

Project / Plant: Water tightness test of the tundish Hauff AT 110 in a waterproof concrete test block with concrete strength C25/30

Order date: 19 June 2018

Product description: Tundish Hauff AT 110

Order: Water tightness test  $\geq 1,0$  bar for 24 hours,  $\geq 1,5$  bar for 24 hours,  $\geq 2,0$  bar for 67 hours and  $\geq 2,5$  bar for 72 hours

Number of samples / tests: 1 test

Sampling: on: - / by: Applicant

Date of delivery: 19 June 2018

Testing period: 20 - 28 June 2018

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Number of annexes: The test report contains 1 annex

Remark: Translation of Test Report A1842052-01,  
1 August 2018


Gersthofen, 1 August 2018  
dö/rö

p. p.

  
B. Eng. David Röck  
- Project manager -



p. p.

  
Jörg Bölzle  
- Project manager -

The test results relate only on the items tested. Without the written approval of the testing laboratory, a duplication in extracts of the test report is not permitted.

Geschäftsführer: Prof. Dr. Roland Hüttl  
Amtsgericht Hamburg, HRB 130568, St.Nr.: 46/736/03268



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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 tundish Hauff AT 110 [1] in a waterproof concrete test block with concrete strength C25/30.

Therefore Hauff-Technik GmbH & Co. KG cast in a tundish Hauff AT 110 in a concrete test block with waterproof concrete. The test block and the components for the test setup were delivered to our test laboratory in Gersthofen, Germany. The assembly of the test setup was performed by an employee of Hauff-Technik GmbH & Co. KG (see Figure 1).

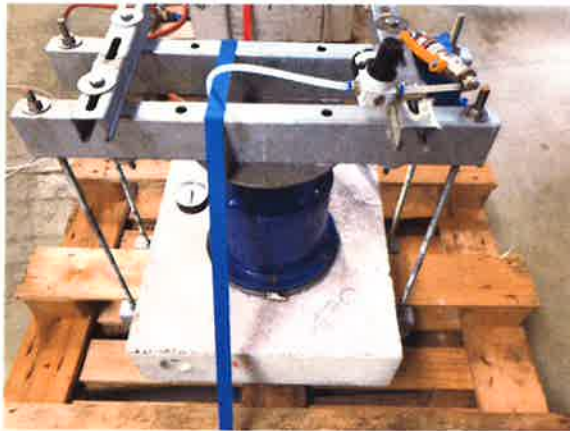


Figure 1. Assembled test setup.

## 2. References

- [1] Hauff-Technik GmbH & Co. KG - „Installation instruction - AT - Tundish“. Version 5090010028\_ak\_at100\_180608.
- [2] WIK A Polska sp. z o.o. sp. k. - “Inspection certificate according to EN 10204 - 3.1. Certification No. WC006958. Edition 20 March 2018”.

## 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 tundish at Kiwa GmbH in Gersthofen, Germany. According to information given by the manufacturer the test setup was assembled as follows:

The tundish was connected to a KG-pipe according to the installation instruction [1] (see Figure 2 – left) and secured at the connection with a clamp which was tightened with a torque of 4 Nm (see Figure 2 – right).

Subsequently the tundish with the KG-pipe was placed centric in the bottom of a wooden formwork (dimensions 500 x 500 200 mm) for the concrete test block, fixed to the reinforcement bars with wire and then it was cast in.

After hardening of the concrete test block the formwork was removed, the sticker at the cover and frame was removed (see Figure 3) and the opening of the tundish was closed with a blind plug.

Afterwards Hauff Technik GmbH & Co. KG attached a pressure bell with manometer above the sealing system. The sealing of the pressure bell was performed with the help of an EPDM sealing and clamping pressure.

