Test report

No.: **13_311-1** **Version: 2/2**

Customer	:	Hauff- Technik GmbH & Co. KG Robert-Bosch-Str. 9 89568 Hermaringen
Test object	:	Hauff-Earthing connection for reinforcement (earthing fixed point)
Type	:	HEA-A-M12/50 with welded construction steel RD10 and RD12
Manufacturer	:	Hauff-Technik GmbH & Co. KG
Date of receipt	:	17.03.2014
Date of test	:	19.03.2014
Applied test regulations	:	- By prescription of the manufacturer - DIN EN 50522 (VDE0101-2):2011-11, Annex D
Test carried out	:	- Short circuit tests with 6.5 kA/1 s according DIN EN 50522 (VDE0101-2):2011-11 - Short circuit tests with 7.7 kA/1 s according DIN EN 50522 (VDE0101-2):2011-11
Test result	:	The maximum allowed temperature of 300 °C was not reached. No damage was visible at the test objects after the tests.
Specialist testers	:	P. Lautenbach; C. Pieper

Dortmund, 27.05.2014

D. Borneburg
Manager test laboratory

H. Walter
Test engineer

Report No. 13_311-1 contains 8 pages and 3 annexes.

*) not in scope of accreditation. Scope of accreditation and type of documentation see overleaf.

Summary

RWE Eurotest GmbH carried out 1 short circuit test with 6.5 kA/1 s by prescription of the manufacturer on a Hauff-Earthing connection for reinforcement type HEA-A-M12/50 with welded construction steel RD10 manufactured by Hauff-Technik GmbH & Co. KG.

RWE Eurotest GmbH carried out 1 short circuit test with 7.7 kA/1 s by prescription of the manufacturer on a Hauff-Earthing connection for reinforcement type HEA-A-M12/50 with welded construction steel RD12 manufactured by Hauff-Technik GmbH & Co. KG.

Result:

The maximum allowed temperature of 300 °C was not reached. No damage was visible at the test objects after the tests.

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Annex:

1. Applied test regulations

By prescription of the manufacturer

based on DIN EN 50522 (VDE0101-2):2011-11

- Short circuit tests with 6.5 kA/1 s
- Short circuit tests with 7.7 kA/1 s
- Maximum allowed temperature of 300 °C
- No visible damage allowed

2. Technical data of the test object

Test object 1: Hauff-Earthing connection for reinforcement (earthing fixed point)

Type: HEA-A-M12/50 with welded construction steel RD10

Manufacturer: Hauff-Technik GmbH & Co. KG

In concrete C 30/37 / wall thickness 100 mm

Test object 2: Hauff-Earthing connection for reinforcement (earthing fixed point)

Type: HEA-A-M12/50 with welded construction steel RD12

Manufacturer: Hauff-Technik GmbH & Co. KG

In concrete C 30/37 / wall thickness 100 mm

3. Test and measuring equipment

Equip.-No.	cal.	Equipment	Type	Manufacturer
ET-811	*	Fibre Optic Isolated Digitizing Subsystem	GEN7t	HBM
ET-533	*	50 kA High-Current Test Equipment	GDPN 5000/12P	Siemens
ET-505	*	Impulse Current Sensing Resistor	Shunt ISM 250	Hilo Test
ET-651	*	ScopeCorder	DL 750	Yokogawa
		Thermocouple	Typ K	Rössel

*) Measuring equipment is calibrated based on national and international reference standards. Calibration certificates can be inspected on request.

Table 1: Test and measuring equipment

The measurement uncertainty of the measuring instruments has been calculated and is archived by RWE Eurotest. Documents can be inspected on request.

4. Tests carried out and results

Short circuit tests with 6.5 kA/1 s were carried out on an on a Hauff-Earthing connection for reinforcement type HEA-A-M12/50 with welded construction steel RD10.

