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SIVACON S8

EN (IEC) 61439-1/2

The new standard for
low-voltage power switchgear and controlgear assemblies

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Dear SIVACON-Partners,

with publication of the IEC 61439 we already informed you about the replacement of the IEC 60439. With the 1st of November 2014 also the European series of standards EN 60439 will be replaced by EN 61439 ultimately. To avoid any problems for you or your customers we summarized the most important information for you.

We don't want to promise too much but one is assured: With SIVACON you committed to high quality and security in low-voltage energy distribution. Therefore SIVACON switchboards already fully comply to the new switchboard standard EN (IEC) 61439-1/2. So nothing will change for you.

With best regards

Florian Möbis

Product Management SIVACON-Partnering



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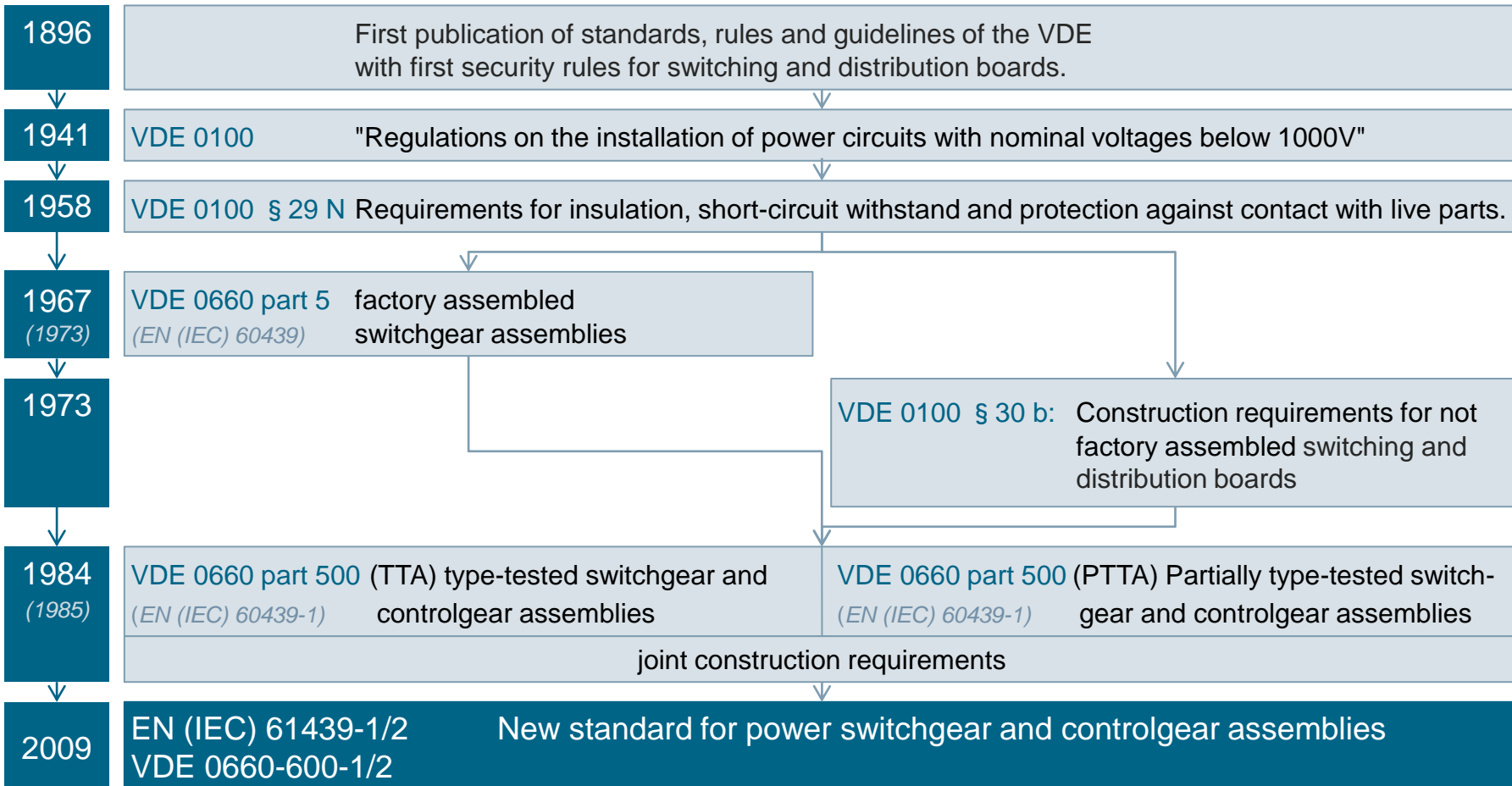


