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1 DOCUMENT AIMS AND A PPLICATION AREA

This Standard applies to 12/20(24) kV cold shrink compact joints for Medium Voltage underground and aerial cables with extruded insulation, both full and reduced insulating thickness, with copper wires or aluminum tape screen. This Standard also applies to transition joints used for the connection of single-pole impregnated paper insulated cables and extruded insulated cable.

These Standard applies to the:

Country	Distribution Company
Romania	**RETELE ELECTRICE**

1.1 RELATED DOCUMENTS TO BE IMPLEMENTED AT COUNTRY LEVEL

This document applies to RETELE ELECTRICE ROMANIA.

2 DOCUMENT VERSION MANAGEMENT

Version	Date	Main changes description
00	25/11/2015	First emission.
01	23/02/2018	General review of construction design. Material codes updated. Chapter on barcode updated, Tolerance on the positioning of the body; cover for the connector; Painted or coated semiconducting layer not allowed; Elimination of the spiral support and introduction of the self-ejecting support; Cold shrink system for oil sealing for transition joints; Introduction of a separate material code and kit for the transition joints; Introduction of MV arial cable joint, Specification of “austenitic steel” constant force springs; New tests: robustness test. expiration test. UV test for MV aerial cable joints; Modification of requirements for resistance to fire; Increase of the minimum section of the copper stocking for Rumania, from 16 to 25 mm2; Modification of requirements of screen connecting plate (grater); Modification of requirements of sealing compounds; short time duration for Rumania Standard dimension for cable preparation. Class 24 kV for Rumania.
02	25/05/2018	Revised tables 6, 7 and 8. Expiration test description.
03	09/07/2018	Third emission
Addendum Ed	28/05/2020	Fourth edition
04	12/05/2022	Rated short time withstand current in the screen (kA) is updated for smaller cross-section cable; Material codes and type codes updated; list of component table is reorganized; The copper stocking (Metallic Screen) cross-section is reported directly in the list of component table; Modification of requirements of screen connecting plate (grater). For smaller and larger cross-sections cables, with aluminum tape screen; type test according to HD-629 S3 for straight and aerial joint and extension of compliance for family and Connectors; The assessment criteria for the robustness test is updated; Acceptance Test chapter modifications; Chapter on barcode updated; paragraph on technical conformity assessment (TCA) is added, recognition of homologation for previous revisions of the standard; Special Joints are added for aerial-underground cable transition and Joints for screen interruption.
05	15/07/2024	Updating of the company logo

3 UNITS IN CHARGE OF THE DOCUMENT

Responsible for drawing up the document:

- Grid Operation / Omologation and Standardization unit

Responsible for authorizing the document:

- Grid Operation unit
- Health, Safety, Environment and Quality unit.

4 REFERENCES

- Code of Ethics of RETELE ELECTRICE;
- RETELE ELECTRICE Zero Tolerance of Corruption (ZTC) Plan;
- Organization and management model as per Legislative Decree No. 231/2001;
- RETELE ELECTRICE Compliance Program (EGCP);
- Stop Work Policy;
- RETELE ELECTRICE Compliance Program (EGCP);
- Integrated Policy of Quality, Health and Safety, Environment and anti-Bribery;
- ISO 9001:2015 - Quality Management System - Requirements;
- ISO 14001:2015 - Environmental Management System - Requirements and user guide;
- ISO 45001:2018 - Occupational Health and Safety Management System - Requirements and user guide;
- ISO 50001:2018 - Energy management systems - Requirements with guidance for use;
- ISO 37001:2016 - Anti-bribery Management System - Requirements with guidance for use.
- IL-RE-097 – Work instruction for Technical Conformity Assessment;
- Barcode specification.

International technical references related with the material:

Reference documents listed below (amendments included) shall be the edition in-force at the contract date.

ISO/IEC 17000	Conformity assessment - Vocabulary and general principles
ISO/IEC 17020	General criteria for the operation of various types of bodies performing inspection
ISO/IEC 17025	General requirements for the competence of testing and calibration laboratories
ISO/IEC 17050-1	Conformity assessment - Supplier's declaration of conformity - Part 1: General requirements (ISO/IEC 17050-1:2004, corrected version 2007-06-15)

ISO/IEC 17050-2	Conformity assessment - Supplier's declaration of conformity - Part 2: Supporting documentation (ISO/IEC 17050-2:2004)
ISO/IEC 17065	Conformity assessment - Requirements for bodies certifying products, processes and services
HD 629.1 S3	Test requirements for accessories for use on power cables of rated voltage from 3,6/6(7,2) kV up to 20,8/36(42) kV Part 1: Accessories for cables with extruded insulation
HD 629.2 S2	Test requirements for accessories for use on power cables of rated voltage from 3,6/6(7,2) kV up to 20,8/36(42) kV Part 2: Cables with impregnated paper insulation
IEC 61238-1	Compression and mechanical connectors for power cables - Part 1: Test methods and requirements
IEC 60695-11-10	Fire hazard testing - Part 11-10: Test flames - 50 W horizontal and vertical flame test methods
IEC 60721-2-1	Classification of environmental conditions - Part 2-1: Environmental conditions appearing in nature - Temperature and humidity.
ISO IEC 17067	Conformity assessment — Fundamentals of product certification and guidelines for product certification schemes.

RETELE ELECTRICE Standards

- GSC001[1] “Underground Medium Voltage Cables”.
- GSCC008 “Medium Voltage Aerial Bundled Cables”

[1] The characteristics of the cables are included in the appropriate Standard. Besides installation on new cables, which comply to GSC001, the joints may be installed on the existing network, which is made of cables compliant to older local standards. Nevertheless, this Standard also takes into account the main characteristics of existing cables (rated voltage, section and min/max diameter over insulation).

