

**zkratovna**  
**Zkušebnictví, a. s.**

Podnikatelská 547, 190 11 Praha 9, Běchovice, Czech Republic

**TEST REPORT**  
**No. 08 - 026**

**Test object** : High-voltage metal-enclosed switchgear and controlgear  
**Type** : FBX-C/24-20/C-C-T1  
**Serial No.** : FBX--0721058/AMT

**Ratings**  
**Rated voltage** : 24 kV  
**Rated normal current** : 630 A  
**Rated frequency** : 50 Hz

**Manufacturer** : AREVA T&D  
bld de la Résistance – BP 84019  
71040 Mâcon Cedex – 9, France

**Test performed** : Arcing due to an internal fault

**Customer** : AREVA T&D  
bld de la Résistance – BP 84019  
71040 Mâcon Cedex – 9, France

**Date of test** : 26.03.2008

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WITHOUT THE WRITTEN APPROVAL OF THE TESTING LABORATORY ZKRATOVNA SHALL NOT BE REPRODUCED EXCEPT IN FULL.

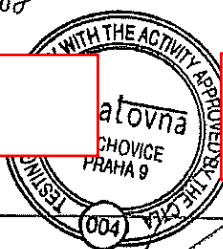
Praha 9, Běchovice

5.5.2008

Tested by:

на основание чл. 2 от 33ЛД

Lucie Šimková



на основание чл. 2 от 33ЛД

Head of the Laboratory

Copy No.: E



e-version

ВЯРНО С ОРИГИНАЛА

KEMA

# TEST REPORT

Report no. 70370100.000-HVL 03-1130  
 Client Alstom Sachsenwerk GmbH  
 Rathenaustrasse 2  
 93055 Regensburg  
 Germany

Reference -

Concerning test  
 Date 10 up to and including 13 June 2003  
 Place KEMA High-Voltage Laboratory, Arnhem,  
 the Netherlands

Object gas-insulated ring main unit, 24 kV  
 Type FBX-E/24-12  
 Manufacturer same as client

## REQUIREMENTS

The requirements as specified in the standard HN 64-S-52.

## TEST PROGRAMME

The programme was specified by the client and was as follows:

- 1 measurement of the resistance of the main circuit in accordance with HN 64-S-52 clause 6.4
- 2 temperature-rise test in accordance with HN 64-S-52 clause 6.5
- 3 measurement of the resistance of the main circuit in accordance with HN 64-S-52 clause 6.4

## SUMMARY AND CONCLUSION

The results obtained relate only to the work ordered and to the material tested.  
The tests were passed.

Author C.H. Beverwijk

KEMA Nederland B.V.

на основание чл. 2 от ЗЗЛД

This B-report consists of:  
31 pages  
2 appendix

S.A.M. Verhoeven  
KEMA High-Voltage Laboratory

Arnhem, 15 August 2003

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 Ulrechtseweg 310, 6812 AP Arnhem, The Netherlands. Telephone: +31 26 4 43 38 43

ДИПЛОМОВАТА ПЛА

1649

Independent, accredited testing station -Member laboratory of STL and LOVAG

# TYPE TEST REPORT

NO. 1803.2080405.154

AREVA T&D Les 4 Chemins Fabrègues 34433 Saint Jean de Védas FRANCE		CLIENT
Transformer substation: AREVA T&D Saint Jean de Védas Switchgear: AREVA T&D Macon		MANUFACTURER
Prefabricated high-voltage and low-voltage substation (transformer substation) with gas-insulated medium-voltage switchgear		TEST OBJECT
Transformer substation: Clipper C27 Switchgear: FBX-C/24-20/C-C-T1		TYPE
Transformer substation: 37062007 and 37062008 Switchgear: FBX--0745095/AMT and FBX--0745117/AMT		SERIAL NO.
Rated voltage	$U_r$ 24 kV	RATED CHARACTERISTICS GIVEN BY THE CLIENT
Rated normal current	$I_r$ 630 A	
Rated peak withstand current	$I_p$ 50 kA	
Rated short-time withstand current	$I_k$ 20 kA	
Rated duration of short-circuit	$t_k$ 3 s	
Internal arcing classification	IAC AB 20 kA 1 s	
IEC 62271-202: 2006-06		NORMATIVE DOCUMENT
Test under conditions of arcing due to internal fault		RANGE OF TESTS PERFORMED
10 April 2008		DATE OF TEST
The ratings of the test object related to the scope of test have been proved. The test has been PASSED.		TEST RESULT

на основании чл. 2 от 33ЛД

на основании чл. 2 от 33ЛД

H. GLABSCH  
Head of High-power test laboratory  
Berlin, 10 July 2008

M. THOM  
Test engineer in charge



Independent test laboratory, accredited by TÜV SÜD and Akkreditierungsstelle Technik (DATech) e.V. in the fields of h.v. apparatus and switchgear, power cables and power cable accessories, h.v. apparatus and switchgear, installation equipment and switching and control equipment.



Independent, accredited testing station · Member laboratory of STL and LOVAG

# TEST REPORT

NO. 2228.2090315.0254

AREVA T&D MACON  
Boulevard de la Résistance  
71040 Macon cedex 9  
FRANCE

CLIENT

AREVA T&D MACON

MANUFACTURER

High-voltage alternating current switch-disconnector

TEST OBJECT

FBX-E/24-20/C + FBX-E/24-20/C + FBX-E/24-20/C

TYPE

09-17-03 / 09-17-05 / 09-17-06

SERIAL NO.

Rated voltage	$U_r$	24 kV	RATED CHARACTERISTICS GIVEN BY THE CLIENT
Rated normal current	$I_r$	630 A	
Rated peak withstand current	$I_p$	53 kA	
Rated short-time withstand current	$I_k$	21 kA	
Rated duration of short-circuit	$t_k$	1 s	

IEC 60265-1: 1998-01  
IEC 62271-200: 2003-11  
IEC 62271-1: 2007-10

NORMATIVE  
DOCUMENT

Short-time withstand current and peak withstand current tests  
of the main switch

RANGE OF TESTS  
PERFORMED

4 May 2009

DATE OF TEST

See Sub-clause 4.6

TEST RESULT

на основание чл. 2 от ЗЗЛД

на основание чл. 2 от ЗЗЛД

H. GLABSCH  
Senior engineer  
Berlin, 06 November 2009

W. MORITZ  
Test engineer in charge



Independent test laboratory, accredited by Deutsche Akkreditationsstelle Technik (DATech) e.V. in the fields of hv. apparatus and switchgear, power cables and power cable accessories, hv. apparatus and switchgear, installation equipment and switching and control equipment.  
Institut „Prüfwerk für elektrische Hochleistungstechnik“ GmbH (IPH Berlin) is a subsidiary of CEST S.p.A. Milan.

ВЯРНО С ОРИГИНАЛА

VEIKI-VNL ELECTRIC LARGE LABORATORIES LTD.



No. 4712 / VNL

## Test Report

Short-time withstand current and peak withstand current tests on main circuit of high-voltage switchgear type FBX-E/24-16/C

5<sup>th</sup> April 2007



STL  
participant

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H-1158 Budapest, Vasgolyó u. 2-4.  
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Phone: +36.1.417 3157, Fax: +36.1.417 3163  
[www.vnl.hu](http://www.vnl.hu)

ВЯРНО С ОРИГИНАЛА

1000



VEIKI-VNL ELECTRIC LARGE LABORATORIES LTD.

Test Report  
No. 4712/ VNL.

2 / 6 page

*Subject:* Short-time withstand current and peak withstand current tests on main circuit of high-voltage switchgear type FBX-E/24-16/C

*Kind of the test:* Development test

*Client:* AREVA T&D  
Appareillage Moyenne Tension  
Boulevard de la Résistance - BP 84019  
71040 Mâcon Cedex 9  
FRANCE

*Reference and date of the order:* 40973, 17<sup>th</sup> January 2007

*Our reference number:* V-104 / 2007

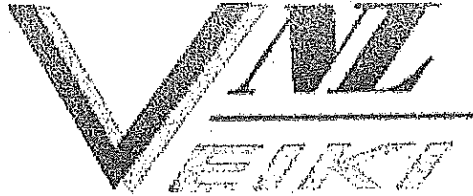
*Place and date of the test:* VEIKI-VNL Electric Large Laboratories Ltd.  
H-1158 Budapest, Vaskólyó u. 2-4  
HUNGARY  
02<sup>nd</sup> March 2007

*Present at the test in charge of the purchaser:* Mr. Dr. Ing. Daniel Piccoz AREVA T&D  
Mr. Didier Thomas AREVA T&D

ВЯРНО С ОРИГИНАЛА

11.5.07

VEIKI-VNL ELECTRIC LARGE LABORATORIES LTD.



No. 4713 / VNL

## Test Report

A handwritten signature in black ink, appearing to be 'd' or a similar character.

Short-time withstand current and peak withstand current tests on main circuit of high-voltage switchgear type FBX-E/24-16/C

5<sup>th</sup> April 2007

A large, stylized handwritten signature in black ink, possibly 'M. W.' or similar.



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[www.vnl.hu](http://www.vnl.hu)

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VEIKI-VNL ELECTRIC LARGE LABORATORIES LTD.

Test Report  
No. 4713/ VNL

2 / 6 page

*Subject:*

Short-time withstand current and peak withstand current tests on main circuit of high-voltage switchgear type FBX-E/24-16/C

*Kind of the test:*

Development test

*Client:*

AREVA T&D  
Appareillage Moyenne Tension  
Boulevard de la Résistance - BP 84019  
71040 Mâcon Cedex 9  
FRANCE

*Reference and date of the order:*

40973 , 17<sup>th</sup> January 2007

*Our reference number:*

V-104 / 2007

*Place and date of the test:*

VEIKI-VNL Electric Large Laboratories Ltd.  
H-1158 Budapest, Vásgolyó u. 2-4  
HUNGARY  
02<sup>nd</sup> March 2007

*Present at the test in charge  
of the purchaser:*

Mr. Dr. Ing. Daniel Piccoz  
Mr. Didier Thomas

AREVA T&D  
AREVA T&D

ВЯРНО С ОРИГИНАЛА

1055



VEIKI-VNL ELECTRIC LARGE LABORATORIES LTD.



No. 4906 /VNL

# Test Report

**Verification of the IP coding, Temperature-rise, Mechanical endurance and Tightness test of switchgear type FBX-C/12-20/C-C-T1**

17<sup>th</sup> of January 2008



**STL**  
participant

The accreditation of VEIKI-VNL Ltd.  
refers to the test activities registered by HAB (Hungarian Accreditation Board) under No.: NAT-1-1251/2007

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ВЯРНО С ОПРИГНАЛА

1006



VEIKI-VNL ELECTRIC LARGE LABORATORIES LTD.

Test Report  
No. 4906 / VNL

2 / 9 page

*Subject:*

Verification of the IP coding, Temperature-rise,  
Mechanical endurance and Tightness test of  
switchgear type FBX-C/12-20/C-C-T1

*Kind of the test:*

Type test

*Client:*

AREVA T&D  
Bld. de la Résistance – BP 84019  
F-71040 Mâcon cedex 9  
France

*Reference and date of the order:*

3139-4500071613  
21<sup>st</sup> of September 2007

*Our reference number:*

V-104/2007

*Place and date of the test:*

VEIKI-VNL Electric Large Laboratories Ltd  
H-1158 Budapest, Vasgolyó u. 2-4  
Hungary  
12<sup>th</sup> –16<sup>th</sup> of November 2007

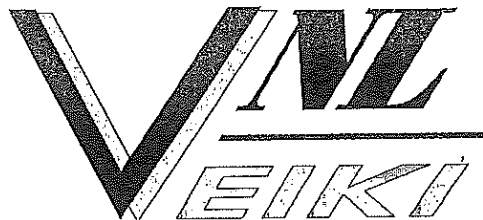
*Present at the test in charge  
of the purchaser:*

Mr. Didier Thomas

ВАРНО С ОРИГИНАЛА

1001

VEIKI-VNL ELECTRIC LARGE LABORATORIES LTD.



No. 4947 /VNL

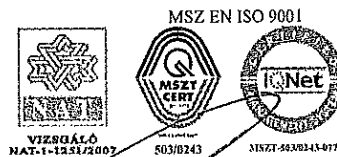
Test report

A handwritten signature in black ink, appearing to be 'L. ...', is written over the 'Test report' text.

Dielectric tests on switchgear type FBX-C/24-12/C-C-T1a  
for rated voltage of 24 kV

9<sup>th</sup> January 2008

A large, stylized handwritten signature in black ink is written vertically on the right side of the page.



STL  
participant

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www.vnl.hu

ВЯРНО СОРИГИНАЛА

1060



VEIKI-VNL ELECTRIC LARGE LABORATORIES LTD.

Test Report  
No. 4947 / VNL

2 / 6 page

*Subject:* Dielectric tests on switchgear type  
FBX-C/24-12/C-C-T1a for rated voltage of 24 kV

*Kind of the test:* Clarification test

*Client:* AREVA T&D  
Bld. de la Résistance – BP 84019  
F-71040 Mâcon cedex 9  
France

*Reference and date of the order:* 3139-4500076196  
27<sup>th</sup> of November 2007

*Our reference number:* V-104/2007

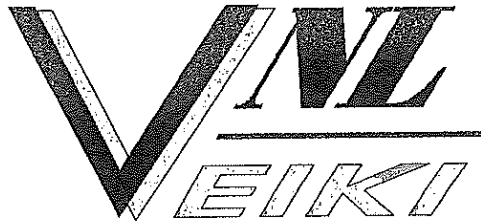
*Place and date of the test:* VEIKI-VNL Electric Large Laboratories Ltd.  
H-1158 Budapest, Vasműly u. 2-4.  
Hungary  
19<sup>th</sup> of December 2007

*Present at the test in charge  
of the purchaser:* Mr. Francois Picot

ВЕРНО С-ОРИГИНАЛА

12609

VEIKI-VNL ELECTRIC LARGE LABORATORIES LTD.



No. 5439 /VNL

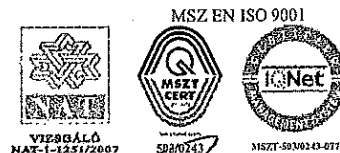
Test report

A large, handwritten signature in black ink, located to the right of the 'Test report' text.

Dielectric tests on switchgear type FBX-C/24-12/C-C-T1a  
for rated voltage of 24 kV

30<sup>th</sup> July 2009

A large, handwritten signature in black ink, located to the right of the test description.



STL  
participant

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1000



VEIKI-VNL ELECTRIC LARGE LABORATORIES LTD.

Test Report  
No. 5439 / VNL

2 / 7 page

*Subject:*

Dielectric tests on switchgear type  
FBX-C/24-12/C-C-T1a for rated voltage of 24 kV

*Kind of the test:*

Control test

*Client:*

AREVA T&D  
Bld. de la Résistance – BP 84019  
F-71040 Mâcon cedex 9  
France

*Reference and date of the order:*

3139-4500115010  
07<sup>th</sup> of April 2009

*Our reference number:*

NTL-18/2009

*Place and date of the test:*

VEIKI-VNL Electric Large Laboratories Ltd.  
H-1158 Budapest, Vaszgolyó u. 2-4.  
Hungary  
21<sup>st</sup> of July 2009

*Present at the test in charge  
of the purchaser:*

Mr. Francois Picot

ВЯРНО С ОРИГИНАЛА  
11661

VEIKI-VNL ELECTRIC LARGE LABORATORIES LTD.



No. 5669 /VNL

Test report

A large, handwritten signature in black ink, appearing to be 'L', is written over the 'Test report' text.

Dielectric tests on the main circuit of the C functions of  
FBX-C/24-12/CCT1a metal-enclosed switchgear

26<sup>th</sup> February 2010

A large, handwritten signature in black ink, appearing to be 'M. K.', is written vertically on the right side of the page.



STL  
participant

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E-mail: [vnl@vnl.hu](mailto:vnl@vnl.hu)

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[www.vnl.hu](http://www.vnl.hu)

ВЯРНО С ОРИГИНАЛА  
1662



VEIKI-VNL ELECTRIC LARGE LABORATORIES LTD.

Test Report  
No. 5669 / VNI.

2 / 7 page

*Subject:* Dielectric tests on the main circuit of the C functions of high-voltage switchgear type FBX-C/24-12/CCT1a for rated voltage of 24 kV

*Kind of the test:* Control test

*Client:* AREVA T&D  
Bld. de la Résistance – BP 84019  
F-71040 Mâcon cedex 9  
France

*Reference and date of the order:* 3139-4520134278  
11<sup>th</sup> of January 2010

*Our reference number:* NTL-01/2010

*Place and date of the test:* VEIKI-VNL Electric Large Laboratories Ltd.  
H-1138 Budapest, Vasműgy u. 2-4.  
Hungary  
01<sup>st</sup> of February 2010

*Present at the test in charge of the purchaser:* Mr. Didier Thomas AREVA T&D

ВЯРНО С ОРИГИНАЛА

1663



Ar0\_0/V1

## RAPPORT D'ESSAIS TEST REPORT

N° 6006

Destinataire  
To AREVA T&D Mâcon

Appareil  
Tested equipment Tableau FBX, type IS C-C-T2 compact  
Switchboard FBX, type IS C-C-T2 compact

Ur = 24 kV  
Ir = 630A  
fr = 50 Hz

Constructeur  
Manufacturer AREVA T&D Mâcon

Objet des essais  
Purpose of tests Essais au courant de courte durée et la valeur de crête du courant admissible  
Short-time withstand current and peak withstand current tests

Lieu des essais  
Site of tests Laboratoire d'Essais de Puissance du CERDA  
CERDA High Power Laboratories

Date(s) des essais  
Date(s) of tests 16 octobre 2007  
October, 16<sup>th</sup> 2007

Essais effectués conformément aux normes : CEI 62271-200 Ed 1 2003/11 et CEI 60694 Ed2.2 2002/01  
Tests performed according to : IEC 62271-200 Ed 1 2003/11 and IEC 60694 Ed2.2 2002/01

Assistait aux essais  
Tests witnessed by Mr D. THOMAS

Rapport composé de  
Report made of 8 pages et  
pages and 10 feuillets joints  
attached leaflets

Date d'émission  
Date of issue 7.11.2007

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Le Responsable des Essais  
Responsible for the tests  
на основание чл. 2 от ЗЗЛД

C. BOURDIÈRE

Le Chef du CERDA  
Head of CERDA  
на основание чл. 2 от ЗЗЛД

M. VITTOZ

Page n° 1

ВЯРНО С ОРИГИНАЛА

11004

**RAPPORT D'ESSAIS**  
**TEST REPORT**

**N°6037**

Destinataire  
To AREVA T&D Mâcon (France)

Appareil  
Tested equipment Tableau FBX, type IS C-C-T2 compact  
Switchboard FBX, type IS C-C-T2 compact

Ur = 24 kV  
I<sub>r</sub> = 630A  
f<sub>r</sub> = 50 Hz

Constructeur  
Manufacturer AREVA T&D Mâcon (France)

Objet des essais  
Purpose of tests Essais au courant de courte durée et la valeur de crête du courant admissible  
Short-time withstand current and peak withstand current tests

Lieu des essais  
Site of tests Laboratoire d'Essais de Puissance du CERDA  
CERDA High Power Laboratories

Date des essais  
Date of tests 6 novembre 2007  
2007, November, the 6<sup>th</sup>

Essais effectués conformément aux normes :  
Tests performed according to : CEI 62271-200 Ed1(2003-11) et CEI 62271-1 Ed1(2007-10)  
IEC 62271-200 Ed1(2003-11) and IEC 62271-1 Ed1(2007-10)

Assistait aux essais  
Tests witnessed by Mr F. PICOT

Rapport composé de  
Report made of 9 pages et  
pages and 17 feuillets joints  
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Date d'émission  
Date of issue 14.11.2007

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COFRAC accreditation demonstrates that the laboratories competence for the sole tests which are in the scope of accreditation, and which  
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Le Responsable des Essais  
Responsible for the tests

Le Chef du CERDA  
Head of CERDA

на основание чл. 2 от ЗЗЛД

на основание чл. 2 от ЗЗЛД

C. BOURDIE

M. VITTOZ

Page n°1

**ВЯРНО С ОРИГИНАЛА**  
1665



## RAPPORT D'ESSAIS TEST REPORT

N°6066-1

Destinataire  
To AREVA T&D Mâcon (France)

Appareil  
Tested equipment Tableau FBX, IS type C-C-T2 compact  
Switchboard FBX, IS type C-C-T2 compact

Ur = 24 kV  
I<sub>r</sub> = 630A  
fr = 50 Hz

Constructeur  
Manufacturer AREVA T&D Mâcon (France)

Objet des essais  
Purpose of tests Essais au courant de courte durée et la valeur de crête du courant admissible  
Short-time withstand current and peak withstand current tests

Lieu des essais  
Site of tests Laboratoire d'Essais de Puissance du CERDA  
CERDA High Power Laboratories

Date des essais  
Date of tests 24 et 25 janvier 2008  
2008, January, the 24<sup>th</sup> and 25<sup>th</sup>

Essais effectués conformément aux normes :  
Tests performed according to : CEI 62271-200 Ed1(2003-11) et CEI 62271-1 Ed1(2007-10)  
IEC 62271-200 Ed1(2003-11) and IEC 62271-1 Ed1(2007-10)

Assistants aux essais  
Tests witnessed by Mr F. PICOT  
Mr JM, LETY

Rapport composé de  
Report made of 9 pages et  
pages and 17

feuilles joints  
attached leaflets

Date d'émission  
Date of issue 19/02/2008

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COFRAC accreditation demonstrates that the laboratories competence for the sole tests which are in the scope of accreditation, and which  
are identified by a C symbol in tests summary pages.*

Le Responsable des Essais  
Responsible for the tests Le Chef du CERDA  
Head of CERDA

на основании чл. 2 от 33ЛД

на основании чл. 2 от 33ЛД

C. BOURDIER

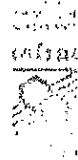
M. VITTOZ

Page n°1

ВЕРНО С ОРИГИНАЛА

1606





**RAPPORT D'ESSAIS**  
**TEST REPORT**

N°6193

Destinataire  
To AREVA T&D Mâcon (France)

Appareil  
Tested equipment Tableau FBX, IS type C-C-T1-C-T1compact  
Switchboard FBX, IS type C-C-T1-C-T1compact

Ur = 24 kV  
I<sub>r</sub> = 630A  
fr = 50 Hz

Constructeur  
Manufacturer AREVA T&D Mâcon (France)

Objet des essais  
Purpose of tests Essais au courant de courte durée et la valeur de crête du courant admissible  
Short-time withstand current and peak withstand current tests

Lieu des essais  
Site of tests Laboratoire d'Essais de Puissance du CERDA  
CERDA High Power Laboratories

Date des essais  
Date of tests 9 juin 2008  
2008, June, the 9<sup>th</sup>

Essais effectués conformément aux normes :  
Tests performed according to : CEI 62271-200 Ed1(2003-11) et CEI 62271-1 Ed1(2007-10)  
IEC 62271-200 Ed1(2003-11) and IEC 62271-1 Ed1(2007-10)

Assistaient aux essais  
Tests witnessed by Mr L LIN  
Mr C GRECH

Rapport composé de  
Report made of 7 pages et  
pages and 6 feuillets joints  
attached leaflets

Date d'émission  
Date of issue 06 août 2008

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Responsible for the tests Le Chef du CERDA  
Head of CERDA

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C. BOURDIER

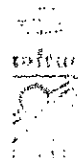
M. VITTOZ

Page n°1

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1668





**RAPPORT D'ESSAIS**  
**TEST REPORT**

**N°6216-1**

Destinataire  
To AREVA T&D Mâcon (France)

Appareil  
Tested equipment Tableau FBX, IS type C-C-T1 + C compact  
Switchboard FBX, IS type C-C-T1 + C compact

Ur = 24 kV  
I<sub>r</sub> = 630 A  
fr = 50 Hz

Constructeur  
Manufacturer AREVA T&D Mâcon (France)

Objet des essais  
Purpose of tests Essais au courant de courte durée et la valeur de crête du courant admissible  
Short-time withstand current and peak withstand current tests

Lieu des essais  
Site of tests Laboratoire d'Essais de Puissance du CERDA  
CERDA High Power Laboratories

Date des essais  
Date of tests 10 juillet 2008  
2008, July, the 10<sup>th</sup>

Essais effectués conformément aux normes :  
Tests performed according to : CEI 62271-200 Ed1(2003-11) et CEI 62271-1 Ed1(2007-10)  
IEC 62271-200 Ed1(2003-11) and IEC 62271-1 Ed1(2007-10)

Assistait aux essais  
Tests witnessed by Mr L LIN

Rapport composé de  
Report made of 11 pages et  
11 pages and 11 feuillets joints  
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Le Responsable des Essais  
Responsible for the tests

Le Chef du CERDA  
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1068



RESEARCH-DEVELOPMENT AND TESTING NATIONAL  
INSTITUTE FOR ELECTRICAL ENGINEERING

INCERCARE



# ICMET CRAIOVA HIGH POWER DIVISION

SR EN ISO / CEI 17025: 2005  
CERTIFICAT DE ACREDITARE  
nr. LI 004 / 2007

HIGH POWER LABORATORY  
"Ovidiu Rarinca"

200515-CRAIOVA Calea Bucuresti Nr. 144 ROMANIA  
Phone: (351) 402 427; Fax: (251) 415482; (351) 404 890;  
E-mail: lmp@icmet.ro

## TEST REPORT No. 10117

**CUSTOMER:** AREVA T&D Appareillage Moyenne Tension  
Boulevard de la Resistance BP 84019 – 71040  
Mâcon Cedex France

**MANUFACTURER:** AREVA T&D SAS SUZHOU  
285 Jinfeng Road  
215129 SUZHOU, JIANGSU - CHINA

**TESTED PRODUCT:** 12 kV, 630 A, 21 kA Switchboard

**REFERENCE STANDARD:** IEC 62271-200/2003, clause 6.6

**TEST PERFORMED:** Short-time withstand current and peak withstand current test

**TEST DATE:** 11.03.2008

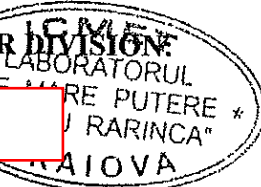
**TEST RESULT:** Passed the tests

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**HEAD OF HIGH POWER DIVISION:**

Dr. Eng. George Curganude

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**HEAD OF LABORATORY:**

Eng. Constantin Iancu

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**DATE OF ISSUE:** 8.04.2008

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**ICMET CRAIOVA**  
**HIGH POWER DIVISION**



**HIGH POWER LABORATORY**  
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INCERCARE

SR EN ISO / CEI 17025:2005  
CERTIFICAT DE ACREDITARE  
nr LI 004 / 2007

**TEST REPORT**  
**No. 10321**

**CUSTOMER:** AREVA T&D Appareillage Moyenne Tension  
Boulevard de la Resistance BP 84019 - 71040  
Macon Cedex - France

**MANUFACTURER:** AREVA T&D Appareillage Moyenne Tension  
Boulevard de la Resistance BP 84019 - 71040  
Macon Cedex - France

**TESTED PRODUCT:** 24 kV, 21 kA Cubicle

**REFERENCE** IEC 62271-200/2003, clause 6.6

**TEST PERFORMED:** Short-time withstand current and peak withstand current test  
on earthing switch

**TEST DATE:** 17.10.2008

**TEST RESULT:** Passed the test

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**HEAD OF HIGH POWER DIVISION:**

Dr. Eng. George Curganu  
на основании чл. 2 от 33ЛД

ICMET

DRUL  
UTERE \*  
RINCA"  
VA

**HEAD OF LABORATORY:**

Eng. Constantin Ianicu

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# Prüffelder Ratingen

Mitglieds-Prüffeld bei STL - DIN EN ISO/IEC 17025 - Akkreditierung seit 1993



## Prüfbericht

Bericht-Nr.: XZ 268 L 015

Ausfertigung-Nr.: 1

Inhalt: 17 Blatt

**Prüfobjekt:** Fabrikfertige Station mit einer metallgeschotteten, gasisolierten Schaltanlage  
**Typbezeichnung:** NZ 210-240 mit FBX-C/24-20/C-C-T1  
 Bemessungs-Spannung: 12 / 24 kV Bemessungs-Strom: 630 A Bemessungs-Frequenz: 50 Hz

**Hersteller:** Scheidt GmbH & Co. KG, Rinteln, Deutschland (Betonstation)  
 AREVA T&D, Mâcon, Frankreich (Schaltanlage)

**Auftraggeber:** Scheidt GmbH & Co. KG, Rinteln, Deutschland

**Prüfdatum:** 22. September 2009

### Angewandte Prüfbestimmungen:

Die Prüfung wurde in Übereinstimmung mit folgende Prüfvorschriften durchgeführt:

IEC 62271-200 / 1<sup>st</sup> Ed. / 2003-11

IEC 62271-202 / 1<sup>st</sup> Ed. / 2006-06

### Durchgeführte Prüfungen:

Typprüfung ‚Verhalten bei Inneren Fehlern‘ der Schaltanlage innerhalb der fabrikfertigen Station.

Prüfung des Verhaltens der fabrikfertigen Station bei Auftreten eines Störlichtbogens aufgrund eines inneren Fehlers. Die Prüfung wurde dreiphasig im Gasraum der Schaltanlage mit einem Stoßstrom von 54,6 kA und einem Kurzschlussstrom von 20,8 kA - 1,03 s äquivalent zu 21,0 kA - 1,02 s bei 50 Hz durchgeführt.

Fortsetzung auf Blatt 3.

### Prüfresultate:

Das Prüfobjekt hat die in Übereinstimmung mit den Prüfbestimmungen durchgeführte Prüfung bestanden.

Diese Störlichtbogenprüfung kann zur Klassifizierung der fabrikfertigen Station gemäß  
**IAC-A 21kA 1s**

herangezogen werden.