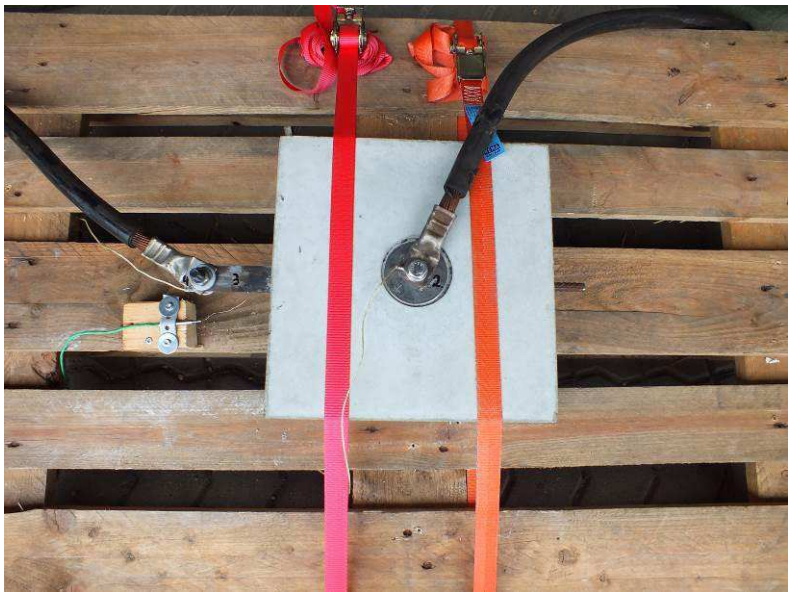


Figure 1: Test setup 1

Short circuit tests with 7.7 kA/1 s were carried out on a Hauff-Earthing connection for reinforcement type HEA-A-M12/50 with welded construction steel RD12.

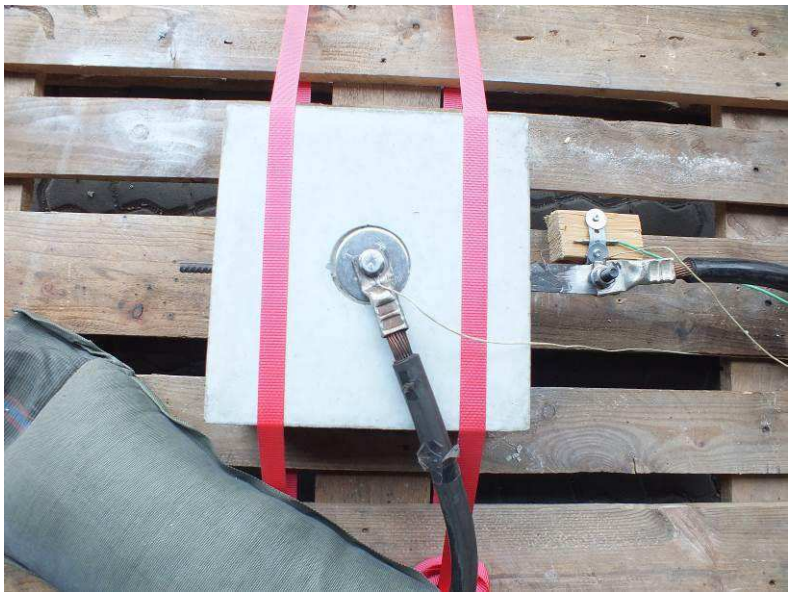


Figure 2: Test setup 2

The temperatures of the test objects were measured with NiCr-Ni thermocouples (diameter of 0.5 mm) during the short-circuit tests at two points (figure 3, T2 and T3) and the ambient temperature (T1).

