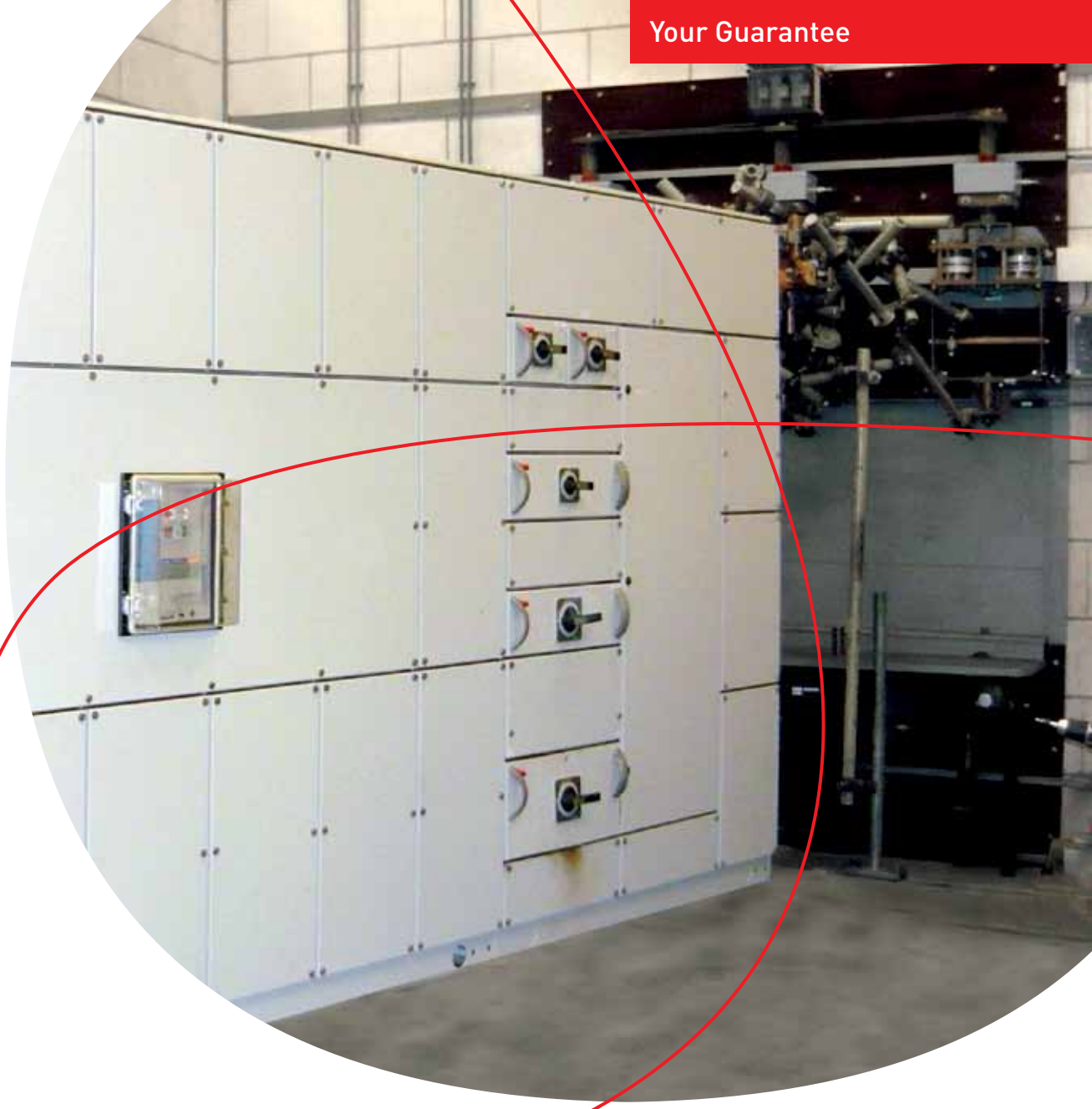

The products from CUBIC are tested and certified

Our assertions about CUBIC's products do not stand alone. The products from CUBIC are all tested and/or type approved by several of the most recognized test laboratories, including KEMA, ASTA, UL, DNV, Russian Maritime Register of Shipping and Germanischer Lloyd. KEMA and UL take current spot tests from CUBIC's production of the modular system.

In addition, the quality system with CUBIC-Modulsystem A/S has been certified according to ISO 9001. The quality system is currently checked by the Danish Standards Association.

