



**Subject:** Global Infrastructure and Networks – GSCM012 DISTRIBUTION FUSE-CUTOUT UP TO 36 kV

**Application Areas**

Perimeter: *Global*

Staff Function: -

Service Function: -

Business Line: *Infrastructure & Networks*

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**THE HEAD OF Network Components**  
**Maurizio Mazzotti**

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## 1 DOCUMENT AIMS AND APPLICATION AREA

The scope of this document is to provide technical requirements for the supply of outdoor distribution fuse-cutouts up to 36 kV to be used in the MV overhead distribution networks of the Enel Group Distribution Companies, listed below:

Country	Distribution Company
Argentina	Edesur
Brazil	Enel Distribuição Rio Enel Distribuição Ceará Enel Distribuição Goiás Enel Distribuição São Paulo
Chile	Enel Distribución Chile
Colombia	Enel Codensa
Iberia	e-distribución
Peru	Enel Distribución Perú

**Table 1 - Distribution Companies**

## 2 DOCUMENT VERSION MANAGEMENT

Version	Date	Main changes description
1	22/07/2021	Initial release

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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 / Network Components

Responsible for authorizing the document:

- Global Infrastructure and Networks: Head of Engineering and Construction unit
- Global Infrastructure and Networks: Head of Health, Safety, Environment and Quality unit.

### **4 REFERENCES**

- Code of Ethics of Enel Group.
- Enel Human Right Policy.
- The Enel Group Zero Tolerance of Corruption (ZTC) Plan.
- Organization and management model as per Legislative Decree No. 231/2001.
- RACI Handbook Infrastructure and Networks no. 06.
- Enel Global Compliance Program (EGCP).
- Integrated Policy of Quality, Health and Safety, Environment and anti-Bribery.

### **5 ORGANIZATIONAL PROCESS POSITION IN THE PROCESS TAXONOMY**

Value Chain/Process Area: Networks Management

Macro Process: Materials management

Process: Network Components Standardization

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## 6 DEFINITIONS AND ACRONYMS

Acronym and Key words	Description
<b>Manufacturer Product</b>	Component manufactured by a Supplier in accordance with a technical specification
<b>Technical Conformity Assessment (TCA)</b>	A “conformity assessment” <sup>1</sup> with respect to “specified requirements” <sup>2</sup> 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
<b>Conformity assessment body</b>	Body that performs the conformity assessment activities [ISO 17000]
<b>Enel Equipment Key code</b>	It's an equipment representative for a group (family) of similar equipment chose by Enel
<b>Enel Equipment Family code</b>	Equipment belonging to a specific group (family) in which another equipment is identified as key code
<b>TCA systems</b>	The “conformity assessment systems”, is applicable specifying that the rules and procedures to carry on the TCA are those specified in the present document
<b>Type A documentation</b>	Not confidential documents used for product manufacturing and management from which it is possible to verify the product conformity to all technical specification requirements, directly or indirectly
<b>Type B documentation</b>	Confidential documents used for product manufacturing and management where all product project details are described, in order to uniquely identify the product object of the TCA
<b>TCA report</b>	Document describing the activities carried out for TCA
<b>TCA dossier</b>	Set of final documents delivered by the Supplier for the TCA
<b>Material LifeCycle Management (MLM)</b>	Integrated IT platform to manage the processes of Technical Specifications (TSM), Technical Conformity Assessment (TCA), Quality Control Tools (QCA), Defects Managing (CMD), Warranties and Materials Shipping (MSH)

<sup>1</sup> Definition 2.1 of ISO/IEC 17000

<sup>2</sup> Definition 3.1 of ISO/IEC 17000

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## 6.1 ENEL GLOBAL INFRASTRUCTURE AND NETWORKS COUNTRIES REFERENCE STANDARDS

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.

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## 7 DESCRIPTION

### 7.1 LIST OF COMPONENTS

Type code	Description	Rated Voltage (kV)	Fuse base type	Pollution level	Rated breaking capacity (kA)
GSCM012/1	Linear fuse-cutout 24kV 8kA (pollution level d)	24	1	d	8
GSCM012/2	Linear fuse-cutout 24kV 8kA (pollution level e)	24	1	e	8
GSCM012/3	V-shaped fuse-cutout 24kV 8kA (pollution level d)	24	2	d	8
GSCM012/4	V-shaped fuse-cutout 24kV 8kA (pollution level e)	24	2	e	8
GSCM012/5	Linear fuse-cutout 36kV 8kA (pollution level d)	36	1	d	8
GSCM012/6	Linear fuse-cutout 36kV 8kA (pollution level e)	36	1	e	8
GSCM012/7	V-shaped fuse-cutout 36kV 8kA (pollution level d)	36	2	d	8
GSCM012/8	V-shaped fuse-cutout 36kV 8kA (pollution level e)	36	2	e	8
GSCM012/9	Linear fuse-cutout 24kV 10,6kA (pollution level d)	24	1	d	10,6

