



پروژه خطوط انتقال پساب از واحد فولادسازی به RO واحد کوثر
اسناد مناقصه تامین، اجرا، تست و راه اندازی



صفحه ۱ از ۲۸

پیوست ۱۸-۱

شماره مناقصه: _____

پیوست هجده: اسناد و مدارک فنی

۱۸-۱ اسناد فنی پایه

۱۸-۱-۱ کد ها و استانداردها



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پیوست ۱۸-۱-۱

شماره مناقصه:

Engineering Standards and Codes



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- 5. Civil And Structural**
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1. Introduction

Owner engineering codes & standards have been prepared for compliance of the Contractor.

These codes & standards are mainly based on national & international standards.

Design, fabrication, testing and supply of the plant equipment, materials & facilities for "Owner" shall be based on these engineering codes & standards.

However, compliance of Contractor with these codes & standards shall not relieve him of the responsibilities for the complete, safe & satisfactory performance of the Plant, these standards will cover only the major parts of the Plant.

Parts not covered here shall be in accordance with acceptable international standards.

Generally, in this Contract; engineering, design, manufacturing inspection, painting, packing & construction shall be according to the following international standards :

- American National Standards (ANSI)
- British Standards (BS)
- German Standards (DIN)
- Japanese Standards (JIS)
- American Society for Testing and Material (ASTM)
- Institute of Electrical and Electrode Engineers (IEEE)
- National Electrical and Manufacturer's Association (NEMA)
- International Electro technical Commission (IEC)
- Instrument Society of America (ISA)
- American Institute of Steel Construction (AISC)
- Steel Structures Painting Council (SSPC)
- National Fire Protection Association (NFPA)
- Standards of the Insulated Power Cable Engineers Association (IPCEA)
- Federal Emergency Management Agency (FEMA)
- American Welding Society (AWS)
- National Association of Corrosion Engineers (NACE)
- American Petroleum Institute (API)
- American Society of Mechanical engineering (ASME)
- ISO
- EN



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شماره مناقصه: _____

- Institute of Electrical and Electrode Engineers (IEBE)
- American Water Work Association (AWWA)
- The American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE).
- American Conference of Governmental Industrial Hygienists (ACGIH)
- Minimum requirements for preservation, packing & marking as per ASTM, D3951, commercial packaging.

Other specific standards and Owner's requirements indicated in this document.



2. Environmental Control

2.1. Environmental Protection

The Contractor shall follow the latest revision of all related Rule and Regulation of the "Iran Environmental Protection Agency , IEPA , Standard".

Typical pollution control aspects , Acc. to IEPA, ACGIH, has been attached here for Owner Plant Units and Systems.

2.2. The Iran Environmental Protection Agency Standards

2.2.1. Scope

This Standard gives the minimum requirements regarding pollution control for the Project.

2.2.2. Standards

The following Standards are applicable :

EPA : Environmental Protection Agency of Iran

WHO : World Health Organization

APHA : American Public Health Association

OHSAS: Occupational Health & Safety Assessment Series

OSHA: (Occupational Safety & Health Administration)

-General Guiline for Invironmental Impact Assessment for Development Plans Publication Pub No.254-1 of Management & Planning Organization.

- Steel Industry Environmental Impact Assessment (Guidline)/Pub No.254-3

- Iranian Environmental Protection Rules & Regulations/Vol 1

In case of any contradiction between above standards, EPA Standard prevails.

All Iranian Standards & Codes & Publications of Management & Planning Organization should be considered as the minimum requirements of the project.

2.2.3. General

The best practicable means shall be owned to restrict pollution from all sources including noise, to an acceptable level.

Wherever potential causes of pollution are unavoidable, measures shall be taken to collect and treat effluents or to silence noise to ensure that there is no risk to health, and no unreasonable annoyance within the works and its immediate surroundings.

The main areas of environmental contamination are :

- Atmospheric pollution
- Liquid discharge
- Solid waste disposal
- Noise

To conserve water, maximum recycling of liquids shall be Owned and for gas cleaning preference will be given to dry methods wherever possible.

2.2.4. Water Pollution Control

According to the regulations of the “Environmental Protection Agency of Iran“ the limit of each pollutant materials in Sewage water should not exceed the quantities shown on table “2“.

Table 2

Maximum Allowable Concentration of Pollutants in Industrial Effluents VII-13/20

Pollutants	Discharge to Surface Water	Agricultural Use and Irrigation	Discharge to Ground waters (Well)
1. Aluminum	5mg/l	5 mg/l	5 mg/l
2. Arsenic	0.1 mg/l	0.1 mg/l	0.1 mg/l
3. Barium	2 mg/l	1.0mg/l	1.0 mg/l
4. Berilium	0.1 mg/l	0.1mg/l	1.0 mg/l
5. B.O.D. ₅	20 mg/l	100mg/l	20 mg/l
6. Borom	2 mg/l	1.0 mg/l	1.0 mg/l
7. Cadmium	0.1 mg/l	0.01 mg/l	0.01 mg/l



