

## ANNEXURE-II

### Bill of Quantities for underground Earthing Works

Rev 00

Project : 220/66/20 kV Khan Al Joz S/S

Customer : PEEGT, Syria

S.No.	Description	Unit	Qty.	Unit ETC Price	Total ETC Price
	<b>MAIN EQUIPMENTS</b>				
1	<b>Earthing material-</b> Cu strip including cutting, bending, welding with earth strip, applying zinc rich paint, clamping to structure/building wall etc. to complete. The Earthing of equipments, Auxiliary Earthmats under Iso/ ES/ CB MOM boxes shall be carried out. Equipment & Structure Earthing details are as per spec				
1.1	185 sq mm dia bare stranded Copper wire	km	18		
1.2	Exothermic joints	nos.	500		
	<b>Total Amount</b>				

**Following also forms the scope of work in addition to above, but not limited to this.**

1	Loading / Unloading, handling, shifting to & from stores, proper storage, assembly, installation, pre-commissioning test and commissioning tests are included in the scope.
2	Minor Civil works such as modification of civil foundations, making holes in the trenches, grouting, fixing of trench material will be in the scope of ETC contractor.
3	Removal of gravel for connection of Equipment earthing strip to the existing mat (wherever earthing mat is already laid), and after completion of earthing , contractor should place the gravel to bring it in original shape.
4	The quantities given in items 1.1 to 1.2 may undergo a change to any extent.

#### **6.4 Lightning protection**

Protection shall be provided for effective shielding of the substation structures and equipment against direct lightning strokes.

Lightning masts and horizontal sky wire conductors supported by the main structures will be used to shield the substation.

Earthing conductors connecting the sky-wire system to earth shall be installed at even intervals with a view of offering low impedance to the passage of stroke current to the earthing grid and shall provide a direct path.

The earthing conductor system shall be of copper clad steel of low impedance and of durable and highly rugged construction. It shall require no maintenance and both conductors and clamps shall be corrosion resistant. Where any part of the earthing conductor system is exposed to mechanical injury, it shall be protected by covering with moulding or tubing preferably of non-conductive material. If metal pipe or

tubing is used around the conductor, it shall be electrically connected to the pipe tubing at both ends.

Joints in earthing conductors shall be thermal weld types, mechanically strong, well made to provide adequate electrical conductivity.,

The substations lightning protection design shall be in accordance with up to date techniques.

The design shielding failure risk shall not be greater than one failure per 100 year. The design should ensure adequate protection from strokes in the surroundings fringe area preferably by conductors at the equipment boundary lines.