Local Standard

Romania

- Legea securității și sănătății în muncă nr.319/2006, cu modificările și completările ulterioare.
- Ordonanța de Urgență nr. 195/22.12.2005 privind protecția mediului, cu toate modificările și completările în vigoare.
- Legea nr. 211/25.11.2011 privind regimul deșeurilor.
- H.G. 1037/03.11.2010 privind deșeurile de echipamente electrice și electronice.

Europa

- Directive 2006/95/EC of the European Parliament and of the Council of 12 December 2006.
- Directive 2004/108/EC electromagnetic compatibility.

5 ORGANIZATIONAL PROCESS POSITION IN THE PROCESS TAXONOMY

Value Chain/Process Area: Networks Management

Macro Process: Materials management

Process: Network Components Standardization

6 DEFINITIONS AND ACRONYMS

Acronym and Key words	Description
Technical Conformity Assessment (TCA)	A “conformity assessment” with respect to “specified requirements” consists in functional, dimensional, constructional and test characteristics required for a product (or a series of products) and quoted in technical specifications and quality requirements issued by RETELE ELECTRICE. This also includes the verification of conformity with respect to local applicable regulation and laws and possession of relevant requested certifications.
Medium Voltage (MV)	Any set of nominal voltage levels exceeding 1 kV and below a value between 30 kV and 100 kV. NOTE: The boundary value between medium voltage and high voltage depends on local and historical circumstances or on common usage. Nevertheless the band 30 kV to 100 kV normally contains the accepted boundary.

Additional terms and definitions are available in Cenelec HD 629.1 S3 and HD 629.2 S2 (See Chapter 4)

7 DESCRIPTION

7.1 List of Components

Type code	Distribution Company and Country	Country Code	Rated voltage U0/U (Um) (kV)	Joint type	Cable section (mm^2)	Copper stocking section (mm2)	Min/max Diameter over insulation (mm)	Rated short time withstand current in the screen (kA)	Grounding Braid System
GSCC004/11	RETELE ELECTRICE	270002	12/20(24)	STRAIGHT	35÷95	25	14.9/25.0	3kA@1seg	No
GSCC004/13	RETELE ELECTRICE	270001	12/20(24)	STRAIGHT	95÷240	25	20.6/32.2	5kA@1seg	No
GSCC004/20	RETELE ELECTRICE	270063	12/20(24)	TRANSITION JOINT	35÷95	25	14.9/25.0	3kA@1seg	No
GSCC004/21	RETELE ELECTRICE	270003	12/20(24)	TRANSITION JOINT	95÷240	25	20.6/32.2	5kA@1seg	No
GSCC004/22	RETELE ELECTRICE	270006	12/20(24)	AERIAL JOINT	35÷95	25	14.9/25.0	3kA@1seg	No
GSCC004/23	RETELE ELECTRICE	270005	12/20(24)	AERIAL JOINT	95÷240	25	20.6/32.2	5kA@1seg	No

Table 1 – List of Component

7.2 Service conditions

7.2.1 General service conditions

The reference altitude is according to IEC 60721-2-1

7.3 Technical characteristics

7.3.1 Type of joints

- Straight Joints: Used for the connection of MV underground with extruded insulation cables
- Transition Joints: Used for the connection of single-pole impregnated paper insulated cables and extruded insulated cables
- Aerial Joints: Used for the connection of MV Aerial with extruded insulation cables
- Special Joints: According to the particular definition in the local section.

7.3.2 Electrical and dimensional characteristics

The following requirements apply:

Rated voltage U_o/U (U_m) (kV)	**12/20(24)**
Rated power frequency withstand voltage (kV)[2]	50
Rated impulse withstand voltage (kV)	125
Rated short time withstand current in the conductor (kA)	According to HD629 (EN 61442)
Rated short time withstand current in the screen (kA)	See Table 1

Table 2 - Electrical characteristics

The rated voltage levels of the cables for which is foreseen the installation of the joints is the following:

Rated voltage of the joint U_o/U (U_m) (kV)	**12/20(24)**
Distribution Company (Country)	**Rated voltage of the cables U_o/U (U_m) (kV)**
RETELE ELECTRICE	12/20(24)

Table 3 - Rated voltage of the cables

With reference to Figure 1, overall dimensions of joints are defined in Table 4:

Rated voltage U_o/U (U_m) (kV)	**12/20(24)**
Maximum length L (mm)	1000
Maximum diameter D (mm)	100

Table 4 - Overall dimensions

[2] Rated power frequency withstand voltage (kV) values for type test is according to HD629 (EN 61442)

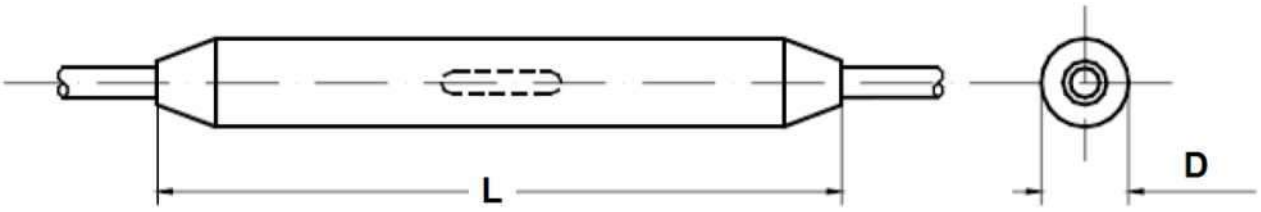


Figure 1 - Maximum dimensions (mm)

7.4 CONSTRUCTION CHAR ACTERISTICS

7.4.1 GENERAL CHARACTERISTICS

7.4.1.1 *Shrink technology*

The joints shall be cold shrink type.