Pollutants	Discharge Surface Water to	Agricultural Use and Irrigation	Discharge to Ground waters (Well)
8. Calcium	75mg/l	No. Limit	No limit
9. C.O.D.	50 mg/l	200 mg/l	50mg/l
10. Chlorine (free Cl ₂)	1.0 mg/l	0.2 mg/l	1.0mg/l
11. Chloride	(Note 1) 600	600	(Note 1) 600
12. Chromium			
a. Six Valence	0.5mg/l	1.0 mg/l	1.0 mg/l
b. Three Valence	1 mg/l	1 mg/l	1 mg/l
13. Cobalt	1.0 mg/l	0.05 mg/l	1.0 mg/l
14. Color(color unit)	75	75	75
15. Copper	1.0 mg/l	0.2 mg/l	1 mg/l
16. Cyanide	0.02mg/l	0.02 mg/l	0.02 mg/l
17. Detergent (ABS)	1.5 mg/l	0.5 mg/l	0.5 mg/l
18. Dissolved oxygen	2.0 mg/l	2.0 mg/l	No limit
19. Fluoride	2.5 mg/l	2.0 mg/l	2.0 mg/l
20. Formaldehyde	1.0 mg/l	1.0mg/l	1.0 mg/l
21. Iron	3 mg/l	3 mg/l	0.5 mg/l
22. Lithium	2.5mg/l	2.5 mg/l	2.5 mg/l
23. Magnesium	100 mg/l	100 mg/l	100 mg/l
24. Manganese	1.0 mg/l	0.2mg/l	0.05 mg/l
25. Mercury	absent	absent	absent
26. Molybdenum	0.01 mg/l	0.01 mg/l	0.01 mg/l
27. Nickel	1 mg/l	0.2 mg/l	0.2 mg/l

Pollutants	Discharge to Surface Water	Agricultural Use and Irrigation	Discharge to Ground waters (Well)
28. Nitrogen :			
A : Ammonium	2.5 mg/l	No. Limit	0.5 mg/l
B : Nitrate	50 mg/l	No. Limit	10 mg/l
C : Nitrite	10mg/l	No. Limit	0.5 mg/l
29. Lead	1.0 mg/l	1 mg/l	1.0 mg/l
30. Oil and grease	10 mg/l	10 mg/l	10 mg/l
31. Phenol	1.0 mg/l	1.0 mg/l	Absent
32. Phosphorus	1.0 mg/l	No. Limit	1.0 mg/l
33. Selenium	1.0 mg/l	0.2 mg/l	0.01 mg/l
34. Silver	1.0 mg/l	0.1 mg/l	0.05 mg/l
35. Solids :			
a. Suspended solids	30 mg/l	100 mg/l	30 mg/l
b. Total dissolved Solids	Note 3	Note 3	Note 3
c. Settleable Solids	Absent	No. Limit	No. Limit
d. Floating materials	Absent	Absent	Absent
36. Sulfate	300 mg/l	500mg/l	300 mg/l
37. Sulfide	1 mg/l	1 mg/l	1 mg/l
38. Zinc	2 mg/l	2mg/l	2mg/l
39. Turbidity (turbidity unit)	50	No. Limit	50
40. PH	6.5 to 8.5	6 – 8.5	5.0 to 9.0
41. Temperature	Note 5	No. Limit	No limit
42. Radioactive Isotopes	Absent	Absent	Absent

Pollutants	Discharge to Surface Water	Agricultural Use and Irrigation	Discharge to Ground waters (Well)
43. Coliform :			
a. Fecal (per 100 ml)	400	400	400
b. M.P.N. (Per 100 ml)	1000	1000	1000
44. Vanadium	0.1 mg/l	0.1 mg/l	0.1 mg/l

Notes :

1- Amount of Cl in the industrial waste water shall not exceed 250 mg/l, if waste water discharges into fresh water.

Industrial waste water should not increase the amount of chloride in saline water more than 10% in a radius about 200m from the entering area.

2- Industrial waste water should not increase the amount of Sulphate in receiving water more than 10% in a radius about 200m from the entering area.

3- Industrial waste water should not increase total dissolved solid receiving water more than 10% in a radius about 200m from the entering area.

4- Reduction of COD and BOD of discharge wastewater should not be less than 90% of entering 24 hours compound sample.

5- Temperature of wastewater shall be so that temperature changing of receiving waters shall not be more than 3°C in a radius of 200m from entering area.

6- TDS value should not be more than 10% of consumer water.

7- The color of the receiving water must not be increased more than 16 standard platinum cobalt units as a result of effluent discharged or will cause substantial visual contrast with the normal appearance of the receiving water.

2.2.4.1. Testing for Water Pollution Control

The testing methods for water and sewage shall be performed in compliance with the following standards and codes :

- ASTM
- WHO

- APHA

2.2.5. Solid Waste Disposal

Maximum recycling of waste shall be Owned and close attention paid to avoiding creation of grit, dust and fume.

2.2.6. Noise Pollution

The best practicable working environment shall be achieved by selection of machinery and noise reduction to acceptable limits.

