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Definitions/Abbreviations

**COMPANY / OWNER
CONTRACTOR**

The entity which has been contracted to supply goods and/or services to the COMPANY.

SUPPLIER

The party which manufactures or supplies equipment and/or services to perform the duties specified by COMPANY or CONTRACTOR.

SUB-SUPPLIER

Any party which manufactures or supplies equipment and/or services to the SUPPLIER to perform the duties specified by COMPANY or CONTRACTOR

AC	Alternating Current
BS	British Standard
C	Centigrade
DC	Direct Current
EAC	Eurasian Customs Union
EN	European Norm
GRP	Glass Re-Inforced Plastic
IEC	International Electrotechnical Commission
IP	Ingress Protection
ISO	International Standards Organisation
ISO	International Organisation for Standardisation
LED	Light Emitting Diode
SDRS	Supplier Documentation Requirement Schedule
SI	System International
TRCU	Technical Regulation Customs Union
V	Voltage

1 PURPOSE

The purpose is to set the standard for good design and engineering practice to be applied on facilities to achieve maximum technical and economic benefit from standardisation.

2 SCOPE

This specification covers the minimum technical requirements for Electrical Bulk Materials.

The SUPPLIERS scope of supply, shall be as defined in the Contract documents.

Requirements for the materials are detailed in the requisition and/or data sheet.

3 REFERENCES

-00-ENG-SPC-00026	Climatic, Environmental and Utility Data
-00-ENG-SPC-00033	Power and Control, Instrumentation and Telecommunication Cables
-AL-LGT-SPC-00001	Packing and Shipping Instructions
-AL-LGT-SPC-00002	Import Instructions
23858-00L GPP-0000-00207	Applicable Codes & Standards

4 ROLES AND RESPONSIBILITIES

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5 CODES AND STANDARDS

Electrical bulk materials shall be designed, manufactured, installed and tested in accordance with the latest applicable sections of international, federal, state or local codes, regulations, ordinances and rules of Kazakhstan as detailed in Appendix A.

The word 'should' shall be replaced by 'shall' wherever it appears in the reference standards.

Kazakhstan is a member country of the Eurasian Customs Union (EAC), equipment shall meet the requirements of the technical regulations of the Customs Union. Attention should be paid to:

- Electromagnetic compatibility
- Low voltage equipment
- Machinery
- Safety
- EAC marking

Where the data sheet indicates that the equipment is for use in a hazardous area, the equipment and all its associated parts shall comply with the requirements of Technical Regulation Customs Union (TR CU) 012/2011.

6 PRECEDENCE

The order of precedence shall be as follows (unless stated otherwise in the project documentation):

- 1) National and/or Local Regulations;
- 2) Purchase Requisition;
- 3) Data sheets and drawings;
- 4) Project specifications;

- 5) This specification
- 6) Industry codes and standards referenced.

CONTRACTOR is responsible for satisfying all technical and certification requirements for and on behalf of the COMPANY with the local Kazakh authorities.

Any apparent conflict between documents in the same level of the hierarchy shall be brought to the attention of the COMPANY for clarification. However, as a general rule, where such conflict exists, the most onerous requirement shall govern.

CONTRACTOR shall identify and detail any deviations and/or exclusions to the documents during the Tendering phase. Unless such deviations/exclusions are specifically identified, the CONTRACTOR shall be deemed to have confirmed full compliance with all the documents listed.

7 SERVICE CONDITIONS

The site conditions are stated in the Specification for Climatic, Environmental and Utility Data Doc. No. -00-ENG-SPC-00026. Electrical equipment shall be suitable for outdoor use in ambient temperatures ranging from minus 45 to plus 40 degrees Celcius.

Electrical bulk materials shall be designed for a minimum of 20 years.

8 GENERAL

8.1 Bulk Materials

Bulk materials include but shall not be limited to;

- Junction boxes
- Control stations
- Lighting, lighting poles and socket outlets
- Cable tray, ladder rack, cable clips, cable ties and trunking
- Cable accessories including cable glands, termination kits, joints and cable markers
- Metal frame supports
- Earthing materials
- Cable transit systems
- Labels

8.2 Utilities

If applicable, SUPPLIER shall advise details of preferred auxiliary power supply requirements for equipment and the expected electrical load demand.

Nominal power supplies available are 400 V, 3 phase, 4 wire, 50 Hz or 230 V single phase, 50Hz.

All equipment shall be brand new and of recent manufacture. Used, re-conditioned or equipment that has been long term storage will be rejected.