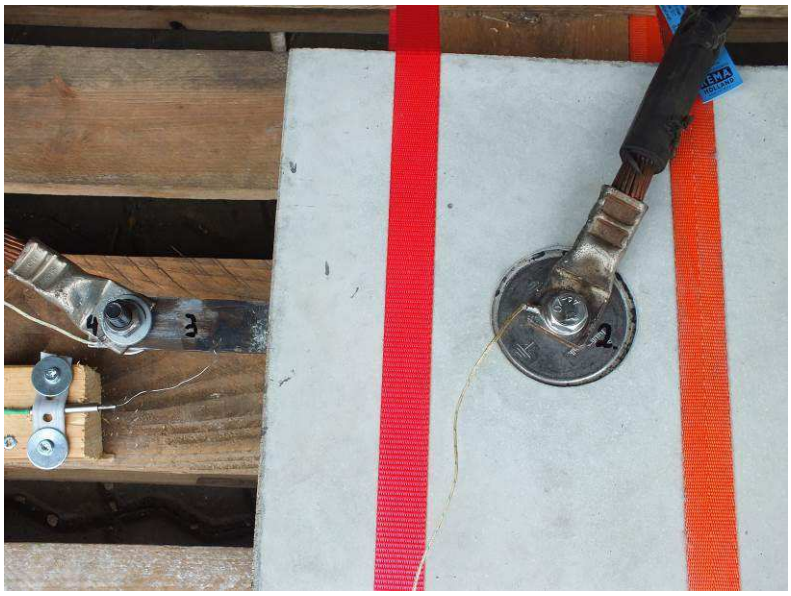


Figure 3: Positions of the thermocouples

The maximum allowed temperature of 300 °C was not reached. No damage was visible at the test object after the tests.

The results of the tests are summarized in table 2.

Test	Short-circuit current [kA]	Duration [s]	Maximum temperature [°C]				Remark	Result
			T1	T2	T3	T4		
1	6.417	1.003	15.9	15.6	88.5	37.3	No damage	Passed
2	7.684	1.003	15.7	36.8	93.5	55.3	No damage	Passed