2.2.6.1. Limited Noise Levels

Where persons are exposed to continuous noise generated by machinery for 8 hours in any one day the sound level shall not exceed 85 dBA.

Where persons are exposed to noise generated by machinery for a period of less than 8 hours, or where the sound level is fluctuating, an equivalent continuous sound level shall be calculated and should not exceed 85 dBA.

The permissible noise level for duration of 8 hours per day and shorter periods are shown on table "3". The sound level indicated in this table is on the basis of slow meter measurement.

Table 3

Duration Per Day(Hr.)	Sound Level DBA (Slow)
8	85
6	92
4	95
3	97
2	100
1 ½	102
1	105
½	110
¼ or less	115

Noise in the following places shall not exceed 35 dBA :

Offices, Rest Rooms, Computer Rooms.

Noise in the following places shall not exceed 40 dBA :

Laboratory, control rooms, pulpits , spare part warehouse, locker rooms.



Noise in the following places shall not exceed 45 dBA :

Electrical rooms, motor rooms , substations.

Note: Aqustic regulation of Iranian National Building Code Part 18 shall be considered.

2.2.6.2. Method of Measurement

1. Noise levels shall be measured by a precision sound level meter, of the self calibrating type, approved by Owner.
2. The noise level of a machine shall be generally measured by the near field method.
3. The machine under test shall be installed on normal foundations in Owner premises and/or the Contractor's works, where agreed, and operated under (a) full load and (b) part load conditions. The noise level shall be measured in dBA or octave bands at a minimum of 5 locations equispaced on a prescribed path, one meter from the vertically projected plan of the machine at a height of 1.5 meters, additional measurements shall be made at the location on the prescribed path giving the highest sound level reading and at every location likely to be occupied by an Ownee for a substantial part of the working day.

It is also desirable that the dimensions of the test area in the specified directions shall be at least three times those of the equipment under test.

4. Before the machine is tested, the background noise levels must be determined using the same sound level meter and filters and the same locations as the test.

If the reading of the background noise level is within 10 dB of the machine test reading, the necessary corrections are to be applied.

5. The final noise levels in the working environment must be measured on site at locations which Ownees will occupy.
6. The noise levels in the offices, control rooms and amenity areas will be measured in the working environment at site, at locations which Ownees will occupy.

2.2.6.3. Noise Reduction

1. When it is determined that the noise level of a machine exceeds the stated limited noise level, an approved means of noise reduction must be provided.
2. An approved means of noise reduction may require the following measures to the machine:
 - (a) Exhaust silencing
 - (b) Machine enclosure or screens Enclosure of the operator's workplace



3. ELECTRICAL

Codes and Standards

The electrical equipment s will comply latest IEC standards (International Electro technical Commission); in subjects that IEC doesn't have relevant standard, the equipment must comply by these standards: BSI, IEEE, VDE, ANSI, NEMA, ICEA, IESNA, CENELEC, API, IECPA, NEC, ISO and NFPA.

The equipment will be engineered, designed, manufactured and tested in accordance with one of the following standards:

Motors

- Cylindrical rotor synchronous machine, ANSI C50.13
- Rotating electrical machines, IEC 34
- International Electro-Technical Commission (IEC) – 34, 72, 79 & 72A
- NEMA (National Electrical Manufacturers Association)
- API RP541
- ISO (International Standard Organization) ISO R281, 1940/1 and 2373

Cables And Wires

The cables and wires shall be manufactured and tested in accordance with all applicable sections of the following standards and codes:

- Nominal cross-sectional areas and composition of conductors of insulated cables, IEC 228
- Calculation of the continuous current rating of cables , IEC 287
- Polyvinyl chloride (PVC) insulated cables of rated Voltage up to and including 750V, IEC 227
- Nominal cross-sectional areas and composition of conductors of insulated cables, IEC 228
- Tests on Anti-corrosion protective coverings of IEC 229 metallic cable sheaths
- Calculation of the continuous current rating of cables, IEC 287
- Extruded solid dielectric insulated power cables for rated voltage from 1 kV up to 30 kV, IEC 502.
- Test methods for insulation and sheaths of electrical cables and cord (Blastomeric and thermoplastic compounds), IEC 540
- Steel conduit and fittings for electrical wiring, BS 31
- Galvanized mild steel wire for armoring cables, BS 1442
- Copper and copper alloy wires, BS 2873
- Un plasticized PVC pipe for industrial pipes, BS 3506



- Fire resisting characteristic of electrical cables, IEC 331
- Mechanical cable gland for rubber and plastic insulation cables, BS 4121
- Non-metallic conduit and fitting for electrical installation, BS 4607
- PVC insulated cable for electricity supply, BS 6346
- Conductor in insulated cables and rods, BS 6360
- Color chart for PVC installation and sheath of electrical cables, BS 6746

Electrical System Installation

- Electrical installation of buildings, IEC 364

Area classification

- IP Degree of protection, IEC 529
- API – RP 500A (classification of location for electrical installations in petroleum refineries)

