ЕРЮГ
EVN група

УЧАСТНИК: „Филкаб“ АД

Седалище и адрес на управление: гр. Пловдив, ул. „Коматевско шосе“ № 92

Тел: 032 277 171 /Факс: 032 671 133 /E-mail: office@filkab.com

ЕИК/~~Булстат~~: 115328801

Адрес за кореспонденция: гр. Пловдив, ул. „Коматевско шосе“ № 92,

представляван от Атанас Иванов Танчев,

в качеството на Изпълнителен директор

О Ф Е Р Т А[1]

за участие в обществена поръчка при условията на чл. 187 по реда на Глава двадесет и шеста от Закона за обществените поръчки (ЗОП)

УВАЖАЕМИ ГОСПОЖИ И ГОСПОДА,

С настоящото Ви представяме нашата оферта за участие в обявената от Вас обществена поръчка № 368-ЕР-17-МР-Д-3 с предмет: „Доставка на арматура за изолирана въздушна мрежа Ср.Н.“

Декларираме, че сме запознати с обявата и условията за участие в обявената от Вас обществена поръчка. Съгласни сме с поставените от Вас условия и ги приемаме без възражения.

Декларираме, че сме запознати и приемаме условията в следните документи: Търговски условия, Технически описания ЕР Юг ЕАД: ТО 186/00 и ТО 187/00, Общи условия на закупуване на дружествата от групата EVN, Клауза за социална отговорност на дружествата от групата на EVN.

Запознати сме с проекта на договор, приемаме го и ако бъдем определени за изпълнител, ще сключим договор в законоустановения срок.

Декларираме, че ще сключим писмен договор, който включва всички предложения от офертата ни.

Декларираме, че при сключването на договор ще представим документи, издадени от компетентен орган за удостоверяване на липсата на обстоятелствата по чл. 54, ал. 1, т. 1 – 3 и декларации за липсата на обстоятелствата по чл. 54, ал. 1, т. 4, 5 и 7 от ЗОП.

Ние сме съгласни да се придържаме към това предложение за срок от 90 дни от датата, която е посочена в обявата за дата на получаване на офертата.

При изпълнението на поръчката ~~ще използваме~~/няма да използваме услугите на следните подизпълнители (невярното се зачертава):

Наименование на подизпълнителя	Обхват на дейностите, които ще извършва	Размер на участието на подизпълнителя в %
н/п	-	-
н/п	-	-

Забележка: В случай, че се използват подизпълнители се представя:

- Заверено от участника копие от документа за регистрация или единния идентификационен код (ЕИК), съгласно чл. 23 от Закона за търговския регистър, когато участникът е юридическо лице или едноличен търговец; копие от документа за самоличност, когато участникът е физическо лице;
- Доказателство за поетите от подизпълнителите задължения

При изпълнението на поръчката ~~ще използваме~~/няма да използваме капацитета на трети лица (невярното се зачертава):

[1] Офертата се подава на български език.

Наименование на трето лице	Вид/наименование на ресурса	Местонахождение/ Описание на дейностите, които ще се изпълняват с ресурса
н/п	-	-
н/п	-	-

Забележка: В случай, че участника се позовава на капацитета на трети лица, той трябва да докаже, че ще разполага с тези ресурси, като представя:

- Документи за поетите от третите лица задължения

Като неразделна част от настоящата оферта, прилагаме:

1. Техническо предложение;
2. Ценово предложение (по образец);
3. Декларация по чл.54, ал.1, т.1, 2 и 7 от ЗОП (по образец);
4. Декларация по чл.54, ал.1, т.3 - 5 от ЗОП (по образец);
5. Мостра на арматура за изолирана въздушна мрежа Ср.Н.:
   5.1. опъвателна клема за изолиран проводник за PAS 95 мм2 - 1 брой;
   5.2. изолация за опъвателна клема за PAS 95 мм2 - 1 брой;

Дата 25.08.2017

ДЕКЛАРАТОР: .....
(подпис и печат)

АКЦИОНЕРНО ДРУЖЕСТВО * ФИЛКАБ 16 * ПЛОВДИВ *

Атанас Танчев
Изпълнителен директор
„Филкаб“ АД

ЕРЮГ
EVN група

ТЕХНИЧЕСКО ПРЕДЛОЖЕНИЕ

От: .....„Филкаб“ АД..... *(наименование на участника)*

С представянето на нашата оферта заявяваме желанието си да участваме в обявената от възложителя обществена поръчка за възлагане чрез събиране на оферти с обява № 368-ЕР-17-МР-Д-3 с предмет: „Доставка на арматура за изолирана въздушна мрежа Ср.Н.“, при следните условия:

Мястото за изпълнение на поръчката: Склад в гр.Стара Загора, бул. Славянски.

Срокът за изпълнение на поръчката: 30 календарни дни, след заявка (не повече от 30 дни).

Гаранционният срок е: 24 месеца, считано от датата на приемо-предавателния протокол (не по-малко от 24 месеца).
Капацитет до 50 % от оферираните количества (не по-малко от 50%).

Ние сме съгласни да се придържаме към направеното техническо предложение за срок от 90 дни от датата, която е посочена в обявата за дата на получаване на офертата.

ТЕХНИЧЕСКИ ПАРАМЕТРИ:

*Таблица № 1 – **попълването на всички полета е задължително***

№	Минимални изисквания на възложителя	Предложение на участника (Да/Не, Информация, Технически показатели)
1	Отговарят ли предлаганите от участника продукти (Опъвателни клеми и изолации за опъвателни клеми за ССХ) изцяло на заложените в цитираните по-горе в настоящото техническо предложение Технически описания,параметри, респективно спазени ли са Технически описания ЕР ЮГ ЕАД – ТО 186/00 и ЕР ЮГ ЕАД - ТО 187/00 във всичките им точки? **Ако „НЕ“**, моля, опишете подробно	[X] Да [ ] Не [.....]
2	Притежават ли предлаганите от участника продукти сертификати/протоколи за успешно издържана „типова проверка“ по EN 50397-2 и EN 60068-2, съгласно ЕР ЮГ ЕАД– ТО 186/00, ЕР ЮГ ЕАД - ТО 187/00, изготвени от акредитирана изпитателна лаборатория, или еквивалентен орган. Моля приложете ги. В случай, че сертификатите/протоколите са издадени от еквивалентен орган, то моля представете доказателство за еквивалентността (равностойността). *Ако съответните документи са на разположение в електронен формат, моля, посочете:*	[X] Да [ ] Не [.....] (уеб адрес, орган или служба, издаващи документа, точно позоваване на документа): [.....][.....][.....][.....]
3	Към офертата за участие изработени ли са мостри съответно: 1(една) Опъвателна клема и 1(една) Изолация за опъвателна клема? Мострите отговарят ли на всички посочени в цитираните по-горе в настоящото техническо предложение Технически описания ЕР ЮГ ЕАД – ТО 186/00 и ЕР ЮГ ЕАД - ТО 187/00 конкретни характеристики и параметри ?	[X] Да [ ] Не

*Таблица № 2 – попълването на полетата **е пожелателно** и служи за по-пълно представяне на участника*		
№	**Обща информация за предлаганите продукти**	**Предложение на участника (Да/Не, Информация, Технически показатели)**
1	**Данни за поризводител и производство:**	
1.1	Данни за производственото хале на производителя	Адрес: ..... Ensio Mettisen katu 2 06100 Porvoo Finland www.ensto.com

Име производител / търговска марка: Ensto Finland Oy

За изпълнение на изискванията на Възложителя се счита положителен отговор (ДА) на изброените в Таблица № 1 точки, прилагане на изисканите документи, доказващи изпълнение на тези изисквания, както и представяне на две мостри, изцяло отговарящи на техническите описания.
По свое усмотрение участникът е в правото си да приложи допълнителни документи, извън изрично посочените, като доказателства на зададените въпроси.

Офертата на участник, чието техническо предложение не изпълнява някое/и от минималните изисквания на Възложителя няма да бъде разгледана, респективно участникът няма да участва в класирането.

Дата.25.08.2017

УЧАСТНИК: .....
(подпис и печат)

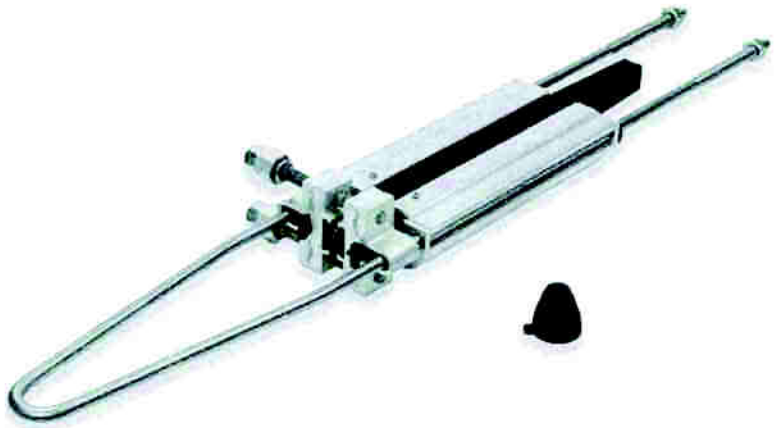
АКЦИОНЕРНО ДРУЖЕСТВО * ФИЛКАБ 16 * ПЛОВДИВ *

Атанас Танчев
Изпълнителен директор
Филкаб АД

Type and Sample Test Report

Tension clamp

SO256 and SO256.2



Test standard:

EN 50397-2 :2009

ВЯРНО С ОРИГИНАЛА

АКЦИОНЕРНО ДРУЖЕСТВО ФИЛКАБ 16 ПЛОВДИВ

ENSTO

Ensto Utility Networks Laboratory
Ensto Finland Oy

Ensio Miettisen katu 2,
P.O.Box 77
06101 Porvoo, Finland

Tel. +358 204 76 21
Fax +358 204 76 2770

Business ID: 1481990-6
Reg. Office: Porvoo

Product: SO256 and SO256.2

Contents	**Document no**
1. Specification	SO256 SO256.2
2. Certificate	FI 29970
3. Sample test report (with BLL-T-conductor only, SMFL 28,5 kN)	
3.1. Visual examination	3765S
3.2. Dimensional and material verification	3765S
3.3. Test for permanent marking	3766S
3.4. Tensile test at ambient temperature	3767S
3.5. Clamp bolt tightening test	3768S
3.6. Damage and failure load test	3764S
4. Sample test report (with BLL-T and PAS)	
5. Type test report (with BLL-T and PAS)	

PRODUCT SPECIFICATION

5/8/2017

6438100303822

SO256

Tension clamp

Code	SO256
GTIN	6438100303822
ENumber	
Name	Tension clamp BLL 99-157 mm² AlMgSi
Description	Tension clamp for covered conductors BLL AlMgSi. The insulation piercing contact part has silicone seal which prevents the moisture getting into the conductor.

Technical specification

Dimensions

Weight:	2.53 kg
Conductor diameter:	16.1 ... 22.3 mm

Features

For conductor size:	BLL 99-157 mm² AlMgSi

Mechanical

SMFL:	28.5 kN
Tightening torque:	40 Nm
SMDL:	22 kN

Certificates

Standards:	EN 50397-2

Specification

Construction:

ВЯРНО С ОРИГИНАЛА

АКЦИОНЕРНО ДРУЖЕСТВО * ФИЛКАБ 16 * ПЛОВДИВ *

Ensto Finland Oy
Ensio Miettisen katu 2
06100 Porvoo
Finland
email: ensto@ensto.com
phone: +358 204 76 21
www.ensto.com

Construction:

Component	Material
Body	Corrosion resistant aluminium alloy
Plastic parts	Frost, heat and UV-radiation resistant plastic
Bolts	Hot-dip galvanised steel M10
Bail	Stainless steel

Installation: The clamp is opened and the conductor wire is inserted between the wedges. The locking connector is tightened. Tightening torque 40 Nm. The clamp is closed and strained.

Markings:

Markings:

ENSTO
SO256
PSS1207
PSS1208
95-157mm²
40 Nm
week/year of manufacture

Packaging

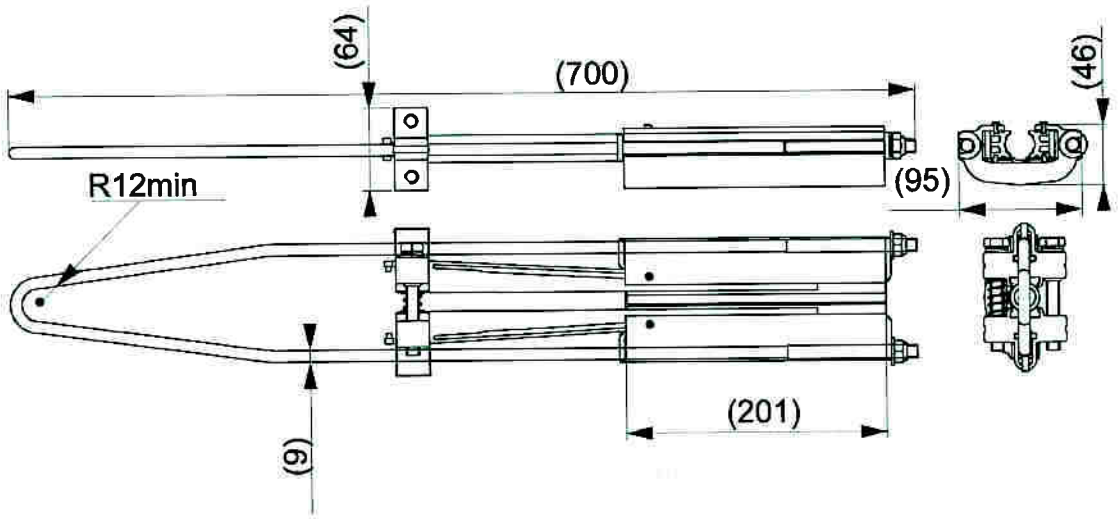
Default package

Unit: PCS
Size: 3
Length: 1130 mm
Width: 150 mm
Height: 120 mm
Weight (net): 7.59 kg
Weight (brt): 7.68 kg
Volume: 0.0203

Pallet package

Unit: PCS
Size: 90
Length: 1200 mm
Width: 800 mm
Height: 860 mm

Weight (net):	227.7 kg
Weight (brt):	248 kg
Volume:	0.8256



ВЯРНО С ОРИГИНАЛА

АКЦИОНЕРНО ДРУЖЕСТВО * ФИЛКАБ 16 * ПЛОВДИВ

Ensto Finland Oy
Ensio Miettisen katu 2
06100 Porvoo
Finland
email: ensto@ensto.com
phone: +358 204 76 21
www.ensto.com

PRODUCT SPECIFICATION

5/8/2017

6438100303839

SO256.2

Tension clamp

Code	SO256.2
GTIN	6438100303839
ENumber	
Name	Tension clamp BLL 99-157 mm² AlMgSi hoist adapter
Description	Tension clamp for covered conductors BLL AlMgSi. The insulation piercing contact part has silicone seal which prevents the moisture getting into the conductor. Clamps are equipped with an adapter for hoist hook.

Technical specification

Dimensions

Weight:	2.79 kg
Conductor diameter:	16.1 ... 22.3 mm

Features

For conductor size:	BLL 99-157 mm² AlMgSi

Mechanical

SMFL:	28.5 kN
Tightening torque:	40 Nm
SMDL:	22 kN

Certificates

Standards:	EN 50397-2

Specification

Construction:

Ensto Finland Oy
Ensio Miettisen katu 2
06100 Porvoo
Finland
email: ensto@ensto.com
phone: +358 204 76 21
www.ensto.com

Construction:

Component	Material
Body	Corrosion resistant aluminium alloy
Bolts	Hot-dip galvanised steel M10
Bail	Stainless steel
Plastic parts	Frost, heat and UV-radiation resistant plastic
Hoist adapter	Hot-dip galvanised steel

Installation: The clamp is opened and the conductor wire is inserted between the wedges. The locking connector is tightened. Tightening torque 40 Nm. The clamp is closed and strained.

Markings:

Markings:

ENSTO
SO256.2
95-157 mm²
40 Nm
week/year of manufacture

Packaging

Default package

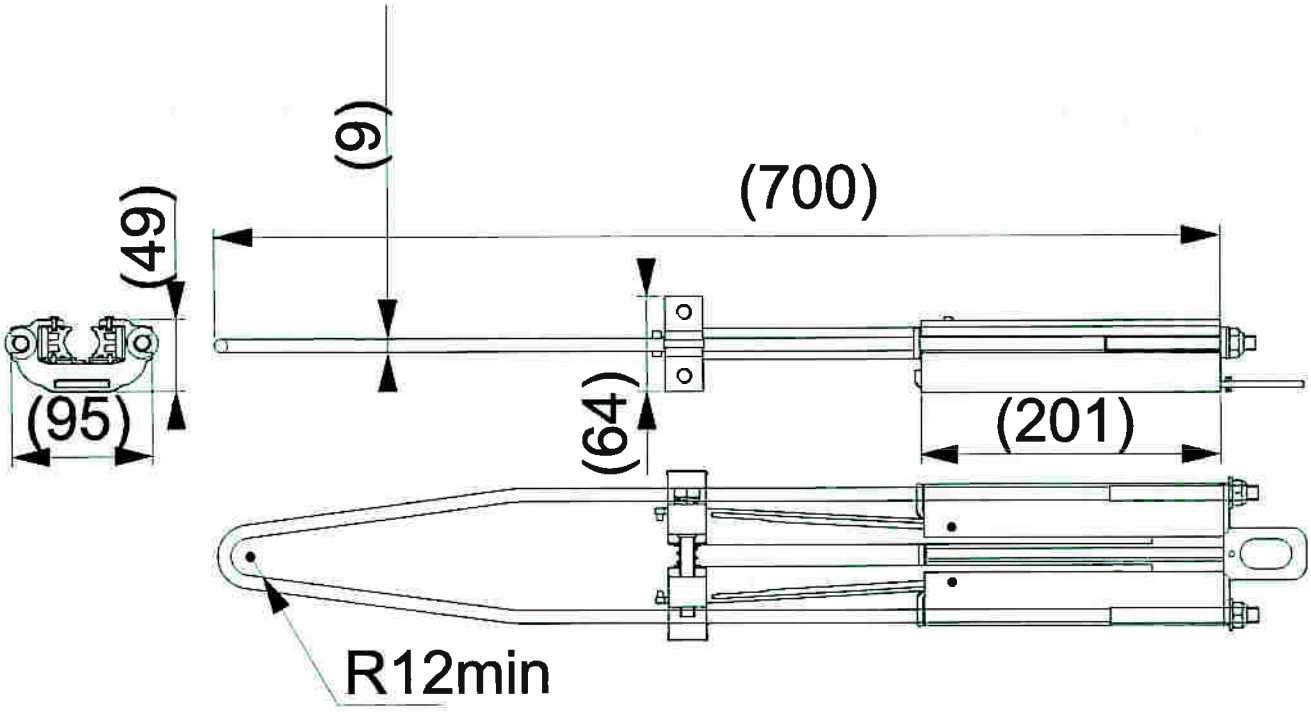
Unit: PCS
Size: 3
Length: 1130 mm
Width: 150 mm
Height: 120 mm
Weight (net): 8.37 kg
Weight (brt): 8.43 kg
Volume: 0.0203

Pallet package

Unit: PCS
Size: 90
Length: 1200 mm
Width: 800 mm
Height: 860 mm
Weight (net): 251.1 kg

Weight (brt):	272 kg
Volume:	0.8256

Ensto Finland Oy
Ensio Miettisen katu 2
06100 Porvoo
Finland
email: ensto@ensto.com
phone: +358 204 76 21
www.ensto.com



ВЯРНО С ОРИГИНАЛА

Ensto Finland Oy
Ensio Miettisen katu 2
06100 Porvoo
Finland
email: ensto@ensto.com
phone: +358 204 76 21
www.ensto.com

CERTIFICATE FI 29970

Our Ref. 289208-1

Product	Fitting for overhead line
Type	SO256 SO256.2
Trade mark	ENSTO
Certificate Holder/ Manufacturer	Ensto Finland Oy Ensio Miettisen katu 2 FI-06150 PORVOO FINLAND
Technical information	Tension clamp for covered conductors BLL 99 - 157 mm² AlMgSi Conductor diameter 16,1 - 22,3 mm Tightening torque 40 Nm, SMDL 22 kN, SMFL 28,5 kN
Other information	See the Appendix to this Certificate
The product is certified according to the following standard(s)	EN 50397-2:2009
Validity	This certificate is valid until 01 June 2022 provided that the Conditions for FI certification are met. This certificate includes the right to use the FI mark under the condition that product changes (if any) will be approved at SGS Fimko before the product is brought onto market.
Date of issue	01 June 2017
	SGS Fimko Ltd
Signature	Sixten Lökfors Project Manager

This certificate has 1 appendix

SGS Fimko Ltd. | Särkiniementie 3 P.O.Box 30 FI-00211 Helsinki, Finland
t. +358 9 696 361 f. +358 9 692 5474 www.sgs.fi
Business ID 0978538-5 Member of the SGS Group (SGS SA)

Appendix to Certificate: 29970

Manufacturing site	Ensto Ensek AS Paldiski mnt. 35 / 4A EE-76606 KEILA ESTONIA
Additional information	SO256.2 with adapter for hoist hook. Additional parts for tension clamps SO256 and SO256.2: Power arc device SDI27.2 including power arc horns SDI10.2 and PEJ90 conductor with screw type cable lugs SML 1.17. End cap PK557.
Is based on test	This certificate is based on and replaces Certificate FI 29719 dated 11 October 2016. Certificate FI 27049 A1 was based on manufacturer´s test reports: 2166S, 2176S, 2165S, 2177S, 2106s, 1938S, 1939S, 2087S, 2089S, 2091S, 2092S, 2094S, 2095S, 2097S, 2098S, 2100S, 2101S, 2103S, 2104S, 2191 and 2170S Manufacturer´s additional test reports: 3571S, 3467S, 3074S, 3572S, 3465S, 3597S, 3595S, 3596S 3764S, 3765S, 3766S, 3767S, 3768S Solar simulator test reports: 050810_SO256, 071210_SDI27-1 and 050111_SDI10_2 SGS Fimko test report: 251420_SML1-17 Low temperature assembly test clause 7.4.14 and Tensile test at low temperature clause 7.4.8 were performed at temperature -25 ± 3 °C.

