

Test Report

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Test Report 20190303

Tested by	: QS- Testing Laboratory	Date	: 21.11.2019
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1. Customer

Siemens AS
Bratsbergveien 5
7037 Trondheim
Norway

2. Purpose

Customer need a PEN terminal lug that deforms bevor the PEN conductor slips out (mounting direction up, conductor connected from below). This is to ensure that when pulling on the cable, the phases L1, L2 and L3 slip out in front of the PEN conductor.

3. Test requirements

In accordance to EN 60999-2:2003, the RM300 (25-300mm²) has passed the bending and pullout tests with the appropriate extraction forces for the various conductor cross sections.

It has to be tested to which pullout forces the terminal lug is bent before the conductor is broken off or pulled out.

4. Test sample

PEN-Terminal Lug K2/AF30-60 1XD5,3 1XD14

Art-No: 158365

V-Direct Terminal RM300 AK

Art-No: 86041

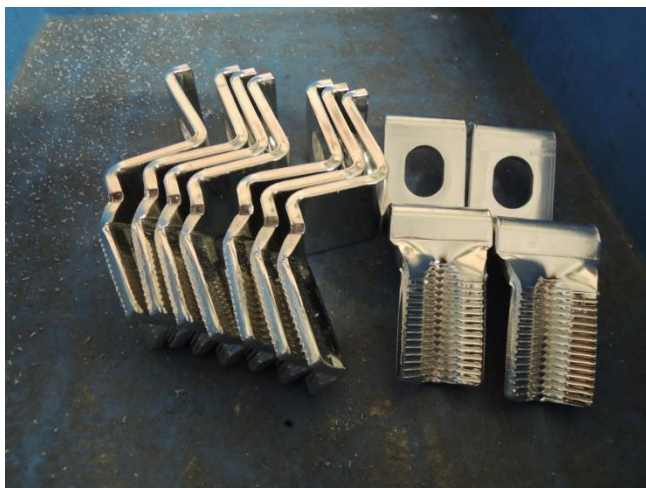


Figure 1: Test sample, left PEN-terminal lug and right RM300AK

Alle Ergebnisse dieses Berichtes beziehen sich auf den genannten Prüfgegenstand. Jegliche Abwandlung des Prüfgegenstands führt zur Ungültigkeit dieses Berichtes. Die im Bericht dargestellten Informationen sind Eigentum von JEAN MÜLLER. Es besteht kein Haftungsanspruch über Irrtümer und Auslassungen. Eine auszugsweise Vervielfältigung oder Veröffentlichung ist ohne unsere schriftliche Genehmigung nicht gestattet. Der Bericht darf Dritten (wenn genehmigt!) nur im vollen Wortlaut zur Kenntnis gegeben werden.

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5. Measuring instruments

test equipment	type	variant
P1608820/001	Humidity Sensor	Sensor System
P1608920/001	barometric pressure sensor	Sensor System

Table 1: Used measuring instruments

type	display reading
rel.hum.	48,4 %
atm. pressure	998 mbar

Table 2: Climate conditions

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6. Test setup

To set up the test, the Z terminal lug is attached to a busbar system and the appropriate conductor is connected via an RM300 terminal. To measure the deformation, a pencil is attached to the terminal which records the deformation on graph paper during the test. If the pencil does not return to its initial position after the weights have been removed, the terminal has plastically deformed. Since only the tensile force is relevant for the deformation of the test specimen, only a conductor cross-section of 300 mm² is initially tested. Afterward the smallest clampable conductor (25mm²) in the RM300 terminal is loaded with the highest weight. This determines whether the cable is torn off or pulled out in the case of the highest static load.