Control Bench Boards

- IEC
- NEC, ANSI, CI, NFPA-70

Grounding system

- Guide for safety in A.C. substation grounding, IEEE 80
- Guide for measuring Earth Resistivity, IEEE 81
- Recommended practice for grounding of Industrial and commercial power system, IEEE 142

Lighting and lamp

- Tungsten filament lamps for general service, IEC 64
- Tubular fluorescent lamps for general lighting , IEC 81 service
- High pressure mercury vapor lamps , IEC 188
- Part-1&2 plugs, socket outlets and couples for industrial purposes , IEC 309

Symbols, Diagrams and Abbreviations

- International Electro technical Vocabulary, IEC 50
- The electric symbols, diagrams and abbreviations shall be as per IEC113, 750

Minimum Requirement

- a. Electrical system and equipment shall be so designed to have highest reliability and min. failure in order to achieve safe, efficient, accurate and easy operation under various operational requirements with minimum maintenance and operating cost.



- b.** The electrical system shall be designed based on safety to personnel during operation and maintenance, convenience of operation, maximum interchangeability of equipment and parts and shall be capable for future expansion of loads. All major electrical equipment shall be centralized as far as possible and located in safe areas to make maximum use of industrial type switchgear, motor control equipment, concealed panel boards and etc.
- c.** Documents including in calculations, drawings, catalogues shall have sufficient and necessary information for satisfactory operation, maintenance, trouble shooting, calibration, spare parts list and etc.
- d.** According to process requirements, some of the electrical information shall be indicated and/or reported by monitoring and logging system in the Unit (s)/ PLANT with DCS and/or conventional control system with the EMPLOYER'S prior Approval
- e.** All guarantee figures shall be measured by sufficient and accurate metering system, for example PLANT, UNITS and all consumer power consumption (KW & kWh) and so on.
- f.** As far as possible designer and supplier shall consider equipment with low variety and high interchangeability
- g.** Generally spare parts shall be in the form of individual parts except for capital spares that are in complete set or main part of vital equipment. Supply of spare part shall be guaranteed by manufacturer for minimum 15 years.
- h.** Necessary space for future expansion and or modification shall be considered.
- i.** Enough bulk materials for contingencies shall be added to the related material take-off lists.
- j.** As a whole, design of the electrical system shall be based on the safety of personnel and equipment during all expected modes of operation and maintenance, having minimum power losses, mechanical protection of equipment, interchangeable and ready to be expanded.
- k.** Equipment shall be designed and derated for local working condition.
- l.** Specifications of special equipment shall be prepared by CONTRACTOR and submitted for Review and Approval.
- m.** As far as possible, power supply of those process utility and off-site Unit (s) which can work separately shall be fed from separate buses.
- n.** Throughout these specifications the initial load means the foreseen load of PLANT at full operation of the related state
- o.** Electrical drawings, equipment specification and design calculation sheets and etc of package units shall be included in related overall PLANT drawings and equipment specifications and design calculation sheets.

4. INSTRUMENTATION, CONTROL AND AUTOMATION SYSTEM

Standards

The latest version of the following Standards shall be used where applicable. The sequence shows the priority.

- I.S.A- Instrument society of America
- IEEE- Institute of Electrical and Electronics Engineers
- I.E.C-International electro technical commission
- D.I.N- Deutsches Institut fur Normung
- ASME-American Society of Mechanical Engineers
- ANSI- American National Standards Institute
- NEC- National Electric Code
- ISO- International Organization of Standardization
- NFPA-National Fire Protection Association
- BS-British Standards
- API – American Petroleum Institute

Terminology (instrumentation, automatic control)

- Symbols, Size, Units
- Functional diagram of instrumentation & control system
- Process flow diagram
- Process charts
- DIN 19226: Control engineering definitions and terms.
- ANSI/ISA S5.1: Instrumentation symbols and identification
- ANSI/ISA S5.2: Binary logic diagram for process operations.
- ANSI/ISA S5.3: Graphic symbols for distributed control/ shared display instrument, logic & computer system
- ANSI/ISA S5.4: Instrument Loop diagram
- ANSI/ISA S5.5: Graphic symbol for process display
- ANSI/ISA S51.1: Process instrumentation terminology
- ANSI/ISA S88: process modeling & control system structuring
- ANSI C85-1: Terminology for automatic control.
- ANSI/IEEE STD: Graphic symbol for logic diagrams.
- PCE-406-XX-TNDR-EL-GENR-MELT-INSTRUMENTATION STANDARD-REV00.DOC
- ISO 31: Size, units, symbols, conversion factors and conversion tables.

