



## Confirmation of Product Type Approval

**Company Name:** TELDOR CABLES & SYSTEMS LTD

**Address:** EIN DOR, 0 19335 Israel

**Product:** Communication Cable

**Model(s):** Teldor MG Hybrid / Composite cables (Combination of Data/Lan – Fiber optic – BUS – Instrumentation 300V – Low Voltage 600V cables)

Certificate Type	Certificate Number	Issue Date	Expiry Date
Product Design Assessment (PDA)	19-GE1877576-PDA	23-AUG-2019	22-AUG-2024
Manufacturing Assessment (MA)	19-PR3653933	08-APR-2019	07-APR-2024
Product Quality Assurance (PQA)	NA	NA	NA

**Tier**  
3

### Intended Service

Data transmission, Communications, LAN, Instrumentations, Control / Signal and low voltage Hybrid (FO+Copper) cables for Marine and Offshore applications with Low smoke, Zero halogens and flame retardant characteristics.

### Description

Multi-core, multi-pair or multi-triad & Fiber Optics Instrumentations, Data transmission, Communications, LAN, Control / Signal Copper and FO cables, flame retardant, halogen free, low smoke emission, armored and non-armored cables made with solid or stranded Copper conductors and Fiber Optics.

The cables are used in Marine, OIL/GAS and Offshore applications.

The cables are made from SHF1 / SHF2 / SHF2-Mud-resistant per NEK606 jackets.

The cables are flame retardant per IEC60332-3, fire resistant (optional) per IEC60331-21/23/25, halogen free, low smoke emission, armored and non-armored.

The cables are oil resistant and designed for harsh conditions.

### Ratings

Voltage max.: 600/1000V

Operating Temperature Range: - 40°C to + 90°C

### Service Restrictions

1. Unit Certification is not required for this product.

2. If the manufacturer or purchaser requests an ABS Certificate for compliance with a specification or standard, the specification or standard, including inspection standards and tolerances, must be clearly defined.
3. Termination itself shall be in the outer sheath of the cable and conductors should be locked in place in order to avoid damage from vibration.
4. In order to achieve transmission compliant cables, these cables shall be installed with suitable termination equipment according to manufacturer's recommendations.
5. The scope of Type Approval is to comply with MSC.1/Circ.1221 dated 11 December 2006.

### Comments

1. The Manufacturer has provided a declaration about the lack of Asbestos in this product.
2. The sheath shall be clearly marked with the following data as a minimum:
  - Manufacturer's identification (name or trade name)
  - Cable designation (Cable type) Number of fibers / cores
  - Jacket type
  - Armor Type
  - Voltage rating
  - Year of manufacture
  - Batch number, Flame test, Meter mark.

The marking shall be repeated at least every 1,0 m.

### Notes, Drawings and Documentation

Data Sheet Teldor Hybrid Composite cables v13

Catalogue Offshore Rev.01/2015

TELDOR Technical Specifications HN - HYB-SDA-6-04HTH+2X2.0MM-D-KH-D\_S BK Part Number: FH0040412B Rev.1.12 dated 30 September 2014

TELDOR Type Test Report dated 15 September 2014

TELDOR Test Report No.9MGD240xxx dated 07 February 2014

BRE Global Report 287633-1 - Teldor Cables - IEC60754 dated 28 August 2013

TELDOR Test Report No.36 (P/N 9MGD240129-VER3) Particular Sheathing dated 06/02/2014

TELDOR Test Report No.36 (P/N 9MGD241239-VER3) Particular Sheathing dated 07/02/2014

TELDOR Test Report P/N F60040477S Multi Tight Steel Braid Armor Fire resistance SHF2 MUD dated 21-06-2016

TELDOR Test Report P/N FH0040412B v02 dated September 15, 2014

TELDOR Test Report P/N 8MG155510 for IEC60332-3-22 dated 12.10.2017

TELDOR Test Report P/N FH0020134B for IEC60332-3-22 dated 22.10.2017

BRE Global Test Report No. P100530-1 Issue 1 for IEC60754 SHF1 dated 1 July 2015

TELDOR Test Report P/N FH0020134B for MG-HYB-MTA-6-1x2KH+2(Cat.6subAsubSFTP247) + 3x1219+2x1619IFS-LSZH-SHF2 dated 18-09-2017

TELDOR Test Report No. 9DNV026101 for Mud Resistance dated 23 January 2014

TELDOR Test Report No. P/N 7MGF032108 for Nek 606: 2016 dated 15 July 2019

TELDOR Test Report No. P/N 8MG1555101 for Power & Control Offshore 600V COMBI 16 (6x2x18 AWG+1x2x12 AWG+1x18 AWG+1 dated 12-03-2017

TELDOR Test Report No. P/N TAB136A129 for Data Cable Fire Resistance dated 14-10-2015

TELDOR Test Report No.7MG0016101 for RS485 Shielded SHF2 dated 2018-01-11

TELDOR Test Report No.7MG0116101 for DeviceNet Armored SHF1 dated 2018-01-11

TELDOR Test Report No. P/N 8MG0036101 2Pairs Shielded SHF1 dated 11 January 2018

TELDOR Test Report No. P/N 8MG1186101 12Pairs Armored SHF2-MUD dated 11 January 2018

TELDOR Test Report No. P/N 8MG1296101 2x1.5 Fire Resistance SHF1 dated 11 January 2018

### **Term of Validity**

This Product Design Assessment (PDA) Certificate 19-GE1877576-PDA, dated 23/Aug/2019 remains valid until 22/Aug/2024 or until the Rules or specifications used in the assessment are revised (whichever occurs first).

