test
Sampling:	on: - / by: Applicant
Date of delivery:	20 December 2017
Testing period:	20 December 2017 - 17 January 2018
Contact:	B. Eng. David Röck Tel. +49 821 72024-14
Number of annexes:	The test report contains 1 annex
Remark:	Translation of Test Report A1742033-01, 11 June 2018

Gersthofen, 11 June 2018
rö/cl

p. p. Dipl.-Ing. (FH) Kerstin Schedl
- Project manager -

Kiwa GmbH

p. p. Jörg Bölzle
- Project manager -

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1. General

Kiwa GmbH, Bautest Augsburg, was contracted by Hauff-Technik GmbH & Co. KG to test the water tightness of the building entry system Hauff MSH-FW [1] with the outer sealing element module 1 and outer sealing element module 2, installed in a test block with exterior waterproofing PCI Pecimor 2K (waterproofing class W2.1E according to DIN 18533-1 [2] and DIN 18533-3 [3]).

Therefore Hauff-Technik GmbH & Co. KG delivered the concrete test block with the already installed building entry system Hauff MSH-FW with the outer sealing element module 1 and outer sealing element module 2 together with the components for the test setup to our test laboratory in Gersthofen, Germany. The surface of the test block which was charged with water pressure was already finished with the exterior waterproofing polymer modified bituminous coating (PMBC) PCI Pecimor 2K [4] according to DIN EN 15814 [5]. The assembly of the test setup was performed by an employee of Hauff-Technik GmbH & Co. KG (see Figure 1).

To test exclusively the sealing function between the PMBC and the outer sealing element module 2 the cast in wall sleeve and the outer sealing element module 1 was cut longitudinal to create a gap for possibly penetrating water.

Figure 1. Assembled test setup.

2. References

[1] Hauff-Technik GmbH & Co. KG - „Montageanweisung für MSH-FW Basic ma_msh_fw_161028.

[2] DIN 18533-1. Waterproofing of elements in contact with soil – Part 1: Requirements and principles for design and execution. Edition July 2017.

[3] DIN 18533-3. Waterproofing of elements in contact with soil – Part 3: Waterproofing with liquid-applied waterproofing materials. Edition July 2017.

[4] PCI technical data sheet 302 - „Bitumen thick coating PCI Pecimor® for external basement walls and foundations. Edition August 2017.

[5] DIN EN 15814. Polymer modified bituminous thick coatings for waterproofing - Definitions and requirements. Edition March 2015.

[6] WIKA Alexander Wiegand SE & CO. KG - "Inspection certificate according to EN 10204 - 3.1. Order No. 22392920/2".

3. Test procedure

3.1 Test preparation (Hauff Technik GmbH & Co. KG)

The assembly of the test setup was performed by the manufacturer (Hauff Technik GmbH & Co. KG) of the building entry system at Kiwa GmbH in Gersthofen, Germany. According to information given by the manufacturer the test setup was assembled as follows:

A wall sleeve was cut longitudinal to create a gap before it was cast in a test block with concrete strength C20/25.

The surface of the test block which was charged with water pressure (this corresponds to the outside of a building) was treated with two layers of the PMBC PCI Pecimor 2K [4] according to DIN EN 15814 [5] to create an exterior waterproofing.

After hardening of the PMBC the building entry system Hauff MSH-FW was set in the wall sleeve drill (see Figure 2) through the side of the concrete test block which was not charged with water pressure until the flange was flush with the concrete surface. After that the five internal hex screws were tightened crosswise until all control pins were flush with the front panel (see Figure 3) or a torque with a maximum of 25 Nm was reached. The internal hex screws were covered with protective screw caps.

Subsequently the sleeve pipes and the internal sealing surface of the MSH-FW outer sealing element module 1 were spread with the lubricant Hauff Gm. The outer sealing element module 1 was then pushed above the sleeve pipes in the wall sleeve (see Figure 4) through the side of the concrete test block which was charged with water pressure. The five internal hex screws of the outer sealing element module 1 were also tightened crosswise until all control pins were flush with the front panel (see Figure 5) or a torque with a maximum of 25 Nm was reached.

