



Certificate No:
TAE00004KR

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Flexible cable

with type designation(s)
CFSPECIAL.592

Issued to

igus GmbH
Köln, Nordrhein-Westfalen, Germany

is found to comply with

DNV 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.

Issued at **Høvik** on **2023-01-18**

This Certificate is valid until **2028-01-17**.

for **DNV**

DNV local unit: **Essen**

Approval Engineer: **Carsten Hunsalz**

Frederik Tore Elter
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.

LEGAL DISCLAIMER: Unless otherwise stated in the applicable contract with the holder of this document, or following from mandatory law, the liability of DNV AS, its parent companies and their subsidiaries as well as their officers, directors and employees ("DNV") arising from or in connection with the services rendered for the purpose of the issuance of this document or reliance thereon, whether in contract or in tort (including negligence), shall be limited to direct losses and under any circumstance be limited to 300,000 USD.



Form code: TA 251

Revision: 2022-09

www.dnv.com

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Product description

XLPE insulated and PUR sheathed, flame retardant chainflex power cables (shielded) for shipboard and offshore applications, especially for e-chain use

CFSPECIAL.592

Rated voltage:	600 / 1000 V
Max. operating conductor temperature:	90 °C acc. to DNV-RU-SHIP Pt.4 Ch.8 or 20.000 h according to manufacturer's instruction
Conductor:	Fine-wired, bare copper strand
Insulation:	XLPE
Element shield:	Bending-resistant braiding made of tinned copper wires
Inner sheath:	TPE
Overall shield:	Tinned copper wires
Reinforcement:	Tensile strength aramid braiding (embedded in the outer jacket)
Outer sheath:	PUR

Number of cores and conductor nominal cross section [mm ²]	Cable Type
(30G4,0+4x(2x2,5)C)C	CFSPECIAL.592

Application/Limitation

The cables listed in this certificate are developed, tested and produced especially for continuously moving e-chain applications.

Apart from the qualities listed above, the cables also fulfil the following special characteristics:

Explanation energy chain:

An energy chain (also e-chain, cable carrier or drag chain) is a component that guides and protects special flexible cables, pneumatic or hydraulic hoses.

You can find energy chains wherever moving machine parts need to be supplied with energy, data, liquids or gases.

Special characteristics cables

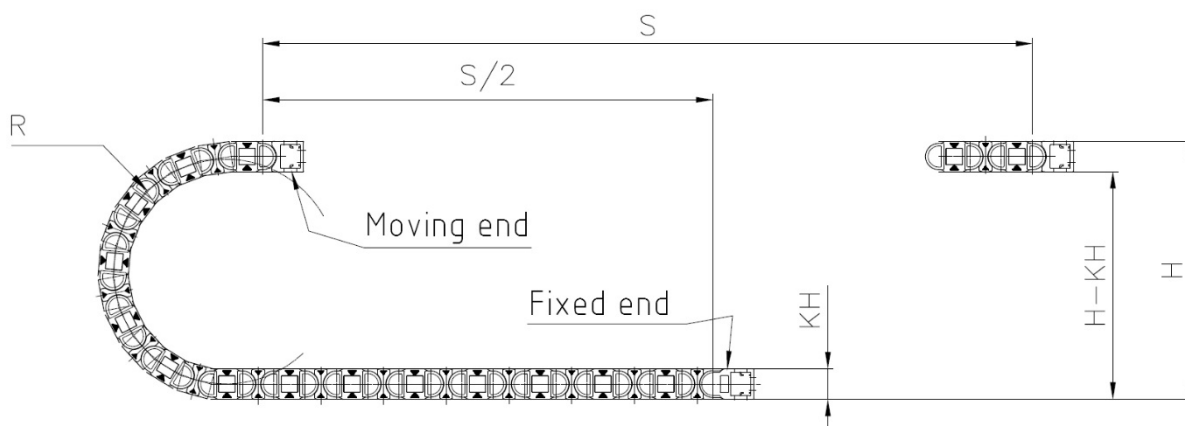
Due to the permanent bending and moving load of the cables in an energy chain, especially developed, tested and produced cables must have the following special properties:

- highly bending-resistant wires
- insulation materials with low mechanical aging due to bending load
- optimized pitch lengths stranding designs
- for shielded cables, highly bending-resistant braided shields with min. 80% optical coverage
- highly abrasion-resistant outer jacket materials
- highly bending-resistant outer jacket materials
- highly media, UV and ozone resistant outer jacket materials
- compact design for sufficient inherent rigidity (Not highly flexible!)
- have to withstand permanent bending tests in energy chains of min. 2-4 million double strokes (back and forth movement) without damage.
- undergo a minimum 15-20% batch production control through energy chain moving tests of at least 200.000 double strokes

Important note:

During the installation of cables in moving energy chains, special assembly and strain relief instructions have to be taken into account.

For further details check: www.igus.de



Temperature range	-50 ° C <	-40°C <	-25°C / 80°C
Min. bending radius for e-chain use	-	-	10 x d
Min. bending radius for flexible movement, following EN 60811-504	-	8 x d	8 x d
Min. bending radius for fixed installation, following DIN EN 50305	5 x d		5 x d

Type Approval documentation

Tests carried out

Standard	Issued	General description	Limitation
DNV-CP-0417	2021-08	DNV Type approval program for Flexible electrical cables	
UL Style		30054, 21223,	
UL 758	2019-04	Appliance Wiring Material	
UL 1581	2020-02	Reference Standard for Electrical Wires, Cables, and Flexible Cords	
IEC 60332-1-2	2015-07	Tests on electric and optical fibre cables under fire conditions – Part 1-2: Test for vertical flame propagation for a single insulated wire or cable –Procedure for 1 kW pre-mixed flame	
NEK TS 606	2022	Cables for offshore installations. Halogen-free and/or mud resistant. Technical specification.	Mud resistance test for cable type with PUR MUD sheath: IRM 902 / 903 100°C 7d. Calcium Bromide 70°C 56d. EDC 95-11 base oil 70°C 56d.

Marking of product

Example:

“00000 m” igus chainflex CFSPECIAL.592 size 600/1000V E310776 cRUus AWM Style xxx VW-1 AWM I/II A/B 80°C 1000V FT1 www.igus.de

Place of Production

DNV id: 10654272

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