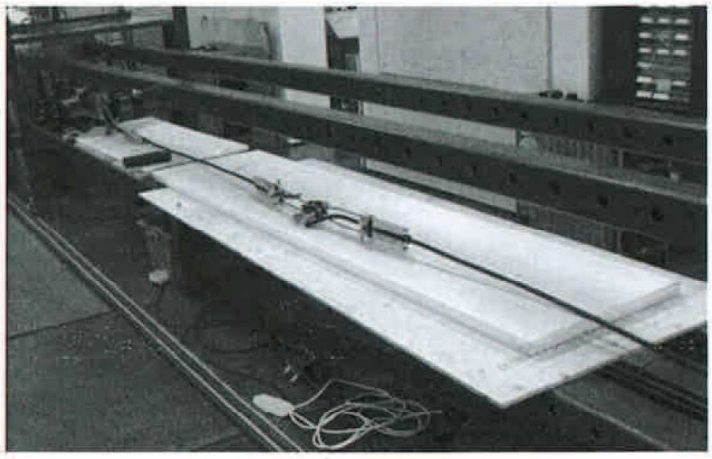
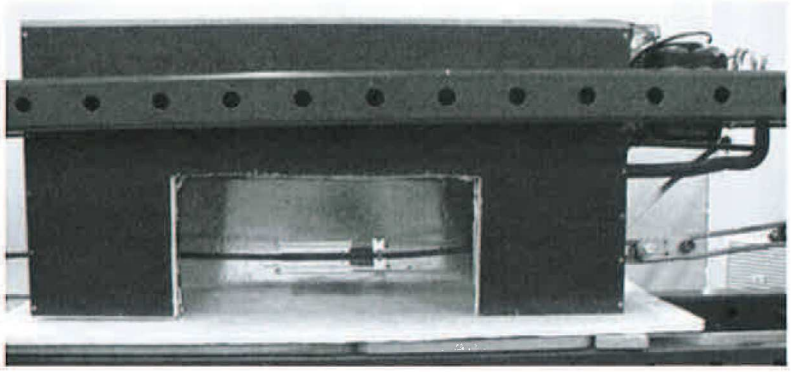
4. Pictures



Picture 4: Test setup in tensile test machine (with out cooling device)



Picture 5: Tension clamp in cooling device

5. Test equipment

ID	TYPE	MODEL	PURPOSE
L14	Torque wrench	BDS 80 E	Torque adjustment
L110	Tensile test machine	50 kN	Tensile tests
C1	Cooling device -25°C	Ensto	Tensile test
C2	Cooling device -25°C	Ensto	Tensile test

6. Test Id

847

7. Revision history

A

ВЕРНО С ОРИГИНАЛА
АКЦИОНЕРНО ДРУЖЕСТВО ФИЛКАБ 16 ПЛОВДИВ

Saves Your Energy

LABORATORY REPORT
No.: 2055S
Revision: A

Date of Test: 20.5 – 19.7.2010

Test object:

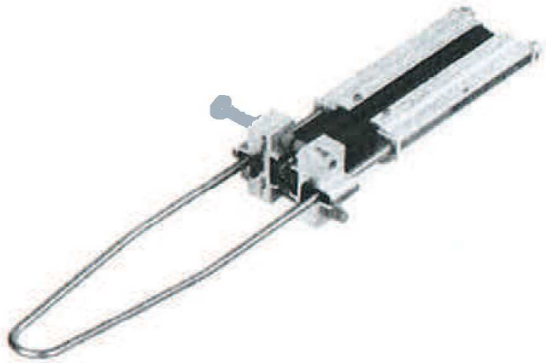
Tension clamp SO255.

Purpose of the test and relevant standards:

Part of type test.
Tensile test for tension clamp at high temperature according to EN 50397-2:2009 clause 7.4.9.

Conclusion:

The clamp passed the test.



Picture 1: Tested clamp SO255

ENSTO UTILITY NETWORKS LABORATORY

Date of Report: 1.2.2011

Tested by: Patrick Ekholm

Witnessed by: Sami Hakonen / SGS Fimko

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ВЯРНО С ОРИГИНАЛА

АКЦИОНЕРНО ДРУЖЕСТВО * ФИЛКАБ 16 * ПЛОВДИВ

1. Test objects

Clamp:

Type:	Tension clamp SO255
Batch number:	0-series
Conductor range:	50 – 70 mm^2
Conductor diameter:	12,7 – 16,7 mm
Tightening torque:	40Nm
No of pcs:	4

Conductors:

Type:	BLL-T 50
Used cross-section:	50 mm^2
Manufacturer/Country:	AMO Kraft AB / Sweden
Insulation thickness:	2,5 mm
Total diameter:	14,2 – 15,2 mm
Number of strands:	7
Insulation material:	HDPE+PE
Conductor material:	AlMgSi
Conductor MBL:	13,9 kN
Refer to standard:	EN50397-1

Type:	BLL-T 70
Used cross-section:	70 mm^2
Manufacturer/Country:	AMO Kraft AB / Sweden
Insulation thickness:	2,5 mm
Total diameter:	15,7 – 16,7 mm
Number of strands:	7
Insulation material:	HDPE+PE
Conductor material:	AlMgSi
Conductor MBL:	18,6 kN
Refer to standard:	EN50397-1

ВЯРНО С ОРИГИНАЛА

2. Testing procedure

The test was made with the maximum operating temperature of the conductor. Two tension clamps were tested. The test arrangement is shown in picture 2. The arrangement was installed in a horizontal test bench. A constant mechanical load was maintained throughout the test. The test load was 15% of conductor MBL. The test load was stabilised at ± 10 % and maintained for a period of at least 6 hours at ambient temperature. After the pre-tightening the test consisted of 100 heat cycles at a rate of maximum four cycles per day.

The heat cycle conditions:

- The conductor temperature was gradually increased to the maximum operating temperature of the conductor ± 5 K, in less than 2 hours.
- The high temperature was maintained for 4 hours.
- The test arrangement was allowed to cool down to ambient temperature naturally.

The heating of the conductor was made with an AC transformer. The temperature of the conductor was measured underneath the covering with a thermocouple. The thermocouple was placed under the strands of the outer layer on the conductor.

