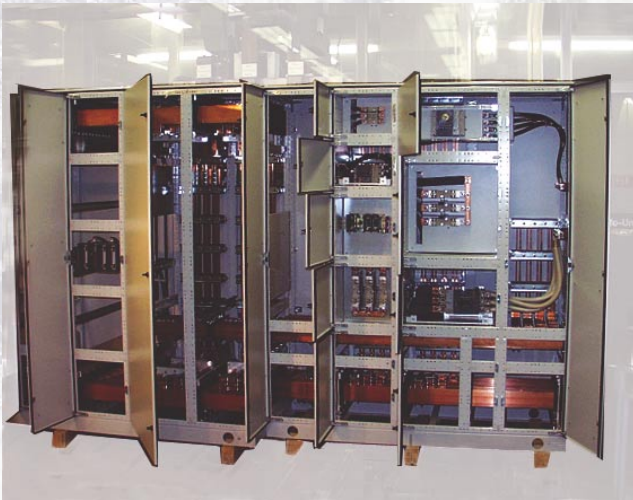


Your guarantee

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

1.

Temperature-rise limits

KEMA, ASTA and SABS have carried out tests on complete switchboards up to 6300 A 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.

Verified by

KEMA, **ASTA** and **SABS** to IEC 60439-1, EN 60439-1, **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 tested to 3.5 kV for 1 minute without puncture or flashover.

The insulation resistance, measured after a 48 hour humidity test, reached a higher value than the required minimum of 2 megohm.

Verified by

KEMA and **SABS** to IEC 60439-1, EN 60439-1, **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 A have been tested. The following short-circuit levels have been obtained at the laboratories of KEMA and ASTA:

Rated short-time withstand current, I_{cw} : Up to 100 kA in 1 s. and 50 kA in 3 s.
Rated peak withstand current, I_{pk} : Up to 220 kA

Verified by

KEMA, **ASTA** and **SABS** to IEC 60439-1, EN 60439-1, **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.

Verified by

KEMA and **SABS** to IEC 60439-1, EN 60439-1, **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.

Verified by

KEMA and **SABS** to IEC 60439-1, EN 60439-1, **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 far beyond what is required. This applies for the system generally and for the Draw-out/Plug-in systems' mechanical interlocking etc. in particular. The constructions have further been verified by KEMA.

Verified by

KEMA and **SABS** to IEC 60439-1, EN 60439-1, **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 up to IP54.

Verified by

Sveriges Provnings- och Forskningsinstitut to IEC 60529, EN 60529, **Det Norske Veritas** to own requirements, **Germanischer Lloyd** to own requirements, and **Russian Maritime Register of Shipping**.

1.

Temperature-rise

UL have carried out tests on complete switchboards up to 5000 A. 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.

Verified by

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:

- Uninsulated live parts and enclosure,
- Terminals of opposite polarity,
- Uninsulated live parts of different circuits.

Verified by

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 A (S7000) have been tested by UL. The following short-circuit rating (RMS) was obtained, I : Up to 100 kA.

Verified by

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 bounding

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.

Verified by

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.

Verified by

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.

Verified by

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 (UL file E92231)	Type 1, 2, 5, 12

Verified by

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

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 The Danish Army Technical Service. Influence 2 G in the frequency range 10-500 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 min. in six directions.

Verified by

The Danish Army Technical Service to IEC 60068-2-6,
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.

Verified by

Sveriges Provnings- och Forskningsinstitut to IEC 60068-2-57.

3. Arcing test

To assess the CUBIC modular system's resistance regarding arc faults a number of tests have been carried through. All tests fulfil the six assessment criterions to "Type B assembly" according to SEK 405 and the five criterions according to IEC 61641.

Also tested in accordance to AS/NZS 3439.1 (Australian / New Zealand standard)

Verified by

Kungliga Tekniska Högskolen, Sverige, to IEC 61641, SEK 405 (Svenska Elektriska Kommissionen, Handbok 405),
Parkside Laboratories 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 thick-ness of approximately 60-80 my. Teknos Schou Laboratory 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 Teknos Schou Laboratory concludes that the corrosion resistance is equal to class C2 high after the international standard ISO 12944.

Verified by

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.



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.

CUBIC worked more than two years to achieve the certification. The result has been that the organization today fully meets a number of quality control requirements from product development and production, purchase of raw materials and semi-manufactures, to administration and service. All these requirements and the observance of them will continuously be supervised by the Danish Standards Association.

This is a definite advantage for the customers as they can rely on the services meeting the promised specifications.

A company with DS/ISO 9001 certification obtains an internationally accepted and understood documentation, which might prove decisive in many negotiations.



CUBIC-Modulsystem A/S

Skjoldborgsgade 21 · DK-9700 Brønderslev · Denmark · Tel +45 9882 2400 · Fax +45 9882 3530 · E-mail: info@cubic.dk