

Subject: COLD SHRINK COMPACT JOINTS FOR MV CABLES.

Application Areas

Perimeter: *Global*

Staff Function: -

Service Function: -

Business Line: *Enel Grids and Innovation*

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THE HEAD OF NETWORK COMPONENTS

Adriano Sabene

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1 DOCUMENT AIMS AND APPLICATION AREA

This Global Standard applies to 12/20(24) kV and 18/30(36) 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 Global Standard also applies to transition joints used for the connection of single-pole impregnated paper insulated cables and extruded insulated cable.

These Global Standard applies to the Distribution Companies of Enel Group listed below:

Country	Distribution Company
Argentina	Edesur
Brazil	Enel Distribuição Rio (RJ); Enel Distribuição Ceará (CE); Enel Distribuição São Paulo (SP)
Chile	Enel Distribución Chile
Colombia	Codensa
Iberia	e-distribución
Italy	e-distribuzione

Distribution Companies

1.1 RELATED DOCUMENTS TO BE IMPLEMENTED AT COUNTRY LEVEL

This document applies to both Enel Global Infrastructure and Networks Srl Company and to Infrastructure and Networks Business Line perimeter, when each Company does not have to issue further documents.

1.2 REPLACED STANDARDS AND TRANSITIONAL PROVISIONS

This edition cancels and replaces all previous versions of the GSCC004 standard, including any associated addenda. A transitional period of up to twelve (12) months from the publication date is established, during which both Edition 4 and Edition 5 shall be considered valid, provided that the following additional requirements are fulfilled:

- The Copper stocking section shall comply with the specifications defined in Table 1 of Clause 7.1.
- The Joints shall be subject to fingerprint characterization in accordance with the provisions of Clause 7.7.2.10
- The robustness test ¹shall be carried out in full compliance with the methodology set out in Clause 7.7.2.6

¹ The robustness test shall include the calculation of the index “*Evol* – Evolution of the average breakdown values” as define in the reference standards (see 7.7.2.6).

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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 aerial 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 Italy, Rumania, Spain and Peru from 16 to 25 mm ² ; Modification of requirements of screen connecting plate (grater); Modification of requirements of sealing compounds; short time duration for Italy, Rumania and Spain. Standard dimension for cable preparation. Class 24 kV for Italy and Rumania.
02	25/05/2018	Revised tables 6, 7 and 8. Expiration test description.
03	09/07/2018	Note on table 8. Edited figure in 10.2. Revised material codes for Brazil.
Addendum Ed 0.	28/05/2020	Enel Distribuição São Paulo is included; Transition joints for 18/30(36) kV is added ;table 2, Rated short time withstand current in the screen (kA) is updated for Colombia; joints for 18/30(36) for Colombia is added; table 6 updated for Argentina; grounding braid system for São Paulo is added; Material codes updated; The range of sections available for 18/30(36) kV joints is updated; Maximum diameter over insulation for 18/30(36) kV joints with cable section 240-400 is updated; special consideration for São Paulo in type tests.
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 revision of the standard; Special Joints are added for aerial-underground cable transition and Joints for screen interruption.
05	18/06/2025	Updated the minimum cross-section of the copper stocking. See Table 1; Introduced a braid system diagram for selected joint configurations (catalogue items); Defined allowable storage and installation temperature ranges; Removed the prohibition against the use of spiral support systems.; The connection method between the aluminum tape screen and the copper stocking shall be defined by the manufacturer.; Cable preparation dimensions shall be defined according to the manufacturer's design.; The use of an oil containment tube in transition joints is now optional.; Type tests updated to reference HD 629.1 S3:2019 with a customized test sequence for straight joints—including additional tests—and HD 629.3 S1:2024 for transition joints.; The duration of the "Expiration Test" has been extended to 10 days.; Updated the reference standard for the Robustness Test on straight joints to NF C 33-050.; Introduced the Fingerprint test for joints; Introduced ad hoc type tests for the connection system between the cable screen and the copper stocking. Introduced a type test for the body support system when spiral-type supports are used.; Updated the sampling table for acceptance; Additional labeling on the packaging is now required.

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3 UNITS IN CHARGE OF THE DOCUMENT

Responsible for drawing up the document:

- Global Infrastructure and Networks: Engineering and Construction / Components and Devices Design unit / Network Components unit

Responsible for authorizing the document:

- Global Infrastructure and Networks: Head of Network Components unit
- Global Infrastructure and Networks: Head of Quality unit.

4 REFERENCES

- Enel Group Code of Ethics;
- The Enel Group Zero Corruption Tolerance (ZCT) Plan;
- Organizational and management model as per Italian Legislative Decree no. 231/2001 or equivalent documents adopted in the Countries;
- Enel Human Rights Policy;
- Stop Work Policy;
- Enel Global 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.
- MAT-O&M-NCS-2021-0033-EGIN version 3 "Global Infrastructure and Networks – GSCG002 Technical Conformity Assessment".
- GRI-GRI-CNS-O&M-0002

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

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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 629.3 S1	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 3: Cables with impregnated paper insulation and cables with extruded 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.

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Enel Global Standards

- GSC001² “Underground Medium Voltage Cables”.
- GSCC015 “Cable preparation for MV Cables”
- GSCC008 “Medium Voltage Aerial Bundled Cables

*Local Standard**Italy*

- Nota Operativa PVR001 – Rev. 2 – Ott. 2012 - Gestione Garanzie dei materiali di ENEL Distribuzione.

Brazil

- NBR14643, Corrosão atmosférica – Classificação da corrosividade de atmosferas
- Nr-10, Segurança em Instalações e Serviços em Eletricidade

Colombia

- RETIE – Reglamento Técnico de Instalaciones Eléctricas.

Chile

- NSEC 5 Reglamento de Instalaciones Eléctricas de Corrientes Fuertes

Iberia

- R.D. 614/2001, de 8 de junio, sobre disposiciones mínimas para la protección de la salud y seguridad de los trabajadores frente al riesgo eléctrico.
- R.D. 337/2014, de 9 de mayo, por el que se aprueban el Reglamento sobre condiciones técnicas y garantías de seguridad en instalaciones eléctricas de alta tensión y sus Instrucciones Técnicas Complementarias ITC-RAT 01 a 23.
- R. D, 223/2008 de 15 de febrero, por el que aprueba el Reglamento sobre condiciones técnicas y garantías de seguridad en líneas eléctricas de alta tensión y sus instrucciones técnicas complementarias ITC-LAT 01 a 09 (R.L.A.T.).

² The characteristics of the cables used in distribution networks are defined in the Enel Group Global Standard. While the joints shall be suitable for new cables compliant with GSC001, their use is also foreseen on legacy networks with cables manufactured according to previous national standards. For this reason, the Global Standard considers key parameters of legacy cables in each Country, including rated voltage, nominal cross-section, and minimum/maximum insulation diameters. This includes single-core impregnated paper insulated cables, both with non-draining and draining compounds.

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Europa

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

Other standards

- NF C33-050 Câbles isolés et leurs accessoires pour réseaux d'énergie - Jonctions, dérivations et bouts perdus unipolaires préfabriqués pour câbles à isolant synthétique de tension assignée comprise entre 6/10(12) kV et 18/30(36) kV
- NF C33-014 Insulated cables and their accessories for power systems. Screen tape for single-core cables of rated voltages from 6/10 (12) kv to 18/30 (36) kv.
- HN 33-E-03 Essai de robustesse pour jonctions et transitions HTA November 2008.

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 Enel Group distribution companies. 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).

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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 (mm ²)	Min/max Diameter over insulation (mm)	Rated short time withstand current in the screen (kA)	Screen Extension (*)
GSCC004/11	ED-ITALY	270002	12/20(24)	STRAIGHT	35÷95	25	14.9/25.0	3kA@1seg	No
GSCC004/11	RJ/CE -BRAZIL	251985	12/20(24)	STRAIGHT	35÷95	25	14.9/25.0	3kA@1seg	No
GSCC004/11	ED-COLOMBIA	274606	12/20(24)	STRAIGHT	35÷95	25	14.9/25.0	3kA@1seg	No
GSCC004/11	ED-CHILE	271927	12/20(24)	STRAIGHT	35÷95	25	14.9/25.0	3kA@1seg	No
GSCC004/11	ED-ARGENTINA	0114-0188	12/20(24)	STRAIGHT	35÷95	25	14.9/25.0	3kA@1seg	No
GSCC004/12	SP -BRAZIL	337829	12/20(24)	STRAIGHT	35÷95	25	14.9/25.0	3kA@1seg	Grounding Braid
GSCC004/13	ED-ITALY	270001	12/20(24)	STRAIGHT	95÷240	35	20.6/32.2	5kA@1seg	No
GSCC004/13	ED-SPAIN	270090	12/20(24)	STRAIGHT	95÷240	35	20.6/32.2	5kA@1seg	No
GSCC004/13	RJ/CE -BRAZIL	275029	12/20(24)	STRAIGHT	95÷240	35	20.6/32.2	5kA@1seg	No
GSCC004/13	ED-COLOMBIA	274607	12/20(24)	STRAIGHT	95÷240	35	20.6/32.2	5kA@1seg	No
GSCC004/13	ED-CHILE	270016	12/20(24)	STRAIGHT	95÷240	35	20.6/32.2	5kA@1seg	No
GSCC004/14	ED-ITALY	270042	12/20(24)	STRAIGHT	95÷240	35	20.6/32.2	5kA@1seg	Grounding Braid
GSCC004/14	SP -BRAZIL	270321	12/20(24)	STRAIGHT	95÷240	35	20.6/32.2	5kA@1seg	Grounding Braid
GSCC004/15	ED-ARGENTINA	0114-0189	12/20(24)	STRAIGHT	95÷240	50	20.6/32.2	10kA@0,5seg	No
GSCC004/16	ED-SPAIN	270002	12/20(24)	STRAIGHT	240÷400	35	26.1/37.5	5kA@1seg	No
GSCC004/45	RJ/CE -BRAZIL	275152	12/20(24)	STRAIGHT	240÷400	50	26.1/37.5	5kA@1seg	No
GSCC004/45	ED-CHILE	271928	12/20(24)	STRAIGHT	240÷400	50	26.1/37.5	5kA@1seg	No
GSCC004/17	SP -BRAZIL	337830	12/20(24)	STRAIGHT	240÷400	35	26.1/37.5	5kA@1seg	Grounding Braid
GSCC004/44	ED-ARGENTINA	0114-0193	12/20(24)	STRAIGHT	240÷400	50	26.1/37.5	10kA@0,5seg	No
GSCC004/18	SP -BRAZIL	337831	12/20(24)	STRAIGHT	400÷630	35	31/43.5	5kA@1seg	Grounding Braid