Picture 2

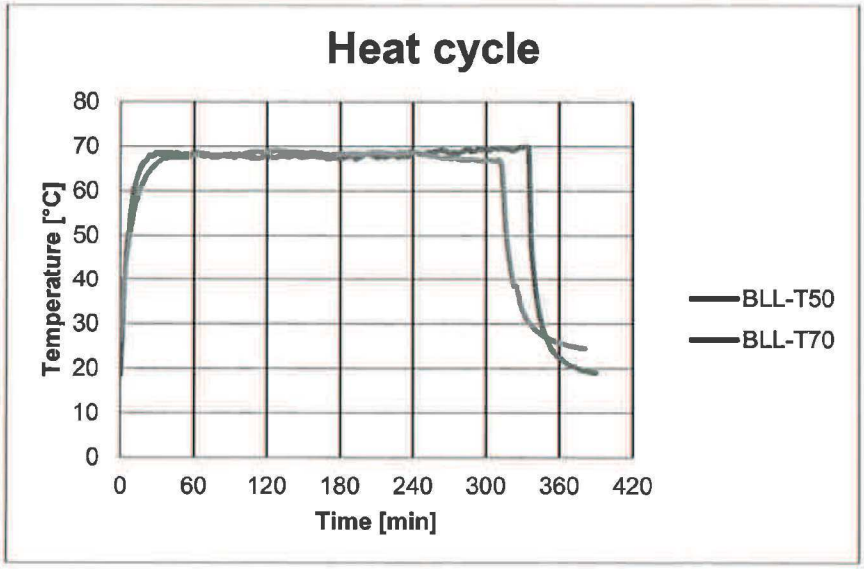
Requirement:

The test is passed if no damage occurs which could affect the correct function of the clamp. Also no damage shall occur on the covering. The slippage of the covering shall be less than 20 mm.

3. Test results

Sample	Conductors	MBL [kN]	15% of MBL [kN]	Measured test load [kN]	Max operating temperature [°C]	Test current [A]	Result
5	BLL-T 50	13,9	2,09	2,16	70	219	ok
6	BLL-T 50	13,9	2,09	2,16	70		
7	BLL-T 70	18,6	2,79	2,91	70	250	ok
8	BLL-T 70	18,6	2,79	2,91	70		

Table 1: Test data



Graph 1: One heat cycle

Summary:
All samples fulfilled standard requirements.

ВЯРНО С ОРИГИНАЛА
ЦИОНЕРНО ДРУЖЕСТВО * ПЛОВДИВ *
ИЛКАБ
16

4. Pictures

Picture 3: Test arrangement in horizontal test bench

5. Test equipment

ID	TYPE	MODEL	PURPOSE
L14	Torque wrench	BDS 80 E	Torque adjustment
L56	Torque wrench	BDS 80 E	Torque adjustment
HT3	Test bench	Ensto	High temperature tests
HT4	Test bench	Ensto	High temperature tests
M8	AC Transformer	0 – 300 A	AC-supply for heating
M9	AC Transformer	0 – 300 A	AC-supply for heating

6. Test Id

848

7. Revision history

A

ВЯРНО С ОРИГИНАЛА

ФИЛКАБ 16

Saves Your Energy

LABORATORY REPORT
No.: 2056S
Revision: A

Date of Test: 20.5 – 19.7.2010

Test object:

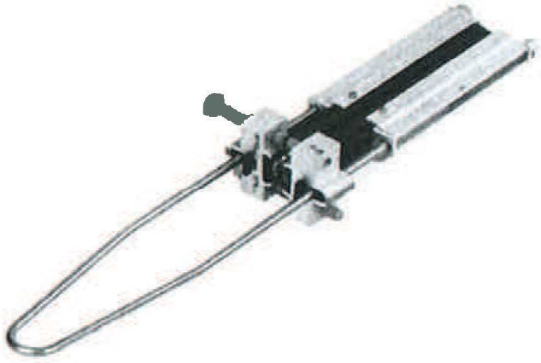
Tension clamp SO255.

Purpose of the test and relevant standards:

Part of type test.
Tensile test for tension clamp at high temperature according to EN 50397-2:2009 clause 7.4.9.

Conclusion:

The clamp passed the test.



Picture 1: Tested clamp SO255

ENSTO UTILITY NETWORKS LABORATORY

Date of Report: 2.2.2011

Tested by: Patrick Ekholm

Witnessed by: Sami Hakonen / SGS Fimko

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1. Test objects

Clamp:

Type:	Tension clamp SO255
Batch number:	0-series
Conductor range:	50 – 70 mm^2
Conductor diameter:	12,7 – 16,7 mm
Tightening torque:	40Nm
No of pcs:	4

Conductors:

Type:	SAX-W 50
Used cross-sections:	50 mm^2
Manufacturer/Country:	Prysmian / Finland
Insulation thickness:	2,4 mm
Total diameter:	12,7 mm
Number of strands:	7
Insulation material:	XLPE
Conductor material:	AlMgSi
Conductor MBL:	15,5 kN
Refer to standard:	EN50397-1

Type:	SAX-W 70
Used cross-sections:	70 mm^2
Manufacturer/Country:	Prysmian / Finland
Insulation thickness:	2,4 mm
Total diameter:	14,3 mm
Number of strands:	7
Insulation material:	XLPE
Conductor material:	AlMgSi
Conductor MBL:	22,5 kN
Refer to standard:	EN50397-1

ВЯРНО С ОРИГИНАЛА

АКЦИОНЕРНО ДРУЖЕСТВО * ФИЛКАБ 16 * ПЛОВДИВ *

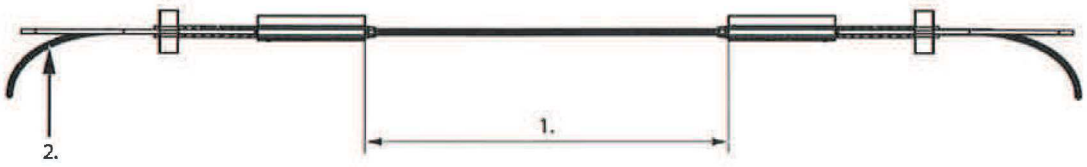
2. Testing procedure

The test was made with the maximum operating temperature of the conductor. Two tension clamps were tested. The test arrangement is shown in picture 2. The arrangement was installed in a horizontal test bench. A constant mechanical load was maintained throughout the test. The test load was 15% of conductor MBL. The test load was stabilised at ± 10 % and maintained for a period of at least 6 hours at ambient temperature. After the pre-tightening the test consisted of 100 heat cycles at a rate of maximum four cycles per day.

The heat cycle conditions:

- The conductor temperature was gradually increased to the maximum operating temperature of the conductor ± 5 K, in less than 2 hours.
- The high temperature was maintained for 4 hours.
- The test arrangement was allowed to cool down to ambient temperature naturally.

The heating of the conductor was made with an AC transformer. The temperature of the conductor was measured underneath the covering with a thermocouple. The thermocouple was placed under the strands of the outer layer on the conductor.



