

# TYPE APPROVAL CERTIFICATE

**This is to certify:****That the Flexible cable**with type designation(s)  
**CFLG.LB.PUR**

Issued to

**igus® GmbH**  
**Köln, Nordrhein-Westfalen, 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 **2021-02-19**for **DNV GL**This Certificate is valid until **2026-02-18**.DNV GL local station: **Essen**Approval Engineer: **Carsten Hunsalz**

---

**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.

LEGAL DISCLAIMER: Unless otherwise stated in the applicable contract with the holder of this document, or following from mandatory law, the liability of DNV GL AS, its parent companies and subsidiaries as well as their officers, directors and employees ("DNV GL") 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.



## Product description

LSZH/TPE insulated and PUR sheathed, flame retardant chainflex fibre optic cable FOC (torsion protected) for shipboard and offshore applications, especially for e-chain use

Type CFLG.LB.PUR

Fibres: Tight buffered fibres 0,9 mm: E9/125; G50/125; G62,5/125

Cable construction

Optical fibre: FOC-fibre made out of glass with LSZH jacket  
Filler if needed: Aramid damper for high tensile stresses  
Power cores optional: Copper conductors, TPE insulated, 300/500 V  
Torsion protection : Extremely bending resistant aramid braid for torsion protection  
Outer sheath: PUR

Number of cores, cross-sectional area according to: EU\_igus\_chainflex\_catalogue\_05.2020

## 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

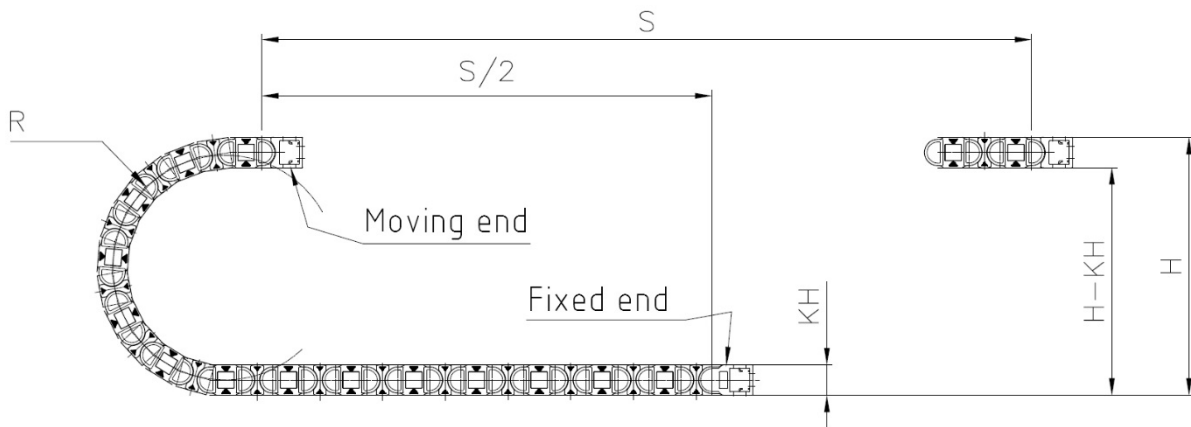
Due to the permanent bending and moving load of the cables in an energy chain, especially developed, tested and produced cables must have the following special properties:

- 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](http://www.igus.de)



Temperature range	-50 ° C <	-40°C <	-25°C <	-15°C / 70°C	> +80°C
Min. bending radius for e-chain use	-	-	7,5 x d	5 x d	7,5 x d
Min. bending radius for flexible movement, following EN 60811-504	-	4 x d		4 x d	4 x d
Min. bending radius for fixed installation, following DIN EN 50305	3 x d			3 x d	3 x d

## Type Approval documentation

Test Report: TR-FO-2014-172, dated 10/Nov/2014  
 TR-FO-2014-173, dated 06/Nov/2014

Specification: igus GmbH chainflex CFLG.LB.PUR

## Tests carried out

Standard	Issued	General description	Limitation
DNVGL-CP-0417	2015-12	DNV GL Type approval program for Flexible electrical cables	
IEC 60793-2-10	2019-05	Optical fibres - Part 2-10: Product specifications - Sectional specification for category A1 multimode fibres	partly
IEC 60793-2-50	2018-12	Optical fibres - Part 2-50: Product specifications - Sectional specification for class B single-mode fibres	partly
IEC 60794-2-20	2013-11	Optical fibre cables - Part 2-20: Indoor cables - Family specification for multi-fibre optical cables	partly
IEC 60794-1-2	2021-01	Optical fibre cables - Part 1-2: Generic specification - Basic optical cable test procedures - General guidance	partly
IEC 60793-1-40	2019-03	Optical fibres - Part 1-40: Attenuation measurement methods	partly
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	

Job Id: **262.1-031962-2**  
Certificate No: **TAE000048J**

<b>Standard</b>	<b>Issued</b>	<b>General description</b>	<b>Limitation</b>
NEK TS 606	2009	Cables for offshore installations. Halogen-free and/or mud resistant. Technical specification.	Mud resistance test for cable types with PUR MUD sheath: IRM903 100°C 7d. Calcium Bromide 70°C 56d. Carbo Sea 70°C 56d.

## Marking of product

Example:

„00000”m igus chainflex CFLG.LB.PUR size CE O xxxx RoHS-II conform www.igus.de

## Place of Production

DNV GL id: 144689

## 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