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Ratingen, 18. Januar 2010

Dr. Martin Wember  
Prüffeldleiter

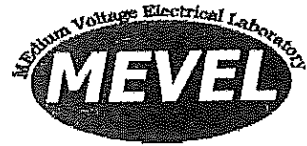
Joachim Köhler  
Prüfingenieur

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Dieser Prüfbericht bezieht sich ausschließlich auf das geprüfte Objekt.  
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## TESTS REPORT AMTR06466-01

Object tested Gas Insulated Compact Switchboard  
Type FBX-C / 17-20 / C-C-T1  
Manufacturer AREVA T&D  
Test Location Temperature Rise Laboratory  
Test date: 1<sup>st</sup> March 2006  
Reference Standards IEC 62271-200 (11/2003) §6.4 and 6.5 and specification TST 19-2 (11.02) §1.3.1 and Appendix C Method A  
Tests carried out Measurement of the main circuit resistance  
Temperature rise test  
Conformity Results comply with the reference standards  
Issued to Areva T&D 01 June 2006



Accredited Test  
Laboratory No. 1.1654

Scope communicated  
by request

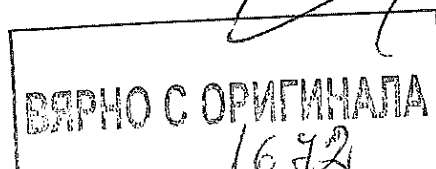
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A. Quemin  
Tests Manager

P. Bailly  
Project Manager

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# TEST REPORT AMTR07495-00

Test object Metal enclosed cubicle  
 Functional unit feeder with current switch-fuse combination

Type FBX CCT1

Manufacturer AREVA T&D

Site of tests MEVEL temperature rise laboratory

Date of tests 28/02 to 4/03/2005

Test specifications IEC 60694 2002, 62271-200 2003

Tests performed Temperature rise test

Conformity Requirements according to above specification are met

Issued to Areva T&D Issue date 23/10/2007

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S. Rathoin  
 Head of Test Laboratories

D. Piccoz  
 Head of MEVEL

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# TEST REPORT

## AMTR08509-00

Test object: Metal enclosed switchgear  
 Type: FBX C C  
 Manufacturer: Areva T&D  
 Site of tests: Temperature-rise tests laboratory  
 Date of tests: 17/03/2008  
 Test specifications: IEC 62271-200 (11-2003), 62271-1 (10-2007)  
 Tests performed: Temperature rise test  
 Conformity: Requirements according to above specification are met  
 Issued to: AREVA T&D  
 Bd de la Résistance  
 71040 MACON CEDEX 9  
 Issue date 03/06/2008



Laboratoire  
accrédité  
Porté sur

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S. RATHOIN  
Head of Test Laboratories

D. PICCOZ  
Head of MEVEL

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http://www.labein.es  
e-mail: labein@labein.es



**ELECTRICAL EQUIPMENT LABORATORY  
ENERGY UNIT**

**Test report**

No B125-07-BT-EE-01

Page 1 of 11

**Short-time and peak withstand current and short-circuit  
making tests on the earthing switch**

**TEST OBJECT:** 24 kV Gas-filled metal-enclosed switchgear with SF6  
**DESIGNATION:** FBX-C/24-20/C-C-T1  
**REQUESTED BY:** AREVA T&D  
Boulevard de la Résistance – BP 84019  
71040 Mâcon Cedex 9 - France  
**MANUFACTURER:** AREVA T&D  
**STANDARD:** IEC 62271-200:2003  
IEC 62271-102:2003  
**RECEPTION DATE:** June 28th 2007  
**TESTS DATE:** July 2nd to 6th 2007

The test object has been subjected to the tests required by the applicant, applying the procedures specified in the standard indicated before.

**THE PRESENT REPORT CONSISTS OF:**

No of pages: 11 (and annex of 9)  
Photographs: Annex  
Oscillograms: Annex

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на основании чл. 2 от 33ЛД

Agustín Ramos



Luis Martínez

Test Chief

Head of Electrical Equipment Laboratory

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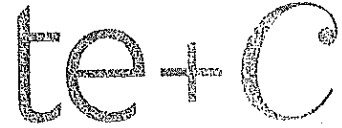
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**ELECTRICAL EQUIPMENT LABORATORY**

# Test report

No CE35-09-AD-03

Page 1 of 5

## Short-time and peak withstand current test

**TEST OBJECT:** 24 kV / 630 A SF6-filled metal-enclosed switchgear

**DESIGNATION:** FBX-C/24-20/CCT1 with aluminium bushings

**REQUESTED BY:** AREVA T&D  
Boulevard de la Résistance – BP 84019  
71040 Mâcon Cedex 9 - France

**MANUFACTURER:** AREVA T&D

**STANDARD:** IEC 62271-200:2003

**RECEPTION DATE:** January 26th 2009

**TESTS DATE:** January 27th to 29th 2009

The test object has been subjected to the tests required by the applicant, applying the procedures specified in the standard indicated before.

### THE PRESENT REPORT CONSISTS OF:

No of pages: 5 (and annex of 4)

Drawings: Annex

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Oscillogram: Annex

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Agustín Ramos



Luis Martínez

Test Chief

Head of Electrical Equipment Laboratory

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# Test report

No CE35-09-AD-04

Page 1 of 5

## Short-time and peak withstand current test

**TEST OBJECT:** 24 kV / 630 A SF6-filled metal-enclosed switchgear  
**DESIGNATION:** FBX-C/24-20/CCT1 with aluminium bushings  
**REQUESTED BY:** AREVA T&D  
 Boulevard de la Résistance – BP 84019  
 71040 Mâcon Cedex 9 - France  
**MANUFACTURER:** AREVA T&D  
**STANDARD:** IEC 62271-200:2003  
**RECEPTION DATE:** January 26th 2009  
**TESTS DATE:** January 27th to 29th 2009

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Agustín Ramos

Test Chief

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Luis Martínez

Head of Electrical Equipment Laboratory



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Testing, Evaluation & Conformity Services

**LABELIN FOUNDATION - ENERGY UNIT  
ELECTRICAL EQUIPMENT LABORATORY**

**Test report**

No CE35-09-AD-05

Page 1 of 5

**Short-time and peak withstand current test**

**TEST OBJECT:** 24 kV / 630 A SF6-filled metal-enclosed switchgear  
**DESIGNATION:** FBX-C/24-20/CCT1 with aluminium bushings  
**REQUESTED BY:** AREVA T&D  
Boulevard de la Résistance – BP 84019  
71040 Mâcon Cedex 9 - France  
**MANUFACTURER:** AREVA T&D  
**STANDARD:** IEC 62271-200:2003  
**RECEPTION DATE:** January 26th 2009  
**TESTS DATE:** January 27th to 29th 2009

The test object has been subjected to the tests required by the applicant, applying the procedures specified in the standard indicated before.

**THE PRESENT REPORT CONSISTS OF:**

No of pages: 5 (and annex of 4)  
Drawings: Annex  
Photographs: Annex  
Oscillogram: Annex

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Agustín Ramos

Test Chief



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Luis Martínez

Head of Electrical Equipment Laboratory

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**Client** AREVA T&D – MACON (France)

**Tested equipment** Three-phase switchgear (RMU), for medium voltage, composed by No.3 sections, designed: FBX-C / 24-12 / C-C-TI

**Tests carried out** Temperature-rise test

**Standards/Specifications** IEC 62271-200 (2003-11) and IEC 60265-1 (1998-1)

**Test date** from March 13, 2007 to March 15, 2007

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**No. of pages** 15 **No. of pages annexed** -

**Issue date** July 26, 2007

**Prepared** Unit LABORATORIES - M. Levati

**Verified** Unit LABORATORIES - A. Geroli

**Approved** Area COMPONENTS - V. Scarioni

**CESI** S.p.A.  
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 Technical Area Components  
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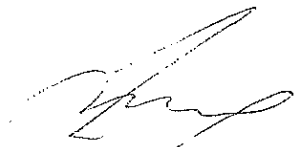
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 http://www.cesi.it

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 Codice fiscale e numero iscrizione CCIAA 00793580150

Registro Imprese di Milano  
 Sezione Ordinaria  
 N. R.E.A. 429222  
 P.I. IT00793580150

ВЯРНО С ОРИГИНАЛА  
 1679







PRODUIT FABRIQUE SOUS SYSTÈME DE MANAGEMENT DE LA QUALITÉ CERTIFIÉ AFAQ ISO 9001/2000  
PRODUCT MADE THROUGH AFAQ ISO 9001/2000 CERTIFIED PROCESS

## RAPPORT D'ESSAIS / TEST REPORT HM21/07-301/1

Appareil / Apparatus : Tableau HTA insensible à son environnement FBX  
Tension assignée / Rated voltage : 24 kV  
Courant assigné / Rated current : 400 A  
Fréquence assignée / Rated frequency : 50 Hz  
Constructeur / Manufacturer : ALSTOM

Objet / Object : Acceptation de type – Défauts internes / Type tests- Internal faults  
Demandeur des essais / Tested for : EGS/DRE/MER  
Date(s) et lieu des essais / Date(s) and place of tests : du 17 au 25/04/2003  
Les Renardières - L.M.E. - SEMT  
Essais réalisés suivant / Tests carried out according to : § 6.107 de la HN64-S-52 de Novembre 2002

Le Rapport est composé des documents suivants / The report comprises the following documents :

- caractéristiques de l'appareil / characteristics of the apparatus : page 3
  - liste des essais effectués / list of tests performed : page 4
  - conditions des essais / tests conditions : pages 5 à 9
  - tableaux et résultats d'essais / tables and tests results : pages 10 à 13
  - photographies / photographs n° : pages 17 à 26
  - oscillogrammes / oscillograms n° : 1001 à 1007
- Ce Rapport comprend / This report includes : 26 pages + 26 feuilles jointes / appended sheets.

« Seule la version française de ce rapport fait foi / The english version of this report is a translation of the original french version. »

La reproduction de ce Rapport d'Essais n'est autorisée que sous la forme de fac-similé photographique intégral, avec l'accord écrit du Laboratoire et du Demandeur des essais.  
Reproduction of this Test Report is authorized only in the form of a complete photographic facsimile with the written authorization of the Laboratory and the Applicant.

Le Responsable des essais,  
Executive Responsible for the tests,

на основании чл. 2 от 33ЛД

Patrick MOISSONNIER

Le Chef de Laboratoire,  
Manager Laboratory,

на основании чл. 2 от 33ЛД

Philippe GROT

на основании чл. 2 от 33ЛД

Les Renardières, le

ВЕРНО С ОРИГИНАЛА

16 80



PRODUIT FABRIQUE SOUS SYSTÈME DE MANAGEMENT DE LA QUALITÉ CERTIFIÉ AFAQ ISO 9001/2000  
PRODUCT MADE THROUGH AFAQ ISO 9001/2000 CERTIFIED PROCESS

## RAPPORT D'ESSAIS / TEST REPORT HM21/07-301/8

Appareil / Apparatus : Tableau HTA insensible à son environnement FBX  
Tension assignée / Rated voltage : 24 kV  
Courant assigné / Rated current : 400 A  
Fréquence assignée / Rated frequency : 50 Hz  
Constructeur / Manufacturer : ALSTOM

Objet / Object : Acceptation de type – Défauts internes / Type tests- Internal faults  
Demandeur des essais / Tested for : EGS/DRE/MER  
Date(s) et lieu des essais / Date(s) and place of tests : 02/10/2003  
Les Renardières - L.M.E. - SEMT  
Essais réalisés suivant / Tests carried out according to : § 6.107 de la HN64-S-52 de Novembre 2002

Le Rapport est composé des documents suivants / The report comprises the following documents :

- caractéristiques de l'appareil / characteristics of the apparatus : page 3
- liste des essais effectués / list of tests performed : page 4
- conditions des essais / tests conditions : page 5
- tableaux et résultats d'essais / tables and tests results : page 6
- photographies / photographs n° : page 9
- oscillogrammes / oscillograms n° : 1001

Ce Rapport comprend / This report includes : 9 pages + 6 feuilles jointes/appended sheets.

« Seule la version française de ce rapport fait foi / The english version of this report is a translation of the original french version. »

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Reproduction of this Test Report is authorized only in the form of a complete photographic facsimile with the written authorization of the Laboratory and the Applicant.

Le Responsable des essais,  
*Executive Responsible for the tests*

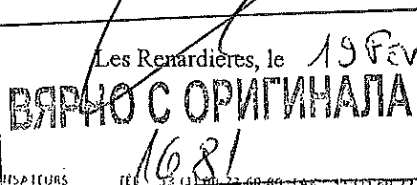
на основание чл. 2 от ЗЗЛД

Patrick MOISSONNIER

Le Chef de Laboratoire,  
*Manager Laboratory*

на основание чл. 2 от ЗЗЛД

Philippe EGROT



Independent, accredited test laboratory - Registration with STLA and LOVAG

# TYPE TEST REPORT

NO. 1374.0016.2.001

ALSTOM Sachsenwerk GmbH  
Rathenastraße 2  
93055 Regensburg

CLIENT

ALSTOM Sachsenwerk GmbH

MANUFACTURER

Gas-Insulated metal-enclosed ring main unit

TEST OBJECT

FBX

TYPE

08 1026 0008

MANUFACTURING NO.

Rated voltage	$U_r$	12/24 kVA	RATED CHARACTERISTICS GIVEN BY THE CLIENT
Rated normal current	$I_r$	630 kA	
Rated peak withstand current	$I_p$	53/42 kA	
Rated short-time withstand current	$I_k$	21/16 s	
Rated duration of short-circuit	$t_k$	1	
Values permissible at internal fault		kA	
Peak current		53 kA	
Short-time current		21 s	
Duration of short-circuit		1	
Type of accessibility		Typ A	

IEC 60298:1990 + Corrigendum 1:1995 + Corrigendum 2:1998 + Amendment A1:1994  
DIN EN 60298 (VDE 0670 Teil 6):1998-05 + Berichtigung 1:1999-03

NORMATIVE DOCUMENT

Test under conditions of arcing due to internal fault

RANGE OF TESTS PERFORMED

14 and 15 January 2002

DATE OF TEST

The criteria of assessment 1 to 6 of IEC 60298:1990 + Corrigendum 1:1995 + Corrigendum 2:1998 + Amendment A1:1994 were fulfilled.  
The tests have been PASSED.

TEST RESULT

на основание чл. 2 от ЗЗЛД

на основание чл. 2 от ЗЗЛД

H. GLABSCH  
Head of high-power test laboratory  
Berlin, 22 April 2002

L.-M. BOETCHER  
Test engineer in charge



ВЯРНО С ОРИГИНАЛА  
1682

Independent test laboratory, accredited by Deutsche Akkreditierungsstelle Technik (DAkT) e.V. in the fields of hv apparatus and switchgear, power cables and power cable accessories, lv apparatus and switchgear, installation equipment and switching and control equipment



DAkT  
DAT - P - 019/92

# TYPE TEST REPORT

NO. 1374.0033.3.044

ALSTOM Sachsenwerk GmbH  
 Rathenastraße 2  
 93055 Regensburg CLIENT

ALSTOM Sachsenwerk GmbH MANUFACTURER

Prefabricated HV/LV substation (transformer substation)  
 with gas-insulated metal-enclosed AC switchgear TEST OBJECT

Transformer substation: KSTV 20 kV/0,4 kV- 630 kVA  
 Switchgear: FBX-C/24-16/C-C-T1 TYPE

Transformer substation: Test sample  
 Switchgear: 598080 2002, 598082 2002 MANUFACTURING NO.

Rated voltage	$U_r$	24 kV	RATED CHARACTERISTICS GIVEN BY THE CLIENT
Rated normal current	$I_r$	630 A	
Rated peak withstand current	$I_p$	40 kA	
Rated short-time withstand current	$I_k$	16 kA	
Rated duration of short-circuit	$t_k$	1 s	
Type of accessibility		Typ A/B	

IEC 61330:1995 /DIN EN 61330:1996 (VDE 0670 Teil 611):1997-08 NORMATIVE DOCUMENT

Test under conditions of arcing due to internal fault on a transformer substation RANGE OF TESTS PERFORMED

- for type A accessibility (restricted to authorized personnel) in front of the medium-voltage switchgear with its doors opened, the rest of the ventilating openings for type B accessibility (unrestricted, including general public). Arc initiation three-pole in the gas compartment with 16.0 kA set short-circuit current for a duration of short-circuit of 1 s.
- for type B accessibility (unrestricted, including general public) with the substation's doors closed. Arc initiation was two-pole in the cable compartment with three-pole-set short-circuit current of 16.0 kA for a duration of short-circuit of 1 s.

12 March 2003 DATE OF TEST

The criteria of assessment 1 to 6 of IEC 61330 and DIN EN 61330 (VDE 0670 Teil 611), resp., have been met. TEST RESULT

The tests have been PASSED

на основании чл. 2 от 33ЛД

на основании чл. 2 от 33ЛД

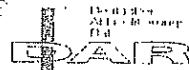
H. GLABSCH  
 Head of high-power test laboratory  
 Berlin, 08 July 2003

E. W. BOETTCHER  
 Test engineer in charge

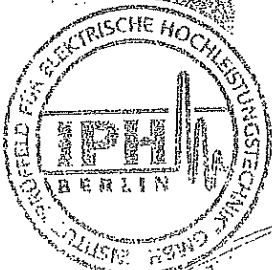
**ВЯРНО С ОПРИГИНАЛА**

1083

Independent test laboratory, accredited by Deutsche Akkreditierungsstelle Technik (DAkT) eV in the fields of HV apparatus and switchgear, power cables and power cable accessories, LV apparatus and switchgear, installation equipment and switching and control equipment.



DAK - P - 019/92



Independent, accredited testing station · Member laboratory of STL and LOVAG

# TYPE TEST REPORT

NO. 1374.0729.4.234

Areva Sachsenwerk GmbH  
Rathenaustraße 2  
93055 Regensburg

CLIENT

Areva Sachsenwerk GmbH

MANUFACTURER

Metal-enclosed AC switchgear

TEST OBJECT

FBX-C/24-16/C-C-T1

TYPE

Test sample

MANUFACTURING NO.

Rated voltage	$U_r$	24 KV	RATED CHARACTERISTICS GIVEN BY THE CLIENT
Rated normal current	$I_r$	630 A	
Rated peak withstand current	$I_p$	40 kA	
Rated short-time withstand current	$I_k$	16 kA	
Rated duration of short-circuit	$t_k$	1 s	
Internal arcing classification		IAC AFL 16 kA 1 s	

IEC 60694: 2002-01  
DIN EN 60694 (VDE 0670 Teil 1000): 2002-09  
IEC 62271-200: 2003-11

NORMATIVE DOCUMENT

Test under conditions of arcing due to internal fault

RANGE OF TESTS PERFORMED

15 July 2004

DATE OF TEST

The ratings of the test object related to the scope of test have been proved.  
The test has been PASSED.

TEST RESULT

на основание чл. 2 от ЗЗЛД

на основание чл. 2 от ЗЗЛД

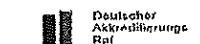
H. GLABSCH  
Head of high-power test laboratory  
Berlin, 09 September 2004

L-M. BOETTCHER  
Test engineer in charge



**ВЯРНО С ОРИГИНАЛА**

Independent test laboratory, accredited by Deutsche Akkreditierungsstelle Technik (DATech) e.V. in the fields of h.v. apparatus and switchgear, power cables and power cable accessories, lv. apparatus and switchgear, installation equipment and switching and control equipment.



DAT - P - 019/92

Independent, accredited testing station · Member laboratory of STL and LOVAG

# TEST REPORT

NO. 1803.2080405.156

AREVA T&D  
Les 4 Chemins Fabrègues  
34433 Saint Jean de Védas  
FRANCE

CLIENT

AREVA T&D Macon

MANUFACTURER

Metal-enclosed AC switchgear

TEST OBJECT

FBX IS-C-C-T1

TYPE

S000007713

SERIAL NO.

Rated voltage	$U_r$	24 kV	RATED CHARACTERISTICS GIVEN BY THE CLIENT
Rated normal current	$I_r$	630 A	
Rated peak withstand current	$I_p$	50 kA	
Rated short-time withstand current	$I_k$	20 kA	
Rated duration of short-circuit	$t_k$	3 s	
Internal arcing classification		IAC AFL 20 kA 1 s	

IEC 62271-200: 2003-11

NORMATIVE DOCUMENT

Test under conditions of arcing due to internal fault in the gas-filled compartment

RANGE OF TESTS PERFORMED

10 April 2008

DATE OF TEST

See Sub-clause 4.6

TEST RESULT

на основание чл. 2 от ЗЗЛД

на основание чл. 2 от ЗЗЛД

H. GLABSCH  
Head of high-power test laboratory  
Berlin, 10 July 2008

M. THOM  
Test engineer in charge



**ВЯРНО С ОРИГИНАЛА**

Independent test laboratory, accredited by Deutsche Akkreditierungsstelle Technik (DATech) e.V. in the fields of hv. apparatus and switchgear, power cables and power cable accessories, lv. apparatus and switchgear, installation equipment and switching and control equipment



DAT - P - 019/92

1685

**zkratovna**

Zkušebnictví, a. s.

Podnikatelská 547, 190 11 Praha 9 – Běchovice, Czech Republic

INDEPENDENT TESTING LABORATORY, ACCREDITED ACCORDING TO ČSN EN ISO/IEC 17025  
BY THE ČESKÝ INSTITUT PRO AKREDITACI, O.P.S., UNDER THE NUMBER 1035

# TEST REPORT

## No. 09 - 058

**Test object** : High-voltage metal-enclosed switchgear and controlgear  
**Type** : FBX-C/12-25/CCT1  
**Serial No.** : FBX--0909054/AMT

**Ratings**  
**Rated voltage** : 12 kV  
**Rated normal current** : 630 A  
**Rated frequency** : 50 Hz

**Manufacturer** : AREVA T&D  
bld de la Résistance – BP 84019  
71040 Mâcon Cedex – 9, France

**Test performed** : Arcing due to an internal fault

**Customer** : AREVA T&D  
bld de la Résistance – BP 84019  
71040 Mâcon Cedex – 9, France

**Date of test** : 12.05. 2009

### ◆ Interpretation of results:

The acceptance criteria 1 to 5 of IEC 62271-200:2003, cl. 6.106 and Annex A for classification IAC AFL 87% of 25 kA 1 s with two phase arc initiation on the bushing terminals in the cable compartment were met.

THIS TEST REPORT IS CONFIDENTIAL AND SHALL NOT BE PASSED OVER OR TRANSFERRED TO ANY THIRD PARTY WITHOUT WRITTEN APPROVAL OF THE CUSTOMER.  
WITHOUT THE WRITTEN APPROVAL OF THE TESTING LABORATORY ZKRATOVNA SHALL NOT BE REPRODUCED EXCEPT IN FULL.

Copy No.: E

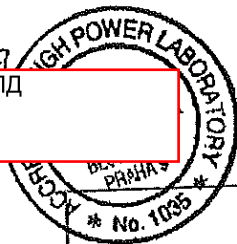
Praha 9, Běchovice

Tested by: *11.08.2009*

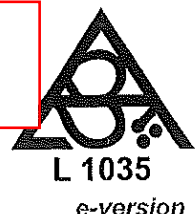
на основание чл. 2 от ЗЗЛД

на основание чл. 2 от ЗЗЛД

Jan Štangler



Vladimír Masný  
Head of the Laboratory



ВЯРНО С ОРИГИНАЛА

1686

**zkratovna**  
Zkušebnictví, a. s.

Podnikatelská 547, 190 11 Praha 9, Běchovice, Czech Republic

**TEST REPORT**  
**No. 07 - 120**

**Test object** : High-voltage metal-enclosed switchgear and controlgear  
Type : FBX-C/24-20/C-C-T1  
Serial No. : FBX--0721000/AMT

**Ratings**  
Rated voltage : 24 kV  
Rated normal current : 630 A  
Rated frequency : 50 Hz

**Manufacturer** : AREVA T&D  
bld de la Résistance – BP 84019  
71040 Mâcon Cedex – 9, France

**Test performed** : Arcing due to an internal fault

**Customer** : AREVA T&D  
bld de la Résistance – BP 84019  
71040 Mâcon Cedex – 9, France

**Date of test** : 02.10. 2007

THIS TEST REPORT IS CONFIDENTIAL AND SHALL NOT BE PASSED OVER OR TRANSFERRED TO ANY THIRD PARTY WITHOUT WRITTEN APPROVAL OF THE CUSTOMER.  
WITHOUT THE WRITTEN APPROVAL OF THE TESTING LABORATORY ZKRATOVNA SHALL NOT BE REPRODUCED EXCEPT IN FULL.

Praha 9, Běchovice

Copy No. E

Tested by:

27.11.2007

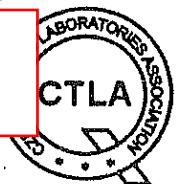
на основание чл. 2 от ЗЗЛД

на основание чл. 2 от ЗЗЛД

Robert Jech



Vladimír Mastry  
Head of the Laboratory



ВЯРНО С ОРИГИНАЛА

1687

e-version



**zkratovna**  
Zkušebnictví, a. s.

Podnikatelská 547, 190 11 Praha 9, Běchovice, Czech Republic

**TEST REPORT**  
**No. 06 - 131**

**Test object** : High-voltage metal-enclosed switchgear and controlgear  
**Type** : FBX-C/24-16/CCT1  
**Serial No.** : 06-18-01

**Ratings**  
**Rated voltage** : 24 kV  
**Rated normal current** : 630 A  
**Rated frequency** : 50 Hz

**Manufacturer** : AREVA T&D  
bld de la Résistance – BP 84019  
71040 Mâcon Cedex – 9, France

**Test performed** : Arcing due to an internal fault

**Customer** : AREVA T&D  
bld de la Résistance – BP 84019  
71040 Mâcon Cedex – 9, France

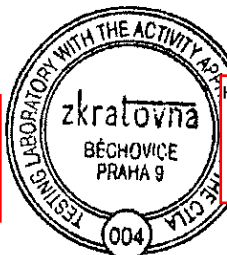
**Date of test** : 17.10. 2006

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WITHOUT THE WRITTEN APPROVAL OF THE TESTING LABORATORY ZKRATOVNA SHALL NOT BE REPRODUCED EXCEPT IN FULL.

Praha 9, Běchovice

Tested by:  
на основание чл. 2 от 33ЛД

Robert Jech



на основание чл. 2 от 33ЛД

Vladimír Mastný  
Head of the Laboratory



e-version

ВЯРНО С ОРИГИНАЛА  
10.08

Copy No.: E

VEIKI-VNL ELECTRIC LARGE LABORATORIES LTD.



No. 5559 /VNL

## Test report

**Short-time withstand current and peak withstand current tests on the main circuit of FBX-C/24-20/CCT1 metal-enclosed switchgear**

4<sup>th</sup> December 2009



**STL**  
participant

The accreditation of VEIKI-VNL Ltd.  
refers to the test activities registered by HAB (Hungarian Accreditation Board) under No.: NAT-1-1251/2007

H-1158 Budapest, Vasgolyó u. 2-4.  
E-mail: vnl@vnl.hu

Phone:+36.1.417 3157, Fax:+36.1.417 3163  
www.vnl.hu

ВЕРНО С ОРИГИНАЛА  
1689



VEIKI-VNL ELECTRIC LARGE LABORATORIES LTD.

Test Report  
No. 5559 / VNL

2 / 6 page

*Subject:* Short-time withstand current and peak withstand current tests on the main circuit of FBX-C/24-20/CCT1 metal-enclosed switchgear

*Kind of the test:* Development test

*Client:* AREVA T&D  
381, Bld. de la Résistance – BP 84019  
F-71040 Mâcon Cedex 9  
FRANCE

*Reference and date of the order:* No. 3139-4520127354, 05.10.2009

*Our reference number:* NTL - 18 / 2009

*Place and date of the test:* VEIKI-VNL Electric Large Laboratories Ltd.  
H-1158 Budapest, Vaszgolyó u. 2-4.  
HUNGARY  
18<sup>th</sup> November 2009

*Present at the test in charge of the purchaser:* Mr. Malek Mebazaa AREVA T&D

ВЯРНО С ОРИГИНАЛА

16.90

ИНЖЕНЕРИНГ ЕАД, Пловдив 4004, ул Коматевско шосе 92, тел: 032/608 881; факс: 032/608 138  
Интернет сайт: [www.fikab.com](http://www.fikab.com) , E-mail: [engineering@eng.bg](mailto:engineering@eng.bg)

### ДЕКЛАРАЦИЯ

Долуподписаният Петър Иванов Данчев, в качеството си на изпълнителен директор на ИНЖЕНЕРИНГ ЕАД, участник в процедура на договаряне с обявление за възлагане на обществена поръчка №PPD 18-063, с предмет:

**„Доставка и монтаж на бетонови комплектни трансформаторни постове (БКТП)“,**

### ДЕКЛАРИРАМЕ, ЧЕ:

Предлаганите компактни КРУ тип FBX са произведени в завода на Шнайдер Електрик в гр. Макон, Франция. Използваните материали при производството на КРУ тип FBX подлежат на рециклиране спазвайки дейностите подробно описани в инструкцията за „Извеждане от експлоатация на елегазови КРУ след края на живота им“.

Дата 13.08.2018г.

Изпълнителен директор

на основание чл. 2 от ЗЗЛД

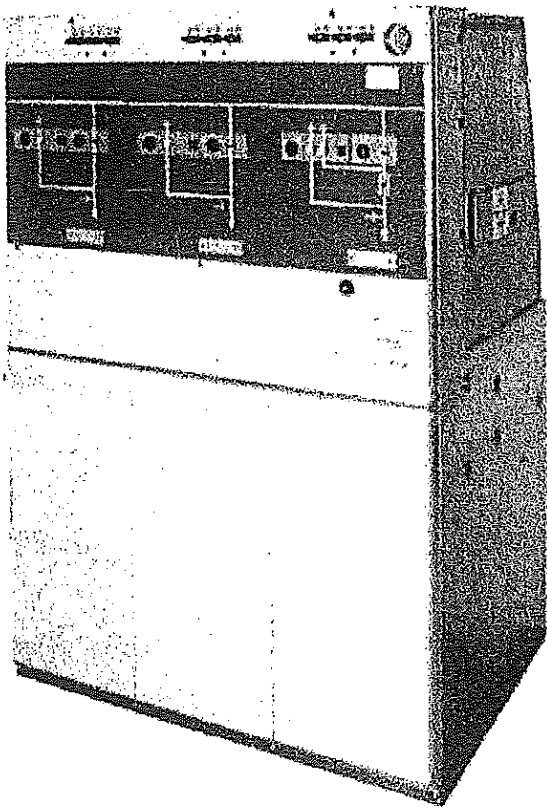


(Петър Данчев)

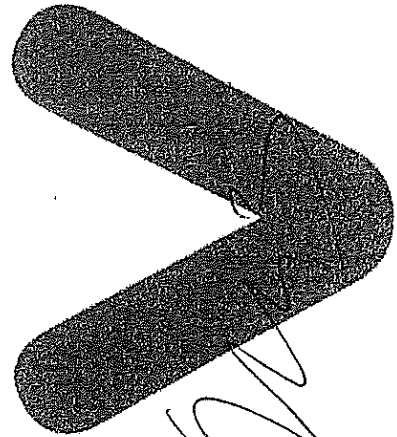
# FBX-C Табло тип ССТ1

Екологичен профил на продукта

SF6-изолирано, табло за  
вторично разпределение



*[Handwritten signature]*



*[Handwritten signature]*



**Schneider**  
Electric

ВЯРНО С ОРИГИНАЛА



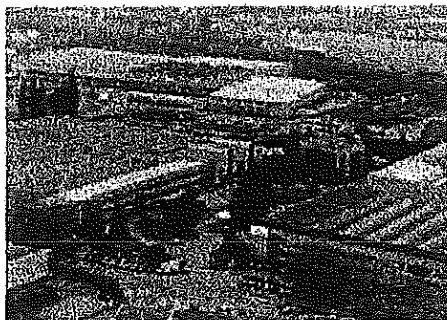
*[Handwritten signature]*

# Екологичен профил на продукта - PEP

## Въведение

Целта на настоящият документ е да предостави информация за екологичните показатели на FBX SF6 изолирано второстепенно разпределително табло през целият му експлоатационен жизнен цикъл.

