

Subject: Global Infrastructure and Networks – GSCT009 – Voltage Regulating Distribution Transformers (VRDT) up to U_m 36 kV

Application Areas

Perimeter: *Global*

Staff Function: -

Service Function: -

Business Line: *Infrastructure & Networks*

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The Head of Network Components
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1 DOCUMENT AIMS AND APPLICATION AREA

This document prescribes the technical characteristics, performance and testing methods for Voltage Regulating Distribution Transformers (VRDT) to be used in the distribution network up to 36 kV of Enel Group Distribution Companies whose Countries are listed below:

The main characteristics of the transformers are described in GST001. In this document are reported the additional requirements for the parts related to voltage regulating (on load tap changer and electronic system for the control).

Country	Distribution Company
Argentina	Edesur
Brazil	Enel Distribuição Rio Enel Distribuição Ceará Enel Distribuição Goiás Enel Enel Distribuição São Paulo
Chile	Enel Distribución Chile
Colombia	Codensa
Iberia	e-distribución
Italy	e-distribuzione
Peru	Enel Distribución Perú
Romania	Enel Distribuție Banat Enel Distribuție Dobrogea Enel Distribuție Muntenia

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.

2 DOCUMENT VERSION MANAGEMENT

Version	Date	Main changes description
01	16/11/2021	First emission

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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

- 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)
- Global Infrastructure and Networks RACI Handbook
- 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
- GST 001 - MV/LV Transformers
- IEC 60076-24 - Power transformers – Part 24: Specification of voltage regulating distribution transformers (VRDT)
- 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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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
<p>Technical Conformity Assessment (TCA)</p>	<p>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.</p>

7 DESCRIPTION

7.1 LIST OF COMPONENTS

The VRDT are listed here below.

The transformers are all insulated with mineral oil, natural (N) or synthetic ester (S).

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Global Type	Rated Power (kVA)	Primary Voltage (kV)	Secondary Voltage (kV)	Ref. Global Type GST001	Country	Country code
GSCT009/1048N	100	20	0,420	GST001/1048N	IT	110144
GSCT009/1041N	100	15	0,420	GST001/1041N	IT	110143
GSCT009/1049N	160	20	0,420	GST001/1049N	IT	110142
GSCT009/1042N	160	15	0,420	GST001/1042N	IT	110141
GSCT009/1055N	250	20	0,420	GST001/1055N	IT	110140
GSCT009/1044N	250	15	0,420	GST001/1044N	IT	110138
GSCT009/1056N	400	20	0,420	GST001/1056N	IT	110139
GSCT009/1045N	400	15	0,420	GST001/1045N	IT	110137
GSCT009/1057N	630	20	0,420	GST001/1057N	IT	110136
GSCT009/1046N	630	15	0,420	GST001/1046N	IT	110135
GSCT009/1120N	100	20	0,420	GST001/1120N	RO	110083
GSCT009/1121N	160	20	0,420	GST001/1121N	RO	110084
GSCT009/1122N	250	20	0,420	GST001/1122N	RO	110085
GSCT009/1128S	400	20	0,420	GST001/1128S	RO	110086
GSCT009/1129S	630	20	0,420	GST001/1129S	RO	110087
GST001/1213N	100	20	0,420	GST001/1213N	ES	In progress
GST001/1229N	160	20	0,420	GST001/1229N	ES	In progress
GST001/1247N	250	20	0,420	GST001/1247N	ES	In progress
GST001/1267N	400	25	0,420	GST001/1267N	ES	In progress
GST001/1281N	630	20	0,420	GST001/1281N	ES	In progress
GST001/1285N	630	25	0,420	GST001/1285N	ES	In progress
GSCT009/821N	100	12	0,4	GST001/821N	CL	In progress
GSCT009/822N	100	23	0,4	GST001/822N	CL	In progress
GSCT009/823N	160	12	0,4	GST001/823N	CL	In progress
GSCT009/824N	160	23	0,4	GST001/824N	CL	In progress
GSCT009/825N	250	12	0,4	GST001/825N	CL	In progress
GSCT009/826N	250	23	0,4	GST001/826N	CL	In progress
GSCT009/829N	400	12	0,4	GST001/829N	CL	In progress
GSCT009/830N	400	23	0,4	GST001/830N	CL	In progress
GSCT009/607N	225	13,8	0,38-0,22	GST001/607N	BR	In progress
GSCT009/908N	150	13,8	0,22-0,127	GST001/908N	BR	In progress
GSCT009/909N	300	13,8	0,22-0,127	GST001/909N	BR	In progress

