Certificate no.:
TAE0000515

TYPE APPROVAL CERTIFICATE

This is to certify:

that the Low Voltage Cable

with type designation(s)
HELMAKAB H-FLEX AS-i BUS cable 32V DC 2x1,5mm2 or 2x2,5mm2,
HELMAKAB H-FLEX AS-i BUS cable 48V DC 2x1,5mm2 or 2x2,5mm2,
HELMAKAB H-FLEX AS-i BUS cable 230V AC 2x1,5mm2

issued to
Helmacab Oy
Kaarina, **Finland**

is found to comply with
DNV rules for classification – Ships, offshore units, and high speed and light craft

Application:

Special cable for field instrumentation. Only to be used in connection with AS-I-bus system equipment
Products approved by this certificate are accepted for installation on all vessels classed by DNV.

Type	Rated voltage (V)	Temp. class (°C)
HELMAKAB H-FLEX AS-i BUS cable 32V DC 2x1,5mm2 or 2x2,5mm2	32V DC	70
HELMAKAB H-FLEX AS-i BUS cable 48V DC 2x1,5mm2 or 2x2,5mm2	48 V DC	70
HELMAKAB H-FLEX AS-i BUS cable 230V AC 2x1,5mm2	230 V AC	70

Issued at **Høvik** on **2025-02-06**

This Certificate is valid until **2030-02-05**.

for **DNV**

DNV local unit: **Turku FIS**

Approval Engineer: **Ivar Bull**

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 USD 300 000.

Manufactured by:
DNV ID: 10659766

Product description

Types:	HELMAKAB H-FLEX AS-i BUS cable 2x1,5mm^2 or 2x2,5mm^2
Standards	IEC 62026-2
Conductors:	Stranded copper (optional tinned) class 6
Core insulation:	HDPE according to EN 50290-2-23
Outer sheath:	Halogen free, Thermoplastic polyurethane, EN 50363-10-2/TMPU *) Sheat colours indicate voltage level: Yellow 32V, black 48V and red 230V.

Voltage:	32 V DC or 48 V DC or 230 V AC.
DC resistance 2x1,5mm^2:	13,7 ohm/km @+20°C
DC resistance 2x2,5mm^2:	8,21 ohm/km @+20°C
Capacitance (nominal value):	80 nF/km
Inductance:	0,4 - 1,3

For dimensions, current ratings and more details, please refer to technical datasheet.

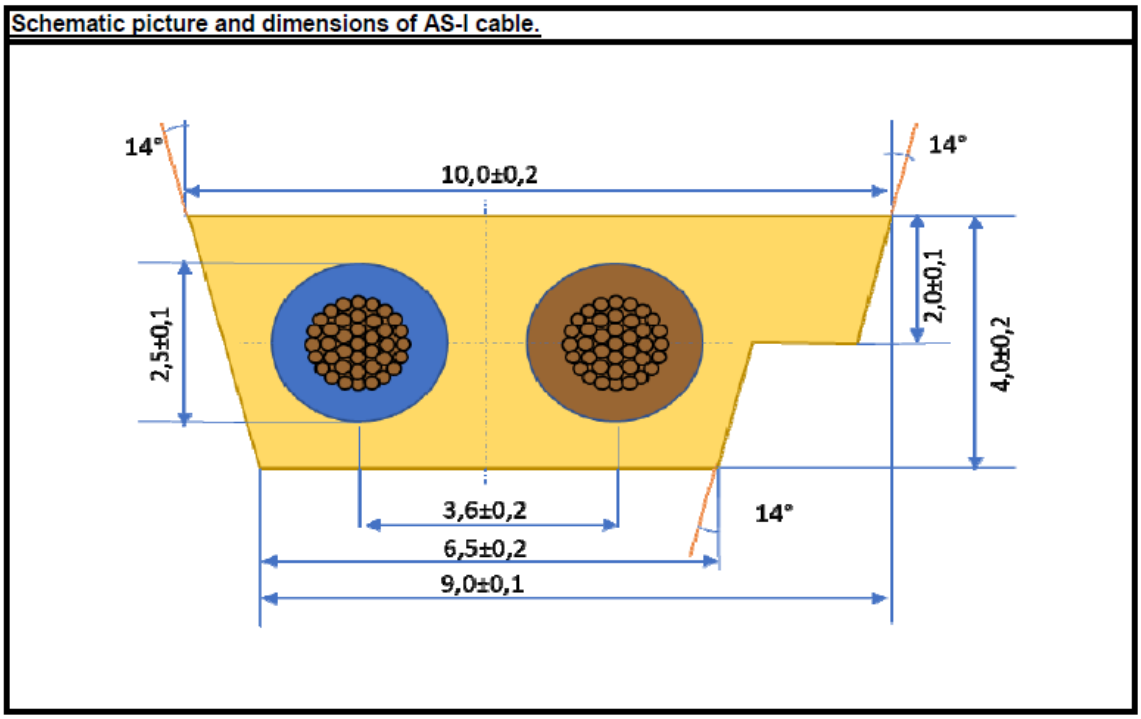
Application/Limitation
In enclosed and semi-enclosed spaces, cable runs not complying with flame retardant properties according to IEC 60332-3, shall be provided with fire stops having at least B-0 penetrations:
— at every second deck or approximately 6 metres for vertical runs
— at every 14 metres for horizontal.
(Interpretation of SOLAS Ch.II-1/45.5.2)

Special cable for field instrumentation. Only to be used in connection with AS-I-bus system equipment.
For easy and quick field installation the use of an insulation piercing connection (IEC 60352-6) is recommended. It depends on the AS-i standard cable.

*)Polyurethane (PUR) sheathed cables may be accepted for applications requiring extra wear resistance, such as moving or flexible installations. However, due to the release of poisonous gases during a fire, these cables shall only be installed on open decks or in technical rooms and must not be used in living quarters or along escape routes.

Operating Temperature: Max +70°C

Schematic picture and dimensions of AS-I cable.



Type Approval documentation

Tests carried out

Standard	Issued	General description	Limitation
IEC 62026-2	2013-04	Low-voltage switchgear and control gear – Controller-device interfaces (CDIs) – Part 2: Actuator sensor interface (AS-i)	Section 8: Constructional and performance requirements
IEC 60092-350	2020-01	Electrical installations in ships - Part 350: General construction and test methods of power, control and instrumentation cables for shipboard and offshore applications	Testing.
IEC 60332-1-2(2004) AMD1(2015)	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.	Flame retardant small scale. Distance between the lower edge of the top support and the onset of charring > 50 mm and charring not to extend downwards > 540 mm from the lower edge of the top support.
IEC 60754-1	2019-11	Test on gases evolved during combustion of materials from cables - Part 1: Determination of the halogen acid gas content	Low Halogen: <0,5% Halogen
IEC 60754-2	2019-11	Test on gases evolved during combustion of materials from cables - Part 2: Determination of acidity (by pH measurement) and conductivity	Halogen free: pH > 4,3 Conductivity < 10µS/mm
NES713	2006	Determination of the Toxicity Index of the Products of Combustion from Small Specimens	TPU jacket: Toxicity index 4.5

Marking of product

HELMACAB H-FLEX ASI BUS PUR 2x <size>mm² - IEC 60332-1-2 “LOT #####” and "length marking"

Sheat colours indicate voltage level: Yellow 32V. Black 48V. Red 230V. For safety reason red cable also has written text marking 230V. Cables with tinned conductor shall be marked on the sheath with "CuSn".

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) and selected type tests (ref. to applicable class programs) checked (if not available these tests shall 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