(*) As defined in Clause 7.4.2.10, the Screen Extension includes any functional configuration for extending and connecting the cable metallic screen outside the joint

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Type code	Distribution Company and Country	Country Code	Rated voltage U0/U (Um) (kV)	Joint type	Cable section (mm ²)	Copper stocking section (mm ²)	Min/max Diameter over insulation (mm)	Rated short time withstand current in the screen (kA)	Screen Extension (*)
GSCC004/19	RJ/CE -BRAZIL	310648	12/20(24)	STRAIGHT	400÷630	50	31/43.5	10kA@0,5seg	No
GSCC004/19	ED-CHILE	270122	12/20(24)	STRAIGHT	400÷630	50	31/43.5	10kA@0,5seg	No
GSCC004/19	ED-ARGENTINA	0114-0192	12/20(24)	STRAIGHT	400÷630	50	31/43.5	10kA@0,5seg	No
GSCC004/20	ED-ITALY	270004	12/20(24)	TRANSITION JOINT	35÷95	25	14.9/25.0	3kA@1seg	No
GSCC004/21	ED-ITALY	270003	12/20(24)	TRANSITION JOINT	95÷240	35	20.6/32.2	5kA@1seg	No
GSCC004/21	ED-CHILE	270107	12/20(24)	TRANSITION JOINT	95÷240	35	20.6/32.2	5kA@1seg	No
GSCC004/22	ED-ITALY	270006	12/20(24)	AERIAL JOINT	35÷95	25	14.9/25.0	3kA@1seg	No
GSCC004/22	ED-SPAIN	270315	12/20(24)	AERIAL JOINT	35÷95	25	14.9/25.0	3kA@1seg	No
GSCC004/22	ED-COLOMBIA	270129	12/20(24)	AERIAL JOINT	35÷95	25	14.9/25.0	3kA@1seg	No
GSCC004/22	RJ/CE -BRAZIL	990255	12/20(24)	AERIAL JOINT	35÷95	25	14.9/25.0	3kA@1seg	No
GSCC004/22	SP -BRAZIL	337835	12/20(24)	AERIAL JOINT	35÷95	25	14.9/25.0	3kA@1seg	No
GSCC004/23	ED-ITALY	270005	12/20(24)	AERIAL JOINT	95÷240	35	20.6/32.2	5kA@1seg	No
GSCC004/23	ED-SPAIN	270316	12/20(24)	AERIAL JOINT	95÷240	35	20.6/32.2	5kA@1seg	No
GSCC004/23	ED-COLOMBIA	270128	12/20(24)	AERIAL JOINT	95÷240	35	20.6/32.2	5kA@1seg	No
GSCC004/23	RJ/CE -BRAZIL	990254	12/20(24)	AERIAL JOINT	95÷240	35	20.6/32.2	5kA@1seg	No
GSCC004/23	SP -BRAZIL	337836	12/20(24)	AERIAL JOINT	95÷240	35	20.6/32.2	5kA@1seg	No
GSCC004/24	RJ/CE -BRAZIL	270330	18/30(36)	STRAIGHT	35÷95	25	20.4/30.0	3kA@1seg	No
GSCC004/24	ED-CHILE	270125	18/30(36)	STRAIGHT	35÷95	25	20.4/30.0	3kA@1seg	No
GSCC004/25	SP -BRAZIL	337832	18/30(36)	STRAIGHT	35÷95	25	20.4/30.0	3kA@1seg	Grounding Braid
GSCC004/26	RJ/CE -BRAZIL	270331	18/30(36)	STRAIGHT	95÷240	35	24.8/37.2	5kA@1seg	No
GSCC004/26	ED-COLOMBIA	270115	18/30(36)	STRAIGHT	95÷240	35	24.8/37.2	5kA@1seg	No
GSCC004/26	ED-CHILE	271917	18/30(36)	STRAIGHT	95÷240	35	24.8/37.2	5kA@1seg	No
GSCC004/26	ED-ARGENTINA	0114-0191	18/30(36)	STRAIGHT	95÷240	35	24.8/37.2	5kA@1seg	No
GSCC004/26	ED-SPAIN	270186	18/30(36)	STRAIGHT	95÷240	35	24.8/37.2	5kA@1seg	No

(*) As defined in Clause 7.4.2.10, the Screen Extension includes any functional configuration for extending and connecting the cable metallic screen outside the joint

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Type code	Distribution Company and Country	Country Code	Rated voltage U0/U (Um) (kV)	Joint type	Cable section (mm2)	Copper stocking section (mm2)	Min/max Diameter over insulation (mm)	Rated short time withstand current in the screen (kA)	Screen Extension (*)
GSCC004/27	SP -BRAZIL	600775	18/30(36)	STRAIGHT	95÷240	35	24.8/37.2	5kA@1seg	Grounding Braid
GSCC004/28	ED-SPAIN	270001	18/30(36)	STRAIGHT	240÷400	35	29.8/42.5	5kA@1seg	No
GSCC004/29	ED-CHILE	270123	18/30(36)	STRAIGHT	240÷400	50	29.8/42.5	10kA@0,5seg	No
GSCC004/29	RJ/CE -BRAZIL	270322	18/30(36)	STRAIGHT	240÷400	50	29.8/42.5	10kA@0,5seg	No
GSCC004/30	SP -BRAZIL	337833	18/30(36)	STRAIGHT	240÷400	35	29.8/46	5kA@1seg	Grounding Braid
GSCC004/31	ED-CHILE	271918	18/30(36)	STRAIGHT	400÷630	50	34.9/49.7	10kA@0,5seg	No
GSCC004/32	SP -BRAZIL	337834	18/30(36)	TRANSITION JOINT	35÷95	25	20.4/30.0	3kA@1seg	Grounding Braid
GSCC004/33	ED-SPAIN	270317	18/30(36)	AERIAL JOINT	35÷95	25	20.4/30.0	3kA@1seg	No
GSCC004/33	RJ/CE -BRAZIL	270300	18/30(36)	AERIAL JOINT	35÷95	25	20.4/30.0	3kA@1seg	No
GSCC004/34	ED-SPAIN	270318	18/30(36)	AERIAL JOINT	95÷240	35	24.8/37.2	5kA@1seg	No
GSCC004/34	ED-COLOMBIA	270127	18/30(36)	AERIAL JOINT	95÷240	35	24.8/37.2	5kA@1seg	No
GSCC004/34	ED-CHILE	270104	18/30(36)	AERIAL JOINT	95÷240	35	24.8/37.2	5kA@1seg	No
GSCC004/34	RJ/CE -BRAZIL	270299	18/30(36)	AERIAL JOINT	95÷240	35	24.8/37.2	5kA@1seg	No
GSCC004/35	ED-ITALY	270209	12/20(24)	SPECIAL JOINT	See Local Section				
GSCC004/36	ED-ITALY	270028	12/20(24)	SPECIAL JOINT	See Local Section				
GSCC004/37	ED-ITALY	270207	12/20(24)	SPECIAL JOINT	See Local Section				
GSCC004/38	ED-ITALY	270208	12/20(24)	SPECIAL JOINT	See Local Section				
GSCC004/39	ED-ITALY	270044	12/20(24)	SPECIAL JOINT	See Local Section				No
GSCC004/40	ED-ITALY	271143	12/20(24)	SPECIAL JOINT	See Local Section				No
GSCC004/41	ED-ITALY	270043	12/20(24)	SPECIAL JOINT	See Local Section				Monitoring Connection
GSCC004/42	ED-SPAIN	270125	12/20(24)	SPECIAL JOINT	See Local Section				No
GSCC004/43	ED-SPAIN	270198	18/30(36)	SPECIAL JOINT	See Local Section				No

(*) As defined in Clause 7.4.2.10, the Screen Extension includes any functional configuration for extending and connecting the cable metallic screen outside the joint

Table 1 – List of Component

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7.2 Service conditions
7.2.1 General service conditions

Environmental service conditions shall be in accordance with IEC 60721-2-1 (see chapter 4), except for temperature limits, which shall comply with the following values:

- Storage temperature: $-5\text{ }^{\circ}\text{C}$ to $+55\text{ }^{\circ}\text{C}$
- Installation and assembly temperature (including cable handling, positioning, component application and shrinkage): $-5\text{ }^{\circ}\text{C}$ to $+55\text{ }^{\circ}\text{C}$ (1B2 – Hot Dry IEC 60721-2-1)

7.2.2 Specific service conditions

Colombia (Enel Distribución Colombia): the reference altitude is 2.700 m

7.2.3 Energization requirement

The joint shall be suitable for immediate energization after installation, if required by network operating conditions.

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:

Table 2 - Electrical characteristics

Rated voltage $U_0/U (U_m)$ (kV)	12/20(24)	18/30(36)
Rated power frequency withstand voltage (kV) ³	50	70
Rated impulse withstand voltage (kV)	125	170
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	

³ Rated power frequency withstand voltage (kV) values for type test is according to HD629 (EN 61442)

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

Rated voltage of the joint $U_0/U (U_m)$ (kV)	12/20(24)	18/30(36)
Distribution Company (Country)	Rated voltage of the cables $U_0/U (U_m)$ (kV)	
Enel Distribuição São Paulo (Brazil)	8.7/15(17.5)	15/25(31) 20/35(42)
Enel Distribuição Ceará (Brazil)	8.7/15(17.5)	-
Enel Distribución Colombia (Colombia)	8.7/15(17.5)	18/30(36)
Enel Distribución Chile (Chile)	8.7/15(17.5)	15/25(31)
Edesur (Argentina) Enel Distribuição Rio (Brazil)	8.7/15(17.5)	18/30(36)
e-distribución (Spain)	12/20(24)	18/30(36)
E-Distribuzione (Italy)	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 $U_0/U (U_m)$ (kV)	12/20(24)	18/30(36)
Maximum length L (mm)	1000	
Maximum diameter D (mm)	100	

Table 4 - Overall dimensions

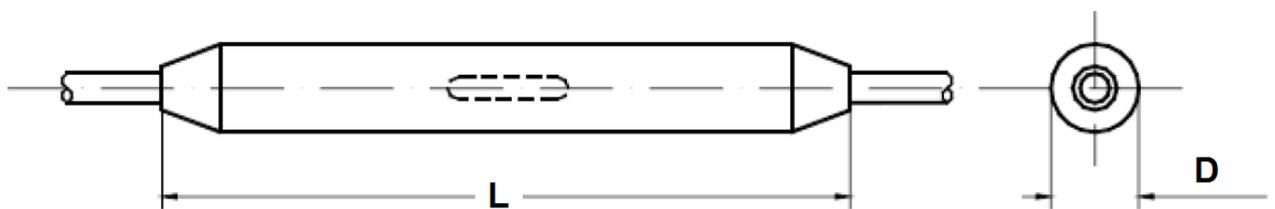


Figure 1 - Maximum dimensions (mm)

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7.4 CONSTRUCTION CHARACTERISTICS**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 made of insulating material resistant to chemical agents and environmental conditions commonly found in soil. The use of tapes, paints, enamels, or similar materials is not considered sufficient to ensure the required level of protection. The joint shall be watertight to prevent water penetration during operation and designed to prevent longitudinal water migration along the cable screens.

