

# TYPE APPROVAL CERTIFICATE

**This is to certify:****That the Flexible cable**with type designation(s)  
**CFBUS**

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 **2020-04-24**for **DNV GL**This Certificate is valid until **2025-04-23**.DNV GL local station: **Essen**Approval Engineer: **Carsten Hunsalz**

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**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.



## Product description

TPE sheathed, flame retardant chainflex bus cables for shipboard and offshore applications, especially for e-chain use

Type CFBUS

Rated voltage: 50 V  
Conductor: Fine-wired, bare copper strand  
Core design  
(Insulation / inner jacket / element shield): According to bus specification  
Overall shield: Tinned copper wires  
Outer sheath: TPE

| <u>Bus Type</u> | <u>Standard</u>  | <u>Impedance (<math>\Omega</math>)</u> |
|-----------------|--|--|
| Profibus        | IEC 61158-2  | 150                                    |
| Interbus        | IEC 61158-2  | 100                                    |
| CAN Bus         | CiA Draft recommendation 303-1<br>ISO 11898-2                          | 120                                    |
| Device Net      | Based on CAN Protocol<br>CiA Draft recommendation 303-1<br>ISO 11898-2 | 120                                    |
| CC Link         | IEC 61158-2  | 110                                    |
| Fire wire       | IEEE 1394  | 100                                    |
| Profinet        | Guideline for PROFINET<br>IEC 61156-6                                  | 100                                    |
| USB 2,0         | Universal Serial Bus Specification<br>Revision 2.0                     | 90                                     |

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:

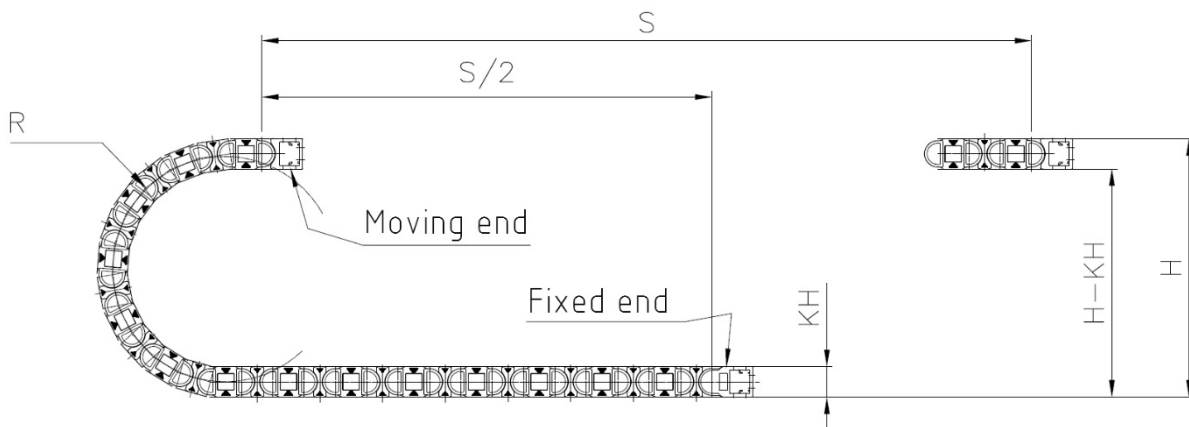
- highly bending-resistant wires
- insulation materials with low mechanical aging due to bending load
- optimized pitch lengths stranding designs
- for shielded cables, highly bending-resistant braided shields with min. 80% optical coverage

- 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)



**CFBUS .001-.035**

| Temperature range  | -50 ° C < | -45°C < | -35°C <  | -25°C / 60°C | > +70°C  |
|--|-----------|---------|----------|--------------|----------|
| Min. bending radius for e-chain use                                | -         | -       | 12,5 x d | 10 x d       | 12,5 x d |
| Min. bending radius for flexible movement, following EN 60811-504  | -         | 8 x d   |          | 8 x d        | 8 x d    |
| Min. bending radius for fixed installation, following DIN EN 50305 | 5 x d     |         |          | 5 x d        | 5 x d    |

**CFBUS .055-.070**

| Temperature range  | -50 ° C < | -45°C < | -35°C < | -25°C / 60°C | > +70°C |
|--|-----------|---------|---------|--------------|---------|
| Min. bending radius for e-chain use                                | -         | -       | 15 x d  | 12,5 x d     | 15 x d  |
| Min. bending radius for flexible movement, following EN 60811-504  | -         | 8 x d   |         | 8 x d        | 8 x d   |
| Min. bending radius for fixed installation, following DIN EN 50305 | 5 x d     |         |         | 5 x d        | 5 x d   |

**Type Approval documentation**

Test Report: No.: 78772939 dated 06.03.2014  
 78772939 / 78774222 dated 06.02.2014  
 Specification: igus GmbH chainflex CFBUS

## Tests carried out

| Standard      | Issued  | General description   | Limitation |
|---------------|---------|---|------------|
| DNVGL-CP-0417 | 2015-12 | DNV GL Type approval program for Flexible electrical cables   |            |
| UL Style      |         | 1598, 11807, 11551, 22187, 21218, 22186, 11632  |            |
| 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 |            |
| EN 50289-1-11 | 2016-12 | Communication cables Specifications for test methods Part 1-11: Electrical test methods Characteristic impedance, input impedance, return loss  |            |

## Marking of product

Example:

“00000 m” igus chainflex CFBUS size 50V  
E310776 N cRUus AWM Style xxx VW-1 AWM I/II A/B 80°C 600V  
FT1 CE N RoHS-II conform www.igus.de

## Place of Production

DNV GL id: 10384447

## 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