Measurement

- IEC 50 (301): General terms on measurement in electricity
- IEC 50 (302): Electrical measuring instruments
- IEC 50 (303): Electronic measuring instruments
- DIN 2257: Terminology used in dimensional metrology, unites, activities checking instruments.
- DIN 19208: Flow measurement: mating dimension and application of shut-off valves.
- DIN 102: Reference temperature of measuring tools and work pieces.
- DIN 43769: Measurement and control; electrical temperature sensors; Thermometers not fitted with protecting tube.
- ISO 1:1975: Standard reference temperature for industrial length measurements.
- ISO 4064-2: 1978: Measurement of water flow in closed conduits.
- EN/ISO 5167: Measurement of fluid flow by means of pressure differential devices inserted in circular cross-section conduits running full
- ISO 13359: Measurement of conductive liquid flow in closed conduits -- Flanged electromagnetic flowmeters -- Overall length

Transducer

- IEC 688: Electrical measuring transducers for converting A.C. electrical
- Quantities to analogue or digital signals.
- ANSI/IEEE 460: Electrical measuring transducers for converting A.C. electrical
- quantities into D.C. electrical quantities.
- ANSI/ISA S37.1: Electrical transducer nomenclature terminology.

Transmitter

- IEC 864: Standardization of Interconnections between Broadcasting Transmitters or Transmitter Systems and Supervisory Equipment
- ANSI/UL 632 : Electrically actuated transmitters
- DIN 16086: Accuracy of transmitters

Instrumentation

- Digital interface
- IEC 625 : Programmable measuring instruments.

- IEC 1003-1 : Industrial process control system-instruments with analogue inputs and two or multi-state outputs
- ANSI/ISA S50.1: Compatibility of analogue signals for electronic industrial process Instruments.
- ANSI/IEEE 488.1 : Digital interface for programmable instrumentation
- ASME PTC 19.2 : Instruments and apparatus.
- API RP 550: Manual for installation of Refinery instrument and control systems.
- ISA RP 12.6 : Recommended practice for installation of intrinsically safe instrument system in class Hazardous location.
- ISA RP 12.4: Practice for instrument purging for reduction Hazardous area classification
- ISA ANSI /MC 96.1: Temperature Measurement Thermocouples
- ASME PTC 19.3: Performance Test code – Temperature Measurement
- ANSI /API 2530: Orifice metering of natural gas and control systems
- ASME ptc 19.5.4: Instrument and Apparatus, Supplement to ASME power Test Codes

Signals for process control (analog/digital)

- IEC 381: Analogue signals for process control system.
- Direct current signals.
- Direct voltage signals.
- IEC 382 : Analogue pneumatic signal for process control system.

Indicator

- IEC 51 : Direct acting indicating analogue electrical measurement instrument.

Recording

- IEC 258 : Direct acting recording electrical measurement
- ANSI /AIIM MS29: Micrographics cores and spools for microfilm recording equipment dimensions

Controller

- Programmable controller
- Industrial control apparatus (general, control device, controller.)
- Control equipment (limit control, motor control center)
- IEC 546 : Controller with analogue signal for use in industry.
- IEC 1131 : Programmable controllers



- ANSI/NEMA ICS.2: Industrial control devices ,controllers, and assemblies
- ISO 3511 : Process measurement control functions and instrumentation.
- ANSI C19.3: American national standard for industrial control apparatus
- IEEE 802.3: Information Processing Systems-Local Area Networks

Control Protocols

- Bus in industrial control
- ANSI/ISA S72.01: PROWAY-LAN industrial data highway.
- OPC (OLE)
- IEC 1158: Field bus standard for use in industrial control system.

Test of industrial control

- Dynamic response testing
- ANSI/ISA RP 55.1 : Hardware testing of digital process computers
- ISA/S26 : Dynamic response testing of process control
- IEEE STD 74 : Test code for industrial control

Safety Requirement

- IEC 1010: Safety requirement for electric measurement & control
- ANSI/ISA 91.01-2001: Identification of Emergency Shutdown Systems and controls
- ANSI/ISA S82.01: Safety standard for electrical & electronic test
- NFPA 77: Recommended practice on static electricity, Measuring, Controlling and Related Equipment

Alarm System

- IEC 839: Alarm systems

Control Centers

- ISA-RP 60.1: Control center facilities
- ISA-RP 60.4: Documentation for control centers.
- ISA-RP 60.6: Nameplates, labels and tags for control centers.
- ISA-RP 60.8: Electrical guide for control centers.



Panels, Racks

- EN 50014: Standards for method of protection-general requirements.
- EIA RS-310-C: Racks, Panels and associated equipment
- IEC 297: 19" mechanical structures.
- NEMA PB1: Standard for panel boards
- NEMA 111: Digital panel instrument

Valve (capacity, size, terminology, flow equation)

- ANSI/ISA S75.05: Control valve terminology
- ANSI/ISA S75.02: Control valve capacity test procedure
- ANSI/ISA S75.01: Flow equations for sizing control valves
- ANSI B-16.34: Valve, Flange and Butt-welding End
- ANSI B-16.37: Hydrostatic Testing of control valves
- BSA BS- 5155: Specification for butterfly valves
- IEC 60534: Control valve terminology and flow equations for sizing
- EN/ISO 4126-1: Safety device for protection against excessive pressure – Safety valves
- ISA RP-75-06: Control valve manifold design
- API RP 520: Sizing, Selection, and Installation of Pressure-Relieving devices in refineries
- API RP 521: Guide for Pressure-Relieving and DePRESSURING SYSTEMS

Cable Standards:

- All instrument and control cables shall be designed, manufactured and tested in accordance with the latest editions of the standards indicated herein, (subject to prior coordination with purchaser).
- The applicable standards in this specification are as follows (but not limited to):
- British Standards (BS)
- EN 50288: Power cables with extruded insulation and their accessories for rated voltages
- BS 5308: PE insulated instrumentation cables
- International Electro Technical Commission (IEC)
- IEC 60502-1: Power cables with extruded insulation and their accessories for rated voltages
- IEC 60079 (all parts): Electrical Apparatus for Explosive Gas Atmosphere
- IEC-60028: International Standards of Resistance for Copper
- IEC-60228: Conductors of insulated cables
- IEC 60540 Test methods for insulation and sheaths of electrical cables and cords (elastomeric and thermoplastic compounds)
- IEC-60245: Rubber insulated cables

- IEC-60446: Basic & safety principles for Man-Machine interface, marking and identification of conductors by colors or alphanumeric
- IEC-60811: Common test methods for insulation and sheathing materials of electric cables Test methods for insulation and sheaths of electrical cables and cords (elastomeric and thermoplastic compounds)
- IEC-60794: Optical Fiber Cable
- IEC-61000: Electromagnetic compatibility
- IEC 60754: Test on gases evolved during combustion of materials from cables
- IEC 60801: Electromagnetic compatibility for industrial process measurement and control equipment
- IEC 60304: Standard colors for insulation for low frequency cables & wires
- Flame Retardant PVC outer jacket according to IEC 60332-1~3
- IEC 60332 (All Parts): Tests on Electrical and Optical Fiber Cables under Fire Conditions
- Flame Resistance
- ANSI MC 96.1: Color Coding
- ASTM D1047: Standard Specification for Poly (Vinyl Chloride) Jacket for Wire and Cable
- International Organization for Standardization (ISO)
- ISO 1000: SI Units and recommendation for use of their multiples and of certain other units
- ISO 9001: 1994 or 9001:2000 (Including Design): Quality management systems-Requirements
- ISO 9002:1994: Quality systems- model for quality assurance in production, installation and servicing
- BS EN 50170: General purpose field communication system
- BS EN 50288 all parts: Multi-elements metallic cables used in analogue and digital communication and control
- BS EN 50290 all parts: Communication cables
- 90BS 5099: Electric cables, voltage levels for spark testing
- BS 7655: Specification for insulating and sheathing materials for cables
- UL 1581: Reference Standard for electrical wires, cables, and flexible cords operating in environments
- IPS: Iranian petroleum standards.
- NEMA: National electrical manufacturer's association code of enclosure.
- NEC: National electrical code.
- NFPA 70; Hazardous Classified Location

Earthing Standards:

- IEC 60621-2: General Protection Requirements Second Edition

- IEC 60364-4-41: Low-voltage electrical installations – Part 4-41: Protection for safety Protection against electric shock
- IEC 60364-5-54: Low-voltage electrical installations – Part 5-54: Selection and erection of electrical equipment – Earthing arrangements and protective conductors
- IEEE Std 1050: IEEE Guide for Instrumentation and Control Equipment Grounding in Generating Stations
- IEEE Std 1100: IEEE Recommended Practice for Powering and Grounding Electronic Equipment
- ANSI/ISA-RP12.06.01: Recommended Practice for Wiring Methods for Hazardous (Classified) Locations Instrumentation Part 1: Intrinsic Safety
- IEC 61000-5 Series: Earthing and Protection Requirements
- BS 7430: Protective Earthing of Electrical Installations
- IEEE 80: Safety in AC Substation Grounding
- IEEE 142: Grounding of Industrial and Commercial Power Systems
- IEC 62305 Series: Protection Against Lightning
- BS EN 62305 Series: Protection Against Lightning
- NFPA 780: Standard for the Installation of Lightning Protection Systems
- IEEE Std 1050: IEEE Guide for Instrumentation and Control Equipment Grounding in Generating Stations
- IEEE Std 1100: IEEE Recommended Practice for Powering and Grounding Electronic Equipment
- ANSI/ISA-RP12.06.01; Recommended Practice for Wiring Methods for Hazardous (Classified) Locations Instrumentation Part 1: Intrinsic Safety
- API-552-RP : Transmission systems, Section 20.3

ANSI (American National Standard Institute)

- ANSI B16.5: Pipe Flanges and Flange Fittings
- ANSI B46.1: Surface Texture
- ANSI/UL-827 :General Station for Watchman Fire Alarm and Supervisory Services

ASME (American Society of Mechanical Engineers)

- ASME B1.20.1: Pipe Threads, General purpose
- ASME B16.36: Orifice Flanges

API (American Petroleum Institute)

- API 500: Hazardous Area Classification



- API RP 551: Process Measurement Instrumentation
- API RP-554: Process Instrumentation and Control
- API MPMS 5: Manual of Petroleum Measurement Standards Chapter 5
- API MPMS 21.2: Flow Measurement Using Electronic Metering Systems - Electronic Liquid Volume Measurement Using Positive Displacement and Turbine Meters

