Inquiry for I&C Cables

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1 Introduction

1.1 1.1. Introduction & objectives of the project

The purpose of this document is the list of required instrument cables for Sepiddasht Steel Complex.

SITE CONDITIONS

Plant Location

The steel making site is located in CHAHARMAHAL VA BAKHTIARI STEEL COMPLEX, with approximate coordinates of:

- *Latitude 32°,10' North*
- *Longitude 51°,10' East*

The nearest airport is SHAHR KORD airport.

Meteorological Conditions

The meteorological information of the Site is based on the data obtained from BOROOJEN meteorological station, since 1994. The station elevation is 2197 meters above mean sea level (M.S.L.).

- *Average maximum air temperature in the summer ranges within 27 to 33°C.*
- *Observed absolute maximum air temperature is equal to 36°C.*
- *Observed absolute minimum air temperature is equal to minus 26°C.*
- *Prevailing wind direction is west wind. The following wind velocities will be considered for design purposes:*
  - *for the elevation (over the sea level) of zero to 10 m 125 km/h.*
  - *for the elevation (over the sea level) of 10 to 20 m 148 km/h.*
- *Design atmospheric pressure should be assumed as 0.88 bar.*
- *Maximum annual amount of precipitation 292 mm.*
- *Observed relative maximum humidity is equal to 82%.*

In the autumn and spring precipitation falls in the form of convective showers, accompanied by thunder storms and lightning. Precipitation in any form is very rare within the summer, due to extremely high water absorbing capacity of the environment.

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Seismic Conditions

For supplied plant and equipments, all calculations referring to seismically conditions will be based on third version of Iranian National Code number 2800. According to this code, design base acceleration will be considered 0.3 g.

2 General

VENDOR shall confirm that all Attached documents are received enclosed with this enquiry and send the "Bid Check List" to ensure that the updated revision of each reference is received by VENDOR.

Additionally, VENDOR is responsible for all coordination with sub vendors and collection of all details, drawings, data submission of all document requested in the requisition.

PURCHASER's approval does not relieve VENDOR responsibility, in any way from his obligation to fulfil the requirements of the purchase order.

VENDOR shall clarify any vague point throughout the requisition with the PURCHASER before finalizing his proposal. If there will be any exception to and/or deviation from the requirements of the PURCHASER in VENDOR's proposal, he shall notify the PURCHASER clearly through a deviation/exception points list to be submitted together with the proposal.

This specification defines the minimum technical requirements for supply, fabrication, inspection, testing and packing of control and instrument cables description.

The vendor is responsible for the design, selection, manufacturing, testing and documentation of control and instrument cable.

2.1 Standards and Codes

IEC-28	*International standard of resistance for copper.*
IEC-92-3	*Cables (construction /testing, and installation).*
IEC-92-352	*Choice of laying of cables for low voltage power supply.*
IEC-92-375	*General instrumentation, control and communication cables.*
IEC-227-1 to 5	*Conductors and cables insulated polyvinyl chloride of nominal voltage of more than 450/750 V.*
IEC-754-1	*Determination of the amount of halogen acid gas involved during the combustion of polymeric materials taken from cables.*
IEC-228	*Conductors of insulated cables class 2 stranded conductors (fixed installation).*
IEC-245-1 to 4	*Conductors and cables rubber insulated having nominal voltage of more than 450/750 V.*
IEC-801-part 3	*EMI and RFI immunity*

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IEC-189-1 to 7	*Cables and wires for low frequency PVC insulated and in PVC protective sleeve.*
IEC-331	*Characteristics of fire resisting electric cables.*
IEC-332	*Testing of electric cables submitted to the fire.*
IEC-334	*Guide to calculation of resistance of plain and coated copper for low frequency cables and wires.*
IEC-584-3	*Thermocouples - Extension and compensating cables*
IEC-60287	*Electric cables calculation of the current rating.*
IEC-60811	*Common test methods for insulating and sheathing materials of electric cables.*
IEC-60446	*Color identification insulated and non-insulated core.*
IEC-60304	*Standard colors for insulation for low frequency cables & wires.*
IEC-60502	*Extruded solid dielectric insulated.*

In the event of conflict between this document and any code/standard referred to herein or other relevant IEC standard, the IEC standard shall be governed.

Any deviations in construction from this specification and above mentioned code/standard shall be high-lighted in the technical offer.

All of the routines, type and periodic tests will be performed according to IEC standard for different type of cables.

2.2 Guaranty

The Supplier shall take full responsibility for the complete material.

All components shall be guaranteed first class material and workmanship throughout and shall be guaranteed to perform satisfactorily in accordance with service condition as specified.

