SECTION 26 25 00

BUSWAY

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes: Procurement, installation, testing and commissioning of all busways complete with all fire barriers, expansion units, all accessories, supports, hardware's etc., as indicated on the drawings specified herein and in accordance with the requirements of the Contract Documents. Work shall include but is not limited to the following:

1. Busways

2. Vertical & Horizontal Expansion units and other accessories and hardware's

3. The manufacturer shall have quality system in accordance with ISO 9001, 14001 and 18001.

4. All modules should be manufactured in same factory and products should be manufactured and certified by an international certification organization like KEMA/DEKRA or ASTA.

5. Manufacturer premises should be monitored by KEMA KEUR or ASTA DIAMOND.

6. Products should be UL listed and certified.

1.2 REFERENCES

A. The installations shall comply with the LATEST EDITIONS of the following Standards:

1. IEC 61439-1

2. IEC 61439-6

3. IEC 60529

4. MEW Specifications S1

5. MEW – R1: "Regulations for Electrical Installations by Ministry of Electricity & Water, Kuwait"

1.3 SUBMITTALS

A. Product Data: Submit to the Engineer's Representative for information only in accordance with the requirements of the Contract Documents, copies of manufacturer's specifications and installation instructions and other data to show compliance with these Specifications.

B. Shop Drawings: Layout floor plans and elevation showing busway systems. Include busway types, dimensions, finishes, components, accessories, clamps, brackets, hanger rods, expansion joints bus plugs, tap boxes, etc.

C. Sample: Sample of busway and plug in box along with the submittal for engineers review, any submittal without samples will not be accepted.

D. Submit following test certificates as per IEC 61439 part 1&6 for all proposed busways from one of the ASTA/UL/KEMA testing authorities :-

Item No	**Clause No:**	**Description**
1	10.2.2	Resistance to corrosion
3	10.2.3.1	Verification of thermal stability of enclosures
4	10.2.3.2	Verification of resistance of insulating materials to abnormal heat and fire due to internal electric effects
5	10.2.6	Mechanical impact
6	10.2.7	Marking
8	10.2.101.1	Test procedure for a straight bus bar trunking unit of ability to withstand mechanical loads
9	10.2.101.2	Test procedure for a joint of ability to withstand mechanical loads
10	10.2.101.3	Resistance of the enclosure to crushing
11	10.3	Degree of protection of assembly
12	10.4	Clearances and creep age distances
14	10.5.2	Effective earth continuity between the exposed conductive parts of the assembly and the protective circuit
15	10.5.3	Short-circuit withstand strength of the protective circuit
17	10.9.2	Power-frequency withstand voltage
18	10.9.3	Impulse withstand voltage (10.9.3)
19	10.10	Verification of temperature rise
20	10.11	Short-circuit withstand strength
21	10.101	Resistance to flame propagation
22	10.102	Fire resistance in building penetrations
	5.101	Phase conductor and fault-loop characteristics
23	5.101	Annex BB Phase conductor characteristics
24	5.101	Annex CC Fault-loop zero-sequences impedances
25	5.101	Annex DD Fault-loop resistances and reactance’s

E. It is the sole responsibility of the contractor, without any cost implication to the project Owner, to upsize the busway ratings wherever required to meet 55^{O}C ambient Temperature due to total load of each line, 65KA/50KA for1sec fault level and voltage drop requirements as per project Specification depending on the proposed manufacturer's product data sheet de-rating guideline and type test certificate.

1.4 SPARE PARTS

A. Requirements of the Technical Specification / Section 26 00 00 shall be referred to and complied with as appropriate without prejudice to requirements stated herein.

B. Following spare parts shall be furnished, properly packed and labelled with equipment no. / Location:

1. 1% spare jointing unit of all types used.

2. 5% spare expansion element of all sizes used.

3. 1% spare tap-off box of each size used.

4. Accessories as recommended by the manufacturer.

PART 2 - PRODUCTS

2.1 GENERAL

A. All the products for the proposed solution shall have been used in projects of substantial scale and proven performance for the last 5 years as minimum.