**Table 2 – List of components (fuse-cutout)**

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Type code	Description	Rated current (A)	Type
GSCM012/20	Fuse-link type K 1A	1	K
GSCM012/21	Fuse-link type K 2A	2	K
GSCM012/22	Fuse-link type K 3A	3	K
GSCM012/23	Fuse-link type K 6,3A	6,3	K
GSCM012/24	Fuse-link type K 8A	8	K
GSCM012/25	Fuse-link type K 10A	10	K
GSCM012/26	Fuse-link type K 12,5A	12,5	K
GSCM012/27	Fuse-link type K 16A	16	K
GSCM012/28	Fuse-link type K 20A	20	K
GSCM012/29	Fuse-link type K 25A	25	K
GSCM012/30	Fuse-link type K 31,5A	31,5	K
GSCM012/31	Fuse-link type K 40A	40	K
GSCM012/32	Fuse-link type K 50A	50	K
GSCM012/33	Fuse-link type K 63A	63	K
GSCM012/34	Fuse-link type K 80A	80	K
GSCM012/35	Fuse-link type K 100A	100	K

**Table 3 – List of components (K type fuse-link)**

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Type code	Description	Rated current (A)	Type
GSCM012/40	Fuse-link type T 1A	1	T
GSCM012/41	Fuse-link type T 2A	2	T
GSCM012/42	Fuse-link type T 3A	3	T
GSCM012/43	Fuse-link type T 6,3A	6,3	T
GSCM012/44	Fuse-link type T 8A	8	T
GSCM012/45	Fuse-link type T 10A	10	T
GSCM012/46	Fuse-link type T 12,5A	12,5	T
GSCM012/47	Fuse-link type T 16A	16	T
GSCM012/48	Fuse-link type T 20A	20	T
GSCM012/49	Fuse-link type T 25A	25	T
GSCM012/50	Fuse-link type T 31,5A	31,5	T
GSCM012/51	Fuse-link type T 40A	40	T
GSCM012/52	Fuse-link type T 50A	50	T
GSCM012/53	Fuse-link type T 63A	63	T
GSCM012/54	Fuse-link type T 80A	80	T
GSCM012/55	Fuse-link type T 100A	100	T

**Table 4 – List of components (T type fuse-link)**

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Type code	Description	Rated current (A)	Type
GSCM012/60	Fuse-link type H 0,5A	0,5	H
GSCM012/61	Fuse-link type H 1A	1	H
GSCM012/62	Fuse-link type H 2A	2	H
GSCM012/63	Fuse-link type H 3A	3	H
GSCM012/64	Fuse-link type H 5A	5	H

**Table 5 – List of components (H type fuse-link)**

For material codes please refer to TSM (Technical Specification Management)

## 7.2 APPLICABLE LAWS AND REFERENCE STANDARDS

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

### 7.2.1 International standard

IEC 60282-2	High-voltage fuses – Part 2: Expulsion fuses.
IEC 60282-4	High-voltage fuses – Part 4: Additional testing requirements for high-voltage expulsion fuses utilizing polymeric insulators.
IEC/TS 60815-1	Selection and dimensioning of high-voltage insulators for polluted conditions – Part 1: Definitions, information and general principles.
IEC/TS 60815-3	Selection and dimensioning of high-voltage insulators intended for use in polluted conditions – Part 3: Polymer insulators for a.c. systems.
IEEE C37.42	Specifications for High-Voltage (>1000 V) Fuses and Accessories.
NBR 7282	Dispositivos fusíveis de alta tensão — Dispositivos tipo expulsão — Requisitos e métodos de ensaio.
ISO 1461	Hot dip galvanized coatings on fabricated iron and steel articles -- Specifications and test methods.
ISO 1183-1	Plastics -- Methods for determining the density of non-cellular plastics -- Part 1: Immersion method, liquid pycnometer method and titration method.
ISO 868	Plastics and ebonite - Determination of indentation hardness by means of a durometer (Shore hardness).