FINAS
Finnish Accreditation Service
S003 (EN ISO/IEC 17065)

ВЯРНО С ОРИГИНАЛА

АКЦИОНЕРНО ДРУЖЕСТВО ФИЛИАЛ 16 ПЛОВДИВ

FINAS
Finnish Accreditation Service
T284 (EN ISO/IEC 17025)

Laboratory Report

No.: 3765S
Revision: A

Date of Test: 16.8.2016

Test object:

Tension clamp SO256 and SO256.2.

Purpose of the test and relevant standards:

Visual examination test and Dimensional and material verification test according to EN 50397-2:2009 clauses 7.1 and 7.2.

Conclusion:

The clamp passed the test.

Picture 1: SO256

Date of Report: 3.5.2017

Tested by: Ola Forsström

ENSTO
UTILITY NETWORKS
LABORATORY

Approved by: Janne Lappalainen

Ordered by: P. Pulkkinen
Distribution: OHL PD-team

1. Test objects

Tension clamp:

Type:	SO256
Manufacturer:	Ensto Finland Oy
Conductor size:	99-157 mm^2
Tightening torque:	40 Nm
SMFL:	28,5 kN
SMDL:	22 kN
Batch number:	2/2016
No of pcs:	1

Type:	SO256.2
Manufacturer:	Ensto Finland Oy
Conductor size:	99-157 mm^2
Tightening torque:	40 Nm
SMFL:	28,5 kN
SMDL:	22 kN
Batch number:	3/2016
No of pcs:	1

2. Testing procedure

The test was performed against the manufacturer specification sheet and standard requirement. The test included a visual examination part and a dimensional and material verification part.

Requirements

The clamp shall fulfill the manufacturer specification data and standard requirement.

3. Test results

Visual examination of SO256

The clamp was visually looking the same as in the specification drawing.

All markings required by the standard were found:

Manufacturer's logo:	Ensto
Product code or reference:	SO256
Batch number (production date):	(week) 07/2016
Minimum and maximum cross section:	95-157 mm^2
Tightening torque or die reference:	40 Nm

Visual examination of SO256.2

The clamp was visually looking the same as in the specification drawing.

All markings required by the standard were found:

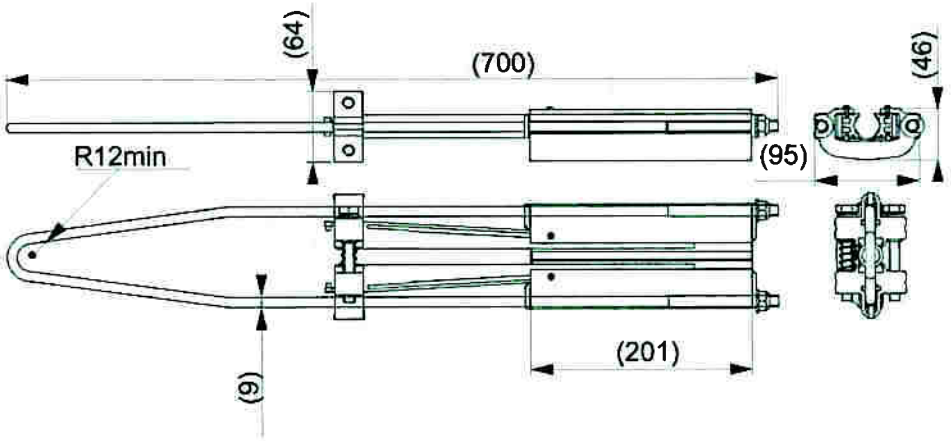
Manufacturer's logo:	Ensto
Product code or reference:	SO256.2
Batch number (production date):	(week) 11/2016
Minimum and maximum cross section:	95-157 mm^2
Tightening torque or die reference:	40 Nm

Dimensional and material verification of SO256

The sample was within specification requirements. The clamp's dimensions were within specification tolerances, see Picture 2.

Distance	Requirement [mm]	In product [mm]
Total length	(700)	705,0
Body length	(201)	206,0
Body height	(95)	94,8
Body width	(46)	46,0
Clamping piece width	(64)	64,0
Bail diameter	(9)	9,0
Bail eye radius	≥12	>12

Table 1: Test results



Picture 2: Specification drawing

Component	Material	Matching specification
Body	Corrosion resistant aluminium alloy	Yes
Plastic parts	Frost, heat and UV-radiation resistant plastic	Yes
Bolts	Hot dip galvanized steel	Yes
Bail	Stainless steel	Yes

Table 2: Clamp materials

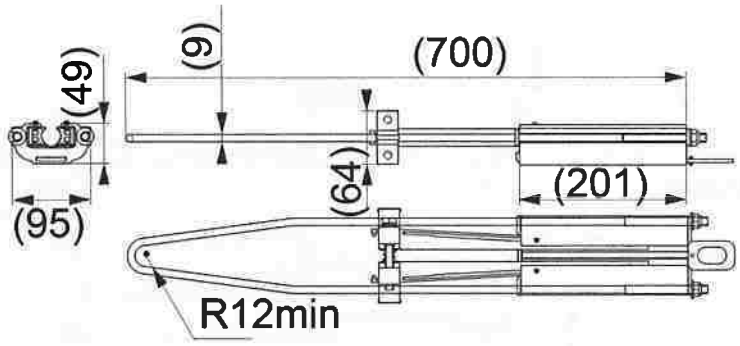
ВЯРНО С ОРИГИНАЛА
АКЦИОНЕРНО ДРУЖЕСТВО "ФИЛКАБ" 16 ПЛОВДИВ

Dimensional and material verification of SO256.2

The sample was within specification requirements. The clamp's dimensions were within specification tolerances, see Picture 3.

Distance	Requirement [mm]	In product [mm]
Total length	(700)	703,0
Body length	(201)	206,0
Body height	(95)	94,9
Body width	(49)	48,8
Clamping piece width	(64)	64,0
Bail diameter	(9)	9,1
Bail eye radius	≥12	>12

Table 3: Test results



Picture 3: Specification drawing

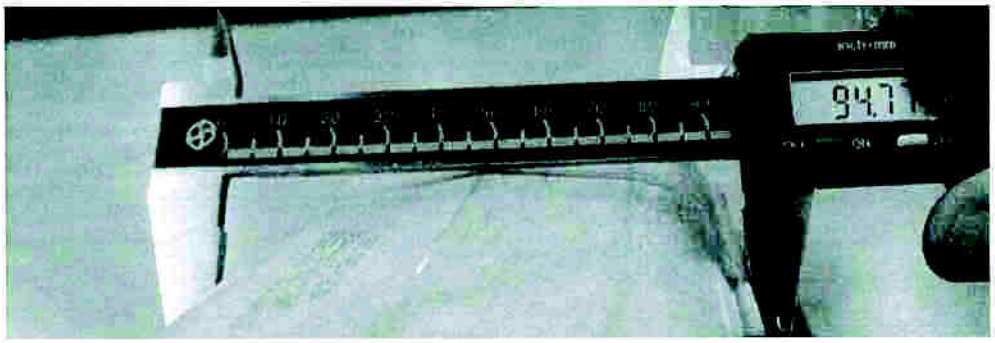
Component	Material	Matching specification
Body	Corrosion resistant aluminium alloy	Yes
Plastic parts	Frost, heat and UV-radiation resistant plastic	Yes
Bolts	Hot-dip galvanised steel	Yes
Bail	Stainless steel	Yes
Hoist adapter	Hot-dip galvanised steel	Yes

Table 4: Clamp materials

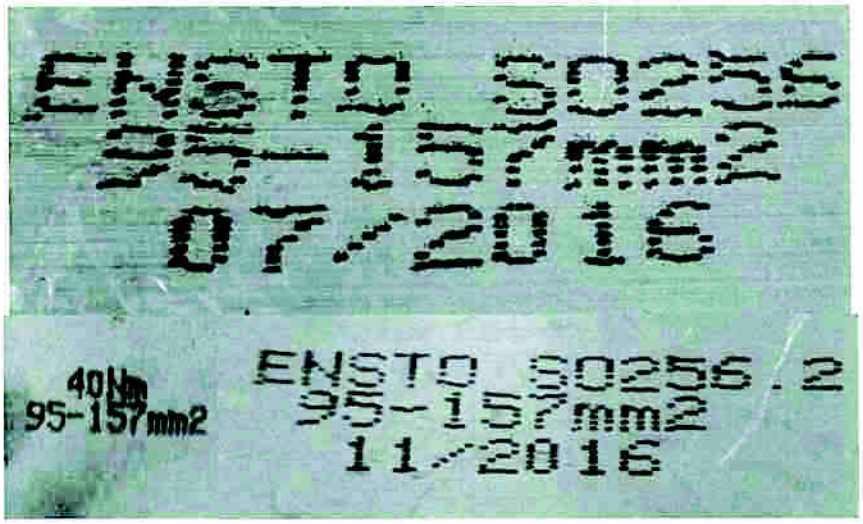
Summary

The clamps passed the test.

4. Pictures



Picture 4: Measuring body height



Picture 5: Markings

5. Test equipment

ID	Type	Model	Purpose	Latest calibration
A209	Caliper	Stainless hardened	Measuring dimensions	15.12.2015
L317	Measuring tape	SL5M	Measuring length	04.08.2016

6. Test Id

3955

7. Revision history

A

ВЯРНО С ОРИГИНАЛА

АКЦИОНЕРНО ДРУЖЕСТВО ФИЛКАБ 16 ПЛОВДИВ

FINAS
Finnish Accreditation Service
T284 (EN ISO/IEC 17025)

Laboratory Report

No.: 3766S
Revision: A

Date of Test: 16.8.2016

Test object:

Tension clamp SO256.

Purpose of the test and relevant standards:

Test for permanent marking according to EN 50397-2:2009 clause 7.3.

Conclusion:

The clamp passed the test.

Picture 1: SO256

Date of Report: 3.5.2017

Tested by: Ola Forsström

ENSTO
UTILITY NETWORKS
LABORATORY

Approved by: Janne Lappalainen

Ordered by: P. Pulkkinen
Distribution: OHL PD-team

1. Test objects

Tension clamp:

Type:	SO256
Manufacturer:	Ensto Finland Oy
Conductor size:	99-157 mm^2
Tightening torque:	40 Nm
SMFL:	28,5 kN
SMDL:	22 kN
Batch number:	2/2016
No of pcs:	3

2. Testing procedure

The markings were rubbed by hand for 15 s with a piece of cloth soaked with water and again 15 s with a piece of cloth soaked with petroleum spirit. The petroleum spirit used was Mineral turpentine from KIILTO / Finland.

Requirements

The marking shall remain clear and allow the accessory to be easily identified.

3. Test results

Sample	Markings clear after the test	Result
1	Yes	Passed
2	Yes	Passed
3	Yes	Passed

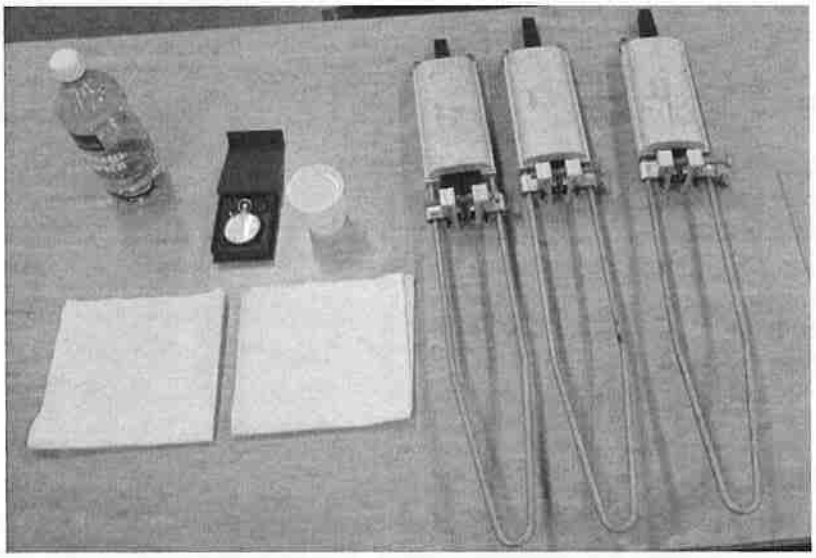
Table 1: Test results

Summary

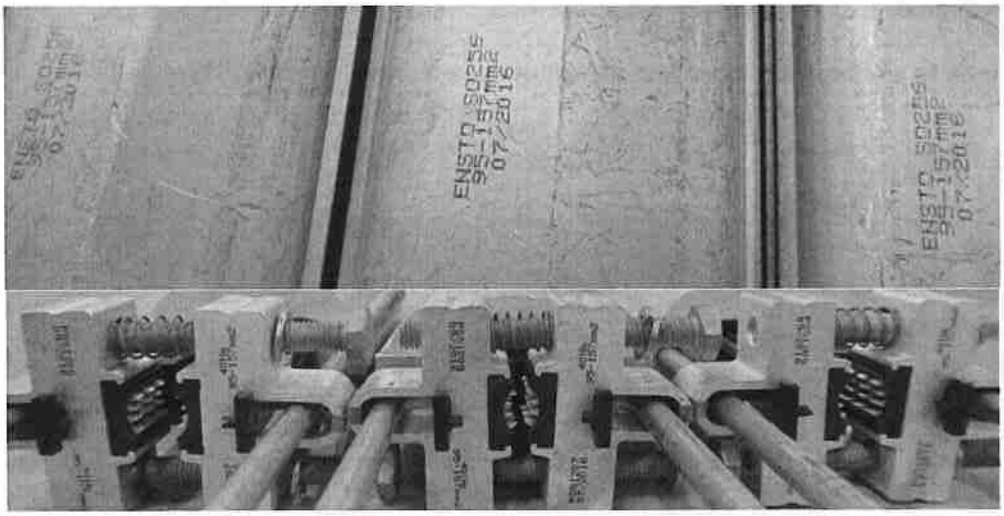
The clamp fulfilled the test requirements.

ВЯРНО С ОРИГИНАЛА
АКЦИОНЕРНО ДРУЖЕСТВО * ФИЛКАБ 16 * Пловдив

4. Pictures



Picture 2: Test setup



Picture 3: Markings after test

5. Test equipment

ID	Type	Model	Purpose	Latest calibration
L253	Stop watch	IHM	Timekeeping	26.10.2015

6. Test Id

3956

7. Revision history

A

FINAS
Finnish Accreditation Service
T284 (EN ISO/IEC 17025)

Laboratory Report

No.: 3767S
Revision: A

Date of Test: 14.9.2016 & 11.4.2017

Test object:

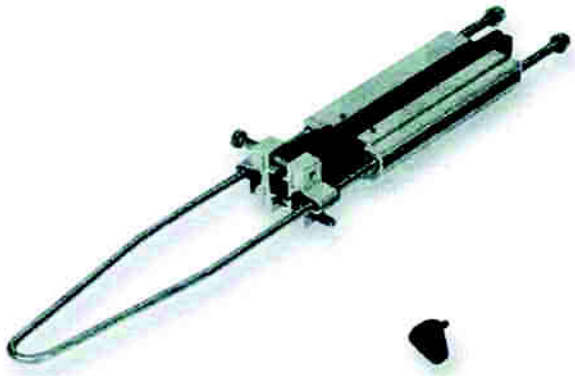
Tension clamp SO256.

Purpose of the test and relevant standards:

Tensile test at ambient temperature according to EN 50397-2:2009 clause 7.4.7.

Conclusion:

The clamp passed the test.



Picture 1: SO256

Date of Report: 3.5.2017

Tested by: Ola Forsström

ENSTO
UTILITY NETWORKS
LABORATORY

Approved by: Janne Lappalainen

Ordered by: P. Pulkkinen
Distribution: OHL PD-team

АКЦИОНЕРНО ДРУЖЕСТВО * ПЛОВДИВ * ФИЛКАБ 16

ВЯРНО С ОРИГИНАЛА

ENSTO

Ensto Utility Networks Laboratory
Ensto Finland Oy

Ensio Miettisen katu 2,
P.O.Box 77
06101 Porvoo, Finland

Tel. +358 204 76 21
Fax +358 204 76 2770

Business ID: 1481990-6
Reg. Office: Porvoo

1. Test objects

Tension clamp:

Type:	SO256
Manufacturer:	Ensto Finland Oy
Conductor size:	99-157 mm^2
Tightening torque:	40 Nm
SMFL:	28,5 kN
SMDL:	22 kN
Batch number:	2/2016 & 3/2017
No of pcs:	4

Conductors:

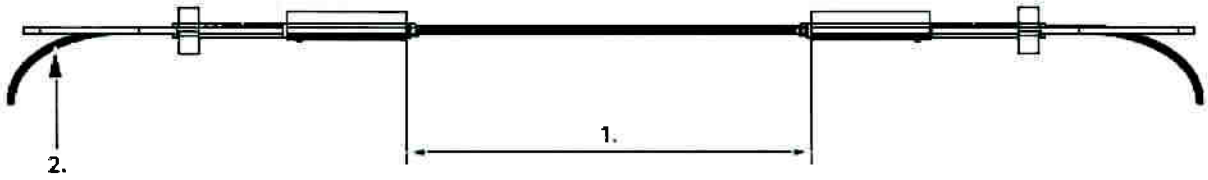
Type:	BLL-T 99 AlMgSi 24kV
Used cross section:	99 mm^2
Conductor material:	AlMgSi
Number of strands:	7
Conductor diameter:	12,8 mm
Conductor construction:	Non-compacted
Shape of conductor:	Round
Insulation material:	HDPE+PE
Insulation thickness:	2,6 mm
Core diameter:	17,8-18,8 mm
Conductor MBL:	25,3 kN
Max operating temperature:	70 °C
Max short-circuit temperature:	200 °C
Manufacturer:	Amokraft
Country:	Sweden
Refer to standard:	EN 50397-1
Conductor ID:	437

Type:	BLL-T 157 AlMgSi 24kV
Used cross section:	157 mm^2
Conductor material:	AlMgSi
Number of strands:	19
Conductor diameter:	16,3 mm
Conductor construction:	Non-compacted
Shape of conductor:	Round
Insulation material:	HDPE+PE
Insulation thickness:	2,5 mm
Core diameter:	21,6 mm
Conductor MBL:	43,7 kN
Max operating temperature:	70 °C
Max short-circuit temperature:	200 °C
Manufacturer:	Amokraft
Country:	Sweden
Refer to standard:	EN 50397-1
Conductor ID:	453

2. Testing procedure

Two tension clamps were tested with minimum and maximum conductor size using BLL-T type conductors. The tension clamps were assembled in accordance with the manufacturer's instructions and fitted into a tensile test machine as shown in Picture 2.

The test load SMFL was SMFL=0,8×conductor MBL. The load was increased to 20 % of SMFL. Then the conductor was marked where it exits from the tension clamp. The load was then gradually increased to 60 % of SMFL and kept there for 60 s. Without any subsequent adjustment of the fitting the load was increased to SMFL and kept there for 60 s. After this the tension clamps where then checked for any movement relative to the conductor. Then the load was steadily increased until failure occurred. The failure load was recorded.



Picture 2: Tensile test arrangement

1. Min. 100 x covered conductor diameter
2. Length of tail minimum 500 mm

Requirements

The movement of the tension clamp relative to the conductor shall be less than 3 mm and no failure of the clamp or the covered conductor shall occur below SMFL, where SMFL=0,80×MBL.

Deviation
For conductor BLL-T 157 the test load SMFL (0,80 × MBL) is higher than the SMFL specified for the tension clamp. In this case the maximum test load was limited to the SMFL of the tension clamp.