Picture 2

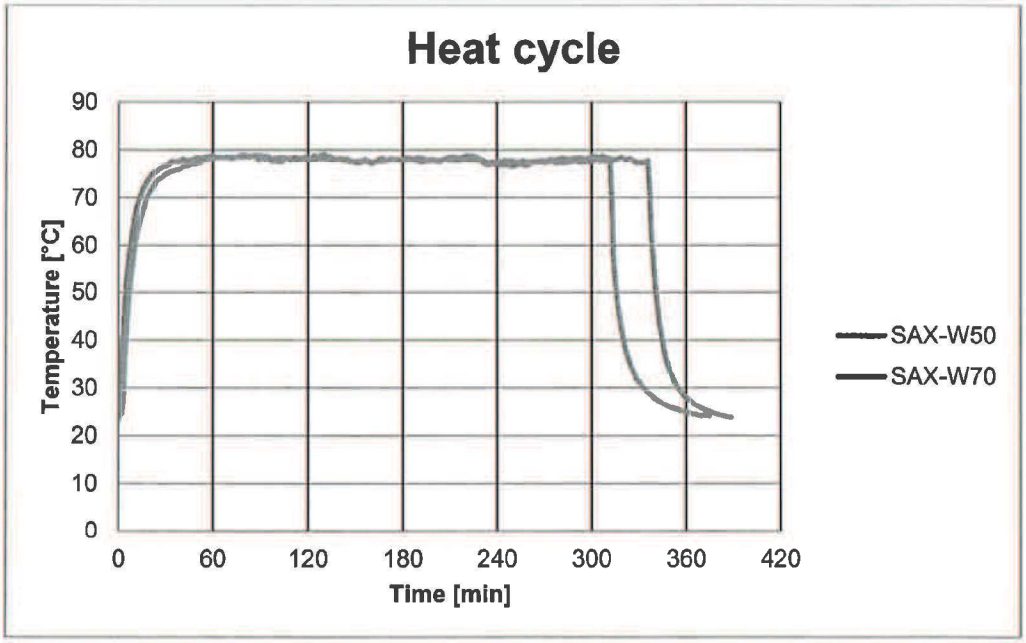
Requirement:

The test is passed if no damage occurs which could affect the correct function of the clamp. Also no damage shall occur on the covering. The slippage of the covering shall be less than 20 mm.

3. Test results

Sample	Conductors	MBL [kN]	15% of MBL [kN]	Measured test load [kN]	Max operating temperature [°C]	Test current [A]	Result
1	SAX-W 50	15,5	2,33	2,26	80	209	ok
2	SAX-W 50	15,5	2,33	2,26	80		
3	SAX-W 70	22,5	3,38	3,56	80	254	ok
4	SAX-W 70	22,5	3,38	3,56	80		

Table 1: Test data



Graph 1: One heat cycle

Summary:
All samples fulfilled standard requirements.

4. Pictures

Picture 3: Test arrangement in horizontal test bench

5. Test equipment

ID	TYPE	MODEL	PURPOSE
L14	Torque wrench	BDS 80 E	Torque adjustment
L56	Torque wrench	BDS 80 E	Torque adjustment
HT3	Test bench	Ensto	High temperature tests
HT4	Test bench	Ensto	High temperature tests
M8	AC Transformer	0 – 300 A	AC-supply for heating
M9	AC Transformer	0 – 300 A	AC-supply for heating

6. Test Id

848

7. Revision history

A

ВЯРНО С ОРИГИНАЛА

АКЦИОНЕРНО ДРУЖЕСТВО ФИЛКАБ 16 ПЛОВДИВ

Saves Your Energy

LABORATORY REPORT
No.: 2058S
Revision: A

Date of Test: 8.6 - 9.6.2010

Test object:

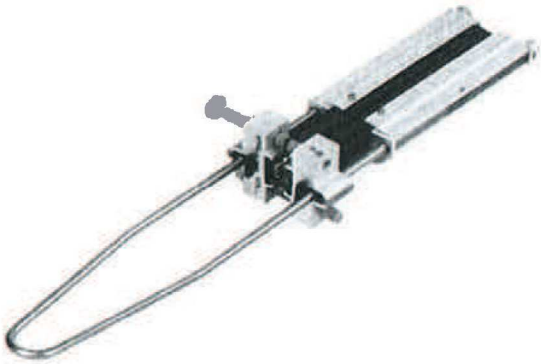
Tension clamp SO255.

Purpose of the test and relevant standards:

Part of type test.
Clamp bolt tightening test for tension clamp according to EN 50397-2:2009 clause 7.4.10.1 with deviation.

Conclusion:

The clamp passed the test.



Picture 1: Tested clamp SO255

ENSTO
UTILITY NETWORKS
LABORATORY

Date of Report: 8.2.2011

Tested by: Patrick Ekholm

Witnessed by: Sami Hakonen / SGS Fimko

Reviewed by: Janne Lappalainen

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ВЯРНО С ОРИГИНАЛА

АКЦИОНЕРНО ДРУЖЕСТВО ФИЛКАВ 15 * ПЛОВДИВ *

1. Test objects

Clamp:

Type:	Tension clamp SO255
Batch number:	0-series
Conductor range:	50 – 70 mm^2
Conductor diameter:	12,7 – 16,7 mm
Tightening torque:	40Nm
No of pcs:	2

Conductors:

Type:	BLL-T 50
Used cross-section:	50 mm^2
Manufacturer/Country:	AMO Kraft AB / Sweden
Insulation thickness:	2,5 mm
Total diameter:	14,2 – 15,2 mm
Number of strands:	7
Insulation material:	HDPE+PE
Conductor material:	AlMgSi
Conductor MBL:	13,9 kN
Refer to standard:	EN50397-1

Type:	BLL-T 70
Used cross-section:	70 mm^2
Manufacturer/Country:	AMO Kraft AB / Sweden
Insulation thickness:	2,5 mm
Total diameter:	15,7 – 16,7 mm
Number of strands:	7
Insulation material:	HDPE+PE
Conductor material:	AlMgSi
Conductor MBL:	18,6 kN
Refer to standard:	EN50397-1

ВЯРНО С ОРИГИНАЛА

ПИОНЕРНО ДРУЖЕСТВО * ФИЛКАБ 16 * ПЛОВДИВ

2. Testing procedure

Two clamps were tested. The clamp was installed on to the covered conductor. The tightening torque was increased to 1,1 x the specified installation torque. The clamp was checked for any damages. Then the tightening continued until breaking occurred. Breaking torque was recorded.

Deviation

Standard says that clamp shall be tightened and loosened 10 times to 1,1 x the specified installation torque. The clamps in test are tightened only ones because the clamps are not allowed to be re-used.

Requirement

No damage shall occur during tightening which could affect the correct function of the clamp or it's nuts.