## Данни за производителя



Шнайдер Електрик Индъстрис АД

Ул. Жозеф Моние 35 , Рюейл –Малмезон , Франция

[www.schneider-electric.com](http://www.schneider-electric.com)

Обектът в Масон произвежда комутатори за средно напрежение (HVA). Табла за първично и вторично разпределение. Следвайки стратегиите на Шнайдер Електрик, обекта в Масон провежда политика на респектиране на околната среда. Обекта притежава сертификат по ISO 14001 обхващащ проектирането на продуктите от 2002. На обекта се прилага Система за Управление на околната среда. В рамките на понятието за еко-дизайн, са разработени и внедрени много от процедурите свързани с развитието на продуктите (оперативни инструкции).

## Представяне на продукта

Таблото за вторично разпределение FBX е компактно, надеждно и лесно за употреба. То е с дизайн на моно блок, налично в компактна и разширена версия. С различните си опции може да бъде адаптирано към изискванията на потребителите за напрежения до 24kV. Устойчиво е на околната среда, непотъващо и не изисква поддръжка. Ролята на FBX таблата е да предават и разпределят електрическа енергия за приложения като публични мрежи, промишлени инсталации, вятърни паркове и др.

- Изследванията на FBX са базов, международен стандартен модел, който се състои от:
- Две С функции ( подаващ входящ или изходящ кабел с комутируем прекъсвач);
- Една Т1 функция (защитен панел в комбинация с предпазители и прекъсвач за товар);
- Не моторизирани механични контроли;
- Охлаждаща решетката, позволяваща на образуванияте от вътрешните дъгови газове да дисипират чрез в задната част на блока.

Техническите характеристики на оборудването са както следва:

- Номинално напрежение: 24 kV
- Номинален ток (шина): 630 A
- Номинален ток (панел С): 630 A
- Номинален ток (панел Т1): 200 A
- номинален ток на късо съединение, краткосрочен (или равен) на : 16 kA
- Номинална честота : 50/60 Hz

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## Разбивка на използваните материали

Посочената по- долу разбивка на използваните материали показва вида и количествата на съставните елементи на функционалната единица (виж § 5).

Метали (Kg)		Терморективни продукти (kg)	
Стомана	155.810	Епоксидна смола	12.141
Неръждаема стомана	83.854		
Медна сплав	26,514	Gas (kg)	
Алуминиева сплав	9,763	SF6	2,450
Сребро	0,051		
		Еластомери (kg)	
Общо	275.991		0,095
Вкл. олово	0,013	EPDM	
		Други материали (Kg)	
Термопластични продукти (Kg)		Силициев двуокис	3,000
Полиестери	7,330	Порцелан	2,993
Ароматични полиамиди	2,964	Кордиерит/ иолит	1,097
Полиамиди	1,198	Натриев алуминосиликат	0,500
Други	0,152	Фенолна смола – импрегнирана хартия	0,430
Общо	11,645	Грес	0,050
		Общо	8,070
		Общо (kg)	310,392

Металите представляват 89 % от общото тегло на FBX, термопластичните продукти 3.7 %, термо реактивните продукти 3,9 %, SF6 газообразни 0,8 %, а останалите 2.6 %. В металните сплави има олово, с концентрация от 38 ppm (0.0038 %).

## Анализ на цикъла на живот

### Методология

Настоящият анализ е извършен с EIME софтуер, версия 1.6. използваната база данни на софтуерът е ECOBILAN 5.0 (оригинал), с добавени вътрешни модули. Настоящият софтуер е в употреба от 1998 год. насам. Оценка на въздействието върху околната среда е извършена за следните етапи от жизнения цикъл на оборудването: Производство, разпространение и употреба. Край на жизнения цикъл и

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въздействието на тази фаза не са взети предвид, тъй като софтуерът няма възможност за това. Изследванията на оборудването са на FBX CCT1, така като е описано на предишната страница. При провеждане на симулацията с EIME, не са взети под внимание термопластичните добавки и въздействието на мястото на производство.

### Функционален блок

Функционалната единица, използвана в този анализ е компактно FBX (тип CCT1) табло за вторично разпределение, снабдени с 3 MV/HVA предпазители.

### Обхват на системата

Анализът обхваща въздействието на фазите на производство, разпределение и употреба върху околната среда. Изчисленията са въз основа на експлоатация от 30 години.

### Производство

Използваните материали са тези, които са изброени в разбивката на материалите (вж. описание на продукта). Към тези, ние сме добавили повърхностната обработка (оценка на третиранията повърхност = 2.5m<sup>2</sup>) и защитното покритие на предния панел (боядисаната площ е изчислена на 1.2m<sup>2</sup>). Компонентите от под изпълнение, използвани в FBX, имат средно покритие 175.3 t.km. 91 % от SF6 газ се рециклира.

### Разпространение

FBX се монтира на дървени палети, тежащи 25 kg, след това се покрива с пластмасово фолио (1 kg) за транспортиране до обекта на клиента. В момента, по голямата част от потенциалните купувачи на това оборудване са от Европа. Прогнозата ни е, че FBX ще покрива средна дистанция от 1060 km, с камион.

### Употреба

Жизненият цикъл на FBX е 30 години.

Подразбира се, че фазите на поддръжка са без допълнения към материалите. Разсеяната енергия (ефект на Джаул) през трите фази, когато оборудването е живо (99.9 % от времето) се оценява на средно 7.3. За целите на EIME симулацията се приема, че произходът на електроенергията е в рамките на Европа. SF6 теч на газ за 30 години представлява 7 % от първоначалната маса на SF6, съдържащи се в рамките на FBX единица.

### Край на жизнения цикъл на експлоатация

FBX е изграден от голямо разнообразие от материали: четири групи метали (стоманени сплави, сплави на неръждаема стомана, алуминиеви сплави, медни сплави); 8 термопластични материала (PBT, PA, PET, PPA, POM, PVC, PC & PE); 2 термореактивни продукти (стъклени епоксидна смола и силициева епоксидна смола); един еластомер (EPDM); SF6 газ; фенол импрегнирана хартия и натриев

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алуминосиликат. Към тези следва да се добавят материалите изграждащи предпазители (порцелан, кордиерит, сребро, алуминий и силициев диоксид). Това голямо разнообразие от материали, прави сортирането на различните компоненти на таблото, в края експлоатационния му живот много трудно.

В допълнение, таблото FBX се състои от около 1800 съставни части, включително фиксиращи 1000. Възлите, съставени от най голямата бройка части са от прекъсвача за натоварване, предпазители и контролите. Тези голям брой части могат да доведат до изключително труден демонтаж и сортиране на различните материали. ISO 11469 гласи, че пластмасовите компоненти, които са с тегло над 25 грама трябва да бъдат маркирани постоянно. Пластмасовите компоненти в FBX са маркирани всички, за да се улесни сортирането и да се подобри рециклирането.

Всички използвани материали могат да бъдат рециклирани. Независимо от това, трябва да се отбележи следното: някои части, или много малки, или свързани с други, не могат да бъдат рециклирани, тъй като те правят операцията по рециклиране, много трудна (и нерентабилна).

#### **Каналите за рециклиране, които следва да се използват, са:**

■ Материали за рециклиране на метали и пластмаси (механично рециклиране на гранули, субпродукти или химично рециклиране до разпадане на продуктите в мономери).

■ Възможно е също и енергийно базирано валоризиране на използваната пластмаса, спестяване на гориво при производството на енергия, тъй като пластмасите отделят топлина при горене.

Относно използваните газове, Шнайдер Електрик предлага на клиентите си възможността да директно изпомпване навън на резервоара на FBX. В този случай, след това SF6 е оползотворен и рециклиран от доставчика.

#### **Екологично въздействие**

Софтуерът EIME изчислява екологичното въздействие на базата отчитане на 11 критерия:

- Изчерпване на суровини (RMD)
- Енергийно изчерпване (ED)
- Водно изчерпване (WD)
- Глобално затопляне (GW)
- Намаляване на озоновия слой (OD)
- Токсичност на водата (WT)
- Токсичност на въздуха (AT)
- Образуване на фото-химичен озонов слой (POC)
- Подкиселяване на въздуха (AA)
- Евтрофикация на водата (WE)
- Производство на опасни отпадъци (HWP)

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Резултатите за въздействието върху околната среда на трите фази (производство (M) - разпределение (D) и употреба (U)) на FBX-ССТ1, проучване върху 30-годишен период

Индикатори	Съкратено	Мярка	S = M + D + U	M	D	U
Изчерпване на суровини	RMD	Y-1	6,28E-12	6,26E-12	1,77E-15	1,80E-14
Енергийно изчерпване	ED	MJ	3,85E+04	1,67E+04	1,58E+03	2,02E+04
Водно изчерпване	WD	dm <sup>3</sup>	1,27E+04	1,00E+04	1,19E+02	2,63E+03
Глобално затопляне	GW	g ~CO <sub>2</sub>	5,58E+06	1,34E+06	1,05E+05	4,14E+06
Намаляване на озоновия слой	OD	g ~CFC-11	5,12E-01	2,89E-01	6,64E-02	1,57E-01
Токсичност на въздуха	AT	m3	6,42E+08	3,44E+08	3,84E+07	2,60E+08
Образуване на фотохимичен озонов слой	POC	g ~C <sub>2</sub> H <sub>4</sub>	1,01E+03	4,33E+02	1,30E+02	4,47E+02
Подкиселяване на въздуха	AA	g ~H <sup>+</sup>	5,14E+02	2,75E+02	2,47E+01	2,14E+02
Токсичност на водата	WT	kg	3,52E+05	2,66E+05	1,19E+04	7,44E+04
Еутрофикация на водата	WE	g ~PO <sub>4</sub>	7,18E+01	6,52E+01	1,72E+00	4,91E+00
Производство на опасни отпадъци	HWP	kg	1,93E+01	1,00E+00	5,99E-02	1,82E+01

Първоначално следва да се отбележи, че фазата на разпространението има малко въздействие върху околната среда в сравнение с фазите на употреба и производство. Фазата на производство оказва най-силно въздействие върху околната среда (7 от 11).

Фазите на производство и употреба имат влияние върху глобалната околна среда (RMD, AA & OD по време на първата фаза, GW по време на последната), както и върху околната среда в близост до производствената или експлоатационна площадка (WD, WT, WE и AT за първия; ED & HWP за последния).

Принципният метод на повърхностна обработка представлява електролитно цинково покритие, нанесено чрез използването на галванична вана, последвано от процес на пасивиране с тривалентен хром, много по-малка степен опасен за човека и за околната среда от процеса на хексавалентен хром.

FBX не включва компоненти на оловото (Pb); все пак има няколко сплави със съдържание на олово. Съдържанието на олово FBX е ниско (41 ppm).

### Заклучение

Липсата на поддръжка през срока на експлоатация на FBX е основно предимство и потвърждение за надеждността и издръжливостта на оборудването. Въздействията върху околната среда, независимо дали са глобални или локални, се разпростират през фазите на производство и поддръжка. На фаза на употреба оказва въздействие върху глобалното затопляне и производството на отпадъци, докато фазата на производство има въздействие върху водите и изчерпването на суровини.

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Ние се ангажираме да защитим нашата планета посредством "Комбинирани иновации и непрекъснато подобрене за посрещане на новите екологични предизвикателства".

**Шнайдер Електрик Индъстрис АД**

Ул. Жозеф Моние 35 , Рюейл –Малмезон , Франция

[www.schneider-electric.com](http://www.schneider-electric.com)

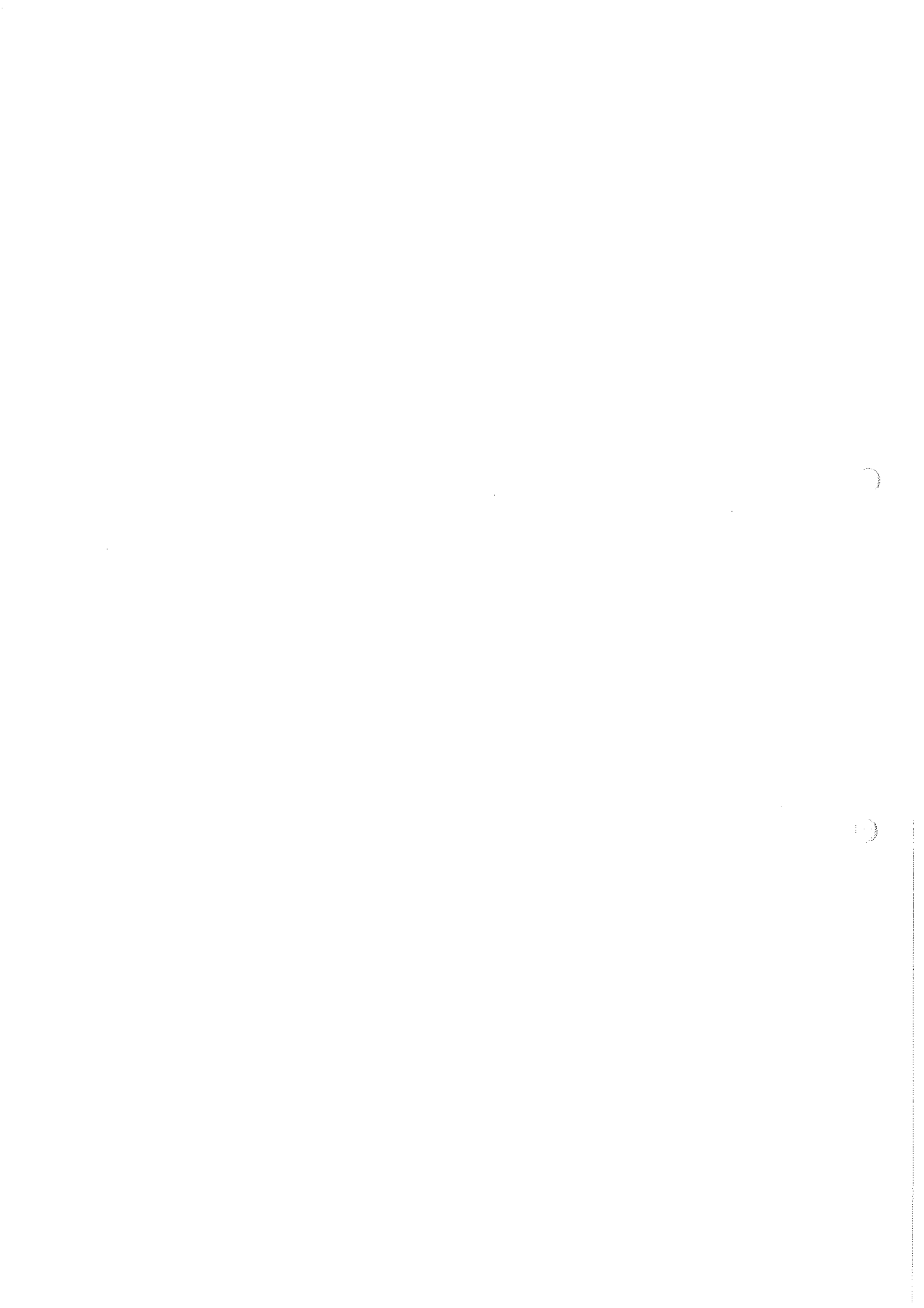
Настоящият документ се основава на ISO14020, който се отнася до общите принципи на екологичните декларации и на ISO14025, свързани с тип III декларации за околната среда. Изготвен съгласно инструкциите в Справочника относно екологичните профили на продукта , версия V5.

Изготвен и публикуван от : Шнайдер Електрик  
Октомври 2010

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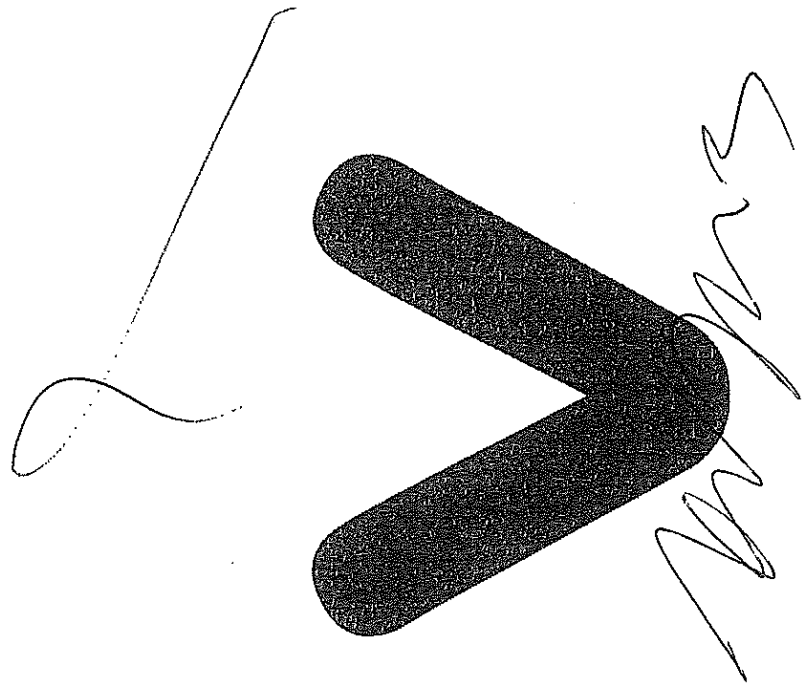
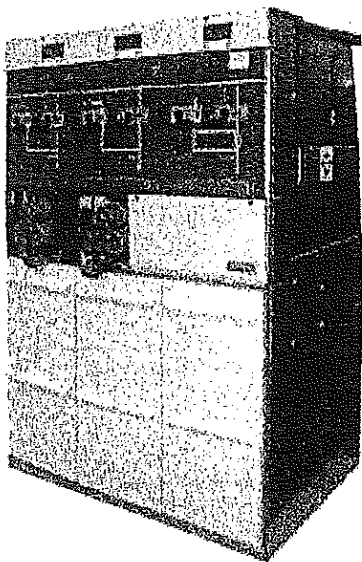




FBX Switchboard

# End of life Guide

SF6 gas insulated secondary distribution switchboard



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Electric

# End of life Guide - FBX



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## Introduction

The end-of-service phase is considered to be a very important part of the life cycle of T&D products. The environmental impact inherent in the disposal of equipment is, sometimes, greater than that of the manufacturing, delivery or utilisation phases. European directives, such as WEEE<sup>1</sup>, ELV<sup>2</sup> and RoHS<sup>3</sup>, have confirmed this point and all insist upon the recovery of waste products and their valorisation at the end of the equipment's service life. Even though our switchgear is not covered by this legislation, Schneider Electric is willingly attempting to optimise recycling, the processing of waste and, as a consequence, the end of service phase of our products.

This guide is aimed at facilitating the disposal of Schneider Electric products whilst minimising their impact on the environment. The separation of the component elements making up the switchgear is completed by:

- Either by disconnecting the mechanical linkages, 
- Or, by dismantling, that is to say, by breaking or shearing the connections. 

<sup>1</sup> DIRECTIVE 2002/96/EC of the European Parliament and the Council of 27 January 2003 on Waste Electrical and Electronic Equipment

<sup>2</sup> DIRECTIVE 2000/53/EC of the European Parliament and the Council of 18 September 2000 on end-of-life vehicles

<sup>3</sup> DIRECTIVE 2002/95/EC of the European Parliament and the Council of 27 January 2003 on Restriction of Hazardous Substances

# End of life Guide - FBX

## Presentation

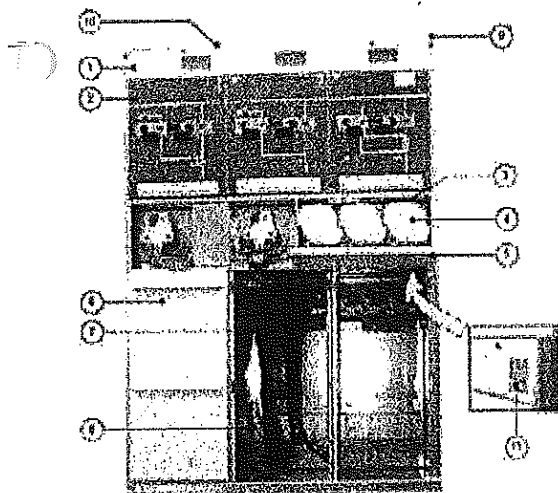
This end-of-service-life guide is applicable across the full range of SF6 gas-insulated FBX products. The switchboard taken as an example is the FBX-C (EDF); 24kV. Its composition is representative of its category.

## Description of the switchboard

Reference	FBX-C
Type	EDF
Switchboard	CCT1
From left to right:	2 x C functions + 1 x T1 function

## Key

- 1 Voltage presence indicator light and low voltage compartment panel.
- 2 Mimic diagram panel
- 3 Fuse compartment
- 4 End plug
- 5 Fuse compartment access panel
- 6 Cable compartment access panel
- 7 HVA connections
- 8 Adjustable cable mounts
- 9 Lifting ring
- 10 Removable top panel – low voltage connections
- 11 Technical data rating plate



## Dimensional characteristics

Width	1 m
Depth	0.75 m
Height	1.38 m
Surface area	0.75 m <sup>2</sup>
Weight	330 kg

## Technical documentation

FBX EDF	Installation - Commissioning	AMTNoT106-02
FBX EDF	Operations - Maintenance	AMTNoT107-02
FBX International Standard	Installation - Commissioning	AMTNoT131-02
FBX International Standard	Operations - Maintenance	AMTNoT132-02

## Ecological declarations

FBX Switchboard	August 2006	6 pages
SFU/SFU Controls	June 2007	6 pages
CD10 Control	June 2007	5 pages

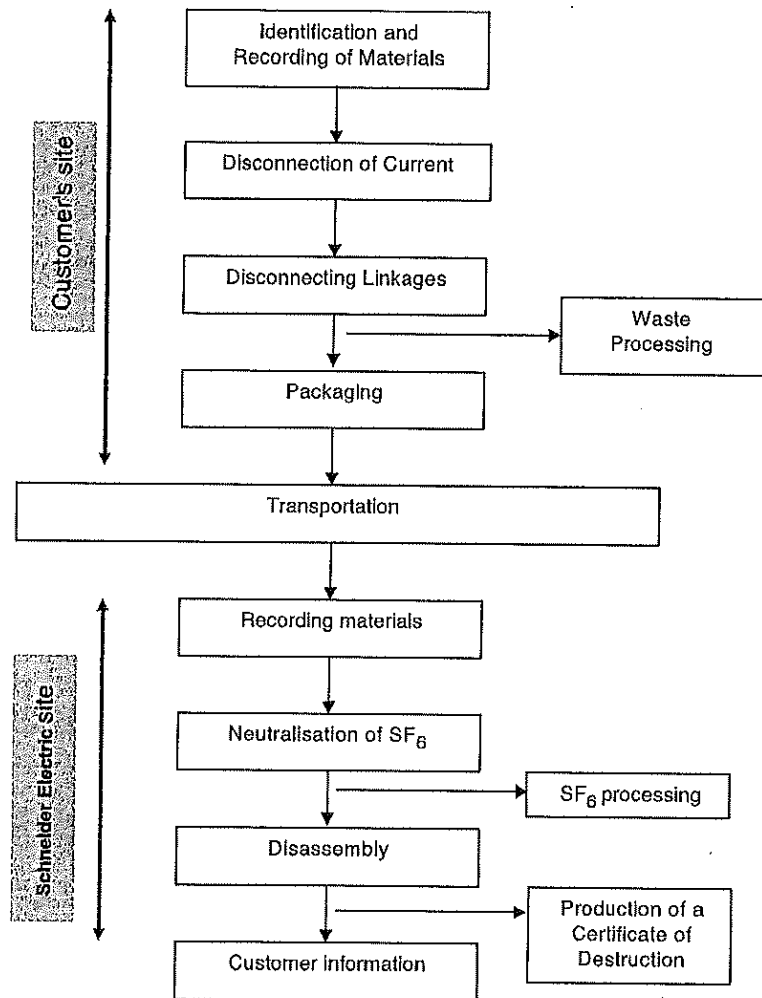
## Service life

The service life of the FBX switchboard is 30 years. This may vary with the environmental conditions, conditions of use and maintenance.

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# End of life Guide - FBX

## Example of the complete life cycle and end-of-service process



### General safety instructions

- Before any dismantling operation:
  - Turn off the current and earth the functions of the Fluokit M24+ switchboard (follow the procedure given in disconnecting the supply to a switchboard).
  - Turn off current to all Low Voltage servo systems.
  - Release the springs on the mechanical controls.
  - The wearing of individual protective equipment is obligatory (gloves, goggles, safety hat and boots, etc.)
- To neutralise the SF<sub>6</sub> gas, which, regardless of specific indications, must be considered to be highly polluted:
  - Transport the materials as category ADR<sup>4</sup>
  - Carry out all SF<sub>6</sub> gas recovery work within a dedicated space (See End-of-service – decommissioning zone).
  - Within the same space, clean and wash down all parts of the Fluokit M24+ before valorising.

<sup>4</sup> ADR French regulation for hazardous substances transport by road (applied to hazardous waste)

<sup>5</sup> Schneider Electric Instruction T&D EHS OI - 3 - Electrical Risk Prevention LOTO



# End of life Guide - FBX

## Identification of materials and logging

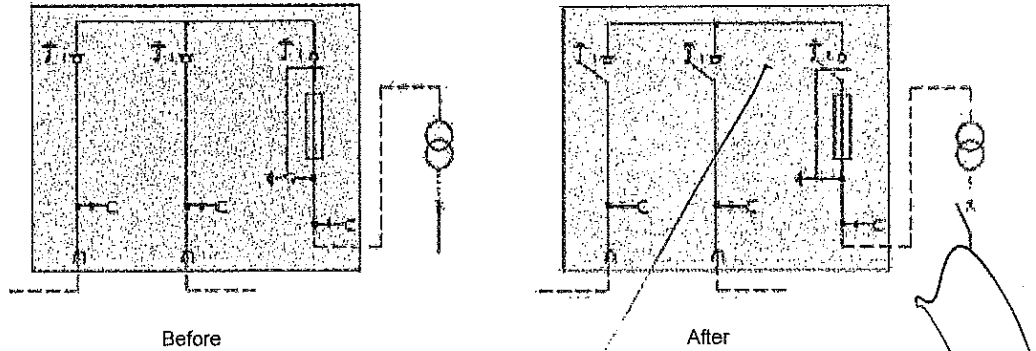
The FBX range includes two types of switchboard: FBX-C (Compact) and FBX-E (Extensible) The information on the Technical Data plate (N° 11 - Description of the switchboard) is indispensable to the identification of the switchboard concerned and the determination of its makeup.

## Disconnecting the supply to a switchboard

- Shutting down the energy consumer units
- HVA lockouts by User and Distributer

The disconnection of the current from a unit must be followed by an electrical lock-out of the unit. This procedure, carried out by the client's manager responsible for lock-outs, is broken down into five stages (Lockout – Tag Out<sup>5</sup>).

### Configuration

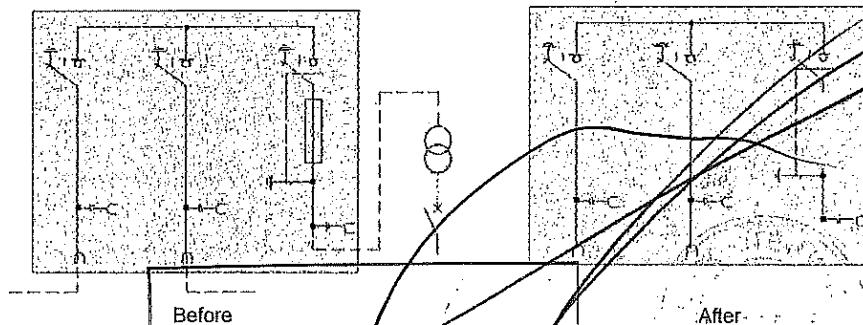


<sup>4</sup> ADR French regulation for hazardous substances transport by road (applied to hazardous waste)  
<sup>5</sup> Schneider Electric Instruction T&D EHS OI - 3 - Electrical Risk Prevention LOTO

## Disconnecting linkages

Operations	Duration	Operator
Remove the fuse access cover	1 h 30	[Handwritten signature]
Remove the HV fuses		
Remove the cable access panel.		
Disconnect and remove the HVA cable clamps		
Disconnect any LV connections		
Disconnect the general earth connector		
Remove the floor mounting points		

### Configuration



ВЯРНО С ОРИГИНАЛА

1701

# End of life Guide - FBX

## Recycling

- Material to be disposed of via Household Waste channels:
  - The HV fuses
- The following ferrous metals should be sent for recycling:
  - Operating handles,
  - Door panels and fuse protection cover
  - Rear deflector
  - Cable clamps and floor mountings

## Packaging



The switchboard is always filled with SF6 gas:

- Respect the centre-of-gravity markings when handling the equipment.
- Do not pierce the tank.
  - Attach the FBX unit to a transport pallet.
  - Identify the switchboard.
  - Protect the switchboard from any physical shocks likely to cause an SF6 gas leak.

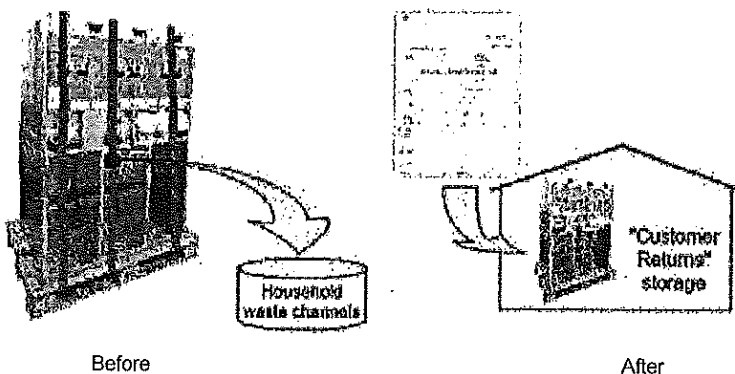
## Transportation

Respect the restrictions laid down for ADR<sup>6</sup> transportation (Production) of a Hazardous Waste Monitoring Form) and declare to the authorities (Prefecture in France) if necessary.

## Schneider Electric recording

Operations	Duration	Operator
Unpack the FBX switchboard – keep the wooden pallet to facilitate further handling operations.	30 mins.	1
Identify and log the material by opening a 'Equipment Return' form		
Possible storage of the FBX unit.		