8.3 Proven Equipment Criteria

Only equipment of proven reliability in similar service conditions, shall be included in the SUPPLIER'S bid proposal (prototypes shall not be proposed). The SUPPLIER shall provide the related necessary evidence (reference lists with installation dates and run-hours accumulated by date etc.). The equipment shall have equivalent design features to the proposed equipment.

Where the requirements above prevent the application of the latest technology, the SUPPLIER may submit a second alternative proposal incorporating the latest technology features for evaluation by the Purchaser. This alternative proposal shall specifically identify the un-proven features and state their advantages.

9 EQUIPMENT DESIGN AND MANUFACTURING

9.1 Electrical System

Where applicable, all components of the equipment shall be rated for the electrical system characteristics indicated in the requisition or its associated attachments.

The equipment shall be suitable for operation with system voltage and frequency variations as stated below, unless defined otherwise in the requisition or its associated attachments.

System voltage variation: + 6%, -10%

System frequency variation: $\pm 5\%$

The electrical arrangement of the bulk materials shall be as indicated in the Requisition.

The following Busbar/wiring phase colours shall be adopted, reference should be made to document -00-ENG-SPC-00033-E Power and Control, Instrumentation and Telecommunication Cables.:

3 Phase/neutral Systems: -

Line 1: - Yellow

Line 2: - Green

Line 3: - Red

Neutral: - Blue

Earth: - Green/Yellow

Single Phase/neutral (2 wire) Systems: -

Line: - Red

Neutral: - Blue

Earth: - Green/Yellow

Single Phase/neutral (3 wire) Systems: -

Line1: - Yellow

Line1: - Red

Neutral: - Blue

Earth: - Green/Yellow

Direct Current Systems: -

Positive: - Red

Negative: - Black

Earth: - Green/Yellow

9.2 Junction Boxes

Junction box enclosures shall be supplied in one of the following materials as defined in the requisition: -

- Glass Re-Inforced Plastic (GRP)
- Copper Free Aluminium

All enclosures shall have removable covers fixed with stainless steel (Grade 316) screws. Enclosures shall have external mounting lugs or equivalent, which are accessed without removing the cover.

Enclosures for outdoor installation shall be rated IP 65 and designed for the environmental temperature from -45 deg C to +40 deg C. Enclosures for indoor installation shall be rated IP 41 minimum.

Junction box enclosures shall be adequately sized to allow for maintenance and replacement of individual terminals without major dis-assembly. Enclosures shall have adequate spacing around terminal blocks for ease in termination of conductors and for routing and bending cables without crossing over terminals.

Junction boxes for installation in hazardous areas Zone 1 shall be Ex 'e' type and Zone 2 shall be Ex 'e' type.

Junction box enclosures shall be equipped with either removable un-drilled gland plates or threaded cable entries as appropriate to standards and hazardous area regulations. All pre-drilled cable entries shall be fitted with proprietary blanking plugs, hazard certified according to enclosure certification.

Non-metallic enclosures shall have factory installed integral earth continuity plates at cable entry positions, complete with internal and external earthing connection studs. Earthing stud shall be minimum M10 size.

Metallic enclosures shall have internal and external earthing connection studs.

Terminal sizes and quantities shall be in accordance with the Requisition. The minimum size of terminal used shall be suitable for a 2.5mm² stranded copper conductors. Terminals shall be suitable for terminating conductors with or without the use of crimped wire pins, lugs or equivalent.

Terminals shall be of Klippon type SAK make or equivalent, mounted on a DIN rail with jumper bars to facilitate linking and include minimum 25% spare. Not more than one conductor shall be connected to each side of the terminal. Where different voltages are present these shall be separated by barriers and the voltages shall be identified.

Each terminal shall be clearly and permanently numbered on the body of the terminal itself.

9.3 Control Stations

Control station enclosures shall be supplied manufactured in heavy duty Glass Re-Inforced Plastic (GRP) material.

All enclosures shall be rated IP 65 and designed for the environmental temperature from -45 deg C to +40 deg C

All enclosures shall have removable covers fixed with stainless steel (grade 316) screws. Enclosures shall have external mounting lugs or equivalent, which are accessed without removing the cover.

Control station enclosures containing electrical devices and/or terminals shall be adequately sized to allow for maintenance and replacement of entire components without disturbing adjacent devices. Enclosures shall have adequate spacing around terminal blocks for ease in termination of conductors and sufficient space for routing and bending cables without crossing over interior terminals and devices.

Control stations for installation in hazardous areas Zone '1'/Zone '2' shall be Flame proof type Ex 'ed'.