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Milestones of Switchboard Standards



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Reasons for the New Series of Standards EN (IEC) 61439

With the EN (IEC) 61439 the series of standards for low-voltage switchgear and controlgear assemblies was radically revised and restructured. The main reasons for this were the following key points of criticism about the pre norm EN (IEC) 60439:



Difficult to understand and execute.

- Grey areas leading to subjective interpretations
- Poor structured content



TTA / PTTA dilemma.

- Misinterpreted categories
- Limited applicability
- Useless classification for end customers



EN (IEC) 60439 part 1 with double function.

- Product standard and
- General requirements for all other standards of this series



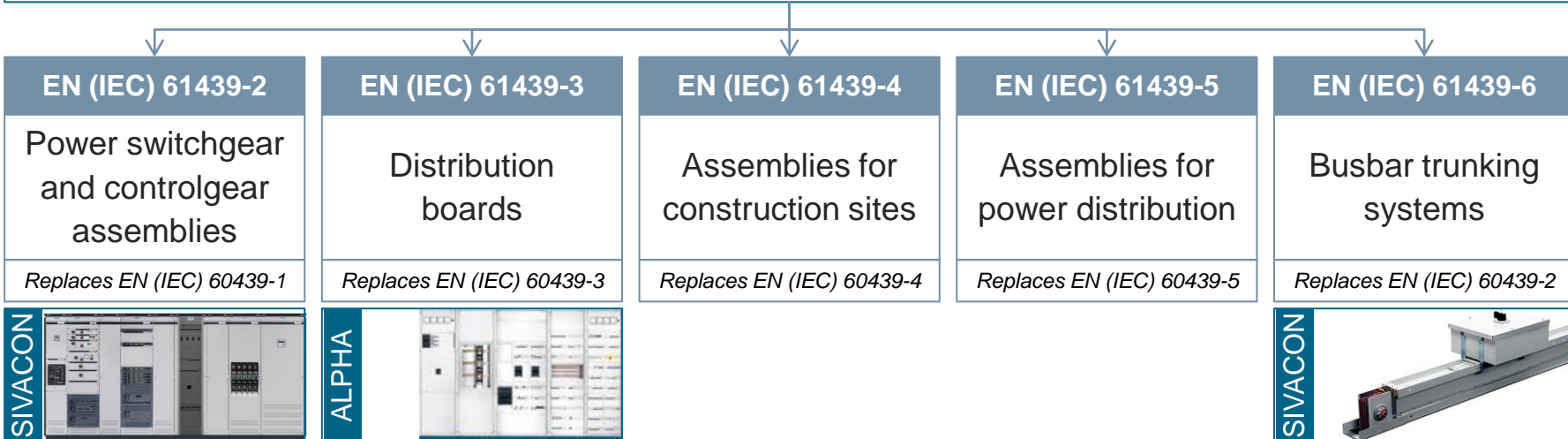
Some manufacturer and specific market segments are ignoring the EN (IEC) 60439.