B. Provide complete busway system including all necessary fittings, supports and hardware, whether or not indicated on the drawings or defined in detail in these specifications.

C. Bus duct shall be manufactured to comply either with IEC 61439-6 or UL 857, 3 phase 4 wire, with 50 percent internal earth of copper conductor same as phase conductor type suitable for 240/415 ±6% volt, 50±4% hertz system. Bus ducts shall comply with a minimum degree of protection IP 54 for indoor applications and IP66 for outdoor applications. The exact IP rating shall be decided according to area of installation in accordance with IEC 529. Full size neutral conductor similar in size to the phase conductor shall be provided.

D. Ratings

1. Ampere ratings shown in project drawings are rated currents at 55^{O}C ambient temperature. Bus bars shall be capable of carrying specified full rated current continuously without exceeding a temperature rise of 55^{O}C. Apply necessary derating factor to ensure that the rated busway carries full rated load current at 55^{O}C.ambient temperature. Complete third party test report shall be submitted to the engineer for review in order to asses and accept the derating proposed.

2. The busways shall be capable of withstanding for one minute, without breakdown, the application of 2200 volt, 50 hertz potential between conductors and between conductors and the enclosures. Submit factory routine test certificates for all modules.

3. Bus bars shall be low impedance and totally enclosed. Submit voltage drop and short circuit calculation to the full length of the bus duct for all feeders and shall be within acceptable limits.

4. The bus bars shall have a minimum short circuit withstand rating of 65KA for 1 second if connected directly to an MLTP fed from a 1600KVA transformer. 50KA for 1 second if connected directly to an MLTP fed from a 1250/1000KVA transformer.

5. The bus bars shall be suitable for mounting in any position without derating.

6. Quality System: The manufacturer shall have quality system in accordance with ISO 9000, 14001 and 18001 and certified by an international certification organization.

E. Busbars

1. The conductor bars shall be rectangular sectioned with rounded corners copper of 99.9% purity to ETP 99.9. All phases and neutral bars shall have equal sizes. The earth bar shall be 50% of phase bar. Mill certificate shall be submitted.

2. The busbars shall be insulated by a double sheath or epoxy insulation of class B (130^{o}C). Insulation voltage shall not be less than 1000V, and suitable for operation up to 600V, 3 Phase, 4 wires, 50Hz supply. Insulation made of PVC is not accepted.

3. Earth bar shall be inside of the bus duct system and shall be of copper.

F. Housing

1. The external casing shall be in galvanized sheet steel or extruded aluminum for mechanical strength and shall be treated in accordance to EN 10346 regulation with thickness of housing not less than 1.5mm steel or 2,5mm aluminum and to be shaped in such a way as to give excellent electromechanical characteristic and heat dissipation and to guarantee total safety against contact with live parts.

2. Housing shall be coated by epoxy polyester paint.

3. The construction shall be of sandwich configuration to prevent the circulation of air inside the casing, all plastic material to be self-extinguishing and non-fire propagating.

G. Jointing Unit

1. The electrical and mechanical jointing of the trunking elements to be achieved by monobloc joint system.

2. The plates of the monobloc joint unit should be tin plated copper.

3. The plate should connect on both sides of each busbar phase and neutral.

4. Each bolt of the joint block to be supplied with a Belleville elastic washer that distributes the contact pressure on the bar and absorb all the mechanical vibrations due to the flow of current. The tightening of the joint to be done by double headed torque bolt and tightened to correct torque setting.

5. The jointing block should have the facility to check the tightness of the bolt with the busbar live and without removing cover plate of the jointing block.

6. The joint-block shall be interlock type so as to ensure that the joint is placed correctly. Additional interlock shall be provided so that joint cover cannot be fitted if the torque bolt has not been fully tightened.

7. The jointing unit should be constructed in a manner to allow removal of jointing unit without disturbing adjacent feeder element for the purpose of electrical isolation or physical removal.

8. Joint UNIT shall require access to only one side for tightening and inspection without the need to de-energize the duct.