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ISO 37	Rubber, vulcanized or thermoplastic -- Determination of tensile stress-strain properties.
ISO 34-1	Rubber, vulcanized or thermoplastic -- Determination of tear strength -- Part 1: Trouser, angle and crescent test pieces.
IEC 60587	Electrical insulating materials used under severe ambient conditions - Test methods for evaluating resistance to tracking and erosion.
IEC 61621	Dry, solid insulating materials - Resistance test to high-voltage, low-current arc discharges.
IEC 62631-1	Dielectric and resistive properties of solid insulating materials - Part 1: General.
IEC TS 62073	Guidance on the measurement of hydrophobicity of insulator surfaces.

## 7.2.2 Enel standards

- MAT-O&M-NCS-2021-0033-EGIN version 3 “Global Infrastructure and Networks – GSCG002 Technical Conformity Assessment”.
- Contractual Requirements for Components and Materials Quality management.
- CNS-O&M-S&L-2021-0032-EGIN “Global Infrastructure and Networks Barcode specification.
- Packaging, transport, and delivery requirements rev.2.

## 7.2.3 Brazil

- NR-10 – Segurança em instalações e serviços em eletricidade.

## 7.2.4 Chile

- Elec 4/2003 – Instalaciones de consumo en baja tensión.
- NSEG 5. E.n.71 - Reglamento de Instalaciones Eléctricas de Corrientes Fuertes.

## 7.2.5 Colombia

- RETIE – Reglamento Técnico de Instalaciones Eléctricas.

## 7.2.6 Perú

- CNE – Suministro - Código Nacional de Electricidad – Suministro 2011.

## 7.2.7 Spain

- The fuse-cutout must comply with the “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. 337/2014, de 9 de mayo)”, and consequently each fuse-cutout must be supplied accompanied by the "Declaración de Conformidad " required by this regulation, and the manufacturer or his authorized representative established in the European Union must keep the required

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“Expediente técnico” at disposal of the Spanish national market surveillance authority for inspection up to at least five years from the last date of manufacture of the product.

- 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.

### 7.2.8 Europe

- Directive 2006/95/EC of the European Parliament and of the Council of 12 December 2006.

## 7.3 SERVICE CONDITIONS

### 7.3.1 General service conditions

Clause 4 of IEC 60282-2 is applicable with the following addition.

Minimum air ambient temperature	-25°C
Pollution level (IEC/TS 60815-3)	d –Heavy e – Very heavy
Maximum reference altitude for Colombia	2.700 m

**Table 6 - Service Conditions**

### 7.3.2 Seismic qualification level

It shall be considered the following considerations upon the seismic qualification level:

Country	Standard (LEVEL)
Argentina	N/A
Brazil	N/A
Colombia	IEC/TR 62271-300 (AF3) + Reglamento Colombiano de Construcción sismo resistente
Chile	ETGI-1020
España	N/A
Peru	IEC/TR 62271-300 (AF5)

**Table 7 – Seismic qualification level**

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## 7.4 TECHNICAL CHARACTERISTICS

The fuse-cutouts must comply the general requirements and the regulations enforced by the reference documents in chapter 7.2. For definitions of each component, characteristics and ratings refer to chapter 3 of IEC 60282-2 Standard.

### 7.4.1 Classification

The fuse-cut out are classified as class A according to their ability to comply with the TRV requirements in Table 9 of IEC 60282-2 Standard.

### 7.4.2 Fuse-link speed designation

The fuse-links that are the subject of this standard are designed according to their compliance with specific pre-arcing time-current characteristics.

- a) Designation **type K**: high-speed fuse-links with pre-arcing time-current characteristics in accordance with Table 10 of IEC 60282-2 Standard.
- b) Designation **type T**: low-speed fuse-links with pre-arcing time-current characteristics in accordance with Table 11 of IEC 60282-2 Standard.
- c) Designation **type H**: extra high-speed fuse-links with pre-arcing time-current characteristics in accordance with Table 11.b of NBR 7282 Standard.

For type K and T fuse-links with a rated current of 1, 2 and 3A refer to IEEE C.37.42 Standard for the values of their melting currents.

### 7.4.3 Rated characteristics.

#### 7.4.3.1 Rated voltage and insulation level.

Rated voltage and insulation used to identify each component and determine the test conditions are given in Table 8.

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Rated Voltage [kV]			24	36
Rated insulation level	Rated short-duration power-frequency withstand voltage – Common value	[kV]	50	70
	Rated short-duration power-frequency withstand voltage – Across the isolating distance	[kV]	60	80
	Rated lightning impulse withstand voltage – Common value	[kV]	125	170
	Rated lightning impulse withstand voltage - Across the isolating distance	[kV]	145	195

**Table 8 – Rated voltage and insulation level**

For the fuse-link, the rated voltage shall be 36 kV. Every fuse-link shall work with the fuse base + fuse carrier with a rated voltage of 24 kV and 36 kV.