The MSH-FW outer sealing element module 2 was pushed above the sleeve pipes (see Figure 6) through the side of the concrete test block which was charged with water pressure until it`s flange was flush with the concrete surface. The five internal hex screws of the outer sealing element module 2 were tightened crosswise until all control pins were flush with the front panel (see Figure 7) or a torque with a maximum of 18 Nm was reached.

After the sleeve pipes of the building entry system were closed with the sleeve caps MS75 (see Figure 8 - left) and MS125 (see Figure 8 - right) at the side of the concrete test block which was charged with water pressure a testing cylinder with pressure reducer, manometer and an EPDM sealing was attached above the sealing system. The sealing of the testing cylinder was performed with the help of the EPDM sealing and the clamping pressure of the threaded rods and the security bar.

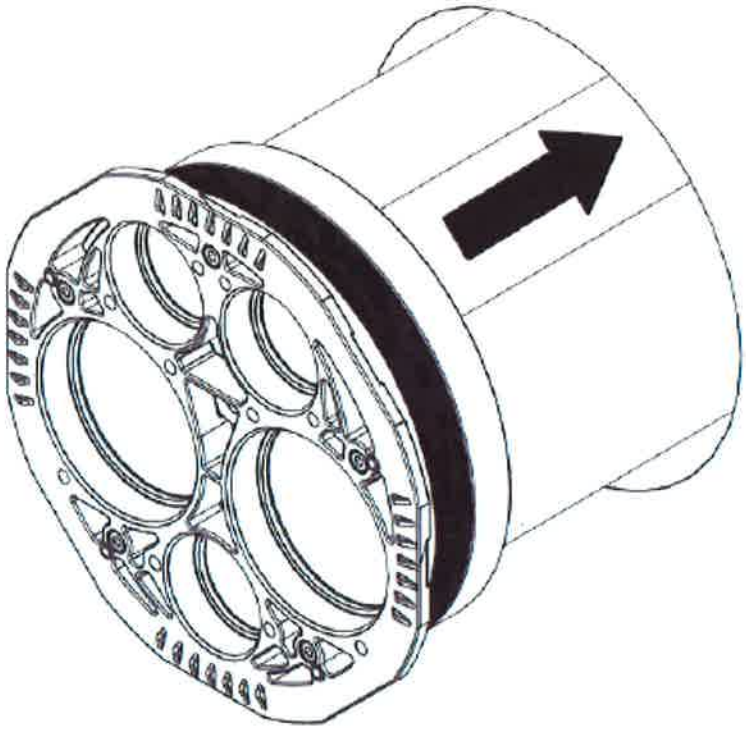


Figure 2. Installation of the MSH-FW building entry system in the wall sleeve through the side of the concrete test block which is not charged with water pressure (picture of the manufacturer).

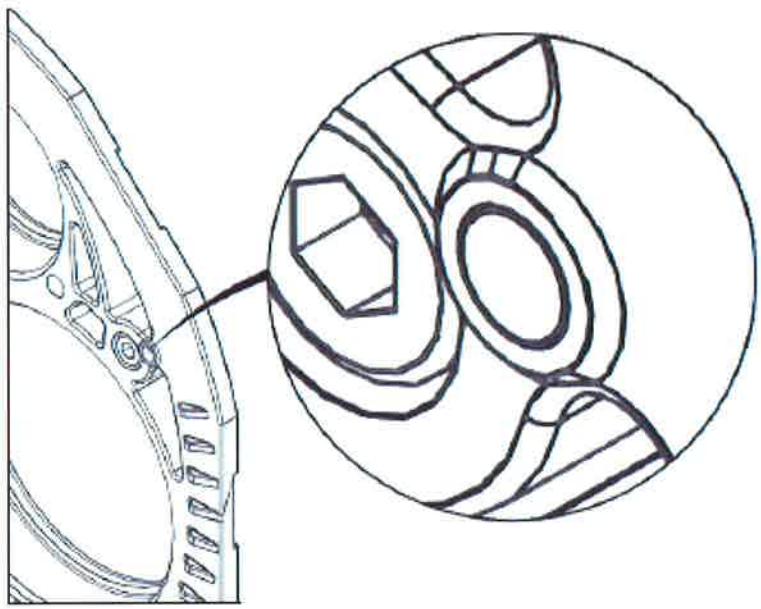


Figure 3. Detail of the control pins which are flush with the front panel of the MSH-FW building entry system (picture of the manufacturer).