EN (IEC) 61439-1/2

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Replaced Standards

EN (IEC) 61439-1
General rules
<i>Replaces EN (IEC) 60439-1</i>



IEC/TR 61439-0
Guidance to specifying assemblies
<i>No preceding standard</i>

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New Terms and Definitions

Power switchgear and controlgear assembly

PSC-assembly

“Low-voltage switchgear and controlgear assembly used to distribute and control energy for all types of loads, intended for industrial, commercial and similar applications where operation by ordinary persons is not intended” [EN (IEC) 61439-2; 3.1.101].

Rated current of the assembly

I_{nA}

Total current which can be distributed by a switchgear and controlgear assembly, limited due to the main busbars and in-feeders.

Rated current of a circuit

I_{nC}

Current, which can be carried without overheating by a Circuit in a switchgear and controlgear assembly if only this circuit is under load.

Rated diversity factor

RDF

- Specifies no longer the supposed loads of circuits but whose (proved) capability to carry a percentage of there rated current simultaneously.
- The product of the rated current and the RDF of a circuit has to be equal or higher as the expected load of the circuit.
- The RDF applies for the operation of the switchgear and controlgear assembly with their rated current (i.e. at maximum permissible load).

Rated short-time withstand current

I_{cw}

A standard value for the current flow duration is no longer defined in the standard (as yet in EN (IEC) 60439-1: 1s)

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Overview

Partition of the EN (IEC) 60439-1 in general rules and a product standard for power switchgear and controlgear assemblies.

EN (IEC) 60439-1

EN (IEC) 61439-1 General rules

- „Black Box“ approach with defined interfaces.
- Replacement of TTA and PTTA due to design verifications.
- Replacement of routine tests due to routine verifications.
- Distinction between „original manufacturer“ and „assembly manufacturer“ with separated verification responsibility.
- Partition of the chapter constructional requirements in:
 - constructional requirements and
 - performance requirementswith single changes.

EN (IEC) 61439-2 Power switchgear and controlgear assemblies

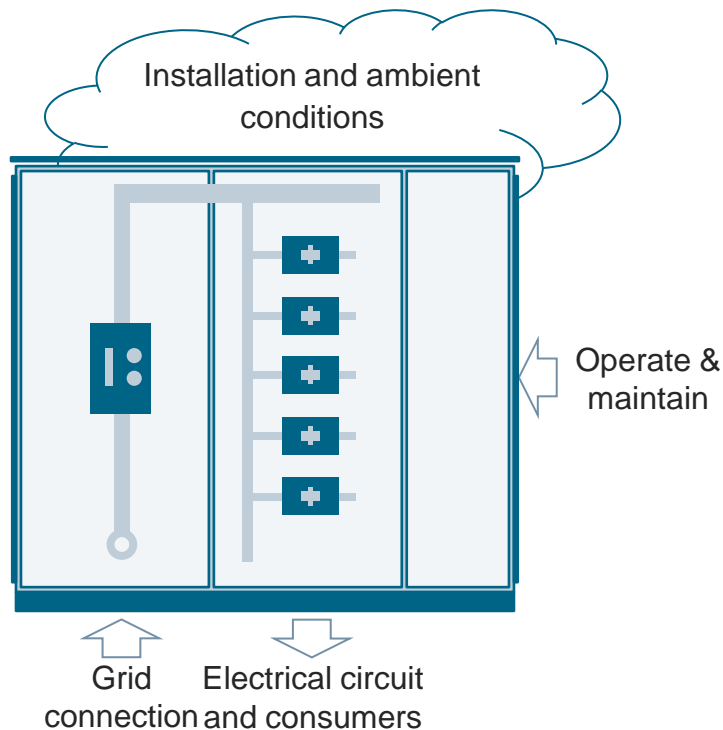
- Contains all requirements of the old EN (IEC) 60439-1 in terms of:
 - gangways between switchboards,
 - withdrawable unit design and
 - internal separation.
- Without significant changes of requirements.

→ For Switchboards according to EN (IEC) 60439-1 the EN (IEC) 61439-1 & -2 applies in future.