7.4.1.2 *Resistance to corrosion, infiltrations, moisture and dust*

The external protection sheath of the joint shall be of insulating material resistant to agents found in soil; the use of tapes, paints, enamels or similar materials is not considered sufficient to ensure the level of protection required. The joint shall be watertight in order to prevent water penetration during the operation. Furthermore, it shall also be designed to prevent the longitudinal migration of water along the cable screens.

7.4.1.3 *Resistance to fire*

The main insulating housing (see 7.4.2.3) shall be resistant to fire.

7.4.1.4 *Heating*

All the materials that make up the joint shall withstand the heating conditions expected during operation, without having an adverse effect on their proper functioning of the joint or the cable.

7.4.1.5 *Materials compatibility*

All the component parts of the joint shall be made out of materials that can be in contact with each other and with the parts that make up the cable, without having an adverse effect on their proper functioning.

Greases and sealing compounds, if any, shall be absolutely neutral in relation to the materials with which they are in contact and shall remain stable in contact with air.

7.4.2 COMPACT JOINT

Compact joints are composed by the following elements:

1. Shear bolt connector
2. Component to control the electric field
3. Main insulating housing
4. Semiconducting layer
5. Metallic screen
6. External protective sheath
7. Greases and sealing compounds

All the above elements, except item 1 (shear bolt connector) and item 7 (greases and sealing compounds), shall be preassembled on a single body (pre-assembled joint body). It shall be designed in order to allow a tolerance on the positioning during the installation of ± 1 cm, with respect to the correct position indicated in the installing instructions.

Alternatively the pre-assembled joint body may be designed in order to ensure also the following functions (e.g. through embedded sealing compounds):

- to seal the whole joint,
- to protect the junction of the metallic screens

The compact joint shall be mounted on a self-ejecting support. Spiral supports are not allowed.

7.4.2.1 *Shear bolt connector*

The electrical continuity of the cables shall be made through a shear bolt connector compliant with IEC 612381, Class A. The connector shall include the shear bolts and shall be made of tin plated aluminum alloy suitable for both aluminum and copper conductors.

No additional hole (e.g. for inspection) shall be made. The shear bolts shall be made to break inside their holes,

assuring that no spike of any projection of material remain on the connector surface.

The connectors shall have a central lock and shall assure the correct positioning of the conductors in the same axis of the connector using adapters (for the smaller section in the prescribed range).

The external surface of the connectors shall not have sharp edges, spikes or deformities.

Connectors must be designed and constructed so that, when properly installed, the electrical resistance of the connection is not greater than the equivalent resistance of the reference conductor.

It is allowed to use greases to improve the electrical contact between the connector and the cable conductors and avoid corrosion. The design of screw cavities protection shall be so that no material is dispersed inside the joint during the cold shrinking operation and/or in the installation.

After the installation, the entire connector shall be protected with a suitable cover with a smooth surface to prevent damages to the joint (e.g. for residual spikes of screws).

With reference to Figure 2, Table 5 reports the main characteristics and dimensions of the connectors:

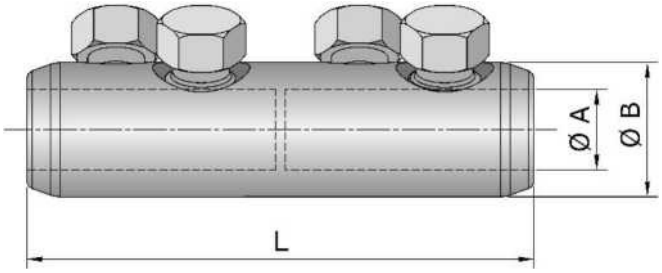


Figure 2 - Shear bolts connector example

Al cable section (mm^2)	Ø A min (mm)	Ø B max. (mm)	N° of screws (min.)
35-95	13	30	2
95-240	19,5	38	4
240- 400	26	45	4
400-630	33	52	6

Table 5 - Connectors dimensions

7.4.2.2 *Component to control the electric field*

It shall be applied on the connector, on the insulation of the cables and connected to the outer semi-conductive screens of the cables.

7.4.2.3 *Main insulating housing*

The main insulating housing shall be made of one single layer and shall ensure, after shrinking, a minimum total thickness of 6 mm (12/20 kV) and 8 mm (18/30 kV) over the connector.

7.4.2.4 *Semiconducting layer*

Painted or coated semiconducting layers are not allowed.

7.4.2.5 *Copper stocking (Metalic Screen)*

The electrical continuity of the metallic screens of the cables shall be made by means of a copper stocking with the minimum sections reported in Table 1.

It shall be compatible with both aluminum tape and copper wire cable screens.

7.4.2.5. a) Cables with aluminum tape screen

In the case of cables with aluminum tape screen, the connection of the copper stocking with the screen shall be made by means of a plate of tin-plated hard copper with a tin coating having minimum thickness of 0,5 pm. The plate shall be as shown in the Figure 3 and shall be bent on a cylinder of diameter 25±2 mm; the convex side of the plate shall include 65 asperities, arranged as shown in the Figure 3. These asperities shall have a particular shape (see example in Figure 3) in order to allow piercing the aluminum tape, to obtain a satisfactory contact with the screen, and to partly penetrate the outer thermoplastic sheath of the cable, to prevent movement or removal of the device.

The edge and the internal side of the plate shall be free of sharp or rough parts, in particular in the lower side in contact with the semiconductive layer of the cable.

The lower side going under the aluminum tape shall have no protruding edge (an example is shown in Figure 3) but a small rounded edge lower than the asperities.

As far as possible, the dimensions of the aluminum tape screen are as described here. The supplier can only modify the measurements for use on cables of smaller (35-95 mm2) and larger (400-630) cross-sections in which the dimensions do not allow a correct installation. The proposal will be checked during the TCA process by RETELE ELECTRICE.