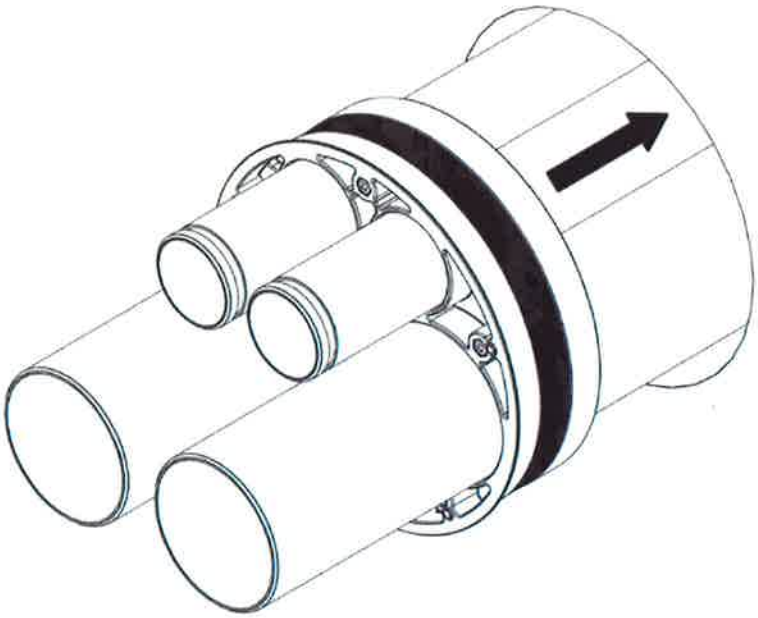


Figure 4. Installation of the MSH-FW outer sealing element module 1 above the sleeve pipes into the wall sleeve (picture of the manufacturer).

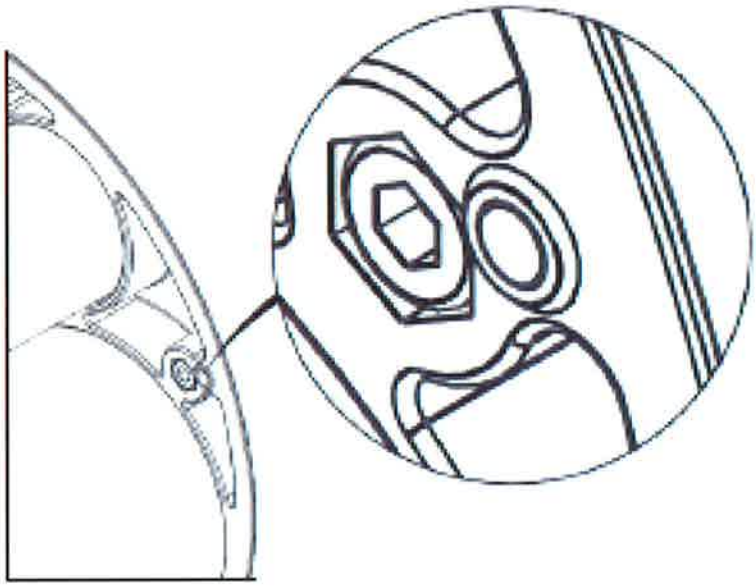


Figure 5. Detail of the control pins which are flush with the front panel of MSH-FW outer sealing element module 1 (picture of the manufacturer).