EN (IEC) 61439-1/2

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„Black-Box“ approach



„Black-Box“ approach

- Creation of interfaces.
- Specification of the interface parameters by the planner / operator.
- The manufacturer is responsible for the solution.

→ Opens the standard for today's and future switchgear and controlgear assemblies.

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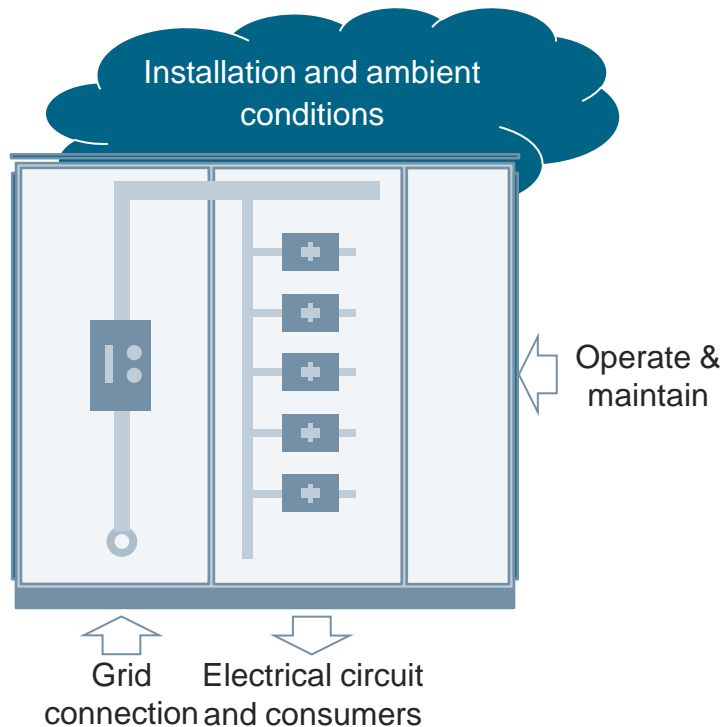
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„Black-Box“ approach