3. Test results

Sample	Conductors	Tigtening torque 44Nm [Nm]	Damage torque [Nm]
1	BLL-T 70	No damage	No damage at 100 Nm
2	BLL-T 50	No damage	No damage at 100 Nm

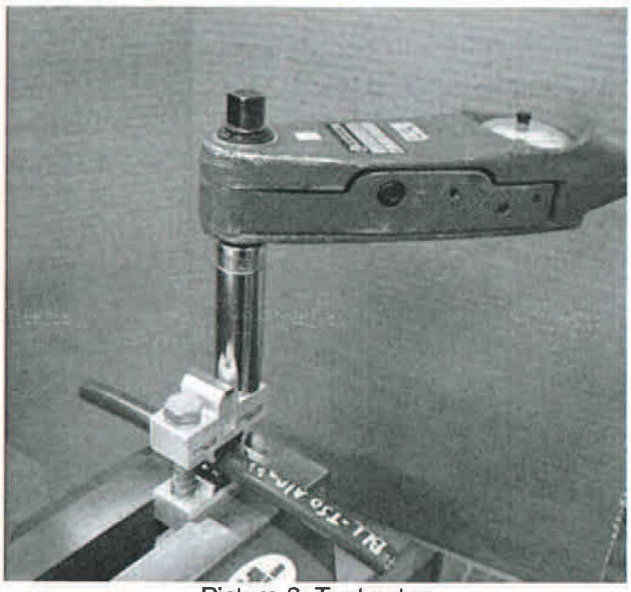
Table 1: Test data

Summary:
All samples fulfilled standard requirements.

ВЯРНО С ОРИГИНАЛА

АКЦИОНЕРНО ДРУЖЕСТВО * ПЛОВДИВ * ФИЛКАБ 16

4. Pictures



Picture 2: Test setup

5. Test equipment

ID	TYPE	MODEL	PURPOSE
L56	Torque wrench	BDS – 80 E	Torque adjustment
L73	Torque wrench	Norbar 200	Torque adjustment

6. Test Id

852

7. Revision history

A

ВЯРНО С ОРИГИНАЛА
АКЦИОНЕРНО ДРУЖЕСТВО * ФИЛКАБ 16 * ПЛОВДИВ

Saves Your Energy

LABORATORY REPORT
No.: 2059S
Revision: A

Date of Test: 8.6 - 9.6.2010

Test object:

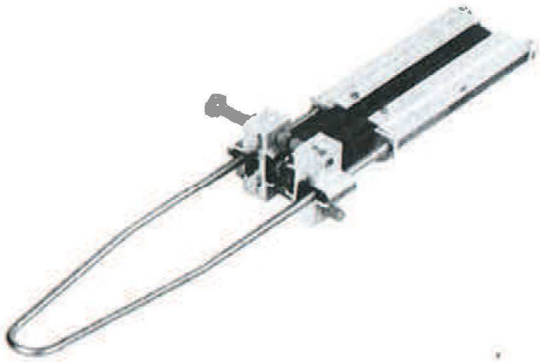
Tension clamp SO255.

Purpose of the test and relevant standards:

Part of type test.
Clamp bolt tightening test for tension clamp according to EN 50397-2:2009 clause 7.4.10.1 with deviation.

Conclusion:

The clamp passed the test.



Picture 1: Tested clamp SO255

ENSTO UTILITY NETWORKS LABORATORY

Date of Report: 8.2.2011

Tested by: Patrick Ekholm

Reviewed by: Janne Lappalainen

Witnessed by: Sami Hakonen / SGS Fimko

Ordered by: V.Vilenius
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АД МОНЕРНО ДРУЖЕСТВО ФИЛКАБ 16 ПЛОВДИВ

ВЯРНО С ОРИГИНАЛА

1. Test objects

Clamp:

Type:	Tension clamp SO255
Batch number:	0-series
Conductor range:	50 – 70 mm^2
Conductor diameter:	12,7 – 16,7 mm
Tightening torque:	40Nm
No of pcs:	2

Conductors:

Type:	SAX-W 50
Used cross-sections:	50 mm^2
Manufacturer/Country:	Prysmian / Finland
Insulation thickness:	2,4 mm
Total diameter:	12,7 mm
Number of strands:	7
Insulation material:	XLPE
Conductor material:	AlMgSi
Conductor MBL:	15,5 kN
Refer to standard:	EN50397-1

Type:	SAX-W 70
Used cross-sections:	70 mm^2
Manufacturer/Country:	Prysmian / Finland
Insulation thickness:	2,4 mm
Total diameter:	14,3 mm
Number of strands:	7
Insulation material:	XLPE
Conductor material:	AlMgSi
Conductor MBL:	22,5 kN
Refer to standard:	EN50397-1

ВЯРНО С ОРИГИНАЛА

АКЦИОНЕРНО ДРУЖЕСТВО * ПРОВДИВ * ФИЛКАБ 16

2. Testing procedure

Two clamps were tested. The clamp was installed on to the covered conductor. The tightening torque was increased to 1,1 x the specified installation torque. The clamp was checked for any damages. Then the tightening continued until breaking occurred. Breaking torque was recorded.

Deviation

Standard says that clamp shall be tightened and loosened 10 times to 1,1 x the specified installation torque. The clamps in test are tightened only ones because the clamps are not allowed to be re-used.

Requirement

No damage shall occur during tightening which could affect the correct function of the clamp or it's nuts.

3. Test results

Sample	Conductors	Tigtening torque 44Nm [Nm]	Damage torque [Nm]
3	SAX-W 70	No damage	No damage at 100 Nm
4	SAX-W 50	No damage	No damage at 100 Nm

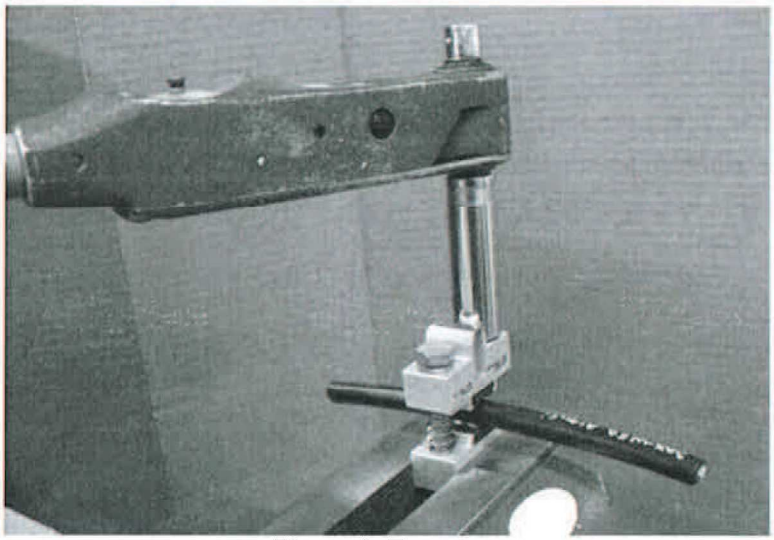
Table 1: Test data

Summary:
All samples fulfilled standard requirements.

ВЯРНО С ОРИГИНАЛА

АКЦИОНЕРНО ДРУЖЕСТВО ФИЛКАБ 16 ПЛОВДИВ

4. Pictures



Picture 2: Test setup

5. Test equipment

ID	TYPE	MODEL	PURPOSE
L14	Torque wrench	BDS – 80 E	Torque adjustment
L73	Torque wrench	Norbar 200	Torque adjustment

6. Test Id

852

7. Revision history

A

ВЯРНО С ОРИГИНАЛА

АКЦИОНЕРНО ДРУЖЕСТВО * ФИЛКАБ 16 * ПЛОВДИВ *

Saves Your Energy

LABORATORY REPORT
No.: 2061S
Revision: A

Date of Test: 17.6.2010

Test object:

Tension clamp SO255.