This PDA is intended for a product to be installed on an ABS classed vessel, MODU or facility which is in existence or under contract for construction on the date of the ABS Rules or specifications used to evaluate the Product.

Use of the Product on an ABS classed vessel, MODU or facility which is contracted after the validity date of the ABS Rules and specifications used to evaluate the Product, will require re-evaluation of the PDA.

Use of the Product for non ABS classed vessels, MODUs or facilities is to be to an agreement between the manufacturer and intended client.

### **ABS Rules**

2019 Rules for Conditions of Classification, 1-1-4/7.7, 1-1-A3, 1-1-A4, which covers the following:

2019 Steel Vessels Rules 4-8-3/9.1, 4-8-3/9.5, 4-8-3/9.13

2019 Offshore Support Vessels Rules, 4-8-3/9.1, 4-8-3/9.5, 4-8-3/9.13

2019 Steel Vessels Under 90 Meters (295 Feet) in Length Rules, 4-6-4/13.1.1, 4-6-4/13.1.2, 4-6-4/13.1.6

2019 International Naval Ships Guide 4-8-3/9.1, 4-8-3/9.5, 4-8-3/9.13

2019 Marine Vessels Rules 4-8-3/9.1, 4-8-3/9.5, 4-8-3/9.13

2019 Rules for Conditions of Classification – Offshore Units and Structures 1-1-4/9.7, 1-1-A2, 1-1-A3, which covers the following:

2019 Mobile Offshore Drilling Unit Rules, 4-3-4/7.1.1, 4-3-4/7.1.2, 4-3-4/7.1.6

2019 Facilities on Offshore Installations Rules 3-6/13

2019 Mobile Offshore Unit Rules, 4-3-4/7.1.1, 4-3-4/7.1.2, 4-3-4/7.1.6

### **International Standards**

IEC 60092-350 Edition 4.0 (2014-08)

IEC 60092-353 Edition 4.0 (2016-09)

IEC 60092-360 Edition 1.0 (2014-04)

IEC 60754-1 Edition 3.0 (2011-11)

IEC 60754-2 Edition 2.0 (2011-11)

IEC 60331-21 Edition 1.0 (1999-04)  
IEC 60331-23 Edition 1.0 (1999-04)  
IEC 60331-25 Edition 1.0 (1999-04)  
IEC 60332-3-22 Edition 2.0 (2018-07)  
IEC 60332-3-24 Edition 2.0 (2018-07)  
IEC 61034-1 Edition 3.1 (2013-06)  
IEC 61034-2 Edition 3.1 (2013-06)  
IEC 60332-1-1 Edition 1.1 (2015-07)  
IEC 60332-1-2 Edition 1.1 (2015-07)  
IEC 60332-1-3 Edition 1.1 (2015-07)  
IEC 60332-2-1 First edition (2004-07)  
IEC 60092-376 Edition 3.0 (2017-05)  
IEC 61158-1 Edition 2.0 (2019-04)  
IEC 61158-2 Edition 6.0 (2014-07)  
IEC 61784-1 Edition 5.0 (2019-04)  
IEC 61784-2 Edition 4.0 (2019-04)

**EU-MED Standards**

NA

**National Standards**

NEK TS 606: 2016

**Government Standards**

NA

**Other Standards**

NA



A handwritten signature in black ink, appearing to read "Joseph W. Wilson".

Corporate ABS Programs  
American Bureau of Shipping  
Print Date and Time: 18-Sep-2019 5:42

ABS has used due diligence in the preparation of this certificate, and it represents the information on the product in the ABS Records as of the date and time the certificate is printed.

If the Rules and/or standards used in the PDA evaluation are revised or if there is a design modification (whichever occurs first), a PDA revalidation may be necessary.

The continued validity of the MA is dependent on completion of satisfactory audits as required by the ABS Rules. The validity of both PDA and MA entitles the product to receive a **Confirmation of Product Type Approval**.

Acceptance of product is limited to the "Intended Service" details prescribed in the certificate and as per applicable Rules and Standards.

This Certificate is valid for installation of the listed product on ABS units which exist or are under contract for construction on or prior to the effective date of the ABS Rules and standards applied at the time of PDA issuance. ABS makes no representations regarding Type Approval of the Product for use on vessels, MODUs or facilities built after the date of the ABS Rules used for this evaluation.

Type Approval requires Drawing Assessment, Prototype Testing and assessment of the manufacturer's quality assurance and quality control arrangements. The manufacturer is responsible to maintain compliance with all specifications applicable to the product design assessment. Unless specifically indicated in the description of the product, certification under type approval does not waive requirements for witnessed inspection or additional survey for product use on a vessel, MODU or facility intended to be ABS classed or that is presently in class with ABS.

Due to wide variety of specifications used in the products ABS has evaluated for Type Approval, it is part of our contract that; whether the standard is an ABS Rule or a non-ABS Rule, the Client has full responsibility for continued compliance with the standard.

Questions regarding the validity of ABS Rules or the need for supplemental testing or inspection of such products should, in all cases, be addressed to ABS.

