

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Data transmission cables and systems

with type designation(s)

Leoni SeaLine Cat 6 / Cat 6A, Leoni SeaLine Cat 7

Issued to

LEONI Special Cables GmbH
Friesoythe, Germany

is found to comply with

DNV GL rules for classification – Ships and offshore units

Application :

Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV GL.

This Certificate is valid until **2018-12-31**.

Issued at **Hamburg** on **2016-06-29**

DNV GL local station: **Leer**

Approval Engineer: **Carsten Hunsalz**

for **DNV GL**

Duy Nam Le
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

LEONI SeaLine® Leoni part number (for example L45467-J417-C6) Cat. 6 / Cat. 6A and Cat. 7 cables

Conductor	Solid or stranded bare copper wire
Insulation	PE foam with skin
Cabling	Twisted pairs with aluminum foil and central strain relief
Metallic covering	Tinned copper wire braid (> 65 % coverage)
Inner-sheath (optional)	SHF1 (optional (if SWB or SWA))
Metallic covering (optional)	SWB - Steel wire braid (optional)
Sheath	SHF2 or SHF2 MUD

List refers to specification CAT K 07-A:

CAT 6 / CAT 6A cables:

LEONI Type Designation	AWG	mm ²	overall diameter in mm	metal covering *)	sheath material
02YSCHX 4X2X0.76/1.8-100 LI PIMF	22	0.34	10	-	SHF2
02YSCH 4X2X0.76/1.8-100 LI PIMF	22	0.34	10	-	MUD-RES
02YSCH(Z)HX 4X2X0.76/1.8-100 LI PIMF	22	0.34	12,6	SWB	SHF2
02YSCH(Z)H 4X2X0.76/1.8-100 LI PIMF	22	0.34	12,6	SWB	MUD-RES
02YSCHBH 4X2X0.76/1.8-100 LI PIMF	22	0.34	13,6	SWA	SHF2
02YSCHBH 4X2X0.76/1.8-100 LI PIMF	22	0.34	13,6	SWA	MUD-RES
02YSCHX 4X2X0.60/1.43-100 PIMF	23	0.29	8,7	-	SHF2
02YSCH 4X2X0.60/1.43-100 PIMF	23	0.29	8,7	-	MUD-RES
02YSCH(Z)HX 4X2X0.60/1.43-100 PIMF	23	0.29	11,2	SWB	SHF2
02YSCH(Z)H 4X2X0.60/1.43-100 PIMF	23	0.29	11,2	SWB	MUD-RES
02YSCHBH 4X2X0.60/1.43-100 PIMF	23	0.29	12,2	SWA	SHF2
02YSCHBH 4X2X0.60/1.43-100 PIMF	23	0.29	12,2	SWA	MUD-RES

*) SWB - Steel wire braid
SWA - Steel wire armouring

CAT 7 cables:

LEONI Type Designation	AWG	mm ²	overall diameter in mm	metal covering *)	sheath material
02YSCHX 4X2X0.76/1.8-100 LI PIMF	22	0.34	10	-	SHF2
02YSCH 4X2X0.76/1.8-100 LI PIMF	22	0.34	10	-	MUD-RES
02YSCH(Z)HX 4X2X0.76/1.8-100 LI PIMF	22	0.34	12,6	SWB	SHF2
02YSCH(Z)H 4X2X0.76/1.8-100 LI PIMF	22	0.34	12,6	SWB	MUD-RES
02YSCHBH 4X2X0.76/1.8-100 LI PIMF	22	0.34	13,6	SWA	SHF2
02YSCHBH 4X2X0.76/1.8-100 LI PIMF	22	0.34	13,6	SWA	MUD-RES
02YSCHX 4X2X0.60/1.43-100 PIMF	23	0.29	8,7	-	SHF2
02YSCH 4X2X0.60/1.43-100 PIMF	23	0.29	8,7	-	MUD-RES
02YSCH(Z)HX 4X2X0.60/1.43-100 PIMF	23	0.29	11,2	SWB	SHF2
02YSCH(Z)H 4X2X0.60/1.43-100 PIMF	23	0.29	11,2	SWB	MUD-RES
02YSCHBH 4X2X0.60/1.43-100 PIMF	23	0.29	12,2	SWA	SHF2
02YSCHBH 4X2X0.60/1.43-100 PIMF	23	0.29	12,2	SWA	MUD-RES

*) SWB - Steel wire braid
SWA - Steel wire armouring

Application/Limitation

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.