3. Test results

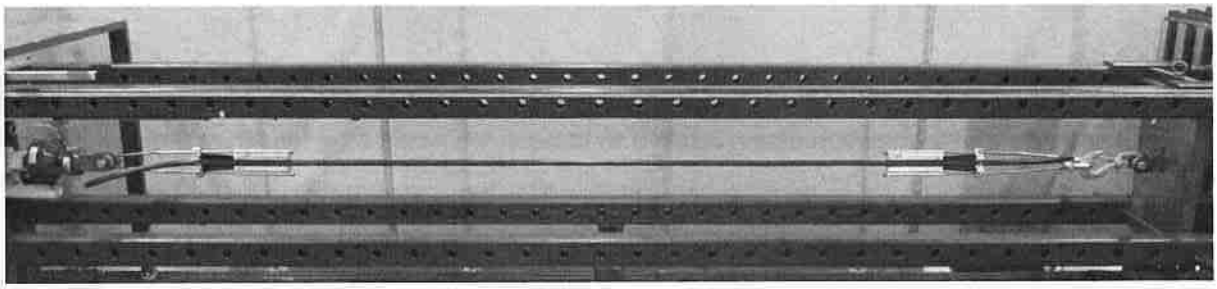
Sample	Conductor	MBL [kN]	20% of SMFL [kN]	60% of SMFL [kN]	SMFL [kN]	Slippage [mm]	Breaking force [kN]	Result
1	BLL-T 99	25,3	4,0	12,1	20,2	0,0	29,5	Passed
2						0,5		
3	BLL-T 157	43,7	7,0	21,0	28,5	0,0	40,0	Passed
4						0,0		

Table 1: Test results

Summary

The clamp fulfilled the test requirements.

4. Pictures



Picture 3: Test setup

5. Test equipment

ID	Type	Model	Purpose	Latest calibration
T1	Tensile test machine	Matertest	Tensile test	No calibration
L109	Force sensor	1220AF-250kN-B	Force measurement	01.09.2016
L110	Force sensor	1210AF-50kN-B	Force measurement	01.09.2016
L56	Torque wrench	BDS80E	Torque measurement	01.07.2015
L281	Torque wrench	BDS80E	Torque measurement	14.10.2016
A209	Caliper	Stainless hardened	Measuring dimensions	15.12.2015
A223	Caliper	Sylvac	Measuring dimensions	15.03.2017

6. Test Id

3957, 4486

7. Revision history

A

FINAS
Finnish Accreditation Service
T284 (EN ISO/IEC 17025)

Laboratory Report

No.: 3768S
Revision: A

Date of Test: 29.8.2016

Test object:

Tension clamp SO256.

Purpose of the test and relevant standards:

Clamp bolt tightening test according to EN 50397-2:2009 clause 7.4.10.1.

Conclusion:

The clamp passed the test.

Picture 1: SO256

Date of Report: 3.5.2017

Tested by: Ola Forsström

Approved by: Janne Lappalainen

ENSTO
UTILITY NETWORKS
LABORATORY

Ordered by: P. Pulkkinen
Distribution: OHL PD-team

ENSTO

Ensto Utility Networks Laboratory
Ensto Finland Oy
Ensio Miettisen katu 2,
P.O.Box 77
06101 Porvoo, Finland
Tel. +358 204 76 21
Fax +358 204 76 2770
Business ID: 1481990-6
Reg. Office: Porvoo

1. Test objects

Tension clamp:

Type:	SO256
Manufacturer:	Ensto Finland Oy
Conductor size:	99-157 mm^2
Tightening torque:	40 Nm
SMFL:	28,5 kN
SMDL:	22 kN
Batch number:	2/2016
No of pcs:	2

Conductors:

Type:	BLL-T 99 AlMgSi 24kV
Used cross section:	99 mm^2
Conductor material:	AlMgSi
Number of strands:	7
Conductor diameter:	12,8 mm
Conductor construction:	Non-compacted
Shape of conductor:	Round
Insulation material:	HDPE+PE
Insulation thickness:	2,6 mm
Core diameter:	17,8-18,8 mm
Conductor MBL:	25,3 kN
Max operating temperature:	70 °C
Max short-circuit temperature:	200 °C
Manufacturer:	Amokraft
Country:	Sweden
Refer to standard:	EN 50397-1
Conductor ID:	437

Type:	BLL-T 157 AlMgSi 24kV
Used cross section:	157 mm^2
Conductor material:	AlMgSi
Number of strands:	19
Conductor diameter:	16,3 mm
Conductor construction:	Non-compacted
Shape of conductor:	Round
Insulation material:	HDPE+PE
Insulation thickness:	2,5 mm
Core diameter:	21,6 mm
Conductor MBL:	43,7 kN
Max operating temperature:	70 °C
Max short-circuit temperature:	200 °C
Manufacturer:	Amokraft
Country:	Sweden
Refer to standard:	EN 50397-1
Conductor ID:	453

ВЯРНО С ОРИГИНАЛА
АКЦИОНЕРНО ДРУЖЕСТВО ФИЛКАБ 16 ПЛОВДИВ

2. Testing procedure

One clamp was tested with minimum and maximum conductor size using BLL-T type conductors.

The torque was increased to 1,1 × the specified installation torque value, 1,1 × 40 = 44 Nm, after which the clamp was checked for damage. The tightening was then continued until breaking occurred. The breaking torque was recorded.

Deviation

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

Requirements

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

3. Test results

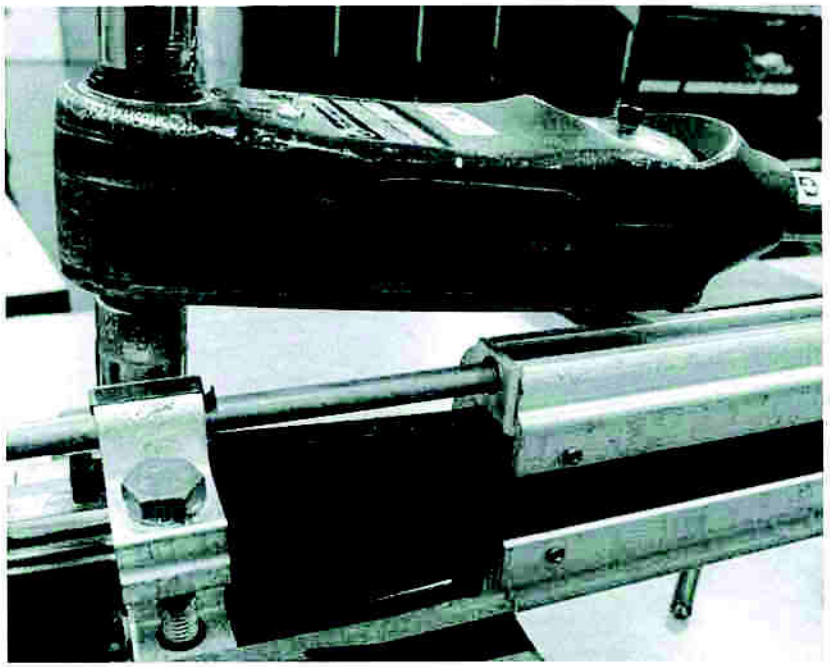
Sample	Conductor	1,1 x tightening torque [Nm]	Damage torque [Nm]	Damage	Result
1	BLL-T 99	44	95,7	Bolt broke	Passed
2	BLL-T 157		92,2	Bolt broke	Passed

Table 1: Test results

Summary

All samples fulfilled the test requirements.

4. Pictures



Picture 2: Test setup

5. Test equipment

ID	Type	Model	Purpose	Latest calibration
L56	Torque wrench	BDS80E	Torque measurement	01.07.2015
L269	Torque wrench	Stahlwille 730D/10	Torque measurement	07.11.2013

6. Test Id

3958

7. Revision history

A

FINAS
Finnish Accreditation Service
T284 (EN ISO/IEC 17025)

Laboratory Report

No.: 3764S
Revision: A

Date of Test: 12.4.2017

Test object:

Tension clamp SO256.

Purpose of the test and relevant standards:

Damage and failure load test according to EN 50397-2:2009 clause 7.4.1.

Conclusion:

The clamp passed the test.

Picture 1: SO256

Date of Report: 3.5.2017

Tested by: Ola Forsström

ENSTO
UTILITY NETWORKS
LABORATORY

Approved by: Janne Lappalainen

Ordered by: P. Pulkkinen
Distribution: OHL PD-team

Ensto Utility Networks Laboratory
Ensto Finland Oy
Ensio Miettisen katu 2,
P.O.Box 77
06101 Porvoo, Finland
Tel. +358 204 76 21
Fax +358 204 76 2770
Business ID: 1481990-6
Reg. Office: Porvoo

1. Test objects

Tension clamp:

Type:	SO256
Manufacturer:	Ensto Finland Oy
Conductor size:	99-157 mm^2
Tightening torque:	40 Nm
SMFL:	28,5 kN
SMDL:	22 kN
Batch number:	3/2017
No of pcs:	3

Conductors:

Type:	BLL-T 157 AlMgSi 24kV
Used cross section:	157 mm^2
Conductor material:	AlMgSi
Number of strands:	19
Conductor diameter:	16,4 mm
Conductor construction:	Non-compacted
Shape of conductor:	Round
Insulation material:	HDPE+PE
Insulation thickness:	2,5 mm
Core diameter:	21,5 mm
Conductor MBL:	43,7 kN
Max operating temperature:	70 °C
Max short-circuit temperature:	200 °C
Manufacturer:	Amokraft
Country:	Sweden
Refer to standard:	EN 50397-1
Conductor ID:	453

2. Testing procedure

Three samples were tested. The test was carried out as in Picture 2. The load was applied in the direction 1. The load was gradually increased until it reached the specified minimum damage load (SMDL). This load was kept constant for 60 s. The fitting was then removed and measurement of any permanent deformation was done. The load was gradually increased until it reached the specified minimum failure load (SMFL). This load was kept constant for 60 s.

Picture 2: Test arrangement

Requirements

Regarding damage load, the test is passed if no permanent deformation, which can affect the proper function of the fitting, occurs at or below the specified mechanical minimum damage load.

3. Test results

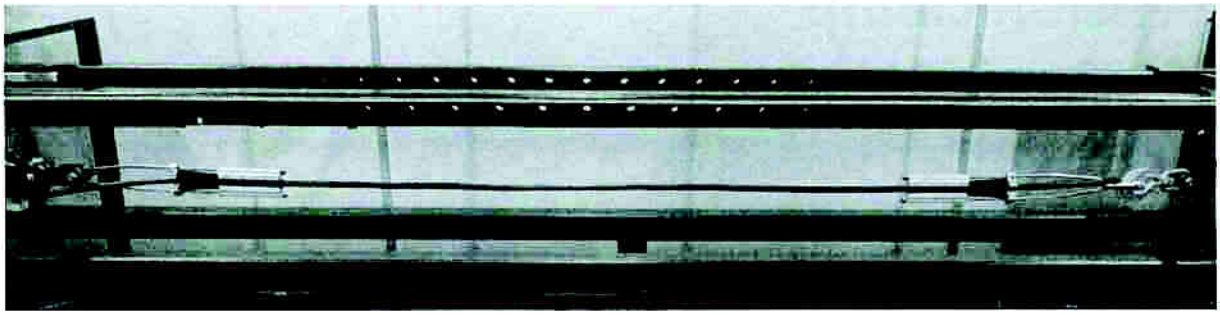
Sample	Conductor	SMDL			SMFL for 60 s [kN]	Result
		SMDL for 60 s [kN]	Allowed permanent deformation [mm]	Measured permanent deformation at 0 kN [mm]		
1	BLL-T 157	22,0	2,0	1,6	28,5	Passed
2				1,4		Passed
3				1,9		Passed

Table 1: Test results

Summary

The clamp fulfilled the test requirements.

4. Pictures



Picture 3: Test setup

5. Test equipment

ID	Type	Model	Purpose	Latest calibration
T1	Tensile test machine	Matertest	Tensile test	No calibration
L110	Force sensor	1210AF-50kN-B	Force measurement	01.09.2016
L281	Torque wrench	BDS80E	Torque measurement	14.10.2016
A223	Caliper	Sylvac	Measuring dimensions	15.03.2017

6. Test Id

4488

7. Revision history

A

Type and Sample Test Report

Tension clamp

SO256 and SO256.2

Test standard:

EN 50397-2 :2009

ENSTO

ilac-MRA

FINAS
Finnish Accreditation Service
T284 (EN ISO/IEC 17025)

Ensto Utility Networks Laboratory
Ensto Finland Oy

Ensio Miettisen katu 2,
P.O.Box 77
06101 Porvoo, Finland

Tel. +358 204 76 21
Fax +358 204 76 2770

Business ID: 1481990-6
Reg. Office: Porvoo

Product: SO256 and SO256.2

Contents	Document no
1. Specification	SO256 SO256.2 SDI27.2 SML1.17 SDI10.2 PK557
2. Certificate	FI 29719
3. Sample test reports	
3.1. Visual examination	
• SO256 and SO256.2	3571S
• SDI27.2	3467S
• SML1.17	3074S
• SDI10.2	3467S
3.2. Dimensional and material verification	
• SO256 and SO256.2	3571S
• SDI27.2	3467S
• SML1.17	3074S
• SDI10.2	3467S
3.3. Test for permanent marking	
• SO256	3572S
• SDI10.2	3465S
3.4. Tensile test at ambient temperature	3597S
3.5. Clamp bolt tightening test	3595S
3.6. Damage and failure load test	3596S
4. Type test report	Complete_type_test_report_SO256

АКЦИОНЕРНО ДРУЖЕСТВО * ФИЛКАБ 16 * ПЛОВДИВ

ВЯРНО С ОРИГИНАЛА

Saves Your Energy

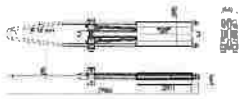
PRODUCT SPECIFICATION

28.9.2016

6438100303822

SO256

Name:	**Tension clamp**
	PAS/BLL-T 95-157 mm² AlMgSi
Type:	SO256
GTIN:	6438100303822
Description:	Tension clamp for covered conductors PAS/BLL AlMgSi. The insulation piercing contact part has silicone seal which prevents the moisture getting into the conductor.
Package:	3/90
Unit:	PCS



Technical specification

Mechanical

SMDL	22 kN
SMFL	25 kN
Tightening torque	40 Nm

Dimensions

Weight	2.53 kg
Conductor diameter	16.1 … 22.3 mm

Features

For conductor size	PAS / BLL 95-157 mm² AlMgSi

Certificates

Standards	EN 50397-2

Construction:

Component	Material
Body	Corrosion resistant aluminium alloy
Plastic parts	Frost, heat and UV-radiation resistant plastic
Bolts	Hot-dip galvanised steel M10
Bail	Stainless steel

Installation: The clamp is opened and the conductor wire is inserted between the wedges. The locking connector is tightened. Tightening torque 40 Nm. The clamp is closed and strained.

Markings:

ENSTO

SO256

PSS1207

PSS1208

Ensto Finland Oy
Ensio Miettisen katu 2
P.O.Box 77
06101 Porvoo, Finland
Tel. +358 204 76 21
Fax +358 204 76 2770
www.ensto.com

6 438100 303822

SO256

95-157mm²

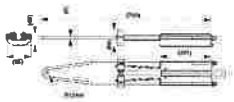
40 Nm

week/year of manufacture

Ensto Finland Oy
Ensio Miettisen katu 2
P.O.Box 77
06101 Porvoo, Finland
Tel. +358 204 76 21
Fax +358 204 76 2770
www.ensto.com

SO256.2

Name:	**Tension clamp**
	PAS/BLL-T 95-157 mm² AlMgSi hoist adapter
Type:	SO256.2
GTIN:	6438100303839
Description:	Tension clamp for covered conductors (PAS/BLL AlMgSi). The insulation piercing contact part has silicone seal which prevents the moisture getting into the conductor. Clamps are equipped with an adapter for hoist hook.
Package:	3/90
Unit:	PCS



Technical specification

Mechanical

SMDL	22 kN
SMFL	25 kN
Tightening torque	40 Nm

Dimensions

Weight	2.79 kg
Conductor diameter	16.1 … 22.3 mm

Features

For conductor size	PAS / BLL 95-157 mm² AlMgSi

Certificates

Standards	EN 50397-2

Construction:

Component	Material
Body	Corrosion resistant aluminium alloy
Bolts	Hot-dip galvanised steel M10
Bail	Stainless steel
Plastic parts	Frost, heat and UV-radiation resistant plastic
Hoist adapter	Hot-dip galvanised steel

Installation: The clamp is opened and the conductor wire is inserted between the wedges. The locking connector is tightened. Tightening torque 40 Nm. The clamp is closed and strained.

Markings: **ENSTO**

SO256.2

95-157 mm²

Ensto Finland Oy
Ensio Miettisen katu 2
P.O.Box 77
06101 Porvoo, Finland
Tel. +358 204 76 21
Fax +358 204 76 2770
www.ensto.com

SO256.2

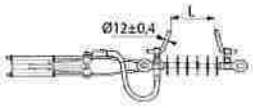
40 Nm

week/year of manufacture

Ensto Finland Oy
Ensio Miettisen katu 2
P.O.Box 77
06101 Porvoo, Finland
Tel. +358 204 76 21
Fax +358 204 76 2770
www.ensto.com

SDI27.2

Name:	**Power arc device**
	For products SDI90.x composite insulators on angle poles and SO255, SO256, SO181.6
Type:	SDI27.2
GTIN:	6438100305611
Description:	Power arc device SDI27.2 is used with SDI90.x composite insulators on angle poles with suspension clamp SO181.6 and on tension poles with tension clamps SO255 or SO256. The package includes arching horns and 95 mm² conductor with cable lugs. Spark gap is adjusted to 90-100 mm on 12 kV, 130-150 mm on 24kV and 220-250 mm on 36 kV.
Package:	9/486
Unit:	PCS



Technical specification

Electrical values

Arc gap	90 ... 250 mm
Nominal voltage (Un)	12 ... 36 kV

Dimensions

Weight	0.83 kg

Use:

Spark gap 12 kV	**90-100 mm**
Spark gap 24 kV	130-150 mm
Spark gap 36kV	220-250 mm

Power arc device SDI27.2 is used with SDI90.x composite insulators on angle poles with suspension clamp SO181.6 and on tension poles with tension clamps SO255 or SO256.

Construction:

Component	**Material**
Al-parts	Corrosion resistant aluminium alloy
Screws	Hot dip galvanized steel
Washers	Stainless steel

The package includes arching 2 pcs horns SDI10.2 and 95 mm² conductor PEJ90 with screw type cable lugs.

Installation:

One end of the conductor will be installed on the clamp and other end on the SDI10.2

Ensto Finland Oy
Ensio Miettisen katu 2
P.O.Box 77
06101 Porvoo, Finland
Tel. +358 204 76 21
Fax +358 204 76 2770
www.ensto.com

SDI27.2

Tools required:	Articulated spanner ST20
Markings:	SDI10.2, 44 Nm

Ensto Finland Oy
Ensio Miettisen katu 2
P.O.Box 77
06101 Porvoo, Finland
Tel. +358 204 76 21
Fax +358 204 76 2770
www.ensto.com

Saves Your Energy

PRODUCT SPECIFICATION

9/20/16

6418677457555

SML1.17

Cable lug with shear head bolts

Code	SML1.17
GTIN	6418677457555
Name	Cable lug with shear head bolts Al/Cu 10-95 mm², Ø13
Description	The cable lug is used for terminating conductors of cables up to 36 kV. Because of the shear head bolt construction, no crimping tools are needed. The required torque is achieved by tightening the bolt until it breaks off. The adapter needed in tightening is included in the package. The lug is longitudinally water tight. It is suitable for aluminium and copper conductors: solid and stranded, sector shaped and circular.

Technical specification

Dimensions

Weight:	0.07 kg
Conductor size Al:	10 ... 95 mm²
Conductor size Cu:	10 ... 95 mm²

Drawing markings

B:	28 mm
d:	14±0,5 mm
H:	10 mm
D1:	25 mm
D2:	13 mm
L1:	32 mm
L2:	59 mm
L3:	73 mm
SW:	17 mm

Ratings

ETIM class:	EC001054

Ensto Finland Oy
Ensio Miettisen katu 2
06100 Porvoo
Finland
email: ensto@ensto.com
phone: +358 204 76 21
www.ensto.com

Specification

Construction:

Construction:

Component	Material
Body	Tinned aluminium alloy
Screws	Tinned aluminium
Tin layer thickness	Lug body, > 10 µm
	Screw, > 3 µm
Centering ring	Polypropylene
Grease	RFL3
Tool	Aluminium

Installation: Follow installation instructions in the connector package.

