



پتروشیمی توسعه پارک
صنعتی گوهر افق

Toase-eh Park Sanati Gohar Ofogh
Petrochemical Co.
**CONCEPTUAL, BASIC and DETAIL
DESIGN ENGINEERING OF STYRENE
PARK OFFSITE**



BINA Consulting Eng. Co.

Document Title : Specification For Electrical Requirements
For Packages

Document No. : EI027-000-EB-EL-SPC-001

Rev. R3

Page 1 of 10

STYRENE PARK OFFSITE

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Specification For Electrical Requirements for Packages

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Document No. : EI027-000-EB-EL-SPC-001

Rev. R3

Page 2 of 10

REVISION RECORD SHEET

Page	Revisions							Page	Revisions						
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38								78							
39								79							
40								80							



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Document No. : EI027-000-EB-EL-SPC-001

Rev. R3

Page 3 of 10

Table of Content

1. INTRODUCTION.....	4
1.1 Applicable codes and standards	4
1.2 Conflicting requirement	5
1.3 Units	5
2. DESIGN CONDITION.....	5
3. TECHNICAL REQUIREMENTS.....	6
3.1 Vendor data	6
3.2 Power Supply	6
3.3 Equipment Enclosures.....	6
3.4 Motors.....	7
3.5 Heating Elements	7
3.6 Electrical Control Devices.....	7
3.7 Wiring and Cables	7
3.8 Grounding and Bonding.....	8
4. NAMEPLATES AND PAINTING.....	8
4.1 Nameplates	8
A. Rating Plates	8
B. Indication of Type of Explosion-protection	8
C. Service Nameplates.....	8
D. Function Labels.....	8
E. Indication of ID Number	8
4.2 Painting	9
5. INSPECTION AND TESTS.....	9
6. SPARE PARTS AND SPECIAL TOOLS.....	9
7. PREPARATION FOR SHIPMENT.....	9



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PARK OFFSITE**



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Document No. : EI027-000-EB-EL-SPC-001

Rev. R3

Page 4 of 10

1. INTRODUCTION

1.1 Applicable codes and standards

- 1.1.1** Design, materials, fabrication, inspection, testing and certification shall be in accordance with the requirements of the specified codes. Codes specified shall be taken as the latest issue including all appendices issued at the contract effective date. The SUPPLIER is responsible for implementing any regulations concerning the design, fabrication, testing and inspection of Package equipments, which are mandatory to any applicable statutory or local regulations.
- 1.1.2** Before PO placement the CONTRACTOR and the SUPPLIER shall agree which editions/dates of the codes and specifications apply. The agreement shall be recorded in the updated specification issued for purchase.
- 1.1.3** The design of any part of supply, which is not covered by the specified code or this specification, shall be carried out according to the SUPPLIER'S standard and shall be agreed with the CLIENT / CONTRACTOR.
- 1.1.4** The design codes and standards shall be as indicated below and/or stated on the equipment data sheet.

IRANIAN PETROLEUM STANDARD (IPS)

IPS-E-EL-100	Engineering Standard for Electrical System Design
IPS-M-EL-131(2)	Material and Equipment Standard for Low Voltage Induction Motors
IPS-M-EL-132(2)	Material and Equipment Standard for Medium and High Voltage Induction Motors
IPS-M-EL-161	Material and Equipment Standard for General Electrical Items
IPS-M-EL-271(1)	Material and Equipment Standard for Low Voltage Cables and Wires

INTERNATIONAL ELECTRO TECHNICAL COMMISSION (IEC)

IEC 60027	Letter symbols to be used in electrical technology
IEC 60034	Rotating electrical machines
IEC 60079	Electrical apparatus for explosive gas atmospheres
IEC 60364	Electrical installations of buildings
IEC 60445	Basic and safety principles for man-machine interface, marking and identification – Identification of equipment terminals and terminations of certain conductors, including general rules for alphanumeric system



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Document Title : Specification For Electrical Requirements
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Document No. : EI027-000-EB-EL-SPC-001

Rev. R3

Page 5 of 10

IEC 60947-4-1 Low-voltage switchgear and control gear, Part 4-1: Contactors and motor starters – Electromechanical contactors and motor starters

IEC 60947-5-1 Low-voltage switchgear and control gear, Part 5-1: Control circuit devices and switching elements – electromechanical control circuit devices

Packaged Equipment shall be manufactured in accordance with the applicable sections of the latest edition.

The design shall be performed based on the requirements detailed in this specification. Priority shall be determined as follows, unless agreed to by CLIENT:

- Data sheet
- Drawings
- This job specification.
- Other job specification mentioned in this document
- IPS Standards
- International Code & Standards
- The Most Stringent Codes or Standards

1.2 Conflicting requirement

This document shall be read in conjunction with the applicable IPS. It is SUPPLIER's responsibility to ensure that the relevant IPS is reviewed and in the event of conflict between IPS and this document or other international standards, the issue shall be referred to CLIENT for approval. However, in general any additional requirements shall be applied.



1.3 Units

The international system of units (SI) shall be used for all drawings and documents.