Control stations shall be equipped with either removable undrilled gland plates or threaded cable entries as appropriate to standards and hazardous area regulations. All pre-drilled cable entries shall be fitted with proprietary blanking plugs, hazard certified according to enclosure certification.

Control station enclosures shall have factory installed integral earth continuity plates at cable entry positions, complete with internal and external earthing connection studs. Earthing stud shall be minimum M10 size.

All control and indicating devices shall be pre-wired to terminals as specified in the requisition and its attachments.

Arrangement, number and type of control and indicating devices to be included in each control station shall be as stated in the requisition and its attachments.

When an ammeter is specified in the requisition as part of a control station, it shall be suitable for 1A rated current transformer secondary windings and scaled as specified in the Requisition. Where specified for motor control duty it shall have a compressed end scale (five or six times current transformer primary current), complete with adjustable "RED" pointer.

The utilisation category of control device contacts shall be AC14 to IEC 60947 Part 5-1.

Terminal sizes and quantities shall be in accordance with the Requisition. The minimum size of terminal used shall be suitable for a 2.5mm² stranded copper conductors. Terminals shall be suitable for terminating conductors with or without the use of crimped wire pins, lugs or equivalent.

Terminals blocks shall be of Klippon type SAK make or equivalent mounted on a DIN rail with jumper bars to facilitate linking and include minimum 25% spare. Not more than one conductor shall be connected to each side of the terminal. Where different voltages are present these shall be separated by barriers and the voltages shall be identified.

Each terminal shall be clearly and permanently numbered on the body of the terminal itself.

Internal wiring shall be rated at 600/1000V insulation level and be 2.5mm² minimum.

9.4 Lighting Fixtures

Lighting fixtures shall comply with the applicable sections of IEC 60598 and IEC 60662.

All lighting fixtures shall be supplied at 230V, 50Hz, single phase supply. High pressure sodium discharge lighting fixtures and accessories shall be suitable for installation in outdoor locations having environmental temperature from -45 deg C to +40 deg C, and shall have ingress protection of at least IP 65.

LED fittings shall be preferred over other types of light fittings for all new projects.

All lighting fixtures other than high pressure sodium shall be suitable for installation in indoor locations having environmental temperature from -45 deg C to +40 deg C, and shall have ingress protection of at least IP 41.

Lighting fixtures and accessories for installation in hazardous areas Zone '1' and in Zone '2' shall be Ex 'de' type.

Unless stated otherwise, enclosures for lighting fixtures shall be either Glass Re- enforced Plastic (GRP) or copper free aluminium.

All discharge type lighting fixtures shall have integral control gear with power factor correction to 0.9 minimum.

All fluorescent lighting fixtures shall have high frequency control gear.

All high pressure sodium discharge lighting fixtures shall be suitable for use with either standard or 'twin-arc' high pressure sodium lamps.

Unless stated otherwise in the requisition or its attachments, lighting fixtures shall have terminals suitable for looping in and out with 6mm², 3 core (L, N&E) cables.

9.5 Lighting Fixture Types

- Road Lighting

Lighting Fixtures shall have photometric characteristics suitable for road lighting design and shall be suitable for pole mounting via mounting spigot, either directly or by means of an outreach arm. Lighting fixtures shall include integral control gear box. Cable entry into the lighting fixture shall be via the mounting spigot which shall include integral entry seal.

Road, and parking areas lighting shall be provided by means of pole-mounted 8x8 LED 5000K (150W), IP66, 230V/50Hz lamps. This lighting shall be connected to the normal power supply system.

Wherever possible, lighting Poles shall be sited in areas classified as non- hazardous.

Road lighting lanterns previously have been of the industrial type employing high pressure sodium (SON) lamps with integral control gear mounted on galvanised steel poles.

Consideration shall be given in the design and selection of fittings to the requirement for efficient and effective maintenance of road lighting poles and lighting fixtures. Changing a lamp shall be a simple process.

Because provision of anti-condensation heaters is impractical, protection located in base of street light or floodlight poles shall comprise fuses rather than MCBs.

- Aircraft Warning Lights

Aircraft warning lights shall be supplied from the category 2 emergency power supply and installed on tall structures in accordance with the requirements of the Ministry of Civil Aviation of Kazakhstan and document "GAS CA-86 – Guidelines on Airfield Services in Civil Aviation of USSR".

