

## MAHARASHTRA INDUSTRIAL DEVELOPMENT CORPORATION

### Item Specification

**Work Name: Pusad Indl. Area....Strengthening of existing infrastructure in Pusad Growth centre.....**

**Sub Estimate:Sub Estimate 1: Strengthening and providing concrete treatment to roads for 7.50 m wide roads & construction of CD work.**

**1 Excavation for roadway in earth, soil of all sorts, sand, gravel or soft murum including dressing section to the required grade, camber and side slopes and conveying the excavated materials with all lifts upto a lead of 50m. and spreading for embankment or stacking as directed.**

**Specification:**

The item shall be executed as per PWD standard specifications, as per MORTH 301 specifications , standard engineering practice and as directed by engineer in charge. Mode of measurement & Payment:- The finished item shall be measured on volumetric basis and paid on per Cubic meter basis.

**2 Compacting the hard murum side widths including laying in layers on each side with vibratory roller including artificial watering etc. complete.**

**Specification:**

General :- This item refers to the work as explained above. The item shall be executed as per Morth Standard Specifications No. 305. Mode of Measurement and Payment :- Measurement shall be made per Square Meter basis & the contract unit rate shall be paid accordingly

**3 Conveying materials obtained from road cutting including all lifts, laying in layers of 20cm. to 30cm. breaking clods, dressing to the required lines, curves, grades and section, watering and compacting to not less than 97% of standard proctor density for a lead of 300m. to 500m. inclusive, from the site of excavation to the site of deposition as directed.**

**Specification:**

The item shall be executed as per PWD standard specifications, as per MORTH 305 specifications , standard engineering practice and as directed by engineer in charge. Mode of measurement &Payment:- The finished item shall be measured on volumetric basis and paid on per Cubic meter basis.

**4 Providing earth work in embankment with approved materials obtained from other sources upto lead of 50m. including all lifts, laying in layers of 20cm. to 30cm. thickness breaking clods, dressing to the required lines, curves, grades & section, watering and compaction with vibratory roller with V-Sat attachment to achieve not less than 97 % of standard proctor density etc. complete ( Material obtained from Other sources)**

**Specification:**

This item refers to the work as explained above. The item shall be executed as per PWD Morth

Standard Specifications No.305 as per best engineering practice and as per direction of engineer in-charge. Mode of measurement & Payment:- Measurement shall be made per Cubic Meter basis & the contract unit rate shall be paid accordingly.

**5 Construction of granular sub-base by providing close graded Material, mixing in a mechanical mix plant at OMC, carriage of mixed Material to work site, spreading in uniform layers with motor grader/ Paver on prepared surface and compacting with vibratory roller to achieve the desired density, complete as per clause 401 -- Plant Mix Method and Grading - I Material**

**Specification:**

The item shall be executed as per PWD standard specifications, as per MORTH 401 specifications, standard engineering practice and as directed by engineer in charge. Mode of measurement & Payment:- The finished item shall be measured on volumetric basis and paid on per Cubic meter basis.

**6 Wet Mix Macadam -- Providing, laying, spreading and compacting graded stone aggregate to wet mix macadam specification including premixing the Material with water at OMC in mechanical mix plant carriage of mixed Material by tipper to site, laying in uniform layers with paver in sub- base / base course on well prepared surface and compacting with vibratory roller to achieve the desired density. Laying By Grader/Paver.**

**Specification:**

The item shall be executed as per PWD standard specifications, as per MORTH 406 specifications, standard engineering practice and as directed by engineer in charge. Mode of measurement & Payment:- The finished item shall be measured on volumetric basis and paid on per Cubic meter basis.

**7 Providing and laying 125 micron Low Density Polyethylene (LDPE) sheet conforming to IS 3395 : 1997 below concrete pavement including all materials and labour complete.**

**Specification:**

The item shall be executed as per PWD standard specifications, as per MORTH 602.5 specifications, standard engineering practice and as directed by engineer in charge. Mode of measurement & Payment:- The finished item shall be measured on area basis and paid on per Square meter basis.

**8 Construction of dry lean cement concrete Sub- base over a prepared sub-grade with coarse and fine aggregate ( natural sand/ VSI grade finely washed crushed sand) conforming to IS: 383, the size of coarse aggregate not exceeding 25 mm, , cement content not to be less than 150 kg/ cum, optimum moisture content to be determined during trial length construction, concrete strength not to be less than 10 Mpa at 7 days, mixed in a batching plant/ Weigh batch mixer, transported to site with all leads and lifts, laid with a paver with electronic sensor /by suitable means as approved by Engineer-in-charge , compacting with vibratory roller, finishing, curing and including preparation of sub-grade surface if required etc. complete. with fully automatic micro processor based PLC with SCADA enabled reversible Drum Type mixer/ concrete Batch mix plant (Pan mixer) etc. complete.**

**Specification:**

The item shall be executed as per PWD standard specifications, as per MORTH 601 specifications, standard engineering practice and as directed by engineer in charge. Mode of measurement & Payment:- The finished item shall be measured on volumetric basis and paid on per Cubic meter basis.

**9 Providing and laying in-situ M40 Grade unreinforced plain cement concrete pavement over a prepared sub base with 43 grade cement , coarse and fine aggregate ( natural sand/ VSI grade finely washed crushed sand) conforming to IS 383, using fine and coarse aggregates combined gradation as per Table 600-3 of MORTH Specification 2013, mixed in a batching and mixing plant/ non tilting mixer and Weigh batcher as per approved mix design, admixtures, transporting to site, spreading, laying with approved make paver, compacted and finished in a continuous operation, finishing to lines and grades as directed by Engineer-in-charge and curing by curing compound /by providing cement vata in cement Mortar 1:8 @0.6m X 0.6m centre to centre, admeasuring 80 mm at bottom and 40 mm at top with depth of 75mm and maintaining the same throughout curing period by any other method approved by Engineer-in-charge. with fully automatic micro processor based PLC with SCADA enabled reversible Drum Type mixer/ concrete Batch mix plant (Pan mixer) etc. complete.**

**Specification:**

The item shall be executed as per PWD standard specifications, as per MORTH 602 specifications, standard engineering practice and as directed by engineer in charge. Mode of measurement & Payment:- The finished item shall be measured on volumetric basis and paid on per Cubic meter basis.

**10 Cutting transverse contraction joints 3 to 4 mm wide and depth 60mm. .in concrete slab using concrete cutting machine with diamond studded saw within 48 hours of casting of bay / slab etc. complete including subsequent widening of the groove 8 to 10 mm. wide at top having depth of 15 mm. as directed by Engineer incharge.**

**Specification:**

The item shall be executed as per PWD standard specifications, as per MORTH 602.6.3 & 602.6.4 specifications, standard engineering practice and as directed by engineer in charge. Mode of measurement & Payment:- The finished item shall be measured on length basis and paid on per meter basis.

**11 Providing to contraction joints polysuphide sealent (Pouring grade) confirming to BS : 5212 - 1989 into sawed groove widened at top for sealent reservoir of specified size and shape as per detailed drawing including fixing Polyethylene foam backer rod of required diameter (appraox. 25% larger than the initial 3 mOne Metric Tonneo 4 mm. joint) overlaid with bond breaking tape as per detailed drawing. Item includes cleaning the joints with water jet / air compressor and allowing joint to become thoroughly dry before sealent is applied and applying primer. (A) Contraction and longitudinal joints (15 mm. deep x 8 mm.wide)**

**Specification:**

The item shall be executed as per PWD standard specifications, as per MORTH 602.6.3 & 602.6.4 specifications, standard engineering practice and as directed by engineer in charge. Mode of measurement & Payment:- The finished item shall be measured on length basis and paid on per meter basis.

**12 Providing and fixing in position TMT FE 500, 32 mm dia dowel bars precoated with anticorrosive epoxy paint of required Dia. 60 cms. Long and at 30.00 cm. C/C and wherever directed including handling, straightening, necessary cutting supported by TMT FE 500, chairs with proper alignment by using properly designed assembly of Bulkheads lubricating half length with bituminous paint as directed etc. complete.**

**Specification:**

The item shall be executed as per PWD standard specifications, as per MORTH 602.6.5 specifications, standard engineering practice and as directed by engineer in charge. Mode of measurement & Payment:- The finished item shall be measured each basis and paid on per Number basis.

**13 Providing and fixing in position TMT FE 500, tie bars precoated with anticorrosive epoxy paint of 12 mm dia. 70 cms.long and at 30.00 cm. C/C and wherever directed including handling, straightening wrapping with paper of approved quality for half length, necessary cutting, handling, straightening , supported by assembly of TMT FE 500, chairs with proper alignment etc. complete.**

**Specification:**

The item shall be executed as per PWD standard specifications, as per MORTH 602.6.4.2 specifications, standard engineering practice and as directed by engineer in charge. Mode of measurement & Payment:- The finished item shall be measured each basis and paid on per Number basis.

**14 Providing and Laying hot applied thermoplastic road marking strip on Bituminous Surface of specified shade/ colour of 2.5 mm thick including 1.5 Refractive index reflectorizing glass beads @ 250gm/sqm .Thickness of 2.5 mm is exclusive of surface applied glass beads as per IRC 35:2015.**

**14.1 Providing and Laying hot applied thermoplastic road marking strip on Bituminous Surface of specified shade/ colour of 2.5 mm thick including 1.5 Refractive index reflectorizing glass beads @ 250gm/sqm .Thickness of 2.5 mm is exclusive of surface applied glass beads as per IRC 35:2015. Initial Dry reflectivity RL shall be > 250 mcd/sqm/lux measured in the initial 7 days and sustained reflectivity RL of 100 mcd/sqm/ lux and Qd of 100 mcd/sqm/ lux measured at the end of 2 years by means of a Standard Reflectometer of Zehntner, EasyLux, Delta make capable of measuring RL & QD both according to IRC 35:2015 clause 15.5. The finished surface to be level, uniform, and free from streaks and holes complete as per direction of Engineer-in-charge and in accordance with applicable specifications.(Refer MORTH Clause 803 for technical Specification and Performance for IRC 35:2015).**

**Specification:**

#### **14.1 Specification**

This item refers to the work as explained above. The item shall be executed as per Morth Standard Specifications No. 803.4. Mode of Measurement and Payment : Measurement shall be made per Square Meter basis & the contract unit rate shall be paid accordingly.

**15 Providing and fixing in position TMT - FE - 500 bar reinforcement of various diameters for R.C.C. pile caps, footings, foundations, slabs, beams columns, canopies, staircase, newels, chajjas, lintels pardis, copings, fins, arches etc. as per detailed designs, drawings and schedules. including cutting, bending, hooking the bars, binding with wires or tack welding and supporting as required complete.**

**Specification:**

The item shall be executed as per PWD standard specifications, as per BDF17 specifications & additional specification no. Bd.F.17 page one no. 306, standard engineering practice and as directed by engineer in charge. Mode of measurement & Payment:- The finished item shall be measured on weight basis and paid on per Metric tonne (MT) basis.

**16 Providing, laying and fixing P.V.C. pipe of 110 mm. dia. with fittings such as bends, tees, reducers, clamps, etc. including necessary excavation, trench filling etc. complete. Including removing existing pipe line if necessary and conveying and stacking the same in PWD chowky or as directed etc. complete.**

**Specification:**

The item shall be executed as per PWD standard specifications, as per BDV60 specifications, standard engineering practice and as directed by engineer in charge. Mode of measurement & Payment:- The finished item shall be measured on length basis and paid on per Running meter basis.

**17 Providing and fixing bitumen sheet to pavement concrete at contraction joint etc. complete**

**Specification:**

This item refers to the work as explained above. The item shall be executed as per standard engineering practice and as directed by engineer in charge.. Mode of Measurement and Payment :- Measurement shall be made per Square Meter basis & the contract unit rate shall be paid accordingly.

**18 Excavation for foundation in earth, soil of all types, sand, gravel and soft murum, including removing the excavated material up to a distance of 50 m. beyond the building area and stacking and spreading as directed, dewatering, preparing the bed for the foundation and necessary back filling, ramming, watering including shoring and strutting etc. complete. (All Lift) By Mechanical Means**

**Specification:**

The item shall be executed as per PWD standard specifications, as per BDA1 specifications & additional specification no. Bd.A.1 page one no. 259, standard engineering practice and as directed by engineer in charge. Mode of measurement & Payment:- The finished item shall be measured on volumetric basis and paid on per Cubic meter basis.

**19 Excavation for foundation in Soft rock and old cement or lime masonry foundations including removing the excavated material upto a distance of 50 metres beyond the building area and stacking as directed, including dewatering, preparing the bed for the foundation and necessary back filling with available earth /murum, ramming, watering including shoring and strutting etc. complete (All lift) By Mechanical Means**

**Specification:**

The item shall be executed as per PWD standard specifications, as per BDA4 specifications & additional specification no. Bd.A.4 page one no. 259, standard engineering practice and as directed by engineer in charge. Mode of measurement & Payment:- The finished item shall be measured on volumetric basis and paid on per Cubic meter basis.

**20 Providing and laying in PCC M15 grade leveling course below approach slab complete with fully automatic micro processor PLC with SCADA enabled reversible drum type mixer/ concrete batch mix plant (pan mixer) as per drawings and Technical specifications etc. complete with fine aggregates of required specifications ( VSI sand finely washed etc )**

**Specification:**

The item shall be executed as per PWD standard specifications, as per MORTH & MORT and H 1700 and 2700 specifications, standard engineering practice and as directed by engineer in charge. Mode of measurement & Payment:- The finished item shall be measured on volumetric basis and paid on per Cubic meter basis.

**21 Providing and laying in situ /Ready Mix cement concrete M-20 of trap / granite /quartzite/ gneiss metal for R.C.C. work in foundations like raft, strip foundations, grillage and footings of R.C.C. columns and steel stanchions etc. including bailing out water, Steel centering formwork, laying/pumping cover blocks, compaction and curing roughening the surface if special finish is to be provided (Excluding reinforcement and structural steel) etc. complete, with fully automatic micro processor based PLC with SCADA enabled reversible Drum Type mixer/ concrete Batch mix plant (Pan mixer) etc. complete. With fine aggregate (Crushed sand VSI Grade)**

**Specification:**

This item refers to the work as explained above. The item shall be executed as per PWD specification No. Bd.F.3 Page One Number 298 and B.7, Page One Number 38 as per best engineering practice and as per direction of engineer-in-charge. Mode of Measurement and Payment:- Measurement shall be made per Cubic Meter basis & the contract unit rate shall be paid accordingly.

**22 Providing ISI standard R.C.C. pipes in standard lengths of following class and diameter suitable for either collar joints or rubber ring joints, excluding GST levied by GOI & GOM in all respect including inspection charges, transport to departmental stores, unloading and stacking etc. complete as per IS-458/1988. Note :One collar should be supplied with each full length plain ended RCC pipe, cost including in rates below. One rubber ring should be supplied with each full length of socketed pipe, cost included in rates below. Note :Only 85% rate is payable till**

satisfactory hydraulic testing is given.

**22.1 Class 'NP-II' ( For 2.00 m. length ) Collar Joints**

**22.1.1 300 mm.**

**22.1.2 150 mm.**

**Specification:**

**22.1.2 Specification**

The item pertains to Providing and laying cement concrete pipe of at suitable location as directed by engineering in charge. The item shall be executed as per wording of the item, best engineering practice, confirming to relevant IS standards and as per direction of engineer in charge. Mode of measurement & Payment:- Measurement shall be made per Running Meter basis & the contract unit rate shall be paid accordingly.

**23 Providing and laying cement concrete pipe of IS 458:2003 NP-3 class of 900mm diameter in proper line, level and slope etc. complete.**

**Specification:**

The item shall be executed as per PWD standard specifications, as per CD 7 specifications & additional specification no. CD.7 page one no. 162, standard engineering practice and as directed by engineer in charge. Mode of measurement & Payment:- The finished item shall be measured on length basis and paid on per Running meter basis.

**24 Providing and laying cement concrete pipe of IS 458:2003 NP-3 class of 600mm diameter in proper line, level and slope etc. complete.**

**Specification:**

The item shall be executed as per PWD standard specifications, as per CD 7 specifications & additional specification no. CD.7 page one no. 162, standard engineering practice and as directed by engineer in charge. Mode of measurement & Payment:- The finished item shall be measured on length basis and paid on per Running meter basis.

**Sub Estimate: Sub Estimate 2: Strengthening and providing 60 mm DBM & 40 mm BC asphalt treatment to roads for 5.50 m wide roads in Pusad Indl. area**

**1 Picking the road surface including sectioning etc. complete (BT surface.)**

**Specification:**

The item shall be executed as per PWD standard specifications & as directed by engineer in charge and charges thereof. Mode of measurement & Payment:- The item shall be measured on area basis and paid on square meter basis.

**2 Construction of granular sub-base by providing close graded Material, mixing in a mechanical mix plant at OMC, carriage of mixed Material to work site, spreading in uniform layers with motor grader/ Paver on prepared surface and compacting with vibratory roller to achieve the desired density, complete as per clause 401 -- Plant Mix Method and Grading - I Material**

**Specification:**

General :- This item refers to the work as explained above. The item shall be executed Morth

Standard Specifications No. 401. Mode of Measurement and Payment :- Measurement shall be made per Cubic Meter basis & the contract unit rate shall be paid accordingly.

**3 Wet Mix Macadam -- Providing, laying, spreading and compacting graded stone aggregate to wet mix macadam specification including premixing the Material with water at OMC in mechanical mix plant carriage of mixed Material by tipper to site, laying in uniform layers with paver in sub- base / base course on well prepared surface and compacting with vibratory roller to achieve the desired density. Laying By Grader/Paver.**

**Specification:**

General :- This item refers to the work as explained above. The item shall be executed as per Morth Standard Specifications No. 406. Mode of Measurement and Payment :- Measurement shall be made per Cubic Meter basis & the contract unit rate shall be paid accordingly.

**4 Prime coat - Providing and applying primer coat with bitumen emulsion on prepared surface of granular Base including cleaning of road surface and spraying, primer at the rate of 0.60 kg/sqm using mechanical means.**

**Specification:**

General :- This item refers to the work as explained above. The item shall be executed as per Morth Standard Specifications No. 502. Mode of Measurement and Payment :- Measurement shall be made per Square Meter basis & the contract unit rate shall be paid accordingly.

**5 DENSE BITUMINOUS MACADAM:--Providing and laying dense bituminous macadam using crushed aggregate of grading 1, premixed with bituminous binder Bitumen of specified grade,@ 4.50 % by weight of total mix and filler, transported at site with VTS, laid over a previously prepared surface , finished to the required grade ,level, alignment,and rolling to achieve the desired density for 76/100 mm compacted thickness with drum mix type hot mix plant with SCADA having complying essential features of Hot mix plant as per IRC-27-2009 specified conditions and attachments such as electronic load sensor based belt conveyers, automatic synchronization of bitumen and aggregate fedder,built in dust controller system and PLC for Drum Mix plant ,Sensor paver, and Vibratory roller excluding prime/Tack coat etc. complete --Bitumen VG-30 grade with stone dust filler (VG-30 bulk bitumen rates are considered to arrive at rates)**

**Specification:**

General :- This item refers to the work as explained above. The item shall be executed as per Morth Standard Specifications No. 505. Mode of Measurement and Payment :- Measurement shall be made per Cubic Meter basis & the contract unit rate shall be paid accordingly.

**6 Providing and applying tack coat on the prepared surface heating by flames in Boiler and spraying bitumen with sprayer on Granular surface treated with primer @ 2.75 kg/10 sqm(VG-30 bulk bitumen rates are considered to arrive at rates)**

**Specification:**

This item refers to the work as explained above. The item shall be executed as per Morth Standard Specifications No. 503. Mode of Measurement and Payment :- Measurement shall be made per Square Meter basis & the contract unit rate shall be paid accordingly.

**7 BITUMINOUS CONCRETE:--Providing and laying bituminous concrete using crushed aggregate of grading 1, premixed with bituminous binder @5.40% by weight of total mix and filler, transported at site with VTS, laid over a previously prepared surface, finished to the required grade ,level, alignment, and rolling to achieve the desired density for 50mm**



**compacted thickness with drum mix plant with SCADA, Sensor paver and Vibratory roller excluding prime/Tack coat etc. complete --Bitumen of specified grade with stone dust filler. (VG-30 bulk bitumen rates are considered to arrive at rates)**

**Specification:**

This item refers to the work as explained above. The item shall be executed as per MORTH 507 specifications & as per additional specifications as per MORTH 509 specifications. Mode of measurement & Payment:- The item shall be measured on volumetric basis and paid on cubic meter basis

**8 Providing and Laying hot applied thermoplastic road marking strip on Bituminous Surface of specified shade/ colour of 2.5 mm thick including 1.5 Refractive index reflectorizing glass beads @ 250gm/sqm .Thickness of 2.5 mm is exclusive of surface applied glass beads as per IRC 35:2015.**

**8.1 Providing and Laying hot applied thermoplastic road marking strip on Bituminous Surface of specified shade/ colour of 2.5 mm thick including 1.5 Refractive index reflectorizing glass beads @ 250gm/sqm .Thickness of 2.5 mm is exclusive of surface applied glass beads as per IRC 35:2015. Initial Dry reflectivity RL shall be > 250 mcd/sqm/lux measured in the initial 7 days and sustained reflectivity RL of 100 mcd/sqm/lux and Qd of 100 mcd/sqm/ lux measured at the end of 2 years by means of a Standard Reflectometer of Zehntner, EasyLux, Delta make capable of measuring RL & QD both according to IRC 35:2015 clause 15.5. The finished surface to be level, uniform, and free from streaks and holes complete as per direction of Engineer-in-charge and in accordance with applicable specifications.(Refer MORTH Clause 803 for technical Specification and Performance for IRC 35:2015).**

**Specification:**

**8.1 Specification**

This item refers to the work as explained above. The item shall be executed as per Morth Standard Specifications No. 803.4. Mode of Measurement and Payment :Measurement shall be made per Square Meter basis & the contract unit rate shall be paid accordingly.

**9 Providing earth work in embankment with approved materials obtained from other sources upto lead of 50m. including all lifts, laying in layers of 20cm. to 30cm. thickness breaking clods, dressing to the required lines, curves, grades & section, watering and compaction with vibratory roller with V-Sat attachment to achieve not less than 97 % of standard proctor density etc. complete ( Material obtained from Other sources)**

**Specification:**

This item refers to the work as explained above. The item shall be executed as per Morth Standard Specifications No.305. Mode of measurement & Payment:- Measurement shall be made per Cubic Meter basis & the contract unit rate shall be paid accordingly.

**10 Excavation for roadway in earth, soil of all sorts, sand, gravel or soft murum including dressing section to the required grade, camber and side slopes and conveying the excavated materials with all lifts upto a lead of 50m. and spreading for embankment or stacking as directed.**

**Specification:**

This item refers to the work as explained above. The item shall be executed as per Morth Standard Specifications No.301. Mode of measurement & Payment:- Measurement shall be made per Cubic

Meter basis & the contract unit rate shall be paid accordingly.

**11 Conveying materials obtained from road cutting including all lifts, laying in layers of 20cm. to 30cm. breaking clods, dressing to the required lines, curves, grades and section, watering and compacting to not less than 97% of standard proctor density for a lead of 300m. to 500m. inclusive, from the site of excavation to the site of deposition as directed.**

**Specification:**

This item refers to the work as explained above. The item shall be executed as per Morth Standard Specifications No.305. Mode of measurement & Payment:- Measurement shall be made per Cubic Meter basis & the contract unit rate shall be paid accordingly.

**12 Providing, laying and fixing P.V.C. pipe of 110 mm. dia. with fittings such as bends, tees, reducers, clamps, etc. including necessary excavation, trench filling etc. complete. Including removing existing pipe line if necessary and conveying and stacking the same in PWD chowky or as directed etc. complete.**

**Specification:**

This item refers to the work as explained above. The item shall be executed as per PWD Morth Standard Specifications No. BDV 60 as per best engineering practice and as per direction of engineer-in-charge. Mode of Measurement and Payment :- Measurement shall be made per Running meter basis & the contract unit rate shall be paid accordingly.

**Sub Estimate:Sub Estimate 3: Construction of Cable duct and Navigation system in Pusad Indl. area**

**1 Excavation for roadway in earth, soil of all sorts, sand, gravel or soft murum including dressing section to the required grade, camber and side slopes and conveying the excavated materials with all lifts upto a lead of 50m. and spreading for embankment or stacking as directed.**

**Specification:**

The item shall be executed as per PWD standard specifications, as per MORTH 301 specifications, standard engineering practice and as directed by engineer in charge. Mode of measurement & Payment:- The finished item shall be measured on volumetric basis and paid on per Cubic meter basis.

**2 Conveying materials obtained from road cutting including all lifts, laying in layers of 20cm. to 30cm. breaking clods, dressing to the required lines, curves, grades and section, watering and compacting to not less than 97% of standard proctor density for a lead of 300m. to 500m. inclusive, from the site of excavation to the site of deposition as directed.**

**Specification:**

This item refers to the work as explained above. The item shall be executed as per Morth Standard Specifications No.305. Mode of measurement & Payment:- Measurement shall be made per Cubic Meter basis & the contract unit rate shall be paid accordingly.

**3 Providing and laying in PCC M15 grade leveling course below approach slab complete with fully automatic micro processor PLC with SCADA enabled reversible drum type mixer/ concrete batch mix plant (pan mixer) as per drawings and Technical specifications etc. complete with fine aggregates of required specifications ( VSI sand finely washed etc )**

**Specification:**

The item shall be executed as per PWD standard specifications, as per MORTH & MORT and H 1700 and 2700 specifications, standard engineering practice and as directed by engineer in

charge. Mode of measurement & Payment:- The finished item shall be measured on volumetric basis and paid on per Cubic meter basis.