## **Product Type Approval**

<b>Cables Family:</b>	Hybrid / Composite (Combination of Data/Lan – Fiber Optic – BUS – Instrumentation 300V – low voltage 600V cables) cables for Marine / Oil / Gas / Offshore applications.
<b>Model/Type designation:</b>	Teldor MG Hybrid / Composite (Combination of Data/Lan – Fiber Optic – BUS – Instrumentation 300V – Power 600V cables), Flame retardant per IEC60332-3-22, Low smoke, Zero Halogens, FR-LSZH/HFFR, Armored/Non-armored, solid/stranded conductors, Fiber Optic with Fire Resistance option per IEC60331, jacketed with SHF1/SHF2/MUD resistance (NEK 606) jacket types.
<b>Intend service/application:</b>	Data transmission, Control / Instrumentation / Signal & power cables made from combination of copper conductors and Fibers for Marine, OIL/GAS, Offshore and Industrial applications.
<b>Description:</b>	Combination of one or more cables/structures of Data/Lan cables, Fiber Optic cables, Bus cables and instrumentation/Control and power cables under common armor and/or jacket. Used for transmitting various types of signals including data/control/signal with power through copper and/or Fibers. The cables are flame retardant per IEC60332-3, halogen free with low smoke emission. The cables are jacketed and sheathed with FR-LSZH materials including SHF1, SHF2 and MUD resistant per NEK 606. The cables are made with copper (solid or stranded) and/or Fibers conductors, armored and non-armored and have fire resistance (optional).
<b>Voltage rating:</b>	300V or 600/1000v depends on the specific structure
<b>International standards:</b>	IEC 61156-1/2/5/6/7/8, ANSI/TIA/EIA 568-C, IEC 60092-350/351/359/360, IEC 60754-1/2, IEC 61034-1/2, IEC 60332-1-1/2/3, IEC 60332-2/3-22, IEC 60331-23/21/25, NEK 606, IEC 60793/4, IEC 60092-376, IEC 61158-1&2, IEC 61784-1&2, IEC60092-353, SOLAS Amendments chapter II-1, Part D, Reg. 45, 5.2.

## 1.1 List of approved DATA/LAN cables/components

Cable types	Design standards	Cross section	Conductor type (IEC60228)	Shielding
<b>MGD cat 3, 5</b>	IEC 61156-2	24 AWG(0.204mm <sup>2</sup> )	Solid class 1	U/UTP, F/UTP, U/FTP, F/FTP, S/FTP, SF/UTP, SF/FTP
	IEC 61156-2	26 AWG(0.138mm <sup>2</sup> ) 24 AWG(0.204mm <sup>2</sup> )	Stranded class 2	
<b>MGD cat 5e</b>	IEC 61156-5	24 AWG(0.204mm <sup>2</sup> )	Solid class 1	U/UTP, F/UTP, U/FTP, F/FTP, S/FTP, SF/UTP, SF/FTP
	IEC 61156-6 (Option IEC61156-5)	26 AWG(0.138mm <sup>2</sup> ) 24 AWG(0.204mm <sup>2</sup> )	Stranded class 2	
<b>MGD cat 6</b>	IEC 61156-5	23 AWG(0.246mm <sup>2</sup> ) 22 AWG(0.324mm <sup>2</sup> )	Solid class 1	U/UTP, F/UTP, U/FTP, F/FTP, S/FTP, SF/UTP, SF/FTP
	IEC 61156-6 (Option IEC61156-5)	26 AWG(0.138mm <sup>2</sup> ) 24 AWG(0.204mm <sup>2</sup> ) 23 AWG(0.246mm <sup>2</sup> ) 22 AWG(0.324mm <sup>2</sup> )	Stranded class 2	
<b>MGD cat 6A, 7, 7A,8</b>	IEC 61156-5,9,10	23 AWG(0.246mm <sup>2</sup> ) 22 AWG(0.324mm <sup>2</sup> )	Solid class 1	U/FTP, F/FTP, S/FTP, SF/FTP
	IEC 61156-6,10 (Option IEC61156-5)	26 AWG(0.138mm <sup>2</sup> ) 24 AWG(0.204mm <sup>2</sup> ) 23 AWG(0.246mm <sup>2</sup> ) 22 AWG(0.324mm <sup>2</sup> )	Stranded class 2	
<b>MGD 1200MHz</b>	IEC 61156-7	23 AWG(0.246mm <sup>2</sup> ) 22 AWG(0.324mm <sup>2</sup> )	Solid class 1	U/FTP, F/FTP, S/FTP, SF/FTP
	IEC 61156-6 (Option IEC61156-7)	26 AWG(0.138mm <sup>2</sup> ) 24 AWG(0.204mm <sup>2</sup> ) 23 AWG(0.246mm <sup>2</sup> ) 22 AWG(0.324mm <sup>2</sup> )	Stranded class 2	U/FTP, F/FTP, S/FTP, SF/FTP

## 1.2. Construction

Conductor	Bare annealed or tinned copper solid (per IEC 60228 class 1) or stranded (per IEC 60228 class 2)
Insulation	Solid or cellular Polyolefine + optional fire resistant tape
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 or MUD Resistant (NEK 606) ), single or double layer
Metallic covering (Armor)	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 (NEK 606), single or double layer