- Floodlight

Lighting fixtures shall be of rectangular design having either symmetric or asymmetric beam characteristic, as specified in the requisition, and shall be complete with mounting stirrup to permit angle adjustment in both horizontal and vertical plane. Lighting fixtures shall include integral control gear box. Cable entry shall be via 20mm ISO threaded entries. All cable entries shall be fitted with a proprietary blanking plug, hazard certified according to enclosure certification where applicable.

- Wellglass

Lighting fixtures shall be suitable for surface (ceiling) mounting via external lugs or bracket, pendant mounting or pole mounted via threaded stanchion bracket. Lighting fixtures shall include integral control gear box. Cable entry shall be via 20mm ISO threaded entries. All cable entries shall be fitted with a proprietary blanking plug, hazard certified according to enclosure certification where applicable.

- Bulkhead

Lighting fixtures shall be suitable for surface mounting, via external lugs or bracket, in either the horizontal or vertical plane. Lighting fixtures shall include integral control gear box. Cable entry shall be via 20mm ISO threaded entries. All cable entries shall be fitted with a proprietary blanking plug, hazard certified according to enclosure certification where applicable.

- High Bay

Lighting fixtures shall incorporate separate removable reflector for ease of mounting and maintenance and shall be suitable for surface mounting via external lugs or bracket. Lighting fixtures shall include integral control gear box. Cable entry shall be via 20mm ISO threaded entries. All cable entries shall be fitted with a proprietary blanking plug, hazard certified according to enclosure certification where applicable.

- LED - Industrial Open Type

Lighting fixtures shall be metallic construction, batten fixing type with integral reflector, without diffuser and electronic type ballast.

- LED - Industrial Emergency Battery Pack

Emergency back up for industrial open type LED lighting fixtures shall be provided from a separate self contained battery charger/power supply capable of supplying the lighting fixtures for 30 minutes on failure of the mains supply. The unit shall be suitable for surface mounting and be capable of providing either maintained or non maintained operation of the lighting fixtures.

- LED - Industrial Closed Type

Lighting fixtures shall be fully enclosed type, suitable for surface mounting via external lugs or bracket and having glass reinforced polyester (GRP) body with hinged, quick release polycarbonate cover.

- LED - Industrial Closed Type Emergency Battery Pack

Lighting fixtures shall be fully enclosed type, suitable for surface mounting via external lugs or bracket and having glass reinforced polyester (GRP) body with hinged, quick release polycarbonate cover.

Emergency back up shall be provided from integral battery charger/power supply capable of supplying the lamp for 30 minutes on failure of the mains supply. The lighting fixtures shall be capable of either maintained or non maintained operation.

- LED - Hazard Certified

Lighting fixtures shall be fully enclosed type, suitable for surface mounting via external lugs or bracket and having glass re-inforced polyester (GRP) body with hinged, quick release polycarbonate cover.

Lighting fixtures and accessories for installation in hazardous areas Zone '1' and in Zone '2' shall be Ex 'de' type.

- LED - Hazard Certified Emergency

Lighting Fixtures shall be fully enclosed type suitable for surface mounting via external lugs or bracket and having glass re-inforced polyester (GRP) body with hinged, quick release polycarbonate cover.

Lighting fixtures and accessories for installation in hazardous areas Zone '1' and in Zone '2' shall be Ex 'de' type.

Emergency back up shall be provided from integral battery charger/power supply capable of supplying the lamp for 30 minutes on failure of the mains supply. The lighting fixtures shall be capable of either maintained or non maintained operation.

- Emergency Exit Sign

Lighting Fixtures shall be fully enclosed LED type suitable for wall or ceiling mounting. Displayed sign shall be either Euro Legend or Pictogram as defined on the requisition.

Emergency back up shall be provided from integral battery charger/power supply capable of supplying the lamp for 30 minutes on failure of the mains supply. The lighting fixture shall be capable of either maintained or non maintained operation.

Lighting fixtures and accessories for installation in hazardous areas Zone '1' and in Zone '2' shall be Ex 'de' type.

- Non Industrial Lighting Fixtures

Lighting Fixture shall include recessed and non recessed LED, compact fluorescent and other types, with or without battery backup, for use in control rooms, offices, accommodation and other indoor locations. Full details of each type shall be as defined in the requisition.

9.6 Lamp Types

- 1) LED – as per ref. Lighting and Small Power Philosophy Doc. No. -00-ELT-SPC-00044 Sodium Discharge – all sodium discharge lamps shall be high pressure elliptical (SON) or tubular (SON-T) type having E27 or E40 cap. according to type and rating. Where stated on the requisition, lamps shall be of the twin-arc types.
- 2) LED shall be stated in the requisition.
- 3) Other – other lamps shall be as stated in the requisition.