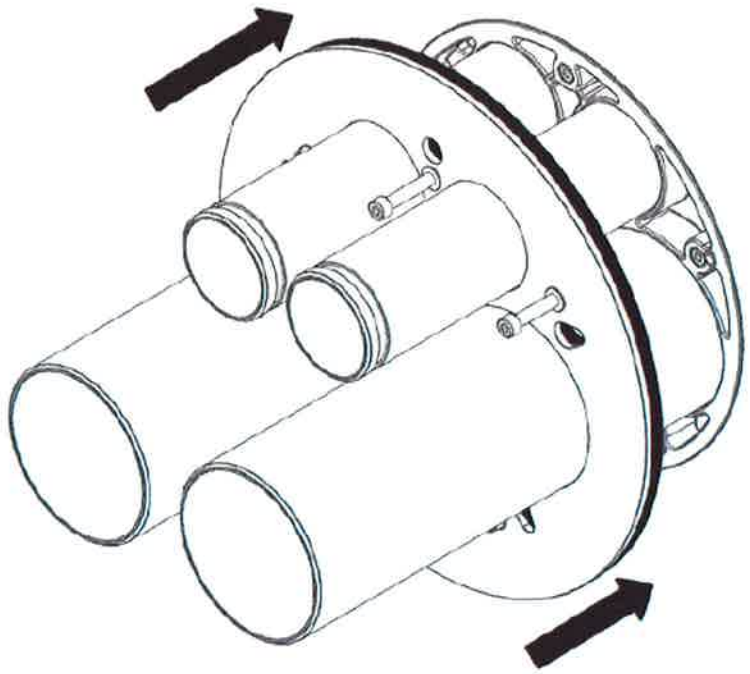


Figure 6. Installation of the the MSH-FW outer sealing element module 2 above the sleeve pipes (picture of the manufacturer).

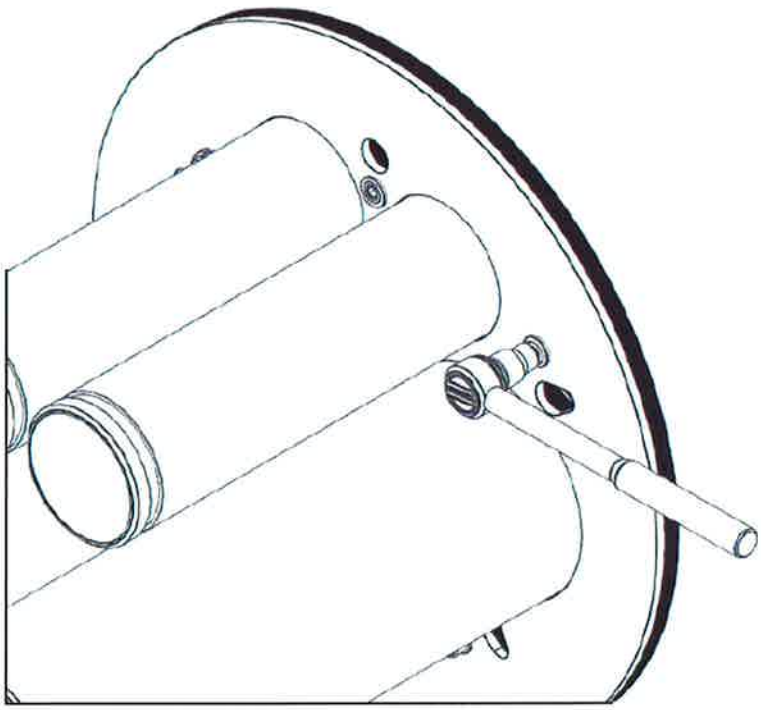


Figure 7. Tightening of the hex screws at the MSH-FW outer sealing element module 2 (picture of the manufacturer).