Figure 2: Test setup

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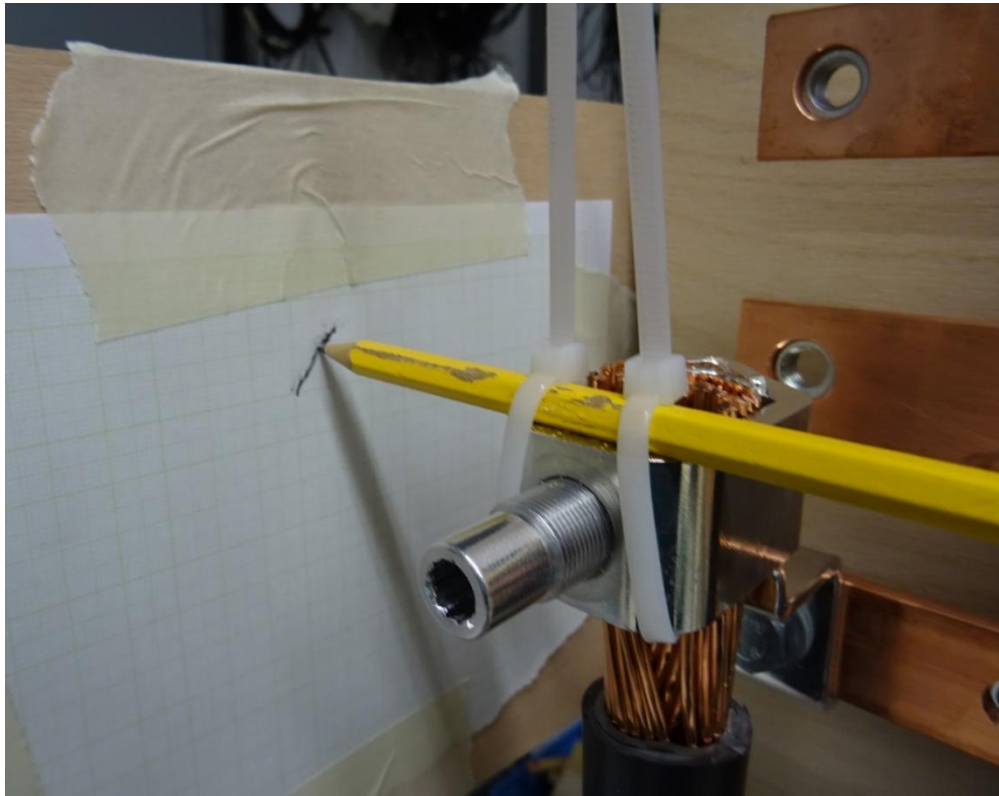


Figure 3: Test setup, deformation display

7. Test results

test sample	tensile force [N]	plastic deformed ?	
		Yes	No
1	560,4	✓	
2	487,8	✓	
3	414,1		×
4	487,8	✓	
5	487,8	✓	
6	414,1	✓	
7	340,4		×
8	487,8	✓	
9	487,8	✓	
10	487,8	✓	

Table 3: Test results 300mm²

Subsequently, it was checked whether the smallest clampable conductor cross-section of 25mm² breaks off at the highest load.

tensile force [N]	torn off conductor ?
560,4	No

Table 4: Test result 25mm²

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8. Test evaluation

The test shows that the terminal lug deforms plastically at a tensile force of 487,8N, at 414,1N the deformation is still in the elastic range.

Table 5 shows the results in relation to the specified tensile forces for conductor cross-sections according to DIN EN ISO 60999-2:2003 within the cross-section range of the RM300 terminal used.

cross-section [mm ²]	tensile force [N]	deformation
300	578	✓
240	578	✓
185	503	✓
150	427	elastic range
120	427	elastic range
95	351	×
70	285	×
50	236	×
35	190	×
25	135	×

Table 5: Comparison of conductor cross-section and tensile force to deformation

Plastic deformation only occurs from the tensile force assigned to the conductor cross-section of 185 mm². Since the static test of the smallest cross-section 25 mm² with the highest tensile force 578 N was positive, the Z-terminal lug ensures plastic deformation before the conductor is torn out over the entire cross-section range of the RM300 terminal used.

JEAN MÜLLER GmbH

- QA-Test laboratory-

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