NFPA (National Fire Protection Association)

- NFPA 24: Standard for the Installation of Private Fire Service
- NFPA 30: Flammable and Combustible Liquids
- NFPA 72E: Automatic Fire Detectors
- NFPA 325M: Fire Hazard Properties of Flammable Liquids, Gases and Volatile Solids

NACE (National Association of Corrosion Engineers)

- NACE MR 01-75: Metals for Sulfide Stress Cracking and Stress Corrosion Cracking

AGA (American Gas Association)

- AGA 9 : Measurement of Gas by Multipath Ultrasonic Meters

ISO (International Organization for Standardization)

- ISO 1000:1992 SI Units and Recommendation for Use of Their Multiples and of Certain Other Units
- ISO 4064-2:2014: Water Meters for Cold Potable Water and Hot Water
- ISO 5168:2005: Measurement of Fluid Flow - Procedures for the Evaluation of Uncertainties
- ISO 9945-1:2003 Information Technology – Portable Operating System Interface (POSIX)
- ISO/TR 12765:1998 Measurement of Fluid Flow in Closed Conduits - Methods Using Transit-Time Ultrasonic Flowmeters
- ISO/TR 15377:2018 Measurement of Fluid Flow by Means of Pressure Differential Devices - Guidelines for the Specification of Orifice Plates, Nozzles and Venturi Tubes BEYOND THE SCOPE OF ISO 5167

CEN (European Committee for Standardization)

- EN 54 : Components for Automatic Fire-Detection Systems

ISA (Instrument Society of America)

- ISA S 20 : Specification Forms for Process Measurement and Control Instruments, Primary Elements and Control Valves
- ISA S 51.1: Process Instrumentation Terminology
- ISA RP 16.1,2,3: Terminology, Dimension and Safety Practices for Indicating Variable Area Meters (Rotameters), (Glass Tube, Metal Tube, Expansion Glass Tube)
- ISA RP 16.4: Nomenclature and Terminology for Extension Type Variable Area Meters
- ISA RP 16.6: Methods and Equipment for Calibration of Variable Area Meters
- ISA RP 31.1: Specification, Installation and Calibration of Turbine Flowmeters
- ISA RP 55.1: Hardware Testing of Digital Process Computers

JIS (Japanese Industrial Standard)

- JIS B 2220: Steel Pipe Flanges
- JIS C 0920 : Degrees of Protection Provided by Enclosures (IP Code)
- JIS G 5501 : Grey Iron Castings
- JIS H 5111 : Bronze Castings

BS (British Standard)

- BS 837 (Parts 1~3) : Pressure Gauges, Selection and Installation Recommendations
- BS 1042 : Measurement of Fluid Flow in Closed Conduits
- BS 1780: Specification for Bourdon-Tube Pressure and Vacuum Gauges
- BS 2765 : Specification for Dimensions of Temperature-Detecting Elements
- BS 3605 : Specification for Seamless and Welded Austenitic Stainless-Steel Pipes and Tubes for Pressure Purposes
- BS 5235 : Specification for Dial-Type Expansion Thermometer
- BS 5345: C(Parts1~8) : Selection, Installation and Maintenance of Electrical Apparatus for Use in Potentially Explosive Atmospheres
- BS 5750: Quality Systems
- IEC 60050: International Electrotechnical Vocabulary
- IEC 60051: Direct Acting Indicating Analogue Electrical Measurement Instruments and Their Accessories
- IEC 60079 (All Parts): Electrical Apparatus for Explosive Gas Atmosphere
- IEC 60348 : Safety Requirements for Electronic Measuring Apparatus
- IEC 60381: Analogue Signals for Process Control Systems



- IEC 60382 ; Analogue Pneumatic Signal for Process Control Systems
- IEC 60488-1: Digital Interface for Programmable Instrumentation
- IEC 60529 : Degrees of Protection Provided by Enclosures (IP code)
- IEC 60584 : Thermocouples
- IEC 60625 : Programmable Measuring Instruments- Interface System
- IEC 60688 : Electrical Measuring Transducers for Converting AC Electrical Quantities to Analog/Digital Signals
- IEC 60751: Industrial Platinum Resistance Thermometer Sensors
- IEC 60947-5-1 : Specification for Low-Voltage Switchgear and Control-gear - Control Circuit Devices and Switching Elements, Electromechanical Control Circuit Devices
- IEC 61010: Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use
- IEC 61520: Metal Thermowells for Thermometer Sensors- Functional Dimensions
- IEC 62262: Degrees of Protection Provided by Enclosures for Electrical Equipment Against External Mechanical Impacts (IK code)

5. Civil

۱. کلیه مباحث ۲۲ گانه مقررات ملی ساختمان و نشریات سازمان برنامه از جمله موارد ذیل:

۲. ایین نامه طراحی ساختمان ها در برابر زلزله؛ استاندارد ۲۸۰۰ - ویرایش ۰۴

۳. مبحث ششم مقررات ملی ساختمان ایران؛ بارهای وارد بر ساختمان ها - ۱۳۹۸

۴. مبحث هفتم مقررات ملی ساختمان ایران؛ پی و پی سازی - ۱۳۹۲

۵. مبحث نهم مقررات ملی ساختمان ایران؛ طراحی و اجرای ساختمان های بتن رمه - ۱۳۹۹

۶. مبحث دهم مقررات ملی ساختمان ایران؛ طراحی و اجرای ساختمان های فولادی - ۱۴۰۱

۷. مبحث یازدهم مقررات ملی ساختمان ایران؛ طرح و اجرای صنعتی ساختمان ها - ۱۳۹۲

۸. ضوابط و معیارهای طرح و محاسبه مخازن آب زمینی (نشریه ۱۲۳)

۹. ایین نامه جوشکاری ساختمانی ایران (نشریه شماره ۲۲۸)

۱۰. ایین نامه اتصالات در سازه های فولادی (نشریه شماره ۲۶۴)

۱۱. ضوابط طرح ساختمان های فولادی صنعتی (نشریه شماره ۳۲۵)

- ASCE 7 Minimum Design Loads and Associated Criteria for Buildings and Other Structures
- ANSI/AISC 360 Specification for Structural Steel Building
- ANSI/AISC 341 Seismic Provisions for Structural Steel Buildings
- ANSI/AISC 358 Prequalified Connections for Special and Intermediate Steel Moment Frames for Seismic Applications
- ACI 315 Details and Detailing of Concrete Reinforcement
- ACI 318 Building Code Requirements for Structural Concrete and Commentary
- ACI 350 Code Requirements for Environmental Engineering Concrete Structures and Commentary

6. Piping

پیمانکار موظف است در کلیه عملیات موضوع این پیمان، کلیه قوانین و مقررات سازمان مدیریت و برنامه ریزی کشور و مقررات

ملی ساختمان ایران به شرح زیر را مدنظر داشته باشد:

۱. تمامی مباحث ۲۲ گانه مقررات ملی ساختمان و تمامی نشریات لازم الاجرا سازمان مدیریت و برنامه ریزی کشور

۲. استاندارد ۲۸۰۰ ویرایش ۴

۳. نشریه شماره ۱۲۸ (جلد ۱ الی ۶)

۴. نشریه شماره ۱۱۰

۵. نشریه شماره ۱۱۷-۳

۶. نشریه ۵۵

۷. نشریه ۱۰۱

۸. نشریه ۳۰۳

۹. نشریه ۲۹۱

استانداردها و آیین نامه های بین المللی رایج شامل:

AISC, ACI, ASCE, ASTM, AWS, DIN, ISO, BS, AMCA, ANSI, ASME, ASME PTC 8.2, ASME

ASNT, EPA, IEEE & IEC, IOCEA, ISA, NEMA, NFPA, OSHA, SSPC, UBS, UL, PTC 11,

DIN, ASME PTC AWWA, 4.1 etc

ASME B31.3 Process Piping

ASME B31.1 Power Piping

ASME B31.4 Liquid Transportation Systems for Hydrocarbons, Liquid Petroleum Gas,
Anhydrous Ammonia and Alcohol

ASME B31.8 Gas Transmission and Distribution Piping System

ASME B16 Series for Piping Components

ASME Boiler and Pressure Vessel Code-Sec. VIII Pressure Vessels Div. I

API 5L Specification for Line Pipe

AWWA C207 Steel Pipe Flanges for Water Work Service

API RP520 (Part I & II) Design and Installation of Pressure Relieving Systems in Refineries

API RP521 Guide for Pressure Relief and DE pressuring Systems



API RP550 Installation of Refinery Instruments and Control Systems
API RP 686 Recommended Practices for Machinery Installation and Installation Design
NACE MR-01-75 Petroleum and Natural Gas Industries Materials for Use in H2s-
Containing Environments in Oil and Gas Production
ASME B1.20.1 Pipe Threads, General Purpose (Inch)
ASTM Series for Materials
MSS Manufacture's Standardization Society of the Valve and Fitting Industry For materials
of regular piping part
BS British Standard
API Series for valves and wellhead Equipment
DIN (Deutsches Institute Fur Normung)

بخشنامه ۵۴/۱۷۵۳-۴۶۱۷-۱۰۵ مورخ ۱۳۸۰/۰۴/۲۳ سازمان مدیریت و برنامه ریزی در خصوص رعایت ضوابط فنی، حقوقی و قراردادی در پروژه های عمرانی عملیات اجرایی پیمان نیز با توجه به کلیه جزئیات موارد فوق، تحت نظر دستگاه نظارت انجام پذیرد. لازم به توضیح است که در صورت وجود هرگونه تناقض بین آیین نامه ها و استانداردهای ذکر شده سخت گیرانه ترین آنها ملاک عمل خواهد بود. یادآور می گردد آخرین ویرایش آیین نامه ها و استانداردهای ذکر شده ملاک عمل بوده و در صورت انتشار ویرایش جدید در مدت قرار داد توافق بین کارفرما، مشاور و پیمانکار جهت به کارگیری یا عدم به کارگیری آنها ضروری خواهد بود.