H. Expansion Element: Expansion elements to be fitted at least 40m of horizontal or vertical run or in accordance to busbar manufacturer's recommendations. Expansion joint shall be fitted wherever busbar cross a building joint.

I. Tap Off Boxes

1. Tap off Boxes for rating up to 630A shall be Plug-in type suitable for any type, model and brand of MCCB. The tap off box enclosure shall be constructed from galvanized sheet steel with paint finish, and it should have hinged front cover. It shall incorporate an external operating handle with ON, OFF, TRIP indication for MCCB enabling it to be operated with the cover closed. The MCCB shall incorporate padlocking facilities in OFF position for maintenance purpose. The plug-in units shall be suitable for mounting on front of the riser as required. The units shall be supplied with all connections and accessories to enable connection to the busbars and the outgoing cable to be correctly and safely achieved.

2. Plug in point for tap off boxes has to be customized and arranged at any distance from wall/ floor.

3. The units shall have clamps with interlocking facility to prevent the unit being removed from the busbar when MCCB is in the ON position. Additional interlock to be provided to prevent opening of the door of plug in when the MCCB is in the ON position.

4. The MCCB shall be connected to the Plug IN unit with copper busbars.

5. The tap off to be with earth terminal connection to the earth bar by plug in contact.

6. The earthing contact shall make first when tap of is plugged in.

7. Tap off units when inserted shall retain the same degree of IP protection.

8. Busway manufacturer shall provide similar brand of MCCB used in LT panels for better co-ordination.

9. Tap-off units should be equipped for hook-stick operation.

10. If needed, Bolt on tap off box shall be manufactured and fixed at joint of busbar with 1000A MCCB.

11. Tap-off units from 30A to 630A should use only plug-in openings in busduct.

J. Earth Bar

1. The earth bar shall be inside the busbar enclosure.

2. The earth bar should be in pure copper and at least 50% of the phase busbar and should run along both sides of the Busbar system and bonded to the busbar enclosure.

K. Accessories: The manufacturer should have a standard range of accessories

including horizontal and vertical elbows, T elements and double Elbows, connecting elements to switchgear and transformer. All modules shall be manufactured at the same factory with all necessary plating.

PART 3 - EXECUTION

3.1 Busways shall be installed by manufacturer's approved/certified contractor.

3.2 Busway installer should have sufficient experience in Kuwait (10 years at least).

3.3 Bus duct and tap off units shall be installed complete with all necessary fittings and hardware in accordance with the manufacturer's instructions. Particular care shall be taken to ensure that the bolted connections are properly torqued and that adequate allowance is made for expansion where necessary expansion couplers shall be used.

3.4 Horizontal Busways shall be supported at not more than 1.5m intervals. Fastenings for supports and accessories as per manufacturer catalogue items. Wherever and whenever busways are linked to equipment emitting vibration, anti-vibration kits which includes flexible conductors, rubber bellows shall be provided at all such locations.

3.5 Fire barriers shall be installed at floor and wall penetrations as required according to KFSD requirements.

3.6 Contractor shall verify site dimensions as-built for structure and coordinate for the actual routing and equipment locations so that the shop drawings for busways to be made accurately. Contractor shall not fabricate the busways without the approval of the shop drawings. It is the Contractor's responsibility to coordinate with all services, equipment, and connection details at ends, support system and location.

PART 4 - TESTS AND INSPECTION

4.1 All reports for below tests shall be submitted for engineers review and acceptance before energizing the system.as per manufacturer's manual.

A. Factory routine tests: all factory routine test reports shall be submitted along with every consignment/delivery.

1. Dielectric test

2. Megger/insulation resistance test at 1000v

4.2 SITE TESTS:

A. reports of insulation test at 1000V

1. Before installation of each piece of bus bar trunking

2. On completion of the installation of each bus bar run

B. test report approved by manufacturer/manufacturer representative shall be submitted for each line to verify the tightness of all the joints

4.3 Final visual inspection report of each and every busway line shall be submitted by the manufacturer or manufacturer approved/certified engineer.

4.4 END OF SECTION

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