The Supplier shall promptly replace any faulty cable length to the full satisfaction of purchaser up to one year from the date of delivery to job site, without any costs to the purchaser.

3 Design and Manufacturing

The cables and wires are mostly installed on trays and ducts, under direct sunlight.

Stranded cables shall be considered for instrument cables with suitable conductivity class.

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The instrument cables shall have Resistance of insulation 10 MΩ. L/R ratio of I.S cables shall be below 25 µH/Ω and capacitance bellow 200 PF/m. Outer sheath shall be halogen free.

Whenever the cables are exposed to the temperature higher than 75 °C, suitable cable with appropriate temperature rating shall be specified.

All cores shall have distinct wire number clearly and indelible.

3.1 Equivalent Materials

Where material requirements are specified as "*make...* or *equal* or *verify by VENDOR* ", VENDOR may propose equivalent material which shall fully meet the technical and environmental requirements and such fulfilment shall be proved by documentary evidence supplied by VENDOR. However, in these cases, the final selections of materials are subject to PURCHASER approval.

3.2 Service Life

The service and support of cables shall be at least 10 years.

3.3 Non Conformity

VENDOR shall immediately inform PURCHASER for any nonconformity, found during manufacturing and / or inspection and testing.

3.4 Deviation

BIDDER shall define any/all deviations to the attached documents and this inquiry if any.
BIDDER shall note that any quotation submitted that does not include the requirements at above items shall be deemed to be non-responsive and will be technically rejected.

Deviations from technical specification and datasheets shall be attached as a "Deviation List" to the

"Letter of Conformity".

In the case of any deviation, PURCHASER approval shall be obtained by VENDOR in writings before the order is placed.

3.5 Marking

The cable oversheath shall be embossed with marks to distinguish the following data as a minimum:

- Manufacturer's name and year of manufacture.
- Voltage grade (specified voltage).

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- Number of cores and core sizes.
- Cable type by abbreviation letters.
- Quality of overheat.

The marking shall be repeated at a minimum of one meter spacing along cables. The marking colour shall be chosen to contrast with the sheath colour. Marking shall be painted in undeletable ink.

4 Inspection and Testing

4.1 General

The cables shall be inspected and tested as specified in this specification and quoted codes and standards.

The acceptance of the cables will depend on the outcome of such inspections and tests.

All tests and inspections shall be supported and evidenced by appropriate test reports, records, etc.

The purchaser, and/or the final user and/or his representative reserve the right to attend any or all such tests/inspections.

The supplier shall notify and submit Test procedure document 20 days in advance on the inspections and tests to be carried out.

The purchaser and/or the final user may waive inspection and witnessing of tests at his own discretion. Such waiver in no way relieves the supplier of his obligations under this specification.

4.2 Inspection

Visual inspection will include but not be limited to checks of satisfactory workmanship, materials, finish, compliance with the Specification and the purchase order, measurement of the thickness of insulation, sheath and overall diameter and aliphatic hydrocarbons outer sheath resistance.

4.3 Testing

Under the condition that all type tests have been carried out for the types of cable in question and proper documentation is tabled, the following routine tests shall be accomplished for all the cable lengths purchased.

(As per IEC-92-3, section 2-testing specification):

- Conductor dimensions
- Conductor resistance
- High voltage test
- Insulation resistance
- Cable capacitance and inductance/resistance ratio.

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- Flame retarding test on sheath (IEC-332)
- Fire resistance test (for fire retardant cables)(IEC-331)
- Bending test

After testing the ends of the cables shall be sealed by an approved method to prevent the ingress of moisture.

Test certificates for all cables should be submitted by the vendor.

5 Preparation for Shipment

Cables shall be supplied in continuous lengths.

The Supplier shall provide plates or inscriptions showing the following information which shall be secured on to each drum:

A. Purchase order number, supplement and item number.

B. Reel number (sequence number within a requisition item)

C. Construction type and voltage grade.

D. Number of conductors and conductor sizes.

E. Cable length on drum.

6 Vendor Data

The vendor shall provide the following technical data as a minimum:

A. Maximum DC resistance of conductors @ 40°C in ohm/km.

B. Inductance between conductors with screen grounded in mH/km.

C. Capacitance between conductors with screen grounded in microF/km.

D. Weight in kg/km.

E. Minimum bending radius.

F. Production quality plan

G. Description of manufacturer workshop tests for each type of cable.

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7 Cables Spec.

Cable Spec.