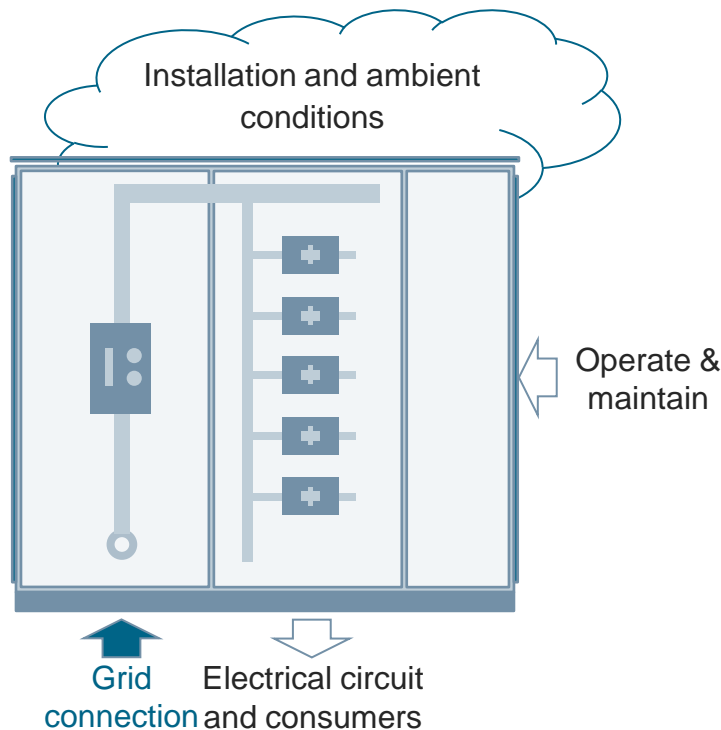
Installation and ambient conditions

- Existing grid system (*TN-C, TN-C-S, TN-S, TT, IT*)
- Degree of pollution
- Indoor and / or outdoor installation
- Stationary or non-stationary switchgear and controlgear assemblies
- Degree of protection (*IP*)
- Electromagnetic compatibility (*EMC*)
- Special operating conditions
(*e.g. extreme thermal, atmospheric und climatic impacts, ...*)
- External design
(*open / closed design, panel design, cubicle design, ...*)
- Protection against mechanical impacts (*IK code*)
- Structural type (*Inserts or removable components*)
- Total mass and if required masses of components
(*Transport*)
- Dimensions and type of installation
(*free standing, wall installation, side by side, ...*)

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„Black-Box“ approach



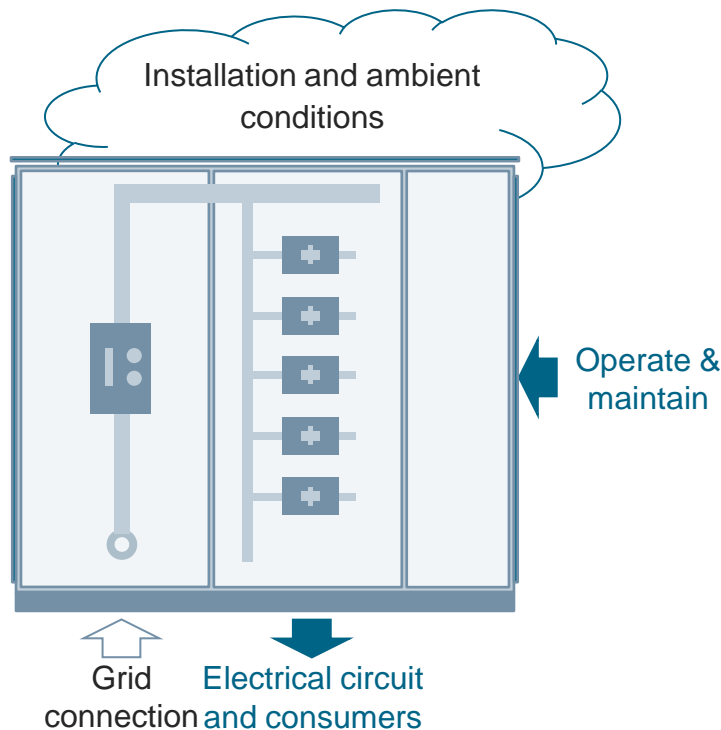
Grid connection

- Rated voltage of the assembly U_n
- Rated frequency f_n
- Rated operating voltage U_e
- Measures for protection against electric shock
(*Protection class*)
- Rated Current of the Assembly I_{nA}
- Rated impulse withstand voltage U_{imp}
- Rated peak withstand current I_{pk}
- Rated short-time withstand current I_{cw}
- Rated conditional short-circuit current I_{cc}
- Amount and Type of supply lines
(Single-conductor or multi-conductor cables , cross-section, conductor material, connection type)

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„Black-Box“ approach



Electrical circuit and consumers

- Rated insulation voltage U_i
- Rated current of a circuit I_{nC}
- Rated diversity factor RDF