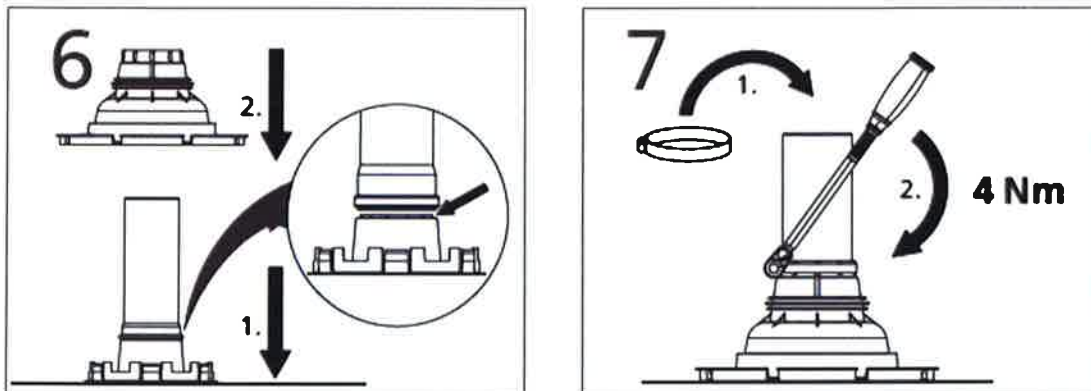


Figure 2. Connection of the KG-pipe and the tundish (manufacturer's drawing).

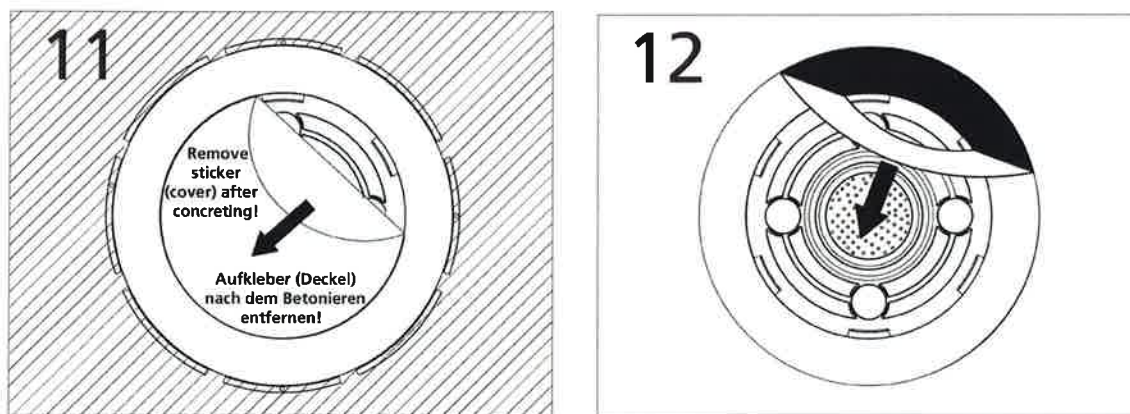


Figure 3. Removal of the sticker at the cover (left) and the frame (right) of the tundish (manufacturer's drawing).

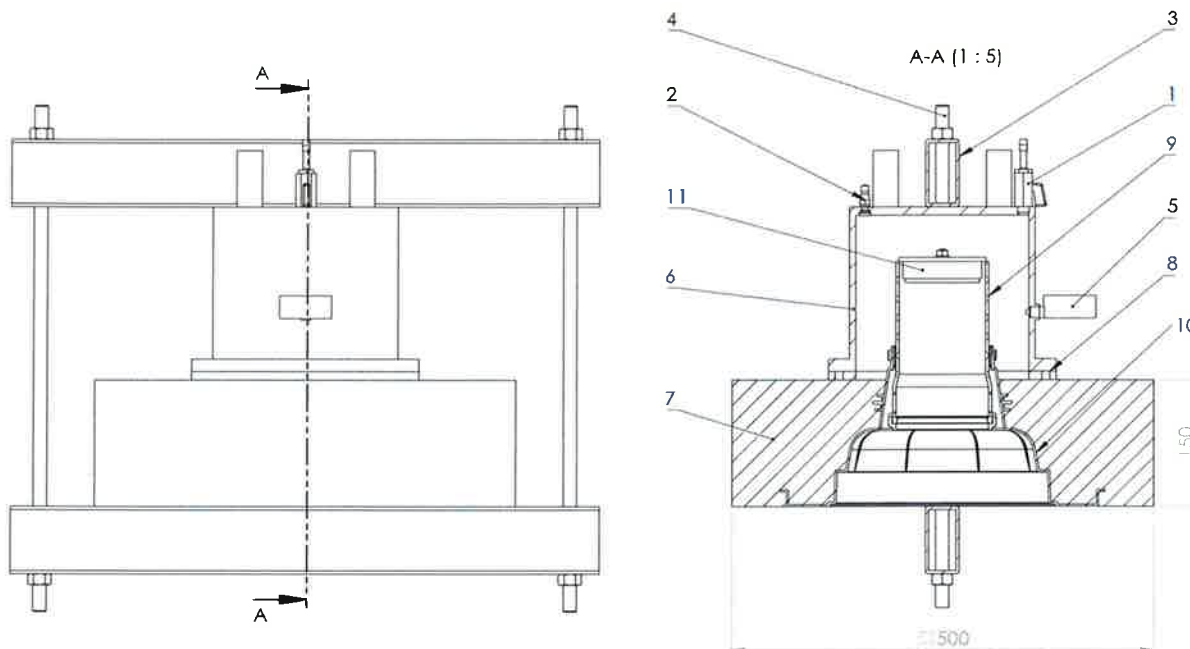
### 3.2 Water tightness test (Kiwa GmbH)