9.7 Mounting Accessories

- 1) Lighting Poles

Lighting poles shall be hot deep galvanised steel, minimum thickness 80 microns. They shall have base plate of adequate size and thickness at bottom for mounting on foundation/support platform. Pole shall have aperture at bottom and shall have backboard for mounting junction box (size approximately 150X150 mm). Poles shall have cap/spigot at

the end. Poles shall have internal and external M10 stud for earthing. Unless stated in material requisition, pole shall have pre welded & galvanised base plate for mounting of JB. Base plate shall be (approx. size 250(H) x200(W) mm).

Climbing steps at standard interval shall be provided for flood lighting poles only. Street lighting pole design shall be without steps.

2) Outreach and Floodlight Mounting Arms

Outreach and floodlight mounting arms shall be deep galvanized steel type, suitable for spigot mounting to lighting Poles. Spigot arrangement shall make provision for supply cables to be routed to lighting fixtures from inside the Pole. Floodlight mounting arms shall be suitable for independently mounting up to 4 Nos floodlights.

3) Stanchion Bracket

Stanchion brackets supplied separately from lighting fixtures shall be deep galvanised steel. When supplied as an integral part of lighting fixtures the material shall be the same as the body of the lighting fixtures.

Stanchion brackets shall be supplied either for wall mounting or spigot type for pole mounting, as stated on the requisition. Spigot type shall be suitable for use with 2 inch NPT threaded pipe.

9.8 Socket Outlets and Plugs

Socket outlet enclosures and plugs shall be supplied manufactured in heavy duty Glass Re-Inforced Plastic (GRP) material.

Enclosures for outdoor installation shall be rated IP 65 and designed for the environmental temperature from -45 deg C to +40 deg C. Enclosures for indoor installation shall be rated IP 41 minimum.

All enclosures shall have removable covers fixed with stainless steel (Grade 316) screws. Enclosures shall have external mounting lugs or equivalent, which are accessed without removing the cover.

Socket outlets and plugs for installation in hazardous areas shall be flameproof type Ex'de'.

Socket outlets and plugs described in the requisition as certified for hazardous area installation shall be suitable for indoor and outdoor installation. Socket outlets described in the requisition as industrial type shall be suitable for indoor and outdoor installation and shall comply with the requirements of IEC 60309.

Socket outlets described in the requisition as non-industrial type (PIBs, Switchgear room, Equipment room) shall be suitable for indoor installation and shall comply with the requirements of IEC 60884.

Socket outlets shall be of a single standardised hazardous area certified type in both hazardous and non-hazardous areas such that plugs used on portable equipment will be of a common pattern.

Non-industrial, convenience socket outlets shall be provided in all buildings like, PIBs, switchrooms, equipment rooms, workshops and offices. They shall be of the two (2) pin and earth type, 230Volt, 16Amp rated, with integral shutters. Sockets shall comply with IEC 60884.

Socket outlets shall incorporate integral isolating switch having contact rating AC 23 in accordance with IEC 60947-3. Switches on hazardous certified units shall be interlocked with the plug such that contacts are fully open before the plug can be engaged or withdrawn.

Internal wiring shall be rated at 600/1000V insulation level and be 2.5mm² minimum.

9.9 Cable Cleats

Cable cleats shall be 2 hole fixing, bolted saddle clamp type, suitable for use with single cables having overall diameter up to 120mm and trefoil groups of cables having overall cable diameter up to 75mm as specified on the Data Sheet.

Cable cleats shall be suitable for use on power distribution systems having maximum prospective short circuit fault levels of 80kA RMS 1sec, 158kA peak.

9.10 Cable Glands and Cable Lugs

Cable glands shall be of the nickel plated, brass body double compression type, dual certified, providing an inner and outer seal for outdoor applications and suitable for the termination of the cables specified in the material requisition.

All cable glands used in hazardous and non hazardous area shall be dual certified type (Ex'd' IIC/ EEx 'e') & IP66 degree of protection.

Cable gland brass components shall be according to ASTM C38500 with material composition of 59% Cu, 3% Pb, & 38% Zn.

Cable glands shall be dimensionally compatible with the specified cable on which they are to be used. The overall seal provided by the cable gland shall comply with IP66 degree of protection according to IEC 60529

Cable glands shall be provided with seals suitable for use with cable sheaths exhibiting 'cold flow' characteristics without deforming or damaging the cable, according to IEC 60079-14, clause 9.1.3. 'Cold flow' is a term used for thermoplastic materials which flow when subjected to pressure at ambient temperature.