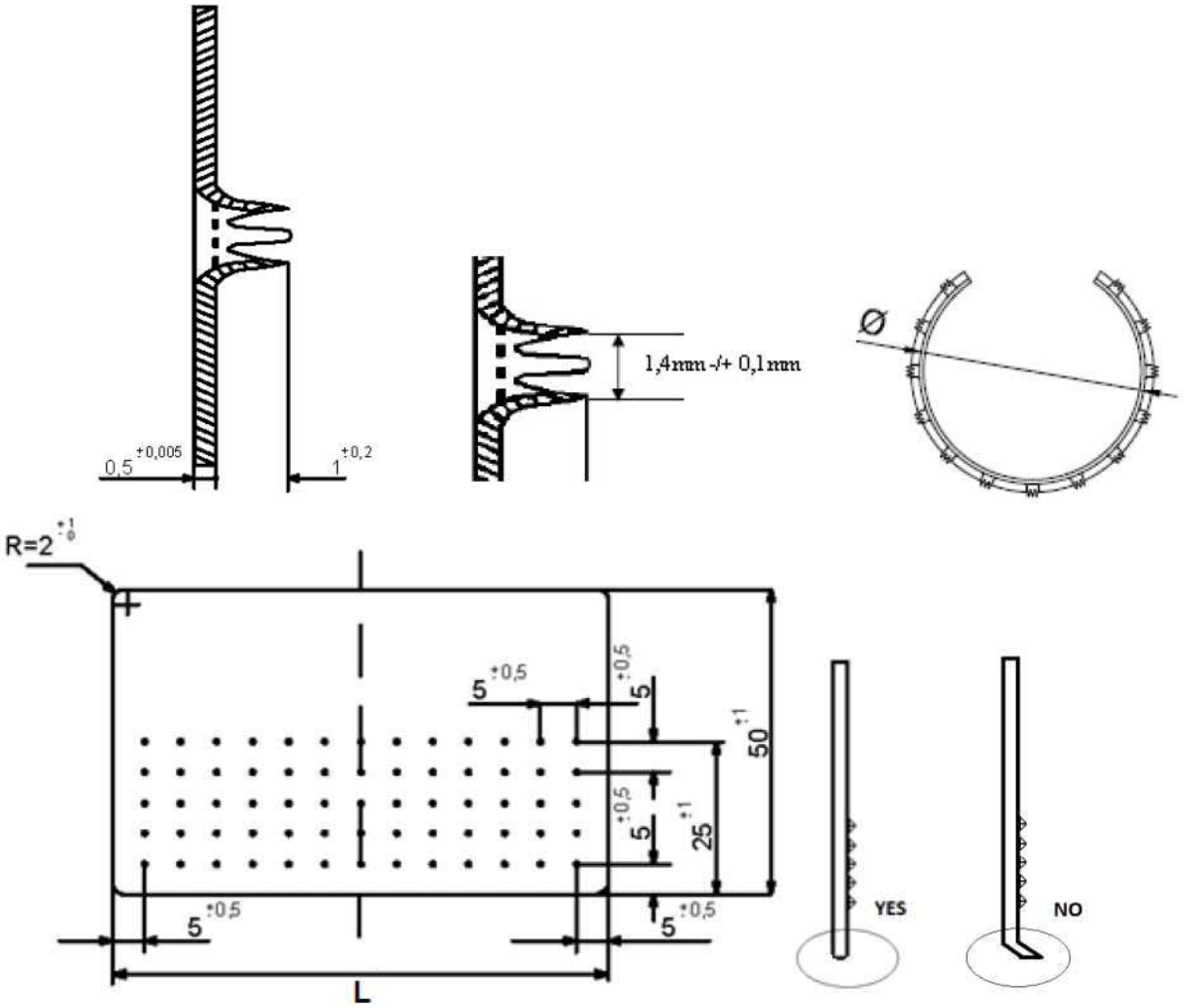


Figure 3 - Detail of rectangular plate for aluminum tape screen connection

7.4.2.5. b) Cables with copper wires screen

In the case of cables with copper wire screen, the copper wires of the metallic screen of the cable shall be fold back over the cable outer sheath and secured by means of a constant force compression system.

7.4.2.5. c) Constant force compression system

Electrical continuity of the screens of the cables and copper stocking of the joint may be achieved using austenitic steel constant force springs, the main insulating housing of the joint itself or another equivalent method.

7.4.2.5. d) External protective sheath

The protective sheath for mechanical protection and sealing of the joint shall be made of one single piece.
For Aerial Joint type the color of the external sheath shall be gray RAL 7001.

7.4.2.5. e) Greases and sealing compounds

Sealing compounds are not allowed, except those:

- to seal the whole joint,
- to protect the junction of the metallic screens.

Greases are not allowed, except those:

- over the main insulation of the cable and over the connector

Greases and sealing compounds shall have no electrical functions for the assembling of the joints but only provide mechanical and/or sealing features.

7.4.2.5. f) Oil sealing system for transition joints

In order to contain the impregnating insulating oil, a cold shrink sealing tube shall be provided. Additional compounds or tapes are allowed only for sealing paper edges towards the connector and/or the lead sheath.

7.4.2.5. g) Grounding Braid

The Joints with grounding braid system (see table 1). Must be provided with a tin coated copper braid locked at one end, with a minimum length according to table 6.

Due to the installation of the braid to the Joint, it is necessary to add the appropriate mastics and constant force springs or another equivalent method to guarantee the impediment of water entering the installation point.