Tools required: SW17 wrench

Markings: ENSTO SML1.17X Al/Cu 10-95mm² WW/YYYY Class A

Standard: IEC61238-1

ETIM

ETIM

Surface protection: Tinned

Nominal cross section copper, RM: 10 ... 95 mm²

Nominal cross section copper, RE: 10 ... 95 mm²

Nominal cross section copper, SM: 10 ... 95 mm²

Nominal cross section aluminium, RM: 10 ... 95 mm²

Nominal cross section aluminium, RE: 10 ... 95 mm²

Nominal cross section aluminium, SM: 10 ... 95 mm²

Nominal cross section aluminium, SE: 10 ... 95 mm²

Material conductor: Aluminium/copper

Packaging

Default package

Unit: PCS

Size: 10

Length: 165 mm

Width: 165 mm

Height: 140 mm

Weight (net): 1.1005 kg

Volume: 3.8115

Pallet package

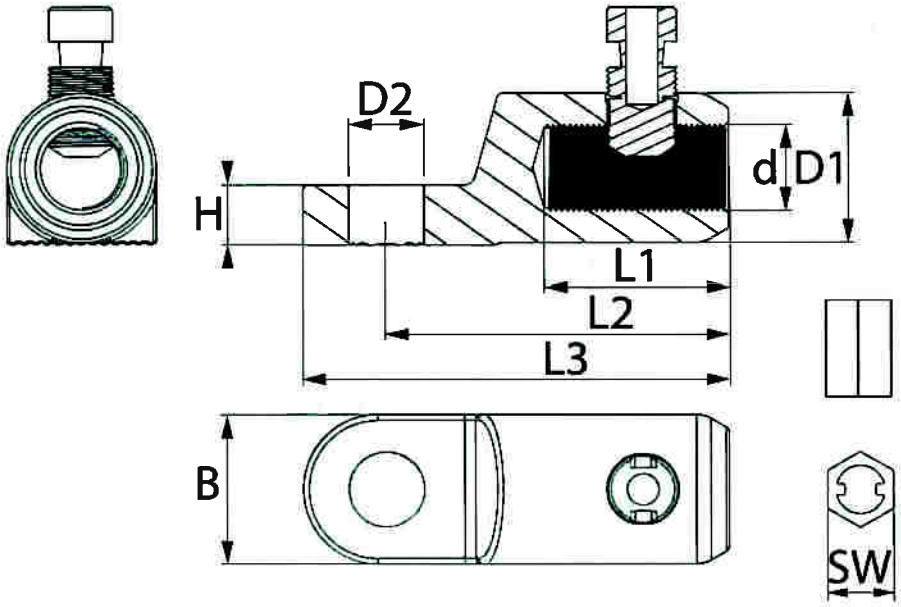
Unit:	FIN
Size:	2520
Length:	1200 mm
Width:	800 mm
Height:	1010 mm
Weight (net):	259.56 kg
Weight (brt):	298 kg
Volume:	969.6

Ensto Finland Oy

Ensio Miettisen katu 2
06100 Porvoo
Finland

email: ensto@ensto.com
phone: +358 204 76 21

www.ensto.com



ВЯРНО С ОРИГИНАЛА

АКЦИОНЕРНО ДРУЖЕСТВО ФИЛКАБ 16 ПЛОВДИВ

Ensto Finland Oy
Ensio Miettisen katu 2
06100 Porvoo
Finland
email: ensto@ensto.com
phone: +358 204 76 21
www.ensto.com

Saves Your Energy

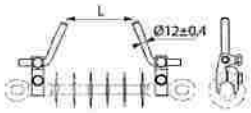
PRODUCT SPECIFICATION

18.5.2016

6418677410673

SDI10.2

Name:	**Power arc device**
	For tension insulators
Type:	SDI10.2
GTIN:	6418677410673
Description:	Used as arc protection with tension insulator type SDI90 on covered conductor lines. SDI10.2 includes two horns, which are fixed to the metal parts of the tension insulator so that the peaks are towards each other and the distance between the peaks is 100 - 150 mm at 24 kV. Arc fault test: Arc test 2 x 10 kA, 1s Short circuit test: I1s=11,5 kA, 1s Idyn=29 kA
Package:	15/945
Unit:	PCS



Technical specification

Electrical values

Arc gap	95 ... 230 mm
Nominal voltage (Un)	12 ... 36 kV

Mechanical

Tightening torque	44 Nm

Dimensions

Weight	0.58 kg

Use: Arcing protection horns for the suspension insulator SDI80.n. The power arc device is designed particularly for the small arc currents.

Construction:

Component	Material
Al parts	Corrosion resistant aluminium alloy, tensile strength 300 N/ mm²
Screws	Hot-dip galvanised
Washers	Stainless steel

The kit SDI10.2 consists of following parts:
- 2 pieces of Arc horns PSS891 and fixing elements

Installation: The horns are mounted on the insulator end fittings. The screws of the clamps have to be tightened to torque of 44 Nm.

Ensto Finland Oy
Ensio Miettisen katu 2
P.O.Box 77
06101 Porvoo, Finland
Tel. +358 204 76 21
Fax +358 204 76 2770
www.ensto.com

6 418677 410673

SDI10.2

Tools required:	Articulated spanner ST20.
Markings:	SDI 10.2 44 Nm

ВЯРНО С ОРИГИНАЛА

АКЦИОНЕРНО ДРУЖЕСТВО ФИЛКАБ 16 ПЛОВДИВ

Ensto Finland Oy
Ensio Miettisen katu 2
P.O.Box 77
06101 Porvoo, Finland
Tel. +358 204 76 21
Fax +358 204 76 2770
www.ensto.com

Saves Your Energy

PRODUCT SPECIFICATION

9/19/16

6438100306915

PK557

End cap

Code	PK557
GTIN	6438100306915
Name	End cap
	50-157 mm²
Description	PK557 is used for preventing water entry into the end of the branch cable.

Technical specification

Dimensions

Weight: 0.01 kg

Conductor size: 50-157

Conductor diameter: 12.7 ... 22.3 mm

Specification

Construction:

Construction:

Component	Material
Body	UV-resistant elastomer

Markings: Ensto, Ø12,7-22,3 and PMR2720

Standard: EN 50397-2

Packaging

Default package

Size: 120

Length: 215 mm

Width: 215 mm

Height: 120 mm

Weight (net): 0.84 kg

Weight (brt): 0.987 kg

Ensto Finland Oy
Ensio Miettisen katu 2
06100 Porvoo
Finland
email: ensto@ensto.com
phone: +358 204 76 21
www.ensto.com

CERTIFICATE FI 29719

Our Ref. 286326-1

Product	Tension clamp for overhead line
Type	SO256 SO256.2
Trade mark	ENSTO
Certificate Holder	Ensto Finland Oy Ensio Miettisen katu 2 FI-06150 PORVOO, FINLAND
Manufacturer	Ensto Finland Oy Ensto Utility Networks Ensio Miettisen katu 2 FI-06150 PORVOO, FINLAND
Technical information	Tension clamp for covered conductors PAS/BLL 95 - 157 mm² AlMgSi Conductor diameter 16,1 - 22,3 mm Tightening torque 40 Nm SMDL 22 kN SMFL 25 Kn
Other information	See the Appendix to this Certificate
The product is certified according to the following standard(s)	EN 50397-2:2009
Validity	This certificate is valid until 11 October 2021 provided that the Conditions for FI certification are met. This certificate includes the right to use the FI mark under the condition that product changes (if any) will be approved at SGS Fimko before the product is brought onto market.
Date of issue	11 October 2016
Signature	**SGS Fimko Ltd** Sixten Lökfors Project Manager

ВЯРНО С ОРИГИНАЛА

АКЦИОНЕРНО ДРУЖЕСТВО ФИЛКАБ 16 ПЛОВДИВ

This certificate has 1 appendix

Appendix to Certificate: 29719

Manufacturing site	Ensto Ensek AS Paldiski mnt. 35 / 4A EE-76606 KEILA ESTONIA
Additional information	SO256.2 with adapter for hoist hook. Additional parts for tension clamps SO256 and SO256.2: Power arc device SDI27.2 including power arc horns SDI10.2 and PEJ90 conductor with screw type cable lugs SML 1.17. End cap PK557.
Is based on test	This certificate is based on and replaces certificate FI 27049 A1 dated 15 December 2014. Certificate FI 27049 A1 was based on manufacturer´s test reports: 2166S, 2176S, 2165S, 2177S, 2106s, 1938S, 1939S, 2087S, 2089S, 2091S, 2092S, 2094S, 2095S, 2097S, 2098S, 2100S, 2101S, 2103S, 2104S, 2191 and 2170S Manufacturer´s additional test reports: 3571S, 3467S, 3074S, 3572S, 3465S, 3597S, 3595S and 3596S Solar simulator test reports: 050810_SO256, 071210_SDI27-1 and 050111_SDI10_2 SGS Fimko test report: 251420_SML1-17 Low temperature assembly test clause 7.4.14. and Tensile test at low temperature clause 7.4.8 were done in temperature -25 ± 3 °C

FINAS
Finnish Accreditation Service
S003 (EN ISO/IEC 17065)

FINAS
Finnish Accreditation Service
T284 (EN ISO/IEC 17025)

Laboratory Report

No.: 3571S
Revision: A
Page: 1/6
Date of Test: 16.8.2016

Test object:

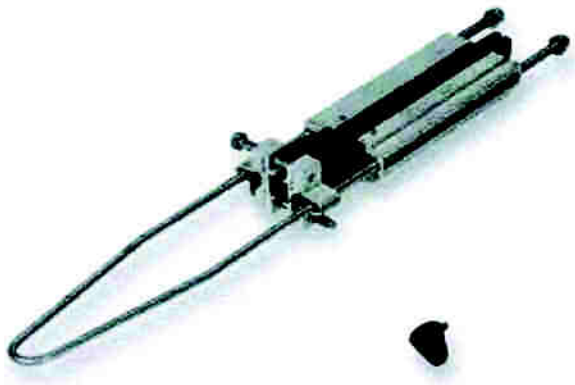
Tension clamp SO256 and SO256.2.

Purpose of the test and relevant standards:

Visual examination test and Dimensional and material verification test according to EN 50397-2:2009 clauses 7.1 and 7.2.

Conclusion:

Clamp passed the test.



Picture 1: SO256

Date of Report: 22.8.2016

Tested by: Mika Karjalainen

Approved by: Janne Lappalainen

ENSTO
UTILITY NETWORKS
LABORATORY

Ordered by: T. Virtanen
Distribution: OHL PD-team

АКЦИОНЕРНО ДРУЖЕСТВО * ФИЛКАБ 16 * ПЛОВДИВ *
ВЯРНО С ОРИГИНАЛА

1. Test objects

Tension clamp:

Type:	SO256
Manufacturer:	Ensto Finland Oy
Conductor size:	95-157 mm^2
Tightening torque:	44 Nm
SMFL:	25 kN
SMDL:	22 kN
Batch number:	07/2016
No of pcs:	1

Type:	SO256.2
Manufacturer:	Ensto Finland Oy
Conductor size:	95-157 mm^2
Tightening torque:	44 Nm
SMFL:	25 kN
SMDL:	22 kN
Batch number:	11/2016
No of pcs:	1

2. Testing procedure

The test was performed against the manufacturer specification sheet and standard requirement. The test included a visual examination part and a dimensional and material verification part.

Requirements

The clamp shall fulfill the manufacturer specification data and standard requirement.

3. Test results

Visual examination of SO256

The clamp was visually looking the same as in the specification drawing.

All markings required by the standard were found:

Manufacturer's logo:	Ensto
Product code or reference:	SO256
Batch number (production date):	07/2016
Minimum and maximum cross section:	95-157 mm2
Tightening torque or die reference:	40

Visual examination of SO256.2

The clamp was visually looking the same as in the specification drawing.

All markings required by the standard were found:

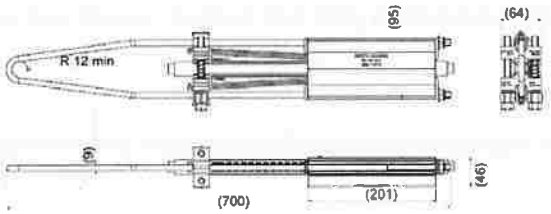
Manufacturer's logo:	Ensto
Product code or reference:	SO256.2
Batch number (production date):	11/2016
Minimum and maximum cross section:	95-157 mm2
Tightening torque or die reference:	40

Dimensional and material verification of SO256

All samples were within specification requirements. Clamps dimensions were within specification tolerances see Picture 2.

Distance	Requirement [mm]	In product
Total length	(700)	705
Body length	(201)	206
Body height	(95)	94,8
Body width	(64)	64,0
Clamping piece width	(46)	46,0
Bail diameter	(9)	9,0
Bail eye radius	≥12	>12

Table 1: Test results



Picture 2: Specification drawing

Component	Material	Matching specification
Body	Corrosion resistant aluminium alloy	yes
Plastic parts	Frost, heat and UV-radiation resistant plastic	yes
Bolts	Hot dip galvanized steel	yes
Bail	Stainless steel	yes

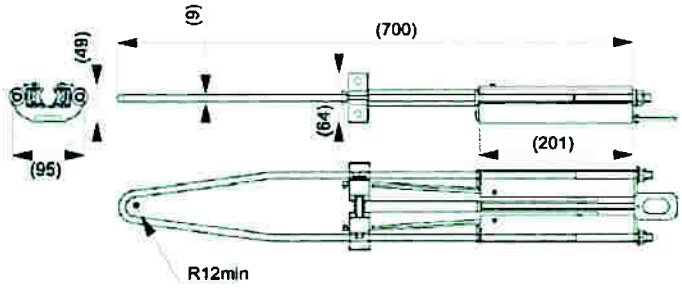
Table 2: Clamp materials

Dimensional and material verification of SO256.2

All samples were within specification requirements. Clamps dimensions were within specification tolerances see Picture 3.

Distance	Requirement [mm]	In product
Total length	(700)	703
Body length	(201)	206,0
Body height	(95)	94,9
Body width	(64)	64,0
Clamping piece width	(49)	48,8
Bail diameter	(9)	9,06
Bail eye radius	≥12	>12

Table 3: Test results



Picture 3: Specification drawing

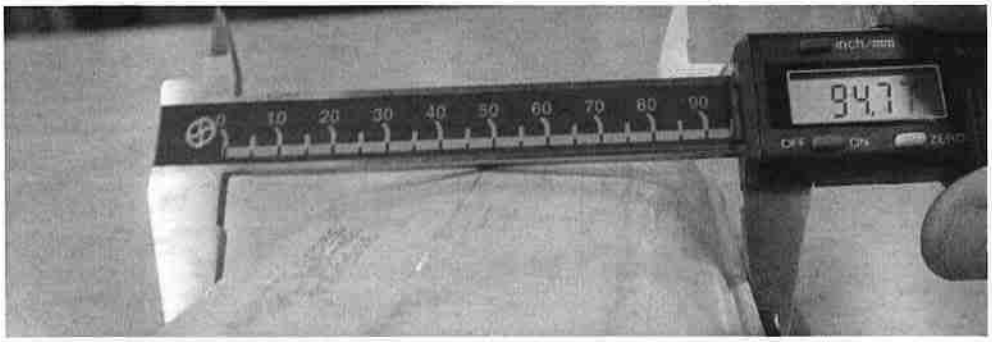
Component	Material	Matching specification
Body	Corrosion resistant aluminium alloy	yes
Plastic parts	Frost, heat and UV-radiation resistant plastic	yes
Bolts	Hot-dip galvanised steel	yes
Bail	Stainless steel	yes
Hoist adapter	Hot-dip galvanised steel	yes

Table 4: Clamp materials

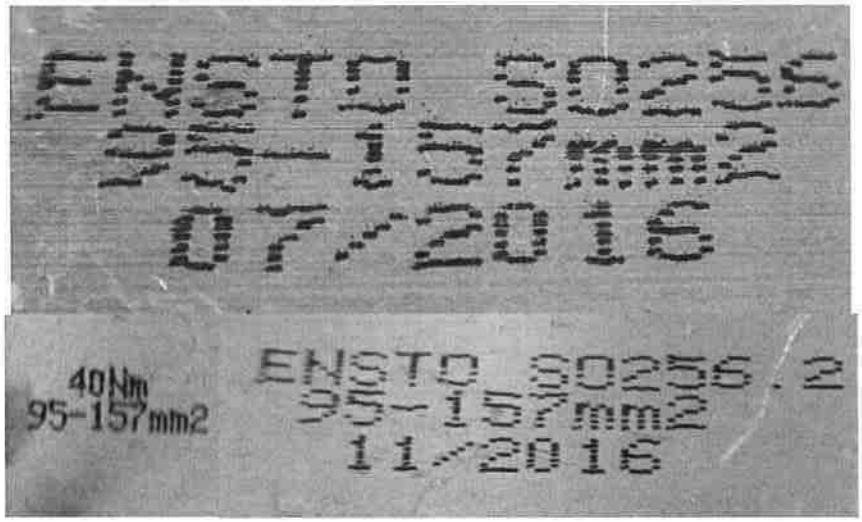
Summary

Clamps passed the test.

4. Pictures



Picture 4: Measuring body height



Picture 5: Markings

5. Test equipment

ID	Type	Model	Purpose	Latest calibration
A209	Caliper	Stainless hardened	Measuring dimensions	15.12.2015
L317	Measuring tape	SL5M	Measuring length	04.08.2016

6. Test Id

3955

7. Revision history

A

FINAS
Finnish Accreditation Service
T284 (EN ISO/IEC 17025)

Laboratory Report

No.: 3467S
Revision: A

Date of Test: 19.5.2016

Test object:

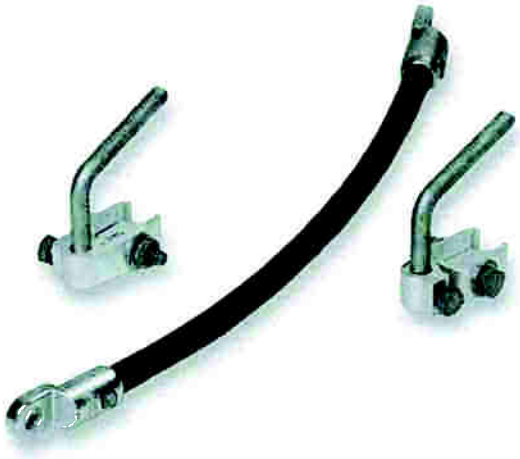
Power arc device SDI27.2.

Purpose of the test and relevant standards:

Part of sample test.
Visual examination test and Dimensional and material verification test according to EN 50397-2:2009 clauses 7.1 and 7.2.

Conclusion:

Power arc device passed the test.



Picture 1: SDI27.2

Date of Report: 20.5.2016

Tested by: Jenna Aarnio

Approved by: Janne Lappalainen

ENSTO
UTILITY NETWORKS
LABORATORY

Ordered by: T. Virtanen
Distribution: OHL PD-Team

АКЦИОНЕРНО ДРУЖЕСТВО ФИЛКАБ 16 ПЛОВДИВ
ВЯРНО С ОРИГИНАЛА

ENSTO

Ensto Utility Networks Laboratory
Ensto Finland Oy
Ensio Miettisen katu 2,
P.O.Box 77
06101 Porvoo, Finland
Tel. +358 204 76 21
Fax +358 204 76 2770
Business ID: 1481990-6
Reg. Office: Porvoo

1. Test objects

Power arc device:

Type:	SDI27.2
Manufacturer:	Ensto Finland Oy
Tightening torque:	44 Nm
Batch number:	5/2016
No of pcs:	1

2. Testing procedure

The test was performed against the manufacturer specification sheet and standard requirement. The test included a visual examination part and a dimensional and material verification part.

Requirements

The clamp shall fulfill the manufacturer specification data and standard requirement.

3. Test results

Visual examination

The power arc device was visually looking the same as in the specification drawing.

The power arc device includes the following parts:

- 2 x power arc device SDI10.2
- 1 x 95 mm² conductor PEJ90 with screw type cable lugs

Markings on power arc device SDI10.2 were found:

Marking	In specification	In product
Product code	SDI10.2	Yes
Tightening torque	44 Nm	Yes

Table 1: Test results of visual examination

Dimensional and material verification

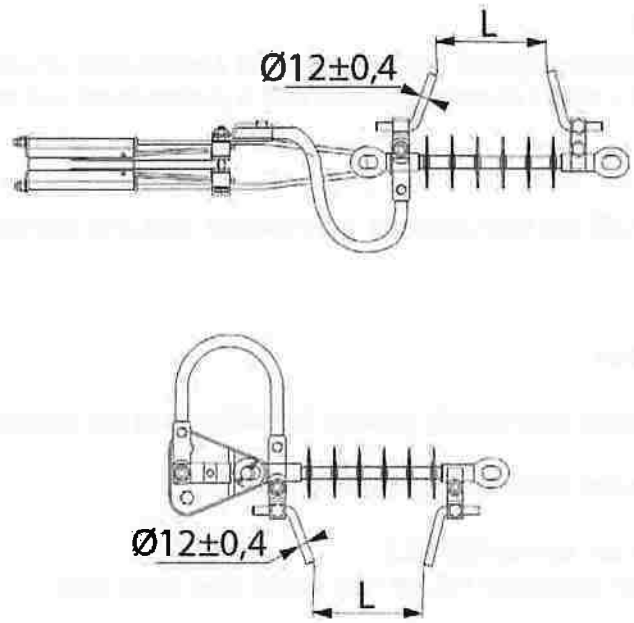
All samples were within specification requirements. Power arc dimension was within specification tolerances, see Picture 2.