**7.4.3.2 Rated current.**

The next sections indicate the rated current of each component, that must be tested with fuse-base, fuse-link and fuse-carrier of this standard.

**7.4.3.2.1 Fuse (complete)**

The rated current of the fuse shall be equal to the maximum rated current of the fuse-link.

**7.4.3.2.2 Fuse-base**

The rated current of the fuse-base shall be 315 A.

**7.4.3.2.3 Fuse-carrier.**

The rated current of the fuse-carrier shall be 100 A.

**7.4.3.2.4 Fuse-link.**

The rated current of each fuse-link is indicated in 7.1 List of Components.

**7.4.3.3 Rated frequency.**

The rated frequency shall be 50/60 Hz.

**7.4.3.4 Rated breaking capacity.**

The rated breaking capacity assigned to the fuse and fuse-carrier shall be 8 kA or 10,6 kA (see list of components).

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## 7.5 CONSTRUCTION CHARACTERISTICS

### 7.5.1 Fuse base.

The design of the fuse base shall be according to one of the types listed above and described in chapter 7.8.

- Type 1: Linear fuse-base
- Type 2: V-shaped fuse base

All fuse bases shall be equipped with hooks for the opening using special poles for load switching capacity.

All metallic parts of the fuse-base shall be hot dip galvanized steel with a thickness of 85  $\mu\text{m}$  for pollution level “d” or 140  $\mu\text{m}$  for pollution level “e” according to ISO 1461, or stainless steel AISI 316.

Exception is made for those pieces that are obtained by molding, which will be made of an alloy that has a copper content of at least 62%.

#### 7.5.1.1 Polymeric insulators

The housing (sheath and sheds) of the insulators shall be HTV (High Temperature Vulcanized) solid silicone type. This type of silicone rubber is solid and vulcanizes at a high temperature (near 200°C).

Two fabrication processes are allowed for the silicone rubber considered in the standard, molding process or by assembling modules.

The characteristics of the silicone rubber are described in table 9.

<b>Mechanic characteristics</b>	<b>Standard</b>	<b>Unit</b>	<b>Minimum value HTV</b>
Density	ISO 1183-1	$\text{g/cm}^3$	1,5
Hardness	ISO 868	Shore A	65
Breaking stress	ISO 37	$\text{N/mm}^2$	3,5
Breaking elongations	ISO 37	%	200
Tear strength	ISO 34-1	$\text{N/mm}^2$	12

**Table 9 – Silicone-rubber characteristics**

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At every existing interface from the composite insulator, the adhesion strength of the interface (interface resistance) shall be higher than the tear strength of the silicone.

Silicone-rubbers of insulators shall have a resistance to tracking and electric erosion with a classification of Class 1A 4,5 according to IEC 60587 and shall resist the effects of corona discharges and ozone. It shall withstand a low-current arc discharge for more than 300 seconds under the conditions indicated in standard IEC 61621 and its volume resistivity shall be over  $10^{10} \Omega \cdot m$  according to IEC 62631-1.

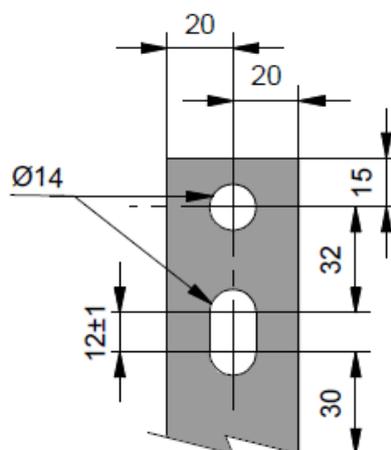
The silicone-rubber must be type V0 according to the IEC 60695-11-10.

Additionally, the silicone-rubber shall have highly hydrophobic features and shall be classified type WC1 as specified in IEC TS 62073.

The minimum creepage distance of the insulators shall be according to the rated voltage of the fuse and the pollution level assigned, considering  $RUSCD = 43,3 \text{ mm/kV}$  for SPS class d and  $RUSCD = 53,7 \text{ mm/kV}$  for SPS class e.

**7.5.1.2 Fuse-base terminals**

The fuse cutout must be supplied with NEMA terminals for the connection of the conductors. They must be tinned or treated with an equivalent system, copper alloy with a maximum zinc content of 6%. Likewise, they will be flat and allow the connection of the corresponding bimetallic terminal on both sides, shown in Figure 1.



**Figure 1 – NEMA terminal**

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**7.5.1.3 Fuse-base top contact for fuse-carrier**

The top contact should be designed to provide a smooth self-aligning action during closing, the top contact is formed of highly conductive copper and is silver plated of minimum 8µm layer thickness.

