DNV·GL

TYPE APPROVAL CERTIFICATE

Certificate No:
TAE00000GF
Revision No:
3

This is to certify:

That the Data transmission cables and systems

with type designation(s)
MGD Cat 3, MGD Cat 5, Cat 5e, MGD cat 6, Cat 6A, MGD cat 7, Cat 7A, MGD 1200MHz

Issued to
TELDOR Cables & Systems Ltd.
Israel, **Israel**

is found to comply with
DNV GL rules for classification – Ships, offshore units, and high speed and light craft

Application :

Cable suitable for horizontal floor wiring. Armoured.
Products approved by this certificate are accepted for installation on all vessels classed by DNV GL.

Issued at **Høvik** on **2019-11-21**

This Certificate is valid until **2024-09-26**.
DNV GL local station: **Haifa**

Approval Engineer: **Ivar Bull**

for **DNV GL**
Digitally Signed By: Low, Hanwee
Location: DNV GL Høvik, Norway
on behalf of

Trond Sjåvåg
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

MGD solid cables.
Cables suitable for horizontal floor wiring between work area communication outlet and communication closet.

Cable types	Design standards	Cross section	Conductor type ref IEC 60228	Shielding
MGD cat 3, 5	IEC 61156-2	24 AWG(0.204mm^2)	Solid class 1	F/UTP, U/FTP, F/FTP, S/FTP, SF/UTP, SF/FTP
MGD cat 5e	IEC 61156-5	24 AWG(0.204mm^2)	Solid class 1	F/UTP, U/FTP, F/FTP, S/FTP, SF/UTP, SF/FTP
MGD cat 6	IEC 61156-5	23 AWG(0.246mm^2) 22 AWG(0.324mm^2)	Solid class 1	F/UTP, U/FTP, F/FTP, S/FTP, SF/UTP, SF/FTP
MGD cat 6A, 7, 7A	IEC 61156-5	23 AWG(0.246mm^2) 22 AWG(0.324mm^2)	Solid class 1	U/FTP, F/FTP, S/FTP, SF/FTP
MGD 1200MHz	IEC 61156-7	23 AWG(0.246mm^2) 22 AWG(0.324mm^2)	Solid class 1	U/FTP, F/FTP, S/FTP, SF/FTP

Construction

Conductor	Bare annealed copper or tinned annealed copper class 1
Insulation	Solid /cellular Polyolefin
Individual screen	*/FTP cables have individual foil screen
Common screen	S/*TP cables have a common braid screen F/*TP cables have a common foil screen SF/*TP cables have a common foil screen and a braid screen
Inner sheath	SHF1 or SHF2
Metallic covering	B: braided galvanized steel wire R: corrugated steel tape W: served steel wire P: Bronze wire braid C: Copper wire braid T: Tinned copper wire braid
Outer sheath	SHF1 or SHF2 or SHF2 MUD, single or double layer.

Optional Constructions:
- Cat3 to Cat 5e cables:
  - Single cables: 4-25 Pair cables
  - Multi cables: 2-12 cores or jacketed cables cabled together
- Cat 6 to 1200MHz Cables:
  - Single cables: 4 Pair cables
  - Multi cables: 2-12 cores or jacketed cables cabled together

Electrical data at 20°C

Category 3		
Frequency MHz	Attenuation dB/100m	NEXT dB
1	2.6	41
4	5.6	32
10	9.8	26
16	13.1	23

Category 5		
Frequency MHz	Attenuation dB/100m	NEXT dB
1	2.1	62
4	4.3	53
10	6.6	47

16	8.2	44
20	9.2	42
31.25	11.8	40
62.50	17.1	35
100	22.0	32

Category 5e		
Frequency MHz	Attenuation dB/100m	NEXT dB
1	2.1	65
4	4.1	56
10	6.5	50
16	8.3	47
20	9.3	46
31.25	11.7	43
62.50	17.0	38
100	22.0	35