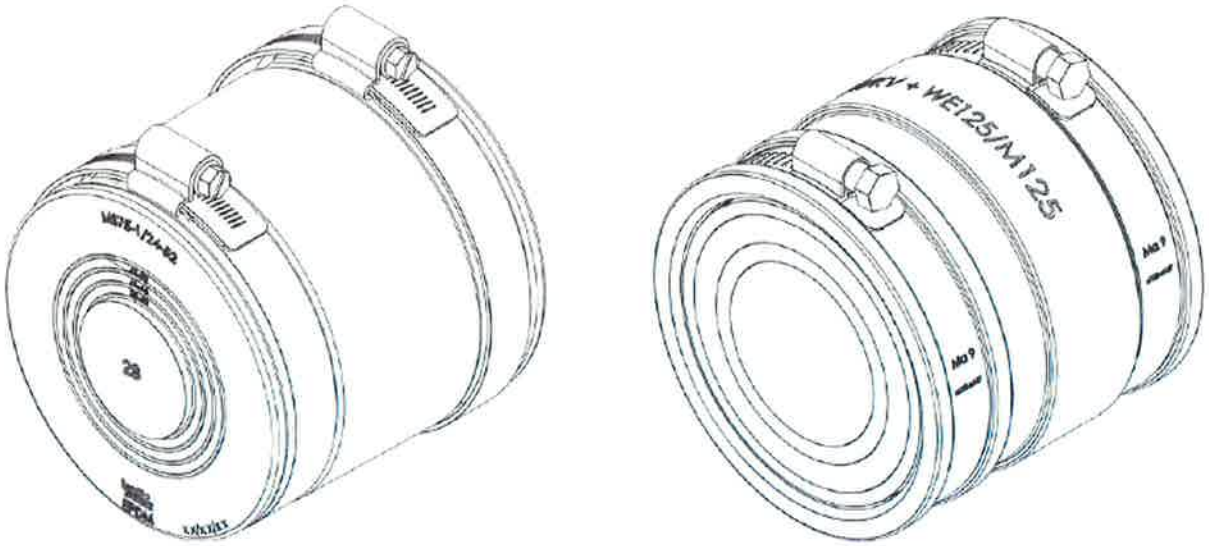


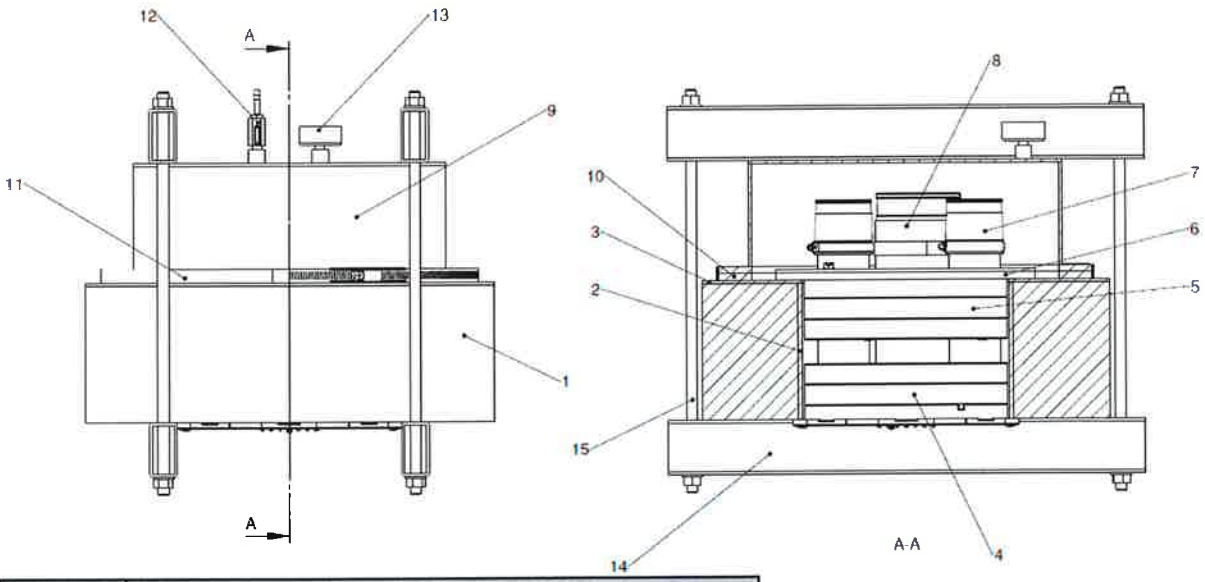
Figure 8. Example for a sleeve cap MS75 (left) and MS125 (right) (picture of the manufacturer).

3.2 Water tighness test (Kiwa GmbH)

The test setup which was assembled by Hauff-Technik GmbH & Co. KG was built up in accordance to Section 3.1 with one manometer (see Figure 9).

A calibration of the assembled manometer (serial no. 54604159 [6]) was performed by WIKA Alexander Wiegand SE & Co. KG (see Section 6).