**7.5.1.4 Mounting bracket**

The mounting bracket shall be part of the supply of the fuse-base and its characteristics are NEMA type B according to IEEE C37.42 standard.

**7.5.2 Fuse-carrier**

All details of the materials used in the composition of the fuse-carrier and the means adopted to make it durable and weatherproof shall be provided by the supplier.

All electrical contact surfaces are to be silver plated of minimum 8µm layer thickness.

The tube shall be designed in fiberglass, protected from weather and environment by ultraviolet resistant coating and must be provided with a reflective tape to distinguish between the open and closed position at nighttime.

The hook shall be in bronze or stainless steel.

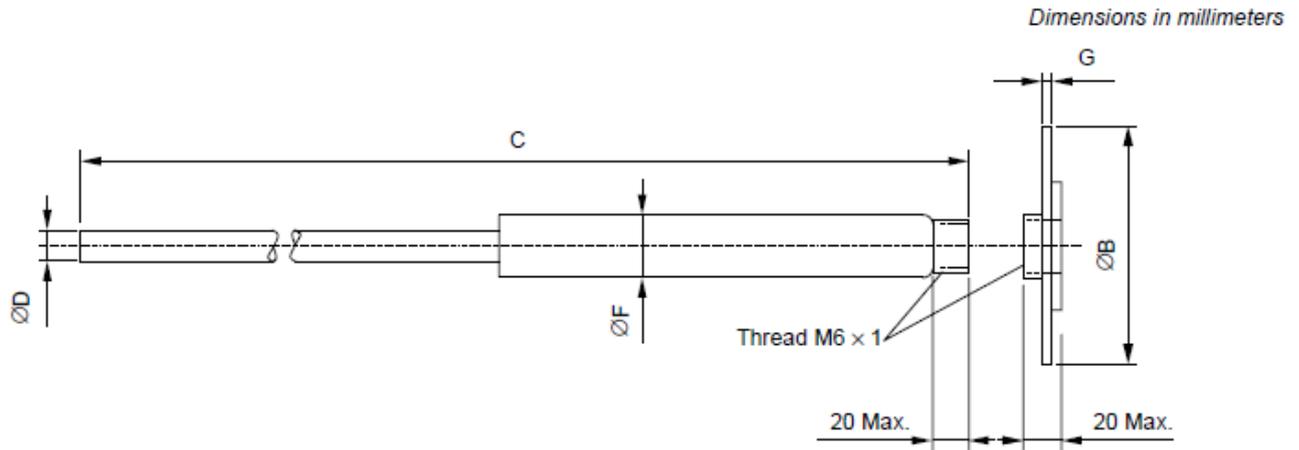
Dimensions of the fuse-carrier are shown in chapter 7.8.3.

**7.5.3 Fuse-links**

The fuse-link shall be removable head type, according to Annex B of IEC 60282-2 standard.

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**Figure 2 – Removable head fuse-link**

Rated current (A)	Dimensions (mm)			
	B	C (min.)	F	D (max)
1 to 50	19,0 ±0,3	600	See note	5
63 to 100	19,0 ±0,3	600	See note	8

Note: The size and shape should be such that the fuse-link will freely enter a fuse-carrier having the following an inside diameter of 11,1 mm.

**Table 10 – General dimensions of fuse-link**

The fuse element shall be made of tin alloy, silver or other equivalent material, whose electrical and mechanical properties are not permanently altered and in order to comply with IEC 60071-2 due to the passage of current of value and duration less than the current minimum fusion by the environment or over time.

The flexible tail shall be made of electrolytic copper with a minimum diameter of 2.5 mm. The use of ferrous material is not allowed in the current conducting parts.

The arc quenching tube shall be made of insulating material coated internally with vulcanized fiber.

The metallic parts (button, washer and metallic string) must be tinned, silvered or protected in another efficient way, against environmental corrosion and current flow, with no chrome, nickel plating or cadmium being allowed.

The fuse-link must be supplied with identification adhesive, made of vinyl or self-adhesive, flexible PVC, resistant to ultraviolet.

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## 7.6 TESTS

### 7.6.1 Type tests

The conditions for performing the type tests are describes in chapter 8.1 of IEC 60282-2 standard.

The results of all type tests shall be recorded in test reports according to chapter 8.2.2 of IEC 60282-2 standard.

The condition of the fuse to be tested and the mounting for the tests shall be according to chapter 8.3 of IEC 60282-2 standard.

#### 7.6.1.1 Dielectric tests

The dielectric tests shall be made as indicated in chapter 8.4 of IEC 60282-2 standard, using the rated values of table 6.