**4 Providing and laying in situ /Ready Mix cement concrete M-20 of trap / granite /quartzite/ gneiss metal for R.C.C. work in foundations like raft, strip foundations, grillage and footings of R.C.C. columns and steel stanchions etc. including bailing out water, Steel centering formwork, laying/pumping cover blocks, compaction and curing roughening the surface if special finish is to be provided (Excluding reinforcement and structural steel) etc. complete, with fully automatic micro processor based PLC with SCADA enabled reversible Drum Type mixer/ concrete Batch mix plant (Pan mixer) etc. complete. With fine aggregate (Crushed sand VSI Grade)**

**Specification:**

This item refers to the work as explained above. The item shall be executed as per PWD specification No. Bd.F.3 Page One Number 298 and B.7, Page One Number 38 as per best engineering practice and as per direction of engineer-in-charge. Mode of Measurement and Payment:- Measurement shall be made per Cubic Meter basis & the contract unit rate shall be paid accordingly.

**5 Providing and fixing in position TMT - FE - 500 bar reinforcement of various diameters for R.C.C. pile caps, footings, foundations, slabs, beams columns, canopies, staircase, newels, chajjas, lintels pardis, copings, fins, arches etc. as per detailed designs, drawings and schedules. including cutting, bending, hooking the bars, binding with wires or tack welding and supporting as required complete.**

**Specification:**

The item shall be executed as per PWD standard specifications, as per BDF17 specifications & additional specification no. Bd.F.17 page one no. 306, standard engineering practice and as directed by engineer in charge. Mode of measurement & Payment:- The finished item shall be measured on weight basis and paid on per Metric tonne (MT) basis.

**6 Providing, erecting pre-cast elements such as cover slabs for drains, grills, kerbs, kerb stone, dividers, manholes, frames, manholes covers, gutters, fence posts grills, rails lintels, sills, bed blocks, steps or any other member or element as per drawings & specifications using RCC grade M-20 including shuttering as may be required, compacting by plate vibrator, curing and finishing the element where required with 1:3 cement mortar, transporting to site and erecting in position grouting with cement mortar 1:3 as may be required and curing etc. all labour and material complete. (Including cost of Steel reinforcement) ( Rates excluding GST )**

**Specification:**

The item pertains to Providing, erecting pre-cast elements such as cover slabs for drains, grills, kerbs, kerb stone, dividers, manholes, frames, manholes covers, gutters, fence posts grills, rails lintels, sills, bed blocks, steps or any other member or element as per drawings & specifications using RCC grade M-20 including shuttering as may be required, compacting by plate vibrator, curing and finishing the element where required with 1:3 cement mortar, transporting to site and erecting in position grouting with cement mortar 1:3 as may be required and curing etc. all labour and material complete. The item shall be executed as per wording of the item, best engineering practice, confirming to relevant IS standards and as per direction of engineer in charge. Mode of Measurement and payment :- Measurement shall be made per cubic Meter basis & the contract unit rate shall be paid accordingly

**7 Providing and applying two coats of flat oil paint of approved colour and shade to internal / external plastered surfaces including scaffolding if necessary, cleaning and preparing the surface (excluding primer coat) etc. complete.**

**Specification:**

The item shall be executed as per PWD standard specifications, as per MORTH Bd.O.7 Page One Number 406 specifications, standard engineering practice and as directed by engineer in charge. Mode of measurement & Payment:- The finished item shall be measured on area basis and paid on per Square meter basis.

**8 Providing, fabricating and erecting at site of work the tubular steel structure (shed) as per standard design and specifications having various spans in between trusses and in multiples of standard length of bays as specified as per standard specifications, inclusive of cost of steel tubular trusses, tubular columns purlins, tie runners, foundation bolts, base plates, nuts and bolts, welding wherever required etc. as per detailed drawing inclusive of one coat of anticorrosive paint and two coats of oil painting of approved quality and shade etc. complete. Spec. Nos. : As directed by Engineer-in-charge.**

**Specification:**

The item shall be executed as per PWD standard specifications, as per MORTH B-18 Page One Number 78 specifications, standard engineering practice and as directed by engineer in charge. Mode of measurement & Payment:- The finished item shall be measured on kilogram and paid on per metric tonne basis.

**9 Foundation & connecting bolts and nuts & washers etc. complete.**

**Specification:**

The item shall be executed as per standard engineering practice and as directed by engineer in charge. Mode of measurement & Payment:- Measurement shall be made per kilogram & the contract unit rate shall be paid accordingly

**10 Providing Nomoculture plate of Industrial Area shall be made out of 3 mm G.P. sheet ( Non Metalic Material ) in square or rectangular shape of any size made out of 3mm thick GP Sheet (Non Metalic Material) highly resistance to moisture and having tensile strength 80 Mpa. Compressive strength 100 Mpa and treated for adhesive bonded with green retro reflective sheeting of high intensity grade having pressure sensitive heat activated adhesive white reflective cut out border with the message having pressure sensitive screen printing of green transperent current over while retro reflective sheeting having border and message in while back ground having a finish surface at back side with pigment french gray colour including M.S. angle of size 35X35X3 mm etc. complete.**

**Specification:**

The item shall be executed as per standard engineering practice and as directed by engineer in

charge. Mode of measurement & Payment:- The finished item shall be measured on area basis and paid on per Square meter basis.

**11 Excavation for foundation in earth, soil of all types, sand, gravel and soft murum, including removing the excavated material up to a distance of 50 m. beyond the building area and stacking and spreading as directed, dewatering, preparing the bed for the foundation and necessary back filling, ramming, watering including shoring and strutting etc. complete. (All Lift) By Manual Means**

**Specification:**

The item shall be executed as per PWD standard specifications, as per MORTH Bd.A.1 Page One Number 259 specifications, standard engineering practice and as directed by engineer in charge. Mode of measurement & Payment:- The finished item shall be measured on volumetric basis and paid on per cubic meter basis.

**12 Providing and laying Cast in situ/Ready Mix cement concrete in M15 of trap/ granite/quartzite/gneiss metal for bed blocks, foundation blocks and such other items including bailing out water, Steel centering, formwork, laying/ pumping, compacting, roughening them if special finish is to be provided, finishing uneven and honeycombed surface and curing etc. complete. The Cement Mortar 1:3 plaster is considered for rendering uneven and honeycombed surface only. Newly laid concrete shall be covered by gunny bag, plastic, tarpaulin etc. (Wooden centering will not be allowed.), with fully automatic micro processor based PLC with SCADA enabled reversible Drum Type mixer/ concrete Batch mix plant (Pan mixer) etc. complete. With fine aggregate (Crushed sand VSI Grade)**

**Specification:**

The item shall be executed as per PWD standard specifications, as per Bd.E.4 Page One Number 289 and B-7, Page One Number 38 specifications, standard engineering practice and as directed by engineer in charge. Mode of measurement & Payment:- The finished item shall be measured on volumetric basis and paid on per cubic meter basis.

**13 Providing, cutting, bending, hooking, tying and laying in position TMT FE 500 steel bars for reinforcement for all RCC works as per detailed drawings etc. complete.**

**Specification:**

The item shall be executed as per PWD standard specifications, as per BR.35 Page Number 134 specifications, standard engineering practice and as directed by engineer in charge. Mode of measurement & Payment:- The finished item shall be measured on Kilogram basis and paid on per metric tonne basis.

**14 Providing & fixing MIDC layout Board in mono pipe type structure in Industrial area made out of 3 mm thick G.P. sheet highly resistance to moisture and having tensile strength 80 Mpa , compressive strength 160 Mpa ...etc complete**

**Specification:**

The item shall be executed as per standard engineering practice and as directed by engineer in charge. Mode of measurement & Payment:- Measurement shall be made per Number & the contract unit rate shall be paid accordingly

**15 Providing & fixing MIDC Board ( Both Side) in mono pipe type structure in Industrial area made out of 3 mm thick G.P.sheet highly resistance to moisture and having tensile strength 80 Mpa , compressive strength 160 Mpa ....etc complete.**

**Specification:**

The item shall be executed as per standard engineering practice and as directed by engineer in charge. Mode of measurement & Payment:- Measurement shall be made per Number & the contract unit rate shall be paid accordingly

**16 Providing and fixing navigation system for plot nos and direction in industrial area manufactured in mono pipe of 100 mm dia x 400 thik having 3 mm GP sheet high resistance to moisture and having tensile strength 80 Mpa and compressive strength 160 Mpa and treated for adhesive bonded with green retro- reflective sheeting of high intensity grade having pressure sensitive heat activated adhesive screen printing of green transparent colour over white retro- reflective sheeting having border and message and white back ground having finish surface at backside with pigmented French grey colour and erected on mono tubular structure made of 100 mm x 4 mm thik RW ms pipe heavy duty 3.0 m long having bracing on ms pipe 40 mm x3 mm thick, informatory board of size 1.20 x 0.90 having ms angle frame 40 x40x5 mm, support 25x25x4 mm ms angle having foundation plate 12 mm thick. The column and bracing shall be duly good Quality. treated with a conversion coating of iron or iron phosphate and fixing the mono column in M-15 concrete as per drawing with nuts and bolts and GI fixture etc.**

**Specification:**

The item shall be executed as per standard engineering practice and as directed by engineer in charge. Mode of measurement & Payment:- Measurement shall be made per Number & the contract unit rate shall be paid accordingly

**Sub Estimate:Sub Estimate No.4...P/E/C of Street Light, High Mast, Pumping machinery and allied works.**

**1 Sub Estimate - P/E/C street lights along the road in Pusad Industrial Area**

**Specification:**

**2 Hot Dipped Galvanized Poles & High-Mast (OH-HM)**

**2.1 Providing & erecting 8 m high (clear height) galvanised octagonal pole with foundation bolts having bottom of 135 mm A/F, top 70 mm A/F on provided foundation as**

per specification no. OH-PL/OPL

## **2.2 Providing and erecting galvanised 1000mm single arm sword type bracket with FRP dome and ball as per specification no. OH-PL/BKT**

### **Specification:**

#### **2.1 Specification**

The details Specifications of GI Octagonal pole 8 Mtr long are as follows:

**Design:-** The Octagonal Poles shall be designed to withstand the maximum wind speed as per IS 875. The top loading i.e. area and the weight of fixtures are to be considered to calculate maximum deflection of the pole and the same shall meet the requirement of BS: 5649 Part VI 1982.

**Pole Shaft:-** The pole shaft shall have octagonal cross section and shall be continuously tapered with single longitudinal welding. There shall not be any circumferential welding. The welding of pole shaft shall be done by Submerged Arc Welding (SAW) process. All octagonal pole shafts shall be provided with the rigid flange plate of suitable thickness with provision for fixing 4 foundation bolts.

**Base Plate:-** This base plate shall be fillet welded to the pole shaft at two locations i.e. from inside and outside. The welding shall be done as per qualified MMAW process

**Door opening:-** The octagonal Poles shall have door of approximate 500 mm length at the eand shall be weather proof to ensure safety of inside connections. The door shall be flush with the exterior weather proof to ensure safety of inside connections. surface and shall have suitable locking arrangement. There shall also be suitable arrangement for the purpose of earthing. The pole shall be adequately strengthened at the location of the door to compensate for the loss in section.

**Materials:-** Material Octagonal Poles HT Steel Conforming to grade S355JO. Base Plate Fe 410 conforming to IS 226 / IS 2062 Foundation Bolts EN.8 grade Welding The welding shall be carried out confirming to standard procedures. The welders shall also be qualified for welding the octagonal shafts Pole sections The Octagonal Poles shall be in single section There shall not be any circumferential weld joint.

**Galvanization:-** The poles shall be hot dip galvanized as per IS 2629 / IS 2633 / IS 4759 standards with average coating thickness of 70 micron. The galvanizing shall be done in single dipping.

**Fixing Type:-** The Octagonal Poles shall be bolted on a pre-cast foundation with a set of four foundation bolts for greater rigidity. Octagonal Poles for installation of the luminaries.

**Manufacturing:-** The pole manufacturing & galvanizing unit shall be ISO 9001: 2000 & ISO 14001 certified to ensure consistent quality & environmental protection.

**Fabrication:-** This specification covers the design, fabrication, supply & erection of high hot dip galvanized octagonal pole with base plate and single arm bracket made including 4 way bakelite connector, MCB, Glands & termination by crimping type lugs etc complete. The Octagonal pole shall be fabricated only as per the approved drawings. The rates quoted on per No. basis of poles supplied in acceptable conditions. The tenderer shall undertake the fabrication works only after acceptance of the drawing. Shearing shall be done by gauge and no variation in length shall be permissible. Punching shall be done by standard tools, to ensure the accuracy required. Bending shall be sharp and shall be done by the hot process. Cold bending shall not be permissible. All the field connections shall be done with the help of be hot deep galvanized hexagonal headed bolts with spring washers and hexagonal nuts. Welding shall be carried out before galvanizing and shall confirm to relevant IS specifications. After the entire cutting, drilling etc. is completed all the

structural members shall punched with erection mark. The steel section shall be thoroughly cleaned with the help of wire brushes. The galvanized surface shall consist of continuous uniform coating thickness of minimum 70 micron of zinc. The galvanizing of each member shall be carried out in one complete immersion. Each individual structure member shall be marked with respective identification marking and shall be stamped by the die before galvanizing. All identical pieces bearing the same erection number must be interchangeable with each other and interchangeable in their relative position in all structures of which they form a part. All burrs and irregular edges shall be ground smooth before galvanizing. Holes as required for various attachments, connections, extensions etc. should be drilled only. No machine or shop work, die work; punching, welding, grinding, machining etc. will be permitted after galvanizing. After approval of drawings, unless specifically waived in writing by MIDC, contractor in the presence of MIDC Inspector shall completely assemble the structure at his works. The cost of such assembly and dismantling shall be of supplier. Any errors in shop such assembly and dismantling shall be borne by supplier. Any errors in shop detail drawings or shop work shown by this assembling shall be immediately rectified. Before galvanizing, the steel section shall be thoroughly cleaned of any paint, grease, rust, scale, acid or alkali or such other foreign matters as are likely to interfere with the galvanizing process or with the quality and durability of the zinc coating pickling shall be very carefully done and shall be proper. The galvanized surface shall consist of continuous & uniform coating of zinc, firmly adhering to the surface of steel. The finished surface shall be clean and smooth and shall be free from defects like discolored patches, bare spots and unevenness of coating. There shall be flaking or loosening when struck squarely with a chisel faced hammer. The galvanized steel member shall with stand minimum for one minute dips in copper sulphite solutions as per IS. Galvanizing of each member shall be carried out in one complete immersion. Double dipping shall not be permitted. Inspection by Inspector or waiver of inspection shall neither relieve contractor from the responsibility of furnishing materials to conform to the requirements of this specifications nor invalidate any claims which may be made because of defective or unsatisfactory materials workmanship and galvanizing. All parts of the structures shall be dispatched unassembled to be bolted together at site. All similar parts of the same structure shall be bundled together before dispatch, except such parts as would make too heavy a bundle for convenience in handling The bundles shall be securely tied at the two ends with galvanized steel binding wire straps of adequate strength to withstand transit handling, long members shall be similarly, securely fastened at one or more intermediate points. Complete structures with attachments etc shall included in each consignment. The successful bidder should submit the test report along with supplied pole. The pole drawing shall be got approved from Engineer-in-Charge before supply. Pole Testing :- The pole testing shall be done at Manufacturers floor witnessed by MIDC's Representative. All arrangements of pole testing, conveyance of MIDC's representative has to be done by the contractor before dispatch of poles at site. Mode of Measurement:- Measurement will be taken on number basis and paid accordingly

## **2.2 Specification**

Under this item agency has to carryout the work of providing and erecting galvanized 1000 mm single arm sword type bracket with FRP dome and ball. The bracket shall be hot dip galvanized as per IS 2629 / IS 2633 / IS 4759 standards with average coating thickness of 70 micron. The galvanizing shall be done in single dipping. The curvature of the bracket shall be designed such as to spread lights uniformly in the middle of the road.

Mode of Measurement :- The item will be measured on No basis and paid accordingly



### **3 Outdoor Fittings (FG-ODF)**

**3.1 Supplying and erecting integrated LED street light fitting 85-90W IP65 & IK08 class having single piece pressure die-cast aluminium housing, having system lumens output of Min. 9300 Lumens, min. efficacy of 110 lumen/W, CRI>70, CCT upto 6500K, THD<10%, p.f. >0.95, operating range of 140-270V, inbuilt surge protection of 10 kV, Life class of 50,000 Hrs at L70B50 including driver complete with minimum 2 Years warranty as per specification No. FG-ODF/SL.**

**Specification:**

#### **3.1 Specification**

1. Housing shall be of die-cast aluminum alloy with heat resistant toughened glass & stainless steel screws & silicon gasket.
  2. Internal wiring shall be done with PTFE (Teflon) coated multistrand copper wire.
  3. Electronic control gear shall be integral & with complete wiring. Driver efficiency shall be >90%.
  4. The heat sink shall be made of suitably designed die cast aluminum heavy body to maintain junction temperature for optimum LED life.
  5. System efficacy shall be >90 Lm/W & colour temperature shall be in the range of 5700K ANSI.
  6. The operating temperature of LED shall be within the range of -10 deg. C to 50 deg. C & colour rendering shall be >70
  7. The fittings shall operate on rated voltage of 240V Ac, 50HZ with operating range of 120 to 270 V. The power factor shall be greater than 0.95.
  8. The driver shall be integral with built in Surge Protection Device which can withstand a surge of at least 4 kV with additional SPD of 10 KVA.
  9. The IP protection of fittings shall be IP 66 Class I.
  10. Luminaire and Lamp shall be LM79, LM80 compliant respectively.
  11. The THD should be less than 10%
  12. The LED shall be with Secondary PMMA lens for optimized light distribution
- Mode of measurement & payment:- The quantity shall be measured and paid on each basis.

### **4 Bunch of Wires (WG-MA/BW)**

**4.1 Supplying and erecting PVC insulated PVC round sheathed FR 1.5 sq.mm (30 no. x 0.25mm dia.) 3 core flexible multi stranded copper industrial cable for voltage grade up to 1.1 kV**

**Specification:**

#### **4.1 Specification**

Specification Mains in surface PVC conduit Specification No (WG-MA/PC)

Scope:

Mains in surface PVC conduit: providing specified PVC Conduits, Wires and erecting the conduits as per approved Method of Construction; ceiling, etc. including entries through walls / slabs / flooring as per requirement, and with all necessary hardware, accessories such as Spacers, Tees, Junction boxes, Checknuts / glands, etc.; making conduits erection work rigid; and drawing the specified wires through these connecting / terminating with lugs, complete finishing, removing

debris from site; testing for safety and beneficial use.

Material:

PVC Conduit: PVC pipe of minimum 20mm dia and above depending on No. of wires to be drawn (refer Table No 1/2); ISI mark, HMS grade accessories for PVC pipes of the same make that of pipe; such as Spacers & Saddles, Couplers, Bends, inspection or non inspection Junction boxes of required ways and resin / adhesive to make all joints rigid. Black pipe shall not be used for surface type wiring.

Hardware: sheet Metal (SM) screws of sizes specified in Method of Construction, washers, rawl / PVC / fill type plugs, wooden gutties, etc.

Wires: Mains / Sub-mains / Circuit mains (comprising phase and neutral wires) PVC insulated wire of specified size, minimum FR grade insulation, of electrolytic tough pitch (ETP) grade, having insulation of 1.1 kV grade, ISI marked, of appropriate colour coding as per Table No 1/5 insulated wire minimum FR grade insulation copper conductor of electrolytic grade, having insulation of 1.1 kV grade, of green or green yellow specified size but not less than 1.5 Sqmm as per Table No 1/5

Lugs: Copper lugs of appropriate type and size.

Other material: Rubber grommet, bush, flexible PVC conduit, gland etc.

Method of Construction: Erection PVC Conduits for Surface type wiring:

General: Erection shall be done as per the final approved layout, plumb. Conduits shall be firmly fixed on spacers with saddles. Fixing of spacers shall be equidistant and at ends, bends, elbows, boards. CSK screws of minimum 35x8 mm and suitable plugs shall be used for fixing spacers and 12x5 mm, round headed screws for fixing In case of stonewalls wooden gutties shall be grouted in wall for fixing of spacers. Distance between 2 spacers shall not be more than 600 be correct depending on number of wires to be drawn (as per Table No. 1/2 for PVC conduits). Separate pipe shall be used for each phase in 1-ph distribution and for power and light distribution. Also utilities like data, telephone, TV cabling distance between pipes shall not be less than 300 mm or anti electrostatic partition is to be provided. conduit accessories shall be made at required locations.

Entries in wall shall be at level of surface conduit with colour coding (For Visual No. 1/4.

Flexible conduits shall be used at expansion joints. Especially for PVC Conduits of surface type wiring: In addition to general instructions above, all joints shall be made rigid with resin / adhesive. necessary, it shall be done with bending spring. Size of conduit shall be as per Table No. 1/2 for number of wires to be drawn through the General Wires shall be drawn with adequate care.

Correct colour coding as per Table No. 1/5, shall be used for phase, neutral and earth.

intermediate joint in between terminals of the accessories. Earth-wire and Return wire (neutral) may be looped only within circuit. For distribution wires of two different phases shall not be drawn in single pipe. Lead wires of sufficient extra length shall be provided and shall be terminated in the terminals of accessories only, with appropriate type and size of lugs. Drawing of wires: through PVC conduits for surface type wiring Insulated Earth wire of green or green-yellow colour of minimum 1.5 sq mm or as per specified shall be drawn through conduit. Number with respect to size of pipe as per Table No. 1/2. At the termination end flexible PVC conduit shall be used with gland as per required.

Mode of Measurement:-The Item will be measured on Mtr basis & will be paid accordingly.

## **5 Cable Enclosures (CB-CE)**

**5.1 Supplying and laying (including excavation of suitable width & depth up to 90 cm) 75 mm outside dia. double wall corrugated pipes (DWC) of HDPE for enclosing cable below ground/road surface, complete.**

## **Specification:**

### **5.1 Specification**

Under this item the DWC pipe of 75 mm dia shall be laid in trench below the ground 0.9 mtr. for enclosing cable below ground/ road surface during laying of cable on site. The pipe shall be jointed with necessary connecting sockets/couplings, tees of same material in straight line & as per direction of site engineer. The excavation of trench for laying the DWC pipe is included in this item. All the pipes shall be without damage. Excavation shall be carried out manually or by any type of machinery. The excavation of trench for laying the DWC pipe in all types of strata is included in this item. All the pipes shall be of standard make without damage. The agency have to carry out the excavation in concrete surfaces also if required in front of the plot holders gates & remake the surface. The agency have to coordinate / cooperate with the plot holders while excavating in-front of their plot, so that any inconvenience shall not be occurred to the plot holder. If any dispute occurs, the agency has to settle the same at their level.

Mode of Measurement :- The quantity shall be measured on running meter basis & paid accordingly

## **6 LT Cables (Aluminum) (CB-LT/AL)**

**6.1 Supplying, erecting & terminating FR XLPE insulated, galvanised steel formed wire armoured (strip) cable, 1100 V 4 core 10 sq. mm. aluminium conductor complete erected with glands & lugs on wall/ trusses/pole or laid in provided trench/ pipe as per specification no. CB-LT/AL**

**6.2 Supplying, erecting & terminating FR XLPE insulated, galvanised steel formed wire armoured (strip) cable, 1100 V 4 core 16 sq. mm. aluminium conductor complete erected with glands & lugs on wall/ trusses/pole or laid in provided trench/ pipe as per specification no. CB-LT/AL**

## **Specification:**

### **6.1 Specification**

Specification:

For both 4 core 10 sq. mm & 4 core 16 sq. mm Cable

Armoured Cables (HT & LT)

#### **1. General**

All material shall conform to relevant standard as per BIS and shall carry ISI mark. If any particular category of material for which ISI mark is not available in market, it shall be as included in approved list. Work shall be carried out as per the method of construction specified by BIS. If there is no reference for particular method of construction in IS, such work shall be carried out as per the approved method of construction specified in chapter 16 of P.W. Dept. Handbook. Material and Work not qualifying to any provision mentioned above shall be to the satisfaction of the Engineer in Charge.

#### **2. Cables: (Armoured)**

The following list records those Indian Standards in force, which are acceptable as good practice, and accepted standard SP 30: 1984 : National Electrical Code SP 7 (Group 4): 2005 : National Building Code IS 1255: 1983 Code of practice of Installation & Maintenance of armoured cables up to 33 kV. IS 3961: Part 2: 1967 : Recommended current ratings of PVC cables. IS 1554: Part 1; 1988 : PVC Insulated (Heavy duty) Electric Cables; Part 1 for working voltages up to and including

1100 Volts. IS 1554: Part 2; 1988 : PVC Insulated (Heavy duty) Electric Cables; Part 1 for working voltages up to and including 3.3 kV to 11 kV.

IS 10810: Part 63; 1993 : Method for Test of cables, Part 63 Smoke density of electric cables under fire condition.

3. Scope: (Armoured cables)

Specification No. (CB-LT/AL, CB-LT/CU, CB-HT)

Providing armoured cable of specified voltage level, size & specified conducting material (Aluminum / Copper) as per Table no. 7/3 including required material, hardware's for erection and erecting on wall, ceiling, RCC slab or drawing the same through pole, pipe, laying in provided conduit, trench, ducts, trays as per approved method of construction including glands, lugs, etc.

4. Material:

Cables:

Cables shall be PVC for LT/MP and XLPE for HT as per Table no. 7/3 and of required construction, colour, shall carry ISI mark, IS No, manufacturer's name, size, duly embossed / screen printed at every meter and having the total count of progressive length in meter at each mark.

Earth wire: Galvanized Iron (G I) wire of appropriate gauge as per Table No 7/1.

Glands: As per specification (CB-GL)

Lugs: As per specification (CB-CL/AL, CB-CL/CU)

Saddles: Saddles fabricated from GI sheet of required gauge and size depending on dia of cable either galvanized or painted with superior quality enamel black paint with necessary shearing mechanical strength, semi circular shaped with extended piece having suitable holes for fixing.

G I Strip: 22 g x 25 mm width G I Strip.

Clamps: MS Clamps fabricated of required length and shape, having the size of 3/6 mm thick mild steel having 25/50 mm width (as per size of cable), rounded ends with wooden / resin cast grip for holding the cable.

Identification tags: For identifying root, connection position GI strip with identification mark / name embossed / painted with arrangement to tie should be fix on cable or arrangement of ferrules to be done.