## Quality Assurance Department

### 1.3. Optional Constructions:

Cat3 to Cat 5e cables:

Single cables: 4-25 Pair cables

Multi cables: 2-12 cores or jacketed cables cabled together, FIG-8 or Siames (2x 4 pair)

Cat 6 to Cat 8 Cables:

Single cables: 4 Pair cables

Multi cables: 2-12 cores or jacketed cables cabled together, FIG-8 or Siames (2x 4 pair)

### 1.4. Special properties:

Halogen free per IEC 60754-1/2

Flame retardant per IEC 60332-3-22 (cat.A), 60332-3-24 (cat.C), IEC 60332-1-1/2/3, IEC 60332-2

Low Smoke per IEC 61034-1/2

Armor/Non-Armor

Shielded / UnShielded

Multi Pair / Multi Core / Multi Cables options

Fire resistant per IEC 60331-23 (Optional)

Various Jacket types (SHF1, SHF2, SHF2-MUD resistant per NEK606)

Designed for marine and offshore application

Oil resistant

Designed for harsh conditions

### 1.5. Application limitation:

Operation temperature: -40°C to +85°C

Storage temperature: -40°C to +85°C

Installation temperature: -20°C to +50°C

### 1.6. Standard Marking of Product:

Teldor P/N No. of Pairs, Cross section (AWG)/Conductor type, Category, shield type, armor type, jacket type, Certification No., meter marking, Batch/Lot, Flame rating, Fire rating

**Note:** final Marking is determined per production

### 1.7. Cable structure:

Transmission Properties	Pair Count	AWG	Solid Cond.	Shield TYPE	Armor	Jacket Type	Fire resistant
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	26=26AWG 24=24AWG 23=23AWG 22=22AWG	R=TC Stranded (Tinned copper)  S=BC Stranded (bare copper)  B=BC Solid (bare copper)  T=TC Solid (tinned copper)	1=U/UTP 2=F/UTP 3=SF/UTP 4=U/FTP 5=F/FTP 6=S/FTP 7=SF/FTP	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	SHF1 SHF2 MUD Resistance(N EK606)	F=fire resistant (optional)

### 1.8. Teldor Fire Resistant Data Transmission Cables per IEC 60331-23



## Quality Assurance Department

Teldor's Fire Resistant Data Cables are designed and produced to meet and exceed the requirements of IEC 60331-23: Tests for electric cables under fire conditions - Circuit integrity for durations of 30, 60 or 90 minutes (and per customer requirement up to 180 minutes).

### Transmission performance under fire per IEC 60331-23 for a duration of 90 minutes +15minutes cooling time\*

Cable Category	Typical transmission application / performance	Minimum transmission performance
Cat.3	Channel Cat. 3	10BASE-T / Channel Cat. 3
Cat. 5	Channel Cat. 5	100BASE-T / Channel Cat. 5
Cat. 5e	Channel Cat. 5e	100BASE-T / Channel Cat. 5
Cat. 6	Channel Cat. 6	100BASE-T / Channel Cat. 5
Cat. 6A	Channel Cat. 6A	100BASE-T / Channel Cat. 5
Cat. 7	Channel Cat. 6A	100BASE-T / Channel Cat. 5
Cat. 7A	Channel Cat. 6A	100BASE-T / Channel Cat. 5
IEC 61156-7 (1200MHz), Cat 8	Channel Cat. 6A	100BASE-T / Channel Cat. 5

\*The requirements of IEC 60331-23 for no open / short circuit between the conductors are fulfilled

## Quality Assurance Department

### 2.1. List of approved Fiber Optic cables/components

<b>Fiber types :</b>	Step index Single mode Multi mode Special fiber (per specific data sheet)
<b>Construction:</b>	MTD - Tight buffered (Multi-distribution cables) BO - Tight buffered (BreakOut cables) Gel filled Loose tube (Single or multi loose tube cables) Dry Loose tube (Single or multi loose tube cables) Combination of tight buffered and loose tubes)
<b>Central strength member (opt.) :</b>	Metalic strength member Dielectric strength member
<b>Peripheral strength member (opt.):</b>	Glass Yarns Aramid yarns
<b>Inner Sheath:</b>	SHF1 SHF2 SHF2-MUD Resistance (NEK606)
<b>Aarmor:</b>	Braided galvanized steel wire Corrugated steel tape Served (Galvanized) steel wire Bronze wire braid Copper wire braid Tinned copper wire braid
<b>Outer Sheath:</b>	SHF1 SHF2 SHF2-MUD Resistance (NEK606) (Sheath can be made from single or double layer)
<b>Water Blocking (opt.):</b>	Swellable Yarns Swellable tapes Gel
<b>Fire Resistance (opt.):</b>	Fire resistance tapes