Cable glands shall be provided in kit form complete with locknuts, earth tag, serrated washer and non-tear, 2mm thick compressible plastic sealing washer suitable for the temperature range specified. Locknuts and earth tags shall be of nickel plated brass or aluminium, as appropriate. Cable glands shrouds are not required.

Cable glands for use with single core aluminium wire armoured cable shall be fabricated of aluminium.

Cable glands shall be certified for use from -45°C to +40°C. Cable glands shall have ISO metric threads of pitch 1.5mm.

Cable lugs shall be of High conductivity tinned copper material and Compression/ Crimping type.

The Cable lugs shall be suitable for the - 45 deg. C and + 40 deg. C.

9.11 Metal Frame Supports and Accessories

Proprietary cable support shall comprise channels, channel combinations, cantilever arms, brackets, fittings and washers manufactured from silicon enriched mild steel (Low temperature steel3 or equal) to BS EN 10113-1, hot dip deep galvanised in accordance with EN ISO 1461. The galvanising process shall be carried out only after all machining and fabrication is completed. Channels, channel combinations, cantilever arms and

cantilever support brackets shall minimum 2.5mm thick, with deep galvanising to minimum thickness of 80 microns. Fixing brackets and accessories shall be minimum 6mm thick, with galvanizing to minimum thickness of 80 microns. Nuts and bolts shall be spun galvanized.

9.12 Earthing

Earthing materials shall include a full range of components and accessories to enable design and installation of complete earthing and lightning protection systems.

Earth electrodes shall be of the copper bond rod type. Both ends of the rods shall be threaded to permit fitting of driving studs and coupling pieces to extend rod length. Rod diameter shall be as stated on the requisition.

Earth electrode couplings shall be Phosphorous Bronze.

Screw clamps for connecting earth conductors to earth electrodes shall be manufactured from high strength copper alloy having high conductivity and corrosion resistance.

Flat tape shall be manufactured from high conductivity copper, PVC insulation for earthing and grey PVC for lightning protection conductors. Sizes shall be as stated in the requisition.

Earthing cable shall be stranded copper conductors with 750V grade Green/Yellow PVC insulation. Sizes shall be as stated in the requisition.

Earthing bus bars shall be fabricated from hard drawn high conductivity tinned copper bar. Sizes shall be as stated in the requisition.

Lightning protection air terminals shall be of the taper pointed air rod type, single or multipoint. Mounting type shall be as stated in the requisition.

Underground earthing conductor joints shall be of the exothermic fusion welded type. Components and accessories shall include moulds, cartridges and special tools to cover a range of joint sizes and types, as stated in the requisition.

Earth electrode inspection pits shall be heavy duty precast concrete type with removable concrete inspection cover. The earth pit covers made from GRP may be used with the approval of company electrical authority.

9.13 Cable Markers, Ferrules and Ferrule Markers

Cable and core marker systems shall consist of user printable flame retardant heat shrink sleeves for cable cores and smaller diameter cables, and polyamide strips for larger cables. Marker strips shall have slotted ends to permit fixing to cable by means of nylon ties.

Printing shall be carried out by thermal transfer process to produce durable, UV stabilised tags.

Cable tags shall be of PVC material with letters in white colour with black background.

Computer software for printing of markers shall be suitable for use on PC compatible computer running latest Windows operating system.

All components of the marking system shall be suitable for environmental temperature from -45 deg C to +40 deg C.

9.14 Cable Termination Kits

Cable termination kit shall be heat shrinkable type suitable for temperature from

- 45 deg C to plus 40 deg C.

Cable termination kit shall have all required component and accessories such as sealing sleeves, insulating tubing, break-out, clamping ring, earth connection lead, sealant tape, cable lug etc. to carry out termination/jointing.

Termination kit shall be suitable for the voltage grade mentioned in the material requisition.

Supplier shall furnish detailed drawings along with part numbers along with offer.

9.15 Nameplates, Rating Plates and Labels

Stainless steel rating plates shall be affixed by stainless steel screws or rivets, where applicable, to the equipment to which they relate such that they are clearly visible and legible giving the information required by the relevant standards (IEC, ISO, etc).

A manufacturer's rating plate shall be affixed in a prominent position on each item, where applicable, giving the following information:

- Manufacturer's name and type/serial No.
- Item Tag Number.
- System voltage, phases, wires and frequency.
- Rated current or rated power as applicable.
- Year of manufacture.
- Purchaser's name.
- Order Item No.
- IP Rating

Ex marking, where applicable, shall also be provided as per the relevant standards.