Due to the low cross section of these cables, extra precautions shall be made during installation. In order to achieve a transmission link compliant with Category 7, cables shall be installed with suitable termination equipment according to manufacturer's recommendations.

Horizontal cables Cat. 6 / 6A and 7
Flame retardant in bunch; cat A. Low smoke
Outer sheath SHF2 or SHF MUD according to NEK TS 606 Ed.4.

Type Approval documentation

datasheet	L45467-J417-C6 L45467-J417-C196 Doc. No.: L45467-j417-C16 dated 09.07.2010, updated 25.03.2013 Doc no.: L45467-j417-C26 dated 09.07.2010, updated 25.03.2013 Spezifikation_CAT K 07-A
Test reports	J415-C256 MPA dresden test report no 2012-b-3477/02 J415-C256 MPA dresden test report no 2012-b-5325/01 J415-C246 MPA dresden test report no 2012-b-3477/03 J415-C246 MPA dresden test report no 2012-b-5326/01 DNV type test _29052013 _ 22AWG cat7 SHF2 Mud-res.pdf (3971-13) Type test ECCOH 5806 Mud-res.pdf Test specification F45052-F5600

Tests carried out

Standard	Release	General description	Limitation
DNV TAP 6-800 App. A; 827.50-2	2010	DNV Type approval program for data communication cables	Ref. IEC 61156-5 standard Category 6 and 7.
IEC 61156-5	2009-05	Multicore and symmetrical pair/quad cables for digital communications – Part 5: Symmetrical pair/quad cables with transmission characteristics up to 1 000 MHz – Horizontal floor wiring – Sectional specification	Reference to requirement for category cable: 6 (250MHz), 7 (600MHz),
IEC 60332-3-22	2009-02	Tests on electric and optical fibre cables under fire conditions – Part 3-22: Test for vertical flame spread of vertically-mounted bunched wires or cables – Category A	Bunch test Category A
IEC 60332-3-24	2010-08	Tests on electric cables under fire conditions - Part 3-24: Test for vertical flame spread of vertically-mounted bunched wires or cables	Bunch test Category C
IEC 60754-1	2011-11	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	2011-11	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	2005-04	Measurement of smoke density of cables burning under defined conditions – Test apparatus, procedure and requirements	Low smoke Light transmittance >60%

Job Id: **262.1-023051-1**
Certificate No: **TAE000018F**

Standard	Release	General description	Limitation
NEK 606 Ed. 4	2009-05	Cables for offshore installations. Halogen-free and/or mud resistant. Technical specification.	Mud resistance test for cable types with SHF2 MUD sheath: IRM903 100°C 7d. Calcium Bromide 70°C 56d. Carbo Sea 70°C 56d.

Marking of product

"sequential length in meter" * LEONI L SeaLine® * Leoni part number * Type designation CAT6 or CAT 6A or CAT7 IEC 60332-3-22 SHF2 or MUD RES * "internal order number"

Example:

00020m * LEONI L SeaLine® * L45467-J417-C116 * 02YSCHX 4X2X0.76/1.8-100 LI PIMF CAT6 IEC 60332-3-22 SHF2 * 130180

Periodical assessment

The scope of the Periodical assessment is to verify that the conditions stipulated for the Type approval is complied with and that no alterations are made to the product design or choice of materials.

The main elements of the survey are:

- Inspection on factory samples, selected at random from the production line (where practicable)
- Results from Production Sample Tests (PST) and Routine Tests (RT) checked
- (if RT- and PST-test reports are not available, tests according to PST and RT to be carried out)
- Review of type approval documentation
- Review of possible change in design, materials and performance
- Ensure traceability between manufacturer's product type marking and Type Approval Certificate.

Survey shall be performed at least every second year.

END OF CERTIFICATE