7.4.1.3 Resistance to fire

The main insulating housing (see 7.4.2.4) shall be resistant to fire.

7.4.1.4 Heating

All materials that constitute the joint shall withstand the heating conditions expected during operation without adversely affecting the proper functioning of the joint or the cable.

7.4.1.5 Materials compatibility

All the components of the joint shall be made of materials compatible with each other and with the components of the cable, ensuring no adverse effect on their proper functioning.

Greases and sealing compounds, if used, shall be completely neutral with respect to the materials they contact and remain stable when exposed to air

7.4.2 COMPACT JOINT

Compact joints are composed by the following elements:

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

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

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

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

The body of the compact joint shall be mounted on a support system that ensures proper installation without causing any damage to the joint body or the cables inside. The use of spiral supports and self-ejecting supports is allowed. The support must also be designed for easy handling and installation, ensuring robustness and stability during and after installation.

7.4.2.1 *Shear bolt connector*

The electrical continuity of the cables shall be made through a shear bolt connector compliant with IEC 61238-1, Class A. The connector shall include shear bolts and shall be made of tin-plated aluminum alloy, suitable for both aluminum and copper conductors.

No additional holes (e.g., for inspection) shall be allowed. The shear bolts shall be designed to break inside their holes, ensuring that no spikes or projections of material remain on the connector surface.

The connectors shall feature a central lock and ensure the correct positioning of the conductors along the same axis of the connector, using adapters for smaller sections within the prescribed range.

The external surface of the connectors shall be free of sharp edges, spikes, or deformities. In particular, the shear bolts shall be designed to break inside their holes, ensuring that no projections of material remain on the connector surface, for any conductor section within the specified application range.

Connectors must be designed and constructed to ensure that, when properly installed, the electrical resistance of the connection does not exceed the equivalent resistance of the reference conductor.

The use of grease is permitted to improve electrical contact between the connector and the cable conductors and to avoid corrosion. The design of screw cavity protection must prevent any material from being dispersed inside the joint during the cold shrinking operation and/or installation.

After installation, the entire connector shall be covered with a suitable protective cover with a smooth surface to prevent damage to the joint (e.g., residual spikes from screws).

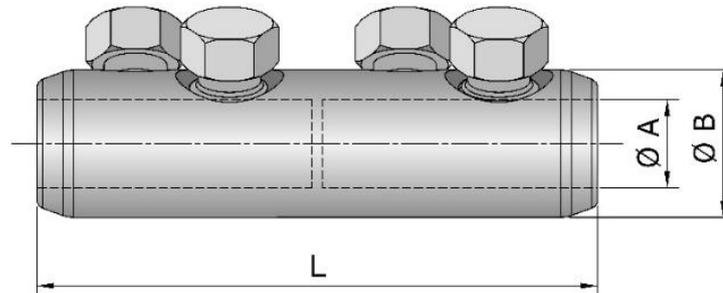
With reference to Figure 2, Table 5 reports the main characteristics and dimensions of the connectors:

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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 Body Support.

The supports systems shall ensure reliable performance throughout the entire installation temperature range specified in this document.

Self-ejecting supports

An integrated mechanical device designed to keep the joint body expanded prior to installation and to automatically disengage as the body is applied over the cable.

The support shall ensure a smooth, progressive, and uniform retraction of the joint body, allowing the installer to maintain full control throughout the entire application process.

Sudden collapse, uncontrolled release, or blocking of the joint body during installation are not permitted.

The system shall be free from friction or mechanical interference that may compromise the positioning or integrity of the joint body.

Spiral supports

A removable helical structure used to maintain the joint body in an expanded state prior to installation. The support is manually unwound during assembly, allowing the joint body to contract progressively over the cable.

The system shall be designed such that, during removal by pulling the release cord, no dragging or mechanical interference with the joint body occurs.

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Adequate clearance shall be ensured between the cable and the spiral support to prevent blocking or obstruction during installation, especially in areas with increased radial thickness—such as the screen connection zone or metallic screen plate.

7.4.2.3 Component to control the electric field

The joint design shall include a solution to manage and control the electric field, particularly in the transition zones between the connector, the cable insulation, and the outer semi-conductive screens of the cables. The solution shall effectively minimize electric field concentration and ensure reliable and long-term operation

7.4.2.4 Main insulating housing

The main insulating body shall be made of a single piece, i.e., a single, factory-integrated component — composed of multiple pre-engineered layers — applied in one step during installation, without intermediate assembly steps. It shall be designed to ensure adequate insulation performance over the connector. The manufacturer shall provide detailed information regarding the total thickness of the insulating housing after shrinking.

7.4.2.5 Semiconducting layer

Semiconducting layers applied as paint, ink, or surface coating (i.e. not continuous or not integrated with the body of the joint) are not allowed. Only continuous, homogeneous, factory-integrated semiconducting layers shall be accepted.

7.4.2.6 Copper stocking (Metallic 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.

The screen continuity device shall:

- Accommodate a retraction of at least 10 mm of the cable outer sheath on each side, without compromising the electrical connection of the metallic screen.
- Be capable of conducting both induced currents and short-circuit currents without causing degradation to the joint components or the cables to which it is connected. The short-circuit current capability shall be as specified in Table 1, according to the conductor cross-section.

7.4.2.6.a) Cables with aluminum tape screen

For cables with an aluminum tape screen, the connection between the copper stocking and the cable screen shall be made using a tin-plated hard copper plate or an alternative solution ensuring equivalent or improved electrical and mechanical performance. In all cases, the screen continuity shall be ensured with an electrical

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resistance not higher than that obtained with a continuous copper braid connection having the cross-section specified in Table 1, measured over the same connection length.

The geometry and features of the plate shall be according to the manufacturer's design. Figure 3 illustrates a reference configuration, but any design is acceptable provided it successfully passes the mechanical and electrical tests specified in section 7.7.2.11 of this standard.

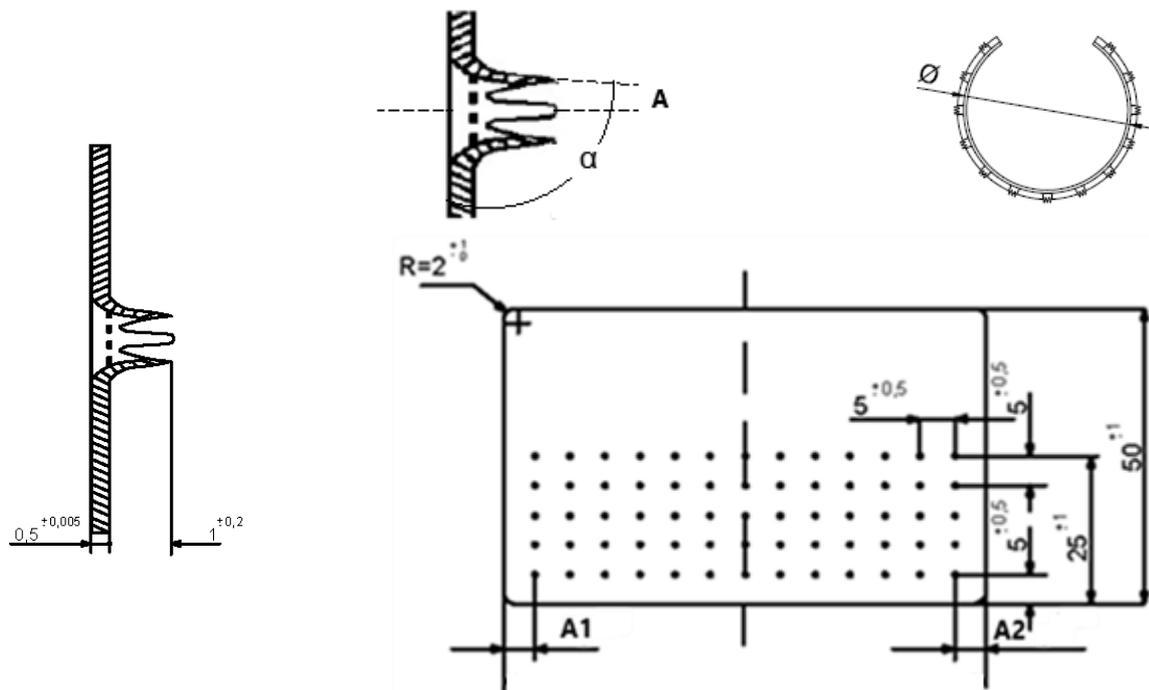


Figure 3 – Reference geometry of rectangular plate for aluminum tape screen connection

7.4.2.6.b) Cables with copper wires screen

In the case of cables with a copper wire screen, the copper wires of the metallic screen shall be folded back over the cable's outer sheath and secured using a constant-force compression system.

7.4.2.6.c) Constant force compression system

Electrical continuity between the cable screens and the copper stocking of the joint may be achieved using austenitic steel constant-force springs, the compressive force exerted by the main insulating housing of the joint, or another equivalent method. The selected system shall ensure reliable electrical contact with the cable screen under all operating conditions, either through mechanical pressure or through integrated conductive elements specifically designed to ensure screen continuity

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7.4.2.7 External protective sheath

The protective sheath for mechanical protection and sealing of the joint shall be made as a single piece. For aerial joint types, the color of the external sheath shall be gray RAL 7001.