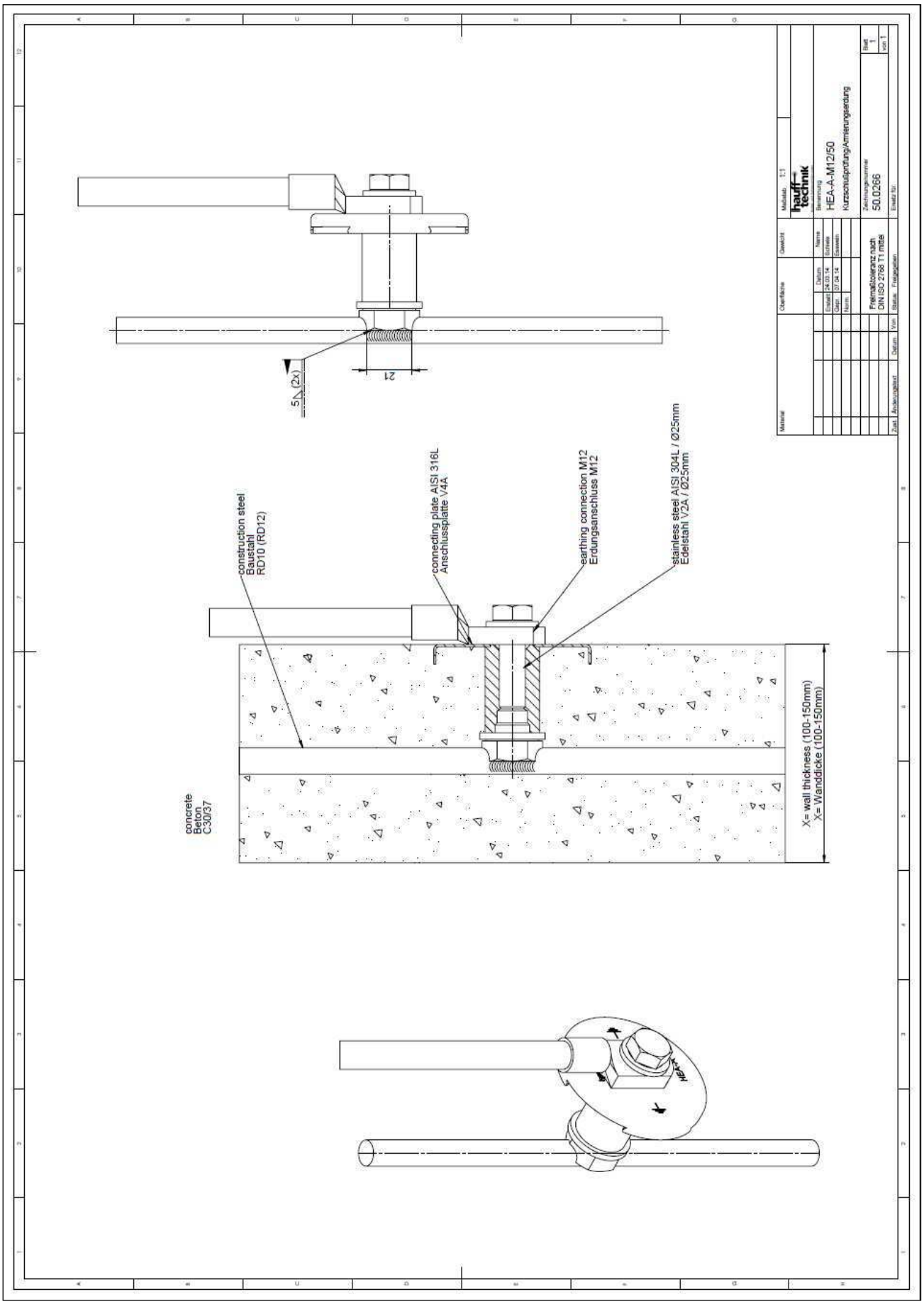
Table 2: Measurement results

5. Overall result

The maximum allowed temperature of 300 °C was not reached. No damage was visible at the test objects after the tests.