Distance	Requirement [mm]	In product	Remark
Arching horn diameter	12 ± 0,4	12,14	passed

Table 2: Test results of dimensional verification

Component	Material	Matching specification
Al-parts	Corrosion resistant aluminium alloy	Yes
Screws	Hot dip galvanized steel	Yes
Washers	Stainless steel	

Table 3: Test results of material verification

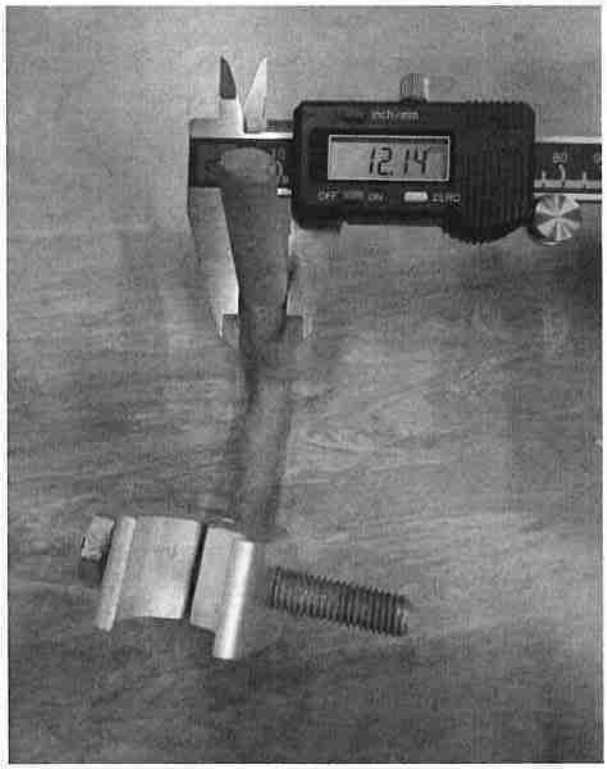


Picture 2: Specification drawing

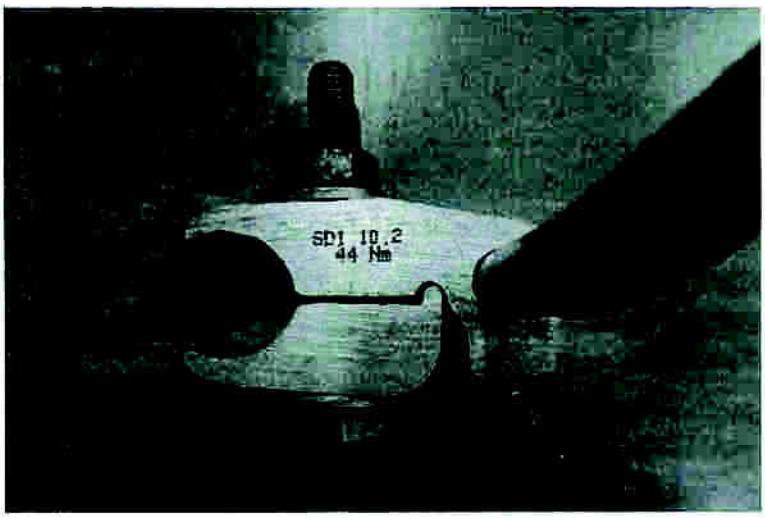
Summary

The power arc device fulfilled all test requirements.

4. Pictures



Picture 3: Measuring the diameter of arching horn



Picture 4: Markings of arching horn

5. Test equipment

ID	Type	Model	Purpose	Latest calibration
A224	Slide gauge	Stainless	Measuring dimensions	16.03.2016

6. Test Id

3871

7. Revision history

A

Laboratory Report

No.: 3074S
Revision: A

Date of Test: Enter a date

Test object:

SML1.17 cable lug with shear head bolt.

Purpose of the test and relevant standards:

Part of type test.
Visual examination test and Dimensional and material verification test, according to EN 50483-1:2009 Annex A, table A.1 and clause 6 Marking.

Conclusion:

The cable lug passed the test.

Picture 1: Tested cable lug SML1.17

Date of Report: 29.4.2015

Tested by: Joonas Kortelainen

ENSTO
UTILITY NETWORKS
LABORATORY

Approved by: Janne Lappalainen

Ordered by: Jukka Mäkeläinen
Distribution: UG PDM-Team

ENSTO

1. Test objects

Cable lug:

Type:	SML1.17 cable lug with shear head bolt
Connector class:	A
Manufacturer:	Ensto Finland Oy
Conductor range:	Al/Cu 10 - 95 mm^2
Batch number:	04 /2014
No of pcs:	1

2. Testing procedure

The test was performed against the manufacturer specification sheet and standard requirement.
The test included the visual examination part and the dimensional and material verification part.

Requirements

The cable lug shall fulfill the manufacturer specification data and standard requirement.

3. Test results

Visual examination:

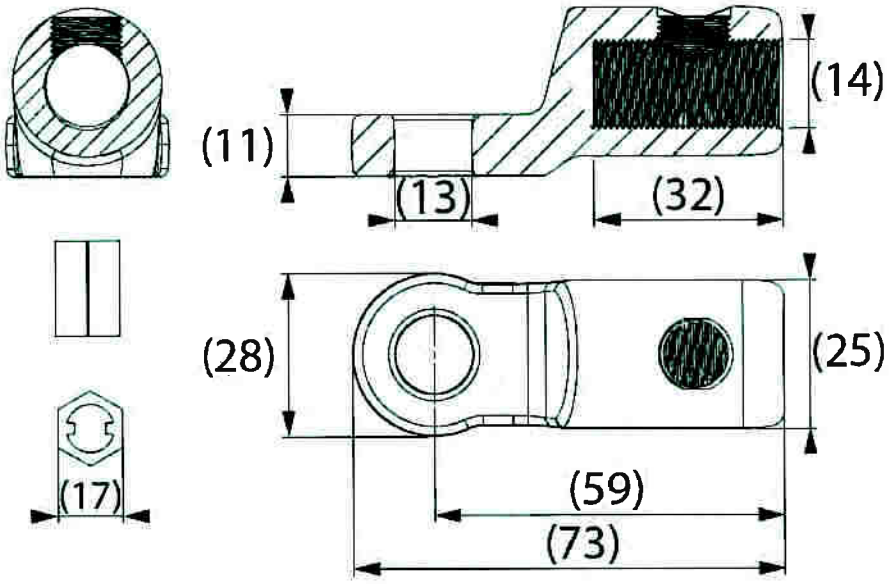
The cable lug was visually looking the same as in the manufacturing drawing.
The identification markings were according to specification.

Marking ENSTO SML1.17X
Al/Cu 10-95mm^2
04/2014 Class A

Dimensional and material verification:

Dimension	Specification [mm]	Measured [mm]
Palm width	28	27,3
Conductor hole diameter	14	14,1
Barrel width	25	24,7
Palm hole diameter	13	13
Palm height	11	10,6
Barrel lenght	32	33,5
Lug lenght to a center of the palm	59	59
Total lenght of the lug	73	73,1
Tool width	17	16,8

Table 1: Dimensions of the cable lug



Picture 2: Specification drawing

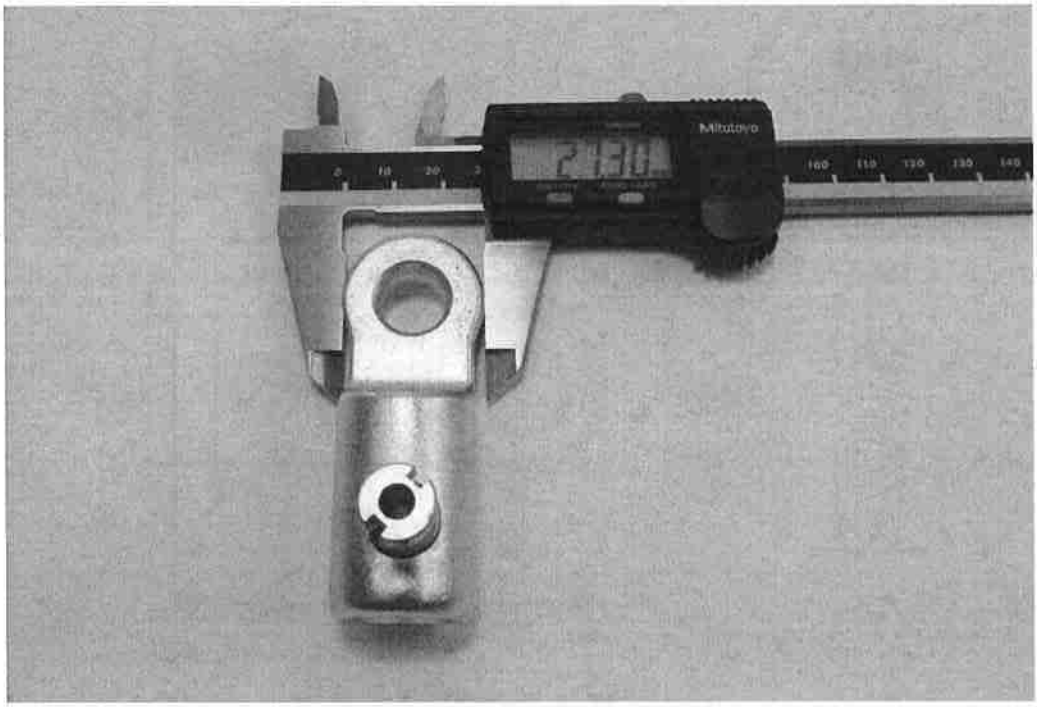
Component	Material	Matching specification
Body	Tinned aluminium alloy	Yes
Screws	Tinned aluminium	Yes
Centering ring	Polypropylene	Yes
Grease	RFL3	Yes
Tool	Aluminium	Yes

Table 2: Materials of the cable lug

Summary

The cable lug fulfilled the test requirements.

4. Pictures



Picture 3: Measuring palm width

5. Test equipment

ID	Type	Model	Purpose	Latest calibration
A238	Slide gauge	CD-15APX	Measuring dimensions	28.04.2015

6. Test Id

2969

7. Revision history

A

Laboratory Report

No.: 3467S
Revision: A

Date of Test: 19.5.2016

Test object:

Power arc device SDI27.2.

Purpose of the test and relevant standards:

Part of sample test.
Visual examination test and Dimensional and material verification test according to EN 50397-2:2009 clauses 7.1 and 7.2.

Conclusion:

Power arc device passed the test.

Picture 1: SDI27.2

Date of Report: 20.5.2016

Tested by: Jenna Aarnio

Approved by: Janne Lappalainen

ENSTO
UTILITY NETWORKS
LABORATORY

Ordered by: T. Virtanen
Distribution: OHL PD-Team

ENSTO

Ensto Utility Networks Laboratory
Ensto Finland Oy
Ensio Miettisen katu 2,
P.O.Box 77
06101 Porvoo, Finland
Tel. +358 204 76 21
Fax +358 204 76 2770
Business ID: 1481990-6
Reg. Office: Porvoo

1. Test objects

Power arc device:

Type:	SDI27.2
Manufacturer:	Ensto Finland Oy
Tightening torque:	44 Nm
Batch number:	5/2016
No of pcs:	1

2. Testing procedure

The test was performed against the manufacturer specification sheet and standard requirement. The test included a visual examination part and a dimensional and material verification part.

Requirements

The clamp shall fulfill the manufacturer specification data and standard requirement.

3. Test results

Visual examination

The power arc device was visually looking the same as in the specification drawing.

The power arc device includes the following parts:

- 2 x power arc device SDI10.2
- 1 x 95 mm² conductor PEJ90 with screw type cable lugs

Markings on power arc device SDI10.2 were found:

Marking	In specification	In product
Product code	SDI10.2	Yes
Tightening torque	44 Nm	Yes

Table 1: Test results of visual examination

Dimensional and material verification

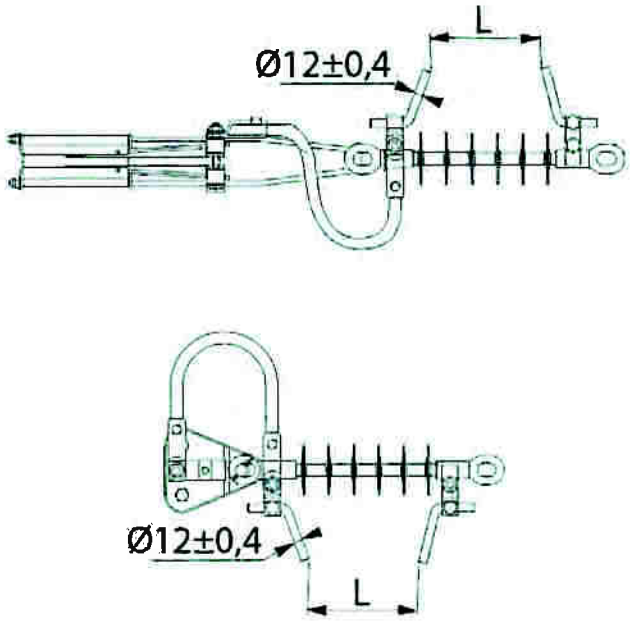
All samples were within specification requirements. Power arc dimension was within specification tolerances, see Picture 2.

Distance	Requirement [mm]	In product	Remark
Arching horn diameter	12 ± 0,4	12,14	passed

Table 2: Test results of dimensional verification

Component	Material	Matching specification
Al-parts	Corrosion resistant aluminium alloy	Yes
Screws	Hot dip galvanized steel	Yes
Washers	Stainless steel	

Table 3: Test results of material verification

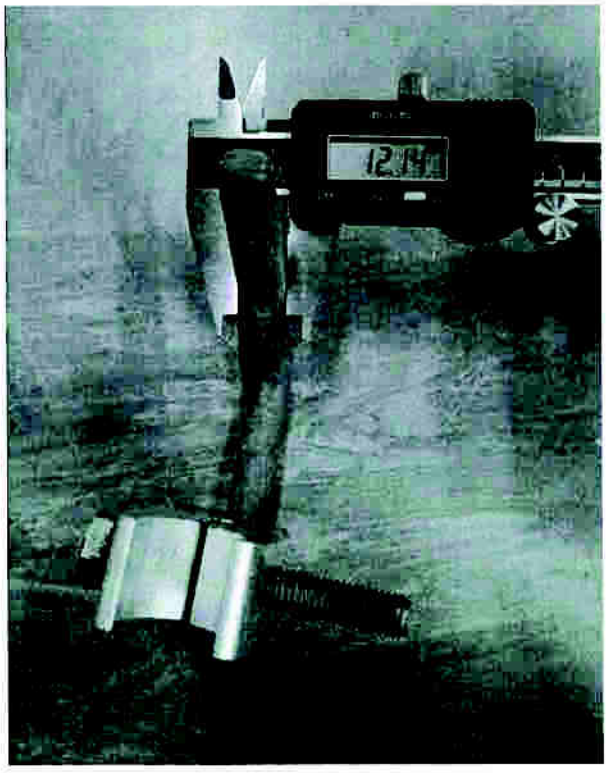


Picture 2: Specification drawing

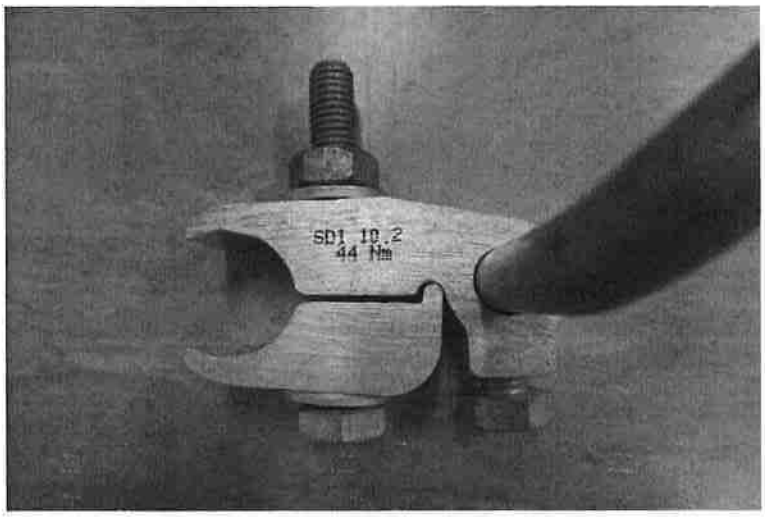
Summary

The power arc device fulfilled all test requirements.

4. Pictures



Picture 3: Measuring the diameter of arching horn



Picture 4: Markings of arching horn

5. Test equipment

ID	Type	Model	Purpose	Latest calibration
A224	Slide gauge	Stainless	Measuring dimensions	16.03.2016

6. Test Id

3871

7. Revision history

A

FINAS
Finnish Accreditation Service
T284 (EN ISO/IEC 17025)

Laboratory Report

No.: 3572S
Revision: A
Page: 1/3
Date of Test: 16.8.2016

Test object:

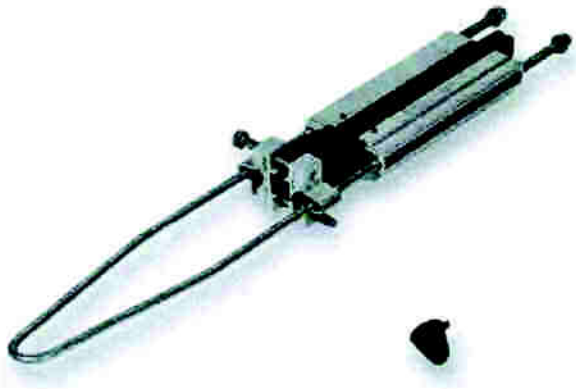
Tension clamp SO256.

Purpose of the test and relevant standards:

Part of type test. Test for permanent marking according to EN 50397-2:2009 clause 7.3.

Conclusion:

Clamp passed the test.



Picture 1: SO256

Date of Report: 22.8.2016

Tested by: Mika Karjalainen

ENSTO
UTILITY NETWORKS
LABORATORY

Approved by: Janne Lappalainen

Ordered by: T. Virtanen
Distribution: OHL PD-team

АКЦИОНЕРНО ДРУЖЕСТВО ФИЛКАБ 16 ПЛОВДИВ
ВЯРНО С ОРИГИНАЛА

ENSTO

Ensto Utility Networks Laboratory
Ensto Finland Oy
Ensio Miettisen katu 2,
P.O.Box 77
06101 Porvoo, Finland
Tel. +358 204 76 21
Fax +358 204 76 2770
Business ID: 1481990-6
Reg. Office: Porvoo

1. Test objects

Tension clamp:

Type:	SO256
Manufacturer:	Ensto Finland Oy
Conductor size:	95-157 mm^2
Tightening torque:	44 Nm
SMFL:	25 kN
SMDL:	22 kN
Batch number:	07/2016
No of pcs:	3

2. Testing procedure

The markings were rubbed by hand for 15 s with a piece of cloth soaked with water and again 15 s with a piece of cloth soaked with petroleum spirit. The petroleum spirit used was Mineral turpentine from KIILTO / Finland.

Requirements

The marking shall remain clear and allow the accessory to be easily identified.

3. Test results

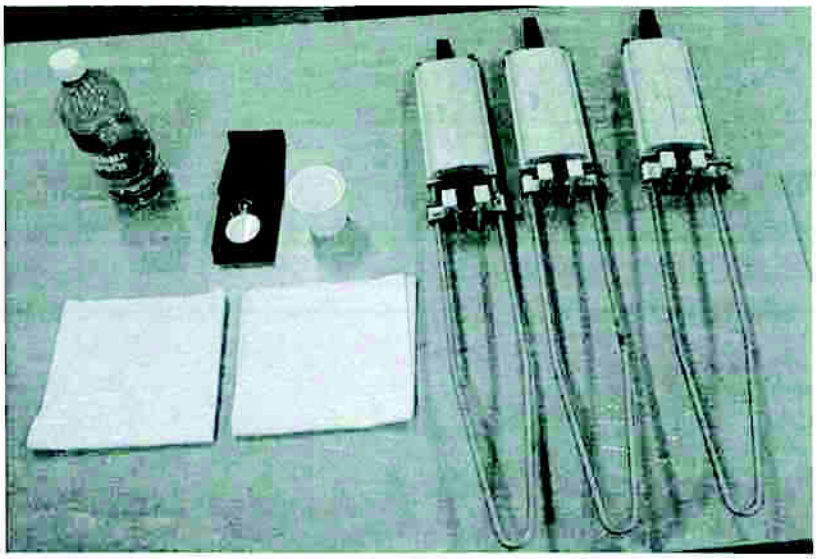
Sample	Markings clear after the test	Result
1	yes	passed
2	yes	passed
3	yes	passed

Table 1: Test results

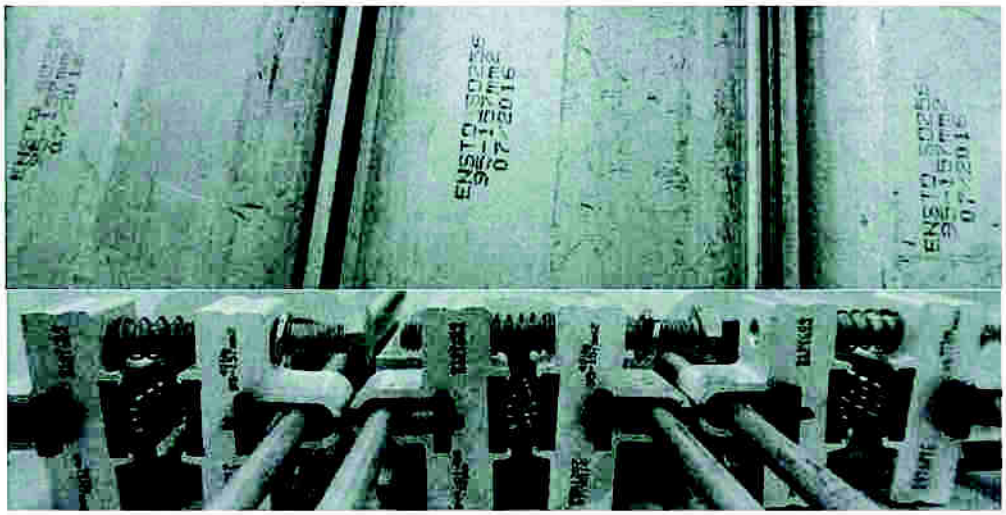
Summary

Clamp fulfilled the test requirements.