#### Typical performance of common fibers

Fiber Code	Units	3	4	5	6	7	8	9	A
Standard Designation		Multimode				Singlemode			
ISO/IEC 11801		OM4	OM3	OM2	OM1	-	-	OS2	-
ANSI/TIA/EIA-492		AAAD	AAAC	AAAB	AAAA	-	-	-	-
IEC 60793-2-10		A1a.3	A1a.2	A1a.1	A1b	-	-	-	-
ITU-T		-	-	-	-	G.657.A2	G.655	G.652.D	G.657.A1
IEC 60793-2-50		-	-	-	-	B6_a2	B4	B1.3	B6_a1
Operating wavelength	nm	850 1300				1310 1550 1625	1550 1625	1310 1550 1625	
Core diameter	µm	50±2.5	50±2.5	50±2.5	62.5±3	-	-	-	-
MFD @1310nm	µm	-	-	-	-	8.6±0.4	-	9.2±0.4	8.6±0.4
MFD @1550nm	µm	-	-	-	-	9.6±0.5	9.6±0.6	10.4±0.6	9.8±0.5
Cladding diameter	µm	125±1			125±2	125±0.7			
Coating diameter	µm	245±10				245±5			
Max. Attenuation Tight-buffer	dB/Km	3.0 @850nm 1.0 @1300nm			3.5 @850nm 1.0 @1300nm	0.40@1310nm 0.30 @1550nm	-	0.40@1310nm 0.30 @1550nm	
Max. Attenuation Loose-tube	dB/Km	2.8 @850nm 0.9 @1300nm			3.2 @850nm 1.0 @1300nm	0.35 @1310nm 0.22 @1550nm 0.25 @1625nm	0.22 @1550nm 0.26 @1625nm	0.35 @1310nm 0.22 @1550nm 0.25 @1625nm	

TELDOR... The Best Connection™

## Quality Assurance Department

### 2.2. Special properties:

Halogen free per IEC 60754-1/2  
 Flame retardant per IEC 60332-3-22 (cat.A), 60332-3-24 (cat.C), IEC 60332-1-1/2/3, IEC 60332-2  
 Low Smoke per IEC 61034-1/2  
 Armor/Non-Armor  
 Fire resistant per IEC 60331-25 (Optional)  
 Various fiber types (SM, MM and special)  
 Various construction types (Tight buffers, Breakout, Single loose tube, Multi loose tube)  
 Dry and Gel filled tubes  
 Various Jacket types (SHF1, SHF2, SHF2-MUD resistant per NEK606)  
 Designed for marine and offshore application  
 Oil resistant  
 Designed for harsh conditions

### 2.3. Application limitation:

Operation temperature: -40°C to +85°C  
 Storage temperature: -40°C to +85°C  
 Installation temperature: -30°C to +50°C

### 2.4. Standard Marking of Product:

Teldor P/N, Fiber type, No. of tubes/tights, No. of fibers in tube, Armor type, jacket type(s), Water blocking type, Certification No., meter marking, Batch/Lot, Flame rating, Fire rating

**Note:** final Marking is determined per production

### 2.5. Cable structure:

Fiber type	Buffer	Fiber count	Tube count	Water Blocking	Armor	Jacket Type (Inner/Outer)	Fire resistant
Step index Single mode Multi mode Special fiber	MTD=multi tight BO=Breakout Gel filled tube Dry Tubes	NNN	NNN	G=Gel D-Dry	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	SHF1 SHF2 MUD Resistance(NEK606)	F=fire resistant (opt.)

### 3.1. List of approved BUS cables/components

**Cable types :**

**ProfiBus 100**  
**ProfiBus 150**  
**CanBus**  
**DeviceNet**  
**FieldBus-H1**  
**Ethernet/IP BUS**  
**RS-485**  
**RS-422**

IEC 61158-2	Type A	Type B							Units
P/N	U	P	C	D	F	E	R	S	
Bus Type	ProfiBUS 150	ProfiBUS 100	CanBUS	DeviceNET	FieldBUS-H1	Ethernet/IP BUS	RS-485	RS-422	
Impedance	150 f=3-20MHz	100 f>100KHz	100-130 f>100KHz	120 f>100KHz	120 - 100 f>100KHz	100 f>100KHz	100 - 120 f>100KHz	100 - 120 f>100KHz	Ohm
Capacitance (f=800Hz)	<30	35 - 44	40 - 55	35 - 44	40 - 55	40 - 55	35 - 50	35 - 50	pF/m
DC Resistance	94 - 10	94 - 10	94 - 13	94 - 10	95 - 5	150-54	94 - 10	94 - 10	Ohm/Km
Voltage rating	150 - 300	150 - 300	150 - 300	300	300	48	300	300	Vrms
Conductor cross-sectional area	≥ 0.34	≥ 0.22	≥ 0.22	≥ 0.22	≥ 0.22	≥ 0.22	≥ 0.22	≥ 0.22	mm <sup>2</sup>
Conductor size options	20,22	16, 18, 20	16,18,20,22,24	16,18,20,22,24	16, 18	20,22,24	16,18,20,22,24	16,18,20,22,24	AWG
Number of pairs	1	1	1-8	1 data + 1 power	1 - 12	2-4	1 - 12	2, 4, 6, 8, 10, 12	-
Individual shield	None	None	1, 2, 5, 6	2	1, 2, 5, 6	1, 2, 5, 6	1, 2, 5, 6	1, 2, 5, 6	-
Overall shield	2, 5, 6	2, 5, 6	1, 2, 5, 6	5	1, 2, 5, 6	1, 2, 5, 6	1, 2, 5, 6	1, 2, 5, 6	-
Wire A Color	Green	N/S	N/S	N/S	N/S	N/S	N/S	N/S	-
Wire B Color	Red	N/S	N/S	N/S	N/S	N/S	N/S	N/S	-
Additional wires (option)	Common wire	Common wire	Common wire	None	Common wire	Common wire	Common wire	Common wire	-