7.4.2.8 Greases and sealing compounds

Sealing compounds are not allowed, except those:

- to seal the whole joint,
- to protect the junction of the metallic screens.
- as part of the oil containment system in transition joints.

Greases are not allowed, except those:

- as part of the connector's internal design, when pre-applied by the manufacturer and not intended for field application
- over the main insulation of the cable and over the connector
- used to facilitate the assembly of the joint's outer protective components, including the sealing or protective sheath.

Greases and sealing compounds shall not be used for electrical functions, such as field control or electrical insulation enhancement. However, when present in regions exposed to electric fields, such materials shall exhibit stable dielectric behavior, without introducing electrical stress concentrations or degradation risks.

7.4.2.9 Oil sealing system for transition joints

The solution designed to contain the impregnating insulating oil shall ensure reliability and ease of installation. It must be designed to minimize the risk of installation errors through intuitive assembly features and clear installation guidelines

7.4.2.10 Screen Extension System (SES)

Joints equipped with a Screen Extension System (SES) (see Table 1) must include a tin-coated copper braid securely attached at one end, with characteristics defined in Table 6. This system allows the screen of the cable to be extended outside the joint for various applications, including:

Grounding Braid (GB): Used to connect the cable screen to the grounding system, ensuring proper dissipation of fault and induced currents.

Cross-Bonding Link (CBL): Designed for interconnecting cable screens in cross-bonding schemes. The braid is connected to a Link-Box, as specified in the ENEL GSCC034 standard.

Monitoring Connection (MC): Used exclusively in joints with screen interruption. In this case, two braids—one for each cable end—are connected to a Link-Box (ENEL GSCC034), allowing continuity, voltage, or current measurements of the screen.

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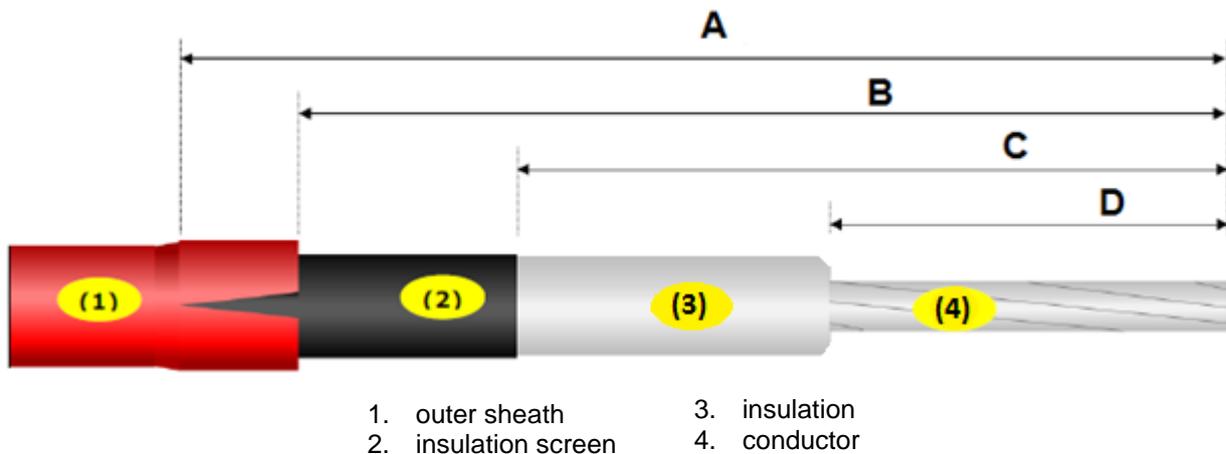
To ensure long-term performance and reliability, all SES configurations must guarantee longitudinal sealing, preventing any water ingress into the accessory through the connection point. Appropriate sealing materials, such as conductive mastics and constant-force springs, or equivalent solutions, must be applied to maintain both electrical and mechanical integrity.

Screen Extension System Type	Length (Meters)	Width (mm)	Section (mm ²)	Isolation	End-Termination Component
Grounding Braid	1	25.4	35	No	
Cross-Bonding Link (*)	2.5		35	Yes	M12 Cable Lug & Screw
Monitoring Connection (*)	2.5		35	Yes	M12 Cable Lug & Screw

Note (*): Refer to the latest revision of ENEL GSCC034 to verify the connector and labeling requirements for the Link-Box connection

Table 6 – Grounding Braid Dimensions
7.5 DIMENSIONS FOR THE PREPARATION OF THE CABLE

The dimensions for cable preparation shall align with the manufacturer's design. To ensure standardization in the instruction manuals, these dimensions shall be referenced with the letters A, B, C, D, and E, as illustrated in Figures 4, 5, and 6, depending on the type of cable. The dimensions must be expressed in millimeters (mm), and the manufacturer shall specify the maximum allowable tolerance during installation, which shall in no case be less than ± 2 mm.

7.5.1 Preparation of the cable with aluminum screen

Figure 4 – cable with aluminum screen

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7.5.2 Preparation of the cable with copper wire screen

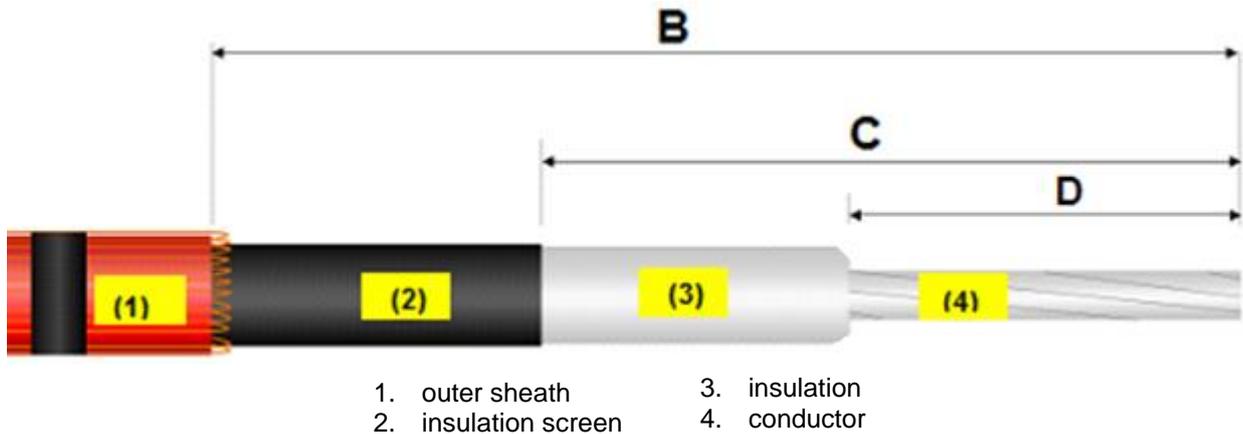


Figure 5 – cable with copper wire screen

7.5.3 Preparation of the cable with oil-impregnated paper insulation

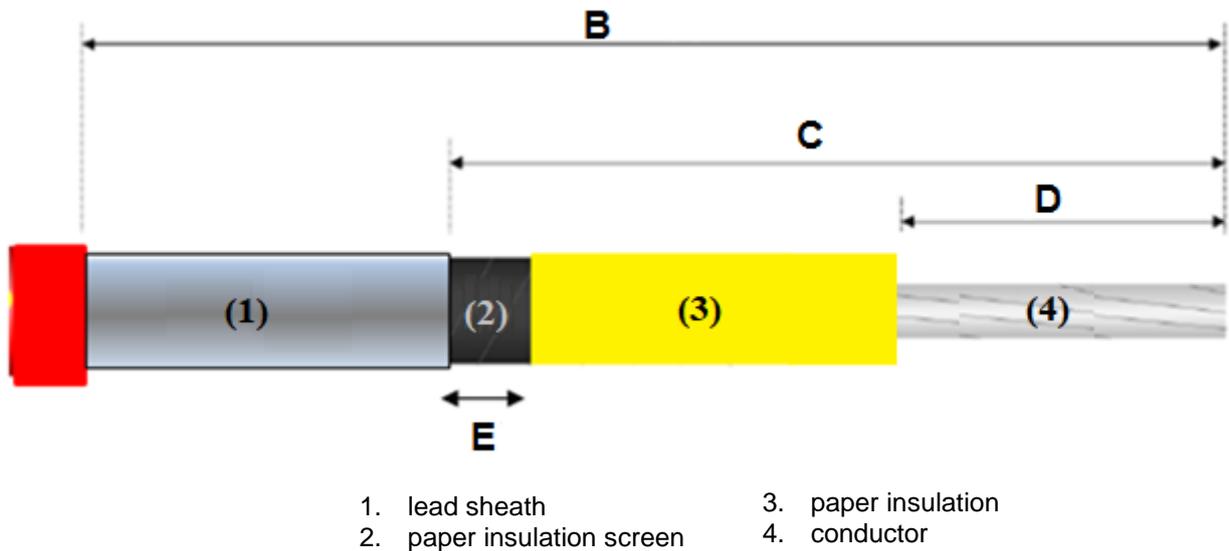


Figure 6 – Cable with oil-impregnated paper insulation

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Staff Function: -

Service Function: -

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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 or equivalent system (see 7.4.2.6.a))
- Constant-force compression system or equivalent (see 7.4.2.6.c)), with the quantity defined according to the supplier's design)
- Greases and sealing compounds (see 7.4.2.8)
- Accessories for cleaning.
- Plastic bag for collecting residual materials of installation.
- List of materials.
- Identification label (see 7.8.3.3)
- Installation instructions and templates (see 7.8.4)
- Other materials, tools and accessories (according to supplier's design)
- Tinned copper rope blocked for grounding (only when required by the design of the screen connection system) (see 7.4.2.10)
- When steel ties are used to secure components within the joint, two (2) additional ties shall be included in the kit to provide redundancy in case of damage or breakage during installation.

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

- 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)
- 1 (one) plates for aluminum tape screen cables or equivalent system (see 7.4.2.6.a))
- Constant-force compression system or equivalent (see 7.4.2.6.c)), with the quantity defined according to the supplier's design)
- Greases and sealing compounds (see 7.4.2.8);
- Accessories for cleaning.
- Plastic bag for collecting residual materials of installation.
- List of materials.
- Identification label (see 7.8.3.3);
- Installation instructions and templates (see 7.8.4);
- Other materials, tools and accessories (according to supplier's design)
- Tinned copper rope blocked for grounding (only when required by the design of the screen connection system) (see 7.4.2.10)
- Oil sealing system (e.g., cold shrink tube or equivalent) (see 7.4.2.9)
- When steel ties are used to secure components within the joint, two (2) additional ties shall be included in the kit to provide redundancy in case of damage or breakage during installation.