Hardware: Sheet Metal (SM) screws of required sizes, plugs / wooden gutties, etc

4. Method of Construction:

General:

a) Irrespective of method of construction the cable ends shall be terminated with appropriate size & type of glands with lugs duly crimped, as directed by Site Engineer.

b) Wherever the cable has to be bent, the turning radius shall be as mentioned in Table No 7/2.

Grouping of cables shall be done with adequate distance between cables as mentioned in IS so as to minimize de-rating. Cables shall be tagged/ferruled with identification name / mark at the point from where distribution starts and at ends. Bare earth wire of appropriate size as per Table no. 7/1 shall run along with the cable. Earth wire running with the cable shall be terminated at the earth terminal nearest to cable termination.

5.1 Erection of Cable on Surface: Erection shall be done as per the routes and layout finalized, in perfect level and in plumb. Before fixing the cable shall be straightened as far as possible for good aesthetics look, continuous bare GI earth wire of required gauge as per Table No 7/1 shall be run. Cable with G I wire shall be fixed by saddles firmly clipped on cable and shall be fixed to wall with minimum 50 x 8 mm SM screws with plugs/wooden gutties, etc. (Distance between two supports /

saddles shall be maximum 450 mm). Wooden gutties shall be used wherever required (Especially for stone wall). The entries made in wall, floor slab, etc for laying the cable shall be made good by filling and finishing with plastering the same.

5.2 Erection of Cable on Trusses: Cable along with bare GI earth wire, while erecting on trusses, shall be firmly clamped by wrapping GI strip of 22 g, 25 mm width of required length fixed to truss with nuts and bolts.

5.3 Erection of Cable on Pole: Cable along with bare GI earth wire, while erecting on pole, shall be firmly clipped by suitable wooden / epoxy resin cast grips, clamped with 25 x 3 mm or 50x6 mm MS strip of required length and fixed to pole with nuts and bolts.

5.4 Laying of Cable in provided Trench/Pole: While laying Cable along with bare GI earth wire, utmost care shall be taken to prevent damage to the insulation of the cable and to the open end. Cable shall be brought out from trench vertically straight (minimum 1.0 metre above G L). Care shall be taken to inspect the trench so that depth of cable shall not be less than as shown in Table No 7/4. Suitable size of cable loops shall be provided near termination point at adequate depth.

5.5 Erecting cable in constructed Trench / duct: Erection of cable/s in constructed trench / duct, shall be as per guide lines of IS 1255.

5.6 Erection of cable/s on trays: Cable/s shall be tied with PVC tags on GI trays. At bending point care shall be taken so that sharp edges of sheet will not damage insulation of cable.

Mode of Measurement:- Executed quantity shall be measured on the basis of running meter & paid accordingly

## **6.2 Specification**

Specification:

For both 4 core 10 sq. mm & 4 core 16 sq. mm Cable

Armoured Cables (HT & LT)

### **1. General**

All material shall conform to relevant standard as per BIS and shall carry ISI mark. If any particular category of material for which ISI mark is not available in market, it shall be as included in approved list. Work shall be carried out as per the method of construction specified by BIS. If there is no reference for particular method of construction in IS, such work shall be carried out as per the approved method of construction specified in chapter 16 of P.W. Dept. Handbook. Material and Work not qualifying to any provision mentioned above shall be to the satisfaction of the Engineer in Charge.

### **2. Cables: (Armoured)**

The following list records those Indian Standards in force, which are acceptable as good practice, and accepted standard SP 30: 1984 : National Electrical Code SP 7 (Group 4): 2005 : National Building Code IS 1255: 1983 Code of practice of Installation & Maintenance of armoured cables up to 33 kV. IS 3961: Part 2: 1967 : Recommended current ratings of PVC cables. IS 1554: Part 1; 1988 : PVC Insulated (Heavy duty) Electric Cables; Part 1 for working voltages up to and including 1100 Volts. IS 1554: Part 2; 1988 : PVC Insulated (Heavy duty) Electric Cables; Part 1 for working voltages up to and including 3.3 kV to 11 kV.

IS 10810: Part 63; 1993 : Method for Test of cables, Part 63 Smoke density of electric cables under fire condition.

### **3. Scope: (Armoured cables)**

Specification No. (CB-LT/AL, CB-LT/CU, CB-HT)

Providing armoured cable of specified voltage level, size & specified conducting material

(Aluminum / Copper) as per Table no. 7/3 including required material, hardware's for erection and erecting on wall, ceiling, RCC slab or drawing the same through pole, pipe, laying in provided conduit, trench, ducts, trays as per approved method of construction including glands, lugs, etc.

#### 4. Material:

##### Cables:

Cables shall be PVC for LT/MP and XLPE for HT as per Table no. 7/3 and of required construction, colour, shall carry ISI mark, IS No, manufacturer's name, size, duly embossed / screen printed at every meter and having the total count of progressive length in meter at each mark.

Earth wire: Galvanized Iron (G I) wire of appropriate gauge as per Table No 7/1.

Glands: As per specification (CB-GL)

Lugs: As per specification (CB-CL/AL, CB-CL/CU)

Saddles: Saddles fabricated from GI sheet of required gauge and size depending on dia of cable either galvanized or painted with superior quality enamel black paint with necessary shearing mechanical strength, semi circular shaped with extended piece having suitable holes for fixing.

G I Strip: 22 g x 25 mm width G I Strip.

Clamps: MS Clamps fabricated of required length and shape, having the size of 3/6 mm thick mild steel having 25/50 mm width (as per size of cable), rounded ends with wooden / resin cast grip for holding the cable.

Identification tags: For identifying root, connection position GI strip with identification mark / name embossed / painted with arrangement to tie should be fix on cable or arrangement of ferrules to be done.

Hardware: Sheet Metal (SM) screws of required sizes, plugs / wooden gutties, etc

#### 4. Method of Construction:

##### General:

a) Irrespective of method of construction the cable ends shall be terminated with appropriate size & type of glands with lugs duly crimped, as directed by Site Engineer.

b) Wherever the cable has to be bent, the turning radius shall be as mentioned in Table No 7/2.

Grouping of cables shall be done with adequate distance between cables as mentioned in IS so as to minimize de-rating. Cables shall be tagged/ferruled with identification name / mark at the point from where distribution starts and at ends. Bare earth wire of appropriate size as per Table no. 7/1 shall run along with the cable. Earth wire running with the cable shall be terminated at the earth terminal nearest to cable termination.

5.1 Erection of Cable on Surface: Erection shall be done as per the routes and layout finalized, in perfect level and in plumb. Before fixing the cable shall be straightened as far as possible for good aesthetics look, continuous bare GI earth wire of required gauge as per Table No 7/1 shall be run. Cable with G I wire shall be fixed by saddles firmly clipped on cable and shall be fixed to wall with minimum 50 x 8 mm SM screws with plugs/wooden gutties, etc. (Distance between two supports / saddles shall be maximum 450 mm). Wooden gutties shall be used wherever required (Especially for stone wall). The entries made in wall, floor slab, etc for laying the cable shall be made good by filling and finishing with plastering the same.

5.2 Erection of Cable on Trusses: Cable along with bare GI earth wire, while erecting on trusses, shall be firmly clamped by wrapping GI strip of 22 g, 25 mm width of required length fixed to truss with nuts and bolts.

5.3 Erection of Cable on Pole: Cable along with bare GI earth wire, while erecting on pole, shall be firmly clipped by suitable wooden / epoxy resin cast grips, clamped with 25 x 3 mm or 50x6 mm MS

strip of required length and fixed to pole with nuts and bolts.

5.4 Laying of Cable in provided Trench/Pole: While laying Cable along with bare GI earth wire, utmost care shall be taken to prevent damage to the insulation of the cable and to the open end. Cable shall be brought out from trench vertically straight (minimum 1.0 metre above G L). Care shall be taken to inspect the trench so that depth of cable shall not be less than as shown in Table No 7/4. Suitable size of cable loops shall be provided near termination point at adequate depth.

5.5 Erecting cable in constructed Trench / duct: Erection of cable/s in constructed trench / duct, shall be as per guide lines of IS 1255.

5.6 Erection of cable/s on trays: Cable/s shall be tied with PVC tags on GI trays. At bending point care shall be taken so that sharp edges of sheet will not damage insulation of cable.

Mode of Measurement:- Executed quantity shall be measured on the basis of running meter & paid accordingly

## **7 Supplying & erecting crimping type aluminium lugs for cable up to 16 sq. mm. complete as per specification no. CB-CL/AL**

### **Specification:**

Specification Nos (CB-CL/AL, CB-CL/CU) Crimping of lugs, and fixing to the terminals with nuts and bolts, etc.

Material: Lug: Lug shall be of high purity aluminum / copper / bimetallic of required type, with required size of hole and smooth finished both from inside and outside. Hardware: Brass or Cadmium plated mild steel nuts and bolts, bimetallic washers. Anti-Oxide paste: Paste of superior quality manufactured by reputed manufacturer.

Method of Construction: Before fixing of lugs to the cable end, the cable end to the equivalent length of the lug shall be prepared by removing the outer PVC insulation along with the steel armouring and then, the inner PVC insulation. The paste shall be applied to the cable lead and inside the lug prior to the inserting of lug on the cable lead. The lug shall then be crimped with hydraulic / mechanical type heavy duty crimping tool. The crimping shall be done in such a manner that there shall be no air gap. Then the crimped portion shall be wrapped with the PVC insulation tape. (Colour of tape shall be of that of cable lead) The above method shall be carried out for all the cores. The cable end with lug shall then be terminated into the terminal and then be tightened with either brass nuts or Cadmium plated nuts as directed by Engineer in charge.

Mode of Measurement: Executed quantity will be measured on number basis. (i.e. each).

## **8 Plate, Pipe type Earthing (EA-EP)**

### **8.1 Supplying, installing and testing pipe type earthing with 40mm. dia. G.I. pipe or 20 mm dia. G.I. Rod complete with all accessories of GI materials & recording the results as per specification no. EA-EP**

#### **Specification:**

#### **8.1 Specification**

(A) Plate / Pipe type Earthing A) Plate type Earthing (With or Without CI Cover, Funnel, etc) (EA EP)

Scope:

Specification No (EA-EP) Supplying and erecting galvanized cast iron / copper earth plate type / G.I. pipe type earthing with / without C.I. cover as per instructions from the site engineer.

Material: Earth Plate: Galvanized cast iron / Copper earth plate or G.I. pipe as per specifications given in Table No 9.1/1.

CI Cover: As per specifications given in Table No 9.1/1.

Earthing Conductor: Copper/G.I strip/Annealed bare copper wire/G.I. earth wire of size as per specifications given in Table No 9.1/1.

GI Pipe: As per specification (CW-PLB/GP) mentioned chapter no. 17.5 for watering, and as enclosure for Earth wire, refer specifications given in Table No 9.1/1.

Hardware: Screw / nut bolts with required washer of dimensions, Rawl plug / clip/ 'U' nails and material as per specifications given in Table No 9.1/1.

Filling material: Coal /Charcoal/ salt as per specifications given in Table No 9.1/1. as per specifications given in Table No 9.1/1.

Lugs: As per specification (CB-LG/AL, CB-LG/CU) mentioned chapter 7.9 & 7.10 Copper/ Aluminium lugs as per specifications given in Table No 9.1/1. Method of construction: Pit is to be dug of required dimension and depth for the earthing at site, and laying of galvanized cast iron / Copper earth plate or G.I. pipe shall be as per Table No 9.1/1. The earth connection to equipment/ switch gear and earthing electrode shall be connected as shown in the diagram and as per IS 3043 amended up to-date. The connections shall be made either by strip or double run of earth wire with drilling, welding, riveting, brazing and nut bolting to plate or pipe, where ever required in an approved manner. As far as possible continuous strip shall be used, but where ever jointing of strip is unavoidable, the overlap portion must not be less than 2 1/2 times the width of the strip either welded/ brazed/soldered by all sides or 6 inches overlap with two nut bolts/ riveting of adequate size with required washer and covered by anti-corrosive paint as per approved jointing practice in the industry and as per directives from site engineer in charge. Pit shall then be filled with screened soil with alternate layer of coal and salt, and if, necessary brick masonry work ( Where ever applicable) shall be done as specified in IS: 3043, with laying wires in PVC/ G.I. pipe and watering arrangement as per drawing no EA-1 and covered with C.I. Cover ( Where ever applicable). Where ever requires or as specified by Site Engineer, a Test link shall be provided for facilitating the testing of resistance of earth electrode.

Testing: The value of each earth electrode shall be measured by earth tester in presence of site Engineer and record to be submitted.

Mode of Measurement: Executed quantity will be measured on number basis (i.e. each)

## **9 C.C. Foundation**

**9.1 Making cement concrete foundation in 1:3:6 cement concrete, (20 to 25) mm. stone metal duly plastered with necessary curing for complete. (pole muffing or any other purpose)**

**9.2 Making M-20 grade reinforced cement concrete foundation by considering the safe soil bearing capacity at site as 10 T/sq.m at 1.5m depth including supply of steel, concrete, excavation and fixing provided nut bolts with the help of template, duly plastered as per design complete (for 6m to 8m high octagonal/conical GI pole).**

**Specification:**

### **9.1 Specification**

Specification:- 1.1 General : The item pertains to providing and laying in position Plain Cement Concrete (PCC) of specified proportion. The work includes providing all material, mixing, compacting, curing, shuttering, dewatering etc. complete up to lift of  $\pm 5$  m. 1.2 Material: 1. Cement



: Ordinary Portland Cement (OPC) as specified at item Gen/C/0.2.1. 2. Fine Aggregate (Sand) : specifications shall conform to item Gen/C/0.2.2. 3. Coarse Aggregate : specifications shall conform to item Gen/C/0.2.3. Grading and maximum size of coarse aggregate shall be as specified in the drawing. Normally the maximum size should not be more than 40 mm or 25 % of the minimum dimension of the member, whichever is less. 4. Water : specifications shall conform to item Gen/C/0.2.4. 1.3 Mix Proportion and Mixing : The mix proportion as specified on the drawing, separately for each component shall be provided. For detailed specifications refer to item No.Gen/C/0.5. For mixing without mechanical mixer, prior permission from the Engineer-in-charge shall be obtained. Specifications for mixing shall conform to item Gen/C/0.7. 1.4 Formwork and Scaffolding : Formwork shall be provided for giving the desired shape and sizes for the PCC as per the drawings. The specifications shall conform to item Gen/C/0.19.7. The stripping time also shall be as specified in the item. The scaffolding shall be normally provided of steel tubes. The specifications for scaffolding also shall conform to item Gen/C/0.19.8. 1.5 Transportation, Placing and Compaction : Specifications shall conform to item Gen/C/0.8. 1.6 Field Tests : The appropriate field tests as directed by the Engineer-in-charge shall be carried out as explained in item Gen/C/0.15. 1.7 Inspection & Testing of Structure : As per the contract conditions inspection & testing of a structure shall be carried out in accordance with item Gen/C/0.16. 1.8 Finishing of Concrete : The finishing of concrete surface shall be as per item Gen/C/0.17. 1.9 Special Features : Special requirements such as Architectural shapes/ finishes, Expansion joints, Construction joints, Water stops, grouting, etc. shall be provided as shown on drawing/s and as directed by Engineer in Charge. For specifications for these the appropriate clauses of item Gen/C/0 shall be referred. 1.10 Curing : As per item Gen/C/0.14. 1.11 Item to Include : This item for providing Plain Cement Concrete (PCC) with specified mix proportion at specified locations with initial lift of + 5 m above or below ground level includes all ingredients of concrete i.e. water, cement, fine and coarse aggregates, all transportation, dewatering, tools and plants, all taxes, royalties, labour, formwork, testing, curing etc. complete.

Mode of Measurement and Payment :- The measurements of the concrete laid shall be taken on volumetric basis in cum. The openings shall be deducted. The unit rate of concrete per cum of specified proportion includes all the items as explained in Gen/C/0.25.

## 9.2 Specification

9.1 For foundation of 8/7 Mtr (size - 0.6 X 0.6 X 1.5) octagonal pole:- The item includes designing, providing and laying in position cement concrete M-20 for RCC work using granite or black trap material including mixing in a mechanically operated mixer, compacting by mechanical or manual means as may be required and directed by Engineer-in-charge including steel or plywood shuttering, centering form work for all elements in foundation plinth where reinforcement concrete is proposed to be used upto +/- 5 m level from the average ground level all labour and materials complete. Finishing with the surface with 1:3 cement mortar.

C1) in 1:1.5.3: Proportions.

General : The item pertains to providing and laying in position Cement Concrete in 1:1.5.3: Proportions for Reinforced concrete works in foundation or plinth. The work includes providing all material, mixing, compacting, curing, shuttering, dewatering, etc. complete upto lift of  $\pm 5$  m.

Providing the reinforcement steel shall be carried

Material

Cement : Cement to be used, for reinforced concrete works normally 43 grade and 53 Grade ordinary Portland cement, shall be used. The storage of cement at the site of work shall be at

contractor's cost and risk. The cement shall be stored at least 15 cm above ground on a dry platform in a suitable weather tight building or go down and in such a manner as to permit easy access for proper inspection and also to prevent deterioration due to moisture. Test Report for the cement supplied shall be submitted by the contractor.

**Fine Aggregate (Sand) :** The Fine Aggregate or sand shall consist of natural sand, crushed stone sand or crushed gravel sand or a combination of any of these meeting requirements of IS : 383 1970. The sand shall be hard, durable, clean and free from adherent coating and organic matter and shall not contain the amount of clay, silt and fine dust more than specified in IS : 2116- 1980 (sand for Specification: (sand for masonry mortar). The sand shall not contain any harmful impurities such as iron pyrites, alkalis, salts, coal or other organic impurities, mica, shale or similar laminated materials, soft fragments, sea shells in such form or in such quantities as to affect adversely the hardening, strength or durability of the mortar. The sand should consist of sharp angular and hard grains, which should be approximately, cubical in size. It should be strong and durable and should be as far as possible pure silica SiO<sub>2</sub>. The use of sand from seashore shall be avoided, only river sand shall be used.

**Coarse Aggregate :** Coarse and fine aggregates for Civil and Structural Works shall conform in all respect to IS : 383-1970 (Specification for coarse and fine aggregates from natural sources for concrete). Aggregates shall consist of naturally occurring (crushed or uncrushed) stones, water worn gravel and sand or a combination thereof. These shall be chemically inert , hard, strong, dense durable, clean and free from veins, adherent coatings, injurious amount of alkalies, vegetable matter and other deleterious substances such as iron pyrites, coal, lignite, mica, shale, sea shells etc. For Reinforced Concrete the size of aggregate shall not be so large as to create difficulty in placing and compacting thoroughly the concrete surrounding the congested reinforcement and filling the corners of the forms. The aggregate having maximum size of 20 mm are to be considered satisfactory for reinforced concrete. Coarse aggregates are the aggregates, which are retained on 4.75 mm IS Sieve and contains only so much finer material as is permitted by specifications.. It shall have a specific gravity not less than 2.6 (saturated surface dry basis). These may be obtained from crushed or uncrushed gravel or stone.

**Storage of Aggregates :** Storage of all types of aggregates at site of work shall be at contractor's cost and risk and shall be stored as specified in IS : 4082. Aggregates shall in no case be stored near to the excavated earth or directly over the ground surface. The Contractor shall maintain sufficient quantities of aggregates, near to the place of work, required for the continuity of the work. Each type and grade of aggregate shall be stored separately on hard, firm surface having adequate slope for drainage of water. Aggregates delivered at site in wet condition or becoming wet due to rain or any other means, shall not be used for at least 24 hours.

**Water :** Water used in construction for all civil and structural works for mixing and curing shall be clean and free from injurious amount of oil, acids, alkalies, organic matters or other harmful substances which may be deleterious to concrete, masonry or steel. The 'pH' value of water sample shall not be less than 6, but generally it should be between 6 to 8. Potable water shall be considered satisfactory. Underground water can also be used with the prior approval of Engineer in- Charge, if it meets all the requirements of IS : 456 (Revised). In case the water is supplied by MIDC, the contractor shall get himself satisfied regarding its quality before using the same in his works at his own expenses. In case there is any change in source of water, water samples shall be tested again to meet the specified requirements.

**Steel : General :** All steel bars, section, plates and other miscellaneous steel materials, etc. shall

be free from loose mill scale, rust as well as oil, mud, paint or other coatings. The materials, construction specifications such as dimensions, shape, weight, tolerances, testing etc. for all materials covered under this section, shall conform to respective IS Standards. NO RE ROLLED MATERIAL IS ACCEPTABLE.

**Reinforcement Bars :** The shape of steel reinforcement shall be such that, it should possess maximum possible perimeter to have better bond with concrete. High strength deformed steel bars of grade Fe 415 conforming to IS : 1786-1985 shall normally be used. The reinforcement bars, structural steel section and other miscellaneous steel materials etc. shall be stored in such a way as to avoid and prevent deterioration, corrosion, bending, twisting and wrapping. In case of any damage occurring to the material on account of faulty storage or negligence by the contractor same shall be borne by the Contractor himself.

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**Curing :** Concrete shall be cured by keeping it continuously moist wet for the specified period of time to ensure complete hydration of cement and its hardening. Curing shall be started after 8 hours of placement of concrete, and in hot weather after 4 hours. The water used for curing shall be of the same quality as that used for making of concrete. Curing shall be assured by use of an ample water supply under pressure in pipes, with all necessary appliances such as hose, sprinklers etc. A layer of sacking, canvas, resin, or other approved material, which will hold moisture for long periods and prevent loss of moisture from the concrete, shall be used as covering. Type of covering which would stain, disfigure, or damage the concrete, during and after the curing period, shall not be used. Only approved covering shall be used for curing. Exposed surface of concrete shall be maintained continuously in a damp or wet condition for at least the first 7 days after placing of concrete, except that high early strength concrete shall be so maintained for at least the first 3 days. The Contractor shall have all equipment and materials required for curing on hand and ready to use before concrete is placed. For curing the concrete in pavements, floors, flat roofs or other level surfaces, the pounding method of curing is preferred after the expiry of first 24 hours during which (i.e. first 24 hours) the concrete shall be cured by use of wet sacking, canvas, resin etc. The minimum water depth of 25mm for pounding shall be maintained. The pounded areas shall be kept continuously filled with water, and leaks, if any, shall be promptly repaired. Areas cured by pounding method shall be cleared of all debris and foreign materials after curing is over.

**Item to Include :** This item for providing Cement Concrete with specified grade, at specified locations with initial lift of  $\pm 5$  m above or below ground level includes all ingredients of concrete i.e. water, cement, fine and coarse aggregates, all transportation, dewatering, tools and plants, all taxes, royalties, labour, form work, testing, curing etc. complete. The provision of reinforcement steel is also included in this item. The agency have to submit the pole manufacturer recommended drawing for foundation before taking up the foundation work. The drawing of the foundation shall be got approved from the Executive Engineer (E&M) prior to its casting. However no variation in dimension of Pole foundation shall be entertained. Also for reinforcement, 08 nos. 12 mm dia. bar with 1.5 mtr length and 08 nos. 8 mm dia. bar with 2.1 mtr length Shall have to be

used strictly. The 02 nos. 50 mm dia. DWC Pipe pipe shall have also to be provided under this item. No deviation shall be acceptable.

Mode of Measurement and Payment : The measurements will be taken on cum basis and paid accordingly

## 9.2 Specification

For foundation of 8/7 Mtr (size - 0.6 X 0.6 X 1.5) octagonal pole:- The item includes designing, providing and laying in position cement concrete M-20 for RCC work using granite or black trap material including mixing in a mechanically operated mixer, compacting by mechanical or manual means as may be required and directed by Engineer-in-charge including steel or plywood shuttering, centering form work for all elements in foundation plinth where reinforcement concrete is proposed to be used upto +/- 5 m level from the average ground level all labour and materials complete. Finishing with the surface with 1:3 cement mortar.

C1) in 1:1.5.3: Proportions.

General : The item pertains to providing and laying in position Cement Concrete in 1:1.5.3: Proportions for Reinforced concrete works in foundation or plinth. The work includes providing all material, mixing, compacting, curing, shuttering, dewatering, etc. complete upto lift of  $\pm 5$  m. Providing the reinforcement steel shall be carried

Material:

Cement : Cement to be used, for reinforced concrete works normally 43 grade and 53 Grade ordinary Portland cement, shall be used. The storage of cement at the site of work shall be at contractor's cost and risk. The cement shall be stored at least 15 cm above ground on a dry platform in a suitable weather tight building or go down and in such a manner as to permit easy access for proper inspection and also to prevent deterioration due to moisture. Test Report for the cement supplied shall be submitted by the contractor.

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which are retained on 4.75 mm IS Sieve and contains only so much finer material as is permitted by specifications.. It shall have a specific gravity not less than 2.6 (saturated surface dry basis). These may be obtained from crushed or uncrushed gravel or stone.

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be used for at least 24 hours.

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**Steel : General :** All steel bars, section, plates and other miscellaneous steel materials, etc. shall be free from loose mill scale, rust as well as oil, mud, paint or other coatings. The materials, construction specifications such as dimensions, shape, weight, tolerances, testing etc. for all materials covered under this section, shall conform to respective IS Standards. NO RE ROLLED MATERIAL IS ACCEPTABLE.

**Reinforcement Bars :** The shape of steel reinforcement shall be such that, it should possess maximum possible perimeter to have better bond with concrete. High strength deformed steel bars of grade Fe 415 conforming to IS : 1786-1985 shall normally be used. The reinforcement bars, structural steel section and other miscellaneous steel materials etc. shall be stored in such a way as to avoid and prevent deterioration, corrosion, bending, twisting and wrapping. In case of any damage occurring to the material on account of faulty storage or negligence by the contractor same shall be borne by the Contractor himself.