The dielectric tests include:

- Lightning impulse voltage dry tests
- Power-frequency voltage dry tests
- Power-frequency wet tests.

#### 7.6.1.2 Measurement of ohmic resistance of fuse-cutout

The resistance of the fuse-cutout contacts must be measured between each base terminal and the metal part of the nearest accessible fuse-carrier after contact. The points and methods used must allow repeatability of measurements within a 1.0% margin for the measured fuse switch.

The resistance value must be the arithmetic mean of three independent measures.

#### 7.6.1.3 Temperature-rise tests.

The temperature-rise test shall be made as indicated in chapter 8.5 of IEC 60282-2 standard.

#### 7.6.1.4 Breaking tests

The breaking tests shall be made as indicated in chapter 8.6 of IEC 60282-2 standard.

#### 7.6.1.5 Time-current characteristics tests.

The time-current characteristics tests shall be made as indicated in chapter 8.7 of IEC 60282-2 standard.

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**7.6.1.6 Lighting surge impulse withstand test.**

The test shall be made as indicated in chapter 9.2 of IEC 60282-2 standard.

**7.6.1.7 Mechanical tests**

**7.6.1.7.1 Mechanical tests of fuse-links**

Mechanical tests of fuse-links shall be made as indicated in chapter 8.8.2 of IEC 60282-2 standard.

The tests shall be performed at a temperature between 10 °C and 40 °C.

**7.6.1.7.2 Mechanical stressing at temperature extremes**

The tests shall be made as indicated in chapter 4.2.1 of IEC 60282-4 standard.

**7.6.1.7.3 Long term deformation/creep testing**

The tests shall be made as indicated in chapter 4.2.2 of IEC 60282-4 standard.

**7.6.1.8 Environmental tests**

**7.6.1.8.1 Accelerated weathering test**

The test shall be made as indicated in chapter 4.3.2 of IEC 60282-4 standard.

**7.6.1.8.2 Tracking and erosion test**

The test shall be made as indicated in chapter 4.3.3 of IEC 60282-4 standard.

**7.6.1.9 Tests on interfaces and connections of end fittings**

The tests shall be made as indicated in chapter 4.4 of IEC 60282-4 standard.

**7.6.1.10 Breaking tests with dye penetration**

The tests shall be made as indicated in chapter 4.5 of IEC 60282-4 standard.

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**7.6.2 Acceptance tests**

In order to do the acceptance for each purchased lot, it shall be necessary to accomplish according to table 11.

N (lot size)	Acceptance test								
	A1			A5			A4		
	A2						A6		
	A3								
	-								
	AQL 1,5%			AQL 2,5%			AQL 1,5%		
Sample size	Ac	Re	Sample size <sup>a</sup>	Ac <sup>b</sup>	Re <sup>b</sup>	Sample size	Ac	Re	
N≤90	8	0	1	c	-	-	c	-	-
91≤150	20	0	2	6	0	1	8	0	1
	20	1	2						
151≤280	20	0	2	18	0	2	8	0	1
	20	1	2						
281≤500	32	0	3	18	0	2	8	0	1
	32	3	4						
501≤1200	50	1	4	18	0	2	8	0	1
	50	4	5						
1201≤3200	80	2	5	24	0	3	8	0	1
	80	6	7						
3201≤10000	125	3	7	24	0	3	20	0	1
	125	8	9						
10001≤35000	200	5	9	36	1	4	20	0	2
	200	12	13						
Ac = Acceptance number			Re =Rejection number						
<p><sup>a</sup> The sample indicated for the tests to verify the time/current characteristics has been set to a number divisible by six. This sample should be divided into six parts, each being subjected to tests with a melting time of 300 s respectively (or 600 s), 10 s, and 0.1 s. Each test (minimum and maximum time) must use the number of samples in the sampling plan.</p> <p><sup>b</sup> The acceptance and rejection numbers indicated for the time × current fusion characteristics verification tests refer to the sum of defective units found in the tests with the three fusion times (300 s or 600 s, 10 s and 0.1 s) , maximum and minimum.</p> <p>AQL - Acceptable Quality Level</p>									

**Table 11 – Sample plan**

**7.6.2.1 Dimensional verification (A1)**

The dimensional verification for fuse-bases, fuse-carrier and/or fuse-links shall be made according to this standard.

**7.6.2.2 Power-frequency voltage dry tests (A2)**

The tests shall be made as indicated in chapter 8.4.5 of IEC 60282-2 standard.