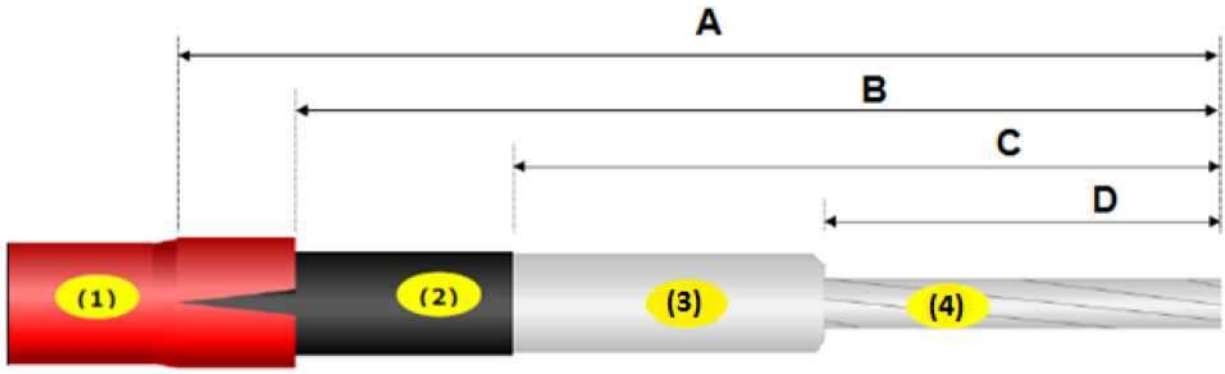
Length (Meters)	Width (mm)	Section (mm^2)
1	25.4	25

Table 6 - Grounding Braid Dimensions

7.5 DIMENSIONS FOR THE PREPARATION OF THE CABLE

Joints shall be designed in order to comply with the dimensions for the preparation of the cables specified in the following paragraphs.

7.5.1 Preparation of the cable with aluminum screen



1. outer sheath
2. insulation screen
3. insulation
4. conductor

Figure 4 - cable with aluminum screen

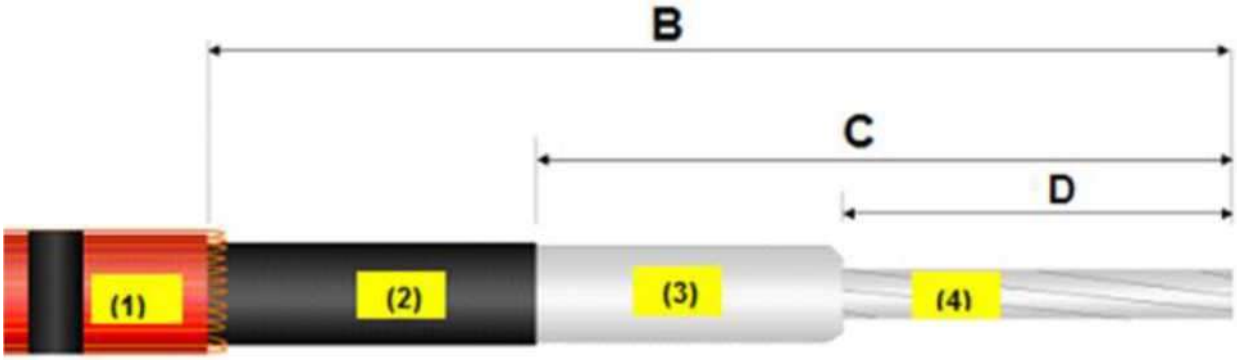
Cable section (mm^2)	Dimension 24 kV (mm)			
	A	B	C	D
35 - 95	225	185	135	50
95 - 240	240	200	150	65
240 - 400	260	220	170	85
400 - 630	285	245	195	110

Table 7 - Cable with aluminum screen dimensions

Therefore the following dimensions (in mm) are fixed:

A-B = 40
B-C = 50
C-D = 85

7.5.2 Preparation of the cable with copper wire screen



3. outer sheath
4. insulation screen
1. insulation
2. conductor

Figure 5 - cable with copper wire screen

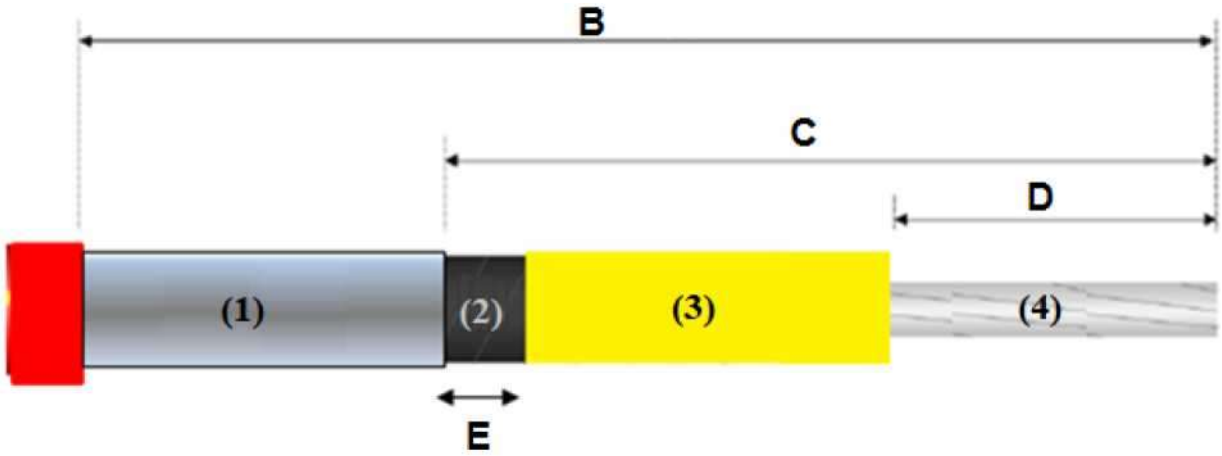
Cable section (mm^2)	Dimension 24 kV (mm)		
	B	C	D
35 - 95	175	135	50
95 - 240	190	150	65
240 - 400	210	170	85
400 - 630	235	195	110