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7.7 TESTING

7.7.1 GENERAL

Tests are classified into:

- Type tests
 - Test sequences are based on HD 629 and supplemented by additional tests defined in this document (see 7.7.2.1; 7.7.2.2; 7.7.2.3;7.7.2.4)
 - Expiration Test (see 7.7.2.5)
 - Robustness Test (see 7.7.2.6)
 - UV Resistance Test (if applies, see 7.7.2.7)
 - Connector test (see 7.7.2.9)
 - Fingerprint Test. (see 7.7.2.10)
 - Screen Connection Tests (see 7.7.2.11)
- Routine Test.
- Acceptance tests (see 7.7.4)

Connectors shall be tested in accordance with IEC 61238-1, Class A, ensuring compliance with mechanical and electrical performance requirements.

Tests on transition joints shall be conducted using oil-insulated paper cables, under conditions specified in the applicable standards. The Supplier shall declare the classification 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.*

Joints for cables with extruded insulation shall be tested are based on HD 629.1 S3:2019 and supplemented by additional tests defined in this document. Type tests shall be performed as specified in Table 7, using samples installed on XLPE-insulated cables with a minimum diameter over insulation (or smaller), as defined in Table 1. For E-distribuzione, type tests shall also be conducted on cables insulated with HPTE or XLPE.

Rated voltage of the cables U ₀ /U (U _m) (kV)	Cable cross-section selected	Test Sequence	Standard reference	Samples
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, HD 629.1 S3:2019	4
	The maximum section indicated in Table 1 for selected material code.	Sequence B3	Table 9, Chapter 7.7.2.3 (this document)	3

Table 7 – Type test for single range.

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e.g., 270186 (Spain) shall be tested on a 240 mm² – 18/30(36) kV cable seq B3 and 95 mm² 18/30(36) kV cable seq B1.

As an alternative, instead of performing sequence B1 on the minimum conductor cross-section, it is acceptable to perform the combined B3 sequence on three test samples. In this way, the entire range can be qualified using a total of six samples—three with the minimum cross-section and three with the maximum cross-section.

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

Extension of compliance⁴ for the same joint design⁵ to smaller or larger cross-sections ranges shall be achieved through the satisfactory completion of the relevant tests as described in Table 8. It is mandatory to perform all the tests described in Chapter 7.7.2.1 for the 95–240 mm² cable cross-section range to obtain the extension to other cross-sections.

Cable cross-section Range (mm²)	Test Sequence according to HD 629.1 S3:2019	Range of cross-section qualified
35-95	Table 17(*) on 35 mm ² cable	Extension to the smallest cross-section range
240-400	Sequence B1 from table 12 on 400 mm ² cable	Extension to the upper intermediate cross-section range
400-630	Sequence B1 from table 12 on 630 mm ² cable	Extension to the largest and upper intermediate cross-section ranges
Note: Samples shall comply with the requirements of HD 629.1 S3:2019 (*) Test N° 4 in <i>Table 17</i> , should be performed with 63 cycles in water instead of the 12 described in standard HD 629.1 S3:2019.		

Table 8 – Type test for extend compliance

e.g., 270001 (Spain) shall be tested on a 400 mm² – 18/30(36) kV cable, using sequence B1. If the same joint design covering the 95–240 mm² range was previously qualified, this additional test shall serve to extend the qualification to the full range up to 400 mm².

⁴ Compliance shall extend the use of a joint to cables with the same U_o as the test cable, provided they have equal or greater nominal insulation thickness.

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

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Service Function: -

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7.7.2.3. Reinforced HD 629 Short-Circuit Tests for Joints of Cables with Extruded Insulation

The test sequences described in Table 9 are based on *Table 12* of the harmonization document HD 629.1 S3. The assemblies are carried out according to the figures in the harmonization document HD 629.1 S3.

Test	Test clause of EN 61442:2005 or the present document	Test sequence		Test requirements
		B1	B3	
1 AC voltage withstand dry	4	X	X	5 min at 4.5 U_0 , no breakdown
2 Partial discharge at ambient temperature	7	X	X	Max. 10 pC at 2 U_0
3 Screen resistance measurement	7.7.3.1		X	Screen resistance: Informative value in [Ω /km] at 20°C
4 Impulse voltage at elevated temperature	6	X	X	10 impulses of each polarity, no breakdown
5 Heating cycle voltage in air	9	X	X	63 cycles at 2.5 U_0 , no breakdown
6 Thermal short circuit (screen)	10		X	2 short circuits at I_{SE} , no breakdown
7 Thermal short circuit (conductor)	11		X	2 short circuits to raise conductor to Θ_{SE} of the cable, no breakdown
8 Heating cycle voltage in water (with oversheath damage for non-waterblocked cables, without oversheath damage for waterblocked cables)	9	X	X	63 cycles at 2.5 U_0 , no breakdown.
9 Dielectric withstand of the external protection	7.7.3.2		X	6 kV - 1 min, no dielectric breakdown
10 Partial discharges at high temperature and at ambient temperature	7	X	X	Máx. 10 pC a 2 U_0
11 Impulse voltage at ambient temperature	6	X	X	10 impulses of each polarity, no breakdown
12 AC voltage withstand dry	4	X	X	5 min at 4.5 U_0 , no breakdown
13 Partial discharge at ambient temperature	7	X	X	Máx. 10 pC a 2 U_0
14 Dielectric withstand under step voltage	7.7.3.3		X	4-hour steps, no dielectric breakdown
15 Screen resistance measurement	7.7.3.1		X	Maximum degradation of 20% relative to the initial measured value at 20°C.
16 Performance Test (Informative)	7.7.3.4		X	Steps of 1 hour on 2 samples out of 3.
17 Visual examination according to Annex C (HD 629.1 S3)	11.3.6	X	X	Shall be documented in the report

Table 9 – Reinforced HD 629 Tests

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 Perimeter: *Global*

Staff Function: -

Service Function: -

 Business Line: *Enel Grids and Innovation*
7.7.2.4. Type Test for Transition joints.

Transition joints between impregnated paper-insulated cables and extruded insulation cables shall be type tested in accordance with HD 629.3 S1:2024. The applicable test sequence is detailed in Table 10 of this specification. Joints shall be classified as Type II-R and tested according to the procedures defined in *Table 6* of the referenced standard.

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.	150 mm ² or 240 mm ² . (Paper Insulated Cable)	Sequence B1; Sequence B2 and Sequence B3R	Table 6 for HD 629.3 S1:2024
Note: The samples and the cable cross-section with extruded insulation selected for the test shall comply with the requirements of HD 629.3 S1:2004.			

Table 10 – Type test for transition Joints.
7.7.2.4 a) Extent of compliance for Transition joints

Compliance for the range of cable nominal cross-sections from 35 mm² to 400 mm² shall be achieved by successfully completing all relevant tests described in Chapter 7.7.2.4

7.7.2.5 Expiration Test

An expiration test shall be performed to verify the joint's ability to maintain its functional and electrical properties throughout its declared shelf life, as specified by the manufacturer.

The test shall be performed of a new joint and on a joint of the same lot aged 10 days at 65°C in oven in expanded stage (to simulate 2 years of storage at 35°C of mean temperature).

Within 4 hours after the thermal ageing period, the aged joint shall be conditioned at +5 °C for 24 hours in its expanded state 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 (table 12 of HD 629-1)	Transition Joint (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 11 – Expiration test.

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Staff Function: -

Service Function: -

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7.7.2.6 Robustness Test

It shall be performed according to Annex B of the French standard NF C 33-050 for Joints of Cables with Extruded Insulation, with the following particularities:

The index “Evolution of the average breakdown values” shall be calculated as described in clause B.4.2.2 of the standard. The acceptance criterion is that no accessory shall exhibit a loss greater than 40 % of its initial average breakdown voltage (i.e. $E_{vol} > -40\%$). Accessories exceeding this threshold shall be disqualified. The test execution parameters are defined in Table 12.

Alternatively, the previous standard HN 33-E-03 may also be accepted. This standard is applicable to joints for cables with extruded insulation as well as to transition joints. In such case, the index shall be calculated according to *clause 5.1.3.2*, and the classification levels (Acceptable, Satisfactory, or Superior) must be determined and comply with the minimum breakdown voltage values required by the standard.

Joint Type	Rated voltage of the cables U0/U (Um) (kV)	Cable cross-section selected	Sample	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)	NF C 33-050
		240-400 (Al) 400-630 (Al/Cu)	630 mm ² – Extruded cable.	Min breakdown values: 4.5 U ₀ for new samples and after aging
	18/30(36) KV (*)	35-95 (Al) 95-240 (Al)	150 mm ² – Extruded cable. Or 240 mm ² – Extruded cable. (Cables with aluminum tape screen)	
		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.	HN 33-E-03
	18/30(36) KV (*)	35-95 (Al) 95-240 (Al)		Min breakdown values: 4.5 U ₀ for new samples. 3 U ₀ After aging

(*) The test shall be performed considering 18/30(36) kV class, thus applying and considering all the reference test values to the corresponding U₀.

Table 12 – Robustness Test.
7.7.2.7 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).

Subject: COLD SHRINK COMPACT JOINTS FOR MV CABLES.

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 Perimeter: *Global*

Staff Function: -

Service Function: -

 Business Line: *Enel Grids and Innovation*

7.7.2.8 Additional type tests for 36 kV class (Enel São Paulo only)

For Enel Sao Paulo only, an additional test is required for 18/30(36) kv class Joints, shall be carried out all the tests prescribed by HD 629-1, *table 17* with the Test requirements for Uo/U (Um) 20,8/36(42) kV.

7.7.2.9 Connectors Tests

Connectors shall be tested according to IEC 61238-1, Class A, covering both the minimum and maximum conductor cross-sections.

For joints intended for cables with extruded insulation, the qualification of an alternative connector may be accepted if it successfully passes all the tests prescribed in HD 629-1, *Table 16*. In the case of transition joints, the procedure defined in *clause 7.2* of HD 629.3 S1:2024 shall apply. In all cases, the alternative connector shall meet the requirements of this document (see 7.4.2.1).