- End of report -

Design drawing



Current -/time-diagrams

Test-No.: 13_311 Test 1 (6,5 kA/1 s) 19.03.2014

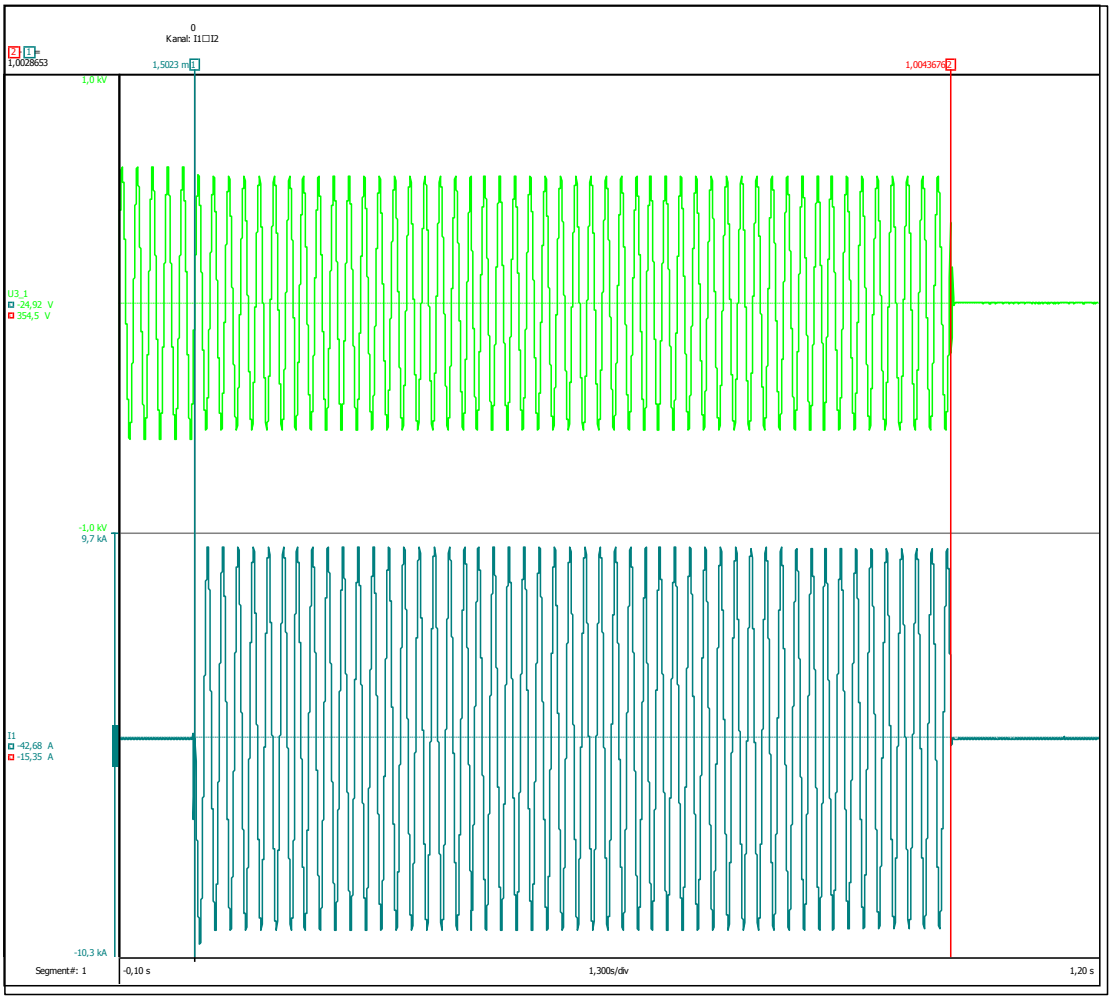


Table		
U3_1_eff	389,8	V
I1_eff	6,417 k	A
I1²t	41,29 M	A²s
I1_max	-9,718 k	A
Time	1,003	s
Winkel_cursor	18,05 k	°
Strom_im_Mittel	6,405 k	A
Winkel_im_Mittel	-22,07	°

Settings of the high current plant		
	L1	L3
U [V]	423	423
R_{slide} [mΩ]	0	0
R_{fixed} [mΩ]	15	25
X_L	i	i
Phi	0°	0°