All text on nameplates, rating plates and labels shall be in both Russian and English, or where separate labels are necessary, one in each language.

9.16 Painting and Finish

Unless otherwise stated, the SUPPLIER'S standard finish will be acceptable subject to the following minimum standards:

- a) Components degreased, sprayed with a zinc phosphate primer and passivated
- b) Electrostatically applied polyester powder coating to an average dry film thickness of 75microns

Finish colour shall be light grey 10-A-03 as per BS 4800. Supplier to refer to Specification for external coating Doc No - -00-ENG-SPC-00035.

The SUPPLIER shall submit details of the paint finish with the bid.

The SUPPLIER shall provide 2.5 litre of touch-up paint to repair any damage incurred during installation.

9.17 Electromagnetic Compatibility

For immunity, all equipment covered by this specification shall, as a minimum, be suitable for operation on electrical power distribution systems having overall disturbance characteristics defined in IEC 61000 and having limits specified for Class 2.

EMC emissions shall also be limited as far as is practical to meet the limits for Class 2 as defined in IEC 61000, but may be subject to more stringent requirements dependent on the

outcome of power system and harmonic studies, subject to agreement between COMPANY and SUPPLIER.

The design of the equipment should be of an adequate standard to maintain its performance during its operational life in its installed environment. For EMC, the performance of the apparatus must comply, is taken to be degraded if permanent or temporary loss of function occurs.

10 TESTING AND INSPECTION

The SUPPLIER shall provide routine test certificates and type test results, for all tests carried out on electrical bulk materials. Tests shall be those listed in the relevant standard specification(s) and any additionally specified within the material requisition.

The COMPANY reserves the right to witness all tests specified on bulk materials.

The SUPPLIER shall give two weeks notice of tests prior to commencement. At this time the SUPPLIER may request a test waiver if authenticated results from earlier type-tests on identical bulk materials can be provided from their archives to the COMPANY.

The COMPANY reserves the right to inspect bulk materials at the SUPPLIERs works prior to despatch to prove compliance with the specifications.

Any bulk materials shall not be despatched unless the test certificates have been approved by the COMPANY.

11 SHIPPING AND HANDLING

Preparation for shipment shall be as stated in the Specifications -AL-LGT-SPC- 00001 and -AL-LGT-SPC-00002 The SUPPLIER shall be solely responsible for the adequacy of the preparation for shipment provisions stated.

Preparation for shipment shall protect the component parts against corrosion, dampness, and breakage or vibration injury during transportation or handling.

Each shipping container shall be clearly identified with the contents, purchase order number and item number.

Location of lifting points, the weight and the centre of gravity shall be clearly marked on all shipping containers.

Where items are required to be dismantled for shipping, instructions shall be provided for reassembly of sections in the field.

The SUPPLIER is required to provide COMPANY with a Certificate of Compliance prior to shipping of equipment.

12 INSTALLATION, SITE TESTING AND COMMISSIONING

SUPPLIER shall provide full details for installing, site testing, commissioning and start up of the equipment as specified in the 'Supplier Documentation Requirements Schedule (SDRS)' listed in the Requisition.

When specified in the Purchase Order, the SUPPLIER shall provide representatives to assist the Purchaser during installation, commissioning and initial start-up of the equipment.

SUPPLIER shall identify any specialised training required for Company's operations and maintenance personnel.

13 MAINTENANCE REQUIREMENTS

SUPPLIER shall provide full details for maintaining the equipment as specified in the 'Supplier Documentation Requirements Schedule (SDRS)' listed in the Requisition.

Due consideration shall be given for easy accessibility to all the items, for maintenance and operational requirements, when designing the internal layout of the equipment. Access shall be provided to all equipment and any area requiring maintenance. The equipment shall be designed so that all maintenance can be carried out with the minimum special facilities/tools.

14 SPARE PARTS AND SPECIAL TOOLS

14.1 Spare parts

The SUPPLIER shall provide with his quotation, separate priced lists of recommended commissioning and operating spares.

Commissioning spares (approved by the COMPANY) shall be included with the bulk materials.

14.2 Special Tools

A complete set of any special tools required for operation, maintenance and testing of the bulk materials shall be provided. The SUPPLIER shall provide a list of special tools, individually priced, with his quotation. A storage box or wall mounted rack shall be provided together with a breaker lifting/transport dolly per substation.