4. Pictures



Picture 2: Test setup



Picture 3: Markings after test

5. Test equipment

ID	Type	Model	Purpose	Latest calibration
L253	Stop watch	IHM	timekeeping	26.10.2015

6. Test Id

3956

7. Revision history

A

FINAS
Finnish Accreditation Service
T284 (EN ISO/IEC 17025)

Laboratory Report

No.: 3465S
Revision: A

Date of Test: 19.5.2016

Test object:

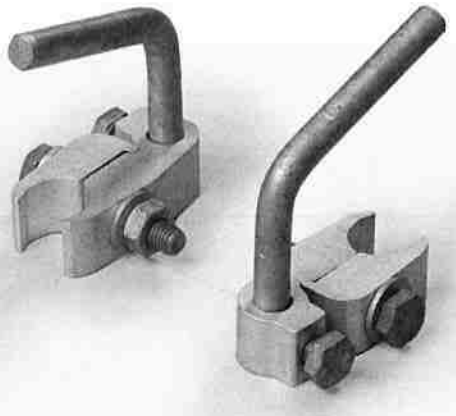
Power arc device SDI10.2.

Purpose of the test and relevant standards:

Part of sample test.
Test for permanent marking according to EN 50397-2:2009 clause 7.3.

Conclusion:

Tested samples passed the test.



Picture 1: SDI10.2

Date of Report: 20.5.2016

Tested by: Jenna Aarnio

Approved by: Janne Lappalainen

ENSTO
UTILITY NETWORKS
LABORATORY

Ordered by: T. Virtanen
Distribution: OHL PD-Team

1. Test objects

Power arc device:

Type:	SDI10.2
Manufacturer:	Ensto Finland Oy
Tightening torque:	44 Nm
Batch number:	06042016/21451
No of pcs:	3

2. Testing procedure

The markings were rubbed by hand for 15 s with a piece of cloth soaked with water and again 15 s with a piece of cloth soaked with petroleum spirit. The petroleum spirit used was Mineral turpentine from KIILTO / Finland.

Requirements

The marking shall remain clear and allow the accessory to be easily identified.

3. Test results

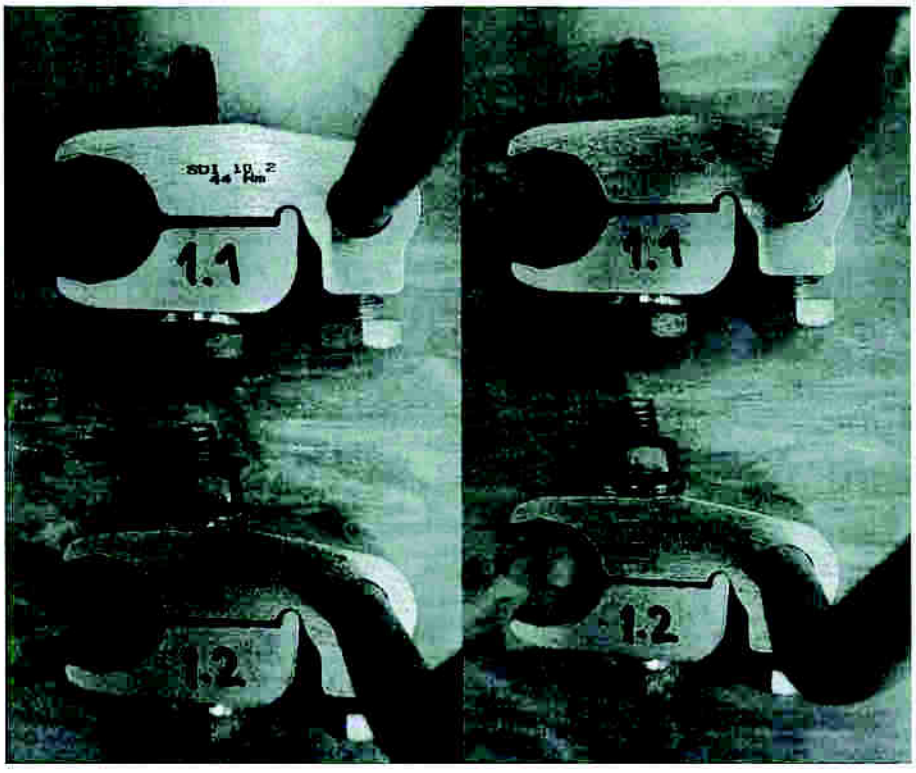
Sample	Markings clear after the test	Result
1.1	yes	passed
1.2	yes	passed
2.1	yes	passed
2.2	yes	passed
3.1	yes	passed
3.2	yes	passed

Table 1: Test results

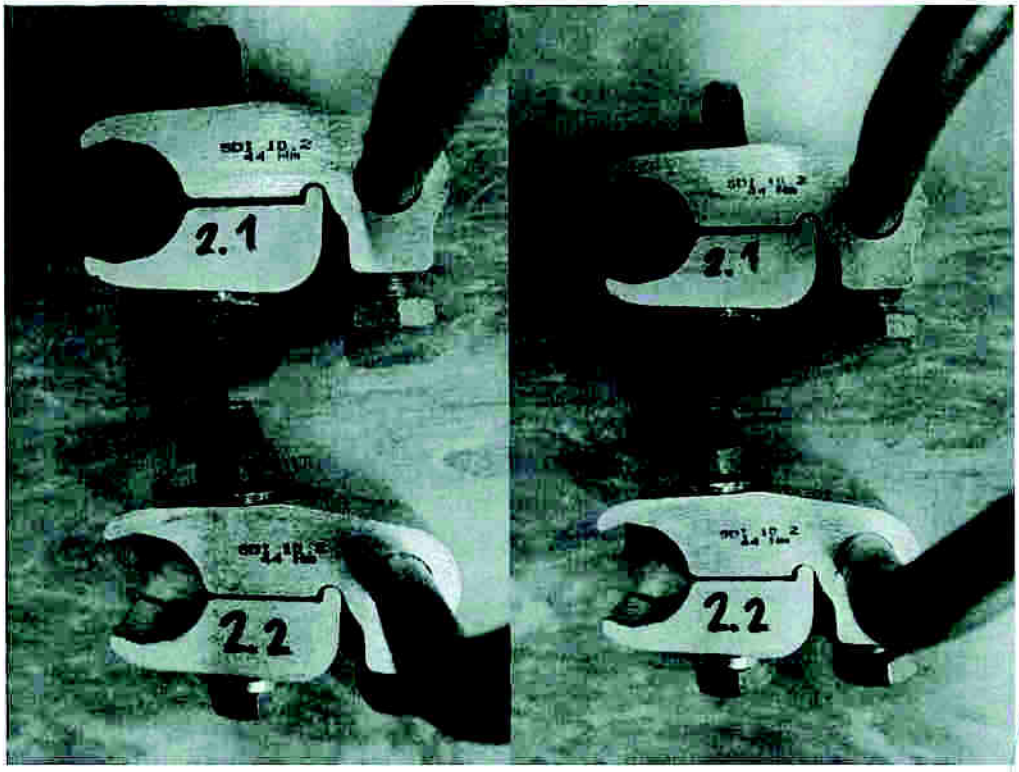
Summary

All samples fulfilled the test requirements.

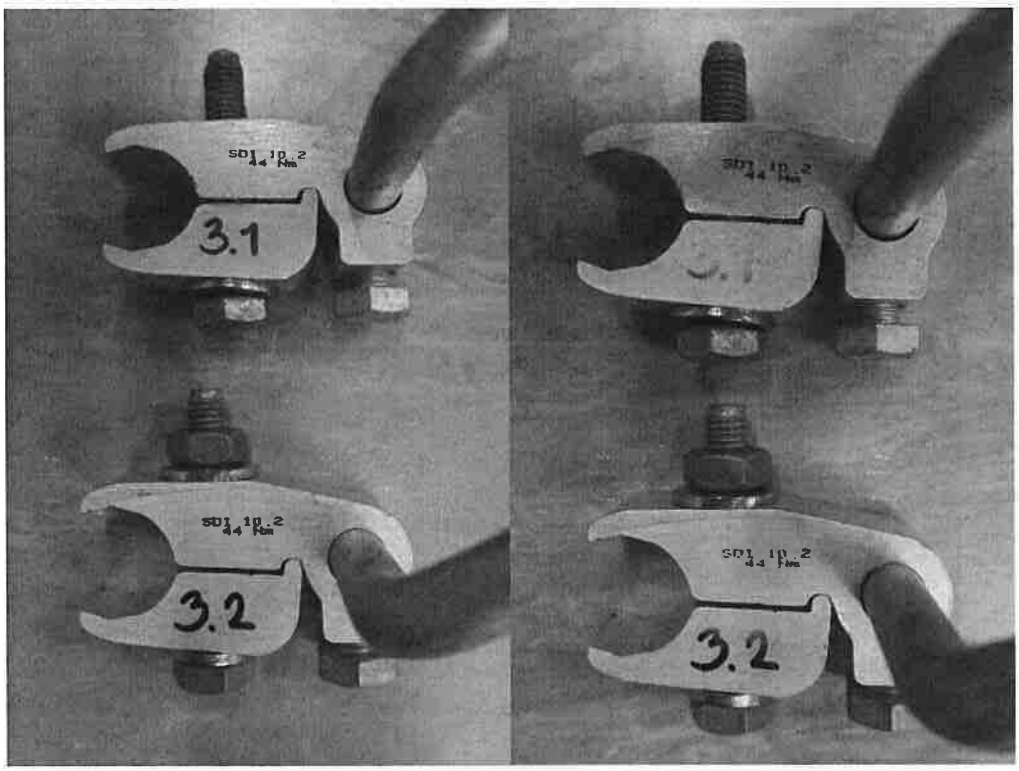
4. Pictures



Picture 2: 1.1 and 1.2 samples before and after the test



Picture 3: 2.1 and 2.2 samples before and after the test



Picture 4: 3.1 and 3.2 samples before and after the test

Picture 5: Test setup

5. Test equipment

ID	Type	Model	Purpose	Latest calibration
L253	Timer	IHM	Timing of test	26.10.2015

6. Test Id

3870

7. Revision history

A

FINAS
Finnish Accreditation Service
T264 (EN ISO/IEC 17025)

Laboratory Report

No.: 3597S
Revision: A

Date of Test: 14.9.2016

Test object:

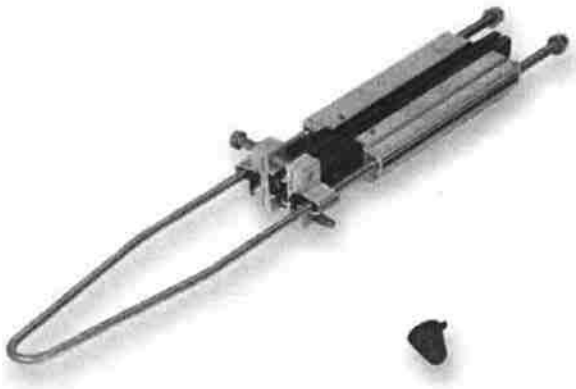
Tension clamp SO256.

Purpose of the test and relevant standards:

Tensile test at ambient temperature according to EN50397-2:2009 clause 7.4.7.

Conclusion:

The clamp passed the test.



Picture 1: SO256

Date of Report: 15.9.2016

Tested by: Mika Karjalainen

ENSTO
UTILITY NETWORKS
LABORATORY

Approved by: Janne Lappalainen

Ordered by: T. Virtanen
Distribution: OHL PD-team

1. Test objects

Tension clamp:

Type:	SO256
Manufacturer:	Ensto Finland Oy
Conductor size:	95-157 mm^2
Tightening torque:	44 Nm
SMFL:	25 kN
SMDL:	22 kN
Batch number:	07/2016
No of pcs:	8

Conductors:

Type:	SAX-W 95
Used cross section:	95 mm²
Conductor material:	AlMgSi
Number of strands:	7
Conductor diameter:	11,3 mm
Conductor construction:	Compacted
Shape of conductor:	Round
Insulation material:	XLPE
Insulation thickness:	2,4 mm
Core diameter:	16,1 mm
Conductor MBL:	30,4 kN
Max operating temperature:	80 °C
Max short-circuit temperature:	200 °C
Manufacturer:	Prysmian
Country:	Finland
Refer to standard:	EN50397-1
Conductor ID:	210

Type:	SAX-W 150 AlMgSi 12/20 kV, K2000
Used cross section:	150 mm²
Conductor material:	AlMgSi
Number of strands:	19
Conductor diameter:	14,2 mm
Conductor construction:	Compacted
Shape of conductor:	Round
Insulation material:	XLPE
Insulation thickness:	2,2 mm
Core diameter:	18,9 mm
Conductor MBL:	47,3 kN
Max operating temperature:	80 °C
Max short-circuit temperature:	200 °C
Manufacturer:	Prysmian
Country:	Finland
Refer to standard:	SFS 5791, EN 50397-1
Conductor ID:	463

АКЦИОНЕРНО ДРУЖЕСТВО * ФИЛКАБ 16 * ПЛОВДИВ *

ВЯРНО С ОРИГИНАЛА

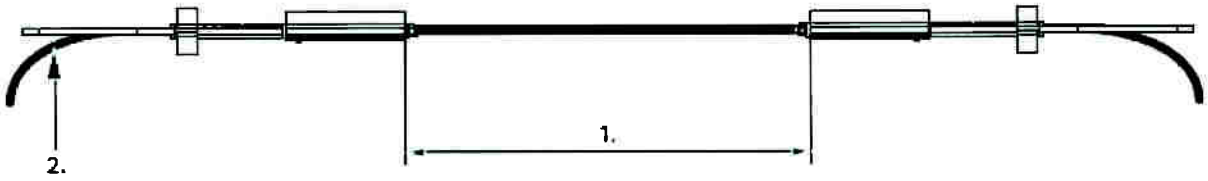
Type:	BLL-T99 AlMgSi 24kV
Used cross section:	99 mm²
Conductor material:	AlMgSi
Number of strands:	7
Conductor diameter:	12,8 mm
Conductor construction:	Non-compacted
Shape of conductor:	Round
Insulation material:	HDPE+PE
Insulation thickness:	2,6 mm
Core diameter:	17,8-18,8
Conductor MBL:	25,3 kN
Max operating temperature:	70 °C
Max short-circuit temperature:	200 °C
Manufacturer:	Amokraft
Country:	Sweden
Refer to standard:	EN 50397-1
Conductor ID:	437

Type:	BLL-T 157 AlMgSi 24kV
Used cross section:	157 mm²
Conductor material:	AlMgSi
Number of strands:	19
Conductor diameter:	16,3 mm
Conductor construction:	Non-compacted
Shape of conductor:	Round
Insulation material:	HDPE+PE
Insulation thickness:	2,5 mm
Core diameter:	21,6 mm
Conductor MBL:	43,7 kN
Max operating temperature:	70 °C
Max short-circuit temperature:	200 °C
Manufacturer:	Amokraft
Country:	Sweden
Refer to standard:	EN 50397-1
Conductor ID:	453

2. Testing procedure

Two tension clamps were tested with minimum and maximum conductor size using BLL-T and SAX-W type conductors. The tension clamps were assembled in accordance with manufacturers' instructions and fitted into a tensile test machine as shown in Picture 2.

The test load SMFL was SMFL=0,8×conductor MBL. The load was increased to 20 % of SMFL. Then the conductor was marked where it exits from the tension clamp. The load was then gradually increased to 60 % of SMFL and kept there for 60 s. Without any subsequent adjustment of the fitting the load was increased to SMFL and kept there for 60 s. After this the tension clamps where then checked for any movement relative to the conductor. Then the load was steadily increased until failure occurred. The failure load was recorded.



Picture 2: Tensile test arrangement

1. Min. 100 x covered conductor diameter
2. Length of tail minimum 500 mm

Requirements

The movement of the tension clamp relative to the conductor shall be less than 3 mm and no failure of the clamp or the covered conductor shall occur below SMFL, where SMFL=0,80×MBL.

Deviation
For some conductors the test load SMFL (0,80 × MBL) is higher than the SMFL specified for the tension clamp. In these cases the maximum test load was limited to the SMFL of the tension clamp.

3. Test results

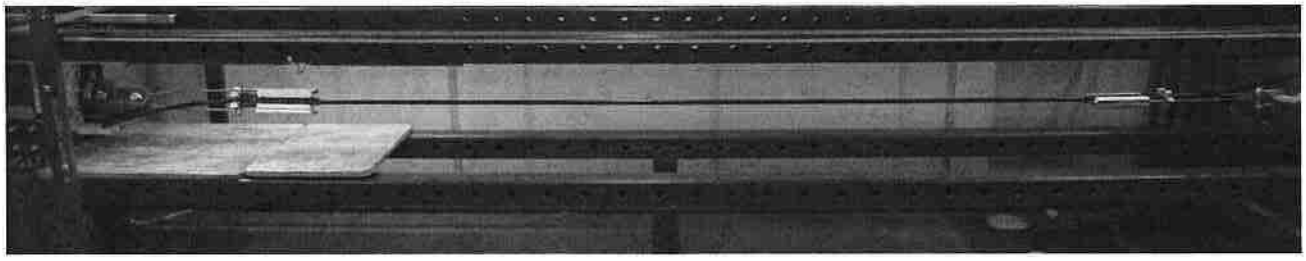
Sample	Conductor	MBL [kN]	20% of SMFL [kN]	60% of SMFL [kN]	SMFL [kN]	Breaking force [kN]	Result
1	SAX-W 95	30,4	4,9	14,6	24,3	34,1	Passed
2							
3	SAX-W 150	47,3	7,6	22,7	25,0	34,3	Passed
4							
5	BLL-T 99	25,3	4,0	12,1	20,2	29,5	Passed
6							
7	BLL-T 157	43,7	7,0	21,0	25,0	34,9	Passed
8							

Table 1: Test results

Summary

The clamp fulfilled the test requirements.

4. Pictures



Picture 3: Test setup

5. Test equipment

ID	Type	Model	Purpose	Latest calibration
T1	Tensile test machine	Matertest	Tensile test	No calibration
L109	Force sensor	1220AF-250kN-B	Force measurement	01.09.2016
L110	Force sensor	1210AF-50kN-B	Force measurement	01.09.2016
L56	Torque wrench	BDS80E	Torque measurement	01.07.2015
A209	Caliper	Stainless hardened	Measuring dimensions	15.12.2015

6. Test Id

3957

7. Revision history

A

FINAS
Finnish Accreditation Service
T284 (EN ISO/IEC 17025)

Laboratory Report

No.: 3595S
Revision: A

Date of Test: 29.8.2016

Test object:

Tension clamp SO256.

Purpose of the test and relevant standards:

Clamp bolt tightening test according to EN 50397-2:2009 clause 7.4.10.1.

Conclusion:

The clamp passed the test.