Cable parameter	Type A	Type B	Optional
Impedance	135 to 165 ohm (f=3 to 20MHz)	100 to 130 ohm (f>100KHz)	70 to 100 ohm (f<1MHz)
Capacity	<30pF/m	<60pF/m	
Resistance	<110ohm/km	Not specified	
Conductor cross-sectional area	>=0.34mm <sup>2</sup>	>=0.22mm <sup>2</sup>	

### 3.2. Optional Constructions:

Conductor material	Bare annealed copper or Tin-coated annealed copper
Conductor construction	Stranded - IEC 60228 Class 2 or Class 5
Insulation material	PO + Optional Fire resistance tape
Fillers and bedding	Halogen-Free, Low-Smoke, Flame retardant
Individual Shield	Optional metal foil + drain or metal braid or metal foil + metal braid
Individual jacket	Optional taped or extruded jacket
Overall Shield	Optional metal foil + drain or metal braid or metal foil + metal braid
Braid construction	0.15mm min., 0.25mm max. tin-coated or bare copper wires, 84% coverage min.
Inner jacket material	SHF1 or SHF2 or SHF2-MUD per IEC60092-360 (Single or double layer)
Armor and MB (Optional)	Bonded Aluminum Moisture barrier Braided galvanized steel wire Corrugated steel tape Served (Galvanized) steel wire Bronze wire braid Copper wire braid Tinned copper wire braid
Outer jacket material (Optional)	SHF1 or SHF2 or SHF2-MUD per IEC60092-360
Outer jacket layers	Single or double layer
Overall diameter	2.0 mm min. - 40 mm max.
Max. pulling force	Specified in the detailed specification.
Special properties	Flame retardant, Fire Resistant, Halogen Free, Low Smoke, Mud Resistant

### 3.3. Special properties:

Halogen free per IEC 60754-1/2  
 Flame retardant per IEC 60332-3-22 (cat.A), 60332-3-24 (cat.C), IEC 60332-1-1/2/3, IEC 60332-2  
 Low Smoke per IEC 61034-1/2  
 Armor/Non-Armor  
 Fire resistant per IEC 60331-23 (Optional)  
 Various types: Profibus (100,150), CanBus, DeviceNet, FieldBus H1 Ethernet/IP, RS-485, RS-422  
 Various Jacket types (SHF1, SHF2, SHF2-MUD resistant per NEK606)  
 Designed for marine and offshore application  
 Oil resistant  
 Designed for harsh conditions

### 3.4. Application limitation:

Operation temperature: -40°C to +90°C  
 Storage temperature: -40°C to +90°C  
 Installation temperature: -15°C to +50°C

## Quality Assurance Department

### 3.5. Standard Marking of Product:

Teldor P/N, Type of conductors, BUS Type, Shield type, Armor type, Voltage, Certification No., meter marking, Batch/Lot, Flame rating, Fire rating

**Note:** final Marking is determined per production

### 3.6. Cable structure:

No. of Data Pairs	BUS Type	AWG (Data pairs)	Conductors	Individual Shield	Overall Shield	Armor (optional)	Voltage rating	Fire Resistance	Jacket Type (Inner/Outer)
Nn	P: ProfiBUS 100 U: ProfiBUS 150 C: CanBUS D: DeviceNET F: FieldBUS-H1 E: Ethernet/IP BUS R: RS-485 S: RS-422	24: 24AWG 22: 22AWG 20: 20AWG 18: 18AWG 16: 16AWG	T: Tin-coated copper B: Bare copper	1: Unshielded 2: Al. foil 3: Copper foil 4: BC braid 5: TC braid 6. Al. foil + TC braid 7. CU foil + BC braid	1: Unshielded 2: Al. foil 3: Copper foil 4: BC braid 5: TC braid 6. Al. foil + TC braid 7. CU foil + BC braid	B: Galvanized Braided Steel Wire M: Aluminum moisture barrier P: Braided Bronze wire R: Corrugated Steel Tape W: Galvanized Served Steel Wire C =Copper wire braid T =Tin Copper wire braid	0: 48V 1: 150V 3: 300V	F=fire resistant (opt.)	SHF1 SHF2 MUD Resistance(NEK 606)