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covering. Type of covering which would stain, disfigure, or damage the concrete, during and after the curing period, shall not be used. Only approved covering shall be used for curing. Exposed surface of concrete shall be maintained continuously in a damp or wet condition for at least the first 7 days after placing of concrete, except that high early strength concrete shall be so maintained for at least the first 3 days. The Contractor shall have all equipment and materials required for curing on hand and ready to use before concrete is placed. For curing the concrete in pavements, floors, flat roofs or other level surfaces, the pounding method of curing is preferred after the expiry of first 24 hours during which (i.e. first 24 hours) the concrete shall be cured by use of wet sacking, canvas, resin etc. The minimum water depth of 25mm for pounding shall be maintained. The pounded areas shall be kept continuously filled with water, and leaks, if any, shall be promptly repaired. Areas cured by pounding method shall be cleared of all debris and foreign materials after curing is over.

Item to Include : This item for providing Cement Concrete with specified grade, at specified locations with initial lift of  $\pm 5$  m above or below ground level includes all ingredients of concrete i.e. water, cement, fine and coarse aggregates, all transportation, dewatering, tools and plants, all taxes, royalties, labour, form work, testing, curing etc. complete. The provision of reinforcement steel is also included in this item. The agency have to submit the pole manufacturer recommended drawing for foundation before taking up the foundation work. The drawing of the foundation shall be got approved from the Executive Engineer (E&M) prior to its casting. However no variation in dimension of Pole foundation shall be entertained. Also for reinforcement, 08 nos. 12 mm dia. bar with 1.5 mtr length and 08 nos. 8 mm dia. bar with 2.1 mtr length Shall have to be used strictly. The 02 nos. 50 mm dia. DWC Pipe pipe shall have also to be provided under this item. No deviation shall be acceptable.

Mode of Measurement and Payment : The measurements will be taken on Number basis and paid accordingly

## **10 Mini Feeder Pillar (SW-MFP)/ Street Light Control Panel (SW-STCP)**

**10.1 Supplying & erecting three phase, 415V, street light control panel upto the max load of 6kW, TPN MCB 40A, powder coated CRCA 14 SWG sheet, outdoor type, having IP54, IK10 protection, suitable rating contactor, 24 hrs. astronomical time switch with minimum 5 years battery back up, auto/manual selector switch, ON/OFF push buttons, indicator lamps, control wiring, metering device, etc. for automatic operation with overcurrent, short circuit, earth fault protection on provided iron frame / CC foundation as per specification SW-STCP.**

**10.2 Supplying & erecting three phase, 415V, street light control panel upto the max load of 12kW, TPN MCB 63A, powder coated CRCA 14 SWG sheet, outdoor type, having IP54, IK10 protection suitable rating contactor, 24 hrs. astronomical time switch with minimum 5 years battery back up, auto/manual selector switch, ON/OFF push buttons, indicator lamps, control wiring, metering device, etc. for automatic operation with overcurrent, short circuit, earth fault protection on provided iron frame / CC foundation as per specification SW-STCP.**

**Specification:**

### **10.1 Specification**

Under the item the agency have supplying & erecting three phase, 415V, street light control panel up to the max load of 6kW, TPN MCB 40A, powder coated CRCA 14 SWG sheet, outdoor type, having IP54,IK10 protection, suitable rating contactor, 24 hrs. astronomical time switch with

minimum 5 years battery back up, auto/manual selector switch, ON/OFF push buttons, indicator lamps, control wiring, metering device, etc. for automatic operation, with overcurrent, short circuit, earth fault protection on provided iron frame / CC foundation.

Mode of Measurement :- The quantity shall be measured on No.(pieces)basis & paid accordingly

## **10.2 Specification**

### **Specification**

Under the item the agency have provide , erect & commission feeder pillar fabricated out of 14/16 SWG CRCA sheet with M.S. Angle Frame for support along with mounting of various Electrical equipment's on 12 mm thick plywood / hylam sheet such as,

Astronomical Timer-02 nos,

Power Contactor 40 A - 02 nos,

Isolator (63A) - 01 Nos.

MCB 6-16A - 06 Nos,

RCCB (40A) -01 no,

TPNDB - 01 No,

Plate type Earthing -01 No,

100 A Main Switch - 01 No,

Self locking arrangement - 01 nos,

Light point - 01 no. including excavation & concrete foundation and painting with one coat of red oxide paint and two coats of enamel paint in approved shade. The item includes the excavation in all strata. The plaster shall be provided to concrete block on exposed faces above ground.

Mode of Measurement :- Executed quantity will be measured on number basis and paid accordingly.

## **11 Painting (CW-PTG)**

**11.1 Painting identification number by indelible ink marker/ enamel paint on fittings/ equipment with the help of ladders if necessary by dismantling and refitting the enclosures, tubes etc if required the same and refitting complete.**

### **Specification:**

#### **11.1 Specification**

The agency has to provide scrapping the existing paint and painting of steel tubular pole above 6 M in length along with street lights / pole brackets / clamps completely. Item includes to provide ladder vehicle for painting of poles. Item shall be executed as per the relevant I.S material use for the work shall be of approved make & ISI marks and shall be got approved from engineer incharge. The rate in schedule shall be treated as inclusive of all taxes and duties, etc. No other incidental charges will be paid by MIDC.

Mode of Measurement :Executed quantity will be measured on number basis (i.e. each)

**12 Rebate for scrap value of exsisting installation of street lights to be dismantled & retained by the contractor viz pole , cable, fitting , wire , frp box etc complete**

### **Specification:**

Under this item, agency has to rebate for scrap value of existing street light installations to be dismantled and retained by the contractor including street light poles, LED/light fittings, brackets,

cables, internal wiring, feeder pillars/FRP boxes, switchgear, junction boxes, nuts, bolts, clamps and all other allied materials complete.

The scope includes careful dismantling of the existing street light system from roads, medians, poles and associated electrical network without causing damage to nearby structures and utilities. The dismantled materials shall become the property of the contractor and the quoted rebate shall be considered accordingly.

The contractor shall carry out dismantling work using proper tools, tackles, cranes, labour and safety precautions as per relevant IS standards and MSEDCL safety practices. Necessary traffic management, barricading and safety arrangements during dismantling shall be provided by the contractor at his own cost.

The item includes disconnection of power supply, removal of poles from foundation wherever required, excavation, transportation, loading-unloading, stacking and disposal of unserviceable material complete. Serviceable and reusable materials if directed by Engineer-in-Charge shall be handed over at designated MIDC store/location.

The contractor shall ensure that no damage occurs to existing underground cables, road structure, water supply lines and nearby installations during dismantling work. Any damage caused shall be rectified by the contractor at his own cost.

Nothing extra shall be paid separately for labour, T&P, transport, safety arrangements, taxes, royalties, lead, lift, dismantling accessories and incidental charges required for completion of the work. The rebate amount quoted by the contractor shall be deducted from the contract amount accordingly.

Mode of Measurement: Executed quantity shall be measured on the basis of Number & paid accordingly.

### **13 Sub Estimate - P/E/C High-Mast at Prominent Locations in Pusad Industrial Area Specification:**

**14 Supplying and erecting 12.5 m (clear height) motorized high-mast (Top -150mm, Bottom- 360mm) hot dipped galvanized material with average minimum thickness 65 micron, made from high tensile structure grade steel as per BSEN - 10025 S 355/E350 & 3mm thickness, with base plate 25 mm thick x OD 520 mm grade as per IS-2062, pole made in single section & submerge arc welded, with lowering & raising motorized unit, wire rope stainless steel 316 grade 2 nos., 7x19 construction 5mm, SG-DG U clamps, double drum with assembly 250 kg, 5x2.5 Sq.mm. flexible copper cable with lantern carriage assembly suitable for max. 12 nos. luminaries and its control gear box, lightning arrestor, arrangement for fixing aviation light, night glow reflector on pole at suitable height, high-mast with serial number, factory inspection report/test report of high-mast should be provided as per specifications on provided foundation J type stud/bolts with double check nuts & necessary accessories complete. specification no. OH-PL/HM**

#### **Specification:**

Supplying, erecting, testing and commissioning of 12.5 metre clear height motorized High Mast Lighting System complete with head frame, lantern carriage, integral power tool unit and all accessories as per Specification No. OH-PL/HM.



The high mast shall be manufactured from high tensile structural steel conforming to BSEN-10025 Grade S355/E350 and shall be of continuously tapered polygonal construction, made in single section, suitable for outdoor heavy duty applications. The mast shaft shall have top diameter 150 mm, bottom diameter 360 mm and minimum wall thickness of 3 mm. The mast shall be designed to withstand wind velocity as per relevant IS standards and site conditions.

The mast shall be fabricated using submerged arc welding process with longitudinal welds and shall be free from surface defects, cracks, bends and other manufacturing imperfections. The entire mast assembly including lantern carriage, brackets and accessories shall be hot dip galvanized internally and externally with average minimum zinc coating thickness of 65 microns conforming to IS 2629 and IS 4759.

The base plate shall be of 25 mm thick MS plate having outside diameter 520 mm manufactured from steel conforming to IS 2062. The base plate shall be welded to mast shaft with adequate gussets/stiffeners to withstand operational stresses and wind load conditions.

The mast shall be provided with motorized lowering and raising arrangement for maintenance of luminaires. The system shall consist of double drum winch assembly of minimum 250 kg safe working load, suitable geared motor, braking arrangement and accessories required for smooth operation of lantern carriage. The winch shall be designed for reliable and safe lowering/raising of complete luminaire assembly.

The high mast shall be provided with two numbers stainless steel wire ropes of SS-316 grade, 7x19 construction and 5 mm diameter suitable for lifting arrangement. Necessary SG/DG type U clamps, termination hardware and tensioning arrangement shall be provided complete.

The lantern carriage assembly shall be suitable for mounting maximum 12 Nos. luminaires with provision for mounting control gear box and junction arrangements. The carriage shall move smoothly over guide rollers without twisting or jerking during operation.

The mast shall be supplied with 5 x 2.5 Sq.mm flexible copper cable of suitable length for electrical connection between lantern carriage and control gear arrangement. The cable shall be weather resistant and suitable for repeated lowering and raising operation.

The high mast shall be provided with integral lightning arrestor/finial at top for protection against lightning. Arrangement for fixing aviation obstruction light shall also be provided. Suitable night glow reflective tape/reflector shall be fixed around the mast at appropriate height for visibility and safety.

The mast shall have a permanently marked serial number, manufacturer identification and year of manufacture. The contractor shall submit factory inspection report, routine test certificates, galvanizing test report and structural design/test certificate of high mast from manufacturer as approved by Engineer-in-Charge.

The item includes erection of high mast on already provided RCC foundation with J-type

foundation bolts/studs complete with double check nuts, washers, templates and alignment arrangement. Proper vertical alignment, grouting and tightening shall be carried out as per manufacturer recommendations.

The scope also includes all necessary accessories, hardware, foundation hardware fixing, earthing terminals, internal wiring, testing, commissioning, lubrication, trial operation, tools and tackles required for satisfactory completion of work.

The work shall be carried out in accordance with relevant IS specifications, IE Rules, safety standards and directions of Engineer-in-Charge complete.

Mode of Measurement: - The Item will be measured per set basis and will be paid accordingly

**15 Supplying and erecting outdoor stand mounted feeder pillar for high-mast of the same manufacturer with 32A TPN MCB incomer, 24hr astronomical time switch with minimum 5 years battery backup, 25 A TP contactor for automatic switching of luminaries, 2 no. 9A contactors and raise/lower push button, and provision for termination of adequate size of incoming and outgoing cables complete erected in min. 14 SWG CRCA sheet box with supporting angles, self lock, gasket and slanting top erected on CC foundation complete.**

**Specification:**

**21.1 High Mast Pole**

The high mast pole shall have a clear height of twelve point five metres and shall be single section and continuously tapered. The top diameter of the pole shall be one hundred fifty millimetres and the bottom diameter shall be three hundred sixty millimetres. The pole shall be manufactured from high tensile structural grade steel conforming to BS EN one zero zero two five Grade S three five five or E three five zero with plate thickness of three millimetres. The pole shall be manufactured by submerged arc welding process. The entire pole shall be hot dip galvanized with an average minimum zinc coating thickness of sixty five microns. Each pole shall have a permanent serial number marked on it.

**Base Plate**

The base plate shall be twenty five millimetres thick with an outer diameter of five hundred twenty millimetres. The base plate material shall conform to IS two zero six two. The pole shall be mounted on J type foundation bolts or studs using double check nuts along with all necessary accessories.

**Raising and Lowering System**

The high mast shall be provided with a motorized raising and lowering system. The system shall have a load carrying capacity of two hundred fifty kilograms and shall be provided with a double drum assembly. The system shall include two numbers stainless steel wire ropes of grade three one six having seven by nineteen construction and diameter of five millimetres. Suitable SG or DG type U clamps shall be provided.

**Lantern Carriage Assembly**

The lantern carriage assembly shall be suitable for mounting a maximum of twelve luminaires. It shall include control gear box and all necessary accessories. Power supply wiring shall be provided using flexible copper cable of size five core two point five square millimetres.

**Electrical and Safety Accessories**

The high mast shall be provided with a lightning arrestor complete with earthing arrangement. Provision shall be made for fixing aviation obstruction light. Night glow reflectors shall be fixed on

the pole at suitable height for visibility.

#### Testing and Documentation

Factory inspection report and test certificate for the high mast shall be provided as per applicable standards and specifications prior to dispatch.

#### Installation

The high mast shall be erected on client provided foundation and shall be completed in all respects including alignment, tightening, testing and commissioning.

Mode of Measurement:- Measurement will be taken on Per Set basis and paid accordingly.

### 21.2 Detailed Technical Specifications

Supplying, erecting, testing and commissioning of outdoor stand mounted feeder pillar suitable for high mast lighting system, of the same manufacturer as the high mast, conforming to the following requirements.

#### Feeder Pillar Construction

The feeder pillar shall be suitable for outdoor installation and shall be stand mounted type. The enclosure shall be fabricated from minimum fourteen SWG cold rolled close annealed steel sheet and shall be provided with supporting angles. The enclosure shall have a slanting top, weather proof gasket, self locking arrangement and suitable finish for outdoor use. The feeder pillar shall be erected on cement concrete foundation complete in all respects.

#### Electrical Components

The feeder pillar shall be provided with thirty two ampere triple pole and neutral miniature circuit breaker as incomer. It shall be equipped with a twenty four hour astronomical time switch with minimum battery backup of five years for automatic control of lighting operations.

For automatic switching of luminaires, a twenty five ampere triple pole contactor shall be provided. In addition, two numbers nine ampere contactors shall be provided for raising and lowering operation of the high mast along with raise and lower push button arrangement.

#### Cable Termination

The feeder pillar shall have adequate provision for termination of incoming and outgoing power cables of suitable size with proper terminals and accessories

#### Installation

The feeder pillar shall be supplied, erected, wired, tested and commissioned complete in all respects including all necessary hardware, internal wiring and accessories as required for proper operation of the high mast lighting system

Mode of Measurement:- Measurement will be taken on Job basis and paid accordingly

**16 Making M-20 cement concrete foundation by considering the safe soil bearing capacity at site as 10 T/sq.m at 2m depth including excavation and fixing provided nut bolts with the help of template, duly plastered as per design complete (for 16m raising lowering high mast).**

#### Specification:

Under the scope of work of this item, agency shall be responsible for providing & casting M- 20 cement concrete foundation suitable for 12.5 m raising lowering high mast considering the safe soil bearing capacity at site as 10 T/sq m at 2 m depth including excavation and fixing provided nut bolts with the help of template as per design in an approved manner. The agency shall submit the standard drawing of the cement concrete foundation issued by manufacturer and get the same approved from the Executive Engineer, MIDC, Division prior to casting of the same. Within the scope of work of this item, the agency shall carry out the work of excavation in all types of soils at site of required size and required depth. The nut bolts supplied under the items elsewhere in this

tender shall be fixed in the cement concrete in an approved manner. The CC Foundation of the high mast shall be executed as per approved drawing only.

Mode of measurement: The measurements shall be recorded on Number basis and paid accordingly

**17 Supplying and erecting integrated LED street light fitting 120W IP65 & IK08 class having single piece pressure die-cast aluminium housing, having system lumens output of Min. 13000 Lumens, min. efficacy of 110 lumen/W, CRI>70, CCT upto 6500K, THD<10%, p.f. >0.95, operating range of 140-270V, inbuilt surge protection of 10 kV, Life class of 50,000 Hrs at L70B50 including driver complete with minimum 2 Years warranty as per specification No. FG-ODF/SL.**

**Specification:**

The specification of 120 W LED flood light fittings shall be as under1. Housing shall be of die-cast aluminum alloy with heat resistant toughened glass

& stainless steel screws & silicon gasket.

2. Internal wiring shall be done with PTFE (Teflon) coated multistrand copper wire.

3. Electronic control gear shall be integral & with complete wiring. Driver efficiency shall be >90%.

4. The heat sink shall be made of suitably designed die cast aluminum heavy body to maintain junction temperature for optimum LED life.

5. System efficacy shall be >90 Lm/W & colour temperature shall be in the range of 5700K ANSI.

6. The operating temperature of LED shall be within the range of -10 deg. C to 50 deg. C & colour rendering shall be >70

7. The fittings shall operate on rated voltage of 240V Ac, 50HZ with operating range of 120 to 270 V. The power factor shall be greater than 0.95.

8. The driver shall be integral with built in Surge Protection Device which can withstand a surge of at least 4 kV with additional SPD of 10 KVA.

9. The IP protection of fittings shall be IP 66 Class I.

10. Luminaire and Lamp shall be LM79, LM80 compliant respectively.

11. The THD should be less than 10%

12. The LED shall be with Secondary PMMA lens for optimized light distribution

Mode of measurement & payment:- The quantity shall be measured and paid on each basis.

**18 Supplying and erecting PVC insulated PVC round sheathed 1.5 sq.mm (30 no. x 0.25 mm dia.) 3 core flexible multi stranded copper Industrial cable for voltage grade up to 1.1 kV**  
**Specification:**

**Specification**

Mains in surface PVC conduit providing specified PVC Conduits, Wires and erecting the conduits as per approved Method of Construction; on surface of wall / ceiling, etc. including entries through walls / slabs / flooring as per requirement, and with all necessary hardware, accessories such as Spacers, Saddles, Bends, Tees, Junction boxes, Check-nuts / glands, etc.; making conduits erection work rigid; and drawing the specified wires through these conduits and duly connecting / terminating with lugs, complete finishing, removing debris from site; testing for safety and beneficial use.

Material:-

PVC Conduit: PVC pipe of minimum 20mm dia and above depending on No. of wires to be drawn (refer Table No 1/2); ISI mark, HMS grade (2mm thick), accessories for PVC pipes of the same

make that of pipe; such as Spacers & Saddles, Couplers, Bends, inspection or non inspection type Elbows, Tees, Junction boxes of required ways and resin / adhesive to make all joints rigid. Black pipe shall not be used for surface type wiring. Hardware: Steel Metal (SM) screws of sizes specified in Method of Construction, washers, rawl /PVC / fill type plugs, wooden gutties, etc.

Wires:- Mains / Sub-mains / Circuit mains (comprising phase and neutral wires) PVC insulated wire of specified size, minimum FR grade insulation, copper conductor of electrolytic tough pitch (ETP) grade, having insulation of 1.1 kV grade, ISI marked, of appropriate colour coding as per Table No.1/5 Earth Continuity Wire: PVC insulated wire minimum FR grade insulation copper conductor of electrolytic grade, having insulation of 1.1 k V grade, of green or green yellow colour, ISI marked, of specified size but not less than 2.5 Sqmm as per Table No 1/5.

Lugs:- Copper lugs of appropriate type and size Other material:-Rubber grommet, bush, flexible PVC conduit, gland etc.

Method of Construction: Erection PVC Conduits for Surface type wiring:

General:

Erection shall be done as per the final approved layout, in perfect level and plumb. Conduits shall be firmly fixed on spacers with saddles. Fixing of spacers shall be equidistant and at ends, bends, elbows, junction boxes, couplings, boards. CSK screws of minimum 35x8 mm and suitable plugs shall be used for fixing spacers and 12x5 mm, round headed screws for fixing saddles on spacers. In case of stonewalls wooden gutties shall be grouted in wall for fixing of spacers. Distance between 2 spacers shall not be more than 600 mm. Size of conduit shall be correct depending on number of wires to be drawn (as per Table No. 1/2 for PVC conduits). Separate pipe shall be used for each phase in 1-ph distribution and for power and light distribution. Also for wiring for other utilities like data, telephone, TV cabling distance between pipes shall not be less than 300 mm or anti electrostatic partition is to be provided. Adequate use of conduit accessories shall be made at required locations. Entries in wall shall be at level of surface conduit with colour coding (For Visual identification) as per Table No. 1/4. Flexible conduits shall be used at expansion joints. Especially for PVC Conduits of surface type wiring: In addition to general instructions above, all joints shall be made rigid with resin / adhesive. Wherever offsets are necessary, it shall be done with bending spring. Size of conduit shall be as per Table No. 1/2 for number of wires to be drawn through the conduit.

Drawing of wires: General Wires shall be drawn with adequate care. Correct colour coding as per Table No. 1/5, shall be used for phase, neutral and earth. Wires shall not have intermediate joint in between terminals of the accessories. Earth-wire and Return wire (neutral) may be looped only within circuit. For lighting load or single-phase distribution wires of two different phases shall not be drawn in single pipe. Lead wires of sufficient extra length shall be provided and shall be terminated in the terminals of accessories only, with appropriate type and size of lugs.

Drawing of wires:- through PVC conduits for surface type wiring Insulated Earth wire of green or green-yellow colour of minimum 1.5 sq mm or as per specified shall be drawn through conduit. Number of wires shall not exceed with respect to size of pipe as per Table No. 1/2. At the termination end flexible PVC conduit shall be used with gland as per required.

Mode of Measurement:- This item will be measured on length (Mtr) basis & will be paid accordingly.

**19 Supplying, erecting & terminating XPLE armoured cable 4 core 16 sq. mm. aluminium conductor with continuous 5.48 sq. mm. (12 SWG) G.I. earth wire complete erected with glands & lugs, on wall / trusses/pole or laid in provided trench/ pipe as per specification no. CB-LT/AL**

## **Specification:**

Specification:

For 4 core 16 sq. mm Cable

Armoured Cables (HT & LT)

### **1. General**

All material shall conform to relevant standard as per BIS and shall carry ISI mark. If any particular category of material for which ISI mark is not available in market, it shall be as included in approved list. Work shall be carried out as per the method of construction specified by BIS. If there is no reference for particular method of construction in IS, such work shall be carried out as per the approved method of construction specified in chapter 16 of P.W. Dept. Handbook. Material and Work not qualifying to any provision mentioned above shall be to the satisfaction of the Engineer in Charge.

### **2. Cables: (Armoured)**

The following list records those Indian Standards in force, which are acceptable as good practice, and accepted standard SP 30: 1984 : National Electrical Code SP 7 (Group 4): 2005 : National Building Code IS 1255: 1983 Code of practice of Installation & Maintenance of armoured cables up to 33 kV. IS 3961: Part 2: 1967 : Recommended current ratings of PVC cables. IS 1554: Part 1; 1988 : PVC Insulated (Heavy duty) Electric Cables; Part 1 for working voltages up to and including 1100 Volts. IS 1554: Part 2; 1988 : PVC Insulated (Heavy duty) Electric Cables; Part 1 for working voltages up to and including 3.3 kV to 11 kV.

IS 10810: Part 63; 1993 : Method for Test of cables, Part 63 Smoke density of electric cables under fire condition.

### **3. Scope: (Armoured cables)**

Specification No. (CB-LT/AL, CB-LT/CU, CB-HT)

Providing armoured cable of specified voltage level, size & specified conducting material (Aluminum / Copper) as per Table no. 7/3 including required material, hardware's for erection and erecting on wall, ceiling, RCC slab or drawing the same through pole, pipe, laying in provided conduit, trench, ducts, trays as per approved method of construction including glands, lugs, etc.

### **4. Material:**

Cables:

Cables shall be PVC for LT/MP and XLPE for HT as per Table no. 7/3 and of required construction, colour, shall carry ISI mark, IS No, manufacturer's name, size, duly embossed / screen printed at every meter and having the total count of progressive length in meter at each mark.

Earth wire: Galvanized Iron (G I) wire of appropriate gauge as per Table No 7/1.

Glands: As per specification (CB-GL)

Lugs: As per specification (CB-CL/AL, CB-CL/CU)

Saddles: Saddles fabricated from GI sheet of required gauge and size depending on dia of cable either galvanized or painted with superior quality enamel black paint with necessary shearing mechanical strength, semi circular shaped with extended piece having suitable holes for fixing.

G I Strip: 22 g x 25 mm width G I Strip.

Clamps: MS Clamps fabricated of required length and shape, having the size of 3/6 mm thick mild steel having 25/50 mm width (as per size of cable), rounded ends with wooden / resin cast grip for holding the cable.

Identification tags: For identifying root, connection position GI strip with identification mark / name embossed / painted with arrangement to tie should be fix on cable or arrangement of ferrules to be

done.

Hardware: Sheet Metal (SM) screws of required sizes, plugs / wooden gutties, etc

#### 4. Method of Construction:

General:

a) Irrespective of method of construction the cable ends shall be terminated with appropriate size & type of glands with lugs duly crimped, as directed by Site Engineer.

b) Wherever the cable has to be bent, the turning radius shall be as mentioned in Table No 7/2.

Grouping of cables shall be done with adequate distance between cables as mentioned in IS so as to minimize de-rating. Cables shall be tagged/ferruled with identification name / mark at the point from where distribution starts and at ends. Bare earth wire of appropriate size as per Table no. 7/1 shall run along with the cable. Earth wire running with the cable shall be terminated at the earth terminal nearest to cable termination.

5.1 Erection of Cable on Surface: Erection shall be done as per the routes and layout finalized, in perfect level and in plumb. Before fixing the cable shall be straightened as far as possible for good aesthetics look, continuous bare GI earth wire of required gauge as per Table No 7/1 shall be run. Cable with G I wire shall be fixed by saddles firmly clipped on cable and shall be fixed to wall with minimum 50 x 8 mm SM screws with plugs/wooden gutties, etc. (Distance between two supports / saddles shall be maximum 450 mm). Wooden gutties shall be used wherever required (Especially for stone wall). The entries made in wall, floor slab, etc for laying the cable shall be made good by filling and finishing with plastering the same.