Picture 1: SO256

Date of Report: 30.8.2016

Tested by: Mika Karjalainen

ENSTO
UTILITY NETWORKS
LABORATORY

Approved by: Janne Lappalainen

Ordered by: T. Virtanen
Distribution: OHL PD-team

ENSTO

Ensto Utility Networks Laboratory
Ensto Finland Oy

Ensio Miettisen katu 2,
P.O.Box 77
06101 Porvoo, Finland

Tel. +358 204 76 21
Fax +358 204 76 2770

Business ID: 1481990-6
Reg. Office: Porvoo

1. Test objects

Tension clamp:

Type:	SO256
Manufacturer:	Ensto Finland Oy
Conductor size:	95-157 mm2
Tightening torque:	44 Nm
SMFL:	25 kN
SMDL:	22 kN
Batch number:	07/2016
No of pcs:	4

Conductors:

Type:	SAX-W 95
Used cross section:	95 mm²
Conductor material:	AlMgSi
Number of strands:	7
Conductor diameter:	11,3 mm
Conductor construction:	Compacted
Shape of conductor:	Round
Insulation material:	XLPE
Insulation thickness:	2,4 mm
Core diameter:	16,1 mm
Conductor MBL:	30,4 kN
Max operating temperature:	80 °C
Max short-circuit temperature:	200 °C
Manufacturer:	Prysmian
Country:	Finland
Refer to standard:	EN50397-1
Conductor ID:	210

Type:	SAX-W 150 AlMgSi 12/20 kV, K2000
Used cross section:	150 mm²
Conductor material:	AlMgSi
Number of strands:	19
Conductor diameter:	14,2 mm
Conductor construction:	Compacted
Shape of conductor:	Round
Insulation material:	XLPE
Insulation thickness:	2,2 mm
Core diameter:	18,9 mm
Conductor MBL:	47,3 kN
Max operating temperature:	80 °C
Max short-circuit temperature:	200 °C
Manufacturer:	Prysmian
Country:	Finland
Refer to standard:	SFS 5791, EN 50397-1
Conductor ID:	463

ВЯРНО С ОРИГИНАЛА
ФИЛКАБ 16
"МИНЬОНЕРНО ДРУЖЕСТВО" ПЛОВДИВ

Type:	BLL-T99 AlMgSi 24kV
Used cross section:	99 mm²
Conductor material:	AlMgSi
Number of strands:	7
Conductor diameter:	12,8 mm
Conductor construction:	Non-compacted
Shape of conductor:	Round
Insulation material:	HDPE+PE
Insulation thickness:	2,6 mm
Core diameter:	17,8-18,8
Conductor MBL:	25,3 kN
Max operating temperature:	70 °C
Max short-circuit temperature:	200 °C
Manufacturer:	Amokraft
Country:	Sweden
Refer to standard:	EN 50397-1
Conductor ID:	437

Type:	BLL-T 157 AlMgSi 24kV
Used cross section:	157 mm²
Conductor material:	AlMgSi
Number of strands:	19
Conductor diameter:	16,3 mm
Conductor construction:	Non-compacted
Shape of conductor:	Round
Insulation material:	HDPE+PE
Insulation thickness:	2,5 mm
Core diameter:	21,6 mm
Conductor MBL:	43,7 kN
Max operating temperature:	70 °C
Max short-circuit temperature:	200 °C
Manufacturer:	Amokraft
Country:	Sweden
Refer to standard:	EN 50397-1
Conductor ID:	453

2. Testing procedure

One clamp was tested with minimum and maximum conductor size using BLL-T and SAX-W type conductors.

The torque was increased to 1,1 × the specified installation torque value, 1,1 × 40 = 44 Nm, after which the clamp was checked for damage. The tightening was then continued until breaking occurred. The 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 once to 1,1 x installation value, because the clamps are not allowed to be re-used.

Requirements

No damage shall occur, during the tightening which could affect the correct function of the clamp or its nuts.

3. Test results

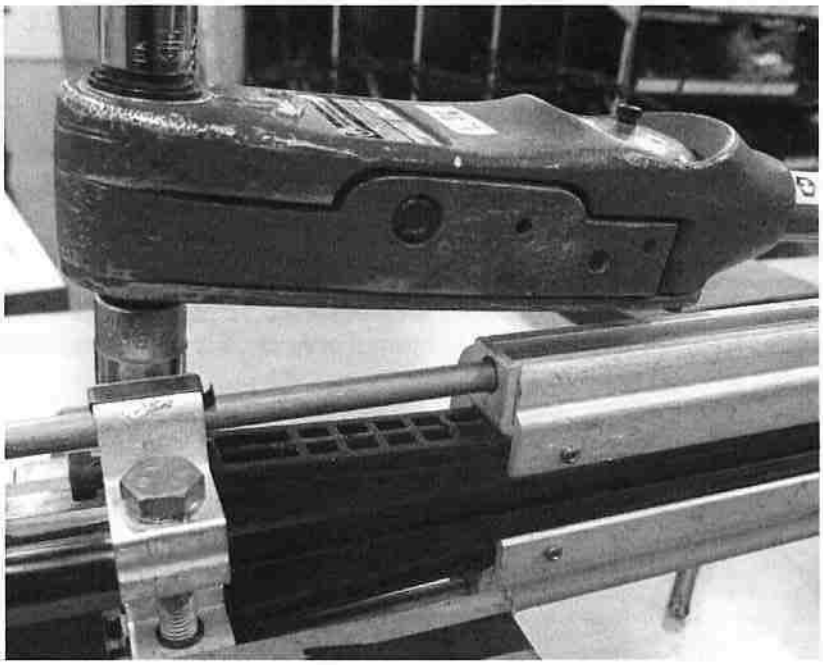
Sample	Conductor [mm²]	1,1 x tightening torque [Nm]	Damage torque [Nm]	Damage	Result
1	PAS-W 95	44	>100	no break	passed
2	PAS-W 150		98	bolt threads broke	passed
3	BLL-T 99	44	95,7	bolt broke	passed
4	BLL-T 157		92,2	bolt broke	passed

Table 1: Test results

Summary

All samples fulfilled the test requirements.

4. Pictures



Picture 2: Test setup

5. Test equipment

ID	Type	Model	Purpose	Latest calibration
L56	Torque wrench	BDS80E	Torque measurement	01.07.2015
L269	Torque wrench	Stahlwille 730D/10	Torque measurement	07.11.2013

6. Test Id

3958

7. Revision history

A

FINAS
Finnish Accreditation Service
T284 (EN ISO/IEC 17025)

Laboratory Report

No.: 3596S
Revision: A

Date of Test: 15.9.2016

Test object:

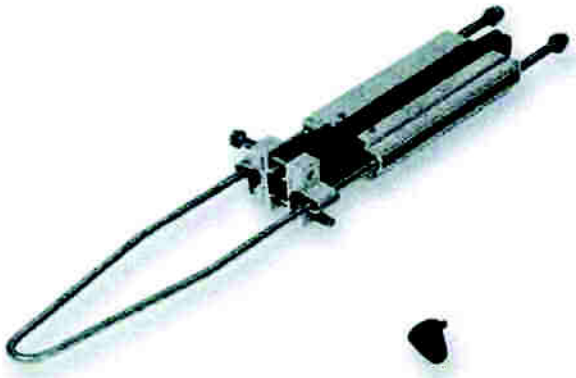
Tension clamp SO256.

Purpose of the test and relevant standards:

Damage and failure load test according to EN 50397-2:2009 clause 7.4.1.

Conclusion:

The clamp passed the test.



Picture 1: SO256

Date of Report: 15.9.2016

Tested by: Mika Karjalainen

ENSTO
UTILITY NETWORKS
LABORATORY

Approved by: Janne Lappalainen

Ordered by: T. Virtanen
Distribution: OHL PD-team

ВЯРНО С ОРИГИНАЛА

АДЮНЕРНО ДРУЖЕСТВО ФИЛКАБ 16 ПЛОВДИВ

ENSTO

Ensto Utility Networks Laboratory
Ensto Finland Oy
Ensio Miettisen katu 2,
P.O.Box 77
06101 Porvoo, Finland
Tel. +358 204 76 21
Fax +358 204 76 2770
Business ID: 1481990-6
Reg. Office: Porvoo

1. Test objects

Tension clamp:

Type:	SO256
Manufacturer:	Ensto Finland Oy
Conductor size:	95-157 mm^2
Tightening torque:	44 Nm
SMFL:	25 kN
SMDL:	22 kN
Batch number:	07/2016
No of pcs:	3

Conductors:

Type:	BLL-T 157 AlMgSi 24kV
Used cross section:	157 mm^2
Conductor material:	AlMgSi
Number of strands:	19
Conductor diameter:	16,3 mm
Conductor construction:	Non-compacted
Shape of conductor:	Round
Insulation material:	HDPE+PE
Insulation thickness:	2,5 mm
Core diameter:	21,6 mm
Conductor MBL:	43,7 kN
Max operating temperature:	70 °C
Max short-circuit temperature:	200 °C
Manufacturer:	Amokraft
Country:	Sweden
Refer to standard:	EN 50397-1
Conductor ID:	453

2. Testing procedure

Three samples were tested. The test was carried out as in Picture 2. The load was applied in the direction 1. The load was gradually increased until it reached the specified minimum damage load (SMDL). This load was kept constant for 60s. The fitting was then removed and measurement of any permanent deformation was done. The load was gradually increased until it reached the specified minimum failure load (SMFL). This load was kept constant for 60s.

Picture 2: Test arrangement

Requirements

Regarding damage load, the test is passed if no permanent deformation, which can affect the proper function of the fitting, occurs at or below the specified mechanical minimum damage load.

3. Test results

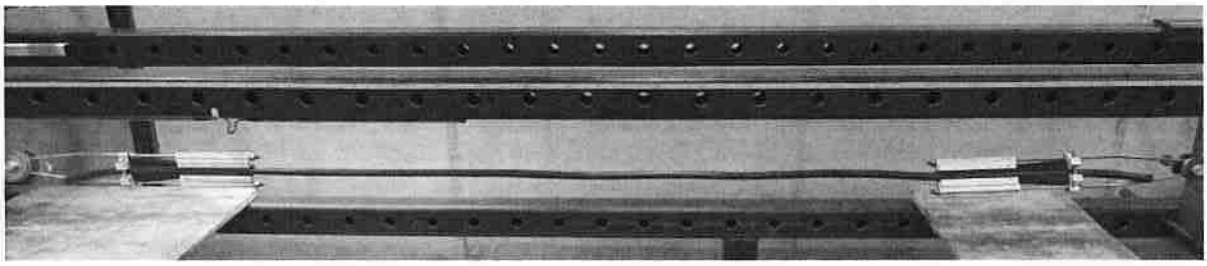
Sample	Conductor	SMDL			SMFL for 60 s [kN]	Result
		SMDL for 60 s [kN]	Allowed permanent deformation [mm]	Measured permanent deformation at 0 kN [mm]		
1	BLL-T 157	22,0	2,0	1,4	25,0	Passed
2				1,1		Passed
3				1,6		Passed

Table 1: Test results

Summary

The clamp fulfilled the test requirements.

4. Pictures



Picture 3: Test setup

5. Test equipment

ID	Type	Model	Purpose	Latest calibration
T1	Tensile test machine	Matertest	Tensile test	No calibration
L109	Force sensor	1220AF-250kN-B	Force measurement	01.09.2016
L110	Force sensor	1210AF-50kN-B	Force measurement	01.09.2016
L56	Torque wrench	BDS80E	Torque measurement	01.07.2015
A209	Caliper	Stainless hardened	Measuring dimensions	15.12.2015

6. Test Id

3959

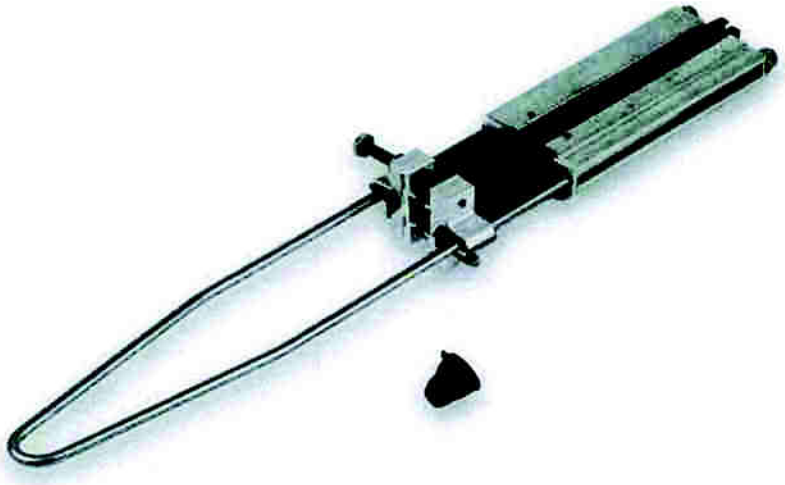
7. Revision history

A

Saves Your Energy

TENSION CLAMP
SO256 and SO256.2

Type Test Report



Test standard: EN50397-2, 2009

ВЯРНО С ОРИГИНАЛА

АКЦИОНЕРНО ДРУЖЕСТВО ФИЛКАБ 16 ПЛОВДИВ

Ensto Utility Networks Laboratory
Ensto Finland Oy

Ensio Miettisen katu 2,
P.O.Box 77
06101 Porvoo, Finland

Tel. +358 204 76 21
Fax +358 204 76 2770

Business ID: 0130215-8
Reg. Office: Porvoo

Contents		Document no
1. Specification		SO256
		SO256.2
		SDI27.2
		SML1.17
		SDI10.2
		PK557
2. Certificate		FI 27049
3. Test reports:		
3.1. Visual examination		
3.1.1.	SO256	2166S
3.1.2.	SO256.2	2166S
3.1.3.	SDI27.2	2176S
3.2. Dimensional and material verification		
3.2.1.	SO256	2166S
3.2.2.	SO256.2	2166S
3.2.3.	SDI27.2	2176S
3.3. Test for permanent marking		
3.3.1.	SO256	2165S
3.3.2.	SDI10.2	2177S
3.4. Damage and failure load test		2106S
3.5. Tensile test at ambient temperature		
3.5.1.	BLL-T AlMgSi	1938S
3.5.2.	SAX-W AlMgSi	1939S
3.6. Tensile test at low temperature		
3.6.1.	BLL-T AlMgSi	2087S
3.6.2.	SAX-W AlMgSi	2089S
3.7. Tensile test at high temperature		
3.7.1.	BLL-T AlMgSi	2091S
3.7.2.	SAX-W AlMgSi	2092S

3.8. Clamp bolt tightening test		
3.8.1.	BLL-T AlMgSi	2094S
3.8.2.	SAX-W AlMgSi	2095S
3.9. Low temperature assembly test		
3.9.1.	BLL-T AlMgSi	2097S
3.9.2.	SAX-W AlMgSi	2098S
3.10. Watertightness test		
3.10.1.	BLL-T AlMgSi	2100S
3.10.2.	SAX-W AlMgSi	2101S
3.11. Short circuit test		
3.11.1.	BLL-T AlMgSi	2103S
3.11.2.	SAX-W AlMgSi	2104S
3.12. Corrosion test		
3.12.1.	SO256	050810_SO256
3.12.2.	Conductor with cable lugs	071210_SDI27-1
3.12.3.	SDI10.2	050111_SDI10_2
3.13. Climatic ageing test (Method 2)		
3.13.1.	SO256	2191S
3.13.2.	End cap	2170S
3.14. Ageing test (IEC61238-1)		
3.14.1.	SML1.17	251420-1_SML1-17

ВЯРНО С ОРИГИНАЛА

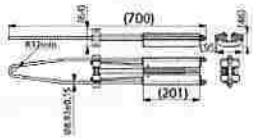
АКЦИОНЕРНО ДРУЖЕСТВО * ФИЛКАБ 16 * ПЛОВДИВ *

Saves Your Energy

PRODUCT SPECIFICATION
20.6.2011

SO256

Name:	**Tension clamp**
	PAS/BLL-T 95-157 mm² AlMgSi
Type:	SO256
EAN:	6438100303822
Description:	Tension clamp for covered conductors PAS/BLL AlMgSi and for insulated messengers of aerial MV cables like AHXAMK-WM3 (Multi-wiski). The insulation piercing contact part has silicone seal which prevents the moisture getting into the conductor.
Package:	3/90
Unit:	PCS



Technical specification

Weight (kg):	2.53
Conductor diameter mm:	16.1-22.3
For conductor mm²:	PAS/BLL 95-157 AlMgSi
SMFL kN:	30
Tightening torque Nm:	40
Use:	Tension clamp for covered conductors PAS/BLL AlMgSi and for insulated messengers of aerial MV cables like AHXAMK-WM3 (Multi-wiski).

Construction:

Component	Material
Body	Corrosion resistant aluminium alloy
Plastic parts	Frost, heat and UV-radiation resistant plastic
Bolts	Hot-dip galvanised steel M10
Bail	Stainless steel

Installation: The clamp is opened and the conductor wire is inserted between the wedges. The locking connector is tightened. Tightening torque 40 Nm. The clamp is closed and strained.

Markings:
ENSTO SO256
PSS1207
PSS1208
95-157mm2
40 Nm
week/year of manufacture

Standard: EN 50397-2

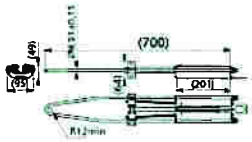
Ensto Finland Oy
Ensio Miettisen katu 2
P.O.Box 77
06101 Porvoo, Finland
Tel. +358 204 76 21
Fax +358 204 76 2770
www.ensto.com

Saves Your Energy

PRODUCT SPECIFICATION
20.6.2011

SO256.2

Name:	**Tension clamp**
	PAS/BLL-T 95-157 AlMgSi hoist adap
Type:	SO256.2
EAN:	6438100303839
Description:	TenTension clamp for covered conductors PAS/BLL AlMgSi and for insulated messengers of aerial MV□ cables like AHXAMK-WM3 (Multi-wiski). The insulation piercing contact part has silicone seal which□ prevents the moisture getting into the conductor. Clamps are equipped with an adapter for hoist hook.
Package:	3/90
Unit:	PCS



Technical specification

Weight (kg):	2.79
Conductor diameter mm:	16.1-22.3
For conductor mm²:	PAS/BLL 95-157 AlMgSi
SMFL kN:	30
Tightening torque Nm:	40

Use: Tension clamp for covered conductors PAS/BLL AlMgSi and for insulated messengers of aerial MV
cables like AHXAMK-WM3 (Multi-wiski). Clamps are equipped with an adapter for hoist hook.

Construction:

Component	Material
Body	Corrosion resistant aluminium alloy
Bolts	Hot-dip galvanised steel M10
Bail	Stainless steel
Plastic parts	Frost, heat and UV-radiation resistant plastic
Hoist adapter	Hot-dip galvanised steel

Installation: The clamp is opened and the conductor wire is inserted between the wedges. The locking connector is tightened. Tightening torque 40 Nm. The clamp is closed and strained.

Markings:
ENSTO SO 256.2
95-157mm2
40 Nm
week/year of manufacture

Standard: EN 50397-2

Ensto Finland Oy
Ensio Miettisen katu 2
P.O.Box 77
06101 Porvoo, Finland
Tel. +358 204 76 21
Fax +358 204 76 2770
www.ensto.com

Saves Your Energy

PRODUCT SPECIFICATION
9.6.2011

SDI27.2

Name:	**Power arc device**
	For products SDI90.x composite insulators on angle poles and SO255, SO256, SO181.6
Type:	SDI27.2
EAN:	6438100305611
Description:	Power arc device SDI27.2 is used with SDI90.x composite insulators on angle poles with suspension clamp SO181.6 and on tension poles with tension clamps SO255 or SO256. □ The package includes arching horns and 95 mm² conductor with cable lugs. Spark gap is adjusted to 90-100 mm on 12 kV, 130-150 mm on 24kV and 220-250 mm on 36 kV.□ □
Package:	9/405
Unit:	PCS

Technical specification

Arc gap mm:	90-250
Nominal voltage (Un) kV:	12-36
Weight (kg):	0.83

Use:

Spark gap 12 kV	**90-100 mm**
Spark gap 24 kV	130-150 mm
Spark gap 36kV	220-250 mm

Power arc device SDI27.2 is used with SDI90.x composite insulators on angle poles with suspension
clamp SO181.6 and on tension poles with tension clamps SO255 or SO256.

Construction:

Component	**Material**
Al-parts	Corrosion resistant aluminium alloy
Screws	Hot dip galvanized steel
Washers	Stainless steel

The package includes arching 2 pcs horns SDI 10.2 and 95 mm² conductor PEJ 90 with screw type cable lugs.