Operate & maintain

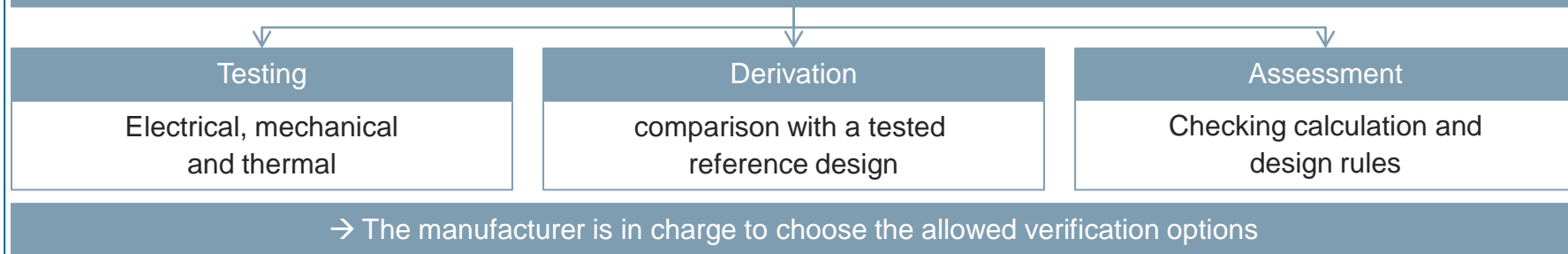
- Intended operating personal
(*Expert, layperson*)
- Device operation
(*e.g. behind the door, from outside, ...*)
- Door locking system
(*Locking handle, knob, with or without lock, ...*)

Design and Routine Verification

Design verification

„Verification made on a sample of an assembly or on parts of assemblies to show that the design meets the requirements of the relevant assembly standard“ [EN (IEC) 61439-1; 3.9.1].

Design verifications can be provided by the following equal methods:



„Design verifications“ are replacing and extending „type tests“.

Routine verification

Verification about the compliance to the relevant assembly standard which has to be performed for every completed assembly.

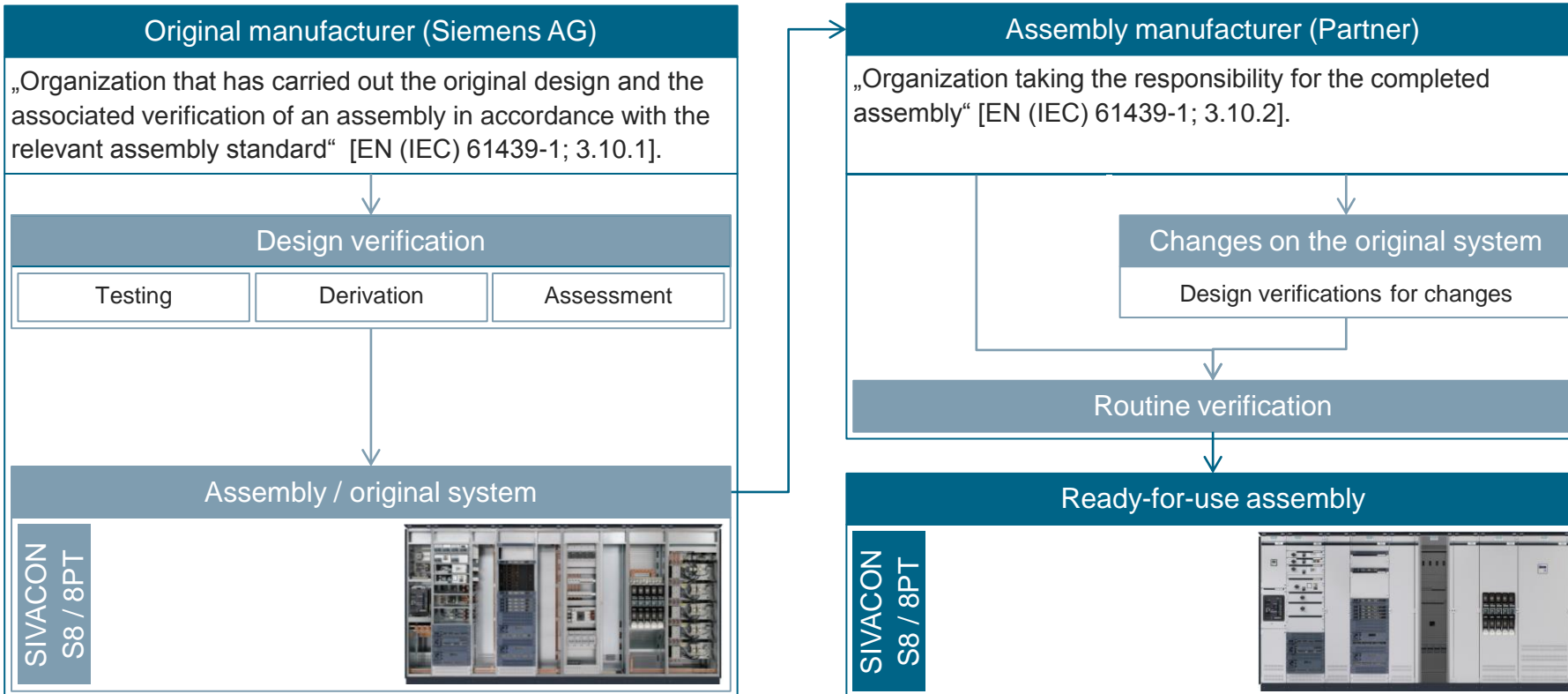
„Routine verifications“ are replacing „routine tests“ without significant changes.