## Quality Assurance Department

### 4.1. List of approved 300V Instrumentation/Control/Signal cables/components

Cable Type	Multicore	Multipair	Multitriad
Number of units	1-40	1-50	1-36
Conductor size	0.5 mm <sup>2</sup> 0.75 mm <sup>2</sup> 1.0 mm <sup>2</sup> 1.5 mm <sup>2</sup> 2.5 mm <sup>2</sup>		
Conductor material	Bare annealed copper or Tin-coated annealed copper		
Conductor construction	Stranded - IEC 60228 Class 2 or Class 5		
Flame barrier	Inorganic tapes / Fire resistance tape		
Insulation material	IEC 60092-351 HF XLPE (Cross-Linked, Halogen-Free, Low-Smoke, Flame retardant)		
Individual Shield	Optional metal foil + drain or metal braid or metal foil + metal braid		
Individual jacket	Optional jacket (taped or extruded)		
Overall Shield	Optional metal foil + drain or metal braid or metal foil + metal braid		
Braid construction	0.15mm or 0.20mm tin-coated or bare copper wires, 84% coverage min.		
Inner jacket material	SHF1 or SHF2 or SHF2-MUD per NEK606 single or double layer		
Armor	Braid wire materials: Braided tinned copper wire. Braided bare copper wire. Braided galvanized steel wire. Braided aluminum alloy wire. Braided copper alloy wire. Braided bronze wire.		
Outer jacket material	SHF1 or SHF2 or SHF2-MUD per NEK606 single or double layer		
Overall diameter	2.0 mm min. - 60 mm max.		
Special Construction	Combinations of various cross sections and combinations of single/pair & triads are allowed		
Max. pulling force	Specified in the detailed specification.		
Special properties	Flame retardant, Halogen Free, Circuit Integrity with water spray and mechanical shock per EN50200, Fire Resistant, Low Smoke, Mud Resistant		

### 4.2. Special properties:

Halogen free per IEC 60754-1/2  
 Flame retardant per IEC 60332-3-22 (cat.A), 60332-3-24 (cat.C), IEC 60332-1-1/2/3, IEC 60332-2  
 Low Smoke per IEC 61034-1/2  
 Armor/Non-Armor  
 Fire resistant per IEC 60331-21/22 (Optional)  
 Various Jacket types (SHF1, SHF2, SHF2-MUD resistant per NEK606)  
 Designed for marine and offshore application  
 Oil resistant  
 Designed for harsh conditions  
 Combinations of cross sections and single/pair/core structures are permitted

**TELDOR... The Best Connection™**

TELDOR Cables & Systems Ltd. Ein Dor 1933500 Israel  
 TELDOR Cables Telecom Ltd. Beit She'an 1173834 Israel  
 Central Ph.: +972-4-6770555 Central Fax: +972-4-6770555



[www.teldor.com](http://www.teldor.com)



## Quality Assurance Department

### 4.3. Application limitation:

Operation temperature: -40°C to +95°C  
 Storage temperature: -40°C to +95°C  
 Installation temperature: -30°C to +50°C

### 4.4. Standard Marking of Product:

Teldor P/N, Number & Type of units, Shield type, Armor type, jacket type(s), Certification No., meter marking, Batch/Lot, Flame rating, Fire rating, **voltage rating**

**Note:** final Marking is determined per production

### 4.5. Cable structure:

Unit Count	Basic Unit type	Conductor Cross-section	Conductors Material	Individual Shield	Overall Shield	Armor	Fire resistant	Jacket Type (Inner/Outer)
Nn	S: Singles P: Pairs T: Triads	05: 0.5 mm <sup>2</sup> 07: 0.75 mm <sup>2</sup> 10: 1.0 mm <sup>2</sup> 15: 1.5 mm <sup>2</sup> 25: 2.5 mm <sup>2</sup>	T: Tin-coated copper B: Bare copper	1: Unshielded 2: Al. foil 3: Copper foil 4: BC braid 5: TC braid 6: Al. foil + TC braid 7: CU foil + BC braid	1: Unshielded 2: Al. foil 3: Copper foil 4: BC braid 5: TC braid 6: Al. foil + TC braid 7: CU foil + BC braid	T: Braided tinned copper wire B: Braided bare copper wire G: Braided galvanized steel wire A: Braided aluminum alloy wire C: Braided copper alloy wire Z: Braided bronze wire	F=fire resistant (opt.)	SHF1 SHF2 MUD Resistance(NEK606)

## Quality Assurance Department

### 5.1. List of approved 600/1000V power/Instrumentation/Control cables/components

Construction:

Conductor: Plain or tinned annealed copper Class 2 or Class 5

Flame barrier: Inorganic tapes / Fire resistance tape

Insulation: HF90, HF XLPE (Halogen-Free, Low-Smoke, Flame retardant)

Individual screen: Aluminium/polyester tape with tinned copper drain wire

Collective screen: Aluminium/polyester tape with tinned copper drain wire

Inner sheath: SHF1 or SHF2 or SHF2 MUD single or double layer

Metal covering / Armor: Plain/tinned copper wire braid or copper alloy wire braid or galvanized steel wire braid (multi core cables only) or Braided aluminum alloy wire or Braided bronze wire

Outer sheath: SHF1 or SHF2 or SHF2 MUD single or double layer

No of cores:	Cross sectional area [mm <sup>2</sup> ]
1-37	1 1,5 2,5 4
1-33	6
1-23	10

No of Pairs:	Cross sectional area [mm <sup>2</sup> ]
2-27	1
2-23	1,5
2-19	2,5

No of Triads:	Cross sectional area [mm <sup>2</sup> ]
1-27	1
1-21	1,5
1-16	2,5

Cables may also include combinations of the above

## 5.2. Special properties:

600/1000V power / low voltage cores  
 single cores, pairs or triads for Instrumentation / Control / Signal applications  
 Halogen free per IEC 60754-1/2  
 Flame retardant per IEC 60332-3-22 (cat.A), 60332-3-24 (cat.C), IEC 60332-1-1/2/3, IEC 60332-2  
 Low Smoke per IEC 61034-1/2  
 Armor/Non-Armor  
 Fire resistant per IEC 60331-21/22 (Optional)  
 Various Jacket types (SHF1, SHF2, SHF2-MUD resistant per NEK606)  
 Designed for marine and offshore application  
 Oil resistant  
 Designed for harsh conditions  
 Combinations of cross sections and single/pair/core structures are permitted

