

TYPE APPROVAL CERTIFICATE

This is to certify:**That the Electric Power Cable**

with type designation(s)

TP(OS)PNBS & TP(OBS)PNBS & TP(IS)PNBS & TP(IS-OS)PNBS & TT(OS)PNBS & TT(IS-OS)PNBS 0,6/1 kV

Issued to

TMC Co., Ltd
CHUNGNAM, Republic of Korea

is found to comply with

Det Norske Veritas' Rules for Classification of Ships, High Speed & Light Craft and Det Norske Veritas' Offshore Standards**IEEE 1580 (2010)****IEC 60332-3-22 (2009-02)****Application :****Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV GL.****Voltage class (kV) 0,6/1****Temp. class (°C) 100/110**This Certificate is valid until **2019-11-30**.Issued at **Busan** on **2015-12-01**for **DNV GL**DNV GL local station: **Seoul**Approval Engineer: **Eun Sook Kim**

Baeg Soon Choi
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: TP(OS)PNBS & TP(OBS)PNBS & TP(IS)PNBS & TP(IS-OS)PNBS & TT(OS)PNBS & TT(IS-OS)PNBS 0,6/1 kV

Construction: Tinned, flexible stranded copper

Conductors: XLPO (Type P & X110)

Core insulation: AL/PS tape + tinned copper drain wire (OS) & (IS) & (IS-OS) or Tinned copper wire braid (OBS)

Screening: Type N

Inner sheath: Bronze wire braid

Metal covering: Type N

Outer sheath:

Number of cores x conductor cross-section	Overall Diameter Approx.	Overall Diameter Approx.
AWG/MCM	mm	inches
TP(OS)PNBS		
2 x 2 x 18	17,7	0,697
3 x 2 x 18	19,3	0,760
4 x 2 x 18	20,2	0,795
5 x 2 x 18	23,0	0,906
7 x 2 x 18	24,2	0,953
8 x 2 x 18	25,3	0,996
10 x 2 x 18	28,7	1,130
12 x 2 x 18	29,6	1,165
14 x 2 x 18	30,5	1,201
16 x 2 x 18	32,4	1,276
19 x 2 x 18	33,5	1,319
24 x 2 x 18	37,0	1,457
2 x 2 x 16	18,3	0,720
3 x 2 x 16	19,9	0,783
4 x 2 x 16	20,8	0,819
5 x 2 x 16	23,8	0,937
7 x 2 x 16	25,0	0,984
8 x 2 x 16	26,2	1,031
10 x 2 x 16	29,8	1,173
12 x 2 x 16	30,7	1,209
14 x 2 x 16	31,8	1,252
16 x 2 x 16	33,6	1,323
19 x 2 x 16	34,9	1,374
24 x 2 x 16	38,5	1,516
2 x 2 x 14	20,2	0,795
3 x 2 x 14	22,4	0,882
4 x 2 x 14	23,4	0,921
5 x 2 x 14	25,4	1,000
7 x 2 x 14	26,8	1,055
8 x 2 x 14	29,3	1,154
10 x 2 x 14	32,2	1,268
12 x 2 x 14	33,2	1,307
14 x 2 x 14	34,3	1,350
16 x 2 x 14	36,3	1,429
19 x 2 x 14	37,7	1,484
24 x 2 x 14	43,3	1,705
TP(OBS)PNBS		