Table 8 - Cable with copper wire screen dimensions

Therefore the following dimensions (in mm) are fixed:

B-C = 40
C-D = 85

7.5.3 Preparation of the cable with oil-impregnated paper insulation



1. lead sheath
2. paper insulation screen
3. paper insulation
4. conductor

Figure 6 - Cable with oil-impregnated paper insulation

Cable section (mm^2)	Dimension 24 kV (mm)			
	B	C	D	E
35 + 95	230	150	50	10
95 + 240	245	165	65	10

Table 9 - Cable with oil-impregnated paper insulation dimensions

Therefore the following dimensions (in mm) are fixed:

B-C = 80
C-D = 100

7.6 CONTENT OF THE KIT

All the necessary elements and accessories to install the compact joint on-field shall be included, namely:

A. Compact joint for extruded cables:

- 1 (one) pre-assembled joint body (see 7.4.2)
- 1 (one) shear bolt connector (see 7.4.2.1)
- 1 (one) shear bolt connector cover (see 7.4.2.1)
- 2 (two) plates for aluminum tape screen cables (see 7.4.2.5.a))
- Constant force compression system see par. 7.4.2.5.c) (quantity defined according to supplier's design)
- Greases and sealing compounds (see 7.4.2.5.e))
- Accessories for cleaning.
- Plastic bag for collecting residual materials of installation.
- List of materials.
- Identification label (see 7.8.3.2)
- Installation instructions and templates (see 7.8.4)
- Other materials, tools and accessories (according to supplier's design)
- Tinned copper braid for grounding (see 7.5.2.5 g))
- Warning sheet[3], indicating the expiration date.

B. Compact joints for transition extruded-paper insulated cables (see Table 1):

- 1 (one) pre-assembled joint body (see 7.5.2)
- 1 (one) shear bolt connector (see 7.5.2.1)
- 1 (one) shear bolt connector cover (see 7.5.2.1)
- 1 (one) plates for aluminum tape screen cables (see 7.4.2.5.a))
- Constant force compression system see par. 7.5.2.5.c) (quantity defined according to supplier's design);
- Greases and sealing compounds (see 7.4.2.5.e));
- Accessories for cleaning.
- Plastic bag for collecting residual materials of installation.
- List of materials.
- Identification label (see 7.8.3.2);
- Installation instructions and templates (see 7.8.4);
- Other materials, tools and accessories (according to supplier's design)
- Tinned copper rope blocked for grounding (see 7.4.2.5.g)).
- Oil sealing cold shrink tube (see 7.4.2.5.f))
- Warning sheet[3], indicating the expiration date.
-

7.7 TESTING

7.7.1 GENERAL

Tests are classified into:

- Type tests
  - Test sequences according to HD 629. (see 7.7.2.1; 7.7.2.2; 7.7.2.3) ○ Expiration Test (see 7.7.2.4)
  - Robustness Test (see 7.7.2.5)
  - UV Resistance Test (if applies, see 7.7.2.6) ○ Additional Type Tests (if applies, see 7.7.2.7)
  - Connector test (see 7.7.2.8)

[3] It must be inside the kit and is intended to warn the installer about the expiration date of the material; it is independent of the labels.

- Acceptance tests (see 7.7.3)

They shall be carried out according to HD 629-1 S3 for joints for cables with extruded insulation and according to HD629-2 S2 for transition joints.

The connectors shall be tested according to IEC 61238-1, class A.

Tests on transition joints shall be performed using oil insulated paper cables.

The Supplier shall declare the resistance to fire of the main insulating housing according to IEC 60695-11-10 or another equivalent standard.

7.7.2 TYPE TEST

7.7.2.1 Type Test for joints for cables with extruded insulation.

Type tests shall be carried out according to table 10 on samples installed on XLPE insulated cables with the minimum diameter over insulation (or lower) specified in Table 1. For RETELE ELECTRICE, type tests shall be carried out on HPTE or XLPE insulated cables.

Rated voltage of the cables U0/U (Um) (kV)	**Cable cross-section selected**	**Test Sequence**	**Standard reference**
The rated voltage indicated in Table 1 for selected material code.	The minimum section indicated in Table 1 for selected material code.	Sequence B1	Table 12 for HD 629.1 S3:2019
	The maximum section indicated in Table 1 for selected material code.	Sequence B1 and Sequence B2	Table 12 for HD 629.1 S3:2019
Note: samples according HD 629.1 S3:2019			

Table 10 - Type test for single range.

e.g., The 270001 shall be tested on a 240 mm^2 - 12/20(24) cable seq. B1 & seq. B2 and 95 mm^2 12/20(24) kV cable seq B1.

7.7.2.2 Extent of compliance for joints for cables with extruded insulation.

Extension of compliance[4] for the same joint design[5] to smaller o larger cross-sections ranges shall be obtained by satisfactory completion of relevant test, according to table 11. It shall be mandatory to perform the required test for the 95-240 mm2 cable cross-section range for obtaining the extension to other sections.

[4] Compliance shall extend the use of a joint on cables of the same Uo as the test cable but with equal or greater nominal insulation thickness.

[5] Same design includes: same architecture, same manufacturing process, same conception, same materials, same sealings, compatible electrical stress.