Category 6		
Frequency MHz	Attenuation dB/100m	NEXT dB
1	2.0	75.3
4	3.8	66.3
10	6.0	60.3
16	7.6	57.2
31.25	10.7	52.9
62.5	15.4	48.4
100	19.8	45.3
150	24.7	42.7
200	29.0	40.8
250	32.8	39.3

Category 6A		
Frequency MHz	Attenuation dB/100m	NEXT dB
1	2.0	75.3
4	3.8	66.3
10	5.9	60.3
16	7.5	57.2
31.25	10.5	52.9
62.5	15.0	48.4
100	19.1	45.3
150	23.7	42.7
200	27.6	40.8
250	31.1	39.3
300	34.3	38.1
400	40.1	36.3
500	45.3	34.8

Category 7		
Frequency MHz	Attenuation dB/100m	NEXT dB
1	2.0	78.0
4	3.7	78.0
10	5.9	78.0
16	7.4	78.0
31.25	10.4	78.9
62.5	14.9	75.5
100	19.0	72.4
150	23.6	69.8
200	27.5	67.9
250	31.0	66.4
300	34.2	65.2
400	40.0	63.4
500	45.3	61.9
600	50.1	60.7

Category 7A		
Frequency MHz	Attenuation dB/100m	NEXT dB
1	2.1	78.0
4	3.7	78.0
10	5.8	78.0
16	7.3	78.0
31.25	10.3	78.0
62.5	14.6	78.0
100	18.5	78.0
150	22.8	76.0
200	26.5	74.0
250	29.7	72.5
300	32.7	71.2
400	38.0	69.4
500	42.8	67.9
600	47.1	66.7
1000	61.9	63.4

1200 MHz		
Frequency MHz	Attenuation dB/100m	NEXT dB
1	1.9	78.0
4	3.5	78.0
10	5.4	78.0
16	6.8	78.0
31.25	9.6	78.0
62.5	13.7	78.0
100	17.5	76.0
200	25.3	71.5
250	28.5	70.0
300	31.5	68.8
400	36.9	67.0
500	41.8	65.5
600	46.3	64.3
1000	62.0	61.0
1200	69.0	59.8

Optional: Cold bend per CSA 22.2 @ -40oC and Cold Impact per CSA 22.2 @ -35oC

Application/Limitation

Temperature window
Operation : -40°C to +85 °C
Installation: -15°C to +50°C

In order to achieve a transmission compliant with Category 7 and above, cables shall be installed with suitable termination equipment according to manufacturer's recommendations.

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

Datasheets	Data transmission cable and system type DC balanced pair armored copper cables, rev 14/12 date 2012-06-08
Type test	DB1B04R2401 – 9DNV001108 cat 6 stranded DB2C04S2601 – 9DNV004108 cat 6_A stranded DB5D04s2601 – 9dnv002108 cat7 stranded DB5F04S2601 – 9DNV005108 cat 7_A stranded DB5G04B2201- 9DNV003108 1200MHz solid DC-W5D04B2303 cat 7 solid dated 2012-04-12 DB-1B04B2303 cat 6 solid, dated 2012-02-05 DB-3C04B2303 cat 6_A solid dated 2012-02-05 DB5F04B2203 cat 7A dated 2011-12-18 Flame test report Category A dated 23.01.2014 9MG0246 Cat 6A Solid armoured Cold bend & Cold Impact dated 18.10.2016 9MGC186 Cat 6 Stranded Cold bend & Cold Impact dated 15.10.2015 9MGC186 Cat 6 Stranded Cold bend & Cold Impact dated 09.03.2016 Mud resistance test NEK 606**-2016** dated **15.07.2019**.