Number of cores x conductor cross-section	Overall Diameter Approx.	Overall Diameter Approx.
AWG/MCM	mm	inches
1 x 2 x 18	14,6	0,575
2 x 2 x 18	19,5	0,768
4 x 2 x 18	22,4	0,882
7 x 2 x 18	25,4	1,000
9 x 2 x 18	29,4	1,157
10 x 2 x 18	30,0	1,181
14 x 2 x 18	32,1	1,264
15 x 2 x 18	32,7	1,287
1 x 2 x 16	14,8	0,583
2 x 2 x 16	20,0	0,787
4 x 2 x 16	23,0	0,906
7 x 2 x 16	26,2	1,031
8 x 2 x 16	28,6	1,126
9 x 2 x 16	30,5	1,201
10 x 2 x 16	31,1	1,224
12 x 2 x 16	32,4	1,276
14 x 2 x 16	33,4	1,315
15 x 2 x 16	34,0	1,339
TP(IS)PNBS		
1 x 2 x 18	14,1	0,555
2 x 2 x 18	18,4	0,724
3 x 2 x 18	20,1	0,791
4 x 2 x 18	22,1	0,870
5 x 2 x 18	24,0	0,945
6 x 2 x 18	25,2	0,992
7 x 2 x 18	25,2	0,992
8 x 2 x 18	26,5	1,043
10 x 2 x 18	30,1	1,185
12 x 2 x 18	31,2	1,228
14 x 2 x 18	32,2	1,268
16 x 2 x 18	34,0	1,339
18 x 2 x 18	35,3	1,390
20 x 2 x 18	35,9	1,413
24 x 2 x 18	39,0	1,535
1 x 2 x 16	14,4	0,567
2 x 2 x 16	19,7	0,776
3 x 2 x 16	20,7	0,815
4 x 2 x 16	22,8	0,898

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Number of cores x conductor cross-section	Overall Diameter Approx.	Overall Diameter Approx.
AWG/MCM	mm	inches
5 x 2 x 16	24,8	0,976
6 x 2 x 16	26,1	1,028
7 x 2 x 16	26,1	1,028
8 x 2 x 16	28,5	1,122
10 x 2 x 16	31,3	1,232
12 x 2 x 16	32,3	1,272
14 x 2 x 16	33,3	1,311
16 x 2 x 16	35,3	1,390
18 x 2 x 16	36,6	1,441
20 x 2 x 16	37,3	1,469
24 x 2 x 16	40,6	1,598
1 x 2 x 14	15,1	0,594
2 x 2 x 14	20,9	0,823
3 x 2 x 14	23,1	0,909
4 x 2 x 14	24,2	0,953
5 x 2 x 14	26,4	1,039
6 x 2 x 14	29,0	1,142
7 x 2 x 14	29,0	1,142
8 x 2 x 14	30,5	1,201
10 x 2 x 14	33,6	1,323
12 x 2 x 14	34,7	1,366
14 x 2 x 14	35,8	1,409
16 x 2 x 14	38,0	1,496
18 x 2 x 14	39,4	1,551
20 x 2 x 14	40,2	1,583
24 x 2 x 14	45,3	1,783
TP(IS-OS) PNBS		
2 x 2 x 18	18,5	0,728
3 x 2 x 18	20,2	0,795
4 x 2 x 18	22,2	0,874
5 x 2 x 18	24,1	0,949
6 x 2 x 18	25,3	0,996
7 x 2 x 18	25,3	0,996
8 x 2 x 18	26,6	1,047
10 x 2 x 18	30,2	1,189
12 x 2 x 18	31,3	1,232
14 x 2 x 18	32,3	1,272
16 x 2 x 18	34,1	1,343
18 x 2 x 18	35,4	1,394
20 x 2 x 18	36,0	1,417
24 x 2 x 18	39,1	1,539
2 x 2 x 16	19,8	0,780
3 x 2 x 16	20,8	0,819
4 x 2 x 16	22,9	0,902
5 x 2 x 16	24,9	0,980
6 x 2 x 16	26,2	1,031
7 x 2 x 16	26,2	1,031
8 x 2 x 16	28,6	1,126
10 x 2 x 16	31,4	1,236