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 4).

A calibration of the assembled manometer (serial no. 5400TD89 [2]) was performed by WIKA Polska sp. z o.o. sp. k. (see Section 6).

After prior consultation with the manufacturer the test of the water tightness with permanently attached water pressure was performed as follows:

- ≥ 1,0 bar for 24 hours
- ≥ 1,5 bar for 24 hours
- ≥ 2,0 bar for 67 hours
- ≥ 2,5 bar for 72 hours.



Position	Designation
1	Stop valve
2	Air bleed valve
3	Security bar
4	Threadad rod M12 with nut and washer
5	Pressure gauge manometer
6	Test cylinder
7	Concrete test block
8	EPDM sealing
9	Wall sleeve
10	AT 110 tundish
11	Blind plug

Figure 4. 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 water pressure depending on the test period can be seen at Figure A1 to Figure A8 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 [h]	Remark
AT 110	≥ 1,0	≥ 1,0	24	No pressure drop as a result of leakages
	≥ 1,5	≥ 1,5	24	No pressure drop as a result of leakages
	≥ 2,0	≥ 2,0	67	No pressure drop as a result of leakages
	≥ 2,5	≥ 2,5	72	No pressure drop as a result of leakages

## 5. Summary

*During the water tightness test of the tundish Hauff AT 110 which was cast in a waterproofed concrete test block with concrete strength C25/30 no pressure drop as a result of leakages was detected during the testing period of 24 hours with a permanent attached water pressure of ≥ 1,0 bar, 24 hours ≥ 1,5 bar, 67 hours ≥ 2,0 bar and 72 hours ≥ 2,5 bar.*

## 6. Calibration certificate

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

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



Customer:	Hauff-Technik GmbH & Co. KG Robert-Bosch-Straße 9 Herrmaringen 89568 DE	Page	1 / 2	
Kunde:		Certificate No. Zeugnis-Nr.	WC006958	
		Date Datum	2018-03-20	
Customer Order No. Kundenbestellnummer	175211375	Customer Part No. Kunden Artikel-Nr.	Order Date Bestelldatum	
Order No. / Item Auftrags-Nr. / Pos.	22666960/3 32210715	Part No. Artikel-Nr.	14225187	
Model Typ	111.10.063	Serial number Seriennummer	5400TD89	Scale range Anzeigebereich
Class Klasse	2,50 %	Tag No. Messstellen-Nr.	0 ... 6 bar rel.	
Reference Referenzgerät	CPG2500 0,01% IS-50 -1 ... 32,1 bar rel.		Calibration No. Kalibriernummer	SW-101-1-17 WPL 17-04
Article text Artikeltext	Bourdon tube pressure gauges,model 111			