After prior consultation with the manufacturer the test of the water tightness with permanently attached water pressure was performed with ≥ 1,0 bar for 28 days.



Position	Designation
1	test block
2	wall sleeve
3	polymer modified bituminous coating (PMBC)
4	MSH-FW building entry system for district heating
5	MSH-FW outer sealing element module 1
6	MSH-FW outer sealing element module 2
7	sleeve cap MS75 for pipe sealing
8	sleeve cap MS110 for pipe sealing
9	test cylinder
10	test cylinder seal
11	security belt for cylinder seal
12	stop valve
13	pressure gauge manometer
14	security bar
15	threaded rod

Figure 9. Detail of the test setup - manufacturer`s drawing.

4. Test results

During the water tightness test no pressure drop as a result of leakages was detected (see Table 1). The test results can be seen at Figure A1 and Figure A2 attached in the annex.

Table 1. Results of the water tightness test.

Test specimen	Water pressure at the beginning of testing [bar]	Water pressure at the end of testing [bar]	Testing period [d]	Remark
MSH-FW	≥ 1,0	≥ 1,0	28	no pressure drop as a result of leakages

5. Summary

During the water tightness test of the building entry system Hauff MSH-FW with the outer sealing element module 1 and outer sealing element module 2 which was installed in a wall sleeve that was cast in a concrete test block with exterior waterproofing PMBC PCI Pecimor 2K according to DIN EN 15814 no pressure drop as a result of leakages was detected during the testing period of 28 days with a permanent attached water pressure of ≥ 1,0 bar.

6. Calibration certificate

Wika Polska sp. z o.o. sp. k.

Inspection certificate according to EN 10204 - 3.1
Abnahmeprüfzeugnis nach EN 10204 - 3.1

WIKA

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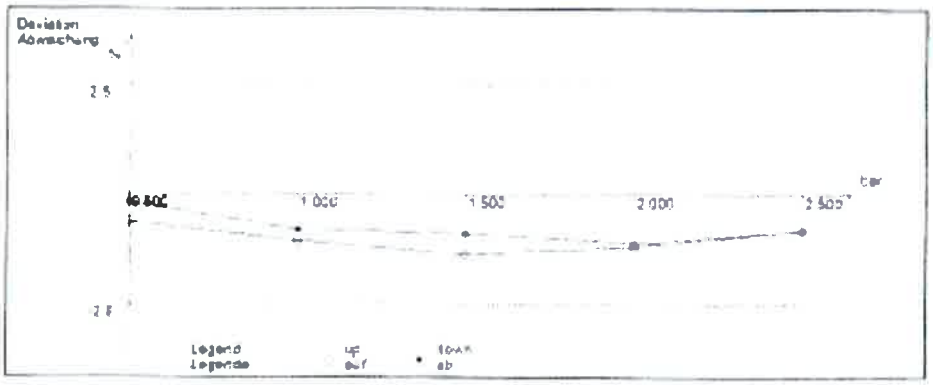
Customer / Kunde	Hauff-Technik GmbH & Co. KG Robert-Bosch-Straße 9 Hermaringen 89568 DE			Certificate No / Zeugnis-Nr	WCC03861
				Date / Datum	2017-05-05
Customer Order No / Kundenbestellnummer	176202179	Customer Part No / Kunden Artikel-Nr		Order Date / Bestelldatum	2017-03-23
Order No. / Item / Auftrags Nr. / Pos.	223929202 31977547	Part No / Artikel Nr	14225186		
Model / Typ	111.10.063	Serial number / Seriennummer	54604159	Scale range / Anzeigebereich	0 ... 2.5 bar rel
Class / Klasse	2.50 %	Tag No / Messstellen-Nr			
Reference / Referenzgerät CPG2500 0.01% 1 ... 2.7 bar rel				Calibration No / Kalibriernummer SN 102 1.17 WPL 17-04	
Result / Ergebnis				Temperature / Temperatur	20°C +/- 5 K