15 DRAWING AND DATA REQUIREMENTS

SUPPLIER shall provide the documentation detailed in the SUPPLIER Documentation Requirement Schedule (SDRS) and the "Supplier Documentation Descriptions" as listed in the Requisition.

A Certificate of Conformance (CoC) is to be supplied for each equipment type.

A Certificate of Analysis is to be supplied for complex material types such as MMO/Ti cathodic protection anodes.

Material safety data sheets are to be supplied for all potentially dangerous materials such as Thermite cartridges

EAC Ex certification where required.

16 DEVIATIONS

Deviations from this specification are only acceptable where the SUPPLIER has listed in his quotation the requirements he cannot or does not wish to comply with and the COMPANY has accepted, in writing, the deviations before order is placed. If the manufacturer is also to offer alternatives resulting in technical or price advantages he should submit a supplement to the main tender.

In the absence of a list of deviations, it will be assumed by the COMPANY that the SUPPLIER complies fully with this specification.

APPENDIX A – CODES AND STANDARDS

CODES AND STANDARDS OF THE REPUBLIC OF KAZAKHSTAN

Rules for the Arrangement of Electrical Installations RK	PUE RoK 2015
Explosive atmospheres - Part 0: Equipment - General requirements, (IDT)	ST RK IEC 60079-0-2010
Degrees of protection provided by enclosures (IP code) (IDT)	ST RK IEC 60529-2012
Explosive atmospheres. Part 1. Equipment protection by flameproof enclosures «d»	GOST IEC 60079-1-2011
Explosive atmospheres - Part 7: Equipment protection by increased safety «e»	ST RK IEC 60079-7-2012
Power and illumination production equipment design instruction	SN RK 4.04-19-2003
Instructions for the installation of electrical equipment, power and lighting networks of hazardous areas	VSN 332-74
Light emitted diodes and light emitted diode modules for general application. Terms and definitions	GOST R 54814-2011
Lighting fittings. Light requirements and test methods	GOST R 54350-2011
Direct acting indicating analogue electrical measuring instruments and their accessories. Part 1.	GOST 30012.1-2002
Definitions and general requirements common to all parts	
Identification of conductors by colours or numerals	GOST R 50462-92
Electrical articles. General requirement for environment mechanical stability.	GOST 17516.1-90
Electrical and other industrial products. General requirements for resistance to environment climatic factors.	GOST 15543.1-89
Plugs, socket-outlets and couplers for industrial purposes. Part 1. General requirements	GOST 30849.1-2002
Plugs, socket-outlets and couplers for industrial purposes. Part 2. Dimensional interchangeability requirements for pin and contact-tube accessories	GOST 30849.2-2002
Plugs, socket-outlets and couplers for industrial purposes. Part 3. Particular requirements for plugs, socket-outlets, connectors and appliance inlets for use in explosive gas atmospheres	GOST 30849.3-2002

INTERNATIONAL CODES AND STANDARDS

Direct acting indicating analogue electrical measuring instruments and their accessories	IEC 60051
Basic and safety principles for man-machine interface, marking and identification - Coding principles for indication devices and actuators	IEC 60073
Explosive atmospheres	IEC 60079
Plugs, socket-outlets and couplers for industrial purposes	IEC 60309
Graphical symbols for use on equipment	IEC 60417
Basic and safety principles for man-machine interface, marking and identification - Identification of equipment terminals and of terminations of certain designated conductors, including general rules for alphanumeric system	IEC 60445
Degrees of protection provided by enclosures (IP Code)	IEC 60529
Lighting Fixtures	IEC 60598
Graphical symbols for diagrams	IEC 60617
High pressure sodium vapour lamps	IEC 60662
Dimensions of low-voltage switchgear and controlgear. Standardised mounting on rails for mechanical support of electrical devices in	IEC 60715

switchgear and controlgear installations	
Plugs and socket-outlets for household and similar purposes	IEC 60884
Low voltage switchgear and controlgear – Part 5-1. Control circuit devices and switching elements – Electromechanical control circuit devices	IEC 60947
Electromagnetic compatibility (EMC)	IEC 61000
Cable management – Cable tray systems and cable ladder systems Edition 2.0	IEC 61537
Safety of equipment for operation in explosive atmospheres	TR CU 012/2011
Other standards applicable:	
Hot rolled products of non-alloy structural steel – Technical delivery conditions	EN 10025
Hot-rolled products in weldable fine grain structural steels. General delivery conditions	BS EN 10113-1
Electrical accessories for domestic and similar purposes – 10/16A 250V plugs and cable couplers	NF C 61-303