5.2 Erection of Cable on Trusses: Cable along with bare GI earth wire, while erecting on trusses, shall be firmly clamped by wrapping GI strip of 22 g, 25 mm width of required length fixed to truss with nuts and bolts.

5.3 Erection of Cable on Pole: Cable along with bare GI earth wire, while erecting on pole, shall be firmly clipped by suitable wooden / epoxy resin cast grips, clamped with 25 x 3 mm or 50x6 mm MS strip of required length and fixed to pole with nuts and bolts.

5.4 Laying of Cable in provided Trench/Pole: While laying Cable along with bare GI earth wire, utmost care shall be taken to prevent damage to the insulation of the cable and to the open end. Cable shall be brought out from trench vertically straight (minimum 1.0 metre above G L). Care shall be taken to inspect the trench so that depth of cable shall not be less than as shown in Table No 7/4. Suitable size of cable loops shall be provided near termination point at adequate depth.

5.5 Erecting cable in constructed Trench / duct: Erection of cable/s in constructed trench / duct, shall be as per guide lines of IS 1255.

5.6 Erection of cable/s on trays: Cable/s shall be tied with PVC tags on GI trays. At bending point care shall be taken so that sharp edges of sheet will not damage insulation of cable.

Mode of Measurement:- Executed quantity shall be measured on the basis of running meter & paid accordingly

**20 Supplying and laying (including excavation of suitable width & depth up to 90 cm) 90 mm outside dia. double wall corrugated pipes (DWC) of HDPE for enclosing cable below ground/road surface, complete.**

#### **Specification:**

Under this item, agency have to supply & lay (including excavation) 90 mm outside dia, double wall corrugated pipes (DWC) of polyethylene ( Confirming to IS 14930 II ) with necessary sockets/coupling, tee of same material at required depth up to 90 cms below road / ground surface, for enclosing provided cable & necessary back filling with light ramming to make the road / ground surface as it was ( except bitumen carpet ). The item includes excavation in all types of

surfaces of road like Asphalted /concrete etc. The agency have to provide machinery for excavation wherever required. The agency will have to coordinate with plot holders while carrying out work in front of main gates of the companies so as to execute the work smoothly. The safety rules & precautions indicators shall be followed while execution.

Mode of Measurement : This Item will be measured on Meter basis and paid accordingly

## **21 Cable Glands(CB-GL)**

**21.1 Supplying & erecting single compression type brass cable glands for 3 to 4 core 16 sq mm /3 to 4 core 25 sq mm /3 core 35 sq mm cable as per specification No. CB-GL**

### **Specification:**

#### **21.1 Specification**

Specification glands: Flange type heavy duty. Made of high purity brass metal, with brass washers, rubber rings, threaded stud with washers Method of Construction. Before erection of gland, the cable end shall be prepared by removing the outer PVC insulation up to the point where gland to be fixed, by leads required. Bottom portion of gland shall be inserted over the steel armouring, and then armour strips shall be bent for the length of collar length of armoring shall be cut. The cable end shall then be, inserted through the entry of plate where the cable is to be terminated. The washer shall be then inserted in such a manner that the bent armour strip should be touching the surface of the entry. The nuts shall be washers over the projected stud portion. Fixing of gland shall be at right angle to the gland plate. Tightening shall assure continuity of earth. shall be punched / knocked out, of correct diameter with respect to gland size.

Mode of Measurement: Executed quantity will be measured on number basis. (i.e. each).

## **22 Cable Lugs (Aluminium) (CB-CL/AL)**

**22.1 Supplying & erecting crimping type aluminium lugs for cable upto 16 sq mm complete as per specification No. CB-CL/AL**

### **Specification:**

#### **22.1 Specification**

Specification Nos (CB-CL/AL, CB-CL/CU) Crimping of lugs, and fixing to the terminals with nuts and bolts, etc.

Material: Lug: Lug shall be of high purity aluminum / copper / bimetallic of required type, with required size of hole and smooth finished both from inside and outside. Hardware: Brass or Cadmium plated mild steel nuts and bolts, bimetallic washers. Anti-Oxide paste: Paste of superior



quality manufactured by reputed manufacturer.

Method of Construction: Before fixing of lugs to the cable end, the cable end to the equivalent length of the lug shall be prepared by removing the outer PVC insulation along with the steel armouring and then, the inner PVC insulation. The paste shall be applied to the cable lead and inside the lug prior to the inserting of lug on the cable lead. The lug shall then be crimped with hydraulic / mechanical type heavy duty crimping tool. The crimping shall be done in such a manner that there shall be no air gap. Then the crimped portion shall be wrapped with the PVC insulation tape. (Colour of tape shall be of that of cable lead) The above method shall be carried out for all the cores. The cable end with lug shall then be terminated into the terminal and then be tightened with either brass nuts or Cadmium plated nuts as directed by Engineer in charge.

Mode of Measurement: Executed quantity will be measured on number basis. (i.e. each).

### **23 Supplying, installing and testing pipe type earthing with 40mm. dia. G.I. pipe or 20 mm dia. G.I. Rod complete with all accessories of GI materials & recording the results as per specification no. EA-EP**

#### **Specification:**

(A) Plate / Pipe type Earthing A) Plate type Earthing (With or Without CI Cover, Funnel, etc) (EA EP)

#### **Scope:**

Specification No (EA-EP) Supplying and erecting galvanized cast iron / copper earth plate type / G.I. pipe type earthing with / without C.I. cover as per instructions from the site engineer.

Material: Earth Plate: Galvanized cast iron / Copper earth plate or G.I. pipe as per specifications given in Table No 9.1/1.

CI Cover: As per specifications given in Table No 9.1/1.

Earthing Conductor: Copper/G.I strip/Annealed bare copper wire/G.I. earth wire of size as per specifications given in Table No 9.1/1.

GI Pipe: As per specification (CW-PLB/GP) mentioned chapter no. 17.5 for watering, and as enclosure for Earth wire, refer specifications given in Table No 9.1/1.

Hardware: Screw / nut bolts with required washer of dimensions, Rawl plug / clip/ 'U' nails and material as per specifications given in Table No 9.1/1.

Filling material: Coal /Charcoal/ salt as per specifications given in Table No 9.1/1. as per specifications given in Table No 9.1/1.

Lugs: As per specification (CB-LG/AL, CB-LG/CU) mentioned chapter 7.9 & 7.10 Copper/ Aluminium lugs as per specifications given in Table No 9.1/1. Method of construction: Pit is to be dug of required dimension and depth for the earthing at site, and laying of galvanized cast iron / Copper earth plate or G.I. pipe shall be as per Table No 9.1/1. The earth connection to equipment/ switch gear and earthing electrode shall be connected as shown in the diagram and as per IS 3043 amended up to-date. The connections shall be made either by strip or double run of earth wire with drilling, welding, riveting, brazing and nut bolting to plate or pipe, where ever required in an approved manner. As far as possible continuous strip shall be used, but where ever jointing of strip is unavoidable, the overlap portion must not be less than 2 1/2 times the width of the strip either welded/ brazed/soldered by all sides or 6 inches overlap with two nut bolts/ riveting of adequate size with required washer and covered by anti-corrosive paint as per approved jointing practice in the industry and as per directives from site engineer in charge. Pit shall then be filled with

screened soil with alternate layer of coal and salt, and if, necessary brick masonry work ( Where ever applicable) shall be done as specified in IS: 3043, with laying wires in PVC/ G.I. pipe and watering arrangement as per drawing no EA-1 and covered with C.I. Cover ( Where ever applicable). Where ever requires or as specified by Site Engineer, a Test link shall be provided for facilitating the testing of resistance of earth electrode.

Testing: The value of each earth electrode shall be measured by earth tester in presence of site Engineer and record to be submitted.

Mode of Measurement: Executed quantity will be measured on number basis (i.e. each)

## **24 Sub Estimate - Supplying & erecting 100 kVA Transformer with UG Cable Work at WTP and Jackwell in Pusad Industrial Area**

**Specification:**

### **25 Brackets (OH-BKT)**

**25.1 Supplying & erecting inline D. P. Structure for 11/0.415 kV, 100 kVA Transformer with R.S.J. Pole 2 Nos. of size 100 x 116 mm x 11 Mtr. Long with suitable Distribution Box of C.R.C.A. Sheet 16 SWG with 4 Pole MCCB 200 Amps as incomer & 6 Nos. 100 Amps Kitkat / MCCB for out going circuits. Transformer D.P. Structure includes the A. B. Switch 200 Amps, D.O. fuse Set & L.A. Set. 2 Nos. of Top channel of size 100 mmx 50 mm for erection of A.B. Switch & 2 Nos. Base channel of size 100 mm x 50 mm for erecting Transformer Channel of size 75 x40 mm for erecting D.O. Fuse Set, L.A., A.B. Switch handle etc. Angle of size 50 x 50 x6 mm for erecting Distribution Box , Transformer Belt etc.as per drawing (min. 124 Kg. iron work ) with necessary clamps, Nut-bolts. V cross arm, top clip, insulators etc. complete with caution board & barbed wire, D.P. Structure shall be erected in c.c. foundation complete**

**Specification:**

### **25.1 Specification**

Under the scope of this item the successful tenderer is required to Supply & erect inline D. P. Structure for 11/0.415 kV, 100 kVA Transformer with R.S.J. Pole 2 Nos. of size 100 x 116 mm x 11 Mtr. Long with suitable Distribution Box of C.R.C.A. Sheet 16 SWG with 4 Pole MCCB 300 Amps as incomer & 6 Nos. 100 Amps Kitkat / MCCB for out going circuits. Transformer D.P. Structure includes the A. B. Switch 200 Amps, D.O. fuse Set & L.A. Set. 2 Nos of Top channel of size 100 mmx 50 mm for erection of A.B. Switch & 2 Nos. Base channel of size 100 mm x 50 mm for erecting Transformer Channel of size 75 x40 mm for erecting D.O. Fuse Set, L.A., A.B. Switch handle etc. Angle of size 50 x 50 x6 mm for erecting Distribution Box , Transformer Belt etc.as per drawing (min. 124 Kg. iron work ) with necessary clamps, Nut-bolts. V cross arm, top clip, insulators etc. complete with caution board & barbed wire. D.P. Structure shall be erected in c.c. foundation complete in an approved manner as per the directions of the Engineer-in-charge. The supply & erection of 100 KVA transformer DP structure shall be got executed under the supervision of Engineer-In-charge as per the approved drawing of Electrical Inspector & as per the direction of MSEDCL authority. The required excavation all strata , concrete foundation , hardware etc is included in the item . Make:- MSEDCL approved

Mode of measurement : The item shall be measured on each basis and paid accordingly.

### **26 Non-sealed transformer (SS-TR-NSL)**

**26.1 Supplying, installing, testing & commissioning of 3 phase, 11/0.433 kV, 50 Hz., 100**

**kVA, Mineral oil immersed and naturally cooled outdoor type, aluminium wound Non-sealed transformer, delta/star connected with additional neutral brought out on load side, temperature rise should not exceed 40° by thermometer in oil and 45° by the resistance method in winding at full load rating, using type A winding insulation (kraft paper) , with standard accessories complete with test certificate with losses below 475 Watts at 50% load, 1650 Watts at 100% load as per IS:1180 (part 1) : 2014, with necessary permissions of Electrical Inspector, as per specification no SS- TR-NSL.**

**Specification:**

## **26.1 Specification**

Under the scope of this item the successful tenderer is required to Supplying, installing, testing & commissioning of 3 phase, 11/0.433 kV, 50 Hz., 100 kVA, Mineral oil immersed and naturally cooled outdoor type, aluminium wound Non-sealed transformer, delta/star connected with additional neutral brought out on load side, temperature rise should not exceed 40° by thermometer in oil and 45° by the resistance method in winding at full load rating, using type A winding insulation (kraft paper) , with standard accessories complete with test certificate with losses below 475 Watts at 50% load, 1650 Watts at 100% load as per IS:1180 (part 1) : 2014, with necessary permissions of Electrical Inspector, as per specification no SS- TR-NSL in an approved manner as per the directions of the Engineer-in-charge.

Following are to be provided mandatorily :

1. Oil conservator with filling holes and cap and plain oil level gauge.
2. Silica gel dehydrating breather.
3. Oil drain valve.
4. Thermometer pocket.
5. Oil filter valve.
6. Lifting arrangement.
7. Two earthing terminals.
8. Diagram and rating plate.
9. First filling of oil with dielectric strength of 50 KV/No. break.
10. Four bi-directional plain rollers.
11. Air vent.
12. Explosion vent.

The transformer losses shall be as per minimum IS:1180 - 2014 energy efficiency level II, With terminal arrangement bushings with lugs/cable end box on H.V. side and cable end box on L.V. side complete with test certificate required as per relevant I.S. standard. The Page 103 Tender ID – 33216 agency has to give all the required tests as per MSEDCL's standard in presence of MIDC and MSEDCL's representative. Necessary testing fees, if any, to be paid to the MSEDCL will be paid by MIDC. The test results of joint inspection shall be recorded on the test report of Transformer with its Sr. No. prior to delivery of the Transformer to site. Necessary work of plinth and or for D.P. structure with D.O. set, L.A., A.B. switch should be completed before dispatch of the transformer. The channel arrangement on plinth is to be done. Earthing arrangement should be completed. The Transformer should be installed on plinths /double pole structure/floor by arranging chains pulley block, crane etc as per IS Norms. After installation of Transformer the stopper/lock should be provided to rollers of the Transformer. The connection of H.T/L.T. side should be completed by provided Copper wire/ cable with necessary lugs to avoid loose connection. The earthing (2 Nos for Neutral & 2 Nos for Body) should be connected from distinct electrodes. The

earthing should be connected by lugs/proper size of strip. The Engineer in charge or his representative should check all connections on H.T. side, L.T. side and earths and insulation and earth resistance test should be carried out and results obtained shall be recorded. Statutory Permissions to be obtained by the Agency / Contractor.

Before commencement of work, the drawings of installation shall be got approved from the Electrical Inspector, I E & L Department. The installation should be got inspected from Electrical Inspector and obtain written permission to charge the Transformers. Commissioning. After above formalities the Transformer, should be charged/commissioned in presence of Engineer in charge or his representative along with load trials and shall be handed over to the department for beneficial use After charging the Transformer, line, phase voltages and line current shall be measured, and the same shall be submitted. Following test certificates shall be submitted:

1. Manufacturer's original certificate of Transformer as stipulated in IS.
2. Test certificate for dielectric strength of oil as per IS.
3. Test results of IR values.
4. Test results of all earth electrodes.
5. Readings of Voltages & currents at the time of commissioning The transformer shall be with Minimum IS:1180 - 2014 energy efficiency level II, or as per prevailing practice of MSEDCL.

The transformer shall be guaranteed for five years period as per the MSEDCL standards/specifications.

Mode of measurement : The item shall be measured on each basis and paid accordingly.

## **27 Excavation (CW-EXN)**

**27.1 Excavating Soft murum/Soft soil road by chiselling for preparing pit for poles stay or earth plates or for laying cables, pipes & clearing the site by removing debris & making the site good complete.**

**Specification:**

### **27.1 Specification**

Under this item, agency has to excavating soft murum/soft soil road by chiselling for preparation of pits for erection of poles, stays, earthing plates and for laying underground cables, pipes etc. including breaking of road surface, dressing sides, ramming bottom, removing excavated material, clearing debris and restoring the site complete.

The work shall include excavation in soft murum, soft soil, compacted earth, road shoulders and similar strata by manual or mechanical means as directed by Engineer-in-Charge. Excavation shall be carried out to required width, depth and alignment suitable for laying of cables/pipes or erection of poles and earthing arrangements.

The item includes chiselling/cutting of existing road crust, murum surface, compacted layer and removal of obstructions encountered during excavation. Proper care shall be taken to avoid damage to nearby utilities such as water pipelines, drainage lines, electrical cables, telecom lines and road structures.

Excavated earth, murum and debris shall be removed from site and disposed off at approved location with all loads and lifts. Useful excavated material if directed shall be stacked properly for reuse.

After completion of cable laying or erection work, the excavated portion shall be refilled with available suitable earth/murum in layers, properly watered and compacted to restore the original condition of road/ground. The surface shall be made good neatly and maintained properly.

The contractor shall provide all labour, tools, tackles, chisels, breakers, machinery, barricading, safety measures, warning signs and traffic protection arrangements required during execution of work.

The work shall be executed as per relevant IS specifications, standard engineering practices and instructions of Engineer-in-Charge complete.

Mode of Measurement :- The item will be measured on Cum basis and will be paid accordingly

**28 Making cement concrete foundation in 1:3:6 cement concrete, (20 to 25) mm. stone metal duly plastered with necessary curing for complete. (pole muffing or any other purpose).**

**Specification:**

Specification:- 1.1 General : The item pertains to providing and laying in position Plain Cement Concrete (PCC) of specified proportion. The work includes providing all material, mixing, compacting, curing, shuttering, dewatering etc. complete up to lift of  $\pm 5$  m. 1.2 Material: 1. Cement : Ordinary Portland Cement (OPC) as specified at item Gen/C/0.2.1. 2. Fine Aggregate (Sand) : specifications shall conform to item Gen/C/0.2.2. 3. Coarse Aggregate : specifications shall conform to item Gen/C/0.2.3. Grading and maximum size of coarse aggregate shall be as specified in the drawing. Normally the maximum size should not be more than 40 mm or 25 % of the minimum dimension of the member, whichever is less. 4. Water : specifications shall conform to item Gen/C/0.2.4. 1.3 Mix Proportion and Mixing : The mix proportion as specified on the drawing, separately for each component shall be provided. For detailed specifications refer to item No.Gen/C/0.5. For mixing without mechanical mixer, prior permission from the Engineer-in-charge shall be obtained. Specifications for mixing shall conform to item Gen/C/0.7. 1.4 Formwork and Scaffolding : Formwork shall be provided for giving the desired shape and sizes for the PCC as per the drawings. The specifications shall conform to item Gen/C/0.19.7. The stripping time also shall be as specified in the item. The scaffolding shall be normally provided of steel tubes. The specifications for scaffolding also shall conform to item Gen/C/0.19.8. 1.5 Transportation, Placing and Compaction : Specifications shall conform to item Gen/C/0.8. 1.6 Field Tests : The appropriate field tests as directed by the Engineer-in-charge shall be carried out as explained in item Gen/C/0.15. 1.7 Inspection & Testing of Structure : As per the contract conditions inspection & testing of a structure shall be carried out in accordance with item Gen/C/0.16 1.8 Finishing of

Concrete : The finishing of concrete surface shall be as per item Gen/C/0.17. 1.9 Special Features : Special requirements such as Architectural shapes/ finishes, Expansion joints, Construction joints, Water stops, grouting, etc. shall be provided as shown on drawing/s and as directed by Engineer in Charge. For specifications for these the appropriate clauses of item Gen/C/0 shall be referred. 1.10 Curing : As per item Gen/C/0.14. 1.11 Item to Include : This item for providing Plain Cement Concrete (PCC) with specified mix proportion at specified locations with initial lift of + 5 m above or below ground level includes all ingredients of concrete i.e. water, cement, fine and coarse aggregates, all transportation, dewatering, tools and plants, all taxes, royalties, labour, formwork, testing, curing etc. complete.

Mode of Measurement and Payment :- The measurements of the concrete laid shall be taken on volumetric basis in cum. The openings shall be deducted. The unit rate of concrete per cum of specified proportion includes all the items as explained in Gen/C/0.25.

**29 Providing pipe type earthing with 40mm. dia. G.I. pipe or 20 mm dia. G.I. Rod complete with all materials as per specification no. EAEP**

**Specification:**

(A) Plate / Pipe type Earthing A) Plate type Earthing (With or Without CI Cover, Funnel, etc) (EA EP)

Scope:

Specification No (EA-EP) Supplying and erecting galvanized cast iron / copper earth plate type / G.I. pipe type earthing with / without C.I. cover as per instructions from the site engineer.

Material: Earth Plate: Galvanized cast iron / Copper earth plate or G.I. pipe as per specifications given in Table No 9.1/1.

CI Cover: As per specifications given in Table No 9.1/1.

Earthing Conductor: Copper/G.I strip/Annealed bare copper wire/G.I. earth wire of size as per specifications given in Table No 9.1/1.

GI Pipe: As per specification (CW-PLB/GP) mentioned chapter no. 17.5 for watering, and as enclosure for Earth wire, refer specifications given in Table No 9.1/1.

Hardware: Screw / nut bolts with required washer of dimensions, Rawl plug / clip/ 'U' nails and material as per specifications given in Table No 9.1/1.

Filling material: Coal /Charcoal/ salt as per specifications given in Table No 9.1/1. as per specifications given in Table No 9.1/1.

Lugs: As per specification (CB-LG/AL, CB-LG/CU) mentioned chapter 7.9 & 7.10 Copper/ Aluminium lugs as per specifications given in Table No 9.1/1. Method of construction: Pit is to be dug of required dimension and depth for the earthing at site, and laying of galvanized cast iron / Copper earth plate or G.I. pipe shall be as per Table No 9.1/1. The earth connection to equipment/ switch gear and earthing electrode shall be connected as shown in the diagram and as per IS 3043 amended up to-date. The connections shall be made either by strip or double run of earth wire with drilling, welding, riveting, brazing and nut bolting to plate or pipe, where ever required in an approved manner. As far as possible continuous strip shall be used, but where ever jointing of strip is unavoidable, the overlap portion must not be less than 2 1/2 times the width of the strip either welded/ brazed/soldered by all sides or 6 inches overlap with two nut bolts/ riveting of adequate

size with required washer and covered by anti-corrosive paint as per approved jointing practice in the industry and as per directives from site engineer in charge. Pit shall then be filled with screened soil with alternate layer of coal and salt, and if, necessary brick masonry work ( Where ever applicable) shall be done as specified in IS: 3043, with laying wires in PVC/ G.I. pipe and watering arrangement as per drawing no EA-1 and covered with C.I. Cover ( Where ever applicable). Where ever requires or as specified by Site Engineer, a Test link shall be provided for facilitating the testing of resistance of earth electrode.

Testing: The value of each earth electrode shall be measured by earth tester in presence of site Engineer and record to be submitted.

Mode of Measurement: Executed quantity will be measured on number basis (i.e. each)

**30 Supplying, erecting & terminating FR XLPE insulated, galvanised steel formed wire armoured (strip) cable, 1100 V 3½ core 120 sq. mm. aluminium conductor complete erected with glands & lugs on wall/ trusses/pole or laid in provided trench/ pipe as per specification no. CB-LT/AL**

**Specification:**

Specification For Armored Cables (HT & LT)

1. General All material shall conform to relevant standard as per BIS and shall carry ISI mark. If any particular category of material for which ISI mark is not available in market, it shall be as included in approved list. Work shall be carried out as per the method of construction specified by BIS. If there is no reference for particular method of construction in IS, such work shall be carried out as per the approved method of construction specified in chapter 16 of P.W. Dept. Handbook. Material and Work not qualifying to any provision mentioned above shall be to the satisfaction of the Engineer in Charge.

2. Cables: (Armored) The following list records those Indian Standards in force, which are acceptable as good practice, and accepted standard SP 30: 1984 : National Electrical Code SP 7 (Group 4): 2005 : National Building Code IS 1255: 1983 Code of practice of Installation & Maintenance of armoured cables up to 33 kV. IS 3961: Part 2: 1967 : Recommended current ratings of PVC cables. IS 1554: Part 1; 1988 : PVC Insulated (Heavy duty) Electric Cables; Part 1 for working voltages up to and including 1100 Volts. IS 1554: Part 2; 1988 : PVC Insulated (Heavy duty) Electric Cables; Part 1 for working voltages up to and including 3.3 kV to 11 kV. IS 10810: Part 63; 1993 : Method for Test of cables, Part 63 Smoke density of electric cables under fire condition.

3. Scope: (Armored cables) Specification No. (CB-LT/AL, CB-LT/CU, CB-HT) Providing armored cable of specified voltage level, size & specified conducting material (Aluminum / Copper) as per Table no. 7/3 including required material, hardware's for erection and erecting on wall, ceiling, RCC slab or drawing the same through pole, pipe, laying in provided conduit, trench, ducts, trays as per approved method of construction including glands, lugs, etc.

4. Material: Cables: Cables shall be PVC for LT/MP and XLPE for HT as per Table no. 7/3 and of required construction, color, shall carry ISI mark, IS No, manufacturer's name, size, duly embossed / screen printed at every meter and having the total count of progressive length in meter at each mark.

Earth wire: Galvanized Iron (G I) wire of appropriate gauge as per Table No 7/1.

Glands: As per specification (CB-GL)

Lugs: As per specification (CB-CL/AL, CB CL/CU)

Saddles: Saddles fabricated from GI sheet of required gauge and size depending on dia of cable either galvanized or painted with superior quality enamel black paint with necessary shearing mechanical strength, semi circular shaped with extended piece having suitable holes for fixing.

Page 94 Tender ID - 30832

G I Strip: 22 g x 25 mm width G I Strip.

Clamps: MS Clamps fabricated of required length and shape, having the size of 3/6 mm thick mild steel having 25/50 mm width (as per size of cable), rounded ends with wooden / resin cast grip for holding the cable.

Identification tags: For identifying root, connection position GI strip with identification mark / name embossed / painted with arrangement to tie should be fix on cable or arrangement of ferrules to be done. Hardware: Sheet Metal (SM) screws of required sizes, plugs / wooden gutties, etc

#### 4. Method of Construction:

General:

a) Irrespective of method of construction the cable ends shall be terminated with appropriate size & type of glands with lugs duly crimped, as directed by Site Engineer.

b) Wherever the cable has to be bent, the turning radius shall be as mentioned in Table No 7/2.

Grouping of cables shall be done with adequate distance between cables as mentioned in IS so as to minimize de-rating. Cables shall be tagged/ferruled with identification name / mark at the point from where distribution starts and at ends. Bare earth wire of appropriate size as per Table no. 7/1 shall run along with the cable. Earth wire running with the cable shall be terminated at the earth terminal nearest to cable termination.

