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TECHNICAL REPORT

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Communication networks and systems for power utility automation – Part 90-27: Use of IEC 61850 for thermal energy systems connected to electric power grid

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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COMMUNICATION NETWORKS AND SYSTEMS FOR POWER UTILITY AUTOMATION –

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IEC TR 61850-90-27 has been prepared by IEC technical committee 57: Power systems management and associated information exchange. It is a Technical Report.

The text of this Technical Report is based on the following documents:

Draft	Report on voting
57/2571/DTR	57/2584/RVDTR

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this Technical Report is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

A list of all parts in the IEC 61850 series, published under the general title *Communication networks and systems for power utility automation*, can be found on the IEC website.

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The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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INTRODUCTION

The world-wide need to reduce greenhouse gas emissions considerably in order to further reduce detrimental effects on the climate requires that all sectors – power generation, industry, transport, buildings construction and agriculture – contribute to the low-carbon transition.

The power sector has been identified as having the biggest potential for cutting emissions and measures. Ways to accomplish that have also been identified: more renewable energy generation. As some renewable energy sources are intermittent, their integration into the electrical grid calls for adequate measures in order not to endanger system stability and reliability. To accomplish the increased renewable energy integration, there are several measures at hand, one of them being the conversion of excess electrical energy into another energy carrier such as gas or heat and hence to couple the electrical grid with the heat network and the gas network.

In order to allow for future sector coupling activities using the IEC 61850 series, the IEC is aware that the scope of the IEC 61850 series of standards needs to be enhanced. This is true especially for IEC 61850-7-420 tackling distributed energy resources. Hence this report is a crucial first step towards introducing relevant non-electric energy sectors such as gas and heat as cross sectors to the electric energy system.

COMMUNICATION NETWORKS AND SYSTEMS FOR POWER UTILITY AUTOMATION –

Part 90-27: Use of IEC 61850 for thermal energy systems connected to an electric power grid

1 Scope

1.1 General

The scope of this part of IEC 61850, which is a Technical Report, is to provide basic aspects that need to be considered when using IEC 61850 for information exchange between systems and components to support applications for thermal systems connected to electric power networks. Thermal systems isolated from electric power networks are outside the scope of this document.

From the perspective of category, this document considers thermal systems that provide thermal energy services for residential and/or commercial buildings and districts. In other words, industrial thermal systems are outside the scope of this document.

From the perspective of energy transformation, this document deals with ones between electricity and thermal energy. Other types of energy such as gas will be documented in a future report.

From the perspective of resource, this document considers generic aspects of thermal energy generators, storage, and loads that may contribute to the operations and management of electric power networks. It also deals with specific types of resources that have electric parts such as power to heat (P2H) that is a kind of electric load, and combined heat and power (CHP) that is an electric generator. This document models the characteristics for such specific units of resources including alarms and ratings. On the other hand, it does not deal with other types of specific units according to the scope of this document. For example, gas boilers, thermal energy tanks, heat exchangers, HVAC, auxiliary devices for thermal systems are not modelled as logical nodes in this document.

As a summary, this document

– gives an overview of thermal energy resources connected to electric power networks.
– provides use cases for typical operations of thermal system and deducts exchanged information necessary for information modelling.
– provides mapping of requirements on LNs based on the use cases.
– defines generic logical nodes for resources in thermal systems.
– defines logical nodes for specific unit types of P2H and CHP.
– defines logical nodes for operations that may contribute to the operations of electric power networks.

1.2 Data model Namespace name and version

Table 1 shows all tracking information of (Tr)IEC 61850-90-27:2023A namespace.

Table 1 – Tracking information of (Tr)IEC 61850-90-27:2023A namespace

Attribute	Content
Namespace IEC specific information	
Version of the UML model used for generating the document (informative)	WG17build10
Date of the UML model used for generating the document (informative)	2023-07-11
Autogeneration software name and version(informative)	j61850DocBuilder 02.02 based on jCleanCim noNS beta9.2 (derived from jCleanCim 02-02)

Table 2 shows all attributes of the (Tr)IEC 61850-90-27:2023A namespace.

Table 2 – Attributes of (Tr)IEC 61850-90-27:2023A namespace

Attribute	Content
Namespace nameplate	
Namespace Identifier	(Tr)IEC 61850-90-27
Version	2023
Revision	A
Release	1
Full Namespace Name	(Tr)IEC 61850-90-27:2023A
Full Code Component Name	IEC_TR_61850-90-27.NSD.2023A.Full
Light Code Component Name	IEC_TR_61850-90-27.NSD.2023A.Light
Namespace Type	transitional
Namespace dependencies	
extends	IEC 61850-7-4:2007B version:2007 revision:B
extends	IEC 61850-7-420:2019A version:2019 revision:A
Namespace transitional status	
Future handling of namespace content	The name space (Tr)IEC 61850-90-27:2023A is considered as "transitional" since the models are expected to be included in further editions IEC 61850-7-4xx. Potential extensions/modifications may happen if/when the models are moved to the International Standard status

1.3 Data model Namespace Code Component distribution

This document is associated with Code components. Each Code Component is a ZIP package containing at least the electronic representation of the Code Component itself and a file describing the content of the package (IECManifest.xml).

The life cycle of a code component is not restricted to the life cycle of this document. The publication life cycle goes through two stages, "Version" (corresponding to an edition) and "Revision" (corresponding to an amendment). A third publication stage (Release) allows publication of Code Component in case of urgent fixes of Inter-operability Tissues, thus without need to publish an amendment.

Consequently, new release(s) of the Code Component(s) may be released, which supersede(s) the previous release, and will be distributed through the IEC web site at: http://www.iec.ch/tc57/supportdocuments.

The latest version/release of the document will be found by selecting the file for the code component with the highest value for VersionStateInfo, e.g. *IEC_TR_61850-90-27.NSD.{VersionStateInfo}.Light*.

The Code Components associated with this document are reflecting the data model specified in this document formatted in NSD files as described in IEC 61850-7-7. They are available in light and full version:

- The full version is named: *IEC_TR_61850-90-27.NSD.2023A.Full*. It contains definition of the whole data model defined in this document with the documentation associated and access is restricted to purchaser of this document.
- The light version is named: *IEC_TR_61850-90-27.NSD.2023A.Light*. It does not contain any documentation but contains the whole data model as per full version.

The light version is freely accessible on the IEC website for download at: http://www.iec.ch/tc57/supportdocuments but its usage remains under the licensing conditions.

In case of any differences between the downloadable code and the IEC pdf published content, the downloadable code(s) is(are) the valid one; it may be subject to updates. See included history files.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 61850-7-4:2010/AMD1:2020, *Communication networks and systems for power utility automation - Part 7-4: Basic communication structure - Compatible logical node classes and data object classes*

IEC 61850-7-420:2021, *Communication networks and systems for power utility automation - Part 7-420: Basic communication structure - Distributed energy resources and distribution automation logical nodes*

IEC SRD 62913-2-3:2019, *Generic smart grid requirements – Part 2-3: Resources connected to the grid domains*