Installation: One end of the conductor will be installed on the clamp and other end on the SDI 10.2

Tools required: Articulated spanner ST 20

Ensto Finland Oy
Ensio Miettisen katu 2
P.O.Box 77
06101 Porvoo, Finland
Tel. +358 204 76 21
Fax +358 204 76 2770
www.ensto.com

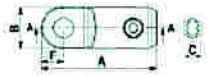
Saves Your Energy

PRODUCT CARD
20.9.2011

SML1.17

Name:	**Cable lug with shear head bolts**
	Al/Cu 10-95 mm², Ø13
Type:	SML1.17
EAN:	6418677457555

Description: The cable lug is used for terminating conductors of cables up to 36 kV. Because of the shear head bolt construction, no crimping tools are needed. The required torque is achieved by tightening the bolt until it breaks off. The adapter needed in tightening is included in the package.□
□
The lug is water tight. It is suitable for aluminium and copper conductors: solid and stranded, sector shaped and circular.□
□
□



Package:	20/2100
Unit:	PCS

Technical specification

Conductor size mm²:	Al/Cu 10-95
Weight (kg):	0.095
A mm:	74
B mm:	26
C mm:	17
D mm:	14
E mm:	13
F mm:	13
Hole diameter mm:	13

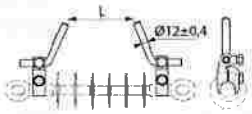
ВЯРНО С ОРИГИНАЛА
ФИЛКАБ 16

Ensto Finland Oy
Ensio Miettisen katu 2
P.O.Box 77
06101 Porvoo, Finland
Tel. +358 204 76 21
Fax +358 204 76 2770
www.ensto.com

Saves Your Energy

PRODUCT SPECIFICATION
9.6.2011

SDI10.2



Name:	**Power arc device**
	For tension insulators
Type:	SDI10.2
EAN:	6418677410673
Description:	Used as arc protection with tension insulator type SDI90 on covered conductor lines. SDI10.2 includes two horns, which are fixed to the metal parts of the tension insulator so that the peaks are towards each other and the distance between the peaks is 100 - 150 mm at 24 kV. □ □ Arc fault test: □ Arc test 2 x 10 kA, 1s□ □ Short circuit test:□ I1s=11,5 kA, 1s□ Idyn=29 kA
Package:	15/945
Unit:	PCS

Technical specification

Arc gap mm:	95-230
Nominal voltage (Un) kV:	12-36
Weight (kg):	0.58
Tightening torque Nm:	44

Use: Arcing protection horns for the suspension insulator SDI80.n. The power arc device is designed particularly for the small arc currents.

Construction:

Component	Material
Al parts	Corrosion resistant aluminium alloy, tensile strength 300 N/ mm²
Screws	Hot-dip galvanised
Washers	Stainless steel

The kit SDI10.2 consists of following parts:
- 2 pieces of Arc horns PSS891 and fixing elements

Installation: The horns are mounted on the insulator end fittings. The screws of the clamps have to be tightened to torque of 44 Nm.

Tools required: Articulated spanner ST20.

Markings: SDI 10.2
44 Nm

Ensto Finland Oy
Ensio Miettisen katu 2
P.O.Box 77
06101 Porvoo, Finland
Tel. +358 204 76 21
Fax +358 204 76 2770
www.ensto.com

Saves Your Energy

PRODUCT SPECIFICATION
20.9.2011

PK557

Name:	**End cap**
	50-157 mm²
Type:	PK557
EAN:	6438100306915
Description:	PK557 is used for preventing water entry into the end of the branch cable.
Package:	120
Unit:	PCS

Technical specification

Conductor size mm²:	50-157
Weight (kg):	0.007
Conductor diameter mm:	12.7-22.3
Construction:	**Component** **Material**
	Body UV-resistant elastomer
Markings:	Ensto, Ø12,7-22,3 and PMR2720
Standard:	EN 50397-2:2009 clause 7.6

ВЯРНО С ОРИГИНАЛА

АКЦИОНЕРНО ДРУЖЕСТВО ФИЛКАБ 16 ПЛОВДИВ

Ensto Finland Oy
Ensio Miettisen katu 2
P.O.Box 77
06101 Porvoo, Finland
Tel. +358 204 76 21
Fax +358 204 76 2770
www.ensto.com

CERTIFICATE FI 27049

Our Ref. 258614-8

Product	Connector for overhead lines
Type	SO256 SO256.2
Trade mark	ENSTO
Certificate Holder	Ensto Finland Oy Ensio Miettisen katu 2 FI-06150 PORVOO, FINLAND
Manufacturer	Ensto Finland Oy Ensto Utility Networks Ensio Miettisen katu 2 FI-06150 PORVOO, FINLAND
Technical information	Tension clamp for covered conductors PAS/BLL 95 – 157 mm^2 AlMgSi Conductor diameter 16,1 – 22,3 mm Tightening torque 40 Nm SMFL 30 kN
The product is certified according to the following standard(s)	EN 50397-2:2009
Validity	This certificate is valid until 13 October 2016 unless the standard in question has been amended or superseded with significant changes in requirements, in which case, SGS Fimko has the right to shorten the validity of the certificate based on the legislation of the European Union. This certificate includes the right to use the FI mark under the condition that changes (if any) will be checked at SGS Fimko before the product is brought onto market and that the conditions for FI certification are met.
Date of issue	13 October 2011
	SGS Fimko Ltd
Signature	Sixten Lökfors Project Manager

This certificate has 1 appendix

SGS Fimko Ltd. | Särkiniementie 3 P.O.Box 30 FI-00211 Helsinki, Finland
t. +358 9 696 361 f. +358 9 692 5474 www.fi.sgs.com
Business ID 0978538-5

Appendix to Certificate: 27049

Manufacturing site	Ensto Ensek AS Paldiski mnt. 35 / 4A EE-76606 KEILA, ESTONIA
Additional information	SO256.2 with adapter for hoist hook. Additional parts for tension clamps SO256 and SO256.2: Power arc device SDI27.2 including power arc horns SDI10.2 and PEJ90 conductor with screw type cable lugs SML 1.17. End cap PK557.
Is based on test	Tests made in manufacturer´s premises, witnessed by SGS Fimko Ltd. Manufacturer´s test reports: 2166S, 2176S, 2165S, 2177S, 2106s, 1938S, 1939S, 2087S, 2089S, 2091S, 2092S, 2094S, 2095S, 2097S, 2098S, 2100S, 2101S, 2103S, 2104S, 2191 and 2170S Solar simulator test reports: 050810_SO256, 071210_SDI27-1 and 050111_SDI10_2 SGS Fimko test report: 251420_SML1-17

Saves Your Energy

LABORATORY REPORT
No.: 2166S
Revision: A

Date of Test: 19.4. and 16.6.2011

Test object:

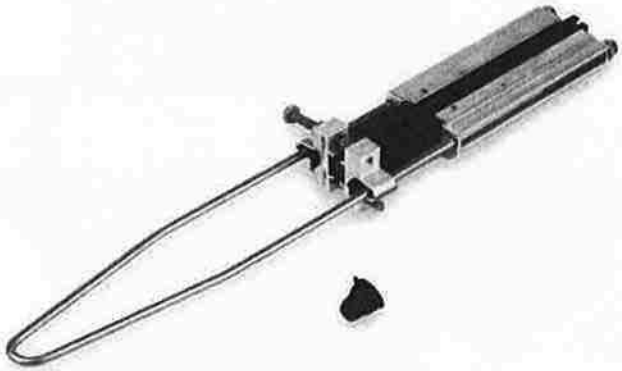
Tension clamp SO256 and SO256.2.

Purpose of the test and relevant standards:

Part of type test.
Visual examination test and Dimensional and material verification test, according to EN 50397-2:2009 clause 7.1 and 7.2.

Conclusion:

The clamp passed the test.



Picture 1: Tested clamp SO256

ENSTO UTILITY NETWORKS LABORATORY

Date of Report: 20.6.2011

Tested by: Patrick Ekholm

Witnessed by: Sami Hakonen / SGS Fimko

Reviewed by: Janne Lappalainen

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

Ensto Utility Networks Laboratory
Ensto Finland Oy
Ensio Mieltisen katu 2,
P.O.Box 77
06101 Porvoo, Finland
Tel +358 204 76 21
Fax +358 204 76 2770
Business ID: 0130215-8
Reg. Office: Porvoo

1. Test objects

Clamp:

Type:	Tension clamp SO256
Batch number:	0-series
Conductor range:	95 – 157 mm^2
Conductor diameter:	16,1 – 22,3 mm
Tightening torque:	40Nm
No of pcs:	1

Type:	Tension clamp SO256.2
Batch number:	0-series
Conductor range:	95 – 157 mm^2
Conductor diameter:	16,1 – 22,3 mm
Tightening torque:	40Nm
No of pcs:	1

2. Testing procedure

The test was performed against the manufacturer specification sheet and standard requirement. The test included a visual examination part and a dimensional and material verification part.

Requirement:

The clamp shall fulfil the manufacturer specification data and standard requirement.

3. Test results

SO256

Visual examination:

The clamp was visually looking the same as in the specification drawing.

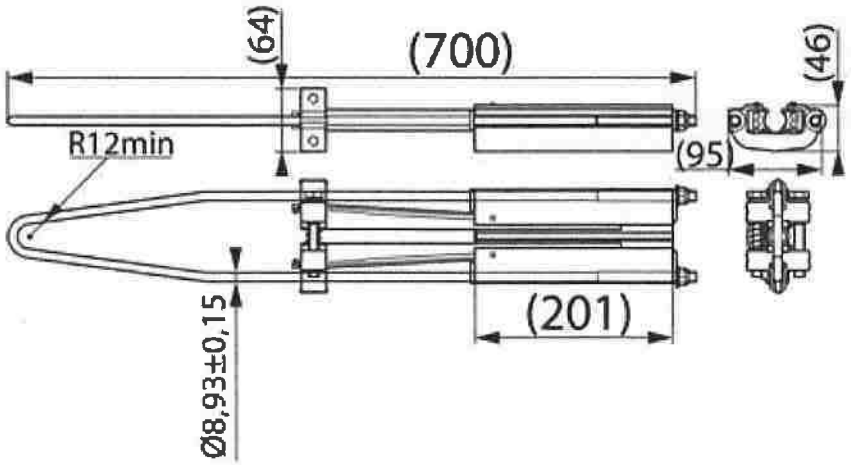
All markings required by the standard were found:

Manufacturer's logo:	ENSTO
Product code:	SO256
Batch number (production date):	09/2011
Minimum and maximum cross section:	95-157mm^2
Tightening torque:	40Nm

Dimensional and material verification:

All samples were within specification requirements. Clamp dimensions were within specification tolerances, see picture 2.

Distance	Requirement [mm]	Measured [mm]
Body height	46	46,2
Body length	201	201,9
Body width	95	94,4
Clamping piece width	64	64,3
Bail diameter	8,93±0,15	8,83
Bail radius	≥ 12	> 12



Picture 2: Specification drawing

SO256.2

Visual examination:

The clamp was visually looking the same as in the specification drawing.

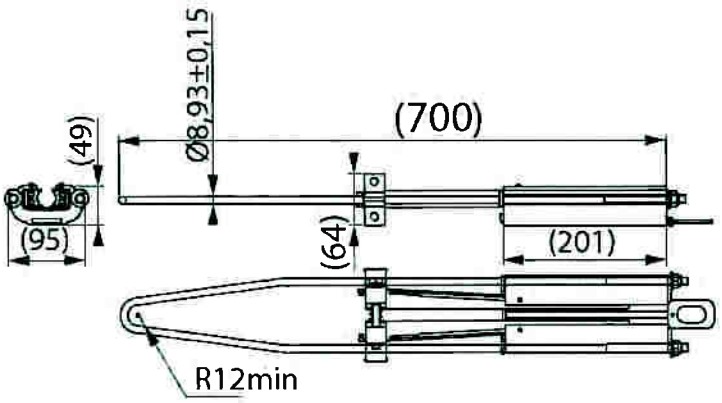
All markings required by the standard were found:

Manufacturer's logo:	ENSTO
Product code:	SO256.2
Batch number (production date):	24/2011
Minimum and maximum cross section:	95-157mm^2
Tightening torque:	40Nm

Dimensional and material verification:

All samples were within specification requirements. Clamp dimensions were within specification tolerances, see picture 2.

Distance	Requirement [mm]	Measured [mm]
Body height	49	48,0
Body length	201	200,0
Body width	95	94,7
Clamping piece width	64	63,9
Bail diameter	8,93±0,15	8,9
Bail radius	≥ 12	> 12



Picture 3: Specification drawing

Summary:

The clamps fulfilled all test requirements.

4. Pictures

Pictures 4 to 5: Clamp markings

5. Test equipment

ID	TYPE	MODEL	PURPOSE
A227	Calliper	Limit	Dimension measurements
	Steel sleeve	Ø 24,1 mm	Radius check

6. Test Id

1213

7. Revision history

A

Saves Your Energy

LABORATORY REPORT
No.: 2176S
Revision: A

Date of Test: 26.5.2011

Test object:

Power arc device SDI27.2.

Purpose of the test and relevant standards:

Part of type test.
Visual examination test and Dimensional and material verification test, according to EN 50397-2:2009 clause 7.1 and 7.2.

Conclusion:

The power arc device passed the test.

Picture 1: Tested power arc device SDI27.2

ENSTO
UTILITY NETWORKS
LABORATORY

Date of Report: 30.5.2011

Tested by: Patrick Ekholm

Witnessed by: Sami Hakonen / SGS Fimko

Reviewed by: Janne Lappalainen

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

Ensto Utility Networks Laboratory
Ensto Finland Oy

Ensio Miettisen katu 2,
P.O.Box 77
06101 Porvoo, Finland

Tel +358 204 76 21
Fax +358 204 76 2770

Business ID: 0130215-6
Reg. Office: Porvoo

1. Test objects

Power arc device:

Type:	SDI27.2
Batch number:	0-series
Tightening torque:	44Nm
No of pcs:	1

2. Testing procedure

The test was performed against the manufacturer specification sheet and standard requirement. The test included a visual examination part and a dimensional and material verification part.

Requirement:

The power arc device shall fulfil the manufacturer specification data and standard requirement.

3. Test results

Visual examination:

The power arc device was visually looking the same as in the specification drawing.

The power arc device includes following parts:

- 2 x power arc device SDI10.2
- 1 x PEJ90 (95mm^2 conductor with screw type cable lugs SML1.17)
- 1 x M10 nut + Stainless steel washer

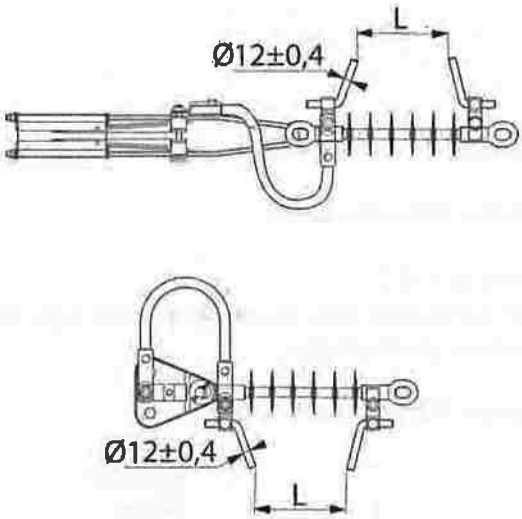
Markings on power arc device SDI10.2 were found:

Product code:	SDI10.2
Tightening torque:	44Nm

Dimensional and material verification:

All samples were within specification requirements. Power arc device dimensions were within specification tolerances, see picture 2.

Distance	Requirement [mm]	Measured [mm]
Arching horn diameter	12 ± 0,4	11,9

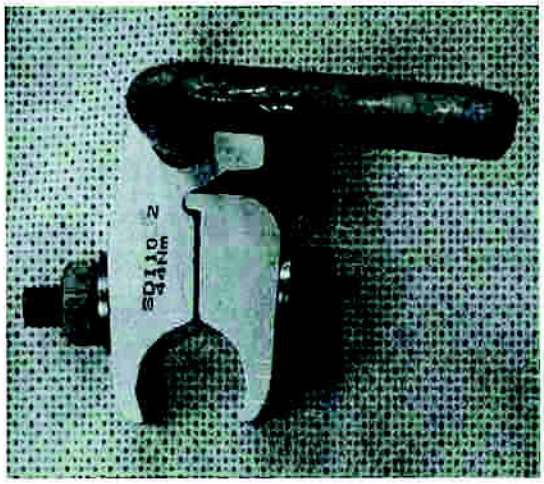


Picture 2: Specification drawing

Summary:

The power arc device fulfilled all test requirements.

4. Pictures



Picture 3: Power arc device SDI10.2 markings

5. Test equipment

ID	TYPE	MODEL	PURPOSE
A227	Calliper	Limit	Dimension measurements

6. Test Id

791

7. Revision history

A

Saves Your Energy

LABORATORY REPORT
No.: 2165S
Revision: A

Date of Test: 24.3.2011

Test object:

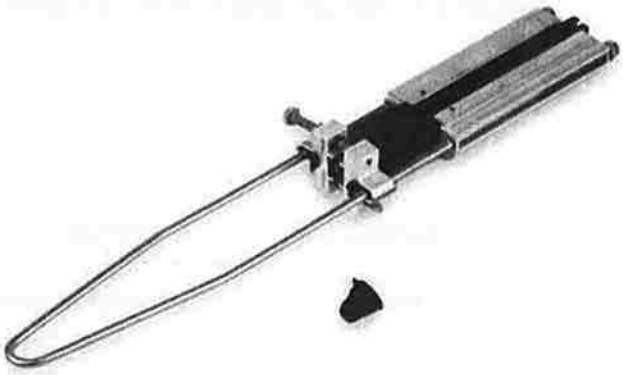
Tension clamp SO256.

Purpose of the test and relevant standards:

Part of type test.
Test for permanent marking according to EN 50397-2:2009 clause 7.3.

Conclusion:

The clamp passed the test.



Picture 1: Tested clamp SO256

ENSTO UTILITY NETWORKS LABORATORY

Date of Report: 23.5.2011

Tested by: Patrick Ekholm

Witnessed by: Sami Hakonen / SGS Fimko

Reviewed by: Janne Lappalainen

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

Ensto Utility Networks Laboratory
Ensto Finland Oy

Ensio Miettisen katu 2,
P.O.Box 77
06101 Porvoo, Finland

Tel +358 204 76 21
Fax +358 204 76 2770

Business ID: 0130215-8
Reg. Office: Porvoo

1. Test objects

Clamp:

Type:	Tension clamp SO256
Batch number:	0-series
Conductor range:	95 – 157 mm^2
Conductor diameter:	16,1 – 22,3 mm
Tightening torque:	40Nm
No of pcs:	3

2. Testing procedure

The test procedure was acc. to standard.
The marking of the clamp was rubbed by hand for 15 s with a piece of cloth soaked with water and another 15 s with a piece of cloth soaked with petroleum spirit.
The petroleum spirit used was Mineral turpentine from KIILTO / Finland

Requirement:

The marking shall remain clear and allow the accessory to be easily identified.

3. Test results

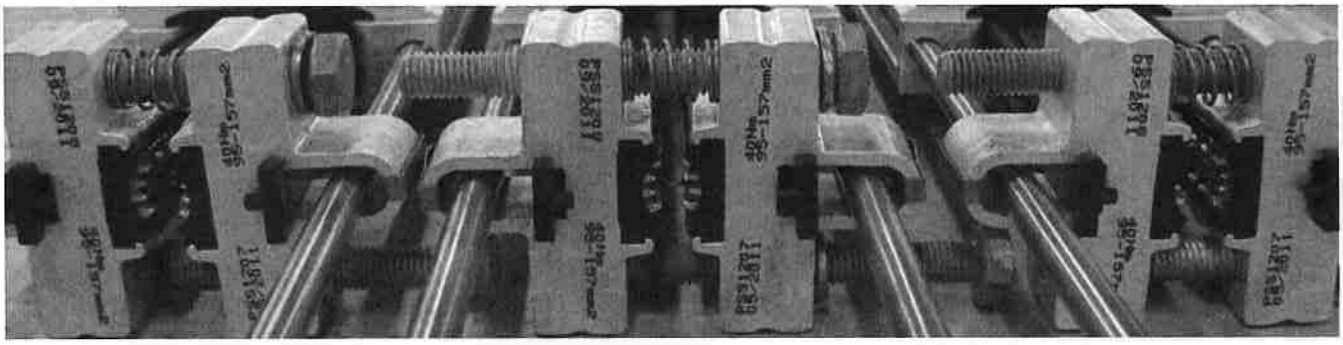
The marking remained clear and was not at all affected of the rubbing.

ВЯРНО С ОРИГИНАЛА

АКЦИОНЕРНО ДРУЖЕСТВО * ФИЛКАБ 16 * ПЛОВДИВ *

4. Pictures

Picture 2: Markings after test



Picture 3: Markings after test

5. Test equipment

No special test equipment needed

6. Test Id

1213

7. Revision history

A

Saves Your Energy

LABORATORY REPORT
No.: 2177S
Revision: A

Date of Test: 26.5.2011

Test object:

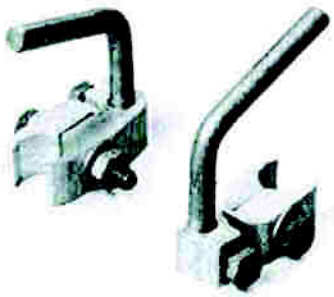
Power arc device SDI10.2.

Purpose of the test and relevant standards:

Part of type test.
Test for permanent marking according to EN 50397-2:2009 clause 7.3.

Conclusion:

The power arc device passed the test.



Picture 1: Tested power arc device SDI10.2

Date of Report: 30.5.2011

Tested by: Patrick Ekholm

Witnessed by: Sami Hakonen / SGS Fimko

Reviewed by: Janne Lappalainen

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

Ensto Utility Networks Laboratory
Ensto Finland Oy

Ensio Miettisen katu 2,
P.O.Box 77
06101 Porvoo, Finland

Tel +358 204 76 21
Fax +358 204 76 2770

Business ID: 0130215-8
Reg Office: Porvoo