

TYPE APPROVAL CERTIFICATE

This is to certify:**That the Low Voltage Cable**with type designation(s)
EXI, EXI-S, EXI(C), EXI(I), EXI(I/C)

Issued to

Kukdong Electric Wire Co., Ltd.
Jincheon-gun, Chungcheongbuk-do, Korea

is found to comply with

DNV GL rules for classification – Ships, offshore units, and high speed and light craft
IEC 60092-376 (2017-05)**Application :****Instrumentation and communication. Fire resistant. Flame retardant. Halogen free. Low smoke. Cold bend(-40°C)/Cold impact(-35°C)****Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV GL.****Rated voltage (V) 250****Temp. class (°C) 90**Issued at **Busan** on **2018-05-17**This Certificate is valid until **2022-06-30**.for **DNV GL**DNV GL local station: **Seoul**Approval Engineer: **Eun Jin Lee**

Michael Jost Auf der Stroth
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

Type EXI, EXI-S, EXI(C), EXI(I), EXI(I/C) 250 V

Conductors : Stranded tinned annealed copper conductor, Class 2
Insulation : HEPR + Mica
Screen : Tinned annealed copper wire braid ('-S' type only)
AL/PS mylar tape with drain wire (individual(I) / common screen(C) only)
Outer sheath : SHF1

Number of cores x conductor cross-section mm ²	Number of cores x conductor cross-section mm ²	Number of cores x conductor cross-section mm ²	Number of cores x conductor cross-section mm ²
EXI, EXI(C)	14 x 2 x 0,75	24 x 2 x 1,5	37 x 3 x 1,0
2 x 1,0	15 x 2 x 0,75	27 x 2 x 1,5	48 x 3 x 1,0
3 x 1,0	19 x 2 x 0,75	30 x 2 x 1,5	
4 x 1,0	20 x 2 x 0,75	33 x 2 x 1,5	1 x 3 x 1,5
5 x 1,0	24 x 2 x 0,75	37 x 2 x 1,5	2 x 3 x 1,5
7 x 1,0	27 x 2 x 0,75	48 x 2 x 1,5	3 x 3 x 1,5
9 x 1,0	30 x 2 x 0,75		4 x 3 x 1,5
12 x 1,0	33 x 2 x 0,75	1 x 3 x 0,75	5 x 3 x 1,5
16 x 1,0	37 x 2 x 0,75	2 x 3 x 0,75	7 x 3 x 1,5
19 x 1,0	48 x 2 x 0,75	3 x 3 x 0,75	10 x 3 x 1,5
23 x 1,0		4 x 3 x 0,75	12 x 3 x 1,5
27 x 1,0	1 x 2 x 1,0	5 x 3 x 0,75	14 x 3 x 1,5
33 x 1,0	2 x 2 x 1,0	7 x 3 x 0,75	15 x 3 x 1,5
37 x 1,0	3 x 2 x 1,0	10 x 3 x 0,75	19 x 3 x 1,5
44 x 1,0	4 x 2 x 1,0	12 x 3 x 0,75	20 x 3 x 1,5
77 x 1,0	5 x 2 x 1,0	14 x 3 x 0,75	24 x 3 x 1,5
	7 x 2 x 1,0	15 x 3 x 0,75	27 x 3 x 1,5
EXI-S	10 x 2 x 1,0	19 x 3 x 0,75	30 x 3 x 1,5
2 x 1,0	12 x 2 x 1,0	20 x 3 x 0,75	33 x 3 x 1,5
3 x 1,0	14 x 2 x 1,0	24 x 3 x 0,75	37 x 3 x 1,5
4 x 1,0	15 x 2 x 1,0	27 x 3 x 0,75	48 x 3 x 1,5
5 x 1,0	19 x 2 x 1,0	30 x 3 x 0,75	
7 x 1,0	20 x 2 x 1,0	33 x 3 x 0,75	EXI(I)
9 x 1,0	24 x 2 x 1,0	37 x 3 x 0,75	/EXI(I/C)
12 x 1,0	27 x 2 x 1,0	48 x 3 x 0,75	1 x 2 x 0,75
16 x 1,0	30 x 2 x 1,0		2 x 2 x 0,75
19 x 1,0	33 x 2 x 1,0	1 x 3 x 1,0	3 x 2 x 0,75
23 x 1,0	37 x 2 x 1,0	2 x 3 x 1,0	4 x 2 x 0,75
27 x 1,0	48 x 2 x 1,0	3 x 3 x 1,0	5 x 2 x 0,75
33 x 1,0		4 x 3 x 1,0	7 x 2 x 0,75
37 x 1,0	1 x 2 x 1,5	5 x 3 x 1,0	10 x 2 x 0,75
44 x 1,0	2 x 2 x 1,5	7 x 3 x 1,0	12 x 2 x 0,75
77 x 1,0	3 x 2 x 1,5	10 x 3 x 1,0	14 x 2 x 0,75
	4 x 2 x 1,5	12 x 3 x 1,0	15 x 2 x 0,75
EXI(C)	5 x 2 x 1,5	14 x 3 x 1,0	19 x 2 x 0,75
1 x 2 x 0,75	7 x 2 x 1,5	15 x 3 x 1,0	20 x 2 x 0,75
2 x 2 x 0,75	10 x 2 x 1,5	19 x 3 x 1,0	24 x 2 x 0,75
3 x 2 x 0,75	12 x 2 x 1,5	20 x 3 x 1,0	27 x 2 x 0,75
4 x 2 x 0,75	14 x 2 x 1,5	24 x 3 x 1,0	30 x 2 x 0,75
5 x 2 x 0,75	15 x 2 x 1,5	27 x 3 x 1,0	33 x 2 x 0,75
7 x 2 x 0,75	19 x 2 x 1,5	30 x 3 x 1,0	37 x 2 x 0,75
10 x 2 x 0,75	20 x 2 x 1,5	33 x 3 x 1,0	48 x 2 x 0,75
12 x 2 x 0,75			