CUBIC

Type Tests
(In accordance with IEC/EN 60439-1)

		Verified by
1	**Temperature-rise limits** KEMA, ASTA and SABS have carried out tests on complete switchboards up to 6300 Amp incl. incoming circuit breaker. As switchgear and controlgear assemblies are manufactured or assembled on a one-off basis, CUBIC has carried out a large number of temperature-rise tests. Furthermore, the CUBIC Modular System including busbars has been temperature-rise tested at an ambient temperature of 50°C.	**KEMA, ASTA and SABS** **Det Norske Veritas** to own requirements, **Germanischer Lloyd** to own requirements, and **Russian Maritime Register of Shipping.**
2	**Dielectric properties** The CUBIC modular system has been power-frequency withstand voltage tested to 3.5 kV without puncture or flashover. The withstand voltage is tested with up to 12 kV without any unintentional disruptive discharges. The insulation resistance, measured after a 48 hour humidity test, reached a higher value than the required minimum of 2 megohm.	**KEMA** and **SABS** **Det Norske Veritas** to own requirements, **Germanischer Lloyd** to own requirements, and **Russian Maritime Register of Shipping.**
3	**Short-circuit withstand strength** The CUBIC busbar systems up to 7000 Amp have been tested. The following short-circuit levels have been obtained at the laboratories of KEMA and ASTA: Rated short-time withstand current, Icw: Up to 120 kAmp for 1 s. and 65 kA for 3 s. Rated peak withstand current, Ipk: Up to 264 kAmp	**KEMA, ASTA** and **SABS** **Det Norske Veritas** to own requirements, **Germanischer Lloyd** to own requirements, and **Russian Maritime Register of Shipping.**
4	**Effectiveness of the protective circuit** In CUBIC assemblies the effective connection between the exposed conductive parts has been tested by a number of measurements, and is under current supervision by KEMA. The short-circuit withstand strength of the protective circuit has been tested to levels corresponding to those of the busbar systems, see above.	**KEMA** and **SABS** **Det Norske Veritas** to own requirements, **Germanischer Lloyd** to own requirements, and **Russian Maritime Register of Shipping.**
5	**Clearances and creepage distances** Clearances and creepage distances have been verified for 1000 V, 50 Hz in CUBIC assemblies.	**KEMA** and **SABS** **Det Norske Veritas** to own requirements, **Germanischer Lloyd** to own requirements, and **Russian Maritime Register of Shipping.**
6	**Mechanical operation** The CUBIC modular system has been mechanically tested through a number of manoeuvres more than 200 times. This applies for the system generally and for the Multi Drawer system's mechanical interlocking etc. in particular. The constructions have further been verified by KEMA.	**KEMA** and **SABS** **Det Norske Veritas** to own requirements, **Germanischer Lloyd** to own requirements, and **Russian Maritime Register of Shipping.**
7	**Degree of protection** The CUBIC modular system has in its standard version been tested at different IP ratings up to IP54.	**KEMA** and **Sveriges Provnings- och Forskningsinstitut** to IEC/EN 60529, **Det Norske Veritas** to own requirements, **Germanischer Lloyd** to own requirements, and **Russian Maritime Register of Shipping.**
8	**EMC tests** According to clause 8.2.8 of EN 60439-1 it is verified that EMC sensitive parts are applied in accordance with manufacturer's recommendation and the guidelines of the IEC 61000-5-2-Technical Report Type 3.	**KEMA / DEKRA**
9	**Verification of the resistance of insulating materials to abnormal heat and fire (glow wire).** The glow wire test was done on all insulation materials. Insulation materials retaining current-carrying parts in position were tested at a temperature of 960 °C. Other insulation materials were tested at a temperature of 650 °C. The duration of the tests was each time 30 seconds and the tip of the glow wire was both times applied at a place where the section is thinnest and not less than 15 mm from the upper edge of the specimen.	**KEMA / DEKRA**

Design verification
(In accordance with IEC/EN 61439-2)