5.1 Erection of Cable on Surface: Erection shall be done as per the routes and layout finalized, in perfect level and in plumb. Before fixing the cable shall be straightened as far as possible for good aesthetics look, continuous bare GI earth wire of required gauge as per Table No 7/1 shall be run. Cable with G I wire shall be fixed by saddles firmly clipped on cable and shall be fixed to wall with minimum 50 x 8 mm SM screws with plugs/wooden gutties, etc. (Distance between two supports / saddles shall be maximum 450 mm). Wooden gutties shall be used wherever required (Especially for stone wall). The entries made in wall, floor slab, etc for laying the cable shall be made good by filling and finishing with plastering the same.

5.2 Erection of Cable on Trusses: Cable along with bare GI earth wire, while erecting on trusses, shall be firmly clamped by wrapping GI strip of 22 g, 25 mm width of required length fixed to truss with nuts and bolts.

5.3 Erection of Cable on Pole: Cable along with bare GI earth wire, while erecting on pole, shall be firmly clipped by suitable wooden / epoxy resin cast grips, clamped with 25 x 3 mm or 50x6 mm MS strip of required length and fixed to pole with nuts and bolts.

5.4 Laying of Cable in provided Trench/Pole: While laying Cable along with bare GI earth wire, utmost care shall be taken to prevent damage to the insulation of the cable and to the open end. Cable shall be brought out from trench vertically straight (minimum 1.0 meter above G L). Care



shall be taken to inspect the trench so that depth of cable shall not be less than as shown in Table No 7/4. Suitable size of cable loops shall be provided near termination point at adequate depth.

Page 95 Tender ID - 30832

5.5 Erecting cable in constructed Trench / duct: Erection of cable/s in constructed trench / duct, shall be as per guide lines of IS 1255.

5.6 Erection of cable/s on trays: Cable/s shall be tied with PVC tags on GI trays. At bending point care shall be taken so that sharp edges of sheet will not damage insulation of cable.

Mode of Measurement:- Executed quantity shall be measured on the basis of running meter & paid accordingly.

**31 Supplying, erecting & terminating FR XLPE insulated, galvanised steel formed wire armoured (strip) cable, 1100 V 3½ core 70 sq. mm. aluminium conductor complete erected with glands & lugs on wall/ trusses/pole or laid in provided trench/ pipe as per specification no. CB-LT/AL**

**Specification:**

Specification For Armored Cables (HT & LT)

1. General All material shall conform to relevant standard as per BIS and shall carry ISI mark. If any particular category of material for which ISI mark is not available in market, it shall be as included in approved list. Work shall be carried out as per the method of construction specified by BIS. If there is no reference for particular method of construction in IS, such work shall be carried out as per the approved method of construction specified in chapter 16 of P.W. Dept. Handbook. Material and Work not qualifying to any provision mentioned above shall be to the satisfaction of the Engineer in Charge.
2. Cables: (Armored) The following list records those Indian Standards in force, which are acceptable as good practice, and accepted standard SP 30: 1984 : National Electrical Code SP 7 (Group 4): 2005 : National Building Code IS 1255: 1983 Code of practice of Installation & Maintenance of armoured cables up to 33 kV. IS 3961: Part 2: 1967 : Recommended current ratings of PVC cables. IS 1554: Part 1; 1988 : PVC Insulated (Heavy duty) Electric Cables; Part 1 for working voltages up to and including 1100 Volts. IS 1554: Part 2; 1988 : PVC Insulated (Heavy duty) Electric Cables; Part 1 for working voltages up to and including 3.3 kV to 11 kV. IS 10810: Part 63; 1993 : Method for Test of cables, Part 63 Smoke density of electric cables under fire condition.
3. Scope: (Armored cables) Specification No. (CB-LT/AL, CB-LT/CU, CB-HT) Providing armored cable of specified voltage level, size & specified conducting material (Aluminum / Copper) as per Table no. 7/3 including required material, hardware's for erection and erecting on wall, ceiling, RCC slab or drawing the same through pole, pipe, laying in provided conduit, trench, ducts, trays as per approved method of construction including glands, lugs, etc.
4. Material: Cables: Cables shall be PVC for LT/MP and XLPE for HT as per Table no. 7/3 and of required construction, color, shall carry ISI mark, IS No, manufacturer's name, size, duly embossed / screen printed at every meter and having the total count of progressive length in meter at each mark.

Earth wire: Galvanized Iron (G I) wire of appropriate gauge as per Table No 7/1.

Glands: As per specification (CB-GL)

Lugs: As per specification (CB-CL/AL, CB CL/CU)

Saddles: Saddles fabricated from GI sheet of required gauge and size depending on dia of cable

either galvanized or painted with superior quality enamel black paint with necessary shearing mechanical strength, semi circular shaped with extended piece having suitable holes for fixing.

Page 94 Tender ID - 30832

G I Strip: 22 g x 25 mm width G I Strip.

Clamps: MS Clamps fabricated of required length and shape, having the size of 3/6 mm thick mild steel having 25/50 mm width (as per size of cable), rounded ends with wooden / resin cast grip for holding the cable.

Identification tags: For identifying root, connection position GI strip with identification mark / name embossed / painted with arrangement to tie should be fix on cable or arrangement of ferrules to be done. Hardware: Sheet Metal (SM) screws of required sizes, plugs / wooden gutties, etc

#### 4. Method of Construction:

General:

a) Irrespective of method of construction the cable ends shall be terminated with appropriate size & type of glands with lugs duly crimped, as directed by Site Engineer.

b) Wherever the cable has to be bent, the turning radius shall be as mentioned in Table No 7/2.

Grouping of cables shall be done with adequate distance between cables as mentioned in IS so as to minimize de-rating. Cables shall be tagged/ferruled with identification name / mark at the point from where distribution starts and at ends. Bare earth wire of appropriate size as per Table no. 7/1 shall run along with the cable. Earth wire running with the cable shall be terminated at the earth terminal nearest to cable termination.

5.1 Erection of Cable on Surface: Erection shall be done as per the routes and layout finalized, in perfect level and in plumb. Before fixing the cable shall be straightened as far as possible for good aesthetics look, continuous bare GI earth wire of required gauge as per Table No 7/1 shall be run. Cable with G I wire shall be fixed by saddles firmly clipped on cable and shall be fixed to wall with minimum 50 x 8 mm SM screws with plugs/wooden gutties, etc. (Distance between two supports / saddles shall be maximum 450 mm). Wooden gutties shall be used wherever required (Especially for stone wall). The entries made in wall, floor slab, etc for laying the cable shall be made good by filling and finishing with plastering the same.

5.2 Erection of Cable on Trusses: Cable along with bare GI earth wire, while erecting on trusses, shall be firmly clamped by wrapping GI strip of 22 g, 25 mm width of required length fixed to truss with nuts and bolts.

5.3 Erection of Cable on Pole: Cable along with bare GI earth wire, while erecting on pole, shall be firmly clipped by suitable wooden / epoxy resin cast grips, clamped with 25 x 3 mm or 50x6 mm MS strip of required length and fixed to pole with nuts and bolts.

5.4 Laying of Cable in provided Trench/Pole: While laying Cable along with bare GI earth wire, utmost care shall be taken to prevent damage to the insulation of the cable and to the open end. Cable shall be brought out from trench vertically straight (minimum 1.0 meter above G L). Care shall be taken to inspect the trench so that depth of cable shall not be less than as shown in Table No 7/4. Suitable size of cable loops shall be provided near termination point at adequate depth.

Page 95 Tender ID - 30832

5.5 Erecting cable in constructed Trench / duct: Erection of cable/s in constructed trench / duct, shall be as per guide lines of IS 1255.

5.6 Erection of cable/s on trays: Cable/s shall be tied with PVC tags on GI trays. At bending point care shall be taken so that sharp edges of sheet will not damage insulation of cable.

Mode of Measurement:- Executed quantity shall be measured on the basis of running meter & paid accordingly.

## **32 Accessories**

**32.1 Supplying and erecting G.I. stay set for poles, including loop insulators at inaccessible height with anchor plate 300x300x6 mm., straining screws, G.I. stay wire 7/8 SWG, G.I. stay rod 20mmx1.8m length and pole clamps duly erected in provided cement concrete foundation complete.**

**Specification:**

### **32.1 Specification**

Under this item the agency will have to provide & erect GI stay set for poles along with CC Foundation, including loop insulators at inaccessible height complete with anchor plate 150 x 150 x 6 mm straining screws GI stay wire 7/8 SWG GI stay rod 20 mm x 1.8 mtr length and pole clamps duly erected in provided cement concrete foundation.

Mode of Measurement :- The item will be measured on Nos basis and will be paid accordingly

**33 Providing Erecting & commissioning DTC Metering With Box single Core LT XLPE Cable as required for 100 KVA DP**

**Specification:**

Under this item, agency has to Provide Erect & commission DTC Metering With Box single Core LT XLPE Cable as required for 100 KVA DP The work is to be carried as per MSEDCL norms under supervision of MSEDCL Representative.

Mode of Measurement : The item shall be measured on per no. basis & will be paid accordingly

**34 Sub Estimate - Supplying, erecting, testing and commissioning of diesel generating set with alternator of 100 kVA at WTP and Jackwell in Pusad Industrial Area**

**34.1 Supplying, erecting, testing and commissioning of diesel generating set with alternator of 100 kVA output continuous rating, 3 phase, 415 V, 50 Hz, 0.8 p.f., A.C. supply, a totally enclosed air cooled / liquid cooled multi-cylinder diesel engine developing suitable BHP at 1500 rpm with 10% overload for 1 hour in 12 hours, along with standard accessories, self-excited, self-regulated, screen protected alternator with static excitation system running at 1500 RPM as per IS 4722-2001 with voltage regulation +/- 5 %, with performance class G2/G3 and maximum fuel consumption 17.4 ltr/hr @75% loading. Both the engine and alternator direct coupled on a common fabricated steel base frame and mounted on anti-vibrating pads, with standard control panel comprising meters, switchgears, indicators connected with suitable wires/cables, the complete set enclosed in composite acoustic enclosure as fully assembled integral unit made of 16 SWG CRCA sheet, sound absorbing material to restrict sound level up to 75 dB at 1.0 m, provided with first filling of oil, diesel not less than 230 ltr etc., on provided M20 grade CC foundation as per specification no. GEN-DG**

**Specification:**

### **34.1 Specification**

Supplying, erecting, testing and commissioning of Diesel Generating Set having 100 kVA continuous power output rating, suitable for 3 Phase, 415 Volt, 50 Hz, AC supply system with power factor 0.8 complete as per Specification No. GEN-DG.

The DG Set shall consist of a totally enclosed air cooled/liquid cooled multi-cylinder diesel engine developing suitable BHP at 1500 RPM and capable of delivering 10% overload capacity for one

hour in every 12 hours continuous operation. The engine shall conform to relevant IS standards and latest CPCB emission norms applicable at the time of supply.

The engine shall be complete with standard accessories such as electronic/mechanical governor, fuel injection system, fuel filters, lube oil filters, air filters, radiator with cooling fan, residential silencer, exhaust piping, battery charging alternator, electric starting arrangement with batteries, anti-vibration mountings and all accessories necessary for efficient and trouble-free operation.

The alternator shall be self-excited, self-regulated, screen protected type conforming to IS 4722-2001, directly coupled to the engine and suitable for operation at 1500 RPM. The alternator shall have static excitation system with voltage regulation within  $\pm 5\%$  under varying load conditions and shall be of performance class G2/G3. The insulation class shall be suitable for continuous operation under tropical climatic conditions.

The maximum fuel consumption of DG set shall not exceed 17.4 litres per hour at 75% loading condition. The contractor shall submit manufacturer's fuel consumption test certificate and performance data for approval.

The engine and alternator shall be mounted on a common heavy duty fabricated steel base frame with suitable anti-vibration pads/mountings to minimize vibration and noise transmission. The base frame shall include integral fuel tank of minimum 230 litres capacity complete with fuel level indicator, drain valve, inlet and outlet connections.

The DG Set shall be provided with standard AMF/manual control panel fabricated from CRCA sheet steel complete with necessary switchgears, protection devices, meters, indications and controls. The control panel shall include voltmeter, ammeter, frequency meter, energy meter, selector switches, indicating lamps, MCCB/ACB, emergency stop push button, engine protection system and all necessary interconnections with suitable copper wiring/cables.

The complete DG Set shall be enclosed in factory fabricated composite acoustic enclosure made from minimum 16 SWG CRCA sheet steel treated against corrosion and weather effects. The enclosure shall be lined internally with sound absorbing/fire retardant insulating material to restrict sound level within 75 dB at 1 metre distance under free field conditions as per CPCB norms.

The acoustic enclosure shall be provided with suitable doors, locking arrangements, ventilation louvers, cable entry arrangement, lifting hooks, maintenance access and exhaust system complete. Arrangement for proper cooling air circulation and hot air discharge shall be provided.

The item includes first filling of lubricating oil, coolant and diesel fuel not less than 230 litres, batteries with leads, earthing terminals, exhaust piping with insulation, foundation bolts, flexible connections and all accessories required for complete installation.

The DG Set shall be erected on provided M20 grade cement concrete foundation with proper alignment, grouting and tightening of foundation bolts complete. The scope also includes testing, commissioning, load trial, synchronization checks wherever required and submission of test certificates, operation manuals and warranty documents.

The contractor shall carry out all necessary wiring, cable connections, earthing, safety arrangements and statutory compliance as per IE Rules, CPCB norms and relevant IS specifications complete.

The work shall be completed in all respects and handed over in satisfactory working condition as directed by Engineer-in-Charge.

Mode of Measurement: - The Item will be measured per Nos. basis and will be paid accordingly

### **35 Auto Mains Failure Panels (AMF Panels) (GEN-AMF/SYNC)**

**35.1 Supplying, erecting, testing and commissioning of microprocessor based AMF panel suitable for diesel generating set of above 82.5 kVA upto 100 kVA capacity 3 phase, 415 V, 50 Hz, A.C. supply with all standard features, safeties etc as per specification no. GEN-AMF.**

**Specification:**

#### **35.1 Specification**

Supplying, erecting, testing and commissioning of microprocessor based Automatic Mains Failure (AMF) Panel suitable for Diesel Generating Set above 82.5 kVA and up to 100 kVA capacity operating on 3 Phase, 415 Volt, 50 Hz AC supply complete as per Specification No. GEN-AMF.

The AMF panel shall be fabricated from CRCA sheet steel of minimum 14/16 SWG thickness, dust and vermin proof, floor/wall mounted, powder coated after suitable surface treatment and suitable for indoor/outdoor installation as directed by Engineer-in-Charge. The panel shall have adequate space for incoming and outgoing cable termination, ventilation and maintenance access.

The panel shall be microprocessor based fully automatic type designed for automatic starting and stopping of DG set during mains failure and restoration of normal power supply. The AMF system shall continuously monitor mains supply parameters and initiate automatic transfer of load to DG set upon failure of mains supply and automatic re-transfer upon restoration of mains power after preset time delay.

The panel shall be suitable for operation with 3 Phase, 415 Volt, 50 Hz AC supply system and compatible with DG set of above 82.5 kVA up to 100 kVA capacity.

The AMF panel shall consist of suitable rated MCCB/ACB/contactors arrangement for mains and DG incomers with electrical and mechanical interlocking to prevent simultaneous closing of mains and DG supply. The switching arrangement shall be suitable for safe changeover operation under full load conditions.

The panel shall be provided with microprocessor based AMF controller having automatic/manual test modes, auto start-stop facility, mains sensing, engine monitoring, fault annunciation and protection functions. Necessary timers for start delay, transfer delay, cool down delay and

restoration delay shall be incorporated.

The panel shall include digital/electronic metering for display of system parameters such as:

- \* Line voltage and phase voltage
- \* Load current in all phases
- \* Frequency
- \* Power factor
- \* kW/kVA indications
- \* DG running hours
- \* Battery voltage and engine status indications

The panel shall be provided with necessary protections including:

- \* Overload protection
- \* Short circuit protection
- \* Single phasing prevention
- \* Under voltage and over voltage protection
- \* Over frequency and under frequency protection
- \* Reverse power protection wherever applicable
- \* Engine low lube oil pressure trip
- \* High engine temperature trip
- \* Battery charger failure indication
- \* Engine over speed protection
- \* Fail to start protection

The AMF panel shall have LED indication lamps for mains ON, DG ON, load on mains, load on DG, fault conditions and control status. Necessary selector switches, push buttons, emergency stop switch and audible alarm with acknowledge/reset facility shall be provided.

The panel shall be complete with copper busbars of suitable rating, properly colour coded and insulated with heat shrink sleeves. All internal wiring shall be carried out with FRLS copper wires ferruled at both ends and neatly dressed.

The panel shall include automatic battery charger suitable for DG starting batteries complete with charging indication and protection arrangement.

The item includes supply and fixing of cable glands, lugs, control wiring, earthing terminals, danger plates, rubber mat, hardware and all accessories required for satisfactory installation and operation.

The panel shall be tested at manufacturer's works and at site for insulation resistance, operational sequence, automatic changeover function and protection performance. Necessary test certificates and operation manuals shall be submitted to Engineer-in-Charge.

The complete work shall be carried out as per relevant IS specifications, IE Rules, safety

standards and directions of Engineer-in-Charge complete.

Mode of Measurement: - The Item will be measured per Number basis and will be paid accordingly

**36 Supplying, erecting & terminating FR XLPE insulated, galvanised steel formed wire armoured (strip) cable, 1100 V 3½ core 150 sq. mm. aluminium conductor complete erected with glands & lugs on wall/ trusses/pole or laid in provided trench/ pipe as per specification no. CB-LT/AL**

**Specification:**

Specification For Armored Cables (HT & LT)

1. General All material shall conform to relevant standard as per BIS and shall carry ISI mark. If any particular category of material for which ISI mark is not available in market, it shall be as included in approved list. Work shall be carried out as per the method of construction specified by BIS. If there is no reference for particular method of construction in IS, such work shall be carried out as per the approved method of construction specified in chapter 16 of P.W. Dept. Handbook. Material and Work not qualifying to any provision mentioned above shall be to the satisfaction of the Engineer in Charge.

2. Cables: (Armored) The following list records those Indian Standards in force, which are acceptable as good practice, and accepted standard SP 30: 1984 : National Electrical Code SP 7 (Group 4): 2005 : National Building Code IS 1255: 1983 Code of practice of Installation & Maintenance of armoured cables up to 33 kV. IS 3961: Part 2: 1967 : Recommended current ratings of PVC cables. IS 1554: Part 1; 1988 : PVC Insulated (Heavy duty) Electric Cables; Part 1 for working voltages up to and including 1100 Volts. IS 1554: Part 2; 1988 : PVC Insulated (Heavy duty) Electric Cables; Part 1 for working voltages up to and including 3.3 kV to 11 kV. IS 10810: Part 63; 1993 : Method for Test of cables, Part 63 Smoke density of electric cables under fire condition.

3. Scope: (Armored cables) Specification No. (CB-LT/AL, CB-LT/CU, CB-HT) Providing armored cable of specified voltage level, size & specified conducting material (Aluminum / Copper) as per Table no. 7/3 including required material, hardware's for erection and erecting on wall, ceiling, RCC slab or drawing the same through pole, pipe, laying in provided conduit, trench, ducts, trays as per approved method of construction including glands, lugs, etc.

4. Material: Cables: Cables shall be PVC for LT/MP and XLPE for HT as per Table no. 7/3 and of required construction, color, shall carry ISI mark, IS No, manufacturer's name, size, duly embossed / screen printed at every meter and having the total count of progressive length in meter at each mark.

Earth wire: Galvanized Iron (G I) wire of appropriate gauge as per Table No 7/1.

Glands: As per specification (CB-GL)

Lugs: As per specification (CB-CL/AL, CB CL/CU)

Saddles: Saddles fabricated from GI sheet of required gauge and size depending on dia of cable either galvanized or painted with superior quality enamel black paint with necessary shearing mechanical strength, semi circular shaped with extended piece having suitable holes for fixing.

Page 94 Tender ID - 30832

G I Strip: 22 g x 25 mm width G I Strip.

Clamps: MS Clamps fabricated of required length and shape, having the size of 3/6 mm thick mild steel having 25/50 mm width (as per size of cable), rounded ends with wooden / resin cast grip for

holding the cable.

Identification tags: For identifying root, connection position GI strip with identification mark / name embossed / painted with arrangement to tie should be fix on cable or arrangement of ferrules to be done. Hardware: Sheet Metal (SM) screws of required sizes, plugs / wooden gutties, etc

#### 4. Method of Construction:

##### General:

a) Irrespective of method of construction the cable ends shall be terminated with appropriate size & type of glands with lugs duly crimped, as directed by Site Engineer.

b) Wherever the cable has to be bent, the turning radius shall be as mentioned in Table No 7/2.

Grouping of cables shall be done with adequate distance between cables as mentioned in IS so as to minimize de-rating. Cables shall be tagged/ferruled with identification name / mark at the point from where distribution starts and at ends. Bare earth wire of appropriate size as per Table no. 7/1 shall run along with the cable. Earth wire running with the cable shall be terminated at the earth terminal nearest to cable termination.

5.1 Erection of Cable on Surface: Erection shall be done as per the routes and layout finalized, in perfect level and in plumb. Before fixing the cable shall be straightened as far as possible for good aesthetics look, continuous bare GI earth wire of required gauge as per Table No 7/1 shall be run. Cable with G I wire shall be fixed by saddles firmly clipped on cable and shall be fixed to wall with minimum 50 x 8 mm SM screws with plugs/wooden gutties, etc. (Distance between two supports / saddles shall be maximum 450 mm). Wooden gutties shall be used wherever required (Especially for stone wall). The entries made in wall, floor slab, etc for laying the cable shall be made good by filling and finishing with plastering the same.

5.2 Erection of Cable on Trusses: Cable along with bare GI earth wire, while erecting on trusses, shall be firmly clamped by wrapping GI strip of 22 g, 25 mm width of required length fixed to truss with nuts and bolts.

5.3 Erection of Cable on Pole: Cable along with bare GI earth wire, while erecting on pole, shall be firmly clipped by suitable wooden / epoxy resin cast grips, clamped with 25 x 3 mm or 50x6 mm MS strip of required length and fixed to pole with nuts and bolts.

5.4 Laying of Cable in provided Trench/Pole: While laying Cable along with bare GI earth wire, utmost care shall be taken to prevent damage to the insulation of the cable and to the open end. Cable shall be brought out from trench vertically straight (minimum 1.0 meter above G L). Care shall be taken to inspect the trench so that depth of cable shall not be less than as shown in Table No 7/4. Suitable size of cable loops shall be provided near termination point at adequate depth.

Page 95 Tender ID - 30832

5.5 Erecting cable in constructed Trench / duct: Erection of cable/s in constructed trench / duct, shall be as per guide lines of IS 1255.

5.6 Erection of cable/s on trays: Cable/s shall be tied with PVC tags on GI trays. At bending point care shall be taken so that sharp edges of sheet will not damage insulation of cable.

Mode of Measurement:- Executed quantity shall be measured on the basis of running meter & paid accordingly.

**37 Supplying and laying (including excavation of suitable width & depth up to 90 cm) 160 mm outside dia, double wall corrugated pipes (DWC) of HDPE for enclosing cable below ground/road surface, complete.**

##### **Specification:**

Under this item, agency have to supply & lay (including excavation) 160 mm outside dia, double wall



corrugated pipes (DWC) of polyethylene ( Confirming to IS 14930 II ) with necessary sockets/coupling, tee of same material at required depth up to 90 cms below road / ground surface, for enclosing provided cable & necessary back filling with light ramming to make the road / ground surface as it was ( except bitumen carpet ). The item includes excavation in all types of surfaces of road like Asphalted /concrete etc. The agency have to provide machinery for excavation wherever required. The agency will have to coordinate with plot holders while carrying out work in front of main gates of the companies so as to execute the work smoothly. The safety rules & precautions indicators shall be followed while execution.

Mode of Measurement : This Item will be measured on Meter basis and paid accordingly

**38 Supplying, installing and testing earthing with galvanised iron earth plate size 60 x 60 x 0.6 cm complete with all accessories of GI materials & recording the results as per specification No. EA-EP**

**Specification:**

Supplying, installing, testing and commissioning of earthing with Galvanised Iron earth plate of size 60 cm x 60 cm x 0.6 cm complete with all GI accessories as per Specification No. EA-EP.

The earthing shall be provided using hot dip galvanised iron plate electrode of approved quality having dimensions 60 cm x 60 cm x 0.6 cm conforming to relevant IS specifications. The earth plate shall be buried in ground with its face vertical at a depth not less than 3.0 metre below finished ground level or as directed by Engineer-in-Charge.

The earth electrode shall be installed in excavated pit of suitable dimensions with alternate layers of charcoal/coke and common salt around the plate for effective earth resistance. The earth pit shall be properly watered and compacted after installation.

The GI earth plate shall be connected with suitable size galvanised iron earth strip/wire through GI bolts, nuts, washers and check nuts complete. The connection shall be mechanically strong and electrically continuous.

The earthing arrangement shall include medium class GI watering pipe of suitable diameter with funnel and wire mesh arrangement for watering the earth pit. Necessary masonry chamber of brickwork with CI/MS hinged cover marked "EARTH" shall be provided at ground level for inspection and maintenance purpose.

The item includes excavation in all types of soil, refilling, watering, compaction, disposal of surplus earth, supply of charcoal, salt, GI hardware, protection pipe for earth lead, clamps, testing and all labour and materials required for complete installation.

The contractor shall test the earth resistance after completion using approved earth tester and record the results. The earth resistance value shall be maintained within permissible limits as specified in relevant IS standards or as directed by Engineer-in-Charge.

The complete work shall be executed as per IS 3043, IE Rules, Specification No. EA-EP and directions of Engineer-in-Charge complete.

