

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Data transmission cables and systems

with type designation(s)

**Leoni SeaLine Cat 5e (FE90) (PH120), Leoni SeaLine Cat 6 / Cat 6A (FE90) (PH120),
Leoni SeaLine Cat 7 (FE90) (PH120), The Data transmission cables and systems are with
functional integrity during fire**

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 **2021-07-31**.

Issued at **Hamburg** on **2016-08-01**

DNV GL local station: **Leer**

for **DNV GL**

Approval Engineer: **Carsten Hunsalz**

**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-J416-C516)
Cat. 5e, Cat. 6 / Cat. 6A and Cat. 7 cables

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

List refers to specification Version 2016-06-07 / F45052-F6400:

CAT 5e:

LEONI Type Designation	AWG	mm ²	overall diameter in mm	metal covering *)	sheath material
02YS(FE)C(FE)H 4X2X0.75/2.0-100 LI PIMF	22	0.34	12.6	-	SHF1
02YS(FE)C(FE)H(Z)H 4X2X0.75/2.0-100 LI PIMF	22	0.34	15.0	SWB	SHF1
02YS(FE)C(FE)HBH 4X2X0.75/2.0-100 LI PIMF	22	0.34	16.0	SWA	SHF1
02YS(FE)C(FE)H 4X2X0.6/1.67-100 PIMF	23	0.29	10.4	-	SHF1
02YS(FE)C(FE)H(Z)H 4X2X0.60/1.67-100 PIMF	23	0.29	13.2	SWB	SHF1
02YS(FE)C(FE)HBH 4X2X0.60/1.67-100 PIMF	23	0.29	14.2	SWA	SHF1
02YS(FE)C(FE)H 4X2X0.7/1.8-100 PIMF	23	0.27	11.2	-	SHF1
02YS(FE)C(FE)H(Z)H 4X2X0.7/1.8-100 PIMF	23	0.27	14.0	SWB	SHF1
02YS(FE)C(FE)HBH 4X2X0.7/1.8-100 PIMF	23	0.27	15.0	SWA	SHF1

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

CAT 6 / CAT 6A cables:

LEONI Type Designation	AWG	mm ²	overall diameter in mm	metal covering *)	sheath material
02YS(FE)C(FE)H 4X2X0.75/2.0-100 LI PIMF	22	0.34	12.6	-	SHF1
02YS(FE)C(FE)H(Z)H 4X2X0.75/2.0-100 LI PIMF	22	0.34	15.0	SWB	SHF1
02YS(FE)C(FE)HBH 4X2X0.75/2.0-100 LI PIMF	22	0.34	16.0	SWA	SHF1
02YS(FE)C(FE)H 4X2X0.6/1.67-100 PIMF	23	0.29	10.4	-	SHF1
02YS(FE)C(FE)H(Z)H 4X2X0.60/1.67-100 PIMF	23	0.29	13.2	SWB	SHF1
02YS(FE)C(FE)HBH 4X2X0.60/1.67-100 PIMF	23	0.29	14.2	SWA	SHF1
02YS(FE)C(FE)H 4X2X0.7/1.8-100 PIMF	23	0.27	11.2	-	SHF1
02YS(FE)C(FE)H(Z)H 4X2X0.7/1.8-100 PIMF	23	0.27	14.0	SWB	SHF1
02YS(FE)C(FE)HBH 4X2X0.7/1.8-100 PIMF	23	0.27	15.0	SWA	SHF1

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

CAT 7 cables:

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LEONI Type Designation	AWG	mm ²	overall diameter in mm	metal covering *)	sheath material
02YS(FE)C(FE)H 4X2X0.75/2.0-100 LI PIMF	22	0.34	12.6	-	SHF1
02YS(FE)C(FE)H(Z)H 4X2X0.75/2.0-100 LI PIMF	22	0.34	15.0	SWB	SHF1
02YS(FE)C(FE)HBH 4X2X0.75/2.0-100 LI PIMF	22	0.34	16.0	SWA	SHF1
02YS(FE)C(FE)H 4X2X0.6/1.67-100 PIMF	23	0.29	10.4	-	SHF1
02YS(FE)C(FE)H(Z)H 4X2X0.60/1.67-100 PIMF	23	0.29	13.2	SWB	SHF1
02YS(FE)C(FE)HBH 4X2X0.60/1.67-100 PIMF	23	0.29	14.2	SWA	SHF1
02YS(FE)C(FE)H 4X2X0.7/1.8-100 PIMF	23	0.27	11.2	-	SHF1
02YS(FE)C(FE)H(Z)H 4X2X0.7/1.8-100 PIMF	23	0.27	14.0	SWB	SHF1
02YS(FE)C(FE)HBH 4X2X0.7/1.8-100 PIMF	23	0.27	15.0	SWA	SHF1

*) 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 5, 6 and 7, cables shall be installed with suitable termination equipment according to manufacturer's recommendations.

This cable is fire resistant according to IEC 60331-23.

Horizontal cables Cat.5e, Cat. 6 / 6A and 7
Flame retardant in bunch; Cat A. Low smoke
Outer sheath SHF1

Type Approval documentation

Specification: Version 2016-06-07 / F45052-F6400

Test Report: LEONI Type Approval Test Report, dated 2016-06-12, 2016-03-08/07/01, 2013-07-01
MPA 20160420/01, 20160421/01/02/03/04/13, 20160222/01, 20151313/01/02/03, 20150889, 2011-B-0317, 2012-B-5326/03/04/06/07
LABCO 16-0138 Index 0, 16-0216 Index 1
VDE 111109-9021-0001/215128, 2015-10-26
VDE 111109-9021-0001/134352, 2010-07-14
VDE 111109-9021-0001/223510, 2016-04-06
VDE 111109-9021-0001/183980, 2013-07-18
VDE 217674-CC4-1, 2015-12-11

Tests carried out

Standard	Release	General description	Limitation
DNVGL-CP-0403	2015-12	DNV GL Type approval program for data communication cables – category cables	Ref. IEC 61156-5 standard Category 5, 6 and 7.

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Standard	Release	General description	Limitation
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: 5 (100MHz), 6 (250/500MHz), 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 60331-23	1999-04	Tests for electric cables under fire conditions – Circuit integrity – Part 23: Procedures and requirements –Electric data cables	180 minutes flame application + 15 minutes cooling down.
EN 50200	2015-12	Method of test for resistance to fire of unprotected small cables for use in emergency circuits	180 minutes flame application
EN 50289-4-16	2012-08	Communication cables - Specifications for test methods - Part 4-16: Environmental test methods - Circuit integrity under fire conditions	180 minutes flame application
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	2013-07/09	Measurement of smoke density of cables burning under defined conditions – Test apparatus, procedure and requirements	Low smoke

Transmission properties during fire

Cable Category without fire influence	Transmission performance during fire
5e	Category 5e
6	Category 6
6A	Category 6A
7	Category 6A

Marking of product

“sequential length in meter” * LEONI L SeaLine® * Leoni part number * Type designation
CAT5e or CAT6 or CAT 6A or CAT7 FIRE RESISTANT FE90 IEC 60331-23 * IEC 60332-3-22 SHF1 *
“internal order number”

Example:

00020m * LEONI L SeaLine® * L45467-J416-C516 * 02YS(FE)C(FE)H 4X2X0.60/1.67-100 PIMF CAT7
FIRE RESISTANT FE90 IEC 60331-23 * IEC 60332-3-22 SHF1 * 130180

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:



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- 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.

Assessment to be performed at least every second year.

END OF CERTIFICATE