

TYPE APPROVAL CERTIFICATE

This is to certify:

That the **Low Voltage Cable**

with type designation(s)

**MarineCom YOZc X-FRSW 250 V,
Marine2Com YOZ2c X-FRSW 250 V,
MarineCom+ YOZc X-FRSW 250 V,
Marine2Com+ YOZ2c X-FRSW 250 V**

Issued to

**B.V. Twentsche Kabelfabriek
Haaksbergen, Netherlands**

is found to comply with

DNV GL rules for classification – Ships, offshore units, and high speed and light craft

Application :

Control and instrumentation. Fire resistant.

Products approved by this certificate are accepted for installation on all vessels classed by DNV.

Type	Rated voltage (V)	Temp. class (°C)
MarineCom YOZc X-FRSW 250 V	250	90
Marine2Com YOZ2c X-FRSW 250 V	250	90
MarineCom+ YOZc X-FRSW 250 V	250	90
Marine2Com+ YOZ2c X-FRSW 250 V	250	90

Issued at **Høvik** on **2021-04-12**

This Certificate is valid until **2026-02-27**.

for **DNV**

DNV local station: **Netherlands FIS**

Approval Engineer: **Ivar Bull**

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Marta Alonso Pontes
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.



Product description

Types: MarineCom YOZc X-FRSW 250 V c = common screen
Marine2Com YOZ2c X-FRSW 250 V 2 = individual screen
MarineCom+ YOZc X-FRSW 250 V
Marine2Com+ YOZ2c X-FRSW 250 V

Construction:

Conductors: Plain or tinned stranded copper class 2 or class 5
Core insulation: Mica tape plus XLHFFR (HF90)
Common Screen: Aluminium foil with tinned copper drain wire
Individual screen (if any): Aluminium foil with tinned copper drain wire
Inner covering: Non hygroscopic tape or Halogen free filler (+)
Metal covering: Tinned or plain copper wire braid
Outer sheath: SHF1

No of elements:	Cross sectional area [mm ²]
1 - 37 pairs	0,75 1,0 1,5 2,5
1 - 19 triples	0,75 1,0 1,5 2,5
1 quad	0,75 1,0 1,5 2,5
1 - 37 cores	0,75 1,0 1,5

Application/Limitation

This type of cable is fire resistant in accordance with IEC Publications 60331-1/2 + BS8491/EN50200 Annex E..

The requirements of SOLAS Amendments Chapter II-1, Part D, Reg. 45, 5.2 (provision to be taken to limit Fire Propagation along Bundles of Cables or Wires) are fulfilled without any additional measures.

Type Approval documentation

Tests carried out

Standard	Release	General description	Limitation
IEC 60092-350	2020-01	General construction and test methods of power, control and instrumentation cables for shipboard and offshore applications	
IEC 60092-376	2017-05	Electrical installations in ships - Part 376: Cables for control and instrumentation circuits 150/250 V (300 V)	
IEC 60092-360	2014-04	Electrical installations in ships - Part 360: Insulating and sheathing materials for shipboard and offshore units, power, control, instrumentation and telecommunication cables.	
IEC 60331-1/2	2018-03	Tests for electric cables under fire conditions - Circuit integrity - Test method for fire with shock at a temperature of at least 830 °C for cables of rated voltage up to and including 0,6/1,0 kV	Minimum 180 min+15 min cooling down time
EN50200	2016-01	Method of test for resistance to fire of unprotected small cables for use in emergency circuits. Annex E: Guidance for using optional water spray protocol. Cable outer diameter <20mm.	Cable OD≤20mm Water spray applied during last 15 minutes of test. No short circuit or earth fault.
BS 8491	2008	Method for assessment of fire integrity of large diameter power cables for use as components for smoke and heat control systems and certain other active fire safety systems	Cable OD>20mm 5 water jets each 10 seconds duration last 5 minutes of test. No short circuit or earth fault.
IEC 60332-3-22	2018-07	Tests on electric cables under fire conditions - Part 3-22: Test for vertical flame spread of vertically mounted bunched wires or cables - Category A	Charred portion of sample does not exceed 2,5m above bottom edge of burner.

Standard	Release	General description	Limitation
IEC 60754-1:2011 +AMD1:2019 CSV	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 60754-2:2011 +AMD1:2019 CSV	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
IEC 61034-1&2:2005 +AMD1:2013 +AMD2:2019CSV	2013-07 2013-09	Measurement of smoke density of cables burning under defined conditions – Test apparatus, procedure and requirements	Low smoke Light transmittance >60%
IEC 60684-2	2011-08	Flexible insulating sleeving – Part 2: Methods of test Clause 45.2 Methods of determination of low levels of fluorine	HF max 0,1% [0,02% can be detected]

Marking of product

TKF- Size – 250V MarineCom YOZc X-FRSW or Marine2Com YOZ2c X-FRSW or MarineCom+ YOZc X-FRSW or Marine2Com+ YOZ2c X-FRSW - HF - IEC60332-22 – IEC 60331-2 [180 min] /EN50200 Annex E or IEC 60331-1/ [180 min] BS8491 - Lot. No

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