DNV·GL

Certificate No:
TAE000035S

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Frequency Converter

with type designation(s)
GM150 (IGCT), SM150 (IGCT), GM150 (HV-IGBT), SM150 (HV-IGBT)

Issued to
Siemens AG Process Industries and Drives Large Drives, PD LD
Nürnberg, Bayern, Germany

is found to comply with
DNV GL rules for classification – Ships, offshore units, and high speed and light craft

Application :

Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV GL.

Issued at **Hamburg** on **2019-03-18**
This Certificate is valid until **2024-03-17**.
DNV GL local station: **Augsburg**

Approval Engineer: **Thomas Hartmann**

for **DNV GL**

Arne Schaarmann
Head of Section

This Certificate is subject to terms and conditions overleaf. Any significant change in design or construction may render this Certificate invalid.
The validity date relates to the Type Approval Certificate and not to the approval of equipment/systems installed.

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Product description

General characteristics of SINAMICS GM and SM series

	GM150/ SM150 (IGCT)	GM150/ SM150 (HV-IGBT)
Voltage variation:	± 10 % (±20% for 1,5s)	± 10 % (±20% for 1,5s)
Rated Frequency:	50/60 Hz	50/60 Hz
Frequency variation:	± 5 % (± 10% for 5s)	± 5 % (± 10% for 5s)
Output frequency:	0..250 Hz	0..250 Hz
Temperature range in operation:	0 … 45 °C (ambient temperature)	0… 45 °C (ambient temperature)
Humidity	< 95% (no condensation permitted)	< 95% (no condensation permitted)
Degree of protection	IP44	IP44 up to IP54
Water cooling	Derating >35°C	Derating >35°C

Sinamics GM150
12-pulse or optional 24-pulse diode rectifier without regenerative feedback

Sinamics SM150
Line-side converter capable of regenerative feedback

Type designation	Mains supply	Output	Rated output current
GM150 (IGCT)			
6SL3835-2LN4x-xxxx	2 x 1,7 kV up to 3 x (2 x 1,7 kV)	10...21 MVA	1750…3 x 1630 A
6SL3845-2NN4x-xxxx	2 x 1,7 kV	10 MVA	2 x 1750…4 x 1750 A
6SL3835-2LR4x-xxxx	2 x 2 x 1,7 kV	20 MVA	1750 A
SM150 (IGCT)			
6SL3845-7NN4x-xxxx	3,3 kV Up to 3 x 3,3 kV	10...31,5 MVA	1750…3 x 1850 A
GM150 (HV-IGBT)			
6SL3815-2LMxx-xxxx 6SL3815-2LNxx-xxxx 6SL3815-2LPxx-xxxx	2 x 1,2/1,7/2,2 kV up to 2 x (2 x 1,2/1,7/2,2 kV)	2,0...13 MVA	500...2 x 900 A
SM150 (HV-IGBT)			
6SL3815-7Nx38-xxxx 6SL3815-7Nx41-xxxx	3,3 kV/4,16 kV	4,6...7,2 MVA	800...1000 A

Required option for ship applications: Option E51 (includes Option M66)

Application/Limitation

Temperature class: A
Vibration class: A
Humidity class: A[2)]
EMC class: EMC Directive /IEC 61800-3
To be used on EMC class A locations

2) Anti Condensation measures

The Sinamics GM150/ SM150 must be regarded as a component. The actual installation to be designed according to Siemens Operating Manual and according to the applicable DNV GL Rules for the actual application. To be installed in an enclosure with an IP degree in accordance with DNV Rules w.r.t. location.
The short circuit behavior of the converter is according to IEC 61800-5-1 (2008) § 5.2.3.6. and §5.2.4.3.

Controller : CU 320 software version V4.8
DNV GL shall be informed of any software modifications to the product which are liable to affect its characteristics and functions, as originally specified and tested.

Product certification
A DNV GL product certificate is needed for each delivery. The following documents shall be submitted for approval:

- Reference to this Type Approval Certificate
- A document covering the intended use and configuration,
  as per DNVGL Pt.4 Ch.8 Sec.1 table 2; E240 - Functional description for electrical assemblies
- Test program for routine tests and functional tests
  as per DNVGL Pt.4 Ch.8 Sec.1 table 2; Z252 - Test procedure at manufacturer
- This type approval certificate covers the document requirements for Semi-conductor assemblies as per DNVGL Pt.4 Ch.8 Sec.1 table 2 as follows:
  - E120 - Electrical data sheet, general
  - E130 - Electrical data sheet, semiconductor assemblies
  - E140 - Assembly schedules and technical data
  - E180 - Layout of electrical assembly
- If additional components apart from the type approved frequency converter are part of the delivery, documentation in accordance with DNV GL rules Pt.4 Ch.8 Sec.1 table 2 shall be delivered for the additional components.

EMC
Converters with conducted and radiated emission above the DNV GL required limits can be installed in "special distribution zone" and "general power distribution zone", in accordance with IEC 60533 provided measures are taken to attenuate these effects on the distribution system, so the safe operation is assured. Planned EMC measures shall be submitted for approval prior to installation onboard.

The EMC measures should be derived from an EMC analysis and plan in accordance with IEC 60533 Annex B and /or IEC 61800-3 Annex E.

Type Approval documentation

Tests carried out
Visual inspection, Performance, Power supply failure, Power supply variations, Inclination test, Vibration, Dry heat, Damp heat (partly), Insulation resistance, High voltage.
EMC: The following tests are in accordance with the EMC directive / IEC 601800-3: Electrical fast transient (Burst), electrical slow transient (Surge), RF-common mode Voltage, radiated RF-electromagnetic fields, electric discharge (ESD), radiated and conducted emission.

Marking of product
Siemens Sinamics GM150 – Type designation – Power – Voltage
Siemens Sinamics SM150 – Type designation – Power – Voltage

Periodical assessment
The scope of the periodical assessment is to verify that the conditions stipulated for the Type approval are complied with and that no alterations are made to the product design or choice of materials.

The main elements of the assessment are:

- Inspection on factory samples, selected at random from the production line (where practicable)
- Results from Routine Tests (RT) checked (if not available tests according to RT to be carried out)
- Review of type approval documentation
- Review of possible change in design, materials and performance
- Ensuring traceability between manufacturer's product type marking and Type Approval Certificate.

Periodical assessment is to be performed after 2 years and after 3.5 years. A renewal assessment will be performed at renewal of the certificate.

END OF CERTIFICATE