

Foreword

This document gives an overview of standards applied on the MVPS 4000-4600-S2(-US) and the main components installed. **Some of the below mentioned standards apply in parts and not as a whole.**

For any additional and continuing information please contact the **product management**.

This document is valid for the following releases of the product: Q1, A1

MVPS 4000-4600-S2 – Standards (IEC)

Station and Low Voltage Wiring:

Standard	Issue Date	Name
EN 50522	11-2010	Earthing of power installations exceeding 1 kV a.c.;
ISO 12944-5	06-2018	Paints and varnishes - Corrosion protection of steel structures by protective paint systems - Part 5: Protective paint systems
IEC 60309	11-2007	Plugs, socket-outlets and couplers for industrial purposes
IEC 60364-4-41	04-2011	Low-voltage electrical installations - Part 4-41: Protection for safety - Protection against electric shock
IEC 60364-4-43	08-2008	Low-voltage electrical installations - Part 4-43: Protection for safety - Protection against overcurrent
IEC 60364-5-52	02-2011	Low-voltage electrical installations - Part 5-52: Selection and erection of electrical equipment - Wiring systems
IEC 60529	04-2010	Degrees of protection provided by enclosures (IP code)
IEC 60664-1	04-2007	Insulation coordination for equipment within low-voltage systems Part 1: Principles, requirements and tests
IEC 60721-3-2	03-1997	Classification of environmental conditions Part 3: Classification of groups of environmental parameter and their severities Section 2: Transportation
IEC 60721-3-4	01-1995	Classification of environmental conditions - Part 3-4: Classification of groups of environmental parameters and their severities - Stationary use at non-weatherprotected locations
IEC 60865-1	10-2011	Short circuit currents- Calculations of effects- Definition and calculation methods
IEC 61439-1	08-2011	Low-voltage switchgear and controlgear assemblies- Part 1: General rules

IEC 61439-2	08-2011	Low-voltage switchgear and controlgear assemblies- Part 2: Power switchgear and controlgear assemblies
IEC 61936-1	11-2011	Power installations exceeding 1 kV
IEC 62271-202	03-2014	High-voltage switchgear and controlgear - Part 202: High voltage/low voltage prefabricated substation

Medium Voltage Switchgear

Standard	Issue Date	Name
DIN EN ISO 9227	07-2017	Corrosion tests in artificial atmospheres – Salt spray tests (ISO 9227:2012)
DIN EN ISO 12944	2018	Painting and varnishes – Corrosion protection of steel structures by protective paint systems
EN 50181	04-2011	Plug-in type bushings above 1 kV up to 52 kV and from 250 A to 2,50 kA for equipment other than liquid filled transformers
IEC 60376	06-2005	Regulation for new sulfur hexafluoride (SF ₆) - Requirements and acceptance testing
IEC 60480	04-2019	Guideline for testing sulfur hexafluoride (SF ₆) after extraction from electrical equipment
IEC 60529 + A1 + A2	1989 A1:1999 A2:2013	Degrees of protection provided by enclosures (IP Code)
IEC 60721-3-2	03-1997	Classification of environmental conditions Part 3: Classification of groups of environmental parameter and their severities Section 2: Transportation
IEC 60721-3-4	01-1995	Classification of environmental conditions - Part 3-4: Classification of groups of environmental parameters and their severities - Stationary use at non- weatherprotected locations
IEC 61243-5	06-1997	Live working –Voltage detectors – Part 5: Voltage detective system
IEC 62271-1	07-2017	High-voltage switchgear and controlgear - Part 1: Common specifications
IEC 62271-100	06-2017	High-voltage switchgear and controlgear - Part 100: Alternating-current circuit-breakers
IEC 62271-102	05-2018	High-voltage switchgear and controlgear - Part 102: Alternating current disconnectors and earthing switches
IEC 62271-103	06-2011	High-voltage switchgear and controlgear - Part 103: Switches for rated voltages above 1 kV up to and including 52 kV
IEC 62271-105	09-2012	High-voltage switchgear and controlgear - Part 105: Alternating current switch-fuse combinations for rated voltages above 1 kV up to and including 52 kV

IEC 62271-200	10-2011	High-voltage switchgear and controlgear - Part 200: AC metal-enclosed switchgear and controlgear for rated voltage above 1 kV and up to including 52 kV
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Low Voltage Transformer