Mode of Measurement:- Executed quantity shall be measured on the basis of Number & paid accordingly

**39 Making cement concrete foundation in 1:3:6 cement concrete, (20 to 25) mm. stone metal duly plastered with necessary curing for complete. (pole muffing or any other purpose).**

**Specification:**

Specification:- 1.1 General : The item pertains to providing and laying in position Plain Cement Concrete (PCC) of specified proportion. The work includes providing all material, mixing, compacting, curing, shuttering, dewatering etc. complete up to lift of  $\pm 5$  m. 1.2 Material: 1. Cement : Ordinary Portland Cement (OPC) as specified at item Gen/C/0.2.1. 2. Fine Aggregate (Sand) : specifications shall conform to item Gen/C/0.2.2. 3. Coarse Aggregate : specifications shall conform to item Gen/C/0.2.3. Grading and maximum size of coarse aggregate shall be as specified in the drawing. Normally the maximum size should not be more than 40 mm or 25 % of the minimum dimension of the member, whichever is less. 4. Water : specifications shall conform to item Gen/C/0.2.4. 1.3 Mix Proportion and Mixing : The mix proportion as specified on the drawing, separately for each component shall be provided. For detailed specifications refer to item No.Gen/C/0.5. For mixing without mechanical mixer, prior permission from the Engineer-in-charge shall be obtained. Specifications for mixing shall conform to item Gen/C/0.7. 1.4 Formwork and Scaffolding : Formwork shall be provided for giving the desired shape and sizes for the PCC as per the drawings. The specifications shall conform to item Gen/C/0.19.7. The stripping time also shall be as specified in the item. The scaffolding shall be normally provided of steel tubes. The specifications for scaffolding also shall conform to item Gen/C/0.19.8. 1.5 Transportation, Placing and Compaction : Specifications shall conform to item Gen/C/0.8. 1.6 Field Tests : The appropriate field tests as directed by the Engineer-in-charge shall be carried out as explained in item Gen/C/0.15. 1.7 Inspection & Testing of Structure : As per the contract conditions inspection & testing of a structure shall be carried out in accordance with item Gen/C/0.16. 1.8 Finishing of Concrete : The finishing of concrete surface shall be as per item Gen/C/0.17. 1.9 Special Features : Special requirements such as Architectural shapes/ finishes, Expansion joints, Construction joints, Water stops, grouting, etc. shall be provided as shown on drawing/s and as directed by Engineer in Charge. For specifications for these the appropriate clauses of item Gen/C/0 shall be referred. 1.10 Curing : As per item Gen/C/0.14. 1.11 Item to Include : This item for providing Plain Cement Concrete (PCC) with specified mix proportion at specified locations with initial lift of + 5 m above or below ground level includes all ingredients of concrete i.e. water, cement, fine and coarse aggregates, all transportation, dewatering, tools and plants, all taxes, royalties, labour, formwork, testing, curing etc. complete.

Mode of Measurement and Payment :- The measurements of the concrete laid shall be taken on volumetric basis in cum. The openings shall be deducted. The unit rate of concrete per cum of specified proportion includes all the items as explained in Gen/C/0.25.

**40 Providing, erecting, commissioning and testing of Vertical Turbine water lubricated Pump capable of discharge 125 M3/Hr of water at duty point head of 33 meter with head range between 31.5 mtr. to 34.5 mtr. with 4 mtrs. long 150 mm x 30 mm size Flanged Column Assembly including BA & Strainer in 1.5 mtr. Section, including CF8M Impeller & Neck Ring, SS410 Shafts, Bowl Assembly, CI/MS Discharge Head, SS Strainer & SS Fasteners etc. complete.**

**Specification:**

Providing, erecting, commissioning and testing of Vertical Turbine Water Lubricated Pumping Unit capable of delivering discharge of 125 Cubic Metre per Hour at duty head of 33 metre with operating head range between 31.5 metre to 34.5 metre complete with pump assembly, column

pipe assembly, discharge head and all accessories required for satisfactory operation.

The vertical turbine pump shall be of water lubricated type suitable for continuous duty operation for pumping clear/raw water applications. The pump shall be designed for smooth and vibration free operation at specified duty conditions with high hydraulic efficiency.

The pump bowl assembly shall be manufactured from close grained cast iron of approved grade with accurately machined internal surfaces. The impeller shall be of CF8M grade stainless steel dynamically balanced and securely keyed/fixed to shaft. Neck rings shall also be of CF8M stainless steel suitable for wear resistance and efficient pump performance.

The pump shaft shall be manufactured from SS-410 grade stainless steel of adequate size and strength suitable for continuous operation. Shaft couplings shall be accurately machined and aligned to ensure smooth transmission of torque.

The pump shall be complete with 150 mm diameter x 30 mm thick flanged column assembly having total length of 4 metre in suitable sections. Column pipes shall be fabricated from heavy duty MS/CI material with machined flanges, suitable gaskets, nuts, bolts and fasteners complete. The pump assembly shall include bowl assembly, bell mouth/BA and suction strainer arrangement in 1.5 metre section suitable to prevent entry of foreign particles and debris. The strainer shall be manufactured from stainless steel with adequate open area for unrestricted flow.

The discharge head shall be of robust CI/MS fabricated construction designed to withstand hydraulic pressure and operational loads. The discharge head shall be complete with motor mounting arrangement, stuffing box/mechanical sealing arrangement wherever applicable and suitable discharge flange connection.

All fasteners exposed to water shall be of stainless steel material to prevent corrosion and ensure long service life. Necessary sleeves, bearings, spiders and water lubricated bearing arrangement shall be provided for smooth operation of rotating parts.

The pump shall be suitable for coupling with appropriate electric motor and shall operate satisfactorily at specified speed and duty conditions. The contractor shall ensure proper alignment of pump and motor during erection.

The scope includes supply, erection, lowering, installation, alignment, foundation fixing, connection with delivery pipeline, tightening of bolts, provision of gaskets, supports and all accessories necessary for complete installation.

The item also includes testing and commissioning of pumping unit at site for discharge, head, vibration, noise level and satisfactory performance under operating conditions. Necessary performance test certificates and material test certificates shall be submitted for approval.

The complete work shall be carried out as per relevant IS specifications, manufacturer standards and directions of Engineer-in-Charge complete.

Mode of Measurement:- Executed quantity shall be measured on the basis of Number & paid accordingly

**41 Providing, erecting, commissioning & testing of 18.5 KW / 25 HP, 4 Pole, Vertical Hollow Shaft induction motor, TEFC, Efficiency Class : IE 3, Class "F" insulation, IP 55 protection (IS:4691) suitable to operate on 3 phase 440 volts 50 Hz, A.C. supply with 3 Nos. PTC Thermistors etc. complete & confirming to IS:12615.**

**Specification:**

Providing, erecting, commissioning and testing of 18.5 kW / 25 HP Vertical Hollow Shaft Induction Motor suitable for driving vertical turbine pump, complete with all accessories and conforming to relevant IS specifications.

The motor shall be 3 Phase, 440 Volt, 50 Hz AC supply operated, squirrel cage induction type, 4

pole construction suitable for continuous duty operation. The motor shall be of Vertical Hollow Shaft (VHS) type specifically designed for coupling with vertical turbine pump assemblies. The motor enclosure shall be Totally Enclosed Fan Cooled (TEFC) type with degree of protection IP-55 conforming to IS 4691 and suitable for outdoor installation under tropical climatic conditions. The motor shall have Class "F" insulation with permissible temperature rise as per relevant IS standards.

The motor shall conform to IS 12615 and shall be of Energy Efficient IE-3 class with high operating efficiency and low power losses. The motor shall be designed for continuous operation at rated load without excessive temperature rise, vibration or noise.

The motor shall be suitable for operation at rated voltage variation and frequency fluctuations as permitted under Indian Standards. The starting torque, pull-out torque and overload capacity shall be suitable for vertical turbine pump application.

The stator and rotor cores shall be manufactured from high quality low loss electrical steel laminations. The windings shall be of electrolytic grade copper conductors insulated with high quality insulating material suitable for Class "F" insulation system.

The motor shall be provided with heavy duty thrust bearing arrangement capable of taking hydraulic and mechanical thrust loads imposed by the vertical turbine pump. Bearings shall be grease lubricated/ oil lubricated as per manufacturer design and suitable for continuous service. The motor shall be provided with 3 Nos. embedded PTC thermistors in winding for temperature monitoring and thermal protection against overheating. Necessary terminal arrangement shall be provided for connection to protection relay/control panel.

The shaft shall be accurately machined and dynamically balanced to ensure vibration free operation. The hollow shaft arrangement shall be suitable for easy coupling with pump shaft and shall include necessary coupling hardware.

The motor shall be provided with terminal box of adequate size suitable for cable termination with cable glands, earthing terminals and identification markings. The terminal box shall be weatherproof and dustproof.

The scope includes supply, erection, alignment, coupling with pump, foundation fixing, connection with starter/control panel, testing and commissioning complete in all respects.

The motor shall be tested at manufacturer works for insulation resistance, high voltage test, no-load test, temperature rise and performance parameters as per relevant IS standards. Test certificates shall be submitted for approval.

The complete installation shall be tested and commissioned at site for smooth operation, current consumption, vibration, temperature rise and satisfactory performance under load conditions.

The work shall be executed as per IS 12615, IS 4691, IE Rules, relevant Indian Standards and directions of Engineer-in-Charge complete.

Mode of Measurement:- Executed quantity shall be measured on the basis of Number & paid accordingly

**42 L. T. Control Panel board, fabricated from 14 G sheet steel, totally dust & vermin proof, powder coated, suitable for 2 Nos. ( 1 No. Working & 1 Nos. Stand by) 25 HP Pumpset consisting of : Incoming Feeder : 1 No. 200 Amp. (Release Range 125 - 160 Amp.) 35 KA, 4 Pole, Moulded case circuit breaker with under voltage release & Earth fault / Earth Leakage Relay with CBCT 3 Nos. 160 Amp. HRC fuse link with fuse base. 01 No. Digital Voltmeter 3 Phase, 96 mm X 96 mm, Square 01 No Digital Ammeter 3 Phase, 96 mm X 96 mm, Square with CT'S 1 Set Phase indicating lamps 1 Set Control fuses/MCB 1 No. Digital Power factor Meter 3 Phase , 3 Element 1 No. Phase Sequence Meter with operating Push Button 1 Set**

**200 Amp. Copper Busbars Outgoing Feeder : 2 Nos. For 25 HP Pumpset, each consisting of 1 No. 100 Amps. (Release Range 63 - 80 Amp.) 35 KA 3 pole, Moulded case circuit breaker 3 Nos. 63 A.HRC base with fuse link. 1 No. 25 HP Fully automatic Star Delta Starter with 32 Amp. Power Contactor, Overload Relay, Star Delta Timer, Motor Protection Relay, Digital Ammeter with CT's & Selector Switch etc complete.**01 NO. FEEDER FOR AUTOMATIC POWER FACTOR CONTROL PANEL CONSISTS OF : 1 No Incomer 100 Amps. (Release Range 63 - 80 Amp.) 35 KA 3 pole, Moulded case circuit breaker 3 Nos. 63 Amps HRC base with fuse link. 01 No. Digital Multifunction Meter VAF + PF meter with CT's indicating lamps, 1 No. Microprocessor based power factor controller 5 Nos MCB, 5 Nos Contactors, 5 Set ON/OFF Push buttons, 5 Nos Capacitor ON indication lamp, 2 No Control Contactors, 1 No. Auto/Manual Selector Switch 25 KVAR Capacitor in banks. 1 No. For lighting feeder, consisting of 32 A Switch disconnecter fuse unit with HRC fuses. 1 No. For Spare feeder, consisting of 63 A Switch disconnecter fuse unit with HRC fuses

**Specification:**

Providing, fabricating, supplying, erecting, testing and commissioning of LT Control Panel Board suitable for operation and control of 2 Nos. 25 HP pump sets (1 No. Working + 1 No. Standby) complete with incoming feeder, outgoing feeders, APFC feeder, lighting feeder, spare feeder, busbars, metering, protection and all accessories required for satisfactory operation.

The panel shall be fabricated from minimum 14 Gauge CRCA sheet steel, totally dust proof and vermin proof, floor mounted, compartmentalized type with suitable structural reinforcement. The panel shall be chemically treated, phosphate coated and finished with powder coating of approved shade suitable for indoor installation.

The panel shall be designed for operation on 3 Phase, 415 Volt, 50 Hz AC supply system and shall conform to relevant IS specifications. The panel shall have adequate space for cable termination, ventilation, maintenance and future extension.

The panel shall be complete with front access arrangement, hinged doors, neoprene gaskets, lifting hooks, gland plates, earthing terminals, danger plates and locking arrangement.

**Incoming Feeder:**

The incoming feeder shall consist of:

1 No. 200 Amp, 4 Pole, 35 kA Moulded Case Circuit Breaker having release range 125–160 Amp complete with under voltage release.

Earth Fault/Earth Leakage Relay complete with CBCT for protection against earth leakage faults.

3 Nos. 160 Amp HRC fuse links with suitable fuse bases.

1 No. Digital Voltmeter, 3 Phase, size 96 mm x 96 mm square.

1 No. Digital Ammeter, 3 Phase, size 96 mm x 96 mm square complete with CTs.

1 Set Phase Indicating Lamps with control switches.

1 Set Control MCBs/Fuses for auxiliary circuits.

1 No. Digital Power Factor Meter, 3 Phase, 3 Element type.

1 No. Phase Sequence Meter with operating push button.

1 Set 200 Amp Electrolytic Grade Copper Busbars with colour coded heat shrink insulation and suitable supports.

**Outgoing Feeders for Pump Sets:**

The panel shall have 2 Nos. outgoing feeders suitable for 25 HP pump sets, each feeder consisting of:

1 No. 100 Amp 3 Pole, 35 kA MCCB with release range 63–80 Amp.

3 Nos. 63 Amp HRC fuse links with suitable bases.

1 No. Fully Automatic Star Delta Starter suitable for 25 HP motor complete with:

32 Amp power contactors

Thermal Overload Relay

Star Delta Timer

Motor Protection Relay

Digital Ammeter with CTs

Ammeter Selector Switch

Push buttons and indication lamps

Necessary auxiliary contacts and interlocks

The starter shall provide automatic starting and protection against overload, single phasing, dry running, phase failure, phase reversal and voltage imbalance.

Feeder for Automatic Power Factor Control Panel:

The APFC feeder shall consist of:

1 No. 100 Amp, 3 Pole, 35 kA MCCB with release range 63–80 Amp.

3 Nos. 63 Amp HRC fuse links with suitable fuse bases.

1 No. Digital Multifunction Meter indicating Voltage, Current, Frequency and Power Factor complete with CTs.

1 No. Microprocessor based Automatic Power Factor Controller.

5 Nos. MCBs for control/protection circuits.

5 Nos. Capacitor Duty Contactors.

5 Sets ON/OFF push buttons.

5 Nos. Capacitor ON indication lamps.

2 Nos. Control contactors.

1 No. Auto/Manual Selector Switch.

25 kVAR Capacitor Bank in suitable stages complete with discharge resistors and protection arrangement.

The APFC panel arrangement shall automatically maintain system power factor within permissible limits and improve system efficiency.

Lighting Feeder:

The lighting feeder shall consist of:

1 No. 32 Amp Switch Disconnecter Fuse Unit complete with HRC fuse links and accessories.

Spare Feeder:

The spare feeder shall consist of:

1 No. 63 Amp Switch Disconnecter Fuse Unit complete with HRC fuse links and accessories.

General Construction:

The panel shall have electrolytic grade copper busbars of suitable current rating supported on non-hygroscopic insulated supports with adequate short circuit withstand capacity. Busbars shall be colour coded and properly sleeved.

All internal wiring shall be carried out using FRLS copper wires with proper ferruling, numbering and dressing. Suitable cable alleys, gland plates and terminal blocks shall be provided.

The panel shall be provided with all necessary meters, relays, indication lamps, selector switches, push buttons, cable glands, lugs, earthing terminals and accessories required for complete operation.

The panel shall be factory tested for insulation resistance, continuity, HV test and operational performance as per relevant IS standards. Test certificates shall be submitted for approval.

The item includes transportation, erection, alignment, cable termination, earthing, testing,

commissioning and trial operation complete in all respects.

The complete work shall conform to relevant IS specifications, IE Rules and directions of Engineer-in-Charge complete.

Mode of Measurement:- Executed quantity shall be measured on the basis of Number & paid accordingly

**43 150 mm dia. Glycerin filled Pressure Gauge with Syphon Tube, Syphon Cock etc. Complete.**

**Specification:**

Providing, supplying, erecting, testing and commissioning of 150 mm diameter Glycerin Filled Pressure Gauge complete with syphon tube, syphon cock, mounting accessories and all necessary fittings required for satisfactory operation.

The pressure gauge shall be industrial duty, dial type, glycerin filled suitable for measuring pressure in water/air/steam line applications with vibration resistant construction. The gauge shall have 150 mm nominal dial size with clearly visible calibrated scale and black markings on white background for easy reading.

The pressure gauge shall be of bourdon tube type manufactured from high quality brass/phosphor bronze/stainless steel internals suitable for operating pressure conditions. The casing shall be weatherproof, corrosion resistant and suitable for outdoor/industrial applications.

The gauge shall be glycerin filled to dampen vibration, pulsation and shock during operation and to ensure stable pointer movement and long service life. The accuracy class of the gauge shall conform to relevant IS standards.

The dial range of pressure gauge shall be suitable for intended operating pressure and shall be approved by Engineer-in-Charge before installation. The gauge shall be complete with adjustable pointer and shatterproof glass/acrylic front.

The item shall include suitable brass/stainless steel syphon tube to protect the gauge from direct heat and pressure surges. The syphon shall be properly bent and installed between pressure line and gauge connection.

The gauge assembly shall also include syphon cock/isolation cock of suitable size for regulating pressure flow and isolation during maintenance/testing. The cock shall be of heavy duty construction with leakproof operation.

The item includes all necessary nipples, reducers, sockets, unions, washers, clamps, mounting brackets, Teflon tape, jointing material and accessories required for complete installation.

The gauge shall be installed in proper position for easy visibility and maintenance. Necessary supports and vibration free mounting arrangement shall be provided.

The contractor shall carry out testing and calibration checks after installation to ensure correct pressure indication and leakproof performance.

The complete work shall be carried out as per relevant IS specifications, standard engineering practices and directions of Engineer-in-Charge complete.

Mode of Measurement:- Executed quantity shall be measured on the basis of Nos (Each)& paid accordingly

**44 Providing earthing with galvanized iron earth plate size 60 x 60 x 0.6 cm complete with all material**

**Specification:**

Providing, supplying, installing, testing and commissioning earthing with Galvanized Iron earth plate of size 60 cm x 60 cm x 0.6 cm complete with all required materials, accessories and allied works for effective grounding system.

The earth electrode shall consist of hot dip galvanized iron plate of approved quality conforming to relevant IS specifications. The plate shall be buried vertically in ground at a depth not less than 3.0 metre below finished ground level or as directed by Engineer-in-Charge.

The earth pit shall be excavated to suitable dimensions in all types of soil and the earth plate shall be surrounded on all sides with alternate layers of charcoal/coke and common salt to maintain low earth resistance and improve conductivity.

The earth plate shall be connected with suitable size GI earth strip/wire using GI bolts, nuts, washers and check nuts complete. All joints shall be mechanically and electrically sound.

The earthing arrangement shall include medium class GI watering pipe of suitable diameter complete with funnel, wire mesh and watering arrangement for maintaining moisture around the electrode.

A masonry inspection chamber of brick masonry in cement mortar with CI/MS hinged cover marked "EARTH" shall be provided for easy inspection and maintenance of earthing system.

The item includes excavation, refilling, watering, compaction, disposal of surplus earth, supply of charcoal, salt, GI hardware, protective pipe for earth lead, clamps, jointing materials and all labour, tools and accessories required for complete installation.

The contractor shall test the earth resistance after completion using approved earth tester and record the readings. The earth resistance shall be maintained within permissible limits as specified in IS 3043 or as directed by Engineer-in-Charge.

The complete work shall be carried out in accordance with relevant IS specifications, IE Rules and directions of Engineer-in-Charge complete.

Mode of Measurement:- Executed quantity shall be measured on the basis of Nos. & paid accordingly

#### **45 Supplying and erecting GI strip of required size used for earthing on wall and/or any other purpose**

##### **Specification:**

Supplying, laying, fixing and erecting Galvanized Iron (GI) strip of required size for earthing purpose on wall, ceiling, trench, equipment structure and/or for any other electrical bonding and grounding application complete.

The GI strip shall be of approved quality, manufactured from mild steel and hot dip galvanized conforming to relevant IS specifications. The galvanization shall be uniform, smooth and free from cracks, flakes and other defects to ensure long service life and corrosion resistance.

The size of GI strip shall be as specified in the schedule of quantities or as directed by Engineer-in-Charge. The strip shall have proper cross-sectional area suitable for carrying fault current safely without overheating.

The work shall include cutting, bending, straightening, drilling and fixing of GI strip neatly along walls, ceilings, cable trenches, equipment supports or structures using suitable GI/MS clamps, spacers, saddles, anchor fasteners, nuts, bolts and screws at regular intervals.

The GI strip shall be laid in proper alignment with smooth bends and without sharp turns.

Necessary joints shall be made by riveting, bolting or welding as approved, and all joints shall be electrically and mechanically continuous.

All welded portions and damaged galvanized surfaces shall be properly treated with zinc rich paint/cold galvanizing compound to restore corrosion protection.

The item includes connection of GI strip with earth electrodes, panels, transformers, motors, structures and equipment using suitable hardware complete. Proper earthing continuity shall be maintained throughout the system.



The contractor shall provide all labour, tools, tackles, clamps, hardware, supports, jointing materials and accessories required for satisfactory completion of work.

After installation, the earthing strip system shall be tested for continuity and proper grounding performance as directed by Engineer-in-Charge.

The complete work shall be executed as per IS 3043, IE Rules, standard engineering practices and directions of Engineer-in-Charge complete.

Mode of Measurement:- Executed quantity shall be measured on the basis of Kg. & paid accordingly

**46 Supplying, erecting & terminating XLPE armoured cable 3½ core 50 sq. mm. Aluminium conductor with continuous 7.794 sq. mm. (10 SWG) G.I. earth wire complete erected with glands & lugs, on wall/ trusses/pole or laid in provided trench/ pipe as per specification no. CB-LT/AL**

**Specification:**

Supplying, laying, erecting, testing and commissioning of XLPE insulated, armoured LT power cable of size 3½ Core 50 Sq.mm Aluminium conductor complete with continuous 7.794 Sq.mm (10 SWG) GI earth wire, erected on wall/truss/pole or laid in provided trench/pipe complete as per Specification No. CB-LT/AL.

The cable shall be 1100 Volt grade, XLPE insulated, PVC inner sheathed, armoured and PVC outer sheathed conforming to IS 7098 Part-I and relevant IS specifications. The conductor shall be stranded Aluminium of high conductivity and adequate current carrying capacity.

The cable shall consist of 3½ cores with reduced neutral core suitable for LT distribution system.

The insulation shall be cross linked polyethylene (XLPE) suitable for continuous operation at conductor temperature up to specified limits under normal and fault conditions.

The armouring shall be of galvanized steel wire/strip providing adequate mechanical protection against external damage. The outer PVC sheath shall be weather resistant, moisture resistant and suitable for underground and outdoor installation.

The cable shall be supplied and erected along wall, truss, cable tray, pole or structure using suitable clamps, saddles and supports at regular intervals or laid in already provided trench/pipe as directed by Engineer-in-Charge.

The item includes supply and fixing of suitable heavy duty brass/compression type cable glands, aluminium cable lugs, ferrules, identification tags, insulation tape and all accessories required for complete cable termination.

The cable shall be provided with continuous 7.794 Sq.mm (10 SWG) GI earth wire complete with proper fixing and connection to earthing system for effective grounding and safety.

The work includes cutting, dressing, bending, pulling, straightening and termination of cable at both ends complete with proper crimping of lugs using approved crimping tools.

While laying in trench, the cable shall be properly aligned and protected from mechanical damage. In case of wall/truss/pole erection, suitable GI/MS clamps and hardware shall be provided for firm support.

The contractor shall ensure minimum bending radius during cable laying as per manufacturer recommendations and IS standards. Necessary precautions shall be taken to avoid damage to cable insulation and sheath during transportation and installation.

After completion, the cable shall be tested for insulation resistance and continuity using approved testing instruments before commissioning. Test results shall be recorded and submitted for approval.

The item includes all labour, tools, tackles, transport, hardware, consumables and accessories

required for satisfactory completion of work.

The complete work shall be carried out in accordance with Specification No. CB-LT/AL, relevant IS standards, IE Rules and directions of Engineer-in-Charge complete.

Mode of Measurement:- Executed quantity shall be measured on the basis of meter & paid accordingly

**47 Supplying, erecting & terminating XLPE armoured cable 2 Run, 3 core, 16 sq. mm. Aluminium conductor with continuous 7.794 sq. mm. (10 SWG) G.I. earth wire complete erected with glands & lugs, on wall/ trusses/pole or laid in provided trench/ pipe as per specification no. CB-LT/AL**

**Specification:**

Supplying, laying, erecting, testing and commissioning of XLPE insulated, armoured LT power cable 2 Runs of 3 Core 16 Sq.mm Aluminium conductor complete with continuous 7.794 Sq.mm (10 SWG) GI earth wire, erected on wall/truss/pole or laid in provided trench/pipe complete as per Specification No. CB-LT/AL.

The cable shall be 1100 Volt grade, XLPE insulated, PVC inner sheathed, armoured and PVC outer sheathed conforming to IS 7098 Part-I and relevant IS specifications. The conductor shall be stranded Aluminium conductor of high conductivity suitable for LT power distribution applications. Each cable shall be of 3 Core, 16 Sq.mm size with XLPE insulation capable of withstanding specified operating temperature and voltage conditions. The armouring shall be galvanized steel wire/strip type providing adequate mechanical protection against external damage during installation and service.

The outer PVC sheath shall be weatherproof, moisture resistant and suitable for indoor as well as outdoor applications. The cable shall be suitable for laying in trench, pipe, on wall, truss, cable tray or pole structure.

The work shall include supply and erection of 2 runs of cable complete with continuous 7.794 Sq.mm (10 SWG) GI earth wire properly fixed along cable route and connected to earthing system for safety and grounding purpose.

