

	GOLGOHAR STEEL PROJECT	
	Technical Specification For Cables	
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Technical Specification For Cables

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1.0 GENERAL

1.1 SCOPE

This Specification Describes the Minimum requirements for design, manufacturing and testing of multi-core/single-core LV and Control cable.

Metric SI system of units shall be applied to all dimensions and relevant documents.

All correspondence and submittals shall be in English.

1.2 DOCUMENT PRIORITY

In the event of any conflict between this specification, the requisition, codes and standards, the priority shall be given in the following order.

- Purchase order
- This specification
- Codes and standards

1.3 CONDITION OF OPERATION

All of the Electrical Equipment & Systems will be suitable for 24 hours, 7 days/week, and 365 days/year operation.

Site Conditions

1.4 Plant Location

The Site is located at Gol-E-Gohar Iron Ore Complex, situated in Sirjan, Province of Kerman in southern part of Islamic Republic of IRAN, approximately 285 km southwest of Kerman city and 335 km north of Bandar Abbas port, in a semi-desertic high plateau terrain, 1750 m above sea level, and flanked by mountains over 2500 m high trending northwest to southwest.

1.5 Meteorological

Ambient Temperature

Max. Temperature:	+40 deg. C (Recorded)
	+50 deg. C (Design)
Min. temperature:	-12 deg. C (Recorded)
	-10 deg. C (Design)
Average temperature:	+15.9 deg. C (Design)
Wet bulb design temperature (summer):	+25 deg C

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Relative Humidity:

Max. 70%

Wind Velocity

According to National Iranian Code (6th revision):

Basic speed data: 130 Km/h

Basic pressure data: 0.845 KN/m²

Correction factor:

0 - 10 m: 2

10 - 20 m: 2.2

20 - 100 m: 2.4

Rainfall

Yearly 120 mm (average)

Monthly rainfall 260mm (Max)

Barometric Pressure

820 milliards

Geological Conditions

This data is belongs to the existing palletizing plant location. For the engineering the contractor shall be study geotechnical conditions for the essential location according to the project plan.

Altitude: About 1,750 m above mean sea level

Soil bearing: approx. 20t/m²

Ground water level: approx. 60 m below ground level

Earthquake Load

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Equipment in plant will be dimensioned including a safety calculation against earthquake according to the “Iranian Code for Seismic Resistant Design of Buildings – Publication No. S253-2nd edition, autumn 1999” (“Iranian Regulations 2800”) and “Minimum

Design Loads for Building and Structures” (Iranian Regulations 519).

- Design base acceleration: 0.3·g
- Classification of Buildings: Group 2
- Soil classification: soil type III-b

2.0 STANDARDS AND CODES

The capacity of the Emergency Diesel Engine Generator shall be able to take care of the following cases. (The cases, which demands maximum requirement will be considered for sizing).

IEC – 60502	Extruded solid dielectric insulation power cable for rated voltage from 1kV up to 30 kV
IEC –60055-2	Paper insulated metal sheathed cables for rated voltage up to 18/30 kV
IEC – 60840	Power cables with extruded insulation and their accessories for rated voltages above 30 kV up to 150 kV
IEC – 60811	Common test methods for insulation and sheathing materials of electric cables.
IEC – 60228	Nominal cross-sectional areas and composition of conductors of insulated cables.
IEC – 60227	Specification for insulating covering and sheaths.
IEC – 60331	Fire resisting characteristics of electric cables.
IEC – 60332	Test on cables under fire conditions.
IEC – 60375	general instrumentation, general and communication cables.
B.S - 6346	specification for P.V.C insulated cables.
B.S - 5467	Cables with thermo setting insulation for electricity supply for rated voltage, up to and including 600/ 1000 V.

Where reference is made in this specification to other standards, it is understood that equivalent standards published by IEC are acceptable.

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3.0 DESIGN AND PERFORMANCE

3.1 LOW VOLTAGE POWER CABLES

CONROL CABLE:

NYCY Cable, 0.6/1 (1.2) kV, Class 2 circular stranded plain annealed copper wire conductor, PVC core insulated, Concentric conductor of copper Screen, unarmored and PVC outer sheath (UV resistant).

NYCY Cables (Single-Core, Twin, Three or Multi-Core)

Rated voltage (U0/U)	0.6/1 kV
Conductor	Class 2 circular stranded plain annealed copper wire conductor
Core Insulation	Polyvinyl chloride (PVC)
Screen	Concentric conductor of copper
Outer Sheath	Polyvinyl chloride (PVC), Black, UV resistant

Conductors

Conductors of LV and control cable shall be:

Conductor shall be Class 2 circular stranded plain annealed copper.

Conductors in the same cable shall be all same size except when four-core cable with reduced neutral is specified.

Primary insulation

Insulation shall be PVC extruded for Lighting, control and signaling cables. Insulation shall be XLPE for LV power cables.

Core screen

Core screen shall consist of a layer of semi-conducting compound and a metallic layer. The metallic layer shall be copper tape according to IEC 60502-1. Concentric conductor of copper Screen shall be used for NYCY cables.

Filler and Bedding

The Filler shall be Non-hygroscopic material, to obtain circular form of the cables, shall be pre-shaped PVC.