Purpose of the test and relevant standards:

Part of type test.
Low temperature assembly test according to EN 50397-2:2009 clause 7.4.14.

Conclusion:

The clamp passed the test at -25 °C.

Picture 1: Tested clamp SO255

Date of Report: 8.2.2011

Tested by: Patrick Ekholm

Witnessed by: Sami Hakonen / SGS Fimko

Reviewed by: Janne Lappalainen

Ordered by: V.Vilenius
Distribution: OHL PD-team

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1. Test objects

Clamp:

Type:	Tension clamp SO255
Batch number:	0-series
Conductor range:	50 – 70 mm^2
Conductor diameter:	12,7 – 16,7 mm
Tightening torque:	40Nm
No of pcs:	4

Conductors:

Type:	BLL-T 50
Used cross-section:	50 mm^2
Manufacturer/Country:	AMO Kraft AB / Sweden
Insulation thickness:	2,5 mm
Total diameter:	14,2 – 15,2 mm
Number of strands:	7
Insulation material:	HDPE+PE
Conductor material:	AlMgSi
Refer to standard:	EN50397-1

Type:	BLL-T 70
Used cross-section:	70 mm^2
Manufacturer/Country:	AMO Kraft AB / Sweden
Insulation thickness:	2,5 mm
Total diameter:	15,7 – 16,7 mm
Number of strands:	7
Insulation material:	HDPE+PE
Conductor material:	AlMgSi
Refer to standard:	EN50397-1

ВЯРНО С ОРИГИНАЛА

АДМИНОНЕРНО ДРУЖЕСТВО * ПЛОВДИВ * ФИЛИКАБ 16

2. Testing procedure

The clamps and the conductors were pre-conditioned in a deep freezer until they reached the test temperature of (-25 ±3)°C. The clamps were removed from the deep freezer and immediately tightening was carried out in a bench vice at a rate of approximately 1 full turn in 8 seconds. Electrical continuity was measured between the main and branch cables. The torque at which continuity was achieved was recorded. Two samples were tested for both minimum and maximum conductors.

Requirement:

Electrical continuity shall be achieved at a torque value less than, or equal to, 70 % of the manufacturer's specified minimum installation torque.

3. Test results

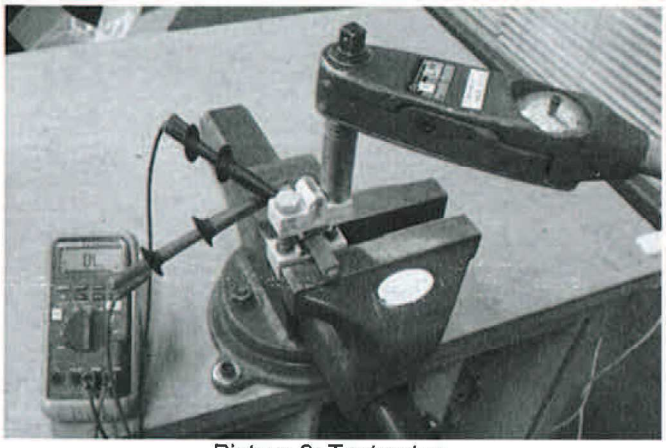
Sample	Conductors	Contact torque [Nm]
1	BLL-T 70	12
2	BLL-T 70	10
3	BLL-T 50	9
4	BLL-T 50	8

Table 1: Test data

Summary:
All samples fulfilled the requirement of the standard as none exceeded 28 Nm which is 70 % of the connectors tightening torque of 40 Nm.

ВЯРНО С ОРИГИНАЛА
АКЦИОНЕРНО ДРУЖЕСТВО ФИЛКАБ 16 ПЛОВДИВ

4. Pictures



Picture 2: Test setup

5. Test equipment

ID	TYPE	MODEL	PURPOSE
L42	Thermometer	2455 16	Temperature measurements
L14	Torque wrench	BDS – 80 E	Torque adjustment
L60	Multimeter	Fluke 87	Voltage drop measurements
L33	Deep freezer	ALK 30	Climate testing

6. Test Id

1082

7. Revision history

A

ВЯРНО С ОРИГИНАЛА

АКЦИОНЕРНО ДРУЖЕСТВО ФИЛКАБ 16 ПЛОВДИВ

Saves Your Energy

LABORATORY REPORT
No.: 2062S
Revision: A

Date of Test: 17.6.2010

Test object:

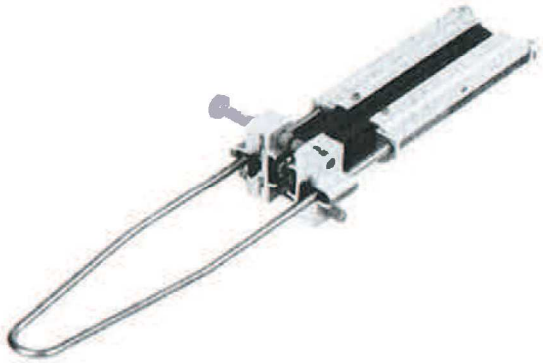
Tension clamp SO255.

Purpose of the test and relevant standards:

Part of type test.
Low temperature assembly test according to EN 50397-2:2009 clause 7.4.14.

Conclusion:

The clamp passed the test at -25 °C.



Picture 1: Tested connector SO255

ENSTO UTILITY NETWORKS LABORATORY

Date of Report: 8.2.2011

Tested by: Patrick Ekholm

Witnessed by: Sami Hakonen / SGS Fimko

Reviewed by: Janne Lappalainen

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ВЯРНО С ОРИГИНАЛА

1. Test objects

Clamp:

Type:	Tension clamp SO255
Batch number:	0-series
Conductor range:	50 – 70 mm^2
Conductor diameter:	12,7 – 16,7 mm
Tightening torque:	40Nm
No of pcs:	4

Conductors:

Type:	SAX-W 50
Used cross-sections:	50 mm^2
Manufacturer/Country:	Prysmian / Finland
Insulation thickness:	2,4 mm
Total diameter:	12,7 mm
Number of strands:	7
Insulation material:	XLPE
Conductor material:	AlMgSi
Refer to standard:	EN50397-1

Type:	SAX-W 70
Used cross-sections:	70 mm^2
Manufacturer/Country:	Prysmian / Finland
Insulation thickness:	2,4 mm
Total diameter:	14,3 mm
Number of strands:	7
Insulation material:	XLPE
Conductor material:	AlMgSi
Refer to standard:	EN50397-1

ВЯРНО С ОРИГИНАЛА

АКЦИОНЕРНО ДРУЖЕСТВО * ФИЛКАБ 16 * ПЛОВДИВ

2. Testing procedure

The clamps and the conductors were pre-conditioned in a deep freezer until they reached the test temperature of (-25 ±3)°C. The clamps were removed from the deep freezer and immediately tightening was carried out in a bench vice at a rate of approximately 1 full turn in 8 seconds. Electrical continuity was measured between the main and branch cables. The torque at which continuity was achieved was recorded. Two samples were tested for both minimum and maximum conductors.