Test item / Prüfpunkt bar	Standard / Reference / bar		Measured value / Messwert bar	Deviation / Abweichung bar	Deviation / Abweichung %	Hysteresis / Hysterese %
0.500	0.516	0.504	0.510	0.010	-0.40	0.45
1.000	1.026	1.020	1.023	-0.023	-0.92	-0.25
1.500	1.534	1.522	1.528	0.028	-1.13	0.47
2.000	2.030	2.027	2.029	0.029	1.14	-0.09
2.500	2.521	2.521	2.521	-0.021	-0.83	0.00



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Inspection certificate according to EN 10204 - 3 1
Abnahmeprüfzeugnis nach EN 10204 - 3 1

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Customer / Kunde: Hauff-Technik GmbH & Co KG
Robert Bosch Straße 9
Hermaringen
89568
DE

Certificate No / Zeugnis-Nr: WC003861

Date / Datum: 2017-05-05

Object keeps the specification
Der Kalibriergegenstand hält die Fehlergrenzen nach Herstellerangaben ein

Calibration was carried out according to the following norm / Die Kalibrierung erfolgte auf der Grundlage der folgenden Norm: DIN EN 837-1

Remarks / Bemerkung

Inspection Representative / Abnahmebeauftragter: ppa. Daniel Kotlewski

Examiner / Prüfer: J Glodowski

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Gersthofen, 11 June 2018

Figure A1. Water tightness test with ≥ 1,0 bar water filled test cylinder (manometer at the beginning of testing on 20.12.2017).

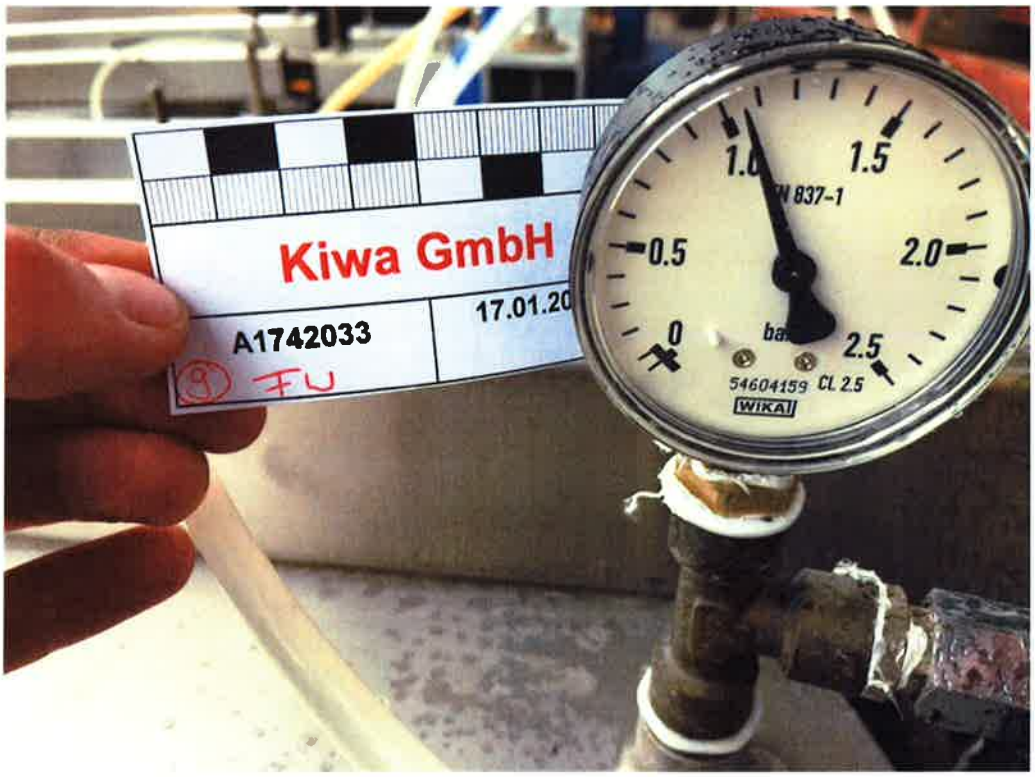

Figure A2. Water tightness test with ≥ 1,0 bar water filled test cylinder (manometer after 28 days on 17.01.2018).