Number of cores x conductor cross-section	Overall Diameter Approx.	Overall Diameter Approx.
AWG/MCM	mm	inches
12 x 2 x 16	32,4	1,276
14 x 2 x 16	33,4	1,315
16 x 2 x 16	35,4	1,394
18 x 2 x 16	36,7	1,445
20 x 2 x 16	37,4	1,472
24 x 2 x 16	40,7	1,602
2 x 2 x 14	22,1	0,870
3 x 2 x 14	23,2	0,913
4 x 2 x 14	24,3	0,957
5 x 2 x 14	26,5	1,043
6 x 2 x 14	29,1	1,146
7 x 2 x 14	29,1	1,146
8 x 2 x 14	30,6	1,205
10 x 2 x 14	33,7	1,327
12 x 2 x 14	34,8	1,370
14 x 2 x 14	35,9	1,413
16 x 2 x 14	38,1	1,500
18 x 2 x 14	39,5	1,555
20 x 2 x 14	40,3	1,587
24 x 2 x 14	45,4	1,787
TT(OS)PNBS		
1 x 3 x 18	14,4	0,567
2 x 3 x 18	20,1	0,791
3 x 3 x 18	22,1	0,870
4 x 3 x 18	23,6	0,929
5 x 3 x 18	25,3	0,996
7 x 3 x 18	28,8	1,134
8 x 3 x 18	30,3	1,193
12 x 3 x 18	34,9	1,374
16 x 3 x 18	37,9	1,492
1 x 3 x 16	14,8	0,583
2 x 3 x 16	20,7	0,815
3 x 3 x 16	22,8	0,898
4 x 3 x 16	24,3	0,957
5 x 3 x 16	26,2	1,031
7 x 3 x 16	29,9	1,177
8 x 3 x 16	31,5	1,240
12 x 3 x 16	36,3	1,429
16 x 3 x 16	39,4	1,551
1 x 3 x 14	15,6	0,614
2 x 3 x 14	23,2	0,913
3 x 3 x 14	24,2	0,953
4 x 3 x 14	26,0	1,024
5 x 3 x 14	29,2	1,150
7 x 3 x 14	32,1	1,264
8 x 3 x 14	33,9	1,335
12 x 3 x 14	39,2	1,543
16 x 3 x 14	44,2	1,740
TT(IS-OS) PNBS		

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Number of cores x conductor cross-section	Overall Diameter Approx.	Overall Diameter Approx.
AWG/MCM	mm	inches
2 x 3 x 18	20,6	0,811
3 x 3 x 18	22,6	0,890
4 x 3 x 18	24,2	0,953
5 x 3 x 18	26,1	1,028
7 x 3 x 18	29,7	1,169
8 x 3 x 18	31,4	1,236
12 x 3 x 18	36,1	1,421
16 x 3 x 18	39,3	1,547
2 x 3 x 16	22,3	0,878
3 x 3 x 16	23,3	0,917
4 x 3 x 16	25,0	0,984
5 x 3 x 16	27,0	1,063

Number of cores x conductor cross-section	Overall Diameter Approx.	Overall Diameter Approx.
AWG/MCM	mm	inches
7 x 3 x 16	30,7	1,209
8 x 3 x 16	32,5	1,280
12 x 3 x 16	37,5	1,476
16 x 3 x 16	40,8	1,606
2 x 3 x 14	23,7	0,933
3 x 3 x 14	24,8	0,976
4 x 3 x 14	26,6	1,047
5 x 3 x 14	29,9	1,177
7 x 3 x 14	33,1	1,303
8 x 3 x 14	34,9	1,374
12 x 3 x 14	40,4	1,591
16 x 3 x 14	45,5	1,791

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 Bunches of Cables or Wires) are fulfilled without any additional measures.

Type Approval documentation

Tests carried out

Type test according to IEEE 1580, IEEE 1202, UL 1309 and IEC 60332-3-22.

Marking of product

TMC – TP(OS)PNBS or TP(OBS)PNBS or TP(IS)PNBS or TP(IS-OS)PNBS or TT(OS)PNBS or TT(IS-OS)PNBS – Size – 0,6/1 kV

Periodical assessment

The scope of the retention/renewal survey 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 Routines (RT) checked (if 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
- Ensuring traceability between manufacturer's product type marking and Type Approval Certificate.

Survey to be performed at least every second year.

END OF CERTIFICATE