7.7.2.10 Fingerprint Test.

The fingerprint will include both the tests established by the EN 50655-3 standard and advanced material characterization tests described in Cigre Brochure 595 2014, WG D1.27. The EN 50655-3 tests will be applied to the materials used in the cold-shrinkable components of the joint.

Additionally, the Cigre tests—DSC (Differential Scanning Calorimetry), TGA (Thermogravimetric Analysis), and FTIR (Fourier Transform Infrared Spectroscopy)—will be performed individually on each layer of the joint body: the conductive layers, the insulating layer, and the external protective layer.

7.7.2.11. Screen Connection System Tests

For joints intended for cables with aluminum tape screen, if the screen continuity is ensured through the use of a mechanical contact system such as a spiked plate (a tin-plated hard copper plate), the following tests shall be carried out on the assembled screen connection system, according to the French standard NF C 33-014 (October 2023):

- **Mechanical Retention Test (NF C 33-014 §7.1):**
 A static axial traction force of 25 daN (± 1 daN) shall be applied for 5 minutes on the grounding conductor, perpendicular to the spiked plate while fixed on the cable.
 Acceptance criteria: no detachment or separation of the grounding element from the spiked plate.

- **Tightness Test (NF C 33-014 §7.3):**
 For systems using sealing devices with internal wall thickness < 2 mm, the assembled screen connection is immersed under 1 meter of water column for at least 24 hours. A blotting paper is placed below the seal.
 Acceptance criteria: no trace of moisture on the blotting paper.
 These tests are required to ensure mechanical robustness and sealing integrity of the screen connection system under field-relevant conditions.

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Application Areas

 Perimeter: *Global*

Staff Function: -

Service Function: -

 Business Line: *Enel Grids and Innovation*

7.7.2.12 Special tests for the joint body support.

Pull-tab extraction test under temperature extremes

This test is intended to verify the functional performance of the cold-shrink joint's internal plastic support (helical core) during the removal process. The test simulates the actual extraction of the pull-tab under representative environmental conditions (low, ambient, and high temperatures) to detect potential issues such as tab jamming, fracture, or abnormal force peaks. The test method is described in detail in section 7.7.3.5

Three specimens shall be tested under each of the following temperature conditions:

- Cold condition: $-5\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$
- Room temperature: $23\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$
- Hot condition: $40\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$
-

Acceptance criteria: For each specimen:

- The pull-tab shall be completely removed without jamming or rupture.
- The movement shall be continuous, without force peaks exceeding 50% of the average extraction force.
- The helical core shall not be partially retained or leave debris inside the joint.
- No visible mechanical deformation or torsional stress shall be present on the cold-shrink body.
- The test shall be passed in all three temperature conditions to be considered compliant.

7.7.3 Test Methods

7.7.3.1. *Screen resistance*

This test determines the electrical resistance of the metallic screen of the loop at 20°C, both before and after the HD 629 test sequence, to evaluate any potential degradation. The measurement shall be conducted using a precision micro-ohmmeter compliant with IEC 60468 or an equivalent standard, ensuring high accuracy in low-resistance measurements. The equipment must support four-wire (Kelvin) measurement to eliminate lead resistance effects. Before measurement, the loop shall be stabilized at 20°C, or a temperature correction factor shall be applied if necessary. The resistance value shall be expressed in ohm per kilometer (Ω/km).

7.7.3.2. *Dielectric Strength of the Outer Protection*

The test⁶ consists of submerging the joints in water at ambient temperature for at least 30 minutes, with a minimum water depth of 30 cm. A 6 kV industrial frequency voltage shall be applied for 1 minute between the cable screen and the surrounding water (see Figure 7).

⁶ The test method is described in NF C33-050:2022, Paragraph 11.3.2.

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 Perimeter: *Global*

Staff Function: -

Service Function: -

 Business Line: *Enel Grids and Innovation*

For joints that include a Screen Extension System, the voltage shall be applied between the conductor of one of the connection elements and the water (see Figure 8). Before testing, the ends of the connection elements shall be properly sealed and insulated if required. The procedure for voltage application shall comply with *Article 6* of IEC 60060-1

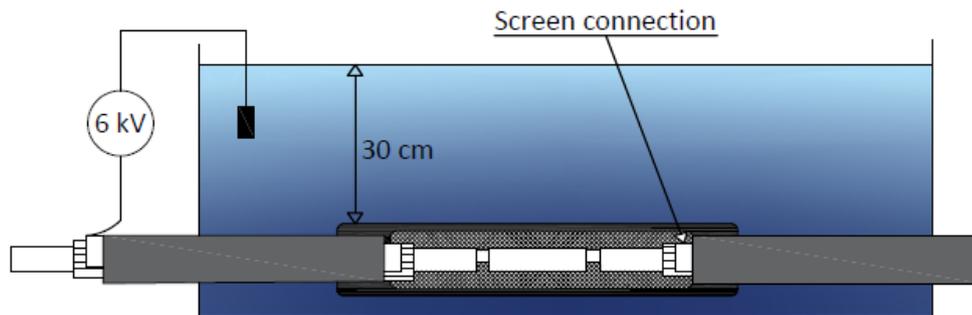


Figure 7 – Schematic diagram for the outer protection test without a Screen Extension System

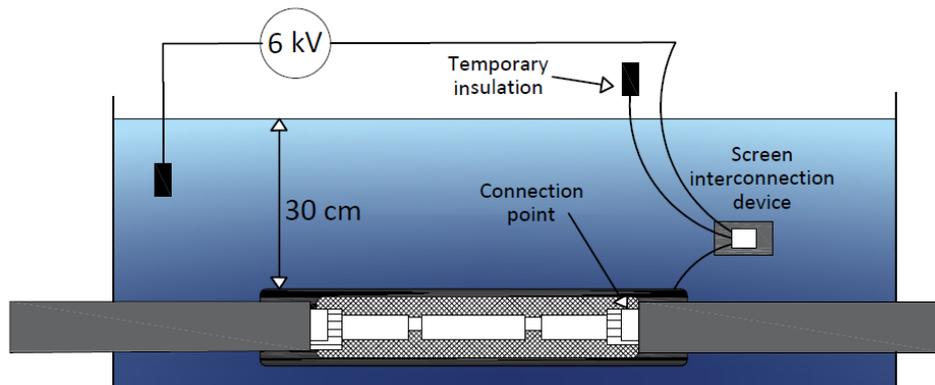


Figure 8 – Schematic diagram for the outer protection test with a Screen Extension System

7.7.3.3. Dielectric Withstand Under Stepped Voltage Increases

This test⁷ can be performed on a single joint or simultaneously on multiple joints. In the event of a failure in one joint, the remaining joints shall continue the test until completion, as specified in Table 9.

Voltage is gradually increased in steps while the joints and cables are maintained at ambient temperature.

The voltage level is raised every 4 hours in defined steps, with values specified in Table 9 according to the different voltage classes.

The procedure for voltage application shall comply with *Article 6* of IEC 60060-1

⁷ The test method is described in NF C33-050:2022, Paragraph 11.3.4.

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Staff Function: -

Service Function: -

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Rated voltage U ₀ /U (U _m) (kV)	12/20(24) KV	18/30(36) KV
1st step (phase-to-earth)	35	51.5
2st step (phase-to-earth)	40	58
3st step (phase-to-earth)	45	64.5
4st step (phase-to-earth)	50	71

Table 13 – Voltage Step Values in kV
7.7.3.4. Performance Test Under Stepped Voltage Increases

Unless otherwise specified, this test ⁸shall be conducted individually on at least 50% of the tested samples. This is an informative test.

The applied voltage shall be increased every hour in steps, with values defined in Table 14 for the different voltage classes, continuing until dielectric breakdown occurs in the tested joint or cable.

The procedure for voltage application shall comply with Article 6 of IEC 60060-1

Rated voltage U ₀ /U (U _m) (kV)	12/20(24) KV	18/30(36) KV
Initial step value (phase-to-earth)	55	77.5
Step increment value (phase-to-earth)	5	6.5

Table 14 – Voltage Step Values in kV
7.7.3.5. Pull-tab extraction method under temperature extremes
Test equipment

The test shall be performed using a mechanical system capable of applying a controlled axial extraction force to the pull-tab of the cold-shrink joint. The system may consist of a linear traction machine, a pair of synchronized driven rollers, or any other suitable configuration, provided it fulfills the following functional requirements:

- Ability to apply a linear extraction force in the axial direction of the pull-tab.
- Capability to record and export the force–displacement or force–time curve.

⁸ The test method is described in NF C33-050:2022, Paragraph 11.3.5.

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 Perimeter: *Global*

Staff Function: -

Service Function: -

 Business Line: *Enel Grids and Innovation*

- An adequate mounting or clamping system shall be used to hold the cable mock-up and the cold-shrink joint in place, preventing any axial movement during the pull-tab extraction

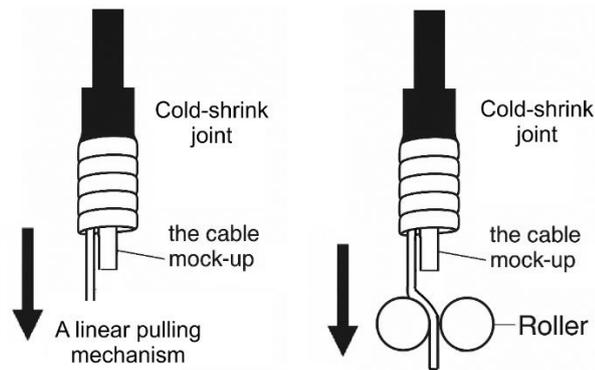


Figure 9 – Examples of valid pull-tab extraction systems (Linear traction bench and Roller traction system)

Procedure

Preparation

- Condition the test specimen for at least 4 hours at the target temperature (either $-5\text{ }^{\circ}\text{C}$, $23\text{ }^{\circ}\text{C}$ or $40\text{ }^{\circ}\text{C}$).
- Mount the cold-shrink joint on the cable mock-up without initiating the collapse.
- Fix the removable plastic former in position to avoid axial movement during the test.
- Attach the pull-tab to the traction system using an appropriate adapter to avoid slippage or premature tearing.

Note: It is recommended that the extraction is performed inside a climatic chamber that maintains the specimen at the target temperature. If this is not possible, it is acceptable to remove the specimen from the chamber after conditioning and perform the extraction immediately, provided the test is completed without significant deviation from the target temperature.