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### 7.6.2.3 Measurement of ohmic resistance of fuse-links (A3)

The electrical resistance of the fuse link cannot vary from  $\geq 7.5\%$  the average resistance of the batch under inspection. In addition, no fuse link must have resistance outside the limits of  $\geq 10\%$  in relation to the resistance of a standard comparison resistor to be prepared by the manufacturer for each rated current value and type of fuse-link.

### 7.6.2.4 Temperature-rise tests (A4)

The temperature-rise test shall be made as indicated in chapter 8.5 of IEC 60282-2 standard.

### 7.6.2.5 Time-current characteristics tests for fuse-links (A5)

The tests shall be made as indicated in chapter 8.7 of IEC 60282-2 standard.

### 7.6.2.6 Mechanical tests of fuse-links. Dynamic tests (A6)

The tests shall be made as indicated in chapter 8.8.2.2 of IEC 60282-2 standard.

## 7.7 MARKING AND INFORMATION

### 7.7.1 Fuse base

The identification according to chapter 11 of IEC 60282-2 standard must be made through a stainless-steel plate or anodized aluminum, permanently fixed or marked directly on the polymeric body and contain the following information:

- Manufacturer's name or trademark
- ENEL type code
- Manufacturer's designation
- Year and month of manufacture.
- Rated insulation level.
- Rated voltage (Ur)
- Rated current (Ir)

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### 7.7.2 Fuse-carrier

- Manufacturer's name or trademark
- Manufacturer's designation
- Year and month of manufacture.
- Rated voltage (Ur)
- Rated current (Ir)
- Rated breaking capacity and TRV class.
- Rated frequency.
- Reflective tape to distinguish between the open and closed position at nighttime.

### 7.7.3 Fuse-links

- Manufacturer's name or trademark.
- Manufacturer's type designation.
- Rated current (Ir) and speed designation.
- Rated voltage (Ur)

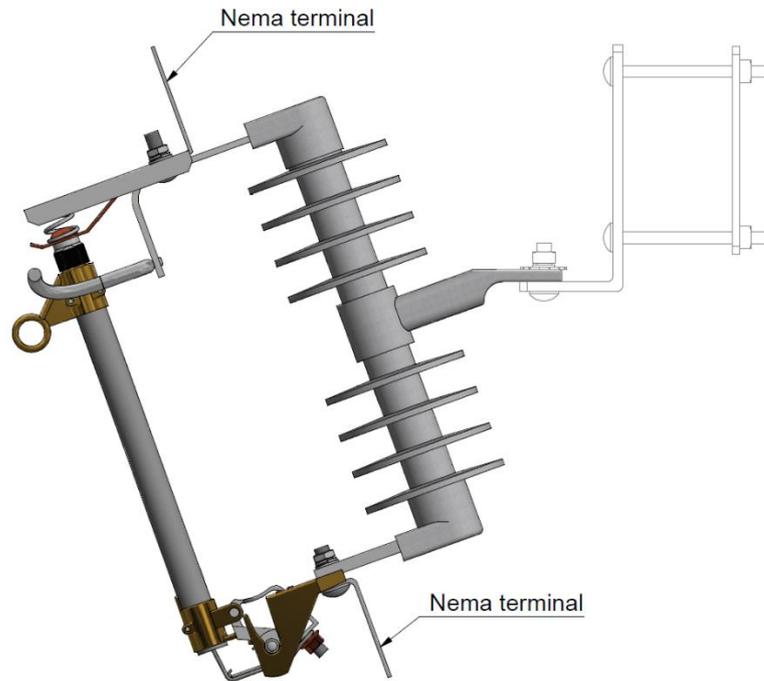
**Subject:** Global Infrastructure and Networks – GSCM012 DISTRIBUTION FUSE-CUTOUT UP TO 36 kV

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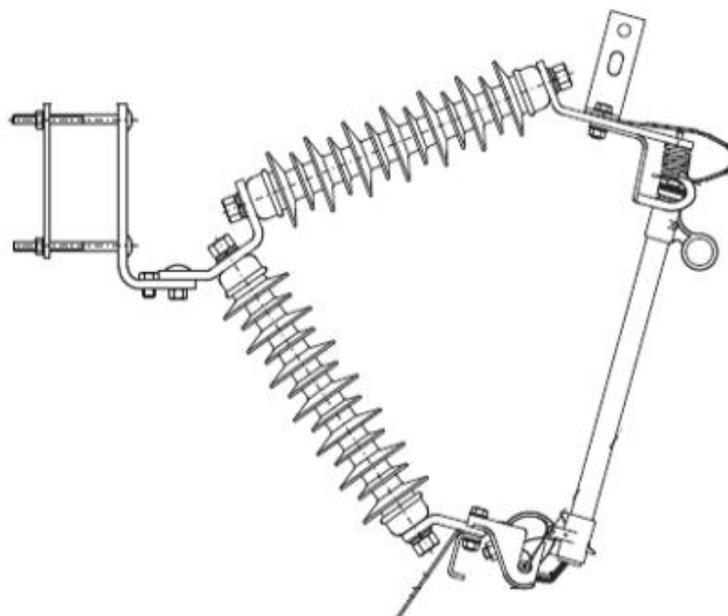
Perimeter: *Global*  
Staff Function: -  
Service Function: -  
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**7.8 GENERAL DRAWINGS**