## Configuration



## Recycling

Dispose of plastics via the household waste channels

<sup>6</sup> ADR French regulation for hazardous substances transport by road (applied to hazardous waste)

<sup>7</sup> « SF6 Handling Guide » Schneider Electric

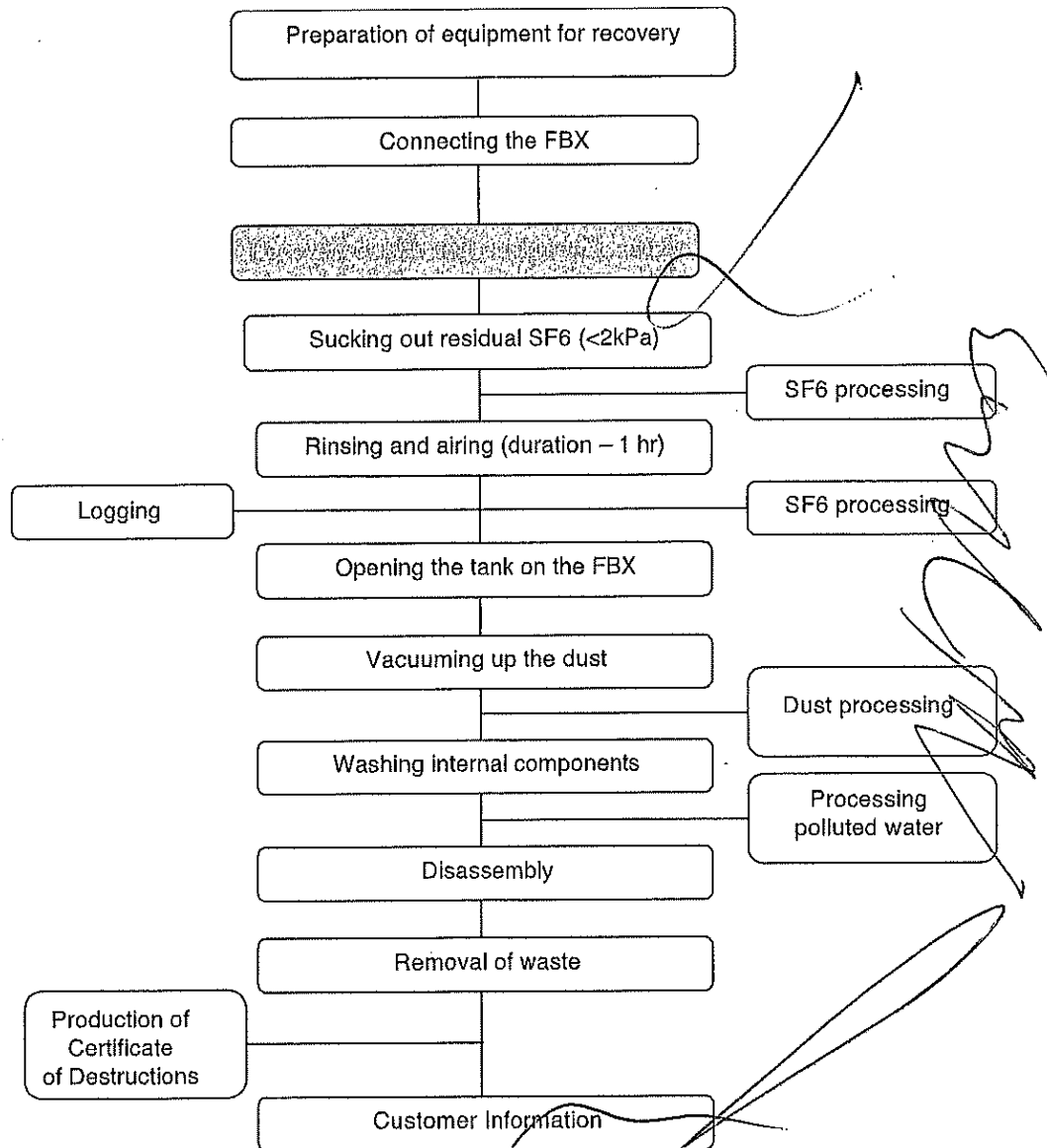
# End of life Guide - FBX

## Neutralisation of SF6 gas

### General instructions for the recovery of the SF6 gas<sup>7</sup>

- SF6 gas recovery operations must be carried out within a dedicated space (See End-of-service – decommissioning zone).
- The operators must be:
  - Trained in this work,
  - Wearing the required items of Individual Protective Equipment,
  - Aware of the risks inherent in the chemicals produced by the decomposition of sulphur hexafluoride, as well as the measures to be taken in the event of an accident.

### Successive stages of SF6 gas recovery



<sup>6</sup> ADR French regulation for hazardous substances transport by road (applied to hazardous waste)

<sup>7</sup> « SF6 Handling Guide » Schneider Electric

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# End of life Guide - FBX

## End-of-service – decommissioning zone

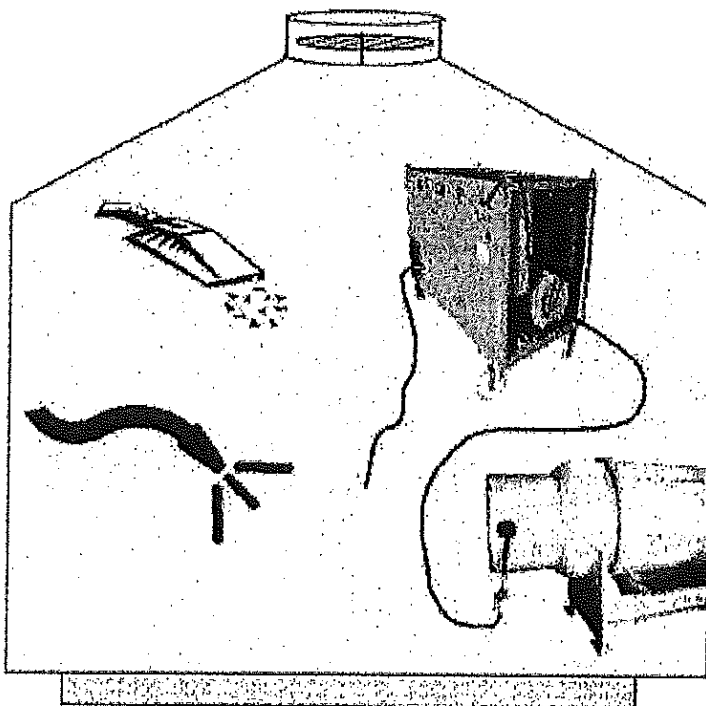
The SF6 recovery operations and the disassembly of polluted equipment must be carried out within a suitably designed space.

This space must be fitted out with:

- A forced air, filtered extraction system.
- A containment basin to recover any polluted liquids,
- A heating system protected from any projections of liquid.

The room must also be furnished with equipment to:

- Recovering the SF6 gas:
  - Vacuum pump (Dilo unit, for example) with a connection for a valve and a second connection for a press-fit nozzle.
  - A specially designed, yellow container for used SF6.
- Parts cleaning:
  - A vacuum cleaner with a dust recovery tank and filter bag.
  - A pressure washer with a neutralisation solution.

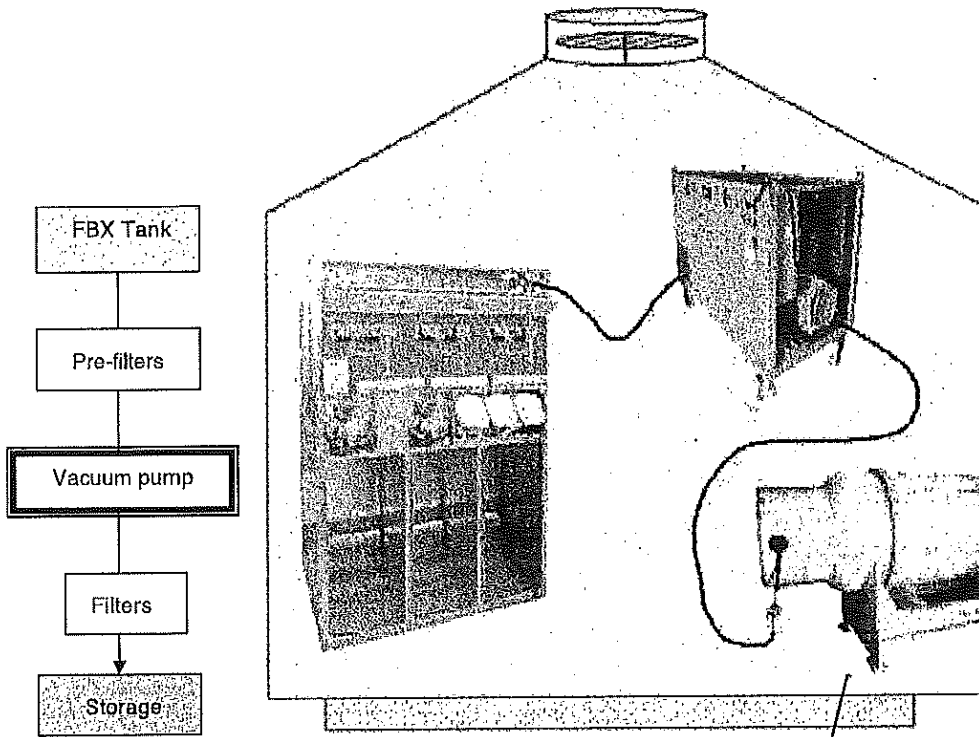


## SF6 gas recovery

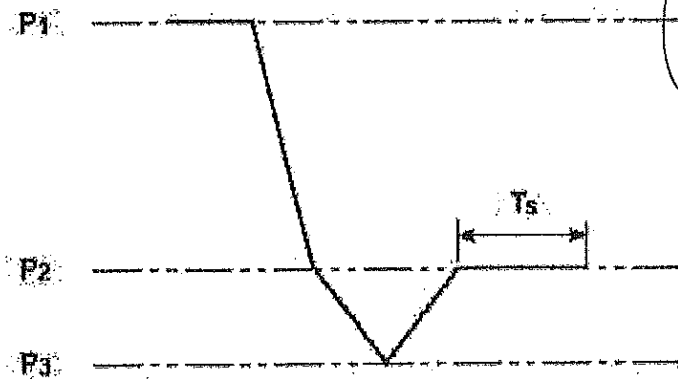
Operations	Duration	Operator
Lower the rated pressure (P1) to atmospheric pressure(P2).	2 h 00	2
Continue recovery to eliminate residual pressure(P3). Note: P3 < 2 k P2.		
Gently let the air in then leave the device to stabilise for 1 hour (Ts).		

# End of life Guide - FBX

## Principle



## Pressure variation graph



ВЪРНО С ОРИГИНАЛА

1703

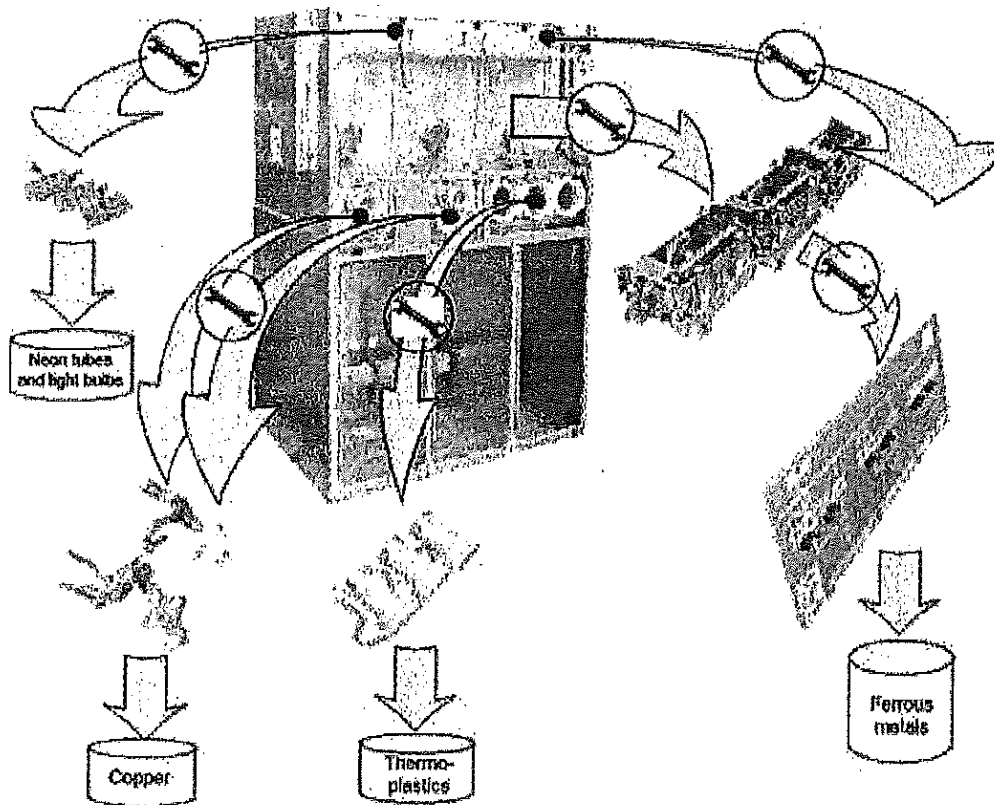
# End of life Guide - FBX

## Disassembly

Dismantling the equipment [See Manual AMTNoT131-02]

Operations	Duration	Operator
Remove the front panel from the switchboard	2 h 00	2
Extract the 3 mechanical commands (See Instructions in Technical documentation)		
Dismantle the voltage warning indicators		
Remove the small panel on the LV cabinet and the roof panel		
Dismantle the 2 earthing tripods.		

## Configuration



## Recycling

Dispose of:

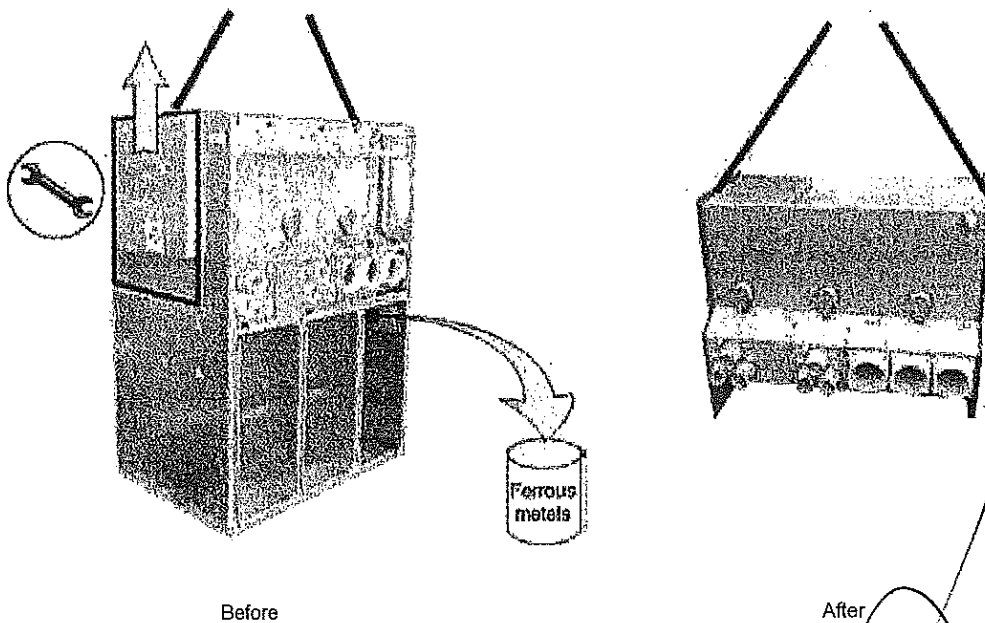
- The three voltage warning units via the neon tube and light bulb disposal channels
- The 2 covers, the roof panel and the 3 mechanical commands via the ferrous metal disposal channel.
- The 3 fuse pugs via the thermo-plastics channel
- The 2 tripods via the Copper disposal channel

# End of life Guide - FBX

## Separation of the tank from the chassis

Operations	Duration	Operator
Unpack the FBX switchboard – keep the wooden pallet to facilitate further handling operations.	30 mins.	2
Identify and log the material by opening a 'Equipment Return' form		

## Configuration



## Recycling

Dispose of the complete chassis via the ferrous metal channels

## Opening the FBX tank in a dedicated zone

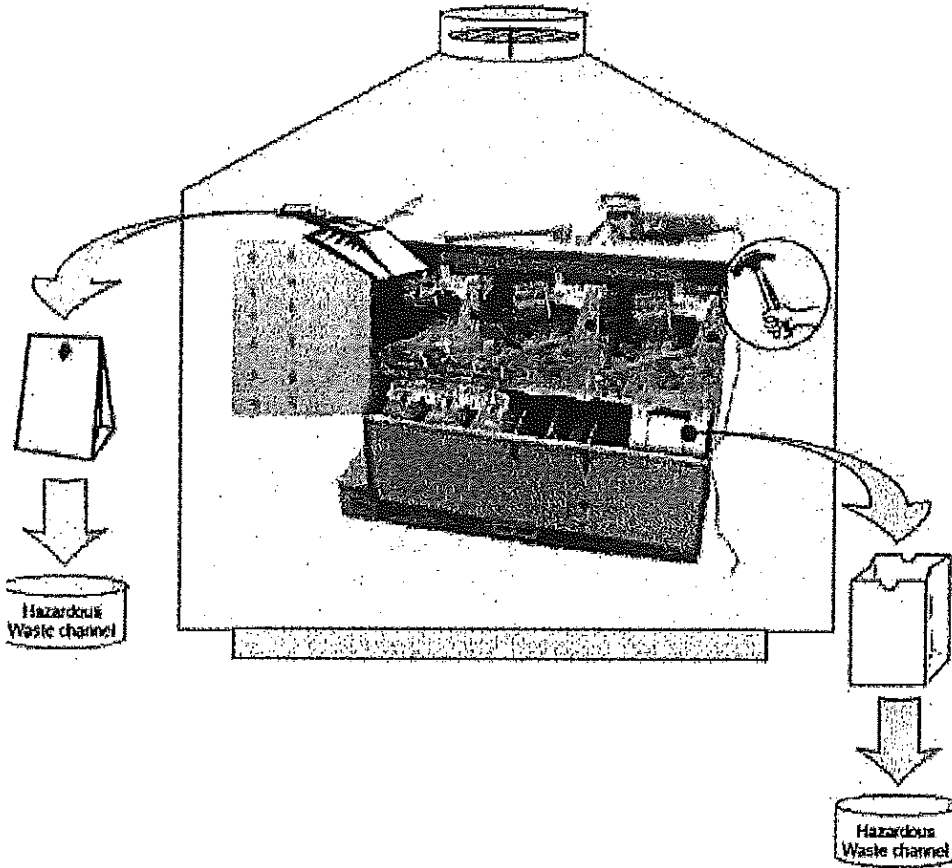
Operations	Duration	Operator
Cut out the rear panel of the tank, following the line of the bead welding.	1 h 00	2
Protect the edges of the cut-out panel with a suitable protective cover		
Vacuum and filter the dust then place it in a plastic bag.		
Recover the molecular filter and slide it into a plastic bag.		

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# End of life Guide - FBX

## Configuration



## Recycling

Dispose of the two hermetically-sealed plastic bags via a Hazardous Waste disposal channel.

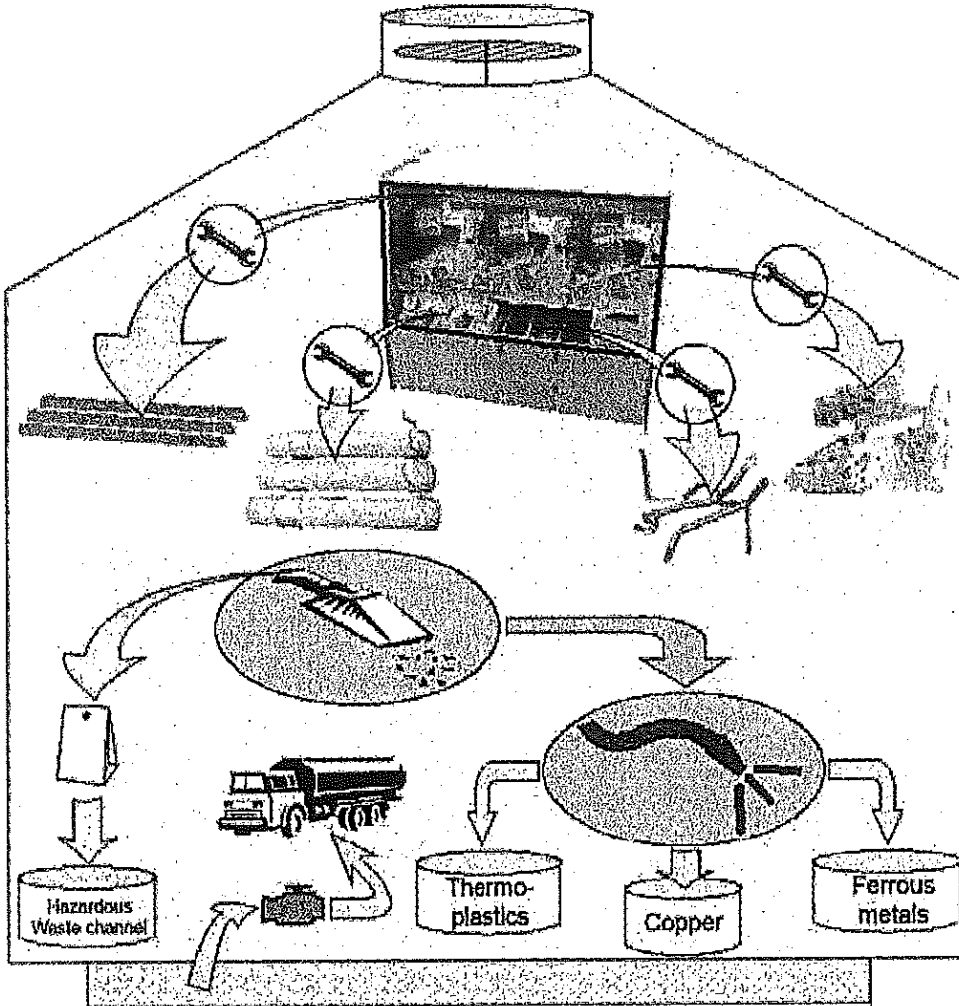
## Disassembly, cleaning and washing of internal tank fittings

Operations	Duration	Operator
Dismantle the busbar, the three interrupter switches, the copper connectors and the three fuse holders	2 h 00	2
Vacuum all parts as well as the inside of the tank itself.		
Wash all parts as well as the inside of the tank itself.		



# End of life Guide - FBX

## Configuration



## Recycling

Dispose of the waste in accordance with its category (copper, thermoplastics, etc.)

Dispose of the dust bags via the Hazardous Waste channels

Recover the polluted liquids and dispose of them via a treatment centre

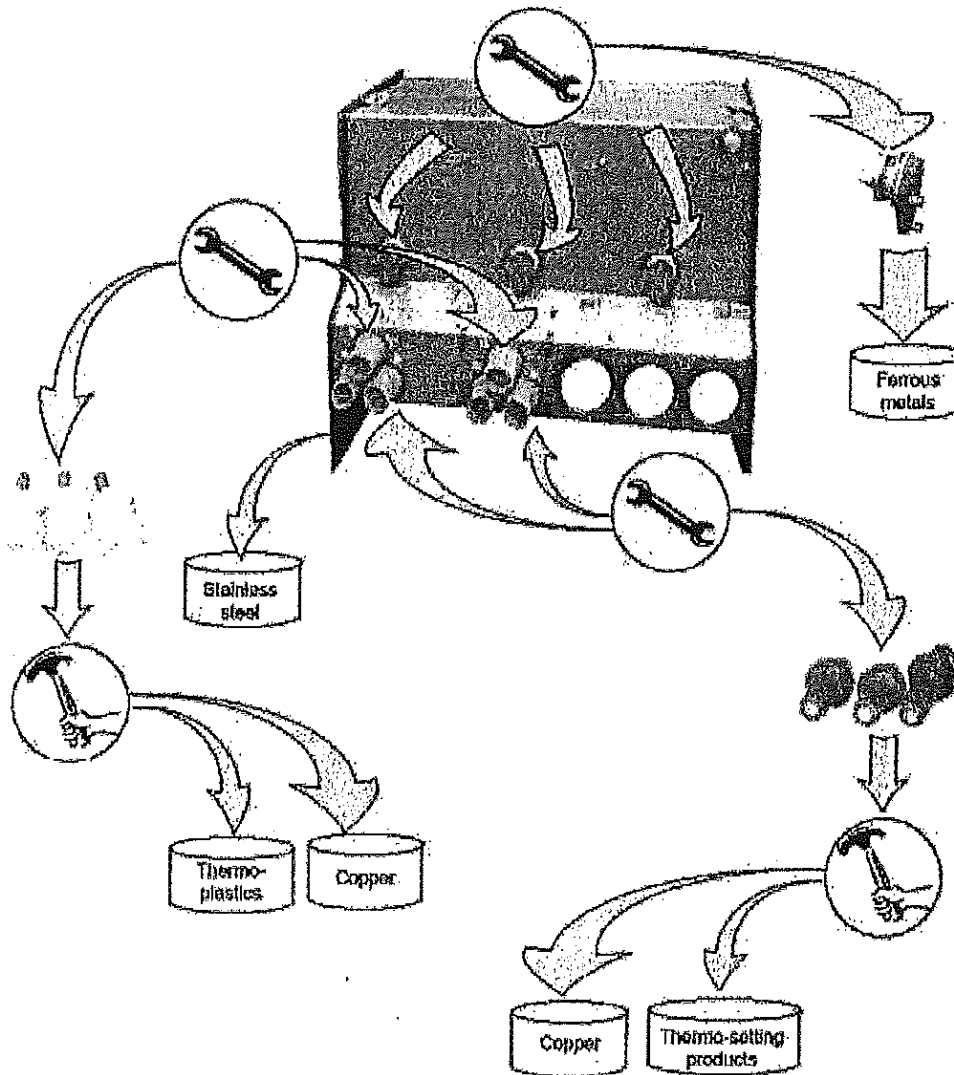
ВЯРНО С ОРИГИНАЛА

# End of life Guide - FBX

## Disassembly and dismantling of external tank equipment

Operations	Duration	Operator
Dismantle the three interrupter switch drive shafts	1 h 30	2
Remove then dismantle the three HV cross members		
Remove then dismantle the three tripod cross members		

### Configuration



### Recycling

Dispose of the 3 drive shafts via the ferrous metal disposal channels

Dispose of the cross member debris via the copper, thermoplastics and thermohardening product channels

Dispose of the tank via stainless steel disposal channels

# End of life Guide - FBX

## Definitions

**B.S.D.I. (Bordereau de Suivi de Déchet Industriel – Hazardous Waste Monitoring Form):** A form, produced by Schneider Electric or the transporter, accompanying the hazardous waste until its arrival at the elimination site.

**C.E.T:** Centre d'Enfouissement Technique (Landfill Site).

**Waste :** Designates all substances or objects that the holder must dispose of or has the intention or obligation of disposing of. Final waste is a waste product incapable of being processed in the current technical and economic situation

**Dismantling:** Dismantling is a more complex process, requiring the use of specific tools (saws, drills, etc.) and additional safety restrictions (protection, fire-permits, etc.) Pieces may be dismantled if they are riveted, welded, glued, etc.

**Disassembly:** Elements to be disassembled are those that can be separated without destroying the mountings using conventional tools These include assemblies that are bolted, click-fit, sleeve-fit, etc.

**D.I.B. (Déchets Industriels Banal – Household Waste):** Waste products collected and treated without the requirement of specific precautions Assimilated into domestic waste. This group includes, in particular, household waste such as paper, card, plastic, wood and metal.

**D.I.D. (Déchets Industriels Dangereux – Hazardous Waste):** Waste products presenting a potential risk to the environment. These are collected and treated separately from household waste products to minimise their impact on the environment and to recover any elements capable of being reused or energetically valorised. Covers, in particular, oils, solvents, used chemical products.

**Elimination** A term relating to any operation not meeting the conditions of valorisation or re-use.

**Treatment** Designates the valorisation or elimination, including intermediate treatment operations.

**Recycling:** Involves the treatment of materials contained within waste using a production-based process so as to allow them to be reused or incorporated into new products, materials or substances.

**Re-use** The use of products or components in identical roles to those for which they were designed without having to resort to processing (excepting cleaning or repair work).

**Valorisation:** All waste processing which meets the following criteria:

- The waste is used to replace other resources
- Use of the waste as a genuine substitution.
- Efficiency criteria
- Global negative environmental impact reduction
- Conformity to regulations and standards
- Maximum possible reduction in the formation and dispersal of hazardous substances

ВЯРНО С ОРИГИНАЛА

# End of life Guide - FBX

## Waste processing

After dismantling (or disassembling), the recovered elements must be forwarded for treatment in the following manner:

Materials	Weight		Valorisation	Incineration		Landfill	Loss
	kg	%	(kg)	kg	MJ	(kg)	(kg)
Metals	Steel	160.23	51.69	151.53		8.7	
	Stainless steel	83.85	27.04	79.66		4.19	
	Copper	26.51	8.55	23.86		2.65	
	Aluminium	9.76	3.14	8.30		1.46	
	<b>Total</b>	<b>280.35</b>	<b>90.44</b>	<b>263.35</b>		<b>17</b>	
Thermoplastics	Epoxy resin	12.14	3.92		12.14	121.40	
	Thermoplastics	11.64	3.75	7.57	4.07	142.45	
	<b>Total</b>	<b>23.78</b>	<b>7.67</b>	<b>7.57</b>	<b>16.21</b>	<b>263.85</b>	
Gas	SF6	2.45	0.79	2.43			0.02
Others	Porcelain	2.99	0.96			4.98	
	Paper	0.43	0.14		0.43	3.87	
	<b>Total</b>	<b>5.87</b>	<b>1.89</b>		<b>0.43</b>	<b>3.87</b>	<b>4.98</b>
<b>Total</b>	<b>310</b>	<b>100</b>	<b>273.35</b>	<b>16.64</b>	<b>267.72</b>	<b>21.98</b>	<b>0.02</b>
* Technical Burial Centre (Landfill site)		<b>Percentages</b>	<b>88 %</b>	<b>5 %</b>		<b>7 %</b>	<b>0 %</b>

These values were based upon an FBX-C, Type C-C-T1, weighing 310 kg. These may vary a little from one product to another.

## Destination of waste products

Type of Waste	Destination	Recommended treatment
SF6 gas	Supplier	Recovery, storage and regeneration
Steel & stainless steel	Local recovery agent	Shredding, sorting and recycling
Non-ferrous metals	Local recovery agent	Shredding, sorting and recycling
Epoxy Resin	Cement works	Revalorisation for added value
Thermo-plastics	Local recovery agent	Incineration
Molecular sieve	Authorised network	Controlled elimination
Soiled protective equipment	Authorised network	Incineration
Cables	Local recovery agent	Separation of sheathing and conductors

# End of life Guide - FBX

## Customer information

The regularisation of the administrative monitoring for the end-of service phase of the M24+ Fluokit is achieved through the production of a Destruction Certificate or completed BSDI form. This document is transmitted to the customer to inform them that all materials taken back by Schneider Electric have been eliminated.

## Contacts

For any further questions relating to this document, or for any additional information, please contact Bernard Valette.

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Due to possible changes in standards and equipment, the features described in this document in the form of text and images are subject to confirmation by Schneider Electric.

