



Confirmation of Product Type Approval

Company Name: TELDOR CABLES & SYSTEMS LTD

Address: EIN DOR, 0 19335 Israel

Product: Communication Cable

Model(s): Teldor MG BUS / FieldBus

Certificate Type	Certificate Number	Issue Date	Expiry Date
Product Design Assessment (PDA)	19-GE1877174-PDA	12-AUG-2019	11-AUG-2024
Manufacturing Assessment (MA)	19-PR3653933	08-APR-2019	07-APR-2024
Product Quality Assurance (PQA)	NA	NA	NA

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Intended Service

BUS / FIELDBUS Data communications cables for Marine, OIL/GAS and Offshore applications with Low smoke, Zero halogens and flame retardant characteristics.

Description

BUS / FieldBus cables for Marine, Oil/Gas and Offshore applications.

The cables are made from solid or stranded conductors with SHF1 / SHF2 / SHF2-Mud-resistant per NEK606 jackets.

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

The cables are oil resistant and designed for harsh conditions.

Includes: ProfiBus (100,150), CanBus, DeviceNet, FieldBus H1 Ethernet/IP, RS-485, RS-422.

Ratings

Voltage: 300V max.

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 BUS cables v12

Catalogue Offshore Rev.01/2015

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

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

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 Inspection / Factory Acceptance Test for RS485 SFTP SHF2 dated 2018-01-11

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.7MG0004129 dated 2014-09-01

TELDOR Test Report No.7MG0005129 dated 2014-09-01

TELDOR Test Report No.7MG0006129 dated 2014-09-01

Term of Validity

This Product Design Assessment (PDA) Certificate 19-GE1877174-PDA, dated 12/Aug/2019 remains valid until 11/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 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 60092-360 Edition 1.0 (2014-04)

IEC 60754-1 Edition 3.0 (2011-11)

IEC 60754-2 Edition 2.0 (2011-11)

IEC 60331-23 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 blue ink, appearing to read "James J. White".

Corporate ABS Programs
American Bureau of Shipping
Print Date and Time: 18-Sep-2019 5:41

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

Cables Family:	BUS & Industrial Ethernet cables for Marine / Oil / Gas / Offshore applications.
Model/Type designation:	Teldor MG BUS / FieldBus cables for Marine / Oil / Gas / Offshore applications, Flame retardant, Fire Resistance (optional), Low smoke, FR-LSZH/HFFR, Armored/Non-armored, jacketed with SHF1 or SHF2 or MUD resistance (NEK 606) jacket types.
Intend service/application:	BUS / FIELDBUS Data communications cables for Marine, OIL/GAS, Offshore and Industrial applications with Low smoke, Zero halogens and flame retardant characteristics. Includes: ProfiBus (100,150), CanBus, DeviceNet, FieldBus H1 Ethernet/IP, RS-485, RS-422.
Description:	BUS / FieldBus cables for Marine, OIL/GAS, Offshore and Industrial applications. The cables are made from solid or stranded conductors with SHF1 / SHF2 / SHF2-Mud-resistant per NEK606 jackets. The cables are flame retardant per IEC60332-3, fire resistant (optional) per IEC60331-23, halogen free, low smoke emission, armored and Non-armored. The cables are oil resistant and designed for harsh conditions. Includes: ProfiBus (100,150), CanBus, DeviceNet, FieldBus H1 Ethernet/IP, RS-485, RS-422.
Voltage rating:	300V
International standards:	IEC 60092-376, IEC 61158-1&2, IEC 61784-1&2, IEC 60092-350, IEC 60052-359, IEC60092-360, IEC 60754-1/2, IEC 61034-1/2, IEC 60332-3-22, IEC 60332-3-24, IEC 60332-1-1/2/3, IEC 60332-2, IEC 60331-23, NEK 606, SOLAS Amendments chapter -1, Part D, Reg. 45, 5.2.

1. Product description

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 ²
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 ²	>=0.22mm ²	

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

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. 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

4. Application limitation:

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

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

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)

7. Tests carried out / Program

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 61156-5	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 61156-7	2012-12	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	2012-12	IEC 61156-6 : 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 61158-2	2014-07	Industrial communication networks. Fieldbus specifications. Part 2: Physical layer specifications and service definition.	
IEC 61784-1	2014-08	Industrial communication networks - Profiles - Part 1: Fieldbus profiles	
IEC 61784-2	2014-07	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:	

Quality Assurance Department

Standard	Release	General description	Limitation
		-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 60092-359	1999-08	Sheathing materials for shipboard power and telecommunication cables	
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 60331-23	1999-04	Tests for electric cables under fire conditions – Circuit integrity – Part 23: Procedures and requirements – Electric data cables	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