

# TYPE APPROVAL CERTIFICATE

This is to certify that the undernoted product(s) has/have been tested in accordance with the relevant requirements of the DNV GL Type Approval System.

Certificate No.	<b>61 937 - 14 HH</b>
Company	<b>igus GmbH</b> <b>Spicher Str. 1a</b> <b>51447 Köln, Germany</b>
Product Description	<b>TPE or PUR sheathed, flame retardant chainflex bus cables for shipboard and offshore applications, especially for e-chain use</b>
Type	<b>CFBUS; CFBUS.PUR</b>
Environmental Category	<b>None</b>
Technical Data / Range of Application	<b>Rated voltage: 50 V</b> <b>Conductor: Fine-wired, bare copper strand</b> <b>Core design (Insulation / inner jacket / element shield): According to bus specification</b> <b>Overall shield: Tinned copper wires</b> <b>Outer sheath: CFBUS: TPE; CFBUS.PUR: PUR</b> <b>Number of cores, cross-sectional area and properties according to specification no.:</b> <b>chainflex CFBUS; CFBUS.PUR</b> <b>special properties mentioned on following pages</b>
Test Standard	<b>UL 758:2013; UL 1581:2011; IEC 60332-1-2:2004; EN 50289-1-11:2011</b> <b>UL Style: 1598, 20236, 21371, 10138, 21235,</b>
Documents	<b>Test report : No.: 78772939 dated 06.03.2014</b> <b>78772939 / 78774222 dated 06.02.2014</b>
Remarks	<b>This certificate is issued on the basis of GL Guidelines for the Performance of Type Approvals, Chapter 1 - Procedure (VI-7-1), Edition 2007 and the GL Type Approval Procedure for Shipboard Cables.</b>

Valid until **2019-05-02**

Page **1** of **4**

File No. **I.N.01**

**Hamburg, 2014-11-27**

Type Approval Symbol



# TYPE APPROVAL CERTIFICATE

This is to certify that the undernoted product(s) has/have been tested in accordance with the relevant requirements of the DNV GL Type Approval System.

Certificate No. **61 937 - 14 HH**

<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 ISO 11898-2	120
Device Net	Based on CAN Protocol CiA Draft recommendation 303-1 ISO 11898-2	120
CC Link	IEC 61158-2	110
Ethernet CAT 5e	IEC 61158-2 IEC 61156-6	100
Ethernet CAT 6A	IEC 61158-2 IEC 61156-6	100
Fire wire	IEEE 1394	100
Profinet	Guideline for PROFINET IEC 61156-6	100
USB 2,0	Universal Serial Bus Specification Revision 2.0	90
DVI		100

Valid until **2019-05-02**

Page **2 of 4**

File No. **I.N.01**

**Hamburg, 2014-11-27**

Type Approval Symbol



# TYPE APPROVAL CERTIFICATE

This is to certify that the undernoted product(s) has/have been tested in accordance with the relevant requirements of the DNV GL Type Approval System.

Certificate No. **61 937 - 14 HH**

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

Apart from the qualities listed on page 1, 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)

Valid until **2019-05-02**

Page **3** of **4**

File No. **I.N.01**

**Hamburg, 2014-11-27**

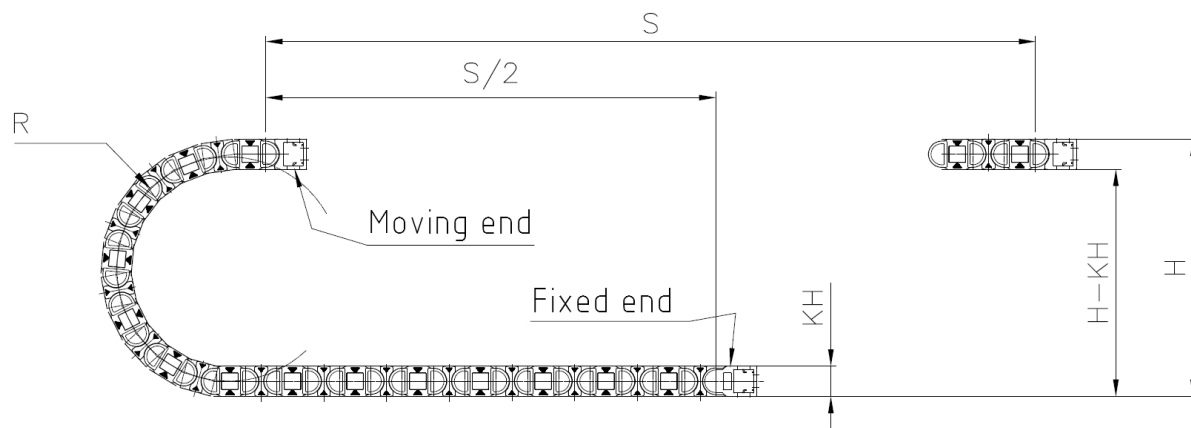
Type Approval Symbol



# TYPE APPROVAL CERTIFICATE

This is to certify that the undernoted product(s) has/have been tested in accordance with the relevant requirements of the DNV GL Type Approval System.

Certificate No. **61 937 - 14 HH**



Valid until **2019-05-02**

Page **4 of 4**

File No. **I.N.01**

**Hamburg, 2014-11-27**

Type Approval Symbol