Tests carried out

Standard	Release	General description	Limitation
IEC 61156-1	2009-10	Multicore and symmetrical pair/quad cables for digital communications – Part 1: Generic specification	
IEC 61156-2	2010-04	Multicore and symmetrical pair/quad cables for digital communications – Part 2: Symmetrical pair/quad cables with transmission characteristics up to 100 MHz - Horizontal floor wiring - Sectional specification	
IEC 61156-3	2008-11	Multicore and symmetrical pair/quad cables for digital communications – Part 3: Work area cable - Sectional specification	

IEC 61156-5	2012-12	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	
IEC 61156-6	2012-12	Multicore and symmetrical pair/quad cables for digital communications - Part 6: Symmetrical pair/quad cables with transmission characteristics up to 1 000 MHz - Work area wiring - Sectional specification	Reference to requirement for category cable: 6 (250MHz), 6A (500 MHz), 7 (600MHz), 7A (1000 MHz)
IEC 61156-7	2012-12	Multicore and symmetrical pair/quad cables for digital communications – Part 7: Symmetrical pair cables with transmission characteristics up to 1 200 MHz - Sectional specification for digital and analog communication cables	
IEC 61156-8	2013-05	Multicore and symmetrical pair/quad cables for digital communications – Part 8: Symmetrical pair/quad cables with transmission characteristics up to 1 200 MHz – Work area wiring – Sectional specification	
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 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.
IEC 60332-3-24	2018-07	Tests on electric and optical fibre cables under fire conditions - Part 3-24: Test for vertical flame spread of vertically-mounted bunched wires or cables - Category C	Charred portion of sample does not exceed 2,5m above bottom edge of burner.
IEC 60754-1	2011-11	Test on gases evolved during combustion of materials from cables – Determination of the amount of halogen acid gas	Low Halogen: <0,5% Halogen
IEC 60754-2	2011-11	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: pH > 4,3 Conductivity < 10µS
IEC 61034-1/2	2013-07/09	Measurement of smoke density of cables burning under defined conditions – Test apparatus, procedure and requirements	Low smoke

IEC 60332-1-1/2/3	2015-07	Tests on electric and optical fibre cables under fire conditions Test for vertical flame propagation for a single small insulated wire or cable	
NEK 606 Ed. 5	2016	Cables for offshore installations. Halogen-free and/or mud resistant. Technical specification.	Mud resistance test: Required Max variations ±: IRM902 & 903 100°C 7d. TS & E@B, weight & vol.: ±30% Calc. Bromide 70°C 56d. TS & E@B: ±25%, weight: ±15%, vol.: ±20% Oil based mud: EDC 95/11 70°C 56d TS & E@B ±30%, weight & vol.: ±25%
IEC 60092-350	2014-08	Annex E: Cold bend test and impact test for low temperature behaviour	Cold bend: -40°C Cold impact: -35°C
CSA C22.2 No. 03	2009	Flexibility at any specified temp.	Cold bend: -40°C
CSA C22.2 No. 03	2009	Abnormal low temperature – impact	Cold impact: -35°C

Marking of product

TELDOR MG No. of cores x No. of pairs, Cross-section, Armor, Type P/N, meter mark – IEC 60332-22 OR IEC 60332-2-2 – LOT No.

Family	Armor	TYPE	Transmission Properties	Pair Count	Solid Cond.	AWG	Flame Rating	Options
MGD	B =Galvanized Braided Steel Wire R =Corrugated Steel Tape W =Galvanized Served Steel Wire P =Bronze wire braid C =Copper wire braid T =Tin Copper wire braid	1=U/UTP 2=F/UTP 3=SF/UTP 4=U/FTP 5=F/FTP 6=S/FTP 7=SF/FTP	3=CAT3 5=CAT5 E=CAT5e B=CAT 6 C=CAT 6A D=CAT 7 F=CAT 7A G=1200MHz	NN Core count in multi cables	B=BC Solid (bare copper) T=TC Solid (tinned copper)	26=26AWG 24=24AWG 23=23AWG 22=22AWG	A=IEC60332-3-22 (Cat.A) C=IEC60332-3-24 (Cat.C)	XX Alpha numeric

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 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