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

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



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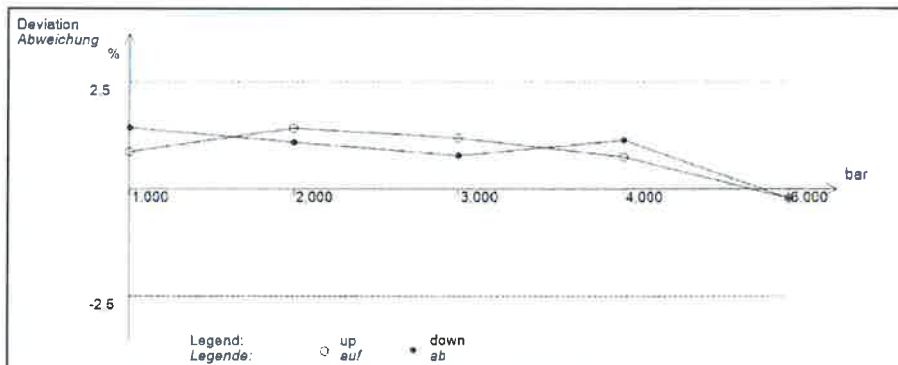
Customer: Hauff-Technik GmbH & Co. KG  
Kunde: Robert-Bosch-Straße 9  
Herrmaringen  
89568  
DE

Certificate No. WC006958  
Zeugnis-Nr.

Date 2018-03-20  
Datum

Result Temperature 20°C +/- 5 K  
Ergebnis Temperatur

Test Item Prüfung bar	Standard Referenz bar	Meanvalue Mittelwert bar	rel. Deviation rel. Abweichung bar	Deviation Abweichung %	Hysteresis Hysterese %
1.000	0.948	0.914	0.931	0.069	1.15
2.000	1.915	1.934	1.925	0.075	1.28
3.000	2.929	2.953	2.941	0.059	0.98
4.000	3.955	3.932	3.943	0.057	0.94
6.000	6.012	6.012	6.012	-0.012	-0.21



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

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

Remarks / Bemerkung:

Inspection Representative (NJO) Examiners  
Abnahmebeauftragter Daniel Kotlewski Prüfer J Glodowski

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Figure A1. Water tightness test with  $\geq 1,0$  bar water filled test cylinder (manometer at the beginning of testing on 20.06.2018).



Figure A2. Water tightness test with  $\geq 1,0$  bar water filled test cylinder (manometer after 24 hours on 21.06.2018).