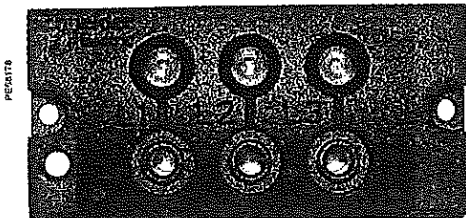


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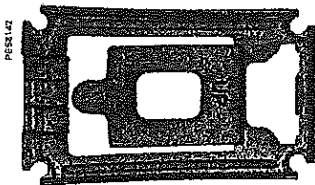
Design, production: Schneider Electric - Assystem France  
Photos: Schneider Electric



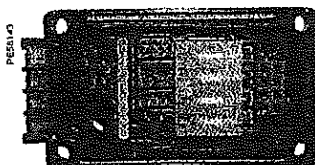
# VPIS V2



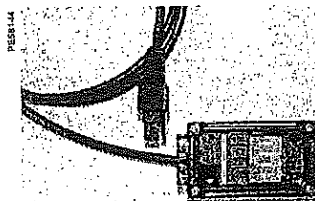
PE83178  
Voltage Indicator



PE83142  
"Open" seal



PE83143  
Standard surge protection



PE83144  
VPIS-VO surge protection



PE83146  
Cover joint (not available as spare part)

## Voltage presence indicating system for MV cubicles

### Description

■ The VPIS V2 is a self-powered voltage presence indicating system, in compliance with the IEC 62271-206 standard

■ Connectors on the front panel allow the use of a phase comparator (see corresponding section in the document)

■ Extended lifetime of LEDs on the front panel

■ Compatibility with existing MV network devices for replacement.

The VPIS V2 consists of two parts:

□ the surge protection part (always connected)

□ the voltage presence indicating part (replaceable for maintenance)

■ Retrofit: no change necessary for the replacement of a VPIS V1 (production from 01-2000 → 02-2009) with a VPIS V2.

However, a special "open" seal is necessary (supplied with each VPIS V2) for installation on an existing wiring harness.

### Thresholds

■ In compliance with the IEC 62271-206 standard, the indicator lamp outputs of the VPIS are lit or flashing when the network voltage is > 45% of the rated voltage.

Voltage value at VPIS input	IEC 62271-206: percentage of network voltage U	Equivalent percentage of rated voltage V	Status of VPIS indicator lamps
	Phase-to-phase	Phase-to-earth	
10%	10%	17%	Extinguished
45%	45%	78%	Lit or flashing

The flashing frequency increases depending on the level of the network voltage. At rated voltage, the indicator lamps seem to be lit steadily.

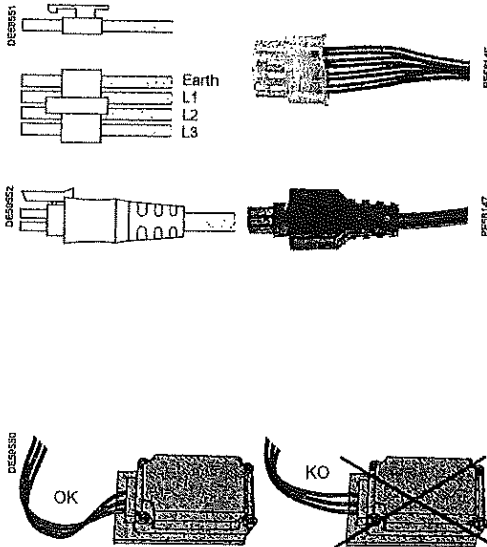
### Customer benefits

■ Voltage presence indicating system in compliance with the IEC 62271-206 standard (and also with the old IEC 61958 standard)

■ 9 references available to adapt to all applications

■ Voltage output option for source changeover switch application

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### Connection

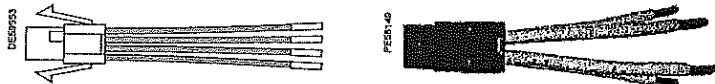
- The VPIS V2 includes a 4-pin connector for connection to the cubicle coupling elements: 1 pin for connection to earth and 1 pin for connection of the coupling elements on each phase
- The wires used have a cross-section of 1 mm<sup>2</sup>, with an outside diameter ranging between 2.5 mm and 2.9 mm
- The connector contacts are Minit 5556 type
- The connector housing is of MOLEX 39-01-4040 or 39-01-4041 type.
- The optional voltage output cable (supplied with the VPIS-VO, for the Flair 22D, 23D, 23DM and VD23) is 1 m long (MOLEX 79516 type cable): the output signals of this cable are of positive half-wave type for each phase (L1, L2 and L3). Two extensions of length 1 m and 2 m are available if needed for the optional voltage output:
  - EMS58422: extension cable for connection VPIS-VO - VD23/Flair 2xD, length 1 m
  - EMS58423: extension cable for connection VPIS-VO - VD23/Flair 2xD, length 2 m.

### Installation recommendation

It is important to respect certain rules regarding the installation of the wiring harness. It must be fixed so that in case of condensation, water flowing along the wires is guided to the ground and not to the wiring harness input of the VPIS.

### Power supply source changeover application

- The VPIS V2 is designed to be connected directly to the new VD23 voltage relay. The VPIS V2 connectors are therefore adapted to those of the VD23.
- The VPIS V2 can also be connected to the old-generation voltage relays of VD3H type, using a specific adapter (ref.: RCL62454).



### Characteristics

Electromagnetic compatibility		Standards	Criteria	Comments
Radlated Interference	Emitted radiation	IEC 62271-1 § 6.9.1.2		30 MHz-1 GHz
Immunity test	Immunity to electrostatic discharge	IEC 61000-4-2 IEC 62271-1 § 6.9.2.1	B	±6 kV contact discharge ±8 kV discharge in air
	Radlated, radio-frequency, electromagnetic field immunity	IEC 6100-4-3 IEC 62271-1 § 6.9.2.1	A	10 V/m 80% AM at 1 kHz 80 MHz to 3 GHz
	Immunity to electrical fast transients	IEC 6100-4-4 IEC 62271-1 § 6.9.2.3	B	±2 kV: mains power supply
	Slow damped oscillatory wave immunity	IEC 6100-4-18 IEC 62271-1 § 6.9.2.4	B	±1 kV in differential mode ±2.5 kV in common mode
	Radlated magnetic field immunity	IEC 6100-4-8 IEC 62271-1 § 6.9.2.1	B	Permanent magnetic field at 100 A/m, 1000 A/m during 1 s
	Immunity to voltage dips and short interruptions	IEC 6100-4-11 IEC 62271-1 § 6.9.3.3	B B B	100% (reduction) during 5 and 50 periods 60% (reduction) during 50 periods 30% (reduction) during 1 period
	<b>Climatic tests</b>		<b>Standards</b>	<b>Comments</b>
In storage	Temperature variation (cyclic with humidity, dry heat and cold)			Low temperature: -40°C (240 min.) Plateau temperature: +20°C (35 min.) High temperature: +85°C (180 min.) Variation: 2°C/min. Cycle time: 870 min. Complete test duration: 1000 hours
In operation	Temperature variation	IEC 60068-2-14		Low temperature: -25°C High temperature: +85°C Variation: 0.5°C/min. Plateau: 3 hours Number of cycles: 2
<b>Mechanical tests</b>		<b>Standards</b>	<b>Comments</b>	
Impacts	De-energized	IEC 61958-1 IEC 60068-2-75		2 Joules 3 Impacts in the weakest places

**VPIS V2 references selection table**

The range of use for each VPIS-V2 depends on Service voltage, network frequency and the switchgear capacitor. Here are typical range of use for 50Hz/60Hz. In case of use only for 50Hz or only 60Hz, the range of use could be expand, please consult the switchgear offer manager.

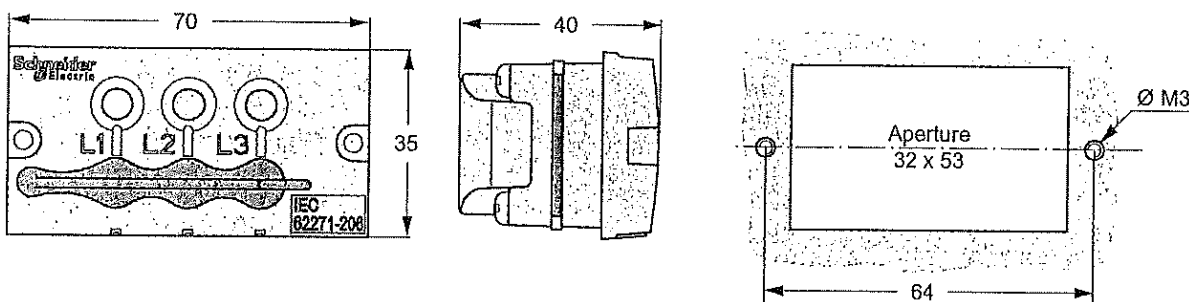
			3 kV	6 kV	10 kV	15 kV	20 kV	30 kV	40 kV
SM6-24	First choice	Without VO	VPI62403	VPI62404	VPI62407	VPI62407	VPI62408		
		With VO 50/60 Hz	VPI62413 (2kV-4kV)	VPI62414 (3.4 kV-6.3 kV)	VPI62417 (9 kV-17 kV)	VPI62417 (9 kV-17 kV)	VPI62418 (13 kV-25 kV)		
	Second choice	Without VO		VPI62405	VPI62406	VPI62408			
		With VO 50/60 Hz		VPI62415 (4 kV-8 kV)	VPI62416 (7 kV-13 kV)	VPI62418 (13 kV-25 kV)			
RM6	First choice	Without VO	VPI62403	VPI62404	VPI62406	VPI62407	VPI62408		
		With VO 50/60 Hz	VPI62413 (2.5 kV-5 kV)	VPI62414 (4 kV-7 kV)	VPI62416 (8 kV-15 kV)	VPI62417 (10.1 kV-24 kV)	VPI62418 (17 kV-24 kV)		
	Second choice	Without VO			VPI62405		VPI62407		
		With VO 50/60 Hz			VPI62415 (5 kV-11 kV)		VPI62417 (10.1 kV-24 kV)		
Ringmaster	First choice	Without VO	VPI62401	VPI62401	VPI62403	VPI62403			
		With VO 50/60 Hz	VPI62411 (3.4 kV-7.5 kV)	VPI62411 (3.4 kV-7.5 kV)	VPI62413 (7.1 kV-16 kV)	VPI62413 (7.1 kV-16 kV)			
	Second choice	Without VO		VPI62402					
		With VO 50/60 Hz		VPI62412 (5.8 kV-10 kV)					
Genie	First choice	Without VO		VPI62401	VPI62402				
		50/60 Hz		(4.5 kV-11 kV)	(7 kV-16 kV)				
	Second choice	Without VO			VPI62401				
		50/60 Hz			(4.5 kV-11 kV)				
SM6-36	First choice	Without VO				VPI62404	VPI62404	VPI62406	VPI62406
		With VO 50/60 Hz				VPI62414 (13 kV-24 kV)	VPI62414 (13 kV-24 kV)	VPI62416 (26 kV-50 kV)	VPI62416 (26 kV-50 kV)
	Second choice	Without VO			VPI62403	VPI62403		VPI62405	
		With VO 50/60 Hz			VPI62413 (9 kV-17 kV)	VPI62413 (9 kV-17 kV)		VPI62415 (21 kV-35 kV)	
CAS 36	First choice	Without VO			VPI62406	VPI62407	VPI62408	VPI62409	VPI62409
		With VO 50/60 Hz			VPI62418 (8.5 kV-14 kV)	VPI62417 (12 kV-20 kV)	VPI62418 (17 kV-30 kV)	VPI62419 (21 kV-42 kV)	VPI62419 (21 kV-42 kV)
	Second choice	Without VO					VPI62407	VPI62408	
		With VO 50/60 Hz					VPI62417 (12 kV-20.2 kV)	VPI62418 (17 kV-30 kV)	
MCSet 1, 2, 3 Nex 17 Nex 24 Evotech	First choice	Without VO	VPI62403	VPI62404	VPI62407	VPI62407	VPI62408		
		50/60 Hz	(2 kV-4 kV)	(3 kV-6.3 kV)	(9 kV-17 kV)	(9 kV-17 kV)	(13 kV-25 kV)		
	Second choice	Without VO		VPI62405	VPI62406	VPI62408			
		50/60 Hz		(4 kV-8 kV)	(7 kV-13 kV)	(13 kV-25 kV)			
F400	First choice	Without VO		F400-24 / F400-Xe (*)				F400-36 kV	
		50/60 Hz		VPI62402 (4 kV-6.2 kV)	VPI62404 (9 kV-13 kV)	VPI62405 (13 kV-19 kV)	VPI62406 (16 kV-27 kV)	VPI62407 (26 kV-60 kV)	VPI62407 (26 kV-60 kV)
Premset	First choice	Without VO	VPI62403	VPI62404	VPI62406	VPI62406			
		With VO 50/60 Hz	VPI62413 (2.5 kV-5.5 kV)	VPI62414 (4 kV-7 kV)	VPI62416 (6 kV-15 kV)	VPI62416 (8 kV-15 kV)			
PIX STD PIX MCC	First choice	Without VO	VPI62403	VPI62405	VPI62407	VPI62407	VPI62408		
		With VO 50/60 Hz	VPI62413 (2.1 kV-4 kV)	VPI62415 (4.6 kV-8.4 kV)	VPI62417 (9.3kV-17.6kV)	VPI62417 (9.3kV-17.6kV)	VPI62418 (13.8kV-25.5kV)		
	Second choice	Without VO			VPI62406				
		With VO 50/60 Hz			VPI62416 (6.6kV-12.1kV)				
FBX C, RE, R, T1	First choice	Without VO	VPI62403	VPI62403	VPI62406	VPI62406			
		With VO 50Hz	VPI62413 (3 kV-7 kV)	VPI62413 (3 kV-7 kV)	VPI62416 (6 kV-13 kV)	VPI62416 (10 kV-24 kV)	VPI62416 (10 kV-24 kV)		
FBX T2, CB,	First choice	Without VO	VPI62406	VPI62406	VPI62408	VPI62409	VPI62409		
		With VO 50Hz	VPI62416 (3 kV-7 kV)	VPI62416 (3 kV-7 kV)	VPI62418 (6 kV-13 kV)	VPI62419 (12 kV-24 kV)	VPI62419 (12 kV-24 kV)		

(\*) These references are no longer manufactured.

**ВЕРНО С ОРИГИНАЛА**

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## Dimensions



## Maintenance

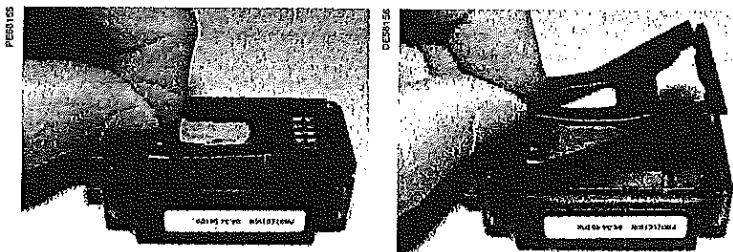
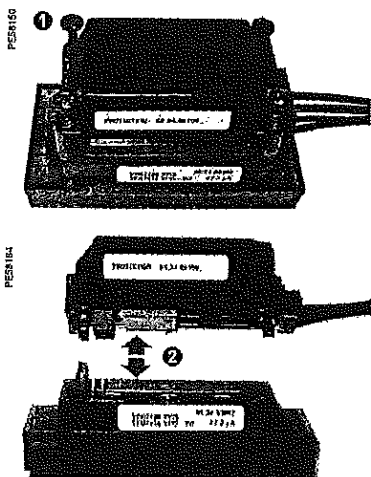
### Replacement of a complete VPIS V2

The whole VPIS V2 (Indicator + protection) must be replaced, in the event of:

- VPIS cable damaged
- Substation flooded.

#### Dismounting the VPIS V2

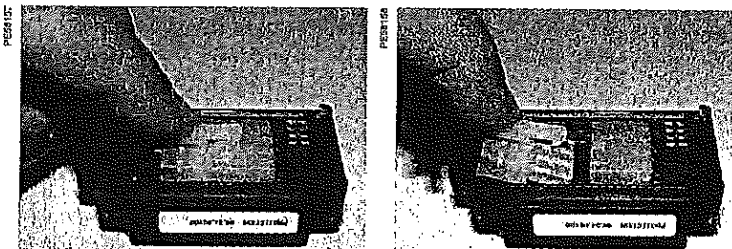
- 1 Loosen four screws on protection enclosure (Pozidrive no.1 or flat 4.5 screwdriver).
- 2 Separate the two parts of the VPIS enclosure.
- 3 Pull the tab of the seal to the rear to remove it from the connector clip and pass it above the latter.
- 4 Remove the seal from its housing to obtain access to the connector.



Note: if the seal is of the "closed" type, it remains fixed on the wiring harness and will be re-used at remounting. The "open" type seal supplied with the VPIS V2 is not used in this case.

#### Recovery of the existing wiring harness

- 5 Press on the connector clip and at the same time pull on it to disconnect it from the VPIS.

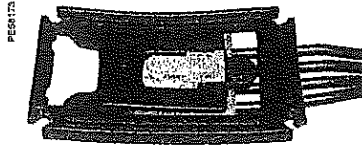


Put aside the two VPIS V2 elements in fault condition and replace them with those of a new VPIS V2. Then mount the new VPIS V2.

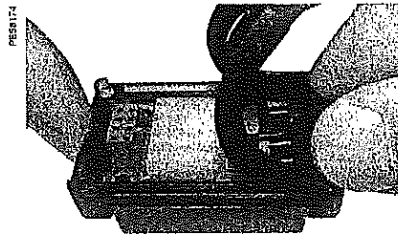
**Mounting the new VPIS V2**

Installation of the seal + wiring harness assembly on the protection part:

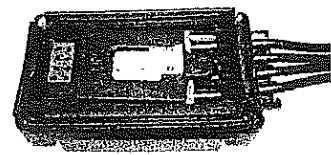
⑥ Pass the tab behind the connector clip.



⑦ Insert the wiring harness connector in the protection part of the VPIS V2.



⑧ Insert the seal in its housing.

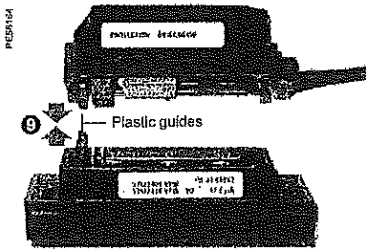


Note: check that the seal is correctly positioned over the entire perimeter of the enclosure to ensure satisfactory tightness.

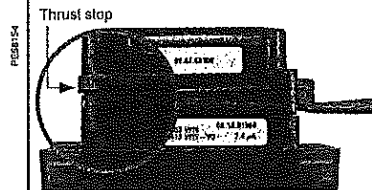
**Assembly of the indicator on the surge protection part**

⑨ Insert the two parts of the VPIS V2 over one another (indicator part over the protection part). During the assembly phase, the wiring harness stays in position in the protection part.

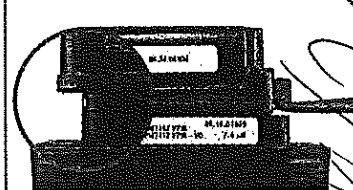
Note: use the plastic guides to ensure that the two items are positioned correctly. The guides should be aligned at the time of connection. If the positioning is not correct, this causes a poor electrical connection.



**Correct assembly**



**Incorrect assembly**



		Status of VPIS LEDs			Status of VPIS LEDs		
		L1	L2	L3	L1	L2	L3
Phases powered	L1	ON	OFF	OFF	OFF	OFF	OFF
	L2	OFF	ON	OFF	OFF	OFF	OFF
	L3	OFF	OFF	ON	ON	ON	OFF
	L1+L2+L3	ON	ON	ON	ON	ON	OFF

**Enclosure mounting**

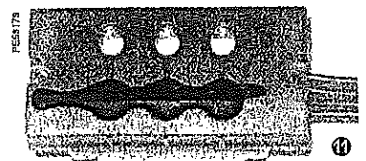
⑩ Place in position and tighten the 4 enclosure mounting screws (Pozidrive no. 1 or flat 4.5 screwdriver). Tighten the screws until the thrust stops in each corner of the protection enclosure are in contact with the indicator part.

Warning: do not tighten screws beyond what is mentioned above, otherwise the seal will be crushed and so tightness of VPIS will be degraded.

Note: when the seal is placed in position, it ensures that the screws are held in place in the protection part and prevents them from coming out of the enclosure.

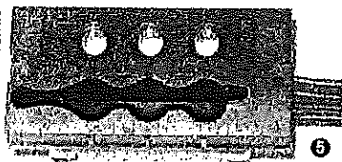
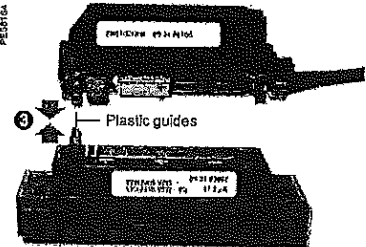
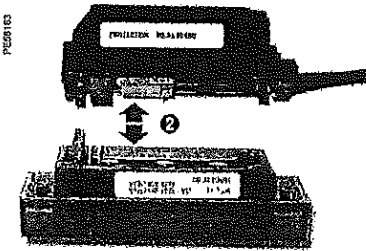
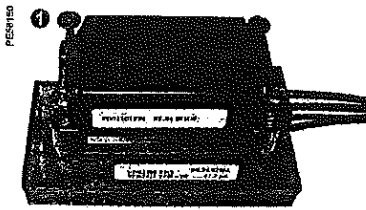
**Installation of the cover joint on the VPIS V2**

⑪ Install the joint concealing the phase comparator test points. Press on it firmly to place it correctly in position.



ВЯРНО С ОРИГИНАЛА

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## Replacement of the VPIS V2 indicator

The Indicator should be replaced if one or more indicator lamps are no longer lit when the MV network voltage seems to be present.

**NB:** never disconnect the wiring harness protection part when the MV network voltage is present.

### Dismounting the Indicator

- ① Loosen four screws on protection enclosure (Pozidrive no.1 or flat 4.5 screwdriver)

Note: when the seal is placed in position, it ensures that the screws are held in place in the protection part and prevents them from coming out of the enclosure.

- ② Separate the two parts of the VPIS enclosure and put aside the defective indicator.

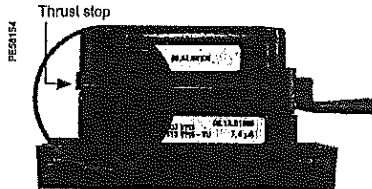
Note: the protection part is kept and its wiring harness should remain in position during the dismantling phase.

### Assembly of the new indicator on the surge protection part

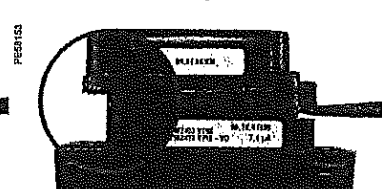
- ③ Insert the new indicator on the existing protection part. During the assembly phase, the wiring harness stays in position in the protection part.

Note: use the plastic guides to ensure that the two items are positioned correctly. The guides should be aligned at the time of connection. If the positioning is not correct, this causes a poor electrical connection.

#### Correct assembly



#### Incorrect assembly



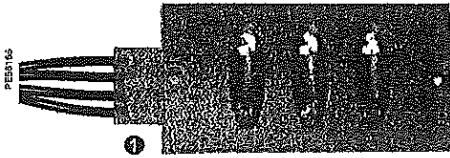
### Enclosure mounting

- ④ Place in position and tighten the 4 enclosure mounting screws (Pozidrive no.1 or flat 4.5 screwdriver). Tighten the screws until the thrust stops in each corner of the protection enclosure are in contact with the indicator part.

**Warning:** do not tighten screws beyond what is mentioned above, otherwise the seal will be crushed and so tightness of VPIS will be degraded.

### Installation of the cover joint on the VPIS V2

- ⑤ Install the joint concealing the phase comparator test points. Press on it firmly to place it correctly in position.



## Replacement of a VPIS V1 with a VPIS V2

### Dismounting the VPIS V1 wiring harness

1 Press on the wiring harness connector clip and then pull on the connector to disconnect it from the VPIS V1.

Note: the wiring harness will be re-used for the phase of remounting on the VPIS V2.

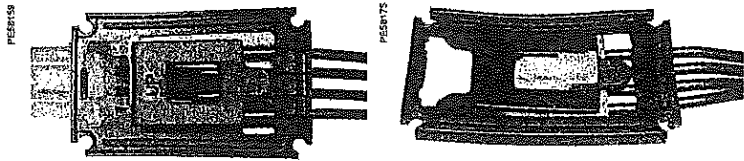
### Installation of the seal on the wiring harness

Note: this operation is necessary only in the case of replacement of a VPIS V1 with a VPIS V2. For the replacement of a VPIS V2, the seal is already assembled in factory on the wiring harness. This operation is therefore not necessary.

Note: the seal available with the VPIS V2 for the replacement is of the "open" type, so as to be able to be mounted on an existing wiring harness cable.

2 Insert the wiring harness wires in the opening parts of the seal (wireway).

3 Pass the tab behind the connector clip.



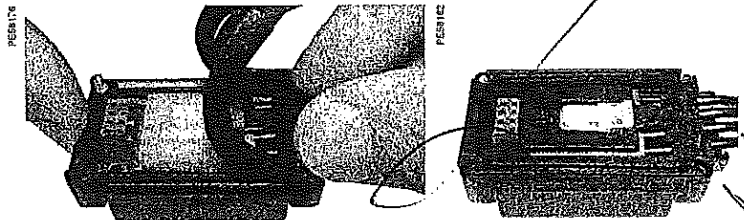
**NB:** the seal should be handled with care:

- Do not make the cable slide more than 10 cm in the seal
- Do not run stripped wires in the seal
- Do not run wires with crimped contacts in the seal.

### Installation of the seal + wiring harness assembly on the protection part:

4 Insert the wiring harness connector in the protection part of the VPIS V2.

5 Insert the seal in its housing.



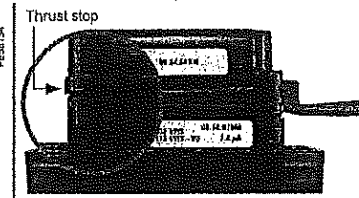
Note: check that the seal is correctly positioned over the entire perimeter of the enclosure to ensure satisfactory tightness.

### Assembly of the indicator on the surge protection part

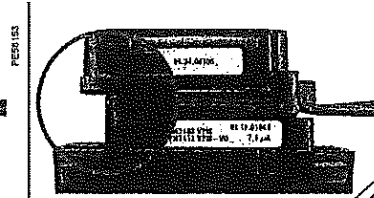
6 Insert the two parts of the VPIS V2 over one another (Indicator part over the protection part). During the assembly phase, the wiring harness stays in position in the protection part.

Note: use the plastic guides to ensure that the two items are positioned correctly. The guides should be aligned at the time of connection. If the positioning is not correct, this causes a poor electrical connection.

#### Correct assembly



#### Incorrect assembly



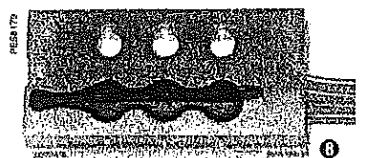
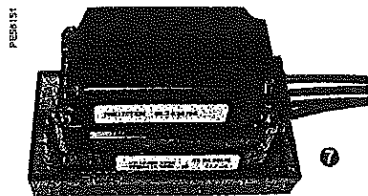
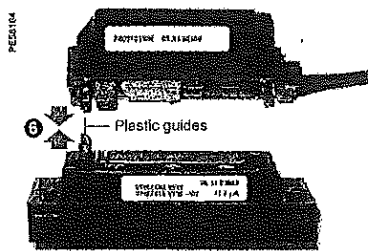
### Enclosure mounting

7 Place in position and tighten the 4 enclosure mounting screws (Pozidrive no. 1 or flat 4.5 screwdriver). Tighten the screws until the thrust stops in each corner of the protection enclosure are in contact with the indicator part.

Warning: do not tighten screws beyond what is mentioned above, otherwise the seal will be crushed and so tightness of VPIS will be degraded.

### Installation of the cover joint on the VPIS V2

8 Install the joint concealing the phase comparator test points. Press on it firmly to place it correctly in position.





ВЪРНО С ОРИГИНАЛА

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### Phase concordance unit

Via the VPIS, the phase concordance unit allows a check of the phase concordance between 2 energised functional input units on the same panel. It is a way of making sure that all three cables are each connected to the corresponding phase of the panel.

- **Balanced phase:** the phase concordance light remains unlit.
- **Unbalanced phase:** the phase concordance unit light is lit.

Phase concordance unit	Functional unit no. 1	Functional unit no. 2	Compatibility result	Corrective actions
 Phase concordance unit V1 Ref.: 51191954FA	V1	V1	OK	
	V2	V2	✗	Use a phase concordance unit V2
 Phase concordance unit V2 without adapter Ref.: VPI62421	V1	V2	✗	Replace VPIS V1 by VPIS V2 and use a phase concordance unit V2
	V1	V1	✗	OR use a phase concordance unit V2 with adapter
	V1	V1	✗	Replace both VPIS V1 units by VPIS V2 units
	V1	V1	✗	OR test with the phase concordance unit V1
	V2	V2	OK	

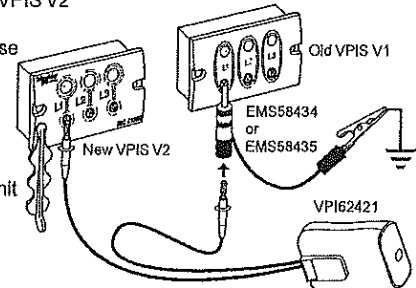
Comparison between a VPIS V1 and VPIS V2 is also possible with using an adapter on VPIS V1 side and a VPI62421 phase concordance unit.

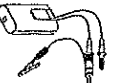
Adapter stand alone for VPIS V1:

- EMS58434 (2.5 - 7.7 kV)
- EMS58435 (8.8 - 23 kV).

Kit including a phase concordance unit + adapter:

- EMS58431 (15 - 20 kV ERDF)
- EMS58438 (8.8 - 23 kV).

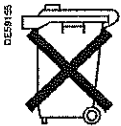


Phase concordance unit	Functional unit no. 1	Functional unit no. 2	Compatibility result	Corrective actions
 Phase concordance unit V2 with adapter Ref.: EMS58431 or EMS58438	V1	V1	✗	Replace both VPIS V1 units by VPIS V2 units OR test with the phase concordance unit V1
	V1	V2	OK	The adapter must be used on VPIS V1 side
	V2	V2	OK	Do not use the adapter

### Safety warning

- The VPIS indication alone is insufficient to ensure that the system is power off: if operating rules require, then appropriate voltage detectors in compliance with the IEC 61243-1, IEC 61243-2 and IEC 61243-5 standards must be used for this purpose.
- In certain situations of high luminosity, it may be necessary to improve the visibility of the indicator lamps, for example by creating shade around them.
- Never disconnect the surge protection part when the MV network voltage is present.

For more product information, consult the phase concordance unit user's manual (NT00214-FR-EN-xx).