## 5.3. Application limitation:

Operation temperature: -40°C to +95°C  
 Storage temperature: -40°C to +95°C  
 Installation temperature: -30°C to +50°C

## 5.4. Standard Marking of Product:

Teldor P/N, Number & Type of units, Shield type, Armor type, jacket type(s), Certification No., meter marking, Batch/Lot, Flame rating, Fire rating, Voltage rating

**Note:** final Marking is determined per production

## 5.5. Cable structure:

Unit Count	Basic Unit type	Conductor Cross-section	Conductors Material	Individual Shield	Overall Shield	Armor	Fire resistant	Jacket Type (Inner/Outer)
Nn	S: Singles P: Pairs T: Triads	05: 0.5 mm <sup>2</sup> 07: 0.75 mm <sup>2</sup> 10: 1.0 mm <sup>2</sup> 15: 1.5 mm <sup>2</sup> 25: 2.5 mm <sup>2</sup> 04: 4.0 mm <sup>2</sup> 06: 6.0 mm <sup>2</sup> 100: 10.0 mm <sup>2</sup>	T: Tin-coated copper B: Bare copper	1: Unshielded 2: Al. foil 3: Copper foil 4: BC braid 5: TC braid 6: Al. foil + TC braid 7: CU foil + BC braid	1: Unshielded 2: Al. foil 3: Copper foil 4: BC braid 5: TC braid 6: Al. foil + TC braid 7: CU foil + BC braid	T: Braided tinned copper wire B: Braided bare copper wire G: Braided galvanized steel wire A: Braided aluminum alloy wire C: Braided copper alloy wire Z: Braided bronze wire	F=fire resistant (opt.)	SHF1 SHF2 MUD Resistance(NEK606)

Optional: Cold bend per CSA 22.2 @ -40°C and Cold Impact per CSA 22.2 @ -35°C (IEC 60092-350 Annex E.)

## 6. Tests carried out / Program

Standard	Release	General description	Limitation
IEC 61156-1	2007-06	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 61156-5	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	
IEC 61156-7	2003-05	Multicore and symmetrical pair/quad cables for digital communications – Part 7: Symmetrical pair cables with transmission characteristics up to 1200 MHz - Sectional specification for digital and analog communication cable	
IEC 61156-6	2009-10	IEC 61156-6 Ed. 3.0: 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	
IEC 60793-2-10	2011-03	Optical fibres - Part 2-10: Product specifications - Sectional specification for category A1 multimode fibres	
IEC 60793-2-50	2008-05	Optical fibres - Part 2-50: Product specifications - Sectional specification for class B single -mode fibres	
IEC 60794-1-2	2003-05	Optical fibre cables – Part 1-2: Generic specification – Basic optical cable test procedures	
IEC 61158-2 ed. 1	2010-10	Industrial communication networks. Fieldbus specifications. Part 2: Physical layer specifications and service definition.	
IEC 61784-1 Ed.3.0	2010-07	Industrial communication networks - Profiles - Part 1: Fieldbus profiles	
IEC 61784-2 Ed.2.0	2010-07	Industrial communication networks - Profiles - Part 2: Additional fieldbus profiles for real -time networks based on ISO/IEC 8802-3	
IEC 61189-1	2007-05	Low-frequency cables and wires with PVC insulation and PVC sheath - Part 1: General test and measuring methods:	
		-8.2 Dielectric strength conductor/conductor and conductor/screen	1,0 kV rms for 1 minute. No breakdown of insulation shall occur.
		-8.3 Insulation resistance.	Minimum 150 MOhm for 1 km cable after dielectric test
		-4.3 Conductor elongation at break	>=8%
IEC 60092-350	2014-08	General construction and test methods of power, control and instrumentation cables for shipboard and offshore applications	
IEC 60092-376	2003-05	Cables for control and instrumentation circuits 150/250 V (300 V)	Increased insulation thickness and voltage level 0,6/1kV
IEC 60092-351	2004-04	Insulating materials for shipboard and offshore units, power, control, instrumentation, telecommunication and data cables	
IEC 60092-353	2011-08	Electrical installations in ships - Part 353: Power cables for rated voltages 1 kV and 3 kV	0,6/1 kV
IEC 60092-359	1999-08	Sheathing materials for shipboard power and telecommunication cables	

## Quality Assurance Department

Standard	Release	General description	Limitation
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 60331-1/2	2009-05	Fire resistance / Circuit integrity – Test for method for fire with shock at temperature of at least 830°C for cables rated up to and including 0,6/1 kV	Minimum 120 min with mechanical shock
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 and including 0,6/1,0 kV	Minimum 120 min
IEC 60332-3-22	2018	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 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 2013-09	Measurement of smoke density of cables burning under defined conditions – Test apparatus, procedure and requirements	Low smoke Light transmittance >60%
NEK 606 Ed. 4	2016	Cables for offshore installations. Halogen-free and/or mud resistant. Technical specification.	Mud resistance test: IRM903 100°C 7d. Calcium Bromide 70°C 56d. Oil based mud: Carbo Sea 70°C 56d or EDC 95/11 70°C 56d
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