Ambient temperature:	14 °C
Humidity:	60 %

Test-No.: 13_311 Test 2 (7,7 kA/1 s) 19.03.2014

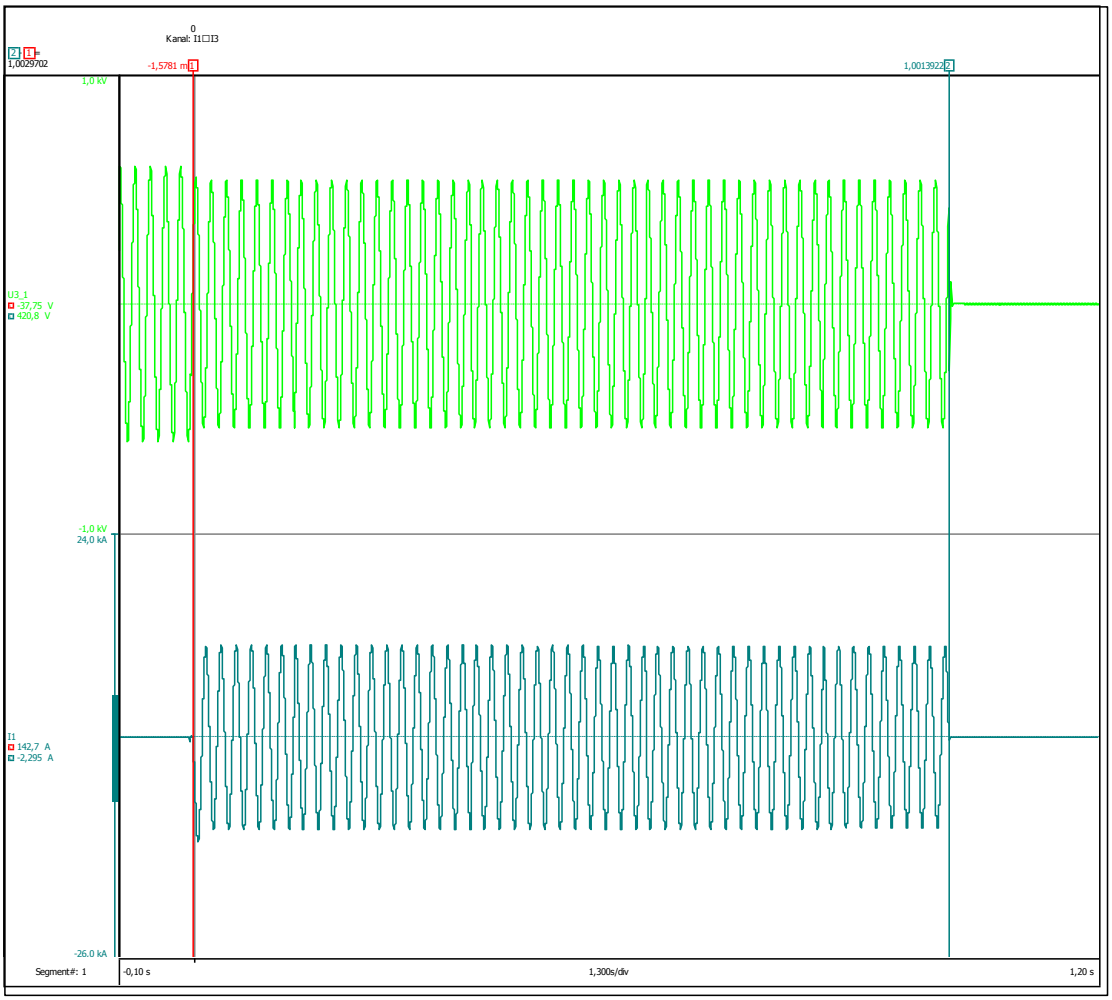


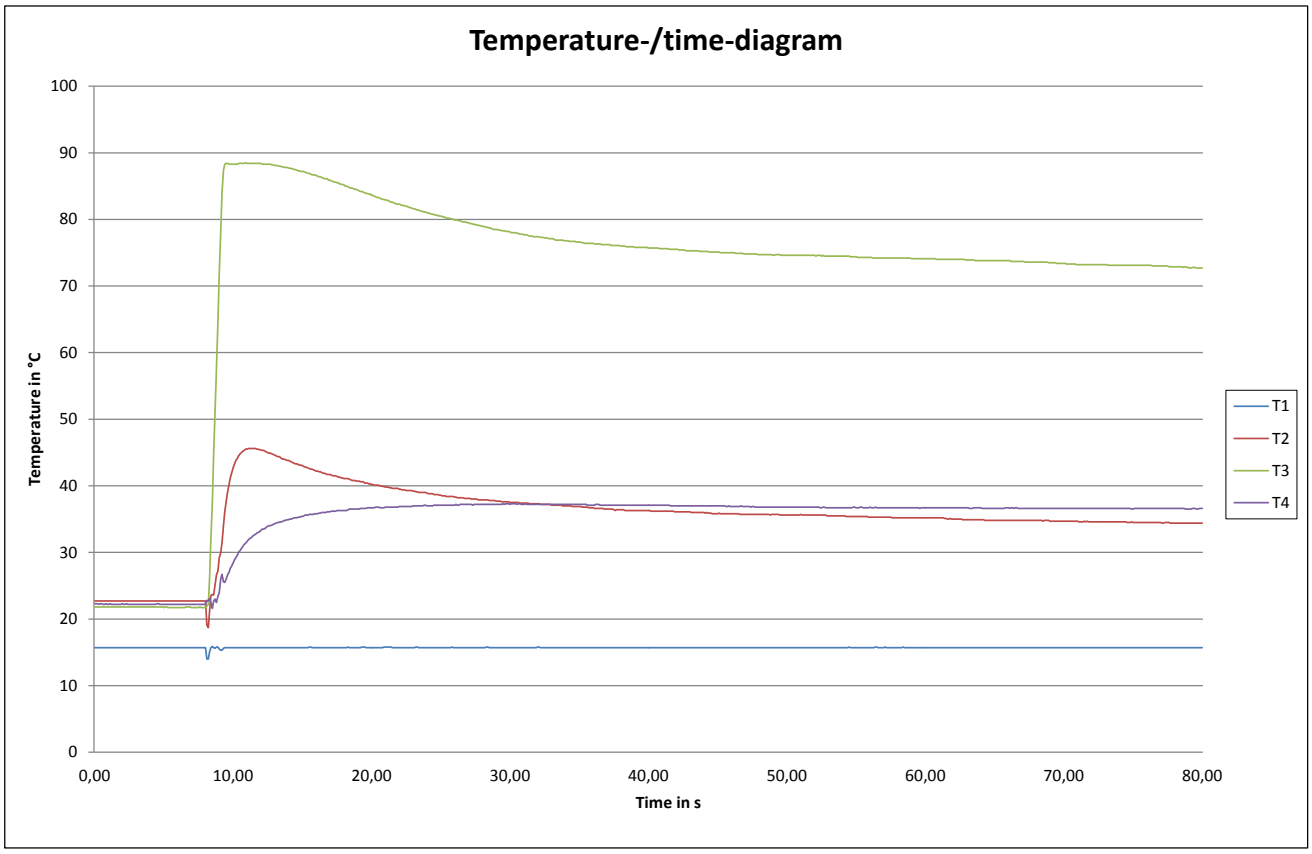
Table		
U3_1_eff	380,9	V
I1_eff	7,684 k	A
I1²t	59,23 M	A²s
I1_max	-12,39 k	A
Time	1,003	s
Winkel_cursor	18,05 k	°
Strom_im_Mittel	7,672 k	A
Winkel_im_Mittel	-49,37	°

Settings of the high current plant		
	L1	L3
U [V]	423	423
R_{slide} [mΩ]	0	0
R_{fixed} [mΩ]	0	25
X_L	i	i
Phi	0°	0°