Used electronic products must be deposited in the appropriate collection points

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Publishing: Schneider Electric Industries SAS  
 Design: Schneider Electric Industries SAS  
 Printing: Altavia St-Etienne - Made In France



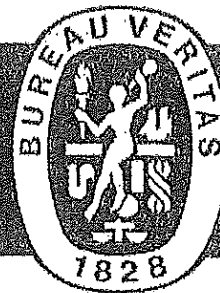
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<p>Schneider Electric Energy 381 Boulevard de la Résistance B.P. 84019 71040 MACON CEDEX 9 FRANCE</p>	<p><b>DECLARATION DE CONFORMITE ÜBEREINSTIMMUNGSERKLÄRUNG</b></p> <p>ETABLI CONFORMEMENT A LA NORME NF L 00-015 C ETABLIERT GEMÄSS STANDARD NF L 00-015 C</p>	<p>N° de la déclaration Nr. der Deklaration <b>16-004</b> Nombre de feuilles Anzahl der Seiten</p>
<p>Client : <i>WIS Munster</i> Kunde</p> <p>Etablissement : <i>Humboldtstr. 100</i> Firma <i>D-29633 Munster</i></p> <p>Numéro de commande : <i>S000101591</i> Auftrags Nr.</p> <p>Référence du contrat : <i>DS11-5400014522</i> Vertragsdaten</p> <p>Dénomination : <i>FBX Schaltanlage Kompakt und Erweiterbar</i> Bezeichnung</p> <p>Référence ou type : <i>FBX-C/24-16/C-C-T2 (1 St.)</i> Gerätenummer oder Typ <i>FBX-E/24-16/R (1 St.)</i> <i>FBX-E/24-16/T1-T1 (1 St.)</i></p> <p>N° de série ou de lot : <i>FBX-1537122/AMT, FBX-1536050/AMT</i> quantité : <i>3 St. Anlagen</i> Séries oder Chargen Nr. <i>FBX-1536048/AMT</i> Menge</p> <p>Numéro et date du bordereau de livraison : <i>3139-84134566 vom 22.09.2015</i> Nr. und Datum des Lieferscheins</p> <p>Nous déclarons que la fourniture citée est conforme aux exigences du contrat et que, après vérifications et essais, elle répond en tout point, aux exigences spécifiées, aux normes et règlements applicables, sauf exceptions, réserves ou dérogations énumérées dans la présente déclaration de conformité.</p> <p>Wir erklären hiermit, dass die vorliegende Lieferung in Übereinstimmung mit den Vertragsanforderungen hergestellt wurde und dass sie, nach Durchführung aller Kontrollen und Prüfungen, in jeder Hinsicht den in den diesbezüglich gültigen Normen und Vorschriften festgelegten Anforderungen, bis auf die in dieser Übereinstimmungserklärung genannten Ausnahmen, Vorbehalte oder Abweichungen, entspricht.</p>		
<p><b>Responsable Qualité Fournisseur</b> Qualitätsbeauftragter der Lieferfirma Nom et Fonction : <i>C. MANZAGOL</i> Responsable Qualité</p> <p>Name und Funktion <i>Qualitätsmanager</i></p> <p>Date: <i>27/01/2016</i> Datum:</p> <p>Signature: <i>[Signature]</i> Unterschrift:</p>	<p>Réservé à l'organisme de surveillance Nur für die beauftragte Prüfstelle</p> <p>Nom et Fonction Name und Funktion</p> <p>Date : Datum:</p> <p>Signature: Unterschrift:</p>	

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Certification



## SCHNEIDER ELECTRIC ENERGY FRANCE APPAREILLAGE MOYENNE TENSION

381 BOULEVARD DE LA RESISTANCE BP 84019 FR-71040 MACON CEDEX 9

*Bureau Veritas Certification Holding SAS - UK Branch certifies that the Management System of the above organisation has been audited and found to be in accordance with the requirements of the management system standards detailed below*

### ISO 9001:2015

*Scope of certification*

#### ENGINEERING AND PRODUCTION OF MEDIUM VOLTAGE SWITCHGEARS AND SWITCHBOARDS

Original cycle start date:	26-DECEMBER-2016
Expiry date of previous cycle:	NA
Certification / Recertification audit date:	NA
Certification / Recertification cycle start date:	31-JULY-2017

Subject to the continued satisfactory operation of the organisation's Management System, this certificate expires on: **30-JULY-2020**

Master Certificate No.: **195538-UK**  
Sub-Certificate No.: **195538-185-UK**

Version: No. 1, Revision date: **26-JULY-2017**

на основание чл. 2 от ЗЗЛД



0006

**Signed on behalf of BVCH SAS UK Branch**

Certification body address: 5<sup>th</sup> Floor, 66 Prescott Street, London E1 8HG, United Kingdom

Local office address: Rm. 23-25, 10/F, Pacific Trade Centre, 2 Kai Hing Road, Kowloon Bay, KLN, H.K.

Further clarifications regarding the scope of this certificate and the applicability of the management system requirements may be obtained by consulting the organisation.  
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ВЯРНО С ОРИГИНАЛА

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**BUREAU VERITAS**  
Certification



## SCHNEIDER ELECTRIC ENERGY FRANCE APPAREILLAGE MOYENNE TENSION

381 BOULEVARD DE LA RESISTANCE BP 84019 FR-71040 MACON CEDEX 9

*Bureau Veritas Certification Holding SAS - UK Branch certifies that the Management System of the above organisation has been audited and found to be in accordance with the requirements of the management system standards detailed below*

### ISO 14001:2015

Scope of certification

**ENGINEERING AND PRODUCTION OF MEDIUM VOLTAGE SWITCHGEARS AND SWITCHBOARDS. REFURBISHING SOLUTIONS AND SUPPLY OF SPARE PARTS FOR ELECTRICAL INSTALLATIONS**

Original cycle start date:	26-DECEMBER-2016
Expiry date of previous cycle:	NA
Certification / Recertification audit date:	NA
Certification / Recertification cycle start date:	31-JULY-2017

Subject to the continued satisfactory operation of the organisation's Management System, this certificate expires on: **30-JULY-2020**

Master Certificate No.: **195539-UK**  
Sub-Certificate No.: **195539-171-UK**

Version: No. 1, Revision date: **26-JULY-2017**

на основание чл. 2 от 33ЛД



0008

Signed on behalf of **BVCH SAS UK Branch**

Certification body address: 6<sup>th</sup> Floor, 66 Prescot Street, London E1 6HG, United Kingdom  
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## **SCHNEIDER ELECTRIC ENERGY FRANCE APPAREILLAGE MOYENNE TENSION**

381 BOULEVARD DE LA RESISTANCE BP 84019 FR-71040 MACON CEDEX 9

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### **OHSAS 18001:2007**

*Scope of certification*

**ENGINEERING AND PRODUCTION OF MEDIUM VOLTAGE SWITCHGEARS AND SWITCHBOARDS. REFURBISHING SOLUTIONS AND SUPPLY OF SPARE PARTS FOR ELECTRICAL INSTALLATIONS.**

Original cycle start date:	26-DECEMBER-2016
Expiry date of previous cycle:	NA
Certification / Recertification audit date:	NA
Certification / Recertification cycle start date:	31-JULY-2017

Subject to the continued satisfactory operation of the organisation's Management System, this certificate expires on: **30-JULY-2020**

Master Certificate No. : **OH-HK-10077**  
Sub-Certificate No.: **OH-HK-10077-158**

Version: No. 1, Revision date: **26-JULY-2017**

на основание чл. 2 от ЗЗЛД

**Signed on behalf of BVCH SAS UK Branch**

Certification body address: Rm. 23-25, 10/F, Pacific Trade Centre, 2 Kai Hing Road, Kowloon Bay, KLN, H.K.  
Local office address: Rm. 23-25, 10/F, Pacific Trade Centre, 2 Kai Hing Road, Kowloon Bay, KLN, H.K.

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# АБВ СТУДИО

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*Превод от английски език*

Алстом

Шнайдер Електрик

Париж, 09.07.2010 г.

Уважаеми клиенти,

Както вече знаете, на 07.07.2010 г. нашият консорциум на Алстом и Шнайдер Електрик финализира придобиването на дейностите по Пренос и Разпределение на Арева.

За нас е удоволствие да ви представим двата нови бизнеса на Алстом и Шнайдер Електрик – бизнеси, чиито хора и дейности добре познавате.

Алстом Грид, най-новият сектор на групата, сформиран от дейностите по Пренос на Арева Т&Д, става третото основно направление заедно с Алстом Транспорт и Алстом Пауър. Предоставя продукти, системи, автоматика и услуги на нашите комунални и големи промишлени клиенти, които отговарят на нуждите им за по-стабилни, ефективни, екологични и „смайт“ мрежи.

С водещи позиции в няколко пазара и технологии Алстом Грид се състои от над 20 000 служители и има оборот, надхвърлях 3,5 милиарда евро.

Обхватът на продуктите достига до 1200 kV AC. Системите включват AC и DC подстанции „до ключ“, мрежови взаимовръзки и усъвършенствана силова електроника. Решенията за автоматизиране на мрежите обхващат енергийни пазари, системи за управление на мрежите и генерирането, автоматика на подстанции, защита и контрол. Благодарение на научноизследователската дейност, която е в центъра на стратегията на този сектор, се подпомага интегрирането на възобновяемите източници на енергия в мрежата и изграждането на взаимовръзки със свръхвисоко напрежение, високо напрежение е-променлив ток и супер мрежи на бъдещето.

ВЯРНО С ОРИГИНАЛА

КО С ОРИГИНАЛА

АБВ СТУДИО ЕООД  
SOFIA, BULGARIA  
ABV STUDIO LTD

17/17

Като глобален специалист в сферата на управление на енергията Шнайдер Електрик има за цел да направи енергията безопасна, надеждна, ефективна и екологична за всички лица и организации.

Събирането на дейностите по Средно напрежение на Шнайдер Електрик и тези по Разпределение на Арева сформира нашият пети глобален бизнес: Енергетиката. Този бизнес ще има оборот от почти 5 милиарда евро, около 18 000 служители, стабилен научноизследователски екип и присъствие в повечето сегменти и географски райони.

Шнайдер Електрик ще може да предоставя системи и решения с добавена стойност, които отговарят на енергийните предизвикателства, които срещате в днешно време, например управление и ефективност на енергията, екологичност, интелигентно съставяне на мрежи и смарт мрежи.

Алстом и Шнайдер Електрик са заедно и изцяло отдадени на изпълнението на всички текущи договори, продължаването на съществуващи оферти по целия обхват на високо, средно и ниско напрежение и предоставянето на съответните услуги.

Вашето удовлетворение остава приоритет за нашите екипи, които се стремят да постигнат плавен преход от Арева Т&Д и непрекъснатост на бизнеса.

Ще бъдете запознати със съответните лица за връзка с Алстом и Шнайдер Електрик, които ще бъдат на разположение за всякакви въпроси от ваша страна и ще се погрижат за бъдещите ви бизнес нужди, както винаги.

Искрено благодарим за подкрепата ви и ще направим всичко по силите ни, за да заслужим доверието ви в бъдеще.

С уважение,

Анри Пупар-Лафарж  
Изпълнителен вицепрезидент,  
Президент, Алстом Грид  
/подпис – не се чете/

Мишел Крошон  
Изпълнителен вицепрезидент  
Шнайдер Електрик  
/подпис – не се чете/

Долуподписаният, Борис Христов Стойчев, удостоверявам верността на извършения от мен превод от английски на български език на приложния документ. Преводът се състои от 2 страници.

Борис Христов Стойчев

Преводчик:

ВЯРНО С ОРИГИНАЛА

ВЯРНО С ОРИГИНАЛА

17.12

**ALSTOM**

**Schneider**  
Electric

Paris, June 9<sup>th</sup>, 2010

Dear Customer,

As you know, on June 7, 2010, our Alstom and Schneider Electric consortium concluded its acquisition of the Transmission and Distribution activities of Areva.

It is now our great pleasure to introduce you to the two new businesses of Alstom and Schneider Electric - businesses whose people and activities you know well.

**Alstom Grid**, the group's newest sector, formed from the Transmission activities of Areva T&D, becomes a natural third pillar alongside Alstom Transport and Alstom Power. It delivers products, systems, automation and services to our utility and large industrial customers that answer their need for more stable, efficient, environmentally friendly and 'SMART' grids.

With leadership positions in several markets and technologies, Alstom Grid comprises over 20,000 employees and has a turnover in excess of 3.5 billion euros.

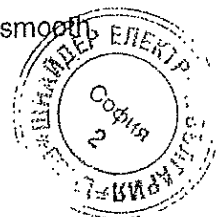
Products range to 1,200 kV AC. Systems include turnkey AC and DC substations, grid interconnections and advanced power electronics. Grid Automation solutions range from energy market, network and generation management systems, to substation automation, protection and control. The sector, with R&D at the heart of its strategy, is helping to integrate renewable energies into the grid and build the Ultra High Voltage and HVDC interconnections and supergrids of the future.

As a global specialist in energy management **Schneider Electric** is dedicated to making energy safe, reliable, efficient, and green for individuals and organizations. Bringing together Schneider Electric Medium Voltage and Areva Distribution activities forms our fifth global Business: Energy. This business will have a turnover close to 5 billion euros, around 18,000 employees, a robust R&D team, and a presence in most segments and geographies.

Schneider Electric will be able to provide value added systems and solutions meeting the energy challenges you are facing today, such as energy efficiency and management, environmental friendliness, grid intelligence, and SMARTGrids.

Alstom and Schneider Electric are jointly and fully committed to the execution of all on-going contracts, the continuation of existing offers across the high, medium and low voltage ranges and the provision of related services.

Your satisfaction remains the priority for our teams, who are focused on managing a smooth transition from Areva T&D and continuity of business.



ВЯРНО С ОРИГИНАЛА

ВЯРНО С ОРИГИНАЛА

You will be introduced to your dedicated contacts for both Alstom and Schneider Electric, who will be available to answer all your questions and are ready to take care of your future business needs, as usual.

We sincerely thank you for your continued support and will do our utmost to deserve your confidence in the future.

Yours sincerely,

Henri Poupart-Lafarge  
Executive Vice President,  
President, Alstom Grid

Michel Crochon  
Executive Vice-President  
Schneider Electric

на основание чл. 2 от ЗЗЛД

на основание чл. 2 от ЗЗЛД

ВЯРНО С ОРИГИНАЛА

ВЯРНО С ОРИГИНАЛА



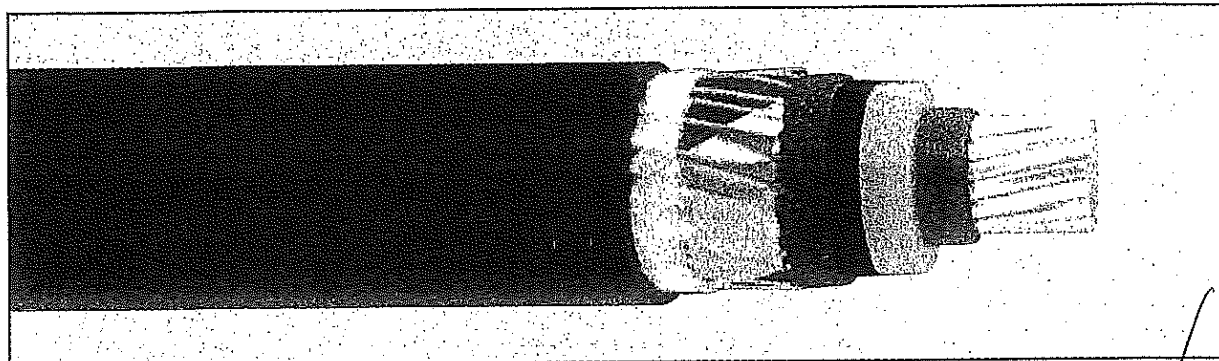
18.20



# NA2XS(F)2Y

U<sub>0</sub>/U - 12/20 kV

Силов кабел средно напрежение  
с надлъжна водоустойчивост,  
XLPE изолация и Al жила



## ПРИЛОЖЕНИЕ

Силов кабел с омрежена полиетиленова изолация с водоблокираща лента в областта на екрана за изграждане на градски и районни електрозахранващи мрежи, за захранване на трансформаторни подстанции в промишлени предприятия и обекти, предназначен за пренасяне и разпределение на електроенергия при номинални напрежения U<sub>0</sub>/U - 12/20 kV с честота 50 Hz.

## ТЕХНИЧЕСКИ ДАННИ

- произведен съгласно DIN VDE 0276 част 620 и HD 620 S1
- отговарящ на изискванията за надлъжна водоустойчивост
- експлоатация при температури на околната среда от - 30°C до + 70°C
- монтаж при температури, не по-ниски от - 20°C
- мин. радиус на еднократно огъване - 15 D
- за полагане в земя, положени в изкоп, помещения, тунели, канали
- макс. продължителна температура на нагряване на токопроводимите жила + 90°C
- макс. допустима температура на нагряване на токопроводимите жила в режим на късо съединение + 250°C, за не повече от 5 s
- изпитвателно напрежение за 12/20 kV - променливо 30 kV, постоянно 96 kV
- цвят на защитната обвивка - черен

- ниво на частичните разряди при напрежение 2 U<sub>0</sub> - 2 pC
- изпитвателно напрежение след полагане и монтаж на кабелите в продължение на 60 min:  
- променливо 2 U<sub>0</sub>, 45 - 65 Hz или  
- променливо 3 U<sub>0</sub>, 0,1 Hz

## КОНСТРУКЦИЯ НА КАБЕЛА

- усукано уплътнено алуминиево жило, клас 2 по DIN VDE 0295
- вътрешен екструдирани полупроводим слой
- омрежена полиетиленова изолация
- външен екструдирани полупроводим слой
- водоблокираща полупроводима лента
- екран от медни телове и медна контактна лента
- разделителна лента
- полиетиленова обвивка

Артикулен №	Брой и сечения на жилата NA2X(F)SY	Форма на жилото	Дебелина на изолацията	Дебелина на обвивката	Диаметър на кабела	Тегло на медта	Тегло на алуминия	Тегло на кабела
	бр x мм <sup>2</sup>		мм	мм	мм	кг/км	кг/км	кг/км
	12/20 kV							
011362079	1x50/16	rm	5,5	2,5	33	182	145	930
011362082	1x70/16	rm	5,5	2,5	34	182	203	1040
011362085	1x95/16	rm	5,5	2,5	36	182	276	1160
011362088	1x120/16	rm	5,5	2,5	37	182	348	1290
011362091	1x150/16	rm	5,5	2,5	38	182	435	1390
011362100	1x150/25	rm	5,5	2,5	39	283	435	1480
011362094	1x185/16	rm	5,5	2,5	40	182	537	1550
011362103	1x185/25	rm	5,5	2,5	41	283	537	1640
011362097	1x240/16	rm	5,5	2,5	40	182	696	1750
011362106	1x240/25	rm	5,5	2,5	43	283	696	1840
011362109	1x300/25	rm	5,5	2,5	45	283	870	2110
011362112	1x400/35	rm	5,5	2,5	48	394	1160	2540
011362115	1x500/35	rm	5,5	2,5	52	394	1450	2920

ФИЛКАБ

63

# HELLENIC CABLES S.A.

HELLENIC CABLE INDUSTRY S.A.

Registered Office: Athens Tower, 2<sup>nd</sup> Building, 2-4 Mesogeion Ave., Athens GR 11527, Greece

Head Office: 33, Amarousiou - Halandriou Str., Maroussi GR 151 25, Greece, Tel.: (+30)-210-6787900, Fax: (+30)- 210-6787406

Code No. S.A.: 2131/06/B/86/19

Ministry of Development

VAT Number: EL 094039428

G.E.M.I. Number: 281701000

Tax office: FAE Athens

E-mail: info@cablel.vionet.gr

www.cablel.com

## Certificate of conformance

No 287/2015

Date 08-11-2015

ORDER No	PO7933
CUSTOMER	FILKAB JSCO
TYPE OF CABLE	NA2XS(F)2Y
CROSS SECTION	1X50 RM
WORKING VOLTAGE	12/20 KV
SPECIFICATIONS	VDE 0276/620
SALES ORDER No	467796

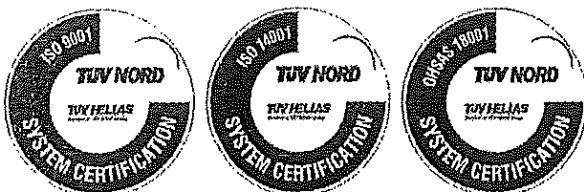
WE CERTIFY THAT:

1. The construction of the above mentioned cable was effected according to the above specification.
2. All routine, special and type tests foreseen by the above specification were carried out satisfactory.
3. All measured values were compared with those data and values given by the above specification and found to meet the requirements.

HELLENIC CABLES S.A.  
QUALITY CONTROL

на основание чл. 2 от ЗЗЛД

ENG. A. POULOS



**CABLEL**  
HELLENIC CABLES  
GROUP

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Tax office: FAE Athens  
E-mail: info@cablel.vionet.gr  
www.cablel.com

Date 08-11-2015

## ROUTINE TEST REPORT

ORDER No PO7933  
CUSTOMER FILKAB JSCO  
TYPE OF CABLE NA2XS(F)2Y  
CROSS SECTION 1X50 mm<sup>2</sup>  
WORKING VOLTAGE 12/20 KV  
SPECIFICATIONS VDE 0276/620  
SALES ORDER No 467796

No of DRUM	LENGTH m	DC RESISTANCE at 20°C in Ω/Km (max measured)		PARTIAL DISCHARGE at 24 KV AC in pC
		OF CONDUCTOR	OF CWS	
1039173001	2026	0.638	1.12	1.1
1039173002	2005	0.640	1.14	1.0

**SHEATH MARKING: • CABLEL 0317 2015 NA2XS(F)2Y 1X50RM/16 12/20 KV ◀VDE▶ 0276**

All of the above drums were subjected to a high voltage test of 42 KV AC for 5 min between conductor and screen without any breakdown.

Specified values: Max conductor resistance is 0.641 Ω/Km, max cws resistance is 1.15 Ω/Km and max partial discharge is 2 pC at 24 KV AC after 1 minute at 28.8 KV AC.

The sheath of the above was spark tested at 15 KV AC.

All of the above tests were found to be satisfactory, and the measured values found to meet the requirements of the specifications.

HELLENIC CABLES S.A.

на основание чл. 2 от ЗЗЛД

A. POULOS

ВЯРНО С ОРИГИНАЛА

**CABLEL®**  
HELLENIC CABLES  
G R O U P

1722

# HELLENIC CABLES S.A.

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E-mail: info@cablel.vionet.gr

www.cablel.com

Date 08-11-2015

## TESTS ON SAMPLES OF XLPE INSULATED CABLES

ORDER No PO7933  
 CUSTOMER FILKAB JSCO  
 TYPE OF CABLE NA2XS(F) 2Y  
 CROSS SECTION 1X50 mm<sup>2</sup>  
 WORKING VOLTAGE 12/20 KV  
 SPECIFICATIONS VDE 0276/620  
 SALES ORDER No 467796  
 SAMPLE FROM DRUM No 1039173001

	CHARACTERISTICS	specified values	measured values
<b>A</b>	<b>Check of dimensions</b>		
1	Number of wires min	6	12
	Conductor diameter mm min-max	7.7-8.6	8.4
2	Inner semiconductive thickness mm	min 0.3	0.50
3	Insulation thickness min average mm	5.5	5.6
	Insulation thickness minimum at any point mm	4.85	5.56
	Difference max thick-min thick	max 0.7	0.26
	Diameter over insulation mm min- max	20.2-21.7	20.9
4	Extruded outer semiconductive thickness min- max	0.3-0.6	0.36-0.49
5	Difference diameter max-min mm	max 0.5	0.20
6	SC waterblocking tape helically applied with overlap		OK
7	Copper wire screen		39X0.70
	Copper tape mm		0.1X10
	Cross section mm <sup>2</sup>	min 16	16.1
	Mean distance between wires mm	max 4	1.2
	Distance between wires mm	max 8	1.7
8	Tape PP-SR with overlap		OK
9	Oversheath MDPE minimum mm	2.03	2.26
<b>B</b>	<b>Hot set test for XLPE insulation elongat.</b>		
	200°C for 15min under 0.2 N/mm <sup>2</sup> stress %	max 175	60
	without load after cooling elongation %	max 15	0
<b>C</b>	<b>Shrinkage measurement of sheath PE</b>		
	mm	max 7	2.6

All of the above measurements were satisfactory, and the measured values found to meet the requirements of the specifications.

HELLENIC CABLES S.A.

QUALITY CONTROL

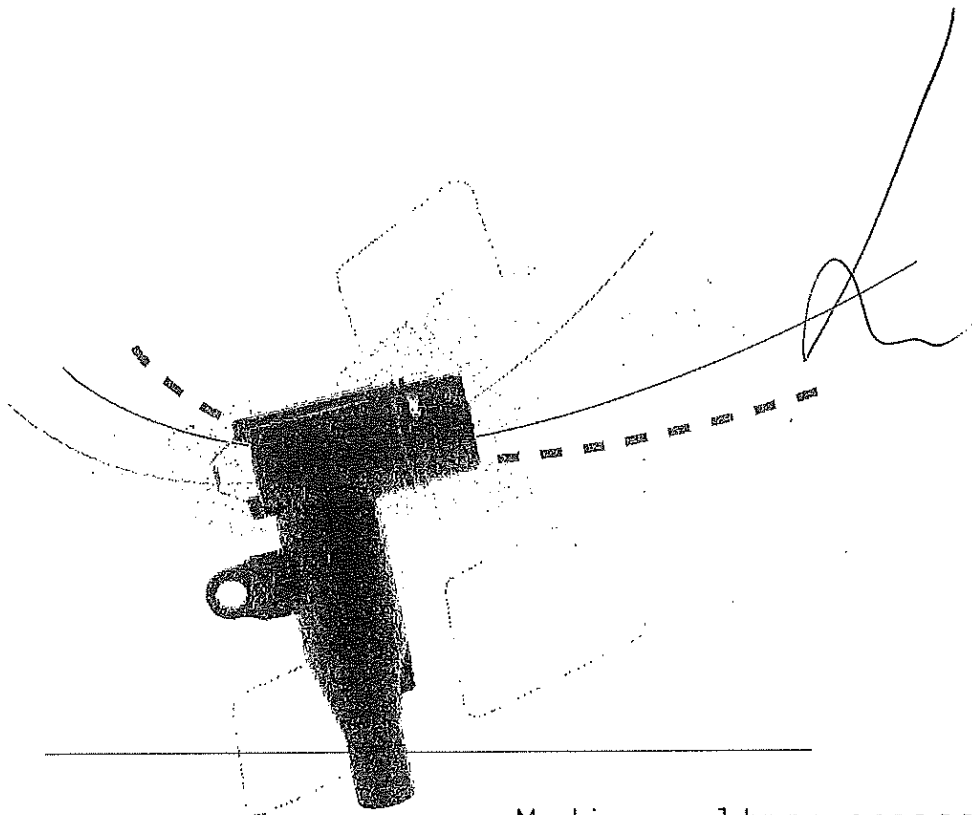
на основании чл. 2 от ЗЗЛД

A. POULOS

**CABLEL**  
 HELLENIC CABLES  
 GROUP

# Euromold

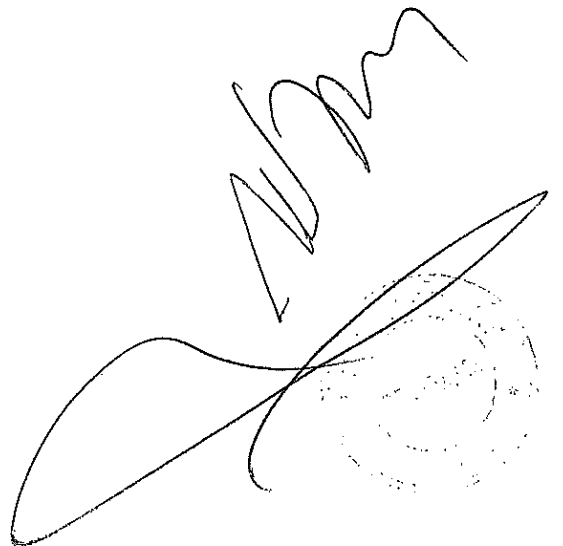
a Nexans company



Medium voltage separable  
connectors and bushings  
- Interface A -

Catalogue 2012

1725



**Nexans Network Solutions  
Div. Euromold  
COMPANY PRESENTATION**



**EUROMOLD**

Euromold is the leading European specialised designer, manufacturer and distributor of prefabricated cable accessories for medium voltage energy distribution. Euromold provides a complete range of accessories for underground cables: premoulded EPDM rubber connectors for cables and epoxy bushings for transformers and switchgear, as well as a large range of cold-shrinkable terminations and joints from 12 to 42 kV. Euromold is also the manufacturer of electrical components for the high voltage accessories of the Nexans group.

**ISO 9001 Certificate**

Since 1992, Euromold's commitment to quality is demonstrated by its ISO 9001 certification.

**International standards**

All our products meet the International standards like CENELEC HD 629.1, CENELEC EN 50180, IEC 60137, IEC 60502-4... or country specifications. Official certificates, CESI, KEMA, ATEX... prove the conformity of our products. Long duration tests of existing or new products are continuously performed in our test fields.