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Product and Verification Responsibility

Distinction between „original manufacturer“ and „assembly manufacturer“



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Constructional and Performance Requirements

Partition of the previous chapter “constructional requirements” in the chapters “constructional requirements” and “performance requirements” with single changes.

“7 Constructional requirements”

“8 Constructional requirements”

- 8.1 Strength of materials and parts
- 8.2 Degree of protection provided by an assembly enclosure
- 8.3 Clearances and creepage distances
- 8.4 Protection against electric shock
- 8.5 Incorporation of switching devices and components
- 8.6 Internal electrical circuits and connections
- 8.7 Cooling
- 8.8 Terminals for external conductors

“9 Performance requirements”

- 9.1 Dielectric properties
- 9.2 Temperature rise limits
- 9.3 Short-circuit protection and short-circuit withstand strength
- 9.4 Electromagnetic compatibility (EMC)

Requirements for strength of materials and parts adopted from the standard for empty enclosures EN (IEC) 62208.

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Validity of Type Test Certificates According to EN (IEC) 60439-1

“Where tests on the assembly have been conducted in accordance with the IEC 60439 series, and the test results fulfill the requirements of the relevant part of IEC 61439, the verification of these requirements need not be repeated.” [EN (IEC) 61439-1; 10.1]



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Constructional Requirements

Changes

8.1 Strength of materials and parts

Adopted requirements from the standard for empty enclosures EN (IEC) 62208

- Corrosion resistance
- Thermal resistance of enclosure parts made of insulating material
- UV Resistance of enclosure parts made of insulating material for outdoor installation
- Protection against mechanical impacts (IK code)
- Ability for transportation (lifting)

8.2.2 Protection against contact with live parts, ingress of solid foreign bodies and water

IPX2 is not applicable for fixed mounted assemblies which are not tilted in normal operation conditions.

8.4 Protection against electric shock

Adoption of new terminologies and requirements from the fundamental safety standards:

Previous terms	Replaced by
“Protection against direct contact“	“Basic protection“
“Protection against indirect contact“	“Fault protection“

8.6.1 Main circuits

Minimum cross-section for neutral conductor: 50% of phase cross-sections and not smaller than 16 mm².

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Performance Requirements

Changes

9.3.4 Co-ordination of protective devices

If back-up protection is applied a warning sign on the assembly or a warning notice in the operating manual is mandatory, that the replacement of short-circuit protective devices by other device types is not allowed.