Execution

- Apply a linear pull on the tab.
- Record the complete force vs. displacement curve.
- Observe and annotate any anomalies: sudden increases in force, irregular motion, noise, tab elongation, or breakage.

Completion

- Once the tab is fully removed, inspect the helical core to verify full extraction.
- Visually inspect the collapsed cold-shrink body for deformation, surface damage, or misalignment.

Reporting

- Include graphs of force vs. displacement for each test.
- Note the maximum force, average force, and time required for complete removal.
- Record qualitative observations (e.g. smoothness, friction, behavior of the tab).
- Include photographs of the test equipment and of the collapsed cold-shrink joints after pull-tab removal.

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Application Areas

Perimeter: *Global*

Staff Function: -

Service Function: -

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7.7.4 ACCEPTANCE TESTS

Acceptance Tests are the tests that the Supplier has to successfully perform in order to obtain the delivery authorization.

The foreseen Acceptance Tests and the sampling to be applied in each case are listed in Table 16, the various sampling criteria are indicated in Table 15.

For each shipping batch, the Supplier shall autonomously perform all the tests foreseen in Table 16 applying the respective sampling criteria.

As contractually provided for, the Supplier must be available to repeat the tests on a reduced sampling at the presence of Enel or designated inspector.

In case of repetition of the Acceptance Tests at the presence of Enel or a designated inspector, regarding the tests performed autonomously, the Supplier, must make available:

- The reports of the tests;
- The tested assembled joints.

In both cases:

- The quantities are always referred to each type of material code prepared for testing;
- The failure of a single test will result in the rejection of the entire batch (relating to the same material code);
- 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;
- 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).

The samplings criteria are the follow:

Sampling type		Shipping batch [unit]			
		≤ 100	> 100 and ≤ 300	> 300 and ≤ 900	> 900
A	[unit]	4	5	7	10
B		3	4	5	6
C		2	4	5	8
D		2	3	4	5

Table 15 – Acceptance Tests samplings criteria

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 Perimeter: *Global*

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 Business Line: *Enel Grids and Innovation*

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

Test		Sampling to be applied during Acceptance Tests		Note
n°	Description	autonomously perform by Supplier	repeated at the presence of Enel	
1	Visual check	A	C	Verification of correspondence to the approved prototype (TCA) regarding: <ul style="list-style-type: none"> • Absence of construction defects or anomalies; • Presence, dimensions, characteristics and markings of all accessories provided in the kit; • Presence and correctness of identification labels and joint marking; • Packaging and barcodes.
2	Accessory manufacturing specifications check	A	C	All accessories must be checked, in particular, the nominal tightening torque of connector shear bolts specified by the manufacturer must be verified with consequent breakage of the same. The connectors of the sampled kits not designed for the joint assembly, must be tested with the largest cable cross-section provided, these kits will then be replenished by new connectors.
3	Verification of the correct application of instructions manual during assembly	B	D	The assembly of each sampled joint must be observed and monitored to check the correct application of the instruction manual regarding: <ul style="list-style-type: none"> • Compliance with the steps and all requirements; • Use of only the equipment provided; • Use of only the kit components.
4	Power-frequency withstand test	B	D	Test execution according to HD629 - (4,5 U ₀ x 5 min)
5	Partial discharge test at ambient temperature	B	D	Test execution according to HD 629-1 S3 - Table 12 - Test n° 2 - (max 10 pC at 2 U ₀). The test is not applicable for Transition Joints (see Table 1 "joint type").

Table 16 – Acceptance Tests
7.7.5 RETIE Certification (only apply to Enel Distribución Colombia)

For Enel Distribución Colombia (Colombia), RETIE certification shall be also provided according to local regulation (see chapter 4). It is requested that this certification be made under the scheme 5 (ISO IEC 17067).

Subject: COLD SHRINK COMPACT JOINTS FOR MV CABLES.**Application Areas**Perimeter: *Global*

Staff Function: -

Service Function: -

Business Line: *Enel Grids and Innovation*

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 U_m 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 Distribution Companies of Enel Group.

7.8.3 Packaging

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

- Material code assigned by the Distribution Companies of Enel Group;
- 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 7.8.3.2)
- Production batch number;
- Identification abbreviation;
- Maximum voltage U_m in kV;
- Expiry date (year/month) of the materials.

Furthermore, the packages shall contain a self-adhesive label with the following information (only for E-distribuzione and Endesa Distribucion):

- manufacturer identification code (CUI);
- material code assigned by the Distribution Companies of Enel Group;
- year and month of manufacture (e.g.: 15/2);
- progressive identification number (assigned by the manufacturer);
- barcode see 7.8.3.2)

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

Subject: COLD SHRINK COMPACT JOINTS FOR MV CABLES.

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Perimeter: *Global*
Staff Function: -
Service Function: -
Business Line: *Enel Grids and Innovation*

7.8.3.1 Label – Storage and Installation Recommendations

- Storage conditions
- Installation conditions

Storage and installation guidelines shall be provided through standardized labeling incorporating pictograms. The label size shall be adjusted according to the packaging dimensions.

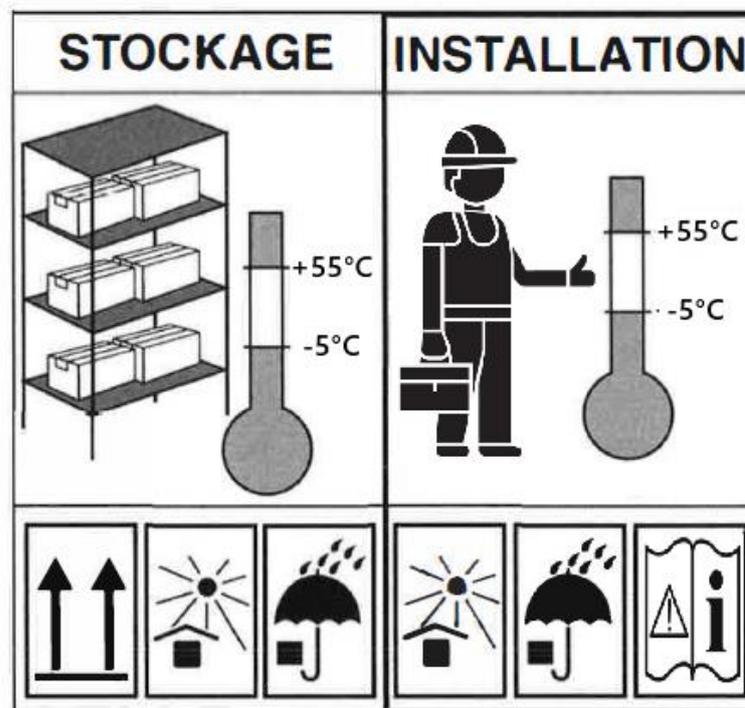


Figure 10 – Reference Label

7.8.3.2 Barcode

The characteristics of the barcode shall comply with the requirements specified in E-Distribuzione specification PVR 006 and in the Global Infrastructure and Networks specification GRI-GRI-CNS-O&M-0002, Revision 2, dated 2023-02-27

7.8.3.3 Identification label

It shall include blank fields to be filled after installation:

Name:

Date:

Company:

Subject: COLD SHRINK COMPACT JOINTS FOR MV CABLES.

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Perimeter: *Global*

Staff Function: -

Service Function: -

Business Line: *Enel Grids and Innovation*

7.8.4 Installation instructions and templates

The instructions for cable preparation may refer to the guidelines provided in Enel Global Standard (GSCC015), which serve as a general reference. Any deviation from these guidelines shall be clearly identified, submitted as part of the TCA process (see 7.9), and subject to Enel's approval. For E-distribuzione 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 Distribution Companies of Enel Group material code/type code⁹ 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 local language of the Country of delivery and shall be approved by Distribution Companies of Enel Group.

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 GSCG002 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.

⁹ This information, if any, will be provided by Distribution Companies of Enel Group during the examination of the installation instructions (before the certification process)

Subject: COLD SHRINK COMPACT JOINTS FOR MV CABLES.

Application Areas

Perimeter: *Global*

Staff Function: -

Service Function: -

Business Line: *Enel Grids and Innovation*

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	(mm ²)		
2.16	Cable section	(mm ²)		
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

Subject: COLD SHRINK COMPACT JOINTS FOR MV CABLES.
Application Areas

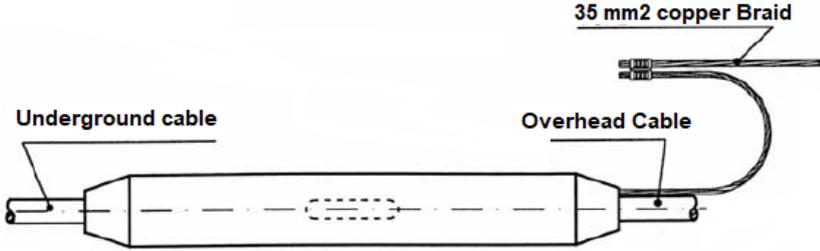
 Perimeter: *Global*

Staff Function: -

Service Function: -

 Business Line: *Enel Grids and Innovation*
9 LOCAL SECTION
9.1 LOCAL SECTION A – E-DISTRIBUZIONE ITALY
9.1.1 Special Joints for Overhead – Underground cables.