		Verified by
1	**Strength of material and parts** Tested for corrosion, thermal stability, resistance of insulting materials to normal heat, resistance to abnormal heat and fire due to internal electric effects. Lifting tests performed for assembly sections up to 1750 kg.	KEMA / DEKRA
2	**Degree of protection** The CUBIC modular system has in its standard version been tested at different IP ratings up to IP54.	KEMA / DEKRA
3	**Clearances** Clearances tested for rated impulse withstand voltage Uimp maximum 12 kV to 14 mm, depending on the used components.	KEMA / DEKRA
4	**Creepage distances** Creepage distance tested for rated insulating voltage Ui maximum 1000 V, pollution degree 3, material group II to 14 mm, depending on the used components.	KEMA / DEKRA
5	**Protection against electric shock** Protection against electric shock and integrity of protective circuits: Effective continuity between the exposed conductive parts of the ASSEMBLY and the protective circuit. Measured below the maximum of 0.1 Ω Effectiveness of the assembly for external faults. Tested for I_{cw} 72 kA for 100 ms, 158.4 kA peak.	KEMA / DEKRA
6	**Incorporation of switching devices and components** Inspection made and found in accordance with the standard.	KEMA / DEKRA
7	**Internal electric circuits and connections** Inspection made and found in accordance with the standard.	KEMA / DEKRA
8	**Terminals for external conductors** Inspection made and found in accordance with the standard.	KEMA / DEKRA
9	**Dielectric properties:** Power-frequency withstand voltage: Tested with maximum 3.5 kV depending on the used components without any disruptive discharge. Impulse withstand voltage: Tested with up to maximum 12 kV for each polarity without any disruptive discharge depending on the used components.	KEMA / DEKRA
10	**Temperature-rise limits** Complete ASSEMBLIES up to 6300 A including incoming ACB and outgoing units up to 1440 A. Horizontal main busbars up to 6000 A. Vertical distribution busbars up to 2000 A.	KEMA / DEKRA
11	**Short circuit withstand strength** Incoming unit including main busbars up to Icw 120 kA, 264 kA peak, Icc 120 kA prospective. Neutral tested to 60% of above. Outgoing units, type MD and MPI are tested with different brands of components up to 1600 A for Icc up to 120 kA.	KEMA / DEKRA
12	**EMC** Verification of the EMC is done in conformity with EN/IEC 61439-2, clause 10.12. According to these clauses it is verified that EMC sensitive parts are applied in accordance with manufacturer's recommendation and the guidelines of the IEC 61000-5-2 - Technical Report Type 3.	KEMA / DEKRA
13	**Mechanical operation** Tested for 200 times without impair of the structure.	KEMA / DEKRA

UL tests
(In accordance with UL 67, UL 508 A, UL 845 and UL 891)

Verified by

1 **Temperature-rise**
UL have carried out tests on complete switchboards up to 5000 Amp. The temperature-rise did not exceed 65 K with tin plated copper bars or 50 K with none plated copper bars. Likewise, the temperature-rise in motor starter units did not exceed maximum limit.

Underwriters Laboratories Inc.
UL 67, UL 508 A, UL 845 and UL 891

Canadian Standards
CSA C22.2 No. 14-95
CSA C22.2 No. 31-M89
CSA C22.2 No. 29-M1989

2 **Dielectric voltage withstand**
The CUBIC modular system has been tested to 2.2 kV for 1 minute without breakdown. The tests were carried out between:
a. Uninsulated live parts and enclosure,
b. Terminals of opposite polarity,
c. Uninsulated live parts of different circuits.

Underwriters Laboratories Inc.
UL 67, UL 508 A, UL 845 and UL 891

Canadian Standards
CSA C22.2 No. 14-95
CSA C22.2 No. 31-M89
CSA C22.2 No. 29-M1989

3 **Short-circuit withstand**
The CUBIC busbar systems up to 5000 Amp (S7000) have been tested by UL. The following short-circuit rating (RMS) was obtained, I : Up to 100 kAmp.

Underwriters Laboratories Inc.
UL 67, UL 508 A, UL 845 and UL 891

Canadian Standards
CSA C22.2 No. 14-95
CSA C22.2 No. 31-M89
CSA C22.2 No. 29-M1989.

4 **Grounding and bonding**
In CUBIC assemblies the effective connection between the exposed conductive parts has been tested by UL.
The resistance between the ground bus and either an exposed dead metal or the ground contact was tested to be less than 0.1 ohm. Likewise, the resistance between the ground bus and the grounding contacts was measured to be less than 0.005 ohm.

Underwriters Laboratories Inc.
UL 67, UL 508 A, UL 845 and UL 891

Canadian Standards
CSA C22.2 No. 14-95
CSA C22.2 No. 31-M89
CSA C22.2 No. 29-M1989

5 **Spacings**
The spacing through air and over surface is made such that it can be verified for up to 600 V in CUBIC assemblies.