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Allowed Alternatives for Design Verifications

	Chapter	Characteristic to be verified	Verification options available		
			Testing	Derivation	Assessment
a) Construction	10.2	Strength of material and parts			
	10.2.2	Resistance to corrosion	Yes	No	No
	10.2.3	Properties of insulating materials			
	10.2.3.1	Thermal stability	Yes	No	No
	10.2.3.2	Resistance to abnormal heat and fire due to internal electric effects	Yes	No	Yes
	10.2.4	Resistance to ultra-violet (UV) radiation	Yes	No	Yes
	10.2.5	Lifting	Yes	No	No
	10.2.6	Mechanical impact	Yes	No	No
	10.2.7	Marking	Yes	No	No
	10.3	Degree of protection of enclosures	Yes	No	Yes
	10.4	Clearance and Creepage distances	Yes	No	No
	10.5	Protection against electric shock and integrity of protective circuits			
	10.5.2	Effective continuity between the exposed conductive parts of the assembly and the protective circuit	Yes	No	No
	10.5.3	Short-circuit withstand strength of the protective circuit	Yes	Yes	No
10.6	Incorporation of switching devices and components	No	No	Yes	
10.7	Internal electrical circuits and connections	No	No	Yes	
10.8	Terminals for external conductors	No	No	Yes	
b) Performance	10.9	Dielectric properties			
	10.9.2	Power-frequency withstand voltage	Yes	No	No
	10.9.3	Impulse withstand voltage	Yes	No	Yes
	10.10	Temperature-rise limits	Yes	Yes	Yes / No
	10.11	Short-circuit withstand strength	Yes	Yes/No	No
	10.12	Electromagnetic compatibility (EMC)	Yes	No	Yes
10.13	Mechanical operation	Yes	No	No	

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Allowed Alternatives for Design Verifications

Temperature-rise limits

Testing

Derivation

Derivation from similar variants of tested designs.
[EN (IEC) 61439-1; 10.10.3]

Assessment

Assessment via calculation allowed for $I_{nA} \leq 1600A$.

For $I_{nA} > 1600A$ temperature-rise verifications according to EN (IEC) 61439 have to be provided by testing and derivations; assessments via calculation are only allowed for assemblies up to 1600A.

Short-circuit withstand strength

Testing

Derivation

Only if the worst variant of an assembly was tested, the results of these tests can be used for verification of favorably variants by derivation.

The short-circuit withstand strength according to EN (IEC) 61439 can be certificated by derivation for parts of an assembly if the worst variant was tested before.

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Routine Verifications

Dielectric test

New test voltage versus EN (IEC) 60439-1.

Test period	1s
-------------	----

Voltage source	500VA, AC, 45-65Hz, ≥ 200 mA
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Test voltage	
Rated insulation voltage U_i (line to line) [V]	Test voltage a.c. - r.m.s. [V]
$U_i \leq 60$	1000
$60 < U_i \leq 300$	1500
$300 < U_i \leq 690$	1890
$690 < U_i \leq 800$	2000
$800 < U_i \leq 1000$	2200

→ Please check the setting possibilities of your test equipment according to the new test parameters for routine verifications.

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Assembly Designation Marking

Type label

The assembly manufacturer has to provide each assembly with at least one durable label, which is visible when the assembly is installed and in operation. These labels have to include at least the following information:

Assembly manufacturer's name or trade mark

Type designation or other identification


For requesting information about the assembly from the assembly manufacturer.

Designation to identify the date of manufacturing

Relevant assembly standard

EN (IEC) 61439-2

Type label example of the Siemens AG

SIEMENS			
IEC 61439-2			
Typ Type Type	SIVACON S8	Baujahr Year Année de constr.	2013
Nr. No. N°	MP 7038898/20		
Felderzahl No. of sections Nombre de colonnes	7	Schutzart Enclosure Degré de protection	IP 41
Bemessungsbetriebsspannung Rated operational voltage tension assignée d'emploi	400 V	Frequenz Frequency Frequence	50 Hz
GERMANY		ALLEMAGNE	

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Switchgear and controlgear assemblies only classified by their application area

- Common practice for other products.
- Kind of verification is irrelevant for customers.

Same technical requirements for all applications / products

Even more clearly as before.

Systematically covering of the complete range

Testing of random examples is not sufficient.

Verification always includes devices!

A verification for a device X is not automatically valid for a replacement with a device Y of another device series of the same or a different manufacturer.

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