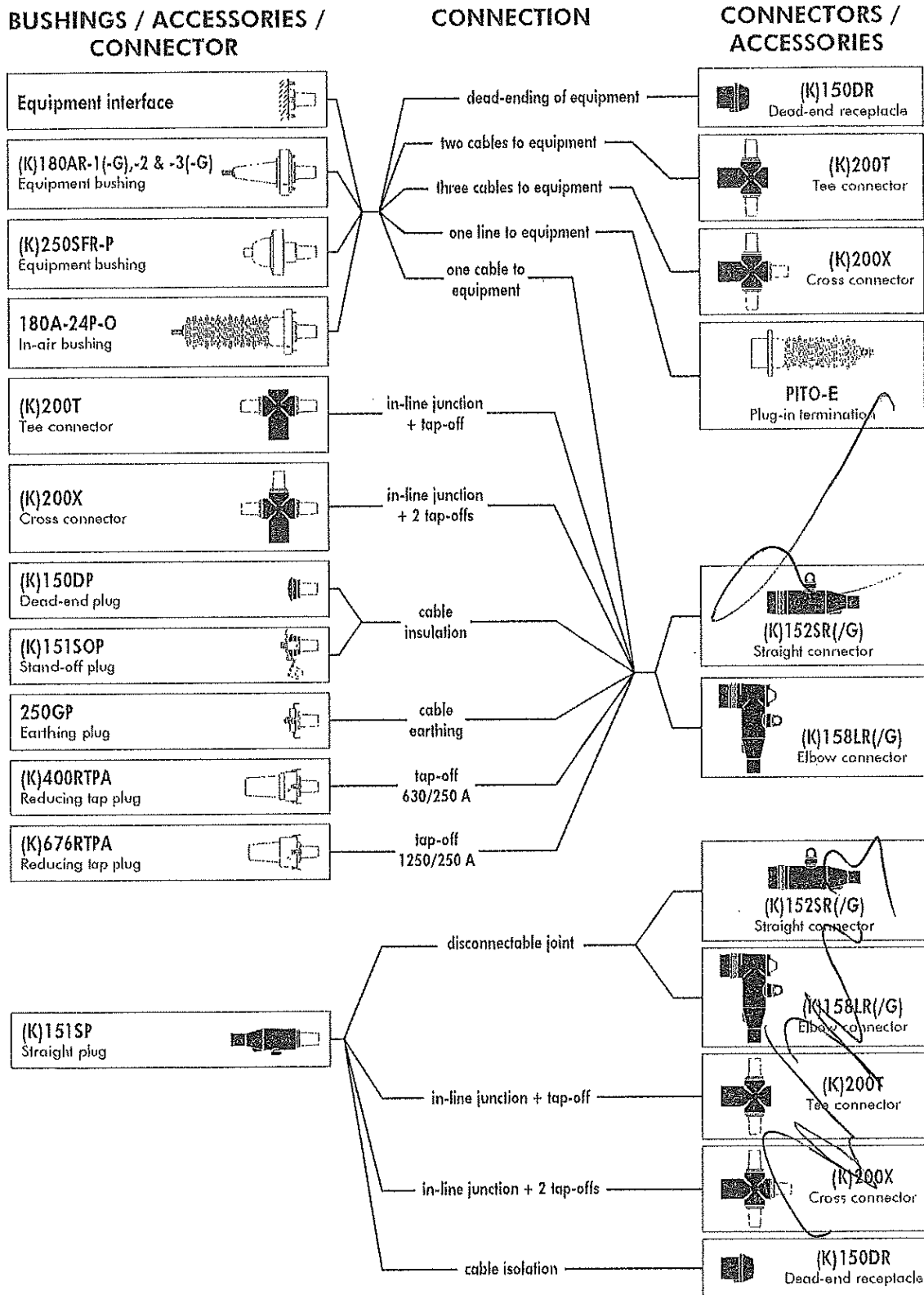
**Laboratory accreditation**

Since June 2000, Euromold's independent ELAB laboratory obtained the BELAC accreditation no. 144-TEST conform with the European standards for laboratories ISO 17025 for electrical testing of low and medium voltage cable accessories according to the international standards HD 623 and HD 629.

While every care is taken to ensure that the information contained in this publication is correct, no legal responsibility can be accepted for any inaccuracy. Nexans Network Solutions N.V. - Div. Euromold reserves the right to alter or modify the characteristics of its products described in this catalogue as standards and technology evolve.

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# Connecting possibilities



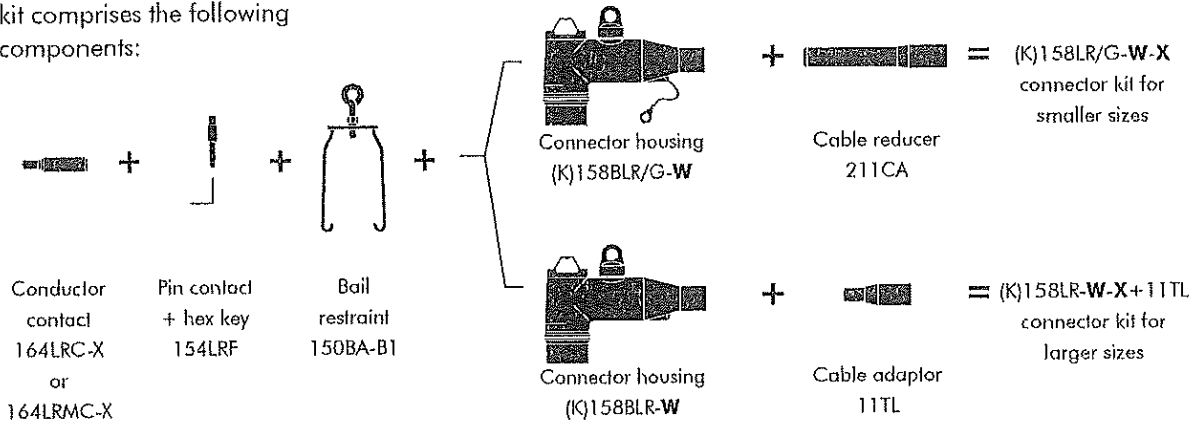
01/2012

**Euromold**  
a Nexans company

1727

## Kit contents

The complete (K)158LR or (K)158LR/G elbow connector kit comprises the following components:



## Ordering instructions

Select the part number which gives the best centring to the cable core insulation diameter and substitute **X** using table X, according to the conductor size and type.  
Add a 'K' for use up to 24 kV.

### Example:

The copper wire screened cable is 24 kV, 50 mm<sup>2</sup> stranded aluminium with a diameter over core insulation of 20.4 mm. Order a K158LR-FG-50(K)M-12-2+11TL elbow connector kit.

**For an option with a bolted conductor contact,** specify the ordering part number below.

Table W


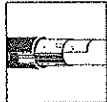

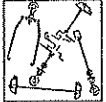


Ordering part number	Dia. over core insulation (mm)	
	min	max
158LR/G-11-X	12.6	16.1
158LR/G-13-X	14.6	18.7
158LR-FB-X+11TL	17.5	20.2
158LR-FG-X+11TL	18.4	21.2
158LR-GA-X+11TL	19.7	22.5
158LR-GAB-X+11TL	21.0	23.8
158LR-GH-X+11TL	23.2	26.4

Table X

Conductor sizes (mm <sup>2</sup> )	Aluminium		Copper
	DIN hexagonal	Deep indent	DIN hexagonal
16	-	-	16(K)M-11-2
25	25(K)M-12-2	25KM-12-1	25(K)M-11-2
35	35(K)M-12-2	35KM-12-1	35(K)M-11-2
50	50(K)M-12-2	50(K)M-12-1*	50(K)M-11-2
70	70(K)M-12-2	70(K)M-12-1*	70(K)M-11-2
95	95(K)M-12-2*	95(K)M-12-1*	95(K)M-11-2

\* The 158LR-FB is not compatible with these conductor contacts.

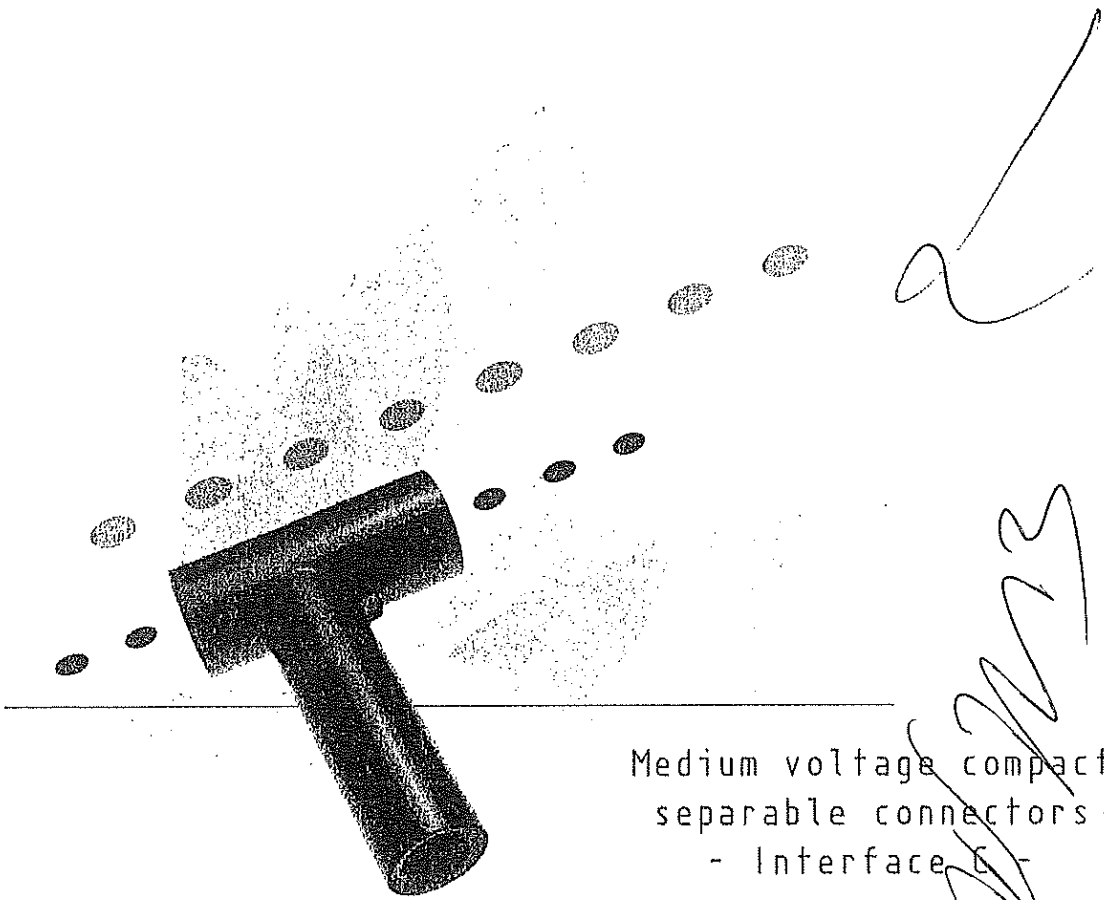
Ordering part number	Dia. over core insulation (mm)	Conductor sizes (mm <sup>2</sup> )
158LR/G-13-25.95-14-5	14.6 - 22.7	35 - 70
158LR-GAS-50.95-14-5+11TL	19.7 - 25.4	25 - 95

					
For use with copper tape screened cables. Order: Kit MT.	For use with Alupe or C 33-226 cables. Please contact our representative.	For use with other cable types. Please contact our representative.	For adapted bail restraints: see 'Bail restraints and typical applications'.	For outdoor applications. Order: +MWS.	Component: can be ordered individually.



# Euromold

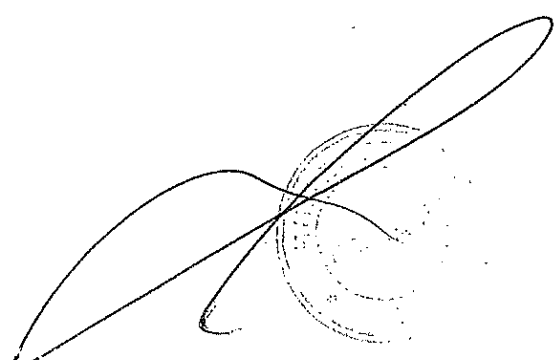
a Nexans company



Medium voltage compact  
separable connectors  
- Interface C -

Catalogue 2011

6729





**Nexans Network Solutions  
Div. Euromold  
COMPANY PRESENTATION**



**EUROMOLD**

Euromold is the leading European specialised designer, manufacturer and distributor of prefabricated cable accessories for medium voltage energy distribution. Euromold provides a complete range of accessories for underground cables: premoulded EPDM rubber connectors for cables and epoxy bushings for transformers and switchgear, as well as a large range of cold-shrinkable terminations and joints from 12 to 42 kV. Euromold is also the manufacturer of electrical components for the high voltage accessories of the Nexans group.

**ISO 9001 Certificate**

Since 1992, Euromold's commitment to quality is demonstrated by its ISO 9001 certification.

**International standards**

All our products meet the International standards like CENELEC HD 629.1, CENELEC EN 50180, IEC 60137, IEC 60502-4... or country specifications. Official certificates, CESI, KEMA, ATEX... prove the conformity of our products. Long duration tests of existing or new products are continuously performed in our test fields.

**Laboratory accreditation**

Since June 2000, Euromold's independent ELAB laboratory obtained the RELAC accreditation no. 144-TEST conform with the European standards for laboratories ISO 17025 for electrical testing of low and medium voltage cable accessories according to the international standards EN 50393, IEC 60502-4, IEC 61442 and HD 629.

While every care is taken to ensure that the information contained in this publication is correct, no legal responsibility can be accepted for any inaccuracy. Nexans Network Solutions N.V. - Div. Euromold reserves the right to alter or modify the characteristics of its products described in this catalogue as standards and technology evolve.

1730

# SEPARABLE CONNECTORS

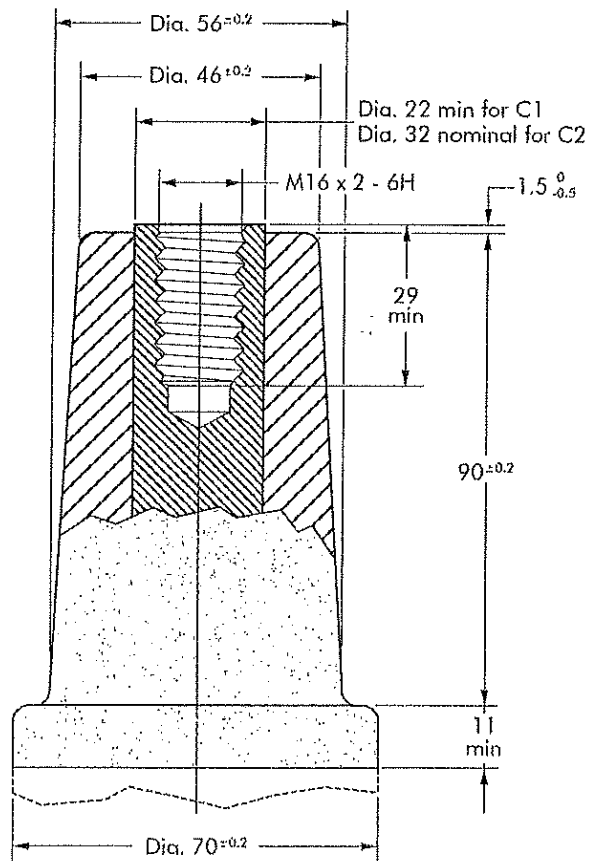
## INTERFACE C

### Table of contents

- 430TB - tee connector
- 484TB - tee connector
- 300PBM - coupling connector
- 430TBM-P2/P3 - dual/triple cable arrangement
- 804PB - coupling connector
- 300SA - surge arrester
- 800SA - surge arrester
- 400TR and 800TR - test rod
- 400TK and 400SW installation tools
- Accessories
- Possible arrangements

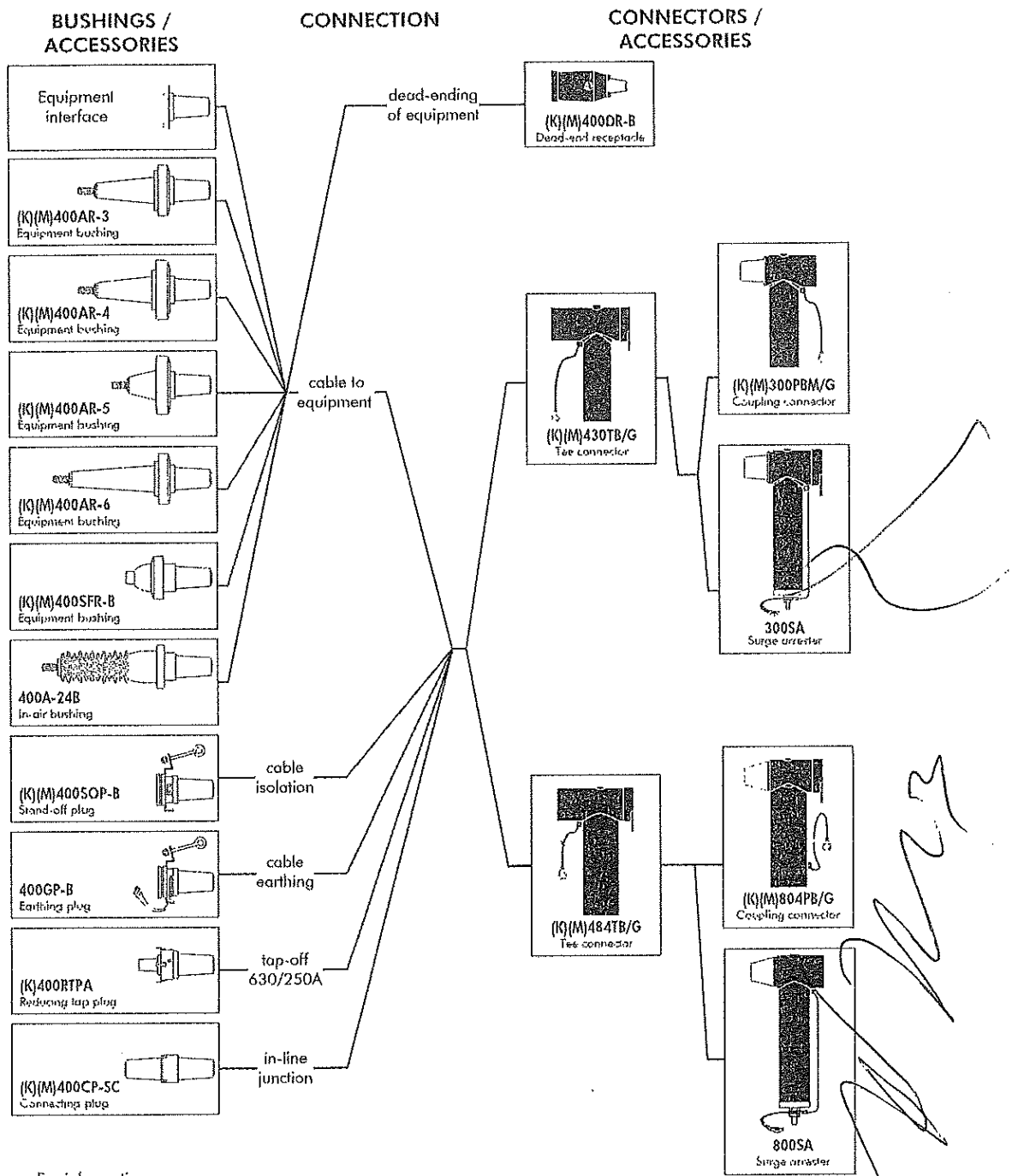
### Interface C1 & C2

Dimensions according to European CENELEC EN 50180 and 50181 (in mm).



08/2011

# Connecting possibilities



For information on our bushings please refer to our bushing catalogue.

## 430TB INTERFACE C TEE CONNECTOR

Up to 36 kV  
630 A (800 A)

6/10 (12) kV  
6.35/11 (12) kV  
8.7/15 (17.5) kV  
12/20 (24) kV  
12.7/22 (24) kV  
18/30 (36) kV  
19/33 (36) kV

### Application

Separable tee shape connector (bolted type) designed to connect polymeric insulated cable to equipment (transformers, switchgear, motors, ...). Also connects cable to cable when using the appropriate mating parts.

### Technical characteristics

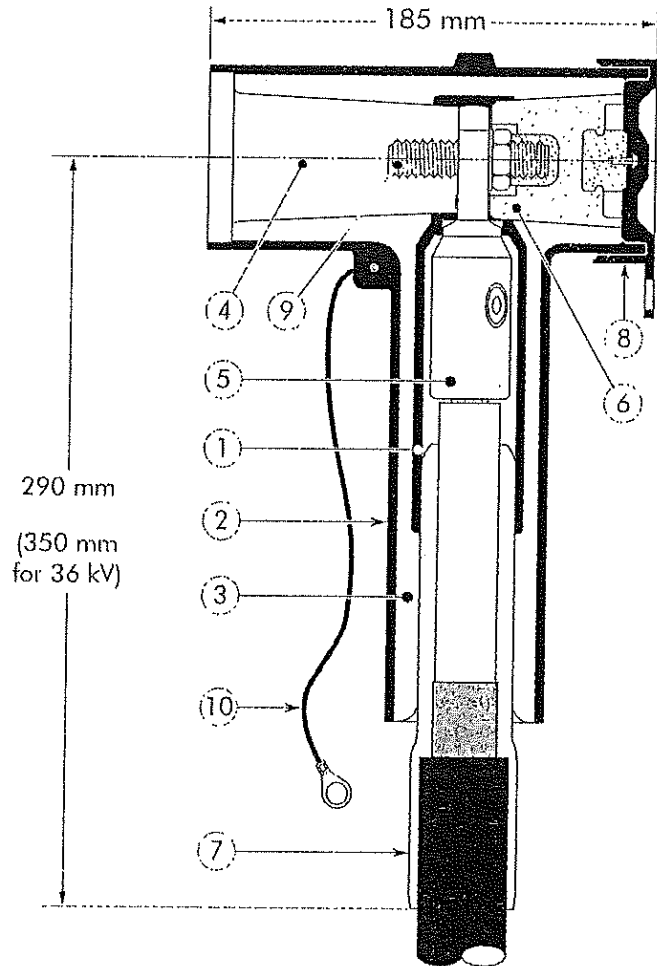
- A thick conductive EPDM jacket provides a total safe to touch screen.
- Each separable connector is tested for AC withstand and partial discharge prior to leaving the factory.

### Design

Separable connector comprising:

1. Conductive EPDM insert.
2. Conductive EPDM jacket.
3. Insulating EPDM layer moulded between the insert and the jacket.
4. Type C interface as described by CENELEC EN 50180 and 50181.
5. Conductor connector.
6. Basic insulating plug (with VD point).
7. Cable reducer.
8. Conductive rubber cap.
9. Clamping screw.
10. Earthing lead.

The screen break design enables cable outer sheath testing without removing or dismantling the connector.



### Specifications and standards

The 430TB separable connector meets the requirements of CENELEC HD 629.1.

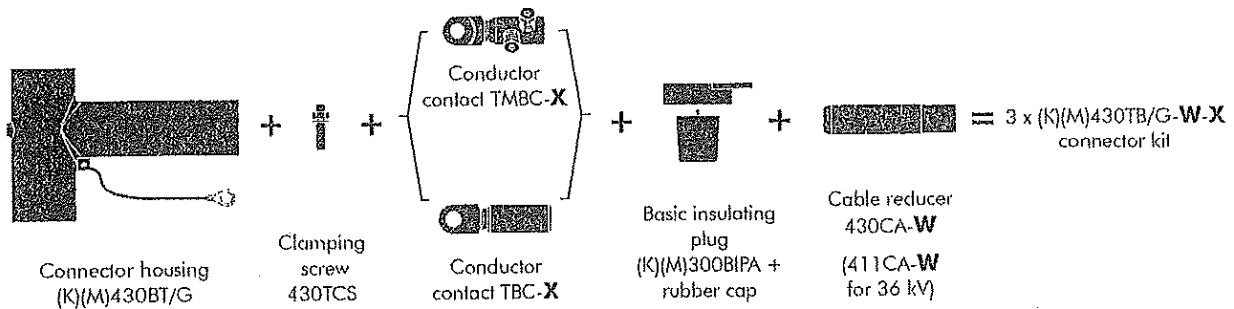
Separable connector type	Voltage $U_m$ (kV)	Current $I_r$ (A)	Current $I_r$ (A) When installed on an appropriate equipment bushing and when using a copper (-11-2) or a bolted (-12-5 or -14-5) conductor contact	Conductor sizes (mm <sup>2</sup> )	
				min	max
430TB/G	12	630	800	35	300
K430TB/G	24	630	800	35	300
M430TB/G	36	630	800	50	240

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## Kit contents

The complete (K)(M)430TB/G tee connector kit comprises 3 x the following components:

The kit also comprises silicone grease, field control mastic, installation rod, installation instructions and crimp chart.



## Ordering instructions

To order the tee connector, select the ordering part number which gives you the best centring of your core insulation diameter and substitute **X** using table X, according to your conductor size and type.

### Example:

The cable is 24 kV, 150 mm<sup>2</sup> compact stranded copper with a diameter over core insulation of 27.5 mm.  
Order 3 x K430TB/G-18-95.240-14-5 tee connector kit.

Table W

Ordering part number	Voltage (Um) (kV)	Dia. over core insulation (mm)	
		min	max
3 x 430TB/G-11-X	12	12.0	17.5
3 x 430TB/G-16-X	12	17.0	23.5
3 x 430TB/G-18-X	12	19.0	32.6
3 x K430TB/G-11-X	24	12.0	17.5
3 x K430TB/G-16-X	24	17.0	23.5
3 x K430TB/G-18-X	24	19.0	32.6
3 x M430TB/G-11-X	36	12.0	17.5
3 x M430TB/G-15-X	36	16.0	22.0
3 x M430TB/G-19-X	36	20.0	26.5
3 x M430TB/G-22-X	36	23.5	31.0
3 x M430TB/G-25-X	36	26.5	32.5
3 x M430TB/G-27-X	36	28.5	37.5

Table X

Conductor sizes (mm <sup>2</sup> )	Aluminium conductor		Aluminium and copper conductor	Copper conductor
	DIN hexagonal	Deep indent	Bolted	DIN hexagonal
35	35(K)M-10-2	35KM-10-1	16.95-14.5	35(K)M-11-2
50	50(K)M-10-2	50(K)M-10-1		50.150-14.5
70	70(K)M-10-2	70(K)M-10-1	95.240-14.5	70(K)M-11-2
95	95(K)M-10-2	95(K)M-10-1		120.300-14.5
120	120(K)M-10-2	120(K)M-10-1	160(K)M-11-2	120(K)M-11-2
150	150(K)M-10-2	150(K)M-10-1		185(K)M-11-2
185	185(K)M-10-2	185(K)M-10-1	240(K)M-11-2	185(K)M-11-2
240	240(K)M-10-2	240(K)M-10-1		300(K)M-11-2
300	300(K)M-10-2	-		300(K)M-11-2

For use with copper tape screened cables. Order: Kit MT.	For use with Alupe or C 33-226 cables. Please contact our representative.	For use with easy strip semi-conductive screened cables. Order: Field control mastic (type MFC).	For use with other cable types. Please contact our representative.	For applications outdoors and in humid climate. Order: +MWS.	When installed on an appropriate equipment bushing: 800 A continuously.

## 484TB INTERFACE C TEE CONNECTOR

Up to 42 kV

630 A (1250 A)

6/10	(12)	kV
6.35/11	(12)	kV
8.7/15	(17.5)	kV
12/20	(24)	kV
12.7/22	(24)	kV
18/30	(36)	kV
19/33	(36)	kV
20.8/36	(42)	kV

### Application

Separable tee shape connector (bolted type) designed to connect polymeric insulated cable to equipment (transformers, switchgear, motors, ...).

Also connects cable to cable when using the appropriate mating parts.

### Technical characteristics

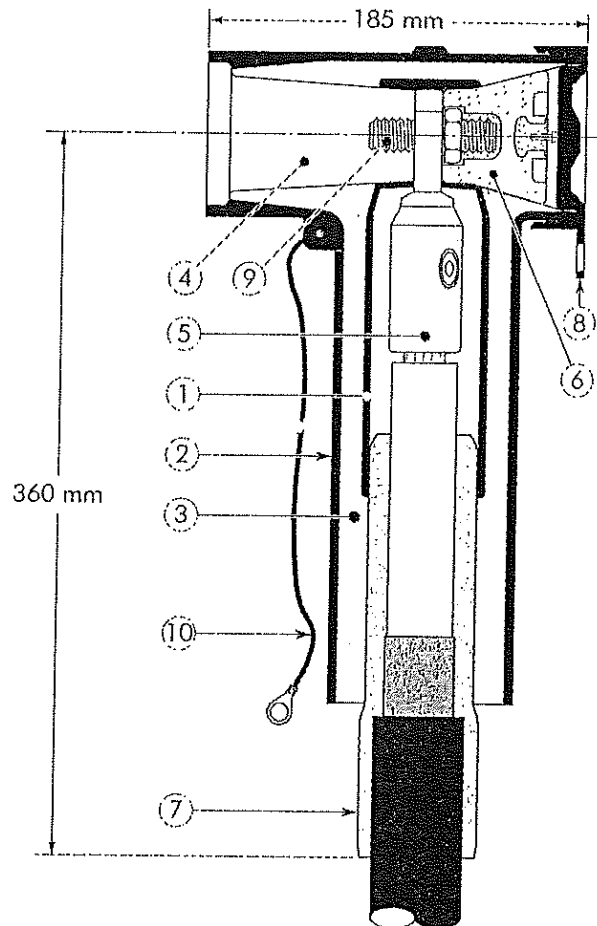
- The thick conductive EPDM jacket provides a total safe to touch screen which ensures safety for personnel.
- Each separable connector is tested for AC withstand and partial discharge prior to leaving the factory.

### Design

Separable connector comprising:

- Conductive EPDM insert.
- Conductive EPDM jacket.
- Insulating EPDM layer moulded between the insert and the jacket.
- Type C - interface as described by CENELEC EN 50180 and 50181.
- Conductor connector.
- Basic insulating plug (with VD point).
- Cable reducer.
- Conductive rubber cap.
- Clamping screw.
- Earthing lead.

The screen break design enables cable outer sheath testing without removing or dismantling the connector.



### Specifications and standards

The 484TB separable connector meets the requirements of CENELEC HD 629.1.

Separable connector type	Voltage $U_m$ (kV)	Current $I_r$ (A)	Current $I_r$ (A) When installed on an appropriate equipment bushing	Conductor sizes (mm <sup>2</sup> )	
				min	max
484TB/G	12	630	1250	50	630
K484TB/G	24	630	1250	35	630
M484TB/G	36	630	1250	35	630
P484TB/G	42	630	1250	35	630

08/2011





## ДЕКЛАРАЦИЯ ЗА СЪОТВЕТСТВИЕ

Долуподписаният, фирма "МАКРИС-ГПХ" ООД

ул. "Ген. Константин Константинов" № 5, гр. София 1336

декларирам на собствена отговорност, че продуктът:

**ЩЕПСЕЛНА КАБЕЛНА ГЛАВА 20 kV, ЗА ВЪНШНА ВРЪЗКА КЪМ КРУ –  
630 A, ПРИСЪЕДИНЯВАНЕ ВЪНШЕН КОНУС С, AL и CU 95-240 mm<sup>2</sup>**

Каталожен номер

**ЗХ(К430ТВ/G-18+ТМВС-10-М16)**

за който се отнася настоящата декларация,

е в съответствие със следните европейски стандарти и нормативи:

**CENELEC HD 629.1**

Произвеждат се от NEXANS POWER ACCESSORRIES GERMANY  
EUROMOLD, Германия в съответствие с цитираните стандарти.

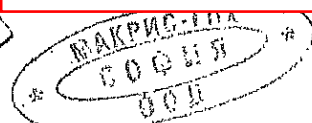
Декларирам, че ми е известна отговорността, която нося съгласно чл. 313 от НК.

Гр. София  
януари.2016 г.

инж. Лилия Милова  
Мениджър Продажби

на основание чл. 2 от ЗЗЛД

ВАРНО С ОРИГИНАЛ



1733





**ДЕКЛАРАЦИЯ ЗА СЪОТВЕТСТВИЕ**

Долуподписаният, фирма "МАКРИС-ГПХ" ООД

ул. "Ген. Константин Константинов" № 5, гр. София 1336

декларирам на собствена отговорност, че продуктът :

**ЩЕПСЕЛНА КАБЕЛНА ГЛАВА 20 kV, ЗА ПРИСЪЕДИНЯВАНЕ НА СИЛОВ  
ТРАНСФОРМАТОР КЪМ КРУ – 200 А, ПРИСЪЕДИНЯВАНЕ ВЪНШЕН  
КОНУС А, AL 50 mm<sup>2</sup>**

Каталожен номер

**3X(K158LR+11TL-FG+50AL)**

за който се отнася настоящата декларация,

е в съответствие със следните европейски стандарти и нормативи :

**CENELEC HD 629.1**

Произвеждат се от **NEXANS POWER ACCESSORIES GERMANY  
EUROMOLD**, Германия в съответствие с цитираните стандарти.

