



Exploration & Production

GENERAL SPECIFICATION

ELECTRICAL

GS EP ELE 161

Electrical cables

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1. Scope

This specification defines the minimum requirements for design, manufacture and testing of electrical cables for power, control, and lighting systems.

This specification covers onshore and offshore projects, but subsea cables and heating cables are excluded from this scope.

Cables related to HVAC services (except power) shall be in accordance with the instrumentation cables specification.

The Manufacturer shall make clear in his bid any deviation from this specification. No deviation from the requirements of this specification are allowable unless itemised in the Manufacturer's quotation and subsequently specifically agreed within the purchase order documents.

In cases where the Company's standard specification has been amended by Project specifications and is so noted, the Project specifications will govern.

2. Reference documents

The reference documents listed below form an integral part of this General Specification. Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and supplements, is the latest revision published at the EFFECTIVE DATE of the CONTRACT.

Design and engineering shall conform as a minimum requirement to the current edition of the following in order of preference:

- Applicable laws, rules and regulations of the country in which the system will be operated. In cases where no "local" regulations exist, the French laws and legislation shall be used
- Company Particular Specifications (if any)
- Company General Specifications
- Applicable International Electro-technical Commission (IEC) Standards
- Applicable CENELEC Standards.

Applicable recognised standards and codes (e.g. UTE-NFC, BSI, VDE, etc.) where IEC publications have not yet been issued.

Standards

Reference	Title
ASTM D 2863	Standard Test Method for Measuring the Minimum Oxygen Concentration to support Candle-Like Combustion of Plastics (Oxygen Index)
ASTM D 2843	Standard Test method for density of smoke from the burning or decomposition of plastic
ASTM E 662	Standard test method for density of smoke from the burning or decomposition of plastics
IEC 60092-350	Electrical installations in ship : General construction and test methods of power, control and instrumentation cables for shipboard and offshore applications

Reference	Title
IEC 60092-351	Electrical installations in ship : Insulating materials for shipboard and mobile and fixed offshore units ,power, telecommunication and control data cables
IEC 60092-359	Electrical installations in ship : Sheathing material for shipboard power and telecommunication cables
IEC 60227-1	Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V - Part 1: General requirements
IEC 60228	Conductors of insulated cables
IEC 60287(All parts)	Electric cables - Calculation of the current rating- (All parts)
IEC 60331-21	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
IEC 60332-3-22	Tests on electric and optical fibre cables under fire conditions - Part 3-22: Tests for vertical flame spread of vertically-mounted bunched wires or cables-Category A
IEC 60445	Basic and safety principles for man-machine interface, marking and identification - Identification of equipment terminals, conductors termination and conductors
IEC 60502 (Parts 1; 2)	Power cables with extruded insulation and their accessories for rated voltages from 1 kV up to 30 kV - (Parts 1; 2)
IEC 60754 (Parts 1; 2)	Test on gases evolved during combustion of electric cables - (Parts 1; 2)
IEC 60811 (All parts)	Common test methods for insulating and sheathing materials of electric cables and optical cables - (All parts)
IEC 60885- (All parts)	Electrical test methods for electric cables – (All parts)
IEC 61034-2	Measurement of smoke density of cables burning under defined conditions - Part 2: Test procedure and requirements
IEC 61892-4	Mobile and fixed offshore units – Electrical installations – Part 4: Cables
UL 1581 (partial)	UL standard for safety for electrical wires, cables and flexible cord: Part about Physical properties after immersion in oil and part about Carbon – Arc and Xenon-Arc tests (1200)

Professional Documents

Reference	Title
Not applicable	



Regulations

Reference	Title
Not applicable	

Codes

Reference	Title
Not applicable	

Other documents

Reference	Title
Not applicable	

Total General Specifications

Reference	Title
Not applicable	

3. Environmental conditions

Cables for onshore projects shall generally be directly buried in the ground. Cables for offshore projects shall be run on cable trays/ladders. In technical voids of technical rooms they shall be supported on cable trays/ladders (offshore/onshore).

Environmental data is given in the environmental data Project specification.

4. Construction requirements

Cables for onshore plants shall follow the requirement of the [IEC 60502 \(Parts 1; 2\)](#), while cable for installation in ships (hull of Floating Units, etc) and fixed offshore units (including topsides of Floating Units) shall follow the requirements of the [IEC 60092-350 / 351 / 359](#).

4.1 Rated voltages

The voltage designation of the cables shall be $U_0/U(U_m)$ as defined in [IEC 60502-1](#) § 4.1 , [IEC 60502-2](#) § 4.1 or [IEC 60092-350](#).

System Voltage	Rated Voltage $U_0/U (U_m)$
LV (control)	450/750 V
LV (< 1000 V) Power and lighting	0.6/1kV(1.2kV)
≤ 6.6 kV	6/10 (12) kV
11 kV	8.7/15 (17.5) kV
20 or 22 kV	12/20 (24) kV
33 kV	18/30 (36) kV

4.2 Conductors

Conductors shall meet the requirements of [IEC 60228](#).

For all cables, conductors shall be class 2 for fixed installations and class 5 for flexible installations.

Cable conductors shall be of high conductivity, stranded plain annealed copper.

Exceptionally for sites where the concentration of H_2S is high, all cable conductors shall be tinned.

HV cables shall incorporate a conductor screen made of an extruded semi-conducting compound applied to the conductors.

4.3 Insulation

4.3.1 HV Cables

The insulation material shall be XLPE (cross linked polyethylene) in accordance with [IEC 60502 \(Parts 1: 2\)](#) or [IEC 60092-351](#).

EPR insulated cables may be quoted as an alternative for HV cables in accordance with [IEC 60502-2](#) or [IEC 60092-351](#).

HV cables shall incorporate an insulation screen which consists of an extruded semi-conducting layer in combination with a metallic layer (copper tape).

4.3.2 LV Cables

Power and lighting cables shall be XLPE insulated in accordance with [IEC 60502-1](#) and or [IEC 60092-351](#).

Control cables (multi-core cables) shall be PVC insulated in accordance with [IEC 60502-1](#) or [IEC 60092-351](#).