Standard	Issue Date	Name
ISO 2768-1	11-1989	General tolerances; part 1: tolerances for linear and angular dimensions without individual tolerance indications
IEC 60085	11-2008	Electrical insulation - thermal evaluation and designation
IEC 60664-1	04-2007	Insulation coordination for equipment within low-voltage systems - Part 1: Principles, requirements and tests
IEC 62103	07-2003	Electronic equipment for use in power installations
IEC 61558-1	04-2009	Safety of power transformers, power supplies, reactors and similar products - Part 1: General requirements and tests
IEC 61558-2-4	02-2009	Safety of transformers, reactors, power supply units and similar products for supply voltages up to 1100V - Part 2-4: Particular requirements and tests for isolating transformers and power supply units incorporating isolating transformers
IEC 60721-3-2	03-1997	Classification of environmental conditions - Part 3-2: Classification of groups of environmental parameters and their severities - Transportation and Handling
IEC 60721-3-4	01-1995	Classification of environmental conditions - Part 3-4: Classification of groups of environmental parameters and their severities - Stationary use at non-weatherprotected locations

Medium Voltage Transformer

Standard	Issue Date	Name
EN 50160	2010 and Cor.:2010	Voltage characteristics of electricity supplied by public distribution networks
EN 50180	02-2017	Bushings above 1 kV up to 52 kV and from 250 A to 3,15 kA for liquid filled transformers
EN 50216-4	12-2015	Power transformer and reactor fittings - Part 4: Basic accessories (earthing terminal, drain and filling devices, thermometer pocket, wheel assembly)
EN 50386	04-2011	Bushings up to 1 kV and from 250 A to 5 kA, for liquid filled transformers; German version EN 50386:2010

Standard	Issue Date	Name
EU Nr. 548/2014	05-2014	Commission Regulation (EU) No 548/2014 of 21 May 2014 on implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to small, medium and large power transformers.
EN 50588-1	03-2016	Medium power transformers 50 Hz, with highest voltage for equipment not exceeding 36 kV
IEC 60076-1	04-2011	Power transformers - Part 1: General
IEC 60076-2	02-2011	Power transformers - Part 2: Temperature rise for liquid-immersed transformers
IEC 60076-3	07-2013	Power transformers - Part 3: Insulation levels, dielectric tests and external clearances in air
IEC 60076-4	06-2002	Power transformers - Part 4: Guide to lightning impulse and switching impulse testing; Power transformers and reactors
IEC 60076-5	01-2007	Power transformers - Part 5: Ability to withstand short-circuit
IEC 60076-7	2008-02	Power transformers - Part 7: Loading guide for oil-immersed power transformers
IEC 60076-10	03-2016	Power transformers - Part 10: Determination of sound levels
IEC 60076-14	08-2014	Power transformers - Part 14: Liquid-immersed power transformers using high-temperature insulation materials
IEC 60214-1	05-2014	Tap changers
IEC 60616	01-1978	Terminal and tapping markings for power transformers
IEC 60721-3-2	03-1997	Classification of groups of environmental parameters and their severities - Transportation and handling
IEC 60721-3-4	01-1995	Classification of environmental conditions - Part 3-4: Classification of groups of environmental parameters and their severities - Stationary use at non-weatherprotected locations
IEC 61039	07-2008	Classification of insulating liquids
IEC 62770	11-2013	Fluids for electrotechnical applications - Unused natural esters for transformers and similar electrical equipment
EN ISO 12944	2018	Paints and varnishes - Corrosion protection of steel structures by protective paint systems
IEC 60529 +A1 +A2	1989 and A1:1999, A2:2013	Degrees of protection provided by enclosures (IP-Code)

MVPS 4000-4600-S2-US – Standards (IEEE)

Product UL listed: E210376

Station and Low Voltage Wiring:

Standard	Issue Date	Name
NFPA 70 - NEC	2017	National Electrical Code
UL 50E	10-2015	STANDARD FOR SAFETY - Enclosures for Electrical Equipment, Environmental Considerations
UL 94	03-2013	STANDARD FOR SAFETY - Standard for Tests for Flammability of Plastic Materials for Parts in Devices and Appliances
UL 347	01-2016	STANDARD FOR SAFETY - Medium-Voltage AC Contactors, Controllers, and Control Centers
UL 489	04-2019	STANDARD FOR SAFETY - Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures
UL 758	04-2019	STANDARD FOR SAFETY - Appliance Wiring Material
UL 857	12-2011	STANDARD FOR SAFETY – Busways
UL 1077	07-2016	STANDARD FOR SAFETY - Supplementary Protectors for Use in Electrical Equipment
UL 1741	02-2018	STANDARD FOR SAFETY – Inverters, Converters, Controllers and Interconnection System Equipment for Use With Distributed Energy Resources
UL 3004	10-2018	OUTLINE - Outline of Investigation for Medium Voltage Junction Boxes
IEEE 80 +Cor. 1	12-2013 / 03-2015	IEEE Guide for Safety in AC Substation Grounding
IEEE 142	06-2007	IEEE Recommended Practice for Grounding of Industrial and Commercial Power Systems
IEEE 386	06-2016	IEEE Standard for Separable Insulated Connector Systems for Power Distribution Systems Rated 2.5 kV through 35 kV
IEEE C37.20.9	03-2019	IEEE Standard for Metal-Enclosed Switchgear Rated 1 kV to 52 kV Incorporating Gas Insulating Systems
IEEE C57.12.00	12-2015	IEEE Standard for General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers
IEEE C57.12.36	09-2015	IEEE Standard Requirements for Liquid-Immersed Distribution Substation Transformers
ANSI Z535-4	11-2011	Product Safety Signs and Labels
ANSI/NEMA CC 1	04-2018	Electric Power Connection for Substations

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No claim to be accurate nor complete.

Medium Voltage Switchgear

UL recognized component: E509320

Standard	Issue Date	Name
IEEE C37.20.03	12-2013	IEEE Standard for Metal-Enclosed Interrupter Switchgear
IEEE C37.20.04	09-2018	IEEE Standard for Indoor AC Switches (1 kV to 38 kV) for Use in Metal-Enclosed Switchgear
IEEE C37.04	12-2018	IEEE Standard for Ratings and Requirements for AC High Voltage Circuit Breakers with Rated Maximum Voltage above 1000 V
IEEE C37.09	12-2018	IEEE Standard Test Procedures for AC High-Voltage Circuit Breakers with Rated Maximum Voltage above 1000V
IEEE C37.20.7	12-2017	IEEE Guide for Testing Switchgear Rated Up to 52 kV for Internal Arcing Faults
IEEE C37.20.9	03-2019	Standard for Metal-Enclosed Switchgear Rated 1 kV to 52 kV Incorporating Gas Insulating Systems
IEEE 386	06-2016	Standard for Separable Insulated Connector Systems for Power Distribution Systems Rated 2.5 kV through 35 kV

Low Voltage Transformer

Included in product UL listing

Standard	Issue Date	Name
UL 1446	11-2016	Standard for Systems of Insulating Materials - General
UL 5085-1	04-2006	Low Voltage Transformers - Part 1: General Requirements
UL 5085-2	04-2006	Low Voltage Transformers - Part 2: General Purpose Transformers
ANSI Z535-4	11-2011	Product Safety Signs and Labels

Medium Voltage Transformer

E509865 (unlisted component), E507145 and others

Standard	Issue	Name
ANSI/IEEE C57.12.00	12-2015	General requirements for liquid-immersed distribution power & regulating transformers
ANSI/IEEE C57.12.36	06-2017	Requirements for Liquid-Immersed Distribution Substation Transformers

Standard	Issue	Name
ANSI/IEEE C57.154	08-2012	IEEE Standard for the Design, Testing, and Application of Liquid-Immersed Distribution, Power, and Regulating Transformers Using High-Temperature Insulation Systems and Operating at Elevated Temperature
ANSI/IEEE C57.12.70	12-2011	Standard for Terminal Markings and Connections for Distribution and Power Transformers
ANSI/IEEE C57.12.80	09-2010	Standard for Terminology for Power and Distribution Transformers
ANSI/IEEE C57.12.90	12-2015	Test code for Liquid-Immersed Distribution, Power and Regulating Transformers
ANSI/IEEE C57.91	12-2011	IEEE Guide for Loading Mineral-Oil-Immersed Transformers and Step-Voltage Regulators
ANSI/IEEE 386	06-2006	Standard for Separable Insulated Connector Systems for Power Distribution Systems above 600V
IEEE C57.147	02-2018	IEEE Guide for Acceptance and Maintenance of Natural Ester Insulating Liquid in Transformers
ASTM D6871	2017	Standard Specification for Natural (Vegetable Oil) Ester Fluids Used in Electrical Apparatus
UL 340	07-2017	Standard for Safety for Tests for Comparative Flammability of Liquids
UL XPLH	-	UL Product Category - [Transformers] Transformers, Distribution, Liquid-filled Type, Over 600V
UL EOUV	-	UL Product Category - Dielectric Mediums
UL EOVK	-	UL Product Category - [Dielectric Mediums] Transformer Fluids