Requirement:

Electrical continuity shall be achieved at a torque value less than, or equal to, 70 % of the manufacturer's specified minimum installation torque.

3. Test results

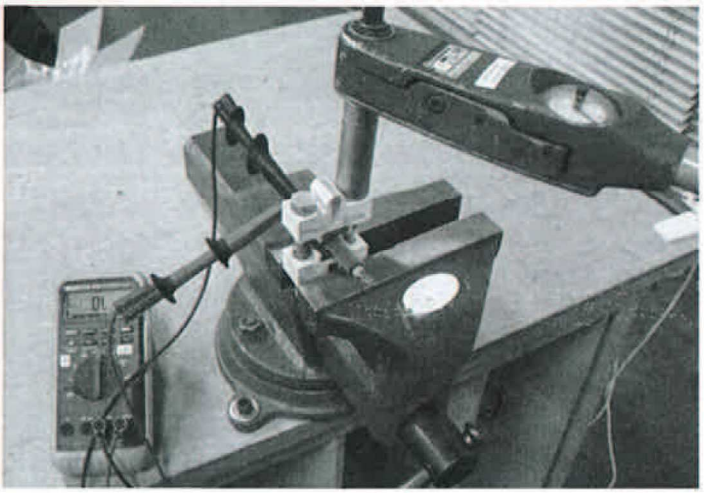
Sample	Conductors	Contact torque [Nm]
5	SAX-W 70	6
6	SAX-W 70	8
7	SAX-W 50	9
8	SAX-W 50	7

Table 1: Test data

Summary:
All samples fulfilled the requirement of the standard as none exceeded 28 Nm which is 70 % of the connectors tightening torque of 40 Nm.

ВЯРНО С ОРИГИНАЛА

4. Pictures



Picture 2: Test setup

5. Test equipment

ID	TYPE	MODEL	PURPOSE
L42	Thermometer	2455 16	Temperature measurements
L14	Torque wrench	BDS – 80 E	Torque adjustment
L60	Multimeter	Fluke 87	Voltage drop measurements
L33	Deep freezer	ALK 30	Climate testing

6. Test Id

1082

7. Revision history

A

ВЯРНО С ОРИГИНАЛА

АКЦИОНЕРНО ДРУЖЕСТВО * ФИЛКАБ 16 * ПЛОВДИВ *

Saves Your Energy

LABORATORY REPORT
No.: 2064S
Revision: A

Date of Test: 30.8 – 1.9.2010

Test object:

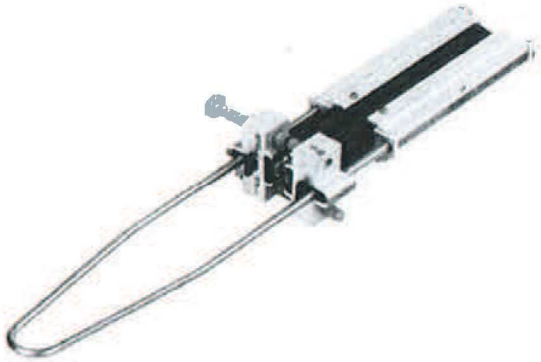
Tension clamp SO255.

Purpose of the test and relevant standards:

Part of type test.
Water tightness test according to EN 50397-2:2009 clause 7.6.

Conclusion:

The clamp passed the test.



Picture 1: Tested clamp SO255

ENSTO UTILITY NETWORKS LABORATORY

Date of Report: 9.2.2011

Tested by: Patrick Ekholm

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ВЯРНО С ОРИГИНАЛА

ФИЛКАБ 16

1. Test objects

Clamp:

Type:	Tension clamp SO255
Batch number:	0-series
Conductor range:	50 – 70 mm^2
Conductor diameter:	12,7 – 16,7 mm
Tightening torque:	40Nm
No of pcs:	6

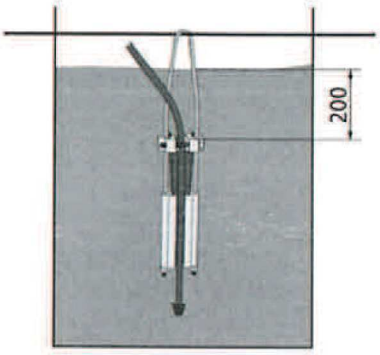
Conductors:

Type:	BLL-T 50
Used cross-section:	50 mm^2
Manufacturer/Country:	AMO Kraft AB / Sweden
Insulation thickness:	2,5 mm
Total diameter:	14,2 – 15,2 mm
Number of strands:	7
Insulation material:	HDPE+PE
Conductor material:	AlMgSi
Refer to standard:	EN50397-1

Type:	BLL-T 70
Used cross-section:	70 mm^2
Manufacturer/Country:	AMO Kraft AB / Sweden
Insulation thickness:	2,5 mm
Total diameter:	15,7 – 16,7 mm
Number of strands:	7
Insulation material:	HDPE+PE
Conductor material:	AlMgSi
Refer to standard:	EN50397-1

2. Testing procedure

The clamps were installed onto the conductors according to manufactures instructions. One end rose over the water surface and the other end was plugged with an end cap. The clamps piercing parts were immersed in the water at a depth of 200mm. The clamps were kept in the water for 48 hours. Three samples were tested for minimum and maximum conductors.



Requirement:

No water shall penetrate to the conductor.

3. Test results

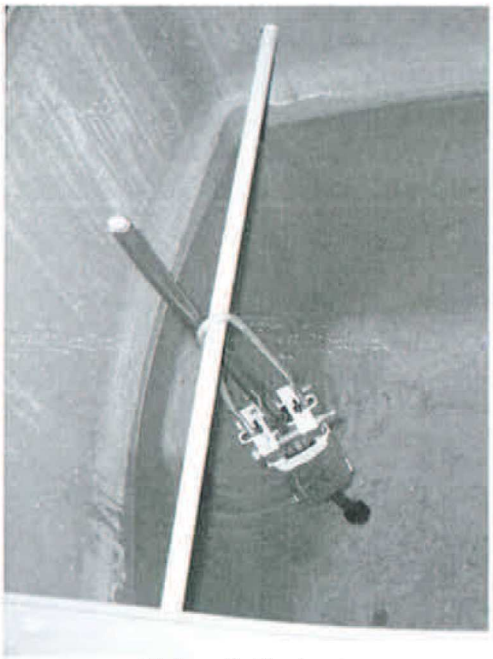
Sample	Conductors	Tightning torque [Nm]	Results
1	BLL-T 50	40	OK
2	BLL-T 50	40	OK
3	BLL-T 50	40	OK
4	BLL-T 70	40	OK
5	BLL-T 70	40	OK
6	BLL-T 70	40	OK

Table 1: Test data

Summary:
All samples fulfilled standard requirements.