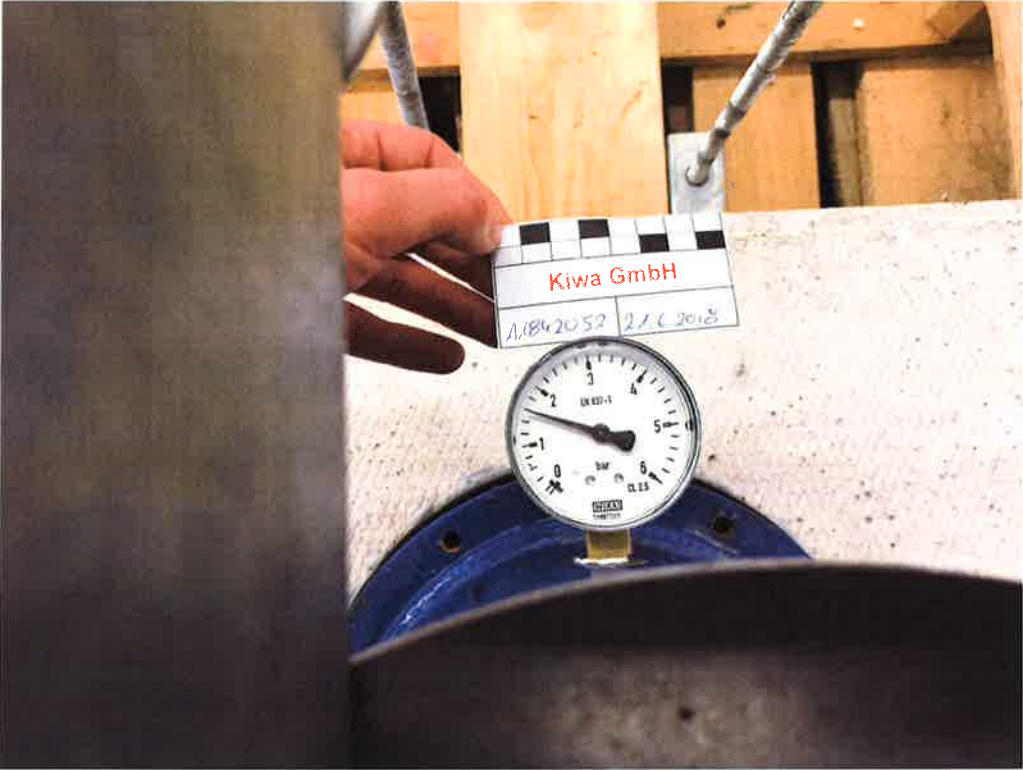


Figure A3. Water tightness test with  $\geq 1,5$  bar water filled test cylinder (manometer at the beginning of testing on 21.06.2018).



Figure A4. Water tightness test with  $\geq 1,5$  bar water filled test cylinder (manometer after 24 hours on 22.06.2018).

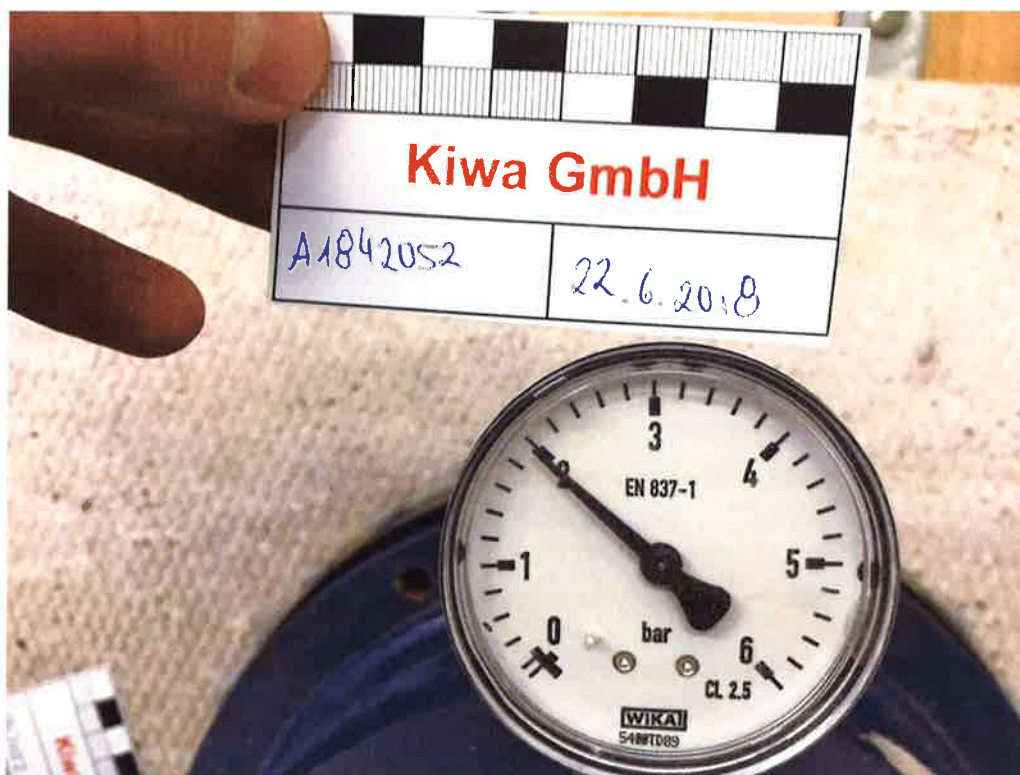


Figure A5. Water tightness test with  $\geq 2,0$  bar water filled test cylinder (manometer at the beginning of testing on 22.06.2018).



Figure A6. Water tightness test with  $\geq 2,0$  bar water filled test cylinder (manometer after 67 hours on 25.06.2018).



Figure A7. Water tightness test with  $\geq 2,5$  bar water filled test cylinder (manometer at the beginning of testing on 25.06.2018).



Figure A8. Water tightness test with  $\geq 2,5$  bar water filled test cylinder (manometer after 72 hours on 28.06.2018).