Cable cross-section Range (mm^2)	Test Sequence	Range Approval (mm^2)			
		35 95	95 240	240 400	400 630
95-240 (*)	Sequence B1 from table 12 on 95 mm2 cable Sequence B1 from table 12 on 240 mm2 cable Sequence B2 from table 12 on 240 mm2 cable		Yes		
35-95	Sequence as per Table 17 (**) on 35 mm2 cable	Yes	Yes		
240-400	Sequence B1 from table 12 on 400 mm2 cable		Yes	Yes	
400-630	Sequence B1 from table 12 on 630 mm2 cable		Yes	Yes	Yes
(*) Mandatory test to obtain the compliance extension. (**) Test N° 4 in Table 17, should be performed with 63 cycles in water instead of the 12 described in standard HD 629.1 S3:2019.					

Table 11 - Type test for extend compliance

7.7.2.3 Type Test for Transition joints.

Type tests shall be carried out according to table 12 on samples installed on oil insulated paper cables with the minimum diameter over insulation (or lower) specified in Table 1.

Rated voltage of the cables U0/U (Um) (kV)	Cable cross-section selected	Test Sequence	Standard reference
The rated voltage indicated in Table 1 for selected material code.	The minimum section indicated in Table 1 for selected material code.	Sequence as per Table 9 (*)	Table 9 for HD 629.2 S2:2006
	The maximum section indicated in Table 1 for selected material code.	Sequence B1-I and Sequence B2	Table 4 for HD 629.2 S2:2006
(*) Test N° 4 in Table 17, should be performed with 63 cycles in water instead of the 12 cycles in air described in standard HD 629.2 S2:2006.			

Table 12 - Type test for single range for transition Joints.

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4 Compliance shall extend the use of a joint on cables of the same Uo as the test cable but with equal or greater nominal insulation thickness.

5 Same design includes: same architecture, same manufacturing process, same conception, same materials, same sealings, compatible electrical stress.

7.7.2.4 EXPIRATION TEST

An expiration test shall be performed in order to verify the capability of the joint to maintain its properties during its life according to the expiry date declared by the manufacturer.

The test shall be performed of a new joint and on a joint of the same lot aged 7 days at 65°C in oven in expanded stage (to simulate 2 years of storage at 35°C of mean temperature).

After ageing, the new joint and the aged joint are put in expanded stage at +5°C during 24h. After that cooling phase, the joints are installed on the minimum cross-section cables of their reference range and the loops are immediately immersed in cold water at 0/+5°C.

Then, the following test sequence is applied:

Test	**Extruded cable Joint[6] (table 12 of HD 629-1)**	**Transition Joint[5] (table 4 of HD 629-2)**
Partial discharge measurement	X (test n°2)	n/a
Lightning impulse voltage test	X (test n°3)	X (test n°11)
Power-frequency voltage tests	X (test n°1)	X (test n°2)
Partial discharge measurement	X (test n°3)	n/a
Visual inspection of water penetration	X	X

Table 13 - Expiration test.

7.7.2.5 ROBUSTNESS TEST

It shall be performed according to the French standard HN 33-E-03 with the following particularities:

The assessment criteria to pass the test is given in HN 33-E-03, except for the classification level which is not applied. However, the index “Evolution of the average breakdown values" must be calculated according to paragraph 5.1.3.2 of the standard. The test execution parameters are described in Table 14.

[6] As defined in paragraph 7.3.1, for the type codes defined in Table 1.

Joint Type	Rated voltage of the cables U0/U (Um) (kV)	Cable crosssection selected	Sample	NH-33 Test Values
Straight or Aerial.	12/20(24) KV	35-95 (Al) 95-240 (Al)	150 mm^2 - Extruded cable. Or 240 mm^2 - Extruded cable. (Cables with aluminum tape screen)	Min breakdown values: 4.5 Uo for new samples and after aging
		240-400 (Al) 400-630 (Al/Cu)	630 mm^2 - Extruded cable.	
Transition.	12/20(24) KV	35-95 (Al) 95-240(Al)	150 mm^2 - oil insulated paper cables. Or 240 mm^2 - oil insulated paper cables.	Min breakdown values: 4.5 Uo for new samples. 3 Uo After aging

Table 14 - Robustness Test.

7.7.2.6 UV RESISTANCE TEST FOR MV AERIAL CABLE JOINTS

Joints to be installed on MV aerial cables (see Table 1) shall be tested according to the IEC 62217 2012 par 9.3.2 (1000 h).

7.7.2.7 Connectors Tests

The connectors shall be tested according to IEC 61238-1, class A, and shall be tested both for their maximum and minimum section.
The qualification can be extended to an alternative connector by carrying out all tests prescribed by HD 629-1, Table 16. The alternative connector shall comply with all the requirements specified in this document (see 7.4.2.1).

7.7.3 ACCEPTANCE TESTS

For each material code, acceptance tests shall be carried out using the smallest cable section (see Table 1 for reference) for each rated voltage of the cable according to Table 3 (e.g. 270001 shall be tested on a 95 mm2 - 12/20(24) kV cable).

During the acceptance tests performed autonomously by the supplier: The supplier must perform all tests listed in Table 16 with the sampling criteria indicated in Table 15.

The reports of the tests carried out and the tested samples shall be made available in case of repetition of the acceptance tests at the presence of the RETELE ELECTRICE or designated inspector

During the repetition of the acceptance tests at the presence of the RETELE ELECTRICE or designated inspector: The test shall be carried out on a sample chosen randomly from the batch already successfully tested by the supplier.

The samplings plans are the follow:

Sample Type	Batch (units)		
	< 50 units	> 50 and < 1200	> 1200
A	2 samples	5 samples	10 samples
B	1 sample	2 samples	3 samples
C	1 sample	2 samples	5 samples
D	1 sample	1 sample	2 samples

Table 15 - Samples for acceptance Tests

In all cases:

The quantities are always referred to each type of material code prepared for testing;
The acceptance number will be 0, and the rejection number will be 1;
On the scheduled acceptance testing date, the supplier shall prepare the cables, stripped as required by the assembly instructions of joints being tested. This will facilitate the joint assembly and reduce the testing time, which benefits both parties.