The type code's GSCC004/35, GSCC004/36, GSCC004/37 and GSCC004/38 from Italy, is for all purposes defined according to this technical specification, with the following exceptions:

ITEM	TITLE	DESCRIPTION																																											
7.1	List of component	<table border="1"> <thead> <tr> <th rowspan="2">Type code</th> <th rowspan="2">Country Code</th> <th colspan="3">Cable section (mm²)</th> <th rowspan="2">Copper stocking section (mm²)</th> <th rowspan="2">Min/max Diameter over insulation (mm)</th> <th rowspan="2">Grounding Braid System</th> </tr> <tr> <th>overhead XLPE Cable</th> <th>Underground XLPE Cable</th> <th>Oil impregnated paper insulation</th> </tr> </thead> <tbody> <tr> <td>GSCC004/35</td> <td>270209</td> <td>35÷150</td> <td>70÷150</td> <td>---</td> <td>25</td> <td>16/30</td> <td>Yes</td> </tr> <tr> <td>GSCC004/36</td> <td>270028</td> <td>95÷150</td> <td>150÷240</td> <td>---</td> <td>25</td> <td>16/33</td> <td>Yes</td> </tr> <tr> <td>GSCC004/37</td> <td>270207</td> <td>35÷95</td> <td>---</td> <td>95÷150</td> <td>25</td> <td>16/27</td> <td>Yes</td> </tr> <tr> <td>GSCC004/38</td> <td>270208</td> <td>150</td> <td>---</td> <td>240</td> <td>25</td> <td>27/33</td> <td>Yes</td> </tr> </tbody> </table> <p style="text-align: center;">Table A.1 12/20(24) kV Special Joints</p>	Type code	Country Code	Cable section (mm ²)			Copper stocking section (mm ²)	Min/max Diameter over insulation (mm)	Grounding Braid System	overhead XLPE Cable	Underground XLPE Cable	Oil impregnated paper insulation	GSCC004/35	270209	35÷150	70÷150	---	25	16/30	Yes	GSCC004/36	270028	95÷150	150÷240	---	25	16/33	Yes	GSCC004/37	270207	35÷95	---	95÷150	25	16/27	Yes	GSCC004/38	270208	150	---	240	25	27/33	Yes
		Type code			Country Code	Cable section (mm ²)					Copper stocking section (mm ²)	Min/max Diameter over insulation (mm)	Grounding Braid System																																
			overhead XLPE Cable	Underground XLPE Cable		Oil impregnated paper insulation																																							
		GSCC004/35	270209	35÷150	70÷150	---	25	16/30	Yes																																				
		GSCC004/36	270028	95÷150	150÷240	---	25	16/33	Yes																																				
GSCC004/37	270207	35÷95	---	95÷150	25	16/27	Yes																																						
GSCC004/38	270208	150	---	240	25	27/33	Yes																																						
7.4.2.1	Shear bolt connector	Dimensions according to manufacturer's design																																											
7.4.2.10	Grounding Braid	<p>The joint is provided with a flat copper braid to connect the aluminum tube screen of the overhead cable with the copper wire 35 mm² with the function of an additional grounding conductor, necessary if - for short distances - the underground laying of the overhead cable is adopted.</p>  <p>The manufacturer shall include in the kit a mechanical connector of adequate size to make the connection between the flat copper braid and the ground wire.</p>																																											
7.4.2.8	Greases and sealing compounds	is allowed to use mastics tapes for increase the insulation thickness if necessary																																											
7.7	Type Test	Type testing shall be in accordance with chapter 7.7 of this standard, and the robustness test is optional.																																											

Subject: COLD SHRINK COMPACT JOINTS FOR MV CABLES.
Application Areas

 Perimeter: *Global*

Staff Function: -

Service Function: -

 Business Line: *Enel Grids and Innovation*
9.1.2 Special Joints for screen interruption

The type code's GSCC004/39, GSCC004/40 and GSCC004/41 from Italy, is for all purposes defined according to this technical specification, with the following exceptions:

ITEM	TITLE	DESCRIPTION																								
7.1	List of component	<table border="1"> <thead> <tr> <th>Type code</th> <th>Country Code</th> <th>Cable section (mm²)</th> <th>Copper stocking section (mm²)</th> <th>Min/max Diameter over insulation (mm)</th> <th>Screen Extension</th> </tr> </thead> <tbody> <tr> <td>GSCC004/39</td> <td>270044</td> <td>70÷240</td> <td>25</td> <td>23/30</td> <td>No</td> </tr> <tr> <td>GSCC004/40</td> <td>271143</td> <td>35÷150</td> <td>25</td> <td>16/33</td> <td>No</td> </tr> <tr> <td>GSCC004/41</td> <td>270043</td> <td>150÷240</td> <td>25</td> <td>23/30</td> <td>MC</td> </tr> </tbody> </table> <p style="text-align: center;">Table A.2 12/20(24) kV Special Joints</p>	Type code	Country Code	Cable section (mm ²)	Copper stocking section (mm ²)	Min/max Diameter over insulation (mm)	Screen Extension	GSCC004/39	270044	70÷240	25	23/30	No	GSCC004/40	271143	35÷150	25	16/33	No	GSCC004/41	270043	150÷240	25	23/30	MC
Type code	Country Code	Cable section (mm ²)	Copper stocking section (mm ²)	Min/max Diameter over insulation (mm)	Screen Extension																					
GSCC004/39	270044	70÷240	25	23/30	No																					
GSCC004/40	271143	35÷150	25	16/33	No																					
GSCC004/41	270043	150÷240	25	23/30	MC																					
7.4.2.1	Shear bolt connector	Dimensions according to manufacturer's design																								
7.4.2	Compact Joint	The main insulating housing and the component to control the electric field must be of a single body design; the rest of the joint parts are integrated according to the manufacturer's design.																								
7.4.2.6	Copper stocking (Metalic Screen)	<p>The joint shall have two half-screens, overlapped by at least 10 mm, but insulated between them with the interposition of insulating material of suitable dielectric characteristics (see table A.3). The two half-screens shall be connected to the respective screens of the two cable segments see par (7.4.2.6);</p> <table border="1"> <thead> <tr> <th colspan="2">Electrical Characteristics</th> </tr> </thead> <tbody> <tr> <td>Rated voltage insulation between shields</td> <td>20 kV</td> </tr> <tr> <td>Lightning impulse withstand voltage between shields</td> <td>60 kV</td> </tr> </tbody> </table> <p style="text-align: center;">Table A.3 12/20(24) kV Special Joints</p>	Electrical Characteristics		Rated voltage insulation between shields	20 kV	Lightning impulse withstand voltage between shields	60 kV																		
Electrical Characteristics																										
Rated voltage insulation between shields	20 kV																									
Lightning impulse withstand voltage between shields	60 kV																									
7.4.2.10	Screen Extension System (SES)	The Screen Extension System (SES) shall be of type MC – Monitoring Connection – as defined in Clause 7.4.2.10.																								
7.7	Type Test	Type testing shall be in accordance with chapter 7.7 of this standard, and the robustness test is optional.																								

Subject: COLD SHRINK COMPACT JOINTS FOR MV CABLES.
Application Areas

 Perimeter: *Global*

Staff Function: -

Service Function: -

 Business Line: *Enel Grids and Innovation*
9.2 LOCAL SECTION B – E-DISTRIBUCIÓN SPAIN
9.2.1 Special transition Joint

The type code's GSCC004/42 from Spain is for all purposes defined according to this technical specification, with the following exceptions:

ITEM	TITLE	DESCRIPTION																
7.1	List of component	<table border="1"> <thead> <tr> <th rowspan="2">Type code</th> <th rowspan="2">Country Code</th> <th colspan="2">Cable section (mm2)</th> <th rowspan="2">Copper stocking section (mm2)</th> <th rowspan="2">Min/max Diameter over insulation (mm)</th> <th rowspan="2">Screen Extension</th> </tr> <tr> <th>Extruded insulation</th> <th>Oil impregnated paper insulation</th> </tr> </thead> <tbody> <tr> <td>GSCC004/42</td> <td>270125</td> <td>50÷240</td> <td>50÷240</td> <td>25</td> <td>20.6/32.2</td> <td>No</td> </tr> </tbody> </table> <p style="text-align: center;">Table A.412/20(24) kV Special Joints</p> <p>Transition joint for oil impregnated paper insulation to Extruded insulation RH5Z1 Cable.</p>	Type code	Country Code	Cable section (mm2)		Copper stocking section (mm2)	Min/max Diameter over insulation (mm)	Screen Extension	Extruded insulation	Oil impregnated paper insulation	GSCC004/42	270125	50÷240	50÷240	25	20.6/32.2	No
Type code	Country Code	Cable section (mm2)			Copper stocking section (mm2)	Min/max Diameter over insulation (mm)				Screen Extension								
		Extruded insulation	Oil impregnated paper insulation															
GSCC004/42	270125	50÷240	50÷240	25	20.6/32.2	No												
7.4.2.1	Shear bolt connector	Dimensions according to manufacturer's design																
7.7	Type Test	Type testing shall be in accordance with chapter 7.7 of this standard, and the robustness test is optional.																
7.9.2	Acknowledgement of TCA for previous revision of the standard.	Products with TCA in force under the Endesa Distribucion Local standard 6710951 Rev II of 23/04/2014 will be recognized as homologated material for the present technical specification. Enel, 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.																

Subject: COLD SHRINK COMPACT JOINTS FOR MV CABLES.
Application Areas

 Perimeter: *Global*

Staff Function: -

Service Function: -

 Business Line: *Enel Grids and Innovation*
9.2.2 Special straight Joint

The type code's GSCC004/43 from Spain or all purposes defined according to this technical specification, with the following exceptions:

ITEM	TITLE	DESCRIPTION																
7.1	List of component	<table border="1"> <thead> <tr> <th rowspan="2">Type code</th> <th rowspan="2">Country Code</th> <th colspan="2">Cable section (mm²)</th> <th rowspan="2">Copper stocking section (mm²)</th> <th rowspan="2">Min/max Diameter over insulation (mm)</th> <th rowspan="2">Screen Extension</th> </tr> <tr> <th>Extruded insulation</th> <th>Extruded insulation (Existing network cable)</th> </tr> </thead> <tbody> <tr> <td>GSCC004/43</td> <td>270198</td> <td>150÷240</td> <td>50÷95</td> <td>25</td> <td>20.6/32.2</td> <td>No</td> </tr> </tbody> </table> <p>Table A.5 18/30(36) kV Special Joints Straight joint for extruded insulation RH5Z1/RHZ1 Cable to RHV/RHZ Cable.</p>	Type code	Country Code	Cable section (mm ²)		Copper stocking section (mm ²)	Min/max Diameter over insulation (mm)	Screen Extension	Extruded insulation	Extruded insulation (Existing network cable)	GSCC004/43	270198	150÷240	50÷95	25	20.6/32.2	No
Type code	Country Code	Cable section (mm ²)			Copper stocking section (mm ²)	Min/max Diameter over insulation (mm)				Screen Extension								
		Extruded insulation	Extruded insulation (Existing network cable)															
GSCC004/43	270198	150÷240	50÷95	25	20.6/32.2	No												
7.4.2.1	Shear bolt connector	Dimensions according to manufacturer's design																
7.7	Type Test	Type testing shall be in accordance with chapter 7.7 of this standard, and the robustness test is optional.																
7.9.2	Acknowledgement of TCA for previous revision of the standard.	Products with TCA in force under the Endesa Distribucion Local standard 6711722 Rev II of 23/04/2014 will be recognized as homologated material for the present technical specification. Enel, 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.																