Декларирам, че ми е известна отговорността, която нося съгласно чл. 313 от НК

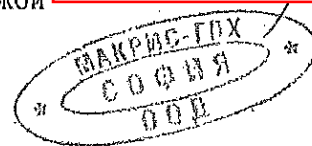
Гр. София  
януари.2016 г.

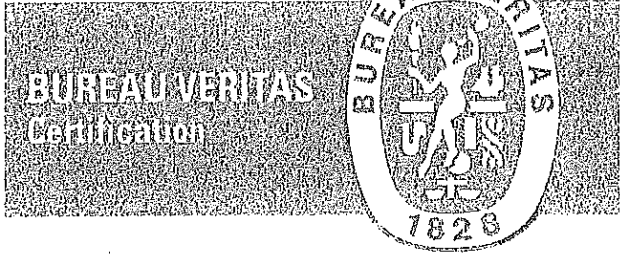
на основание чл. 2 от ЗЗЛД

инж. Лилия Милова  
Мениджър Продажби

**ВЯРНО С ОРИГИНАЛА**

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## Certification

Awarded to

### NEXANS NETWORK SOLUTIONS NV

Divisie Euromold Zuid III Industrielaan 12, 9320 Erembodegem, Belgium

Bureau Veritas Certification certify that the Management System of the above organisation has been audited and found to be in accordance with the requirements of the management system standards detailed below

STANDARD

## ISO 9001:2015

SCOPE OF SUPPLY

Development, design, manufacturing and sales of electrical cable accessories for medium and high voltage networks.

Original Approval Date : 18/06/1992

Subject to the continued satisfactory operation of the organisation's Management System, this certificate is valid until : 16/06/2019

To check the validity of this certificate please call +32 (0)3 247 94 00.

Further clarification regarding the scope of this certificate and the applicability of the management system requirements may be obtained by consulting the organisation

Certificate Number: BE010047-1

Date: 22/07/2016

на основание чл. 2 от ЗЗЛД



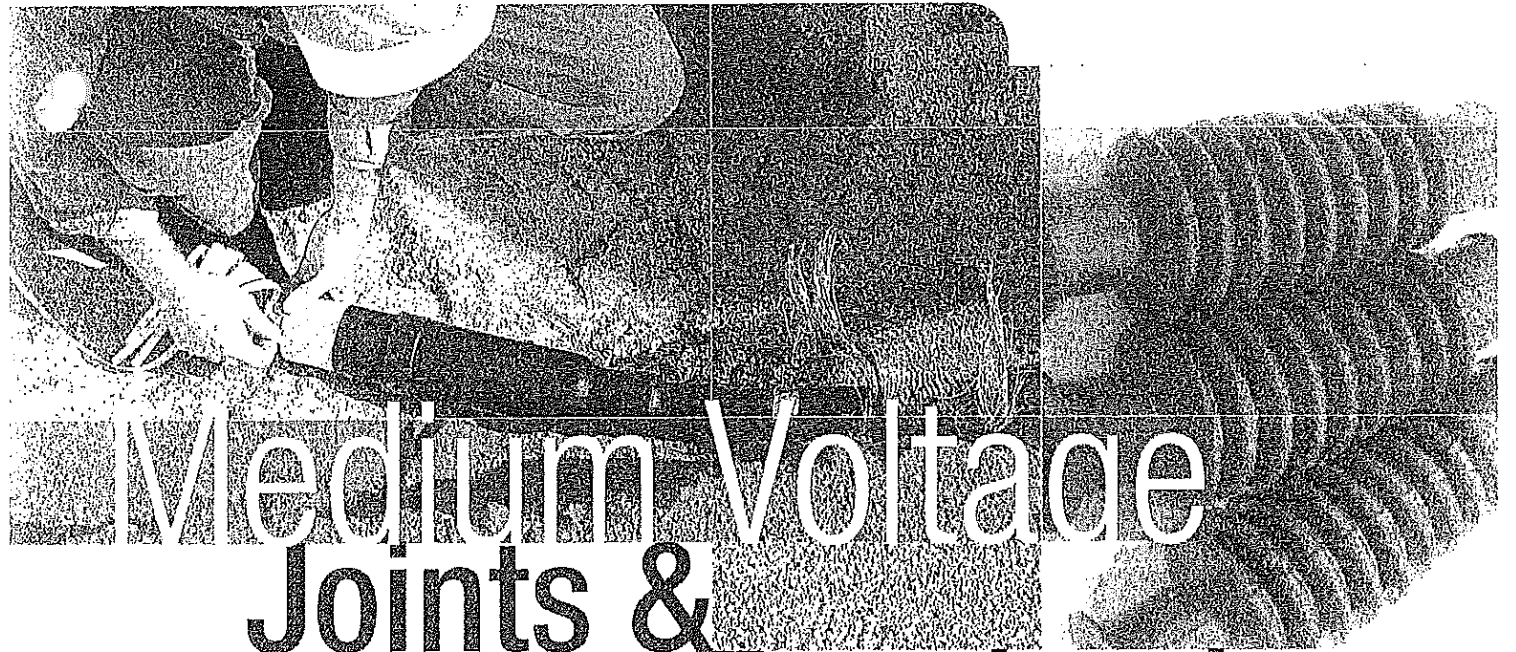
Sebastian ter Horst - Certification Manager

Managing office: Bureau Veritas Certification (Belgium) NV/SA - Mechelsesteenweg 128-136 - B-2018 - Antwerp - Belgium  
Issuing office: Bureau Veritas Certification (Belgium) NV/SA - Mechelsesteenweg 128-136 - B-2018 - Antwerp - Belgium

ВЯРНО С ОРИГИНАЛА

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# Medium Voltage Joints & Terminations

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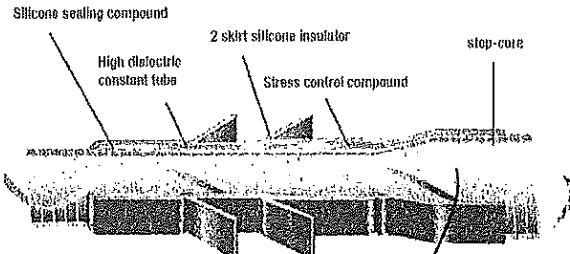
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# Medium Voltage - Cold Shrink Terminations

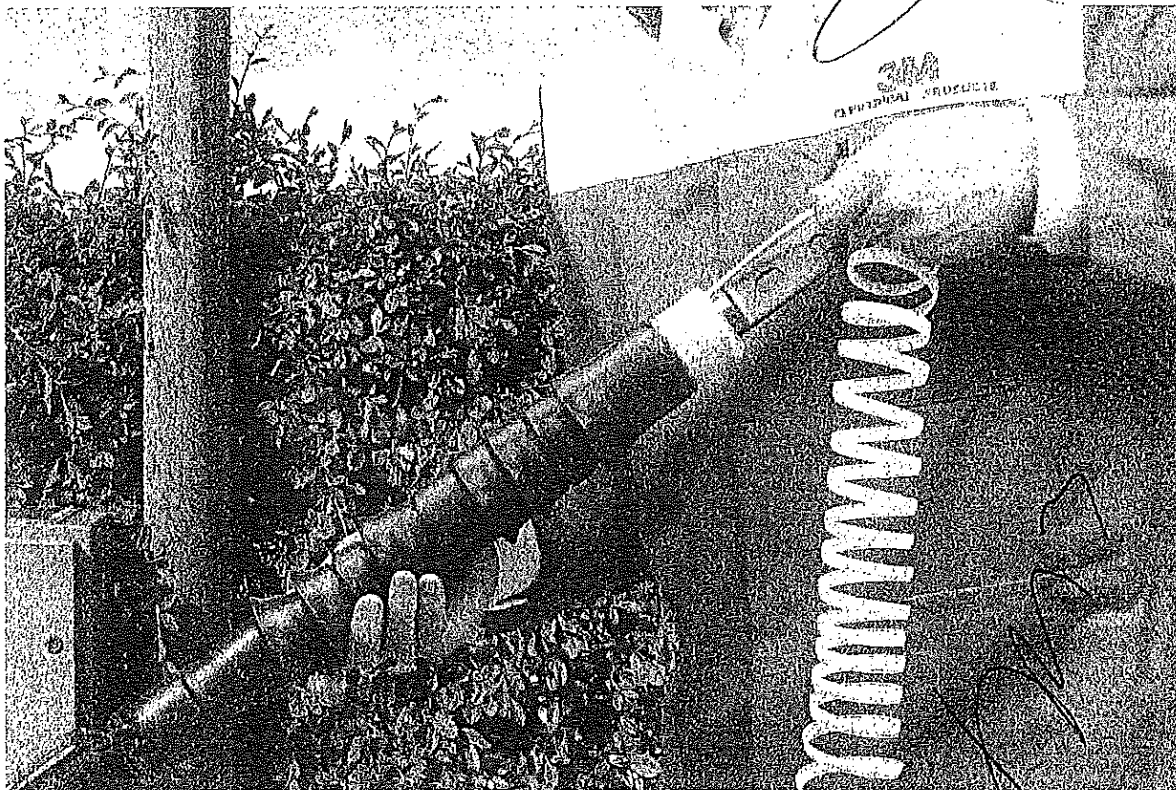
QTIII terminations offer easy installation and reliable performance when terminating indoor and outdoor medium voltage cables. QTIII is a one-piece silicone rubber termination, which is expanded and loaded onto a removable supporting core, which allows the termination to be installed without the need for tools or heat. The core is stepped to allow a greater application range for armoured cables. QTIII consists of a tubular silicone insulator, with a built in refractive stress control tube and compound, and a built in top seal. Due to this unique design the QTIII termination is installed in one operation without the need for any additional components.

QTIII terminations are suitable for use on polymeric cables medium voltage up to 52kV.

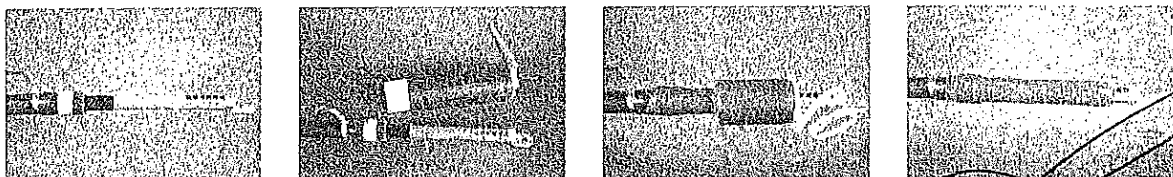
Both indoor and outdoor terminations are available for single core and three core cables. QTIII terminations have been tested in accordance with IEEE Std 48-1990, VDE 0278 Part 4 and IEC/CENELEC. Details of type tests are available upon request.



## Outdoor Termination



## Indoor Termination



**3M™ Cold Shrink Termination Kits**

( For XLPE, Screened Armoured Cables )

15kV	1	Indoor	25 – 95 mm <sup>2</sup> 120 – 240 mm <sup>2</sup> 300 – 500 mm <sup>2</sup> 600 – 1000 mm <sup>2</sup>	92-EB 62-1 META 92-EB 63-1 META 92-EB 64-1 META 92-EB 65-1 META
	1	Outdoor	35 – 70 mm <sup>2</sup> 95 – 185 mm <sup>2</sup> 240 – 400 mm <sup>2</sup> 630 mm <sup>2</sup>	92-EB 62-2 META 92-EB 63-2 META 92-EB 64-2 META 92-EB 65-2 META
	3	Indoor	25 – 35 mm <sup>2</sup> 50 – 150 mm <sup>2</sup> 185 – 300 mm <sup>2</sup>	92-EB 62-3 META 92-EB 63-3 META 92-EB 64-3 META
	3	Outdoor	25 – 35 mm <sup>2</sup> 50 – 150 mm <sup>2</sup> 185 – 300 mm <sup>2</sup>	92-EB 62-4 META 92-EB 63-4 META 92-EB 64-4 META
20kV	1	Indoor	25 – 95 mm <sup>2</sup> 70 – 150 mm <sup>2</sup> 185 – 300 mm <sup>2</sup> 400 – 800 mm <sup>2</sup>	93-EB 62-1 META 93-EB 63-1 META 93-EB 64-1 META 93-EB 65-1 META
	1	Outdoor	25 – 95 mm <sup>2</sup> 70 – 150 mm <sup>2</sup> 185 – 300 mm <sup>2</sup> 400 – 800 mm <sup>2</sup>	93-EB 62-2 META 93-EB 63-2 META 93-EB 64-2 META 93-EB 65-2 META
	3	Indoor	25 – 70 mm <sup>2</sup> 95 – 240 mm <sup>2</sup> 300 – 400 mm <sup>2</sup>	93-EB 62-3 META 93-EB 63-3 META 93-EB 64-3 META
	3	Outdoor	25 – 70 mm <sup>2</sup> 95 – 240 mm <sup>2</sup> 300 – 400 mm <sup>2</sup>	93-EB 62-4 META 93-EB 63-4 META 93-EB 64-4 META
36kV	1	Indoor	35 – 95 mm <sup>2</sup> 120 – 185 mm <sup>2</sup> 240 – 500 mm <sup>2</sup> 630 mm <sup>2</sup>	94-EB 62-1 META 94-EB 63-1 META 94-EB 64-1 META 94-EB 65-1 META
	1	Outdoor	35 – 95 mm <sup>2</sup> 120 – 185 mm <sup>2</sup> 240 – 500 mm <sup>2</sup> 630 mm <sup>2</sup>	94-EB 62-2 META 94-EB 63-2 META 94-EB 64-2 META 94-EB 65-2 META
	3	Indoor	25 – 120 mm <sup>2</sup> 150 – 240 mm <sup>2</sup> 300 mm <sup>2</sup>	94-EB 62-3 META 94-EB 63-3 META 94-EB 64-3 META
	3	Outdoor	25 – 120 mm <sup>2</sup> 150 – 240 mm <sup>2</sup> 300 mm <sup>2</sup>	94-EB 62-4 META 94-EB 63-4 META 94-EB 64-4 META

**Paper Termination Kits**

( For Belted, PILC MIND Cable )

15kV	3	Indoor	70 - 300 mm <sup>2</sup>	MT - 16
	3	Outdoor	35 – 70 mm <sup>2</sup>	MO - 16



САСИН БЪЛГАРИЯ ЕООД  
гр. София, ж.к. „Изгрев”, ул. „Тинтява” № 122  
тел./факс: 02/ 989 00 06, E-mail: [sales@sassin-bg.com](mailto:sales@sassin-bg.com)

## Декларация за съответствие

**Наименование на издаващата организация:**  
„САСИН БЪЛГАРИЯ” ЕООД

**Адрес на издаващата организация:**  
гр. София, ул. „Тинтява”, №122

**Производител:** ЗМ Италия,  
ул. Карло Гаваци №25, 20010 Маркало кон Казоне (Милано), Италия

**Предмет на декларацията:**  
Кабелна глава 93-ЕВ 6х-1

Предметът на декларацията, описан по-горе, е в съответствие с изискванията на следните документи и/или приложими стандарти:

Документ №	Заглавие	Издание/Дата на издаване
БДС HD 629.1	Изисквания за изпитване на аксесоари за използване със силови кабели с обявено напрежение от 3,6/6(7,2) kV до 20,8/36(42) kV. Част 1: Кабели с екструдирана изолация	S2:2006 A1:2008
БДС EN 61442	Методи за изпитване на принадлежности за силови кабели с обявени напрежения от 6 kV ( $U_m = 7,2$ kV) до 36 kV ( $U_m = 42$ kV) (IEC 61442:2005, с промени)	2006

и са съобразени със съществените изисквания за безопасно използване на електрически съоръжения и не застрашават живота и здравето на хората, домашните животни или вещите.

**Специфични изисквания:** Да се спази инструкцията за монтаж, придружаваща изделието.

**Допълнителна информация:**

В случай на несъгласувано изменение на продуктите, тази декларация губи валидност.

гр. София  
02. 10. 2017 г.

Анатоли  
Управител

на основание чл. 2 от ЗЗЛД

ВЯРНО С ОРИГИНАЛА

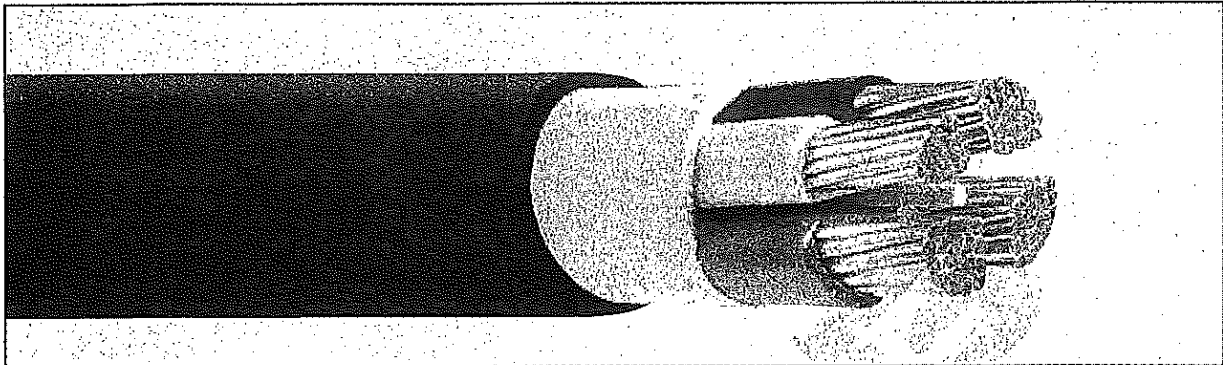
1739



# NYU

U<sub>0</sub>/U - 0.6/1 kV

Силов кабел  
ниско напрежение  
с PVC изолация и Cu жила



### ПРИЛОЖЕНИЕ

За изграждане на предимно подземни разпределителни електрически мрежи и инсталации на промишлени и обществени обекти, където не се очакват механични повреди, за пренасяне и разпределение на електроенергия при номинални напрежения U<sub>0</sub>/U до 0.6/1 kV.

### ТЕХНИЧЕСКИ ДАННИ

- произведен съгласно DIN VDE 0276 част 603, HD 603 S1
- експлоатация при температури на околната среда:
  - при фиксиран монтаж от -30°C до +50°C
- монтаж при температури, не по-ниски от -5°C
- допустим радиус на огъване:
  - едножилни кабели - 15 D
  - многожилни кабели - 12 D
- за полагане във вътрешни помещения, в изкопи в земя, в бетон, във вода, канали, тунели и шахти
- макс. продължителна температура на нагряване на токопроводимите жила +70°C
- макс. допустима температура на нагряване на токопроводимите жила в режим на късо съединение, за не повече от 5 s
  - за номинални сечения до 300 mm<sup>2</sup> +160°C
  - за номинални сечения над 300 mm<sup>2</sup> +140°C
- неразпространение на горенето - по IEC 332-1

- изпитвателно напрежение - променливо 4 kV, постоянно 12 kV
- цвят на защитната обвивка - черен

### КОНСТРУКЦИЯ НА КАБЕЛА

- плътни или усукани медни жила, клас 1 или 2 по DIN VDE 0295
- поливинилхлоридна изолация
- запълнение на фугите
- поливинилхлоридна обвивка

### ОЗНАЧЕНИЕ НА ФОРМАТА НА ЖИЛАТА

- ge-кръгло плътно
- gm-кръгло многожично
- se-секторно плътно
- sm-секторно многожично

### ЦВЯТ НА ИЗОЛАЦИЯТА НА ЖИЛАТА НА КАБЕЛИТЕ

едножилни - черен или жълто-зелен

брой на жилата	Оцветяване на жилата до 2006		брой на жилата	Оцветяване на жилата след 2006	
	без жълто-зелено жило			без жълто-зелено жило	
2-жилни	черен, син		2-жилни	син, кафяв	
3-жилни	черен, син, кафяв		3-жилни	кафяв, черен, сив	
4-жилни	черен, син, кафяв, черен		4-жилни	син, кафяв, черен, сив	
5-жилни	черен, син, кафяв, черен, черен		5-жилни	син, кафяв, черен, сив, черен	
многожилни	черен с цифрова номерация на жилата		многожилни	черен с цифрова номерация на жилата	
брой на жилата	с жълто-зелено жило		брой на жилата	с жълто-зелено жило	
3-жилни	жълто-зелен, черен, син		3-жилни	жълто-зелен, син, кафяв	
4-жилни	жълто-зелен, черен, син, кафяв		4-жилни	жълто-зелен, кафяв, черен, сив	
5-жилни	жълто-зелен, черен, син, кафяв, черен		5-жилни	жълто-зелен, син, кафяв, черен, сив	
многожилни	черен с цифрова номерация на жилата и едно жълто-зелено жило		многожилни	черен с цифрова номерация на жилата и едно жълто-зелено жило	



# NYU

Uo/U - 0.6/1 kV

Силов кабел  
ниско напрежение  
с PVC изолация и Cu жила

Артикулен №	Брой и сечения на жилата NYU	Форма на токопроводимото жило	Диаметър на кабела	Тегло		Артикулен №	Брой и сечения на жилата NYU	Форма на токопроводимото жило	Диаметър на кабела	Тегло	
				на медта	на кабела					на медта	на кабела
	бр. x мм²		мм	кг / км	кг / км		бр. x мм²		мм	кг / км	кг / км
010815032	1 x 1,5	re	7,1	14	63	010815268	4 x 1,5	re	12,9	57	232
010815035	1 x 2,5	re	7,5	23	76	010815269	4 x 2,5	re	13,8	93	289
010815036	1 x 4,0	re	8,4	37	104	010815270	4 x 4,0	re	16,2	149	419
010815037	1 x 6,0	re	8,9	56	128	010815271	4 x 6,0	re	17,4	223	525
010815038	1 x 10,0	re	9,7	94	183	010815272	4 x 10,0	re	19,5	376	741
010815039	1 x 16,0	re	10,7	149	247	010815273	4 x 16,0	re	21,8	595	1024
010815040	1 x 25,0	rm	12,7	243	359	010815274	4 x 25,0	rm	27,2	970	1615
010815041	1 x 35,0	rm	13,9	337	462	010815275	4 x 35,0	rm	30,1	1346	2095
010815042	1 x 50,0	rm	15,4	454	603	010815276	4 x 50,0	sm	29,2	1817	2311
010815043	1 x 70,0	rm	17,1	656	817	010815277	4 x 70,0	sm	33,4	2624	3142
010815044	1 x 95,0	rm	19,4	911	1092	010815278	4 x 95,0	sm	37,8	3643	4281
010815045	1 x 120,0	rm	20,8	1147	1334	010815279	4 x 120,0	sm	40,8	4587	5256
010815046	1 x 150,0	rm	22,7	1415	1627	010815280	4 x 150,0	sm	44,8	5660	6442
010815047	1 x 185,0	rm	25,0	1770	2013	010815281	4 x 185,0	sm	49,3	7082	8033
010815048	1 x 240,0	rm	27,8	2327	2598	010815282	4 x 240,0	sm	55,3	9308	10426
010815049	1 x 300,0	rm	30,7	2887	3200	010815330	5 x 1,5	re	13,7	71	272
010815050	1 x 400,0	rm	34,1	3692	4048	010815331	5 x 2,5	re	14,8	116	341
010815051	1 x 500,0	rm	38,1	4725	5141	010815332	5 x 4,0	re	17,4	187	494
010815091	2 x 1,5	re	12,2	28	192	010815333	5 x 6,0	re	19,0	279	635
010815094	2 x 2,5	re	12,9	46	229	010815334	5 x 10,0	re	21,6	470	911
010815095	2 x 4,0	re	14,9	75	315	010815335	5 x 16,0	re	24,1	744	1262
010815096	2 x 6,0	re	15,9	112	382	010815336	5 x 25,0	rm	29,9	1213	1964
010815097	2 x 10,0	re	17,5	188	509	010815337	5 x 35,0	rm	33,5	1683	2593
010815098	2 x 16,0	re	19,4	298	676	010815338	5 x 50,0	rm	38,1	2271	3435
010815099	2 x 25,0	rm	23,5	485	1027	010815339	5 x 70,0	rm	43,3	3280	4638
010815100	2 x 35,0	rm	25,7	673	1301	010815340	5 x 95,0	rm	50,1	4554	6318
010815101	2 x 50,0	rm	29,1	908	1703	010815726	7 x 1,5	re	14,7	100	323
010815146	3 x 1,5	re	12,1	43	201	010815727	8 x 1,5	re	16,0	114	385
010815149	3 x 2,5	re	12,9	70	247	010815728	10 x 1,5	re	17,7	142	472
010815150	3 x 4,0	re	15,0	112	350	010815729	12 x 1,5	re	18,2	171	509
010815151	3 x 6,0	re	16,1	168	435	010815730	14 x 1,5	re	19,0	199	559
010815152	3 x 10,0	re	18,0	282	606	010815731	16 x 1,5	re	19,9	227	617
010815153	3 x 16,0	re	20,1	447	828	010815733	19 x 1,5	re	20,8	270	689
010815154	3 x 25,0	rm	24,4	728	1260	010815736	24 x 1,5	re	23,9	341	904
010815155	3 x 35,0	rm	26,7	1010	1622	010815739	30 x 1,5	re	25,3	426	1030
010815156	3 x 50,0	rm	30,4	1363	2139	010815743	37 x 1,5	re	27,0	526	1195
010815157	3 x 70,0	sm	29,2	1968	2380	010815765	7 x 2,5	re	15,8	163	413
010815158	3 x 95,0	sm	33,2	2732	3233	010815766	8 x 2,5	re	17,4	186	493
010815159	3 x 120,0	sm	35,4	3440	3962	010815767	10 x 2,5	re	19,3	232	609
010815160	3 x 150,0	sm	39,2	4245	4867	010815768	12 x 2,5	re	19,8	279	662
010815161	3 x 185,0	sm	42,7	5311	6046	010815769	14 x 2,5	re	20,7	325	738
010815162	3 x 240,0	sm	48,1	6981	7869	010815770	16 x 2,5	re	21,7	372	907
010815195	3 x 25,0 +16	rm re	25,4	876	1422	010815771	19 x 2,5	re	22,8	441	916
010815198	3 x 35,0 +16	rm re	27,7	1159	1790	010815772	24 x 2,5	re	26,2	557	1203
010815201	3 x 50,0 +25	sm rm	29,2	1605	2091	010815775	30 x 2,5	re	27,8	697	1386
010815204	3 x 70,0 +35	sm rm	33,4	2304	2820	010815782	37 x 2,5	re	29,9	859	1641
010815207	3 x 95,0 +50	sm rm	37,8	3187	3824	010815819	7 x 4,0	re	19,3	261	639
010815210	3 x 120,0 +70	sm rm	40,8	4096	4779	010815822	10 x 4,0	re	23,8	373	950
010815213	3 x 150,0 +70	sm rm	44,8	4901	5685	010815844	7 x 6	re	20,5	403	859
010815216	3 x 185,0 +95	sm rm	49,3	6222	7163	010815859	7 x 10	re	23,5	672	1200
010815219	3 x 240,0 +120	sm rm	55,3	8128	9227						

ФИЛЧАБ

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## CERTIFICATE OF CONFORMITY NO. 27408

We, SC Prysmian Romania Cabluri și Sisteme SA, declare under our sole responsibility that the products delivered to FILKAB JS.Co with delivery notes:

4950036816 / 21-07-2015

4950036817 / 21-07-2015

4950036818 / 21-07-2015

are in conformity with the following standard(s) or other normative document(s) listed below.

No.	Product	Quantity	Batch	Drum	Standard
1	NFA2X 3x70+54.6 0.6/1 kV (6E)(CEZ) [BG]	1996 M	1006950709	DWP2200 22504950	HD-626-S1 *
2	NFA2X 3x70+54.6 0.6/1 kV (6E)(CEZ) [BG]	2033 M	1006950699	DWP2200 22504816	HD-626-S1 *
3	NFA2X 3x70+70 0.6/1 kV (6E) (EVN) [BG]	709 M	1007073632	DWP2200 22504870	HD-626-S1 *
4	NFA2X 3x70+70 0.6/1 kV (6E) (EVN) [BG]	2017 M	1007170355	DWP2200 22505010	HD-626-S1 *
5	NFA2X 3x70+70 0.6/1 kV (6E) (EVN) [BG]	2018 M	1007146224	DWP2200 22504925	HD-626-S1 *
6	NFA2X 3x70+70 0.6/1 kV (6E) (EVN) [BG]	2016 M	1007170309	DWP2200 22505008	HD-626-S1 *
7	(N)AY2Y-J 4x185SM 1kV [NO EF] (EVN) [BG]	467 M	1006942594	DWP2100 21506658	HD - 603 S1 *
8	(N)AY2Y-J 4x185SM 1kV [NO EF] (EVN) [BG]	538 M	1006941846	DWP2100 21506684	HD - 603 S1 *
9	NYO 1x185RM 0.6/1 kV	1006 M	1007170209	DWP1800 18515588	HD - 603 S1 *
10	NYO 1x240RM 0.6/1 kV (EVN) [BG]	1023 M	1007170220	DWP1800 18515434	HD - 603 S1 *

\* See attached measurement reports

(Place and date of issue)

SLATINA

SC Prysmian Romania Cabluri și Sisteme SA

21-07-2015

Quality Manager

Badalica Vasile

(name and signature)

на основание чл. 2 от ЗЗЛД

ВЯРНО С ОРИГИНАЛА

Prysmian Cabluri și Sisteme S.A.

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Nr. înregistrare 328/12/1991  
 Camera de Comerț a Jud. Olt  
 C.U.I. 1520931

Capital Social  
 103.850.920 lei

QUALITY AND LABORATORIES	Test No.: 38036
FINAL TESTS LABORATORY	Date: 20-07-2015

## TESTS CERTIFICATE

Product: NYY-O 1x240RM 0.6/1 kV (EVN) [BG]      Nominal voltage: 0.6/1 kV  
 Drum no.: DWP1800 18515434      Manufacturing code:      Length: 1023 m  
 Routine test according with: HD-603 S1

**High voltage test:**

REQUIREMENTS	MEASUREMENT
- Duration of test: 5 minutes - Voltage: 4 kV AC - No breakdown	No breakdown

**Conductor D.C. resistance at 20 degree Celsius:**

Section	Requirement	Measurements
240	max. 0,0754 ohm/km	0,0744 ohm/km

Conclusion: PASSED

ВЯРНО С ОРИГИНАЛА

QUALITY AND LABORATORIES MANAGER      Badalica Vasile <div style="border: 1px solid red; height: 20px; width: 100%;"></div> на основание чл. 2 от ЗЗЛД		SIF EN      Ghioca Nicolae <div style="border: 1px solid red; height: 20px; width: 100%;"></div> на основание чл. 2 от ЗЗЛД	Page 1/1
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