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The bedding shall be an extruded layer of PVC compound.

3.2 OUTER SHEATH

The outer sheath for the cables shall be applied by extrusion and shall be of PVC compound conforming to the requirement specified in the applicable standards. To protect the cable against rodent and termite attack suitable chemicals shall be added into the PVC compound of the outer sheath.

COLOR CODES FOR CONDUCTORS OF POWER CABLES

3-cores:	Red, Black, Yellow/Green (L1, N, PE)
4-cores:	Red, Yellow, Blue, Yellow/Green (L1, L2, L3, PE)
5-cores:	Red, Yellow, Blue, Black, Yellow/Green (L1, L2, L3, N, PE)
6-cores and up:	Black with White numbers (for Control Cables)
1 or 2-Cores (DC- Cables):	Red (for Positive) & Blue (for Negative)

COLOR OF EXTERNAL SHEATHS

Low Voltage Power cables:	Black
Low Voltage Control cables:	Grey
Low Voltage DC Power cables:	Red (+), Blue (-), Orange (for 2-Cores)

3.3 CABLE MARKING

Cable shall be marked on the outer sheath to provide the following information:

- Manufacturer's name
- Number of cores and conductor size
- Construction code
- Insulation voltage
- Length of Cable (per meter)
- Cable Type

This marking shall be repeated at frequent intervals not to exceed 5 m, and this number shall be legible.

3.4 CABLING SYSTEM

Main cable route inside electrical room and also areas with congestion of many consumers shall run in concrete trenches, whenever possible. The main cable route between the areas and electrical rooms and other small area such as Bins, Towers, shall

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be concrete conduit bank using Rigid PVC conduits with required manholes to limit the number and length of curves of conduits and circuit splicing for pulling of cables. It is allowed to use cable tray beside conveyor walkway for cable laying of lighting and LV motor power cable.

If aboveground cabling is necessary, a hot-dip galvanized cable tray/ladder or rigid galvanized steel conduit shall be installed.

Cables leaving cable tray to reach equipment will be individually protected by close conduit system.

All cabling support materials (i.e. ladders, trays, and relevant fixing materials) used throughout the plant shall be hot-dip galvanized.

Cable trays shall be covered by removable top covers, allowing adequate ventilation, where mechanical damage is likely.

3.5 SPECIAL CHARACTERISTICS

Cables shall have all or some of the following special characteristics as will be specified in the requisition:

- Hydrocarbon resistant.
- Non – flame propagation.
- Non – fire propagation.
- Fire resistance.
- Low production of corrosion gas.
- Low production of toxics gas.
- Low production of opaque – smoke.

Listed characteristics shall be specified according to the reference code.

ADDITIONAL REQUIREMENTS

Cables shall be supplied on wooden drums in one continuous length.

The wood used for construction of the drums shall be properly seasoned, sound and free from defects. Preservatives shall be applied to the entire drum.

Unless otherwise specified, the cables to be supplied on maximum per drum up to total drum weight of:

- 1.5 ton for cable size less than 6 mm².
- 3.0 ton for cable size from 6 mm² up to and including 50 mm².
- 5.0 ton for cable size greater than 50 mm².

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Supplier shall engrave or paint the following information on each drum. If paint method is used, it shall be weatherproof and not affected by direct sunlight. This label/plate shall be suitable for two years site storage and usage.

- a) Purchase order number.
- b) Purchase order item number.
- c) Cable type (size, number of cores, type, etc.).
- d) Cable length.
- e) Drum weight.
- f) Drum number.
- g) Manufacturer name and year of manufacture.

3.6 CABLE ACCESSORIES

The termination shall be suitable for the type of cables offered. The termination shall be supplied in kit form. The kit shall include all insulation and sealing materials apart from conductor fittings and consumable items. An installation instruction shall also be included in each kit.

The termination kits shall be suitable for termination of the cables to an indoor switchgear or to a weatherproof cable box of an outdoor mounted transformer/motor.

JOINTING KITS

The usage of straight jointing kits is not allowed in this project.

INFORMATION REQUIRED WITH BID

The following information shall be provided with quotation:

List of clausewise deviations from project specification. If the same is not furnished, it will be assumed that offered equipment meets all the requirements of this standard.

Catalogues and brochures giving technical and physical details of the cable like current rating, overall diameter, weight, etc.

Recommendations in respect of installation and limitation of use.

“Type Test” certificates and “Special Test” results for cables offered.

Type test certificated for cable accessories.

Note: Offer is likely to be rejected, if the above information is not furnished with bid.

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3.7 SHIPPING

Manufacturer shall be solely responsible for the adequacy of the preparation for shipping provisions employed, with respect to materials and their application to ensure that the cable reaches its destination in perfect working condition when handled by commercial carrier systems.

3.8 GUARANTEES

Suppliers of wires and cables under project specification, shall certify that such wire and cable meet all the requirements of project specification and is of first-class material and workmanship throughout. Suppliers shall replace any length of wire or cable failing under any of the following conditions:

Under a voltage test after installation is performed before the wire or cable is placed in service, but within 36 months from date of shipment.

During normal and proper use within one year of date of commissioning, the commencement of such a year being not more than 36 months from date of shipment.