2. DESIGN CONDITION

The electrical equipment shall be designed in due consideration of following design conditions, unless otherwise specified:

- Max. outdoor Recorded Temperature +48°C
- Max. indoor Recorded Temperature +45°C
- Min. outdoor Recorded Temperature 10°C
- Min. indoor Recorded Temperature 5°C
- Humidity 80%
- Soil Temperature 30°C

	<p>Toase-eh Park Sanati Gohar Ofogh Petrochemical Co.</p> <p>CONCEPTUAL, BASIC and DETAIL DESIGN ENGINEERING OF STYRENE PARK OFFSITE</p>		 <p>BINA Consulting Eng. Co.</p>
	<p>Document Title : Specification For Electrical Requirements For Packages</p>		
<p>Document No. : EI027-000-EB-EL-SPC-001</p>		<p>Rev. R3</p>	<p>Page 6 of 10</p>

3. TECHNICAL REQUIREMENTS

3.1 Vendor data

Vendor shall supply:

- Equipment outline drawings that show the location of electrical equipment
- Dimensioned cable entry
- Dimensioned drawings for electrical equipment (Standardized).
- Foundations and/or mounting dimensions, including the weight of the components.
- Schematic diagrams of all supplied power and control equipment.
- Interconnection diagrams that show external connections to supplied equipment, with all terminal boxes, terminal blocks, relays, control switches, instruments and indicating lights properly identified.
- Control panel layout drawings showing the physical relationship of equipment within the panel.
- Descriptions of all devices that include electrical ratings and catalogue numbers.

Before fabrication commences, Drawings shall be approved by Contractor. As-built drawings shall be submitted and approved by Contractor upon completion of fabrication and testing.

3.2 Power Supply

Furnished control and power apparatus shall be designed for operation using the following power supplies, or as specified on the data sheets:

- 6000 Volts, 3 phase, 50 Hz, $\pm 10\%$ voltage variation and $\pm 5\%$ frequency variation
- 400 Volts, 3 phase, 50 Hz, $\pm 10\%$ voltage variation and $\pm 5\%$ frequency variation
- 230 Volts, single phase, 50 Hz, $\pm 10\%$ voltage variation $\pm 5\%$ frequency variation

3.3 Equipment Enclosures



All furnished electrical equipment, including motors, shall have enclosures approved for the environmental conditions defined on the data sheets. Enclosures shall be primed and painted in Supplier's standard color(s).

The minimum requirement for enclosures shall be:

The type of enclosure for all power equipment, installed in electrical equipment rooms (and buildings) shall be min. IP41.

The type of enclosure for electrical equipment installed in the process plant and other outdoor areas protected with canopy shall be min. IP54 and IP55 for electrical motors.

The type of enclosure for electrical equipment installed in the process plant and other outdoor areas unprotected shall be min. IP65.

	Toase-eh Park Sanati Gohar Ofogh Petrochemical Co. CONCEPTUAL, BASIC and DETAIL DESIGN ENGINEERING OF STYRENE PARK OFFSITE		 BINA Consulting Eng. Co.
	Document Title : Specification For Electrical Requirements For Packages		
Document No. : EI027-000-EB-EL-SPC-001		Rev. R3	Page 7 of 10

3.4 Motors

Motors shall be furnished by Vendor supplying the mechanical equipment unit, unless otherwise stated on the data sheets. Motors shall comply with the following:

- Motors shall have a rating based upon continuous operation at rated loads without infringing upon the service factor and without exceeding the temperature rise determined by the enclosure and insulation within a maximum ambient temperature.

Exceptions where time rated motors are proposed for use with cranes, hoists and so forth, shall be stated by Supplier.

- Motors less than 0.4 kW shall be rated 230 Volts, single phase and 50 Hz.
- Motors 0.4 kW and larger, shall be rated 400 Volts, 3 phase and 50 Hz.
- Motors above 150 KW and up to 1MW, shall be rated 6000 Volts, 3 phase and 50 Hz.

Motors shall be equipped with bearings suited for that particular application, and designed to prevent leakage of lubricant or entrance of foreign matter along the shaft.

3.5 Heating Elements

Heating elements shall have minimum mechanical protection IP55, and provide terminal enclosures to prevent exposure of live components. Heating elements shall have explosion protection as required in hazardous location.

Heating elements rated less than 3000 Watts shall be rated for 230-Volt single-phase operation.

Higher wattage heaters shall be suitable for 400-Volt 3-phase operation.

3.6 Electrical Control Devices

Relays and instruments shall be grouped and mounted in control panels whenever possible. Wires that enter control panels and wires from unused relay contacts shall be terminated in control panel terminal blocks.

3.7 Wiring and Cables

Wiring and cabling shall be done by armored cable, complete with adequate support and mechanical protection from operating and shipping damage. Wiring for different signal types, shall be separated and run into separate junction boxes.

Junction boxes and control devices shall be mounted in accessible locations. When skid-mounted equipment is supplied, junction boxes connected to home runs shall be located at the outer edge of the skid.

Junction boxes and control devices shall be identified with an engraved nameplate, non-corrodible material.