ВЯРНО С ОРИГИНАЛА
АКЦИОНЕРНО ДРУЖЕСТВО * ФИЛКАБ 16 *

4. Pictures



Picture 2: Test setup

5. Test equipment

ID	TYPE	MODEL	PURPOSE
L56	Torque wrench	BDS 80 E	Torque adjustment

6. Test Id

854

7. Revision history

A

ВЯРНО С ОРИГИНАЛА

АКЦИОНЕРНО ДРУЖЕСТВО ФИЛКАБ 16 ПЛОВДИВ

Saves Your Energy

LABORATORY REPORT
No.: 2065S
Revision: A

Date of Test: 24-26.8 and 17-19.8.2010

Test object:

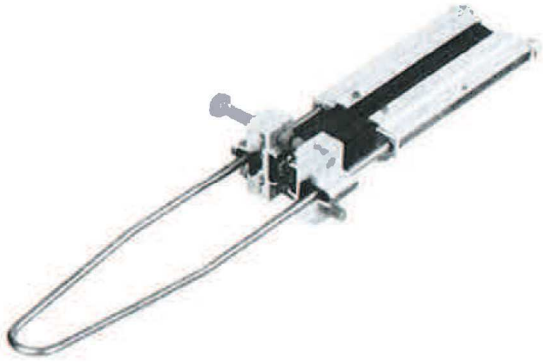
Tension clamp SO255.

Purpose of the test and relevant standards:

Part of type test.
Water tightness test according to EN 50397-2:2009 clause 7.6.

Conclusion:

The clamp passed the test.



Picture 1: Tested clamp SO255

ENSTO UTILITY NETWORKS LABORATORY

Date of Report: 18.5.2011

Tested by: Patrick Ekholm

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ВЯРНО С ОРИГИНАЛА

АНГЛОНЕРНО ДРУЖЕСТВО ФИЛКАБ 16 ПЛОВДИВ

1. Test objects

Clamp:

Type:	Tension clamp SO255
Batch number:	0-series
Conductor range:	50 – 70 mm^2
Conductor diameter:	12,7 – 16,7 mm
Tightening torque:	40Nm
No of pcs:	6

Conductors:

Type:	SAX-W 50
Used cross-sections:	50 mm^2
Manufacturer/Country:	Prysmian / Finland
Insulation thickness:	2,4 mm
Total diameter:	12,7 mm
Number of strands:	7
Insulation material:	XLPE
Conductor material:	AlMgSi
Refer to standard:	EN50397-1

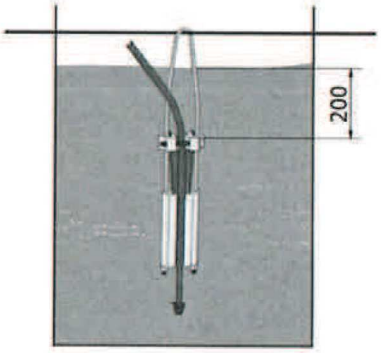
Type:	SAX-W 70
Used cross-sections:	70 mm^2
Manufacturer/Country:	Prysmian / Finland
Insulation thickness:	2,4 mm
Total diameter:	14,3 mm
Number of strands:	7
Insulation material:	XLPE
Conductor material:	AlMgSi
Refer to standard:	EN50397-1

ВЯРНО С ОРИГИНАЛА

АКТИВНО ДРУЖЕСТВО ФИЛКАЕ 16

2. Testing procedure

The clamps were installed onto the conductors according to manufactures instructions. One end rose over the water surface and the other end was plugged with an end cap. The clamps piercing parts were immersed in the water at a depth of 200mm. The clamps were kept in the water for 48 hours. Three samples were tested for minimum and maximum conductors.



Requirement:

No water shall penetrate to the conductor.

3. Test results

Sample	Conductors	Tightning torque [Nm]	Results
7	SAX-W 50	40	OK
8	SAX-W 50	40	OK
9	SAX-W 50	40	OK
10	SAX-W 70	40	OK
11	SAX-W 70	40	OK
12	SAX-W 70	40	OK

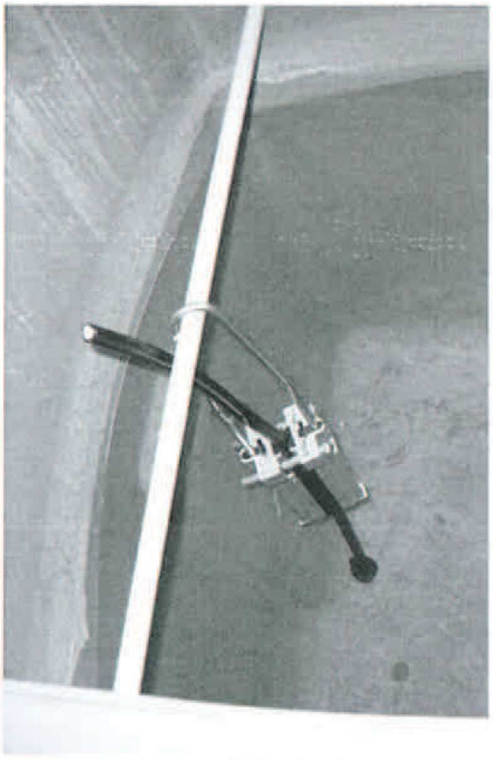
Table 1: Test data

Summary:
All samples fulfilled standard requirements.

ВЯРНО С ОРИГИНАЛА

ФИЛКАБ 16

4. Pictures



Picture 2: Test setup

5. Test equipment

ID	TYPE	MODEL	PURPOSE
L56	Torque wrench	BDS 80 E	Torque adjustment

6. Test Id

854

7. Revision history

A

ВЯРНО С ОРИГИНАЛА

АКЦИОНЕРНО ДРУЖЕСТВО ФИЛКАБ 16 ПЛОВДИВ

Saves Your Energy

LABORATORY REPORT
No.: 2067S
Revision: A

Date of Test: 17.6.2010

Test object:

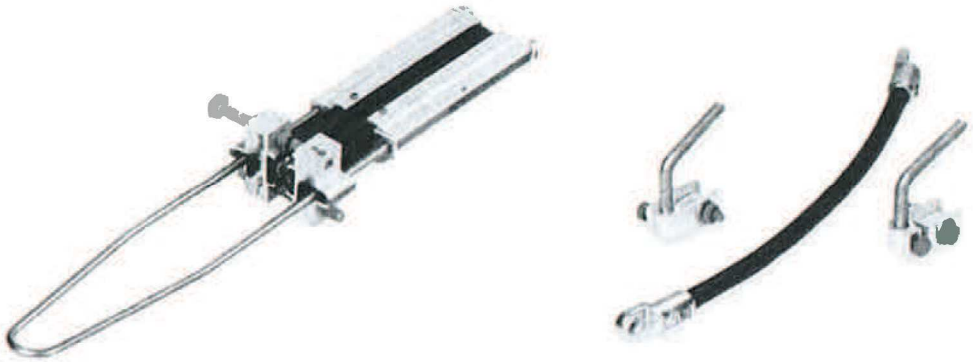
Tension clamp SO255 and power arc device SDI27.1.