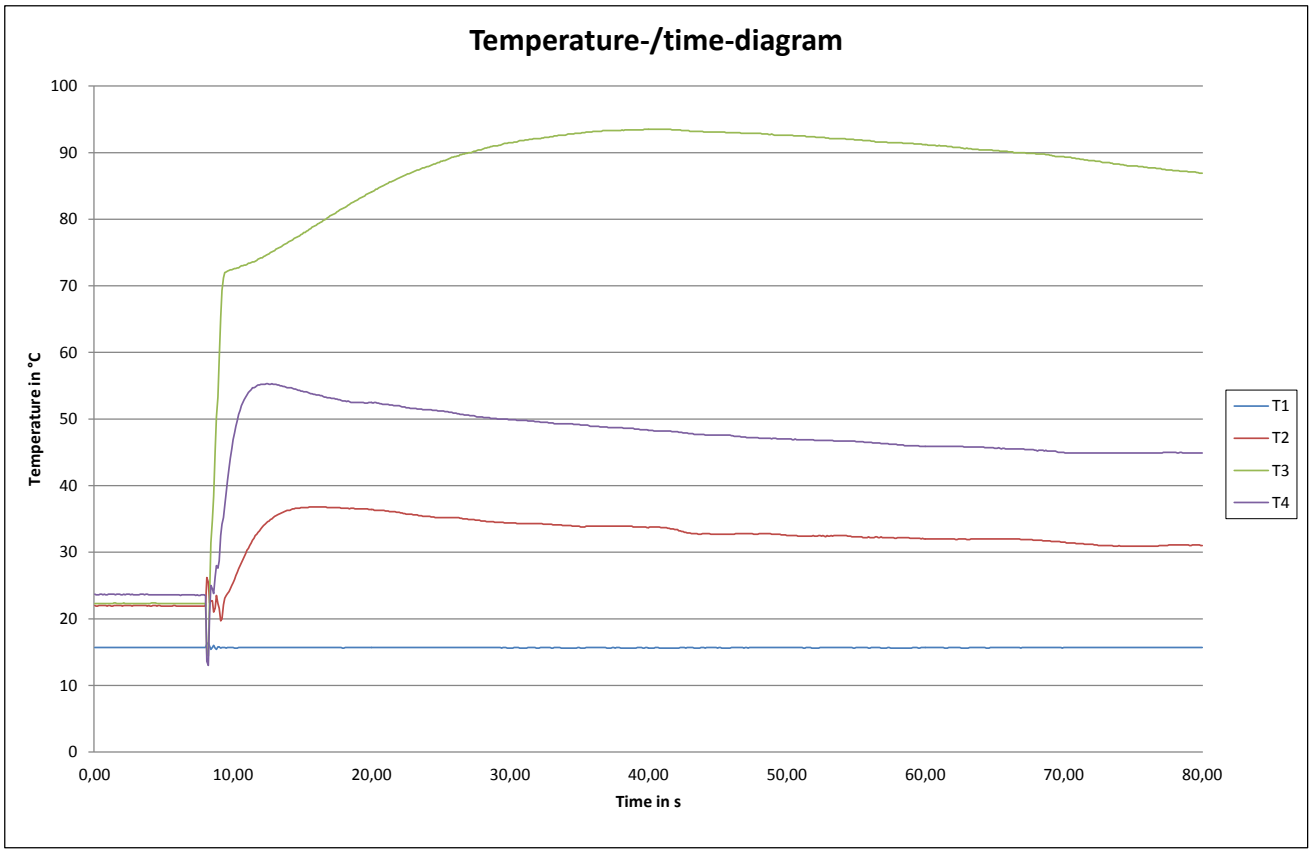
Ambient temperature:	14 °C
Humidity:	60 %

Temperature-/time-diagrams

Test 1



Test 2



Testing Laboratory

The RWE Eurotest Testing Laboratory is an independent institute that has been approved according to European standards.

Our testing laboratory, accredited in conformity with DIN EN ISO/IEC 17025, is at the disposal of manufacturers and users alike for testing the conformity of electro technical products against standards and confirming fitness for use. Our accreditation by the Deutsche Akkreditierungsstelle Technik (DATech e.V.), a member of the Deutscher Akkreditierungsrat (DAR) accreditation council, guarantees our customers uniform testing procedures in conformity with European testing regulations and thus internationally accepted test results:

Whether you are a manufacturer or a user, you will have a strong partner with many years of testing experience at every stage of the product cycle. We will provide the following support for you:

- Type tests
- Sample tests
- Routine tests
- Commissioning tests
- Damage and fault analysis
- Material tests for safety features and equipment

Scope of accreditation

RWE Eurotest is accredited to carry out testing in the fields:

- High-voltage appliances and installations
- Low-voltage switchgear and control gear assemblies
- Cables
- Power cable accessories
- Pressed connectors and detachable cable clamps
- Corrosion protection
- EMC-testing
- Oil-examinations

The detailed listing of the scope of accreditation is available at our homepage www.rweeurotest.com.

Documentations

- Test certificates will be issued for passed tests performed against standards in the scope of accreditation.
- Test reports will be issued for tests a least performed against one standard in the scope of accreditation.