Lettering shall be a minimum of 20 mm high and be black on a white background.

Control stations and instruments shall be installed with cable glands.

Terminal blocks shall be installed with 20% spare terminals in each junction box or control panel.

All wires shall be marked at both ends with white heat shrink sleeve type markers.

Cables for analog, RTD and vibration devices shall be twisted pair using 1.5 mm² stranded copper, 105°C insulation and 300 Volts rated minimum; or triad with individual pair or triad shield tinned copper drain wire, 90°C wire armored and a PVC fire retardant outer jacket.



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For Packages

Document No. : EI027-000-EB-EL-SPC-001

Rev. R3

Page 8 of 10

Cable for thermocouple extensions shall be twisted pair using 1.5 mm² solid copper, 105°C insulation with shield, tinned copper drain wire 90°C, wire armored and a PVC fire retardant outer jacket.

Cables for solenoids and motor control stations shall be 2.5 mm² stranded copper using 90°C insulation, 600 Volts rated, wire armored and a PVC fire retardant outer jacket.

Cables that are used in areas with probable presence of hydrocarbon components, shall be lead covered.

Wire for all other circuits shall be stranded copper using 90°C insulation, 600 Volts rated and a minimum size of 2.5 mm².

3.8 Grounding and Bonding

When electrical or instrumentation components are not mounted on metal frames welded to equipment or skid bases ,facilities for bonding cables shall be provided.

Terminals for connection of 70 mm² ground cables shall be provided on opposite corners of the equipment or skid base.

4. NAMEPLATES AND PAINTING

4.1 Nameplates

A. Rating Plates

- Per electrical equipment shall have a rating plate fixed to an easily visible, non-removable part.
- The rating plates shall be of non-corrodible material.
- The rating plate shall give the necessary information specified in the applicable standards.
- Language to be used in the rating plates shall be in English.

B. Indication of Type of Explosion-protection

In addition to the above, the explosion-protected type electrical equipment shall have indication of the “symbols concerning explosion-protection”.

C. Service Nameplates



Per electrical equipment shall be provided with a service nameplate, fixed to a readily-visible position on the non-removable part.

D. Function Labels

Labels or markings indicating function of each operating or monitoring device, or caution markings, shall be provided where required, in English language, unless otherwise specified.

E. Indication of ID Number

CONTRACTOR’s ID No. (Identification Number) shall be indicated on the non-removable part, except when the texts of the service nameplates mentioned in Par. 4.1.3 include the ID No.

	Toase-eh Park Sanati Gohar Ofogh Petrochemical Co. CONCEPTUAL, BASIC and DETAIL DESIGN ENGINEERING OF STYRENE PARK OFFSITE		 BINA Consulting Eng. Co.
	Document Title : Specification For Electrical Requirements For Packages		
Document No. : EI027-000-EB-EL-SPC-001		Rev. R3	Page 9 of 10

4.2 Painting

All metallic surfaces, except machined, plated or stainless steel surfaces, shall be shop painted. Prior to painting, surface treatment for rust prevention shall be given. Material and method for painting is left to the discretion of Supplier unless otherwise specified, but shall withstand satisfactorily the use in the corrosive atmosphere.

5. INSPECTION AND TESTS

Electrical equipment shall be inspected and tested at manufacturer's shop in accordance with the associated codes and standards, and related inspection and test records shall be submitted to CONTRACTOR.



Type of inspection, i.e., test by Supplier, witness by CONTRACTOR, OWNER or third party, submission of inspection and test records, total inspection, sampling inspection, etc., shall be referred to inspection and test plan.

6. SPARE PARTS AND SPECIAL TOOLS

- Spare parts for erection, pre-commissioning, commissioning and start-up shall be supplied as specified separately.
- Spare parts for 2 years operation shall be supplied as specified separately. Supplier shall recommend any other spare parts for 2 years operation in addition to the spare parts specified by CONTRACTOR.
- Special tools necessary for assembling, installation and maintenance of electrical equipment shall be supplied.

7. PREPARATION FOR SHIPMENT

- Before packing, electrical equipment shall be thoroughly cleaned for removal of foreign matters and the part which is likely to become rusted shall be properly treated for rust prevention after drying. All openings, such as cable entrances, shall be properly covered or plugged to prevent foreign matters from entering during transit and subsequent storage.
- Electrical equipment shall be packed in accordance with the best modern practice consistent with destination and method of transport employed. Fragile components such as measuring instruments and indicating lights shall be especially protected to prevent mechanical damage.
- Electrical equipment shall be wrapped with plastic sheet taking care to prevent ingress of water, and the package shall be adequately secured to prevent damage during transportation. Especially for export, the plastic wrapping shall be sealed with silica gel dryer put inside.
- Total weight and CONTRACTOR's ID No. shall be clearly marked on the package.

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<p>Document No. : EI027-000-EB-EL-SPC-001</p>		<p>Rev. R3</p>	<p>Page 10 of 10</p>

- Equipment and loose components shall be properly packaged for all shipping conditions. Components shall be properly marked to facilitate onsite assembly.

Wooden boxes shall be used for final paching of electrical equipment.