Purpose of the test and relevant standards:

Part of type test.
Short-circuit test according to EN 50397-2:2009 clause 7.8 with deviation.

Conclusion:

The clamp and power arc device passed the test.



Picture 1: Tested clamp SO255 and power arc device SDI27.1

ENSTO UTILITY NETWORKS LABORATORY

Date of Report: 9.2.2011

Tested by: Patrick Ekholm

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ВЯРНО С ОРИГИНАЛА

АКЦИОНЕРНО ДРУЖЕСТВО ФИЛКАБ 16 ПЛОВДИВ

1. Test objects

Clamps:

Type:	Tension clamp SO255
Batch number:	0-series
Conductor range:	50 – 70 mm^2
Conductor diameter:	12,7 – 16,7 mm
Tightening torque:	40Nm
No of pcs:	6

Type:	Power arc device SDI27.1
Batch number:	0-series
Tightening torque:	44Nm
No of pcs:	6

Conductors:

Type:	BLL-T 70
Used cross-section:	70 mm^2
Manufacturer/Country:	AMO Kraft AB / Sweden
Insulation thickness:	2,5 mm
Total diameter:	15,7 – 16,7 mm
Number of strands:	7
Insulation material:	HDPE+PE
Conductor material:	AlMgSi
Max. short circuit current:	6,65 kA (+50°C >> +250°C)
Refer to standard:	EN50397-1

ВЯРНО С ОРИГИНАЛА

2. Testing procedure

Three test arrangements shall be tested. The test arrangement is subjected to one pulse of over-current for 1s. The test arrangement is shown in Picture 2. For this test the earthing rod will be replaced by a straight piece of the same cross-section, shape and material as the earthing rod. The test arrangement is made of two clamps installed on maximum conductor and combined with a test rod. The resistances are measured over reference conductor and the connectors before and after the test.

1 Resistance measurement reference conductor
2 Resistance measurement clamp
3 Resistance measurement clamp
4 Test rod twice the length of earthing rod

Picture 2: Test arrangement

Requirement:
The change of resistance before and after short circuit shall be less than 50 %. No visible damage shall be observed on the connector or on the cable.

3. Test results

Sample	Lenght [mm]		Resistance before [µΩ]			Resistance after [µΩ]			Change in resistance	Over-current
	Reference	Clamp	Reference	Between measuring points	Clamp	Reference	Between measuring points	Clamp		
7	395	306	176	323	187	176	328	192	3 %	8,3 kA
8	395	305	176	295	159	176	295	159	0 %	8,3 kA
9	403	296	197	307	162	192	299	158	-3 %	8,6 kA
10	403	310	197	312	160	192	305	157	-2 %	8,6 kA
11	393	313	177	307	166	177	304	163	-2 %	8,3 kA
12	393	298	177	295	161	177	294	160	-1 %	8,3 kA

Table 1: Test data

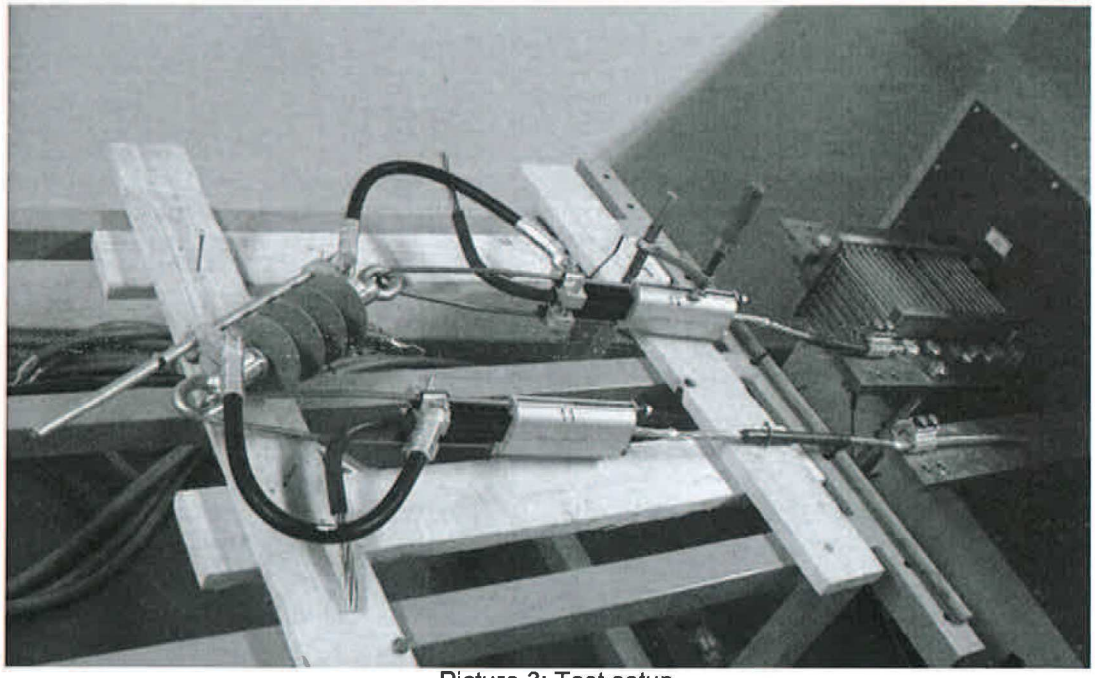
Summary:
All samples fulfilled test requirements.

Deviation

The standard requires an over-current pulse of 10kA. In this case the pulse is lower because the conductor is not specified to withstand an over-current pulse of 10kA.

ВЯРНО С ОРИГИНАЛА

4. Pictures



Picture 3: Test setup

5. Test equipment

ID	TYPE	MODEL	PURPOSE
SM3	Short-circuit transformer	230 kVA	Supply for s-c test
L160	Analog input/output module	cFP-AIO-610	DC-current measurement
L163	Thermocouple module	cFP-TC-125	Voltage drop measurements
L164	Thermocouple module	cFP-TC-125	Voltage drop measurements
L56	Torque wrench	BDS 80 E	Torque adjustment
L68	Scopemeter	105B	Short-circuit characteristics

6. Test Id

857

7. Revision history

A

ВЯРНО С ОРИГИНАЛА

АКЦИОНЕРНО ДРУЖЕСТВО ФИЛКАБ 15 ПЛОВДИВ