**7.8.1 Fuse base type 1 (Linear)**



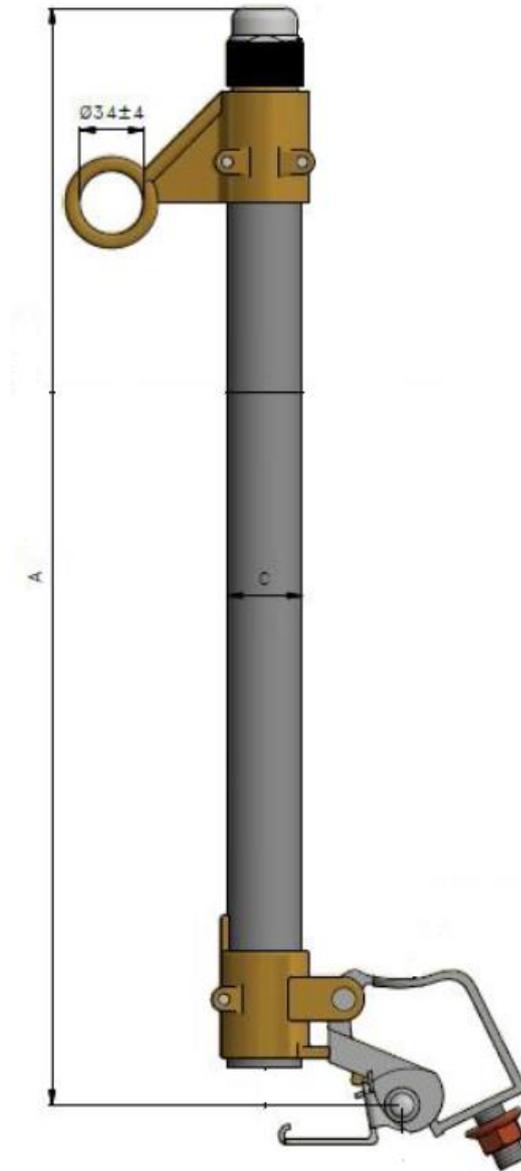
**7.8.2 Fuse-base type 2 (V-shaped)**



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**7.8.3 Fuse-carrier**



Ur (kV)	A [mm]
24	375±2
36	468±2

The internal diameter for the fuse-carrier shall be 11,1 mm.

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## 8 ANNEX A - TECHNICAL CHECK LIST

Item	Unit	Requested	Offered
<b>1 General information</b>			
1.1 Supplier name			
1.2 Production plant address			
1.3 Distribution Company and Country			
1.4 Type Code			
1.5 Designation			
1.6 Supplier reference			
<b>2 Voltage</b>			
2.1 Rated voltage	[kV]		
2.2 Rated short-duration power-frequency withstand voltage – Common value	[kV]		
2.3 Rated short-duration power-frequency withstand voltage – Across the isolating distance	[kV]		
2.4 Rated lightning impulse withstand voltage – Common value	[kV]		
2.5 Rated lightning impulse withstand voltage - Across the isolating distance	[kV]		
<b>3 Current</b>			
3.1 Rated current of fuse base	[A]		
3.2 Rated current of fuse-carrier	[A]		
<b>4 Rated frequency</b>	[Hz]		
<b>5 Rated breaking capacity</b>	[kA]		
<b>6 Polymeric insulator</b>			
6.1 Material			
6.2 RUSCD	[mm/kV]		
<b>7 Seismic qualification level</b>			
<b>8 TRV class</b>			
<b>9. Drawings with material characteristics</b>			



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Item	Unit	Requested	Offered
<b>1 General information</b>			
1.1 Supplier name			
1.2 Production plant address			
1.3 Distribution Company and Country			
1.4 Type Code			
1.5 Designation			
1.6 Supplier reference			
<b>2 Voltage</b>			
2.1 Rated voltage	[kV]		
<b>3 Current</b>			
3.1 Rated current	[A]		
<b>8 Type</b>	-		
<b>9. Drawings with material characteristics</b>			

**Fuse-link check-list**