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GSCT009/617N	630	13,8	0,38-0,22	GST001/617N	BR	In progress
GSCT009/980N	225	13,8	0,22-0,127	GST001/980N	BR	In progress
GSCT009/984N	400	13,8	0,38-0,22	GST001/984N	BR	In progress
GSCT009/985N	400	13,8	0,22-0,127	GST001/985N	BR	In progress
GSCT009/986N	630	13,8	0,22-0,127	GST001/986N	BR	In progress
GSCT009/606N	150	13,8	0,38-0,22	GST001/606N	BR	In progress
GSCT009/608N	300	13,8	0,38-0,22	GST001/608N	BR	In progress
GSCT009/919N	150	34,5	0,38-0,22	GST001/919N	BR	In progress

7.2 MAIN CHARACTERISTICS

The main characteristics of the transformers are described in GST001. In this document are reported the additional requirements for the parts related to voltage regulating (on load tap changer and electronic system for the control).

Transformers shall be totally oil-filled hermetic type (without gas cushion).

The loss value of the VRDT shall be in compliance with EU Regulation n° 548/2014 and subsequent modifications.

Voltage regulation shall be $\pm 4 \times 2,5 \%$

The voltage regulation system shall be maintenance free (500,000 tap-change operations without maintenance or replacing of the electromechanical components).

7.3 DESIGN AND CONSTRUCTION REQUIREMENTS

Shall be in compliance with GST001 and IEC 60076-24.

Basic regulating and control functions shall be combined in one control unit.

The control unit of the voltage regulating system shall be separated from the transformers tank suitable for outdoor installation (protection degree IP 54).

The VRDT shall be capable of performing voltage regulation and switching operations also in reverse power flow situations.

The voltage regulation shall be made with reference to set up the secondary voltage fix value or dynamic value (voltage/current compensation).

A switching operation shall be performed in a time less than 1 second.

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A switching operation once started, shall be terminated completely, even if power supply of the control unit fails after the switching operation has started. This shall be ensured by energy storage means in the control unit.

if additionally requested, the VRDT shall be equipped with a device for remote data communication according standard protocol IEC 61850.

The basic control and regulation unit shall be provided with:

- number of switching operations, current operating position and measured voltage shown on a display
- input for a blocking signal in order to prevent automatic operation when this input is active
- visual signal of status for supply voltage, motor running and error
- contacts for the correct operation status signal.

Setting of the basic regulating parameters shall not require a PC or additional software but shall be possible with the control and regulating unit itself.

Notes for network installation:

The electronic part of the voltage regulation system shall be:

- sourced directly by transformer and protected by a proper circuit-breaker (not included in the supply)
- specifically protected with a box for outdoor conditions in case of outdoor installation (not included in the supply).

7.4 EXCEPTIONS

Possible exceptions to the present prescriptions, concerning the adoption of technical and/or manufacturing aspects different from the ones prescribed in the present GS, can be evaluated by the Distribution Company. In such a case, the Distribution Company will take into account the opportunity to require additional tests with regard to the technical/manufacturing proposed solutions.

Such exceptions can be approved only by the Distribution Company.

7.5 DOCUMENTATION

Shall be in compliance with GST001 integrated with the specific part related to the voltage regulating system.

7.6 LIST OF TESTS

Shall be in compliance with GST001 and IEC 60076-24 (routine, functional, type and special test).