Underwriters Laboratories Inc.
UL 67, UL 508 A, UL 845 and UL 891

Canadian Standards
CSA C22.2 No. 14-95
CSA C22.2 No. 31-M89
CSA C22.2 No. 29-M1989

6 **Environmental rating**
The CUBIC modular system is in standard version tested by UL to type 1, 2, 5, and 12.

A special version in stainless steel has further been tested to type 4 and 4x.

Underwriters Laboratories Inc.
UL 67, UL 508 A, UL 845 and UL 891

Canadian Standards
CSA C22.2 No. 14-95
CSA C22.2 No. 31-M89
CSA C22.2 No. 29-M1989

Main type-tested electro-technical data

Rated voltage and frequency:	Up to 600 V; 50-60 Hz
Rated current:	Up to 5000 Amp
Bus short circuit bracing:	Up to 100 kAmp RMS
Enclosure types	Type 1, 2, 5, 12

Underwriters Laboratories Inc.
UL 67, UL 508 A, UL 845 and UL 891

Canadian Standards
CSA C22.2 No. 14-95
CSA C22.2 No. 31-M89
CSA C22.2 No. 29-M1989

Other Tests

Verified by

1 **Vibrations and Shocks**

The CUBIC modular system has been vibration and shock tested in standard version with electrical components. The vibration test was carried out by SP Technical Research Institute of Sweden. Influence up to 2 G in the frequency range 5-100 Hz in all three planes according to IEC 60068-2-6.
The shock test was carried out by Elektronikcentralen. Influence three shocks of 30 G for 12.5 ms in six directions.

Elektronikcentralen to the demands of the Royal Danish Navy,
Det Norske Veritas to own requirements,
Germanischer Lloyd to own requirements, and
Russian Maritime Register of Shipping.

2 **Seismic test, earthquake simulation**

The CUBIC modular system has fulfilled an earthquake simulation test according to the IEC 60068-2-57 Test Ff: Vibration - Time-history method. As Required Response Spectra, RRS:a, the spectra given in Annexes B and D of the document HN20-E-53 2ème edition Octobre 1994 were used. The earthquake simulation tests were done with biaxial horizontal and vertical multi frequency motions. The ZPA-level at the SSE test was 1 G in the horizontal directions and 0.8 G in the vertical.

Sveriges Provnings- och Forsknings-institut to IEC 60068-2-57, and
Russian Maritime Register of Shipping.

3 **Arcing-fault test**

The CUBIC modular system has been arc fault tested according to IEC/TR 61641 with a prospective current up to 100 kA and with permissible test duration up to 1000 ms. Assessment of the tests; the modular system fulfills all seven criteria according to IEC/TR 61641.

The CUBIC modular system has also been tested in accordance to AS/NZS 3439.1 (Australian / New Zealand stand-ard) with a prospective current up to 100 kA and with permissible test duration up to 300 ms. Assessment of the tests; the modular system fulfills all conditions regarding operator protection and suitability for further service according to AS/NZS 3439.1.

Parkside Laboratories to AS/NZS 3439.1,
Testing and Certification Australia to AS/NZS 3439.1
Det Norske Veritas to own requirements,
Germanischer Lloyd to own requirements, and
Russian Maritime Register of Shipping.

4 **Surface treatment**

The CUBIC modular system is surface treated with powder lacquer to a thickness of approximately 60-80 my. Dupont Powder Coatings Scandinavia AB has carried out a tropical test ISO 6270: Constant climate, air temperature 40 +/- 2° C, 100% relative humidity for 240 hours with excellent result.
The Dupont Powder Coatings Scandinavia AB concludes that the corrosion resistance is equal to class C2 high after the international standard ISO 12944.

Teknos Schou Laboratory to ISO 6270, ISO 4628-2-5, ISO 2409 and ISO 12944.
Det Norske Veritas to own requirements,
Germanischer Lloyd to own requirements, and
Russian Maritime Register of Shipping.

Quality and environment

DS/ISO 9001

The certificate is a documentation for the quality system of the company which is certified in compliance with the international standard DS/ISO 9001. The certification is a quality mark to the whole company and its way of acting.


Certifikat
Certificate
100056
DS/EN ISO 9001:2008

ISO 14001

ISO 14001 specifies requirements for the environmental management system and makes it possible to constantly develop and implement policies and objectives that take into account legal requirements and environmental conditions.


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DS/EN ISO 14001:2004

DS/OHSAS 18001

DS/OHSAS 18001, which stands for Occupational Health and Safety Assessment Series, is an international system of governance of health and safety in the workplace. The system aims to help companies control and minimise health and safety risks.


Certifikat
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