All the tests to be performed and the relative sampling are listed in the following table:

Test	Sampling during execution by Supplier	Sampling during repetition by RETELE ELECTRICE	Note
1. Visual check, Accessory manufacturing specifications check, and joint marking	A	C	- Verification of correspondence to the approved prototype (dimensions, completeness of the accessory kit, presence, and correctness of identification labels and joint marking, packaging, and barcodes). - The nominal tightening torque of shear bolts specified by the manufacturer shall always be verified.
2.Accessory assembly check	B	D	- Check the assembly according to the approved manual.
3. Power-frequency withstand test	B	D	- Required values according to table N° 2 and test description according to IEC-61442.
4. Partial discharge test at ambient temperature	B	D	- According to test N° 2 to table 12 of HD 629-1 S3. Partial discharge measurement is not applicable for Transition Joints.

Table 16 - Acceptance Tests

7.8 Conditions of Supply

7.8.1 Warranty

The manufacturer shall guarantee that the cold shrink compact joints are supplied to meet all requirements of this technical specification.

The cold shrink compact joints shall be warranted against manufacturing defects for a period of 2 years.

7.8.2 Labelling

The joint must bear the following information:

a) name of the manufacturer;
b) maximum voltage Um in kV
c) year and month of manufacture (e.g.: 15/2)

In particular, this information shall be placed on the external sheath of the joint by means of indelible and permanent screen printing or an equivalent method accepted by the RETELE ELECTRICE.

7.8.3 Packaging

Joints shall be supplied in individual packages which shall bear the following information:

- Material code assigned by the RETELE ELECTRICE;
- Name of the manufacturer;
- Type of joint (e.g. cold shrink compact);
- Type of cables for which the accessory is intended, section and conductor material allowed (aluminum/copper);
- Year and month of packaging;
- Progressive identification number assigned by the manufacturer (or serial number);
- Barcode (see 7.8.3.1)
- Production batch number;
- Identification abbreviation;
- Maximum voltage U_m in kV;
- Expiry date (year/month) of the materials.

For RETELE ELECTRICE, shipping (of several individual packages) shall meet the requirements of the packaging in compliance with GUI 101 specifications.

7.8.3.1 Barcode

The characteristics of the barcode are listed in Barcode specification

7.8.3.2 Identification label

It shall include blank fields to be filled after installation:

Name: .....
Date: .....
Company: .....

7.8.4 Installation instructions and templates

The instruction for the preparation of the cable shall be written in compliance with RETELE ELECTRICE requirements. For RETELE ELECTRICE the technical specification DJ4580 also applies.

Accessory assembly instructions shall be written on A4 paper, and the various stages of construction of the joint shall be illustrated by photographs or diagrams in color.

Templates shall be included for the following types of cables:

- Extruded cables with aluminum tape screen
- Extruded cables with copper wires screen
- Paper insulated cable

Furthermore, for processing steps that require the use of a special tool, the description of these operations shall be accompanied by the RETELE ELECTRICE material code/type code for the tool and a color photograph.

Additionally a QR code shall be included for each step of the installation instructions to provide a web-link to demonstration videos and tutorials on the related joint. The videos shall be in the local language of the Country of delivery.

Installing instruction and templates shall be in the Romanian language.

7.9 TECHNICAL CONFORMITY ASSESSMENT

7.9.1 General conditions

The manufacturer shall provide personnel and equipment necessary to carry out type tests and acceptance tests described herein. Otherwise, the supplier could hire the service to a laboratory previously accepted by the customer and assume the cost. The product shall comply with the requirements of ILRE097 regarding the Technical Conformity Assessment.

The equipment should be properly calibrated by a laboratory certified or approved by the client. The manufacturer shall possess up to date calibration certificates (to turn over) at the time of inspection.

7.9.2 Acknowledgement of TCA for previous revision of the standard.

Products with TCA in force under standard GSCC004 Rev 3 of 09/07/2018 or Rev 4 of 12/05/2021 and their respective addendums will be recognized as homologated material for the present RETELE ELECTRICE technical specification., therefore, reserves the right to check that the conditions of supply, contents of the kit, type codes, country codes, manuals, labels, etc., shall comply with the requirements of this technical specification.

8 ANNEXES

8.1 Technical Check List example

The following chart indicates the minimum technical information that suppliers shall provide.

Item	Description	Unit	Required	Offered
1	**GENERAL INFORMATION**			
1.1	Supplier	-		
1.2	Factory	-		
1.3	Supplier Product Designation	-		
2	**MAIN FEATURES**			
2.1	Distribution Company and Country	-		
2.2	Country Code	-		
2.3	GS Type Code			
2.4	Joint Type			
2.5	Rated voltage U0/U (Um)	(kV)		
2.6	Rated power frequency withstand voltage	(kV)		
2.7	Rated impulse withstand voltage			
2.8	Rated short time withstand current in the conductor			
2.9	Rated short time (0,5 s) withstand current in the screen.			
2.10	Maximum length L	(mm)		
2.11	Maximum diameter D	(mm)		
2.12	Shrink Technology			
2.13	Resistance to fire			
2.14	Type of connector			
2.15	Copper stocking cross section	(mm2)		
2.16	Cable section	(mm2)		
2.17	Min/max diameter over insulation	(mm)		
2.18	Maximum external diameter of shear bolts connector:	(mm)		
2.18.1	Minimum internal diameter of shear bolts connector	(mm):		
2.18.2	Number of screws of shear bolts connector			
2.19	Minimum total thickness over the connector of main insulating housing after shrinking	(mm)		
2.2	Grounding Braid System	Yes/no		
The "L" and “D” dimensions, as defined in figure 1				

Table 17 - Check list