Number of cores x conductor cross-section mm ²
1 x 2 x 1,0
2 x 2 x 1,0
3 x 2 x 1,0
4 x 2 x 1,0
5 x 2 x 1,0
7 x 2 x 1,0
10 x 2 x 1,0
12 x 2 x 1,0
14 x 2 x 1,0
15 x 2 x 1,0
19 x 2 x 1,0
20 x 2 x 1,0
24 x 2 x 1,0
27 x 2 x 1,0
30 x 2 x 1,0
33 x 2 x 1,0
37 x 2 x 1,0
48 x 2 x 1,0
1 x 2 x 1,5
2 x 2 x 1,5
3 x 2 x 1,5

Number of cores x conductor cross-section mm ²
4 x 2 x 1,5
5 x 2 x 1,5
7 x 2 x 1,5
10 x 2 x 1,5
12 x 2 x 1,5
14 x 2 x 1,5
15 x 2 x 1,5
19 x 2 x 1,5
20 x 2 x 1,5
24 x 2 x 1,5
27 x 2 x 1,5
30 x 2 x 1,5
33 x 2 x 1,5
37 x 2 x 1,5
48 x 2 x 1,5
1 x 3 x 0,75
2 x 3 x 0,75
3 x 3 x 0,75
4 x 3 x 0,75
5 x 3 x 0,75
7 x 3 x 0,75
10 x 3 x 0,75
12 x 3 x 0,75

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14 x 3 x 0,75
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5 x 3 x 1,0
7 x 3 x 1,0
10 x 3 x 1,0
12 x 3 x 1,0
14 x 3 x 1,0
15 x 3 x 1,0
19 x 3 x 1,0
20 x 3 x 1,0
24 x 3 x 1,0

Number of cores x conductor cross-section mm ²
27 x 3 x 1,0
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37 x 3 x 1,0
48 x 3 x 1,0
1 x 3 x 1,5
2 x 3 x 1,5
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19 x 3 x 1,5
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24 x 3 x 1,5
27 x 3 x 1,5
30 x 3 x 1,5
33 x 3 x 1,5
37 x 3 x 1,5
48 x 3 x 1,5

Application/Limitation

This type of cable is fire resistant in accordance with IEC Publication 60331.

The requirement of SOLAS Chapter II-1 Part D Reg. 45, 5.2 to limit Fire Propagation along Bunches of Cables or Wires are fulfilled without any additional measures.

Type Approval documentation

Tests carried out

Standard	Release	General description	Limitation
IEC 60092-350	2014-08	General construction and test methods of power, control and instrumentation cables for shipboard and offshore applications	
IEC 60092-376	2017-05	Cables for control and instrumentation circuits 150/250V(300V)	
IEC 60092-360	2014-04	Insulating and sheathing materials for shipboard and offshore units, power, control, instrumentation, telecommunication cables	
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

Job Id: **262.1-013626-2**
Certificate No: **TAE00002UJ**

Standard	Release	General description	Limitation
IEC 60331-21	1999-04	Tests for electric cables under fire conditions – Circuit integrity – Part 21: Procedures and requirements – Cables of rated voltage up to 0,6/1,0 kV	@ 750 °C/90 min. test
IEC 60331-1/-2	2009-05	Fire resistance / Circuit integrity – Test method for fire <i>with shock</i> at temperature of at least 830°C for cables rated up to and including 0,6/1 kV	@ 830 °C w/shock (120)
IEC 60684-2	2011-08	Flexible insulating sleeving – Part 2: Methods of test.	Fluorine content <0,1%
IEC 60754-1	2011	Test on gases evolved during combustion of materials from cables – Determination of the amount of halogen acid gas	Low Halogen <0,5%
IEC 60754-2	2011	Test on gases evolved during combustion of materials from cables – Determination of the degree of acidity of gases evolved during the combustion of materials taken from electric cables by measuring pH and conductivity	Halogen free ≥4,3pH, ≤10μS/mm
IEC 61034-1/2	2013-06	Measurement of smoke density of cables burning under defined conditions – Test apparatus, procedure and requirements	Low smoke >60%
CSA C22.2 No. 03	2009-09	5.11 Flexibility at any specified temperature	Cold bend: -40°C
CSA C22.2 No. 03	2009-09	5.12 Abnormal low temperature – impact	Cold impact: -35°C

Marking of product

250 V – EXI or EXI-S or EXI(C) or EXI(I) or EXI(I/C) – Size – Kukdong – IEC 60332-3 Cat.A – IEC 60331(120) – Year of manufacture – Length

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