ROW	TYPE	DESCRIPTION
1	NICR-NI	*Thermocouple K Cable , -220...+1250°C* *TC type K (NiCr-Ni)* *bendable*
2	OLFLEX 140	*OLFLEX 140 - H05VV5-F harmonised PVC control cable, oil-resistant, flexible and numbered for various applications, U0/U: 300/500 V.* *Oil-resistant according to EN 50363-4-1: TM5* *Harmonised (HAR): H05VV5-F*
3	OLFLEX 140 CY	*OLFLEX 140 CY - H05VVC4V5-K harmonised PVC control cable, oil-resistant, screened, flexible and numbered for various applications, U0/U: 300/500 V.* *Oil-resistant according to EN 50363-4-1: TM5* *Harmonised (HAR): H05VVC4V5-K* *and EMC compliant*
4	OLFLEX CLASSIC 100	*Flexible PVC cable, colour coded, control cable for various applications, 300/500V.*
5	UNITRONIC LiYCY	*Screened data transmission cable with colour code acc. to DIN 47100.* *Low-frequency PVC data cable DIN 47100 coded Flexible, Flame retardant Screened, Instrumentation Control*
6	UNITRONIC LiYCY (TP)	*Screened data transmission cable with colour code acc. to DIN 47100 and twisted pairs.* *Low-frequency PVC data cable, DIN 47100 coded, Twisted pairs, Flame retardant, Screened, Instrumentation Control*
7	OLFLEX FD 855 P	*Halogen-free, highly flexible control cable with abrasion and oil resistant PUR sheath.* *OLFLEX FD 855 P - Halogen-free power and control cable for power chain use in harsh conditions with UL/cUL AWM certification.*

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8	OLFLEX SERVO FD 781 CY	*Screened, low capacitive servo cable with PVC outer sheath for flexible power chain application*
9	UNITRONIC FD CP (TP) plus	*Screened highly flexible data transmission cable with PUR outer sheath and twisted pairs - UL/CSA-listed* *UNITRONIC® FD CP (TP) plus: Low-frequency PUR data cable UL AWM CMX VW-1 Halogen-free, Highly flexible Drag chain, Screened Twisted pair, Low capacitance, -40°C* *Flexible at low temperatures* *Low capacitance* *Halogen-free*
10	SILFLEX EWKF	*Silicone cables with increased mechanical characteristics. ÖLFLEX® HEAT 180 EWKF - silicone power and control cable, tear and notch resistant, for use in machines, plant construction and tool building, suitable for +180°.*
11	SILFLEX EWKF C	*Screened silicone cables with increased mechanical characteristics.* *ÖLFLEX® HEAT 180 EWKF C - shielded silicone power and control cable, tear and notch resistant, for use in plant construction and tool building, suitable for +180°C.*
12	NYY-J	*Fixed installation, direct burial; PVC cable with different application area, RM stranded core*

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8 Cable lengths

EAF, LF I&C Cable Length

Row	Core No.	Cable Type	Length (m)
1	10x1.5+sh	UNITRONIC LiY-CY (TP)	350
2	12x1.5	OLFLEX 140 G	2150
3	12x(2x1.5+sh) +sh	LiY-CY (TP)	800
4	12x(2x1.5+sh) +sh	THERMOCOUPLE- Type K /COMPENSATION	110
5	14x(2x1.5+sh) +sh	UNITRONIC FD CP (TP) plus	430
6	18x1.5+sh	OLFLEX 140 CY G	790
7	24x1.5+sh	OLFLEX 140 CY G	300
8	24x1.5+sh	OLFLEX FD 855 CP G	50
9	2x1.5+sh	SILFLEX EWKF C	680
10	2x1.5+sh	UNITRONIC LiY-CY	770
11	2x(2x1.5)+sh	UNITRONIC LiY-CY (TP)	3520
12	3x1.5+sh	SILFLEX EWKF C	1850
13	3x1.5+sh	OLFLEX 140 CY G	5120
14	4x(2x1.5+sh)+sh	UNITRONIC LiY-(L)CY (TP)	570
15	5x1.5+sh	OLFLEX 140 CY G	2550
16	7x1.5+sh	OLFLEX 140 CY G	1610
17	7x1.5	OLFLEX 140 G	4990
18	7x1.5+sh	UNITRONIC LiY-CY	300
19	12x1.5+sh	OLFLEX 140 CY G	1550
20	3x1.5	SILFLEX EWKF	100
21	4x1.5+sh	SILFLEX EWKF C	150
22	3x1.5	OLFLEX 140 G	250
23	7x(2x1.5+sh)+sh	UNITRONIC LiY-CY (TP)	500
24	4x2.5+PE	NYY-J	500
25	4x4+PE	NYY-J	1400
26	2X2.5+PE	NYY-J	500
27	2X4+PE	NYY-J	1400
28	4x16+PE	NYY-J	300

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Annex 1: Cable types technical catalogues

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