The cable shall be erected on wall/truss/pole using suitable GI/MS clamps, saddles, spacers and supporting hardware at regular intervals or laid in already provided trench/pipe as directed by Engineer-in-Charge.

The item includes supply and fixing of suitable heavy duty brass/compression type cable glands, aluminium cable lugs, ferrules, identification tags, insulation tape and all accessories necessary for proper cable termination at both ends.

The cable shall be properly dressed, aligned and terminated using approved crimping tools.

Necessary care shall be taken during pulling and laying to avoid damage to insulation, sheath and armouring.

The contractor shall maintain permissible bending radius during installation as recommended by manufacturer and relevant IS standards. Proper identification of both cable runs shall be provided. The GI earth wire shall be properly connected with equipment, panels and earthing system ensuring electrical continuity throughout the installation.

After completion of laying and termination work, insulation resistance and continuity tests shall be carried out using approved testing instruments. The cable shall be commissioned only after satisfactory test results.

The item includes all labour, tools, tackles, transportation, consumables, hardware and accessories required for satisfactory completion of work.

The complete work shall be executed in accordance with Specification No. CB-LT/AL, relevant IS

specifications, IE Rules and directions of Engineer-in-Charge complete.

Mode of Measurement:- Executed quantity shall be measured on the basis of meter & paid accordingly

**48 Making cement concrete foundation in 1:3:6 cement concrete, (20 to 25) mm. stone metal duly plastered with necessary curing for complete.**

**Specification:**

Specification:- 1.1 General : The item pertains to providing and laying in position Plain Cement Concrete (PCC) of specified proportion. The work includes providing all material, mixing, compacting, curing, shuttering, dewatering etc. complete up to lift of  $\pm 5$  m. 1.2 Material: 1. Cement : Ordinary Portland Cement (OPC) as specified at item Gen/C/0.2.1. 2. Fine Aggregate (Sand) : specifications shall conform to item Gen/C/0.2.2. 3. Coarse Aggregate : specifications shall conform to item Gen/C/0.2.3. Grading and maximum size of coarse aggregate shall be as specified in the drawing. Normally the maximum size should not be more than 40 mm or 25 % of the minimum dimension of the member, whichever is less. 4. Water : specifications shall conform to item Gen/C/0.2.4. 1.3 Mix Proportion and Mixing : The mix proportion as specified on the drawing, separately for each component shall be provided. For detailed specifications refer to item No.Gen/C/0.5. For mixing without mechanical mixer, prior permission from the Engineer-in-charge shall be obtained. Specifications for mixing shall conform to item Gen/C/0.7. 1.4 Formwork and Scaffolding : Formwork shall be provided for giving the desired shape and sizes for the PCC as per the drawings. The specifications shall conform to item Gen/C/0.19.7. The stripping time also shall be as specified in the item. The scaffolding shall be normally provided of steel tubes. The specifications for scaffolding also shall conform to item Gen/C/0.19.8. 1.5 Transportation, Placing and Compaction : Specifications shall conform to item Gen/C/0.8. 1.6 Field Tests : The appropriate field tests as directed by the Engineer-in-charge shall be carried out as explained in item Gen/C/0.15. 1.7 Inspection & Testing of Structure : As per the contract conditions inspection & testing of a structure shall be carried out in accordance with item Gen/C/0.16. 1.8 Finishing of Concrete : The finishing of concrete surface shall be as per item Gen/C/0.17. 1.9 Special Features : Special requirements such as Architectural shapes/ finishes, Expansion joints, Construction joints, Water stops, grouting, etc. shall be provided as shown on drawing/s and as directed by Engineer in Charge. For specifications for these the appropriate clauses of item Gen/C/0 shall be referred. 1.10 Curing : As per item Gen/C/0.14. 1.11 Item to Include : This item for providing Plain Cement Concrete (PCC) with specified mix proportion at specified locations with initial lift of + 5 m above or below ground level includes all ingredients of concrete i.e. water, cement, fine and coarse aggregates, all transportation, dewatering, tools and plants, all taxes, royalties, labour, formwork, testing, curing etc. complete.

Mode of Measurement and Payment :- The measurements of the concrete laid shall be taken on volumetric basis in cum. The openings shall be deducted. The unit rate of concrete per cum of specified proportion includes all the items as explained in Gen/C/0.25.

**49 Providing, fixing in position and jointing 150 mm diameter, C.I.D.F. Glandless Sluice valves, Class-I type, both end flanged with Spur/Worm Gear arrangement, PN-1.0 (Suitable for working pressure of 10 kg/cm<sup>2</sup> conforming to IS:14846-2000**

**Specification:**

Providing, supplying, fixing in position, jointing, testing and commissioning of 150 mm diameter Cast Iron Double Flanged (CIDF) Glandless Sluice Valve, Class-I type with spur/worm gear arrangement, PN-1.0 rating suitable for working pressure of 10 kg/cm<sup>2</sup> conforming to IS 14846:2000 complete.

The sluice valve shall be double flanged, non-rising spindle, glandless resilient seated type suitable for water supply applications. The valve body, bonnet and other major components shall be manufactured from high quality cast iron of approved grade conforming to relevant IS specifications.

The valve shall be of Class-I construction with PN-1.0 pressure rating and suitable for working pressure up to 10 kg/cm<sup>2</sup>. The valve shall be hydraulically tested at manufacturer works for body pressure and seat leakage as per IS 14846:2000.

The valve shall be provided with resilient seating arrangement ensuring bubble tight shut-off and smooth operation. The wedge/disc shall be properly guided and designed to minimize friction and wear during operation.

The valve shall be provided with spur gear/worm gear arrangement suitable for easy manual operation under full pressure conditions. The gear mechanism shall be enclosed type, grease lubricated and designed for smooth and reliable performance.

The spindle/stem shall be manufactured from stainless steel of suitable grade resistant to corrosion and wear. Bearings, bushings and sealing arrangements shall be designed for long service life and minimum maintenance.

Both ends of valve shall be flanged conforming to relevant IS standards suitable for connection with matching pipeline flanges. Necessary nuts, bolts, rubber insertion gasket, washers and jointing materials shall be provided for proper leakproof jointing.

The valve shall be internally and externally coated with approved epoxy/bituminous coating suitable for potable/raw water service and protection against corrosion.

The work shall include lowering, positioning, alignment, fixing, jointing and proper support arrangement complete in all respects. The contractor shall ensure correct direction of flow and proper accessibility for operation and maintenance.

The item includes all labour, tools, tackles, lifting equipment, consumables and accessories required for satisfactory installation and commissioning.

After installation, the valve shall be tested hydrostatically for leakage and smooth operation under working pressure conditions as directed by Engineer-in-Charge.

The complete work shall be carried out in accordance with IS 14846:2000, relevant IS specifications, standard engineering practices and directions of Engineer-in-Charge complete.

Mode of Measurement:- Executed quantity shall be measured on the basis of Number & paid accordingly

**50 Providing, fixing in position and jointing 550 mm diameter, C.I.D.F. flanged Reflux Valves, without bypass arrangements, PN-1.0 (Suitable for working pressure of 10 kg/cm<sup>2</sup> confirming to IS: 5312.**

**Specification:**

Providing, supplying, fixing in position, jointing, testing and commissioning of 550 mm diameter Cast Iron Double Flanged (C.I.D.F.) Reflux Valve without bypass arrangement, PN-1.0 rating suitable for working pressure of 10 kg/cm<sup>2</sup> conforming to IS 5312 complete.

The reflux valve shall be double flanged type suitable for installation in pumping mains, rising mains and water transmission pipelines for prevention of reverse flow of water. The valve shall operate automatically under hydraulic pressure and shall provide smooth, reliable and non-slam closing operation.

The valve body, cover and other major components shall be manufactured from high quality close grained cast iron conforming to relevant IS specifications. The valve shall be robustly designed to withstand working pressure of 10 kg/cm<sup>2</sup> and hydraulic surges encountered during operation.

The reflux valve shall conform to IS 5312 and shall be suitable for PN-1.0 pressure rating. The body and valve assembly shall be hydraulically tested at manufacturer's works for body pressure and leakage tests as per relevant standards.

The valve shall be of swing check/reflux type with renewable seat ring and properly balanced door/disc arrangement ensuring minimum pressure loss and efficient sealing against reverse flow. The disc/flap shall open freely under forward flow conditions and close automatically on reversal of flow.

The seat and seating surfaces shall be accurately machined to provide leakproof operation. The hinge pin, shaft and moving components shall be manufactured from corrosion resistant material of suitable grade for long service life.

The valve shall be provided with suitable gasket arrangement between body and cover to ensure leakproof joints. Necessary nuts, bolts, washers and rubber insertion gaskets for flange joints shall be supplied complete.

Both ends of valve shall be double flanged conforming to relevant IS standards suitable for connection with matching pipeline flanges. The flange drilling shall be compatible with standard PN-1.0 pipeline flanges.

The internal and external surfaces of valve shall be coated with approved bituminous/epoxy protective coating to prevent corrosion and ensure durability under water supply service conditions. The work shall include lowering, positioning, alignment, fixing in line, jointing with pipeline and tightening of all bolts complete in all respects. Proper support and accessibility for maintenance shall be ensured during installation.

The contractor shall provide all labour, tools, tackles, cranes, consumables and accessories required for satisfactory installation and commissioning of valve.

After installation, the valve shall be tested under operating conditions for leakage, smooth functioning and proper automatic closing action as directed by Engineer-in-Charge.

The complete work shall be executed in accordance with IS 5312, relevant IS specifications, standard engineering practices and directions of Engineer-in-Charge complete.

Mode of Measurement:- Executed quantity shall be measured on the basis of Number & paid accordingly

#### **51 Providing, fixing in position and jointing 150 mm dia., M.S./C.I. flanged Dismantling Joint, PN-1.0.**

##### **Specification:**

Providing, supplying, fixing in position, jointing, testing and commissioning of 150 mm diameter M.S./C.I. flanged Dismantling Joint, PN-1.0 rating complete.

The dismantling joint shall be suitable for use in water supply/rising main/pumping installations to facilitate easy erection, removal and maintenance of valves, pumps and pipeline equipment. The joint shall be designed to accommodate axial adjustment during installation and dismantling operations.

The dismantling joint shall be fabricated from Mild Steel/Cast Iron of approved quality conforming to relevant IS specifications. The body, follower flanges and end rings shall be of robust construction suitable for working pressure corresponding to PN-1.0 rating.

The dismantling joint shall consist of flanged body, tie rods, follower flanges, sealing gasket and necessary nuts, bolts and washers complete. The tie rods shall be manufactured from high tensile steel with suitable anti-corrosive protection.

The flanges shall be drilled as per relevant IS standards and suitable for connection with matching 150 mm dia. pipeline flanges. The joint shall provide sufficient adjustment range to facilitate

installation and removal of connected equipment without disturbing adjacent pipelines.

The sealing arrangement shall consist of suitable quality rubber gasket capable of providing leakproof performance under working pressure conditions. The gasket material shall be suitable for potable/raw water applications.

All MS fabricated components shall be properly welded, ground and finished smoothly. MS dismantling joints shall be internally and externally protected with approved anti-corrosive primer and bituminous/epoxy coating. In case of CI dismantling joints, protective coating shall also be provided to prevent corrosion.

The item includes supply of all nuts, bolts, washers, rubber insertion gaskets, tie rods and accessories required for complete installation and leakproof jointing.

The work shall include lowering, positioning, alignment, fixing in pipeline, tightening of bolts, testing and commissioning complete in all respects.

Proper care shall be taken during installation to avoid misalignment and undue stress on connected equipment and pipelines. The contractor shall ensure correct axial setting and proper tightening sequence of tie rods and flange bolts.

After installation, the dismantling joint shall be tested hydraulically under working pressure for leakage and satisfactory performance as directed by Engineer-in-Charge.

The item includes all labour, tools, tackles, consumables and incidental charges required for satisfactory completion of work.

The complete work shall be executed in accordance with relevant IS specifications, standard engineering practices and directions of Engineer-in-Charge complete.

Mode of Measurement:- Executed quantity shall be measured on the basis of Number & paid accordingly

**52 Providing, transporting, cutting, fabricating, welding, hoisting and erecting in position welded or bolted structural steel work with tubular sections using ERW tubes of various diameters erecting using devices like derricks, cranes or any other suitable guys etc. and final bolting, welding, testing as may be required including two coats of red oxide zinc chrome paint and two coats of synthetic super enamel paint of approved colour & shade all material & labour complete.**

**Specification:**

Providing, transporting, cutting, fabricating, welding, hoisting and erecting in position structural steel work using ERW tubular sections of various diameters complete with all materials, labour, tools, tackles, painting and allied works required for satisfactory completion of work.

The structural steel work shall be fabricated from approved quality ERW steel tubes conforming to relevant IS specifications suitable for structural applications. The tubular sections shall be free from cracks, bends, lamination, surface defects and other manufacturing imperfections.

The work shall include cutting, bending, grinding, drilling, notching, edge preparation, matching and fabrication of tubular members as per approved drawings and design requirements. All fabricated members shall be true to line, level and dimensions.

All welding work shall be carried out by qualified welders using approved welding electrodes and proper welding procedures. Welded joints shall be continuous, uniform and free from cracks, blow holes, slag inclusion and other defects. Necessary grinding and finishing of weld joints shall be carried out wherever required.

Bolted connections shall be made using approved quality nuts, bolts, washers and fastening hardware of suitable size and grade. All connections shall be properly aligned and tightened to ensure structural stability.

The fabricated steel structure shall be transported carefully to site without damage or distortion. The erection work shall include hoisting, lifting, positioning, alignment and fixing in final position using derricks, cranes, chain pulley blocks, winches, guys or any other suitable lifting equipment as required.

The contractor shall provide temporary supports, staging, scaffolding, bracing and safety arrangements during erection work to ensure stability and safe working conditions.

After fabrication and surface preparation, all steel members shall be cleaned properly by wire brushing/scraping to remove rust, mill scale, oil, grease and foreign matter. The entire steel work shall then be painted with two coats of red oxide zinc chromate primer of approved make followed by two coats of synthetic super enamel paint of approved colour and shade.

Each coat of paint shall be applied uniformly after proper surface preparation and drying of previous coat. Touch up painting shall be carried out after erection wherever required.

The scope includes all labour, consumables, welding electrodes, gas cutting materials, bolts, nuts, washers, scaffolding, staging, lifting arrangements, transportation, loading-unloading and all incidental charges required for complete execution of work.

The erected structure shall be properly aligned, levelled and tested for stability and workmanship as directed by Engineer-in-Charge.

The complete work shall be carried out in accordance with relevant IS specifications, approved drawings, standard engineering practices and directions of Engineer-in-Charge complete.

Mode of Measurement:- Executed quantity shall be measured on the basis of MT & paid accordingly

**53 Providing 150 mm dia - 15 mm thick, M.S. Slipon Flanges at departmental store or work site, finished smoothly on one side including drilling of holes as per B.S. Table or IS: 1537-1976 including cost of MS plates.**

**Specification:**

Providing, manufacturing, supplying and delivering 150 mm diameter × 15 mm thick Mild Steel Slip-On Flanges at departmental store/work site complete with machining and drilling as per relevant standards.

The slip-on flanges shall be manufactured from approved quality mild steel plates conforming to relevant IS specifications. The flanges shall be of robust construction suitable for water supply and pipeline applications.

The flange shall be 150 mm nominal diameter with thickness of 15 mm and shall be accurately cut, machined and finished smoothly on both faces, particularly on the jointing face to ensure proper alignment and leakproof connection.

The flange bore shall be suitable for slip-on type pipe connection and concentric with flange outside diameter. The flange edges shall be properly dressed and free from burrs, sharp edges, cracks and surface defects.

The flange shall be drilled with required number and size of bolt holes as per relevant British Standard Table or IS 1537:1976 suitable for matching flange connections. All holes shall be accurately spaced on pitch circle diameter and properly aligned.

The item includes cost of mild steel plates, cutting, machining, drilling, grinding, finishing, handling, loading, unloading and transportation to departmental store/work site complete.

All fabricated flanges shall be checked for dimensional accuracy, thickness, concentricity and workmanship before delivery. The finished flanges shall be properly stacked and protected against damage during transportation and storage.

The contractor shall provide all labour, machinery, tools, tackles and consumables required for

fabrication and supply of flanges complete in all respects.

The complete work shall be carried out in accordance with IS 1537:1976, relevant IS specifications and directions of Engineer-in-Charge complete.

Mode of Measurement:- Executed quantity shall be measured on the basis of Number & paid accordingly

**54 Jointing of 150 mm dia., M. S. Flanged pipes or specials of any thickness including all jointing materials such as nuts, bolts, rubber gasket, zinc packing, labour required and satisfactory hydraulic testing etc. complete.**

**Specification:**

Providing and carrying out jointing of 150 mm diameter Mild Steel flanged pipes or specials of any thickness complete with all jointing materials, labour, testing and allied works required for satisfactory completion.

The work shall include proper alignment, positioning and jointing of MS flanged pipes, fittings and specials such as bends, tees, reducers, dismantling joints, valves and other pipeline accessories. The flange joints shall be made using approved quality rubber insertion gaskets of suitable thickness placed centrally between mating flanges to ensure leakproof joints under working pressure conditions.

The item includes supply and fixing of all necessary mild steel/high tensile nuts, bolts, washers and zinc packing materials complete. The bolts shall be tightened uniformly in proper sequence to ensure even pressure on gasket and proper alignment of flange joints.

Before jointing, all flange faces shall be cleaned thoroughly and checked for smoothness, alignment and damage. Burrs, rust, dirt and foreign material shall be removed properly from flange surfaces.

The work shall include handling, lowering, supporting, aligning and temporary fixing of pipeline sections during jointing operation complete in all respects.

After completion of jointing work, the pipeline shall be subjected to hydraulic testing at specified pressure as directed by Engineer-in-Charge. Any leakage observed during testing shall be rectified by the contractor at his own cost and the pipeline retested until satisfactory performance is achieved.

The contractor shall provide all labour, tools, tackles, chain pulley blocks, consumables, jointing materials, scaffolding and accessories necessary for complete execution of work.

Proper care shall be taken during jointing to avoid misalignment, excessive stress and damage to pipes, gaskets and flanges.

The complete work shall be carried out in accordance with relevant IS specifications, standard engineering practices and directions of Engineer-in-Charge complete.

Mode of Measurement:- Executed quantity shall be measured on the basis of Kg. & paid accordingly

**55 3 Ton capacity, triple spur gear Chain Pulley Block with 6 Mtrs. lift.**

**Specification:**

Providing, supplying and delivering 3 Ton capacity Triple Spur Gear Chain Pulley Block with 6 metre lift complete with all standard accessories required for safe and efficient lifting operations.

The chain pulley block shall be manually operated, heavy duty, triple spur gear type suitable for lifting, lowering and handling loads up to 3 Ton capacity under industrial working conditions.

The chain pulley block shall conform to relevant IS specifications and shall be manufactured from high quality tested steel materials with robust construction for long service life and reliable operation.



The load chain shall be of high tensile alloy steel, heat treated and calibrated type suitable for rated lifting capacity. The hand chain shall be endless type made from tested steel links suitable for smooth manual operation.

The gear arrangement shall be triple spur gear type with machine cut gears running in proper alignment to ensure smooth, efficient and trouble-free lifting operation with minimum manual effort. The load wheel, pinion, gears and shafts shall be accurately machined and mounted on anti-friction bearings/bushes as per manufacturer design. All moving parts shall be properly lubricated and enclosed wherever necessary.

The chain pulley block shall be provided with heavy duty forged steel hooks at top and bottom complete with safety latches. Hooks shall be capable of withstanding rated load safely without permanent deformation.

The lifting height shall be minimum 6 metres and the chain length shall be adequate for full rated lift operation. The brake mechanism shall be automatic load actuated type capable of holding load securely at any position during lifting or lowering.

The body/frame of chain pulley block shall be fabricated from heavy duty steel plates properly machined and assembled to withstand shock, vibration and repeated loading conditions.

The item shall include all standard accessories, suspension arrangement, lubrication and protective finish complete. The equipment shall be painted with approved anti-corrosive paint for protection against rust and atmospheric conditions.

The contractor/supplier shall provide manufacturer's test certificate indicating proof load test, safe working load and performance compliance as per relevant IS standards.

The chain pulley block shall be tested for smooth operation, braking efficiency and safe lifting capacity before delivery.

The complete item shall be supplied in ready to use condition complete in all respects as directed by Engineer-in-Charge.

Mode of Measurement:- Executed quantity shall be measured on the basis of Number & paid accordingly

### **56 3 Ton capacity geared Travelling Trolley with 6 Mtrs. lift.**

#### **Specification:**

Providing, supplying and delivering 3 Ton capacity Geared Travelling Trolley suitable for operation with chain pulley block/hoist complete with all standard accessories and fittings required for safe lifting and horizontal movement of loads.

The travelling trolley shall be heavy duty geared type suitable for manual operation on standard ISMB/I-beam track arrangement and capable of carrying safe working load of 3 Ton under continuous industrial service conditions.

The trolley frame shall be fabricated from high quality structural steel plates and sections with rigid construction designed to withstand operational stresses, impact loads and vibration during lifting and travelling operations.

The trolley shall be suitable for beam mounting with adjustable wheel arrangement to suit standard beam flange widths. The wheel assembly shall consist of machined cast steel/forged steel wheels mounted on properly aligned shafts with anti-friction bearings/bushes for smooth movement.

The geared travelling mechanism shall be operated through hand chain arrangement with machine cut gears and pinions designed for smooth and easy horizontal movement of suspended loads with minimum manual effort.

The trolley shall be complete with load bar/suspension arrangement suitable for mounting 3 Ton chain pulley block or hoist securely. Necessary locking arrangement, spacers and adjustment

washers shall be provided for proper alignment on beam track.

The travelling wheels shall be designed with proper tread profile to ensure safe operation on beam flange without derailment. Anti-drop/stopper arrangement shall be provided for additional operational safety.

The gear train, shafts and moving parts shall be manufactured from high quality steel and properly machined for accurate alignment and efficient transmission of motion. All moving components shall be adequately lubricated.

The trolley shall be provided with endless hand chain of suitable length for manual travelling operation. The hand chain shall be of tested steel links suitable for continuous operation.

The item shall include all standard accessories, nuts, bolts, washers, spacers and fittings complete in all respects. The trolley components shall be painted with approved anti-corrosive paint for protection against rust and atmospheric conditions.

The equipment shall conform to relevant IS specifications and standard safety requirements applicable for material handling equipment.

The supplier shall provide manufacturer's test certificate indicating safe working load, proof load testing and compliance with relevant standards.

The travelling trolley shall be tested for smooth movement, proper alignment and safe load carrying operation before delivery.

The complete item shall be supplied in ready to use condition complete in all respects as directed by Engineer-in-Charge.

Mode of Measurement:- Executed quantity shall be measured on the basis of Number & paid accordingly

#### **57      Rebate for old Pump Motor Panel Valves, Cables etc. Complete**

##### **Specification:**

Rebate for scrap value of existing old Pump, Motor, Control Panel, Valves, Cables and allied electrical/mechanical accessories to be dismantled and retained by the contractor complete.

The scope includes careful dismantling, disconnection, removal and handling of existing pumping machinery, motors, control panels, valves, pipelines, cables, cable glands, starters, electrical accessories, supports, foundations and other associated materials from pumping station/site as directed by Engineer-in-Charge.

The dismantled materials shall become the property of the contractor and the quoted rebate shall be considered accordingly while submitting tender rates. The contractor shall assess the scrap value of all recoverable materials before quoting rebate amount.

The work shall include safe isolation of electrical supply, disconnection of cable terminations, removal of earthing connections, dismantling of pipe joints, valves and mechanical assemblies complete without causing damage to nearby structures, equipment and utilities.

The contractor shall use proper tools, tackles, chain pulley blocks, cranes, lifting devices and skilled labour for dismantling and shifting of heavy equipment. Necessary safety precautions, barricading, shutdown coordination and protection arrangements shall be provided during execution of work.

The item includes dismantling and removal of:

Existing pumps and motors

LT control panels/starters

Valves and specials

Electrical cables and wiring

Cable trays/supports

Pipe fittings and accessories

Base frames, nuts, bolts and hardware

Earthing materials and allied installations

The contractor shall transport dismantled scrap materials from site and dispose/store the same at his own responsibility. Serviceable materials, if specifically instructed by Engineer-in-Charge, shall be handed over at designated MIDC store/site in good condition.

The contractor shall ensure that no damage occurs to existing pipelines, civil structures, electrical systems and operational installations during dismantling activities. Any damage caused shall be repaired/reinstated by the contractor at his own cost.

The item includes all labour, transportation, loading-unloading, dismantling equipment, consumables, safety measures, statutory compliance and incidental charges required for satisfactory completion of work.

Nothing extra shall be paid separately for dismantling, handling, shifting, disposal, safety arrangements, lead, lift or other incidental operations. The rebate amount quoted by the contractor shall be deducted from the total contract value accordingly.

The complete work shall be carried out as per standard engineering practices and directions of Engineer-in-Charge complete.

Mode of Measurement:- Executed quantity shall be measured on the basis of Lumpsum & paid accordingly.

#### **Sub Estimate:Testing**

##### **1 Testing Charges**

#### **Specification:**

The construction material like cement, sand, steel etc shall be tested by the contractor from the approved Govt. LAB and the test report shall be submitted to the department. Reimbursement of testing payment shall be made to the agency for such testing charges under this item in sch-B, if test results are found satisfactory. The frequency and parameters of material testing shall be as per directions of engineer in charge. The contractor shall visit the site with engineer in charge before execution of work. Mode of measurement & Payment:- The item shall be measured on satisfactory testing of material and paid on JOB basis.

#### **Sub Estimate:Royalty**

##### **1 Royalty charges**

#### **Specification:**

The payment of royalty will be reimbursed to the agency after submission of valid transit passes of royalty paid by the agency for bonafied work. The contractor shall visit the site with engineer in charge before execution of work. The item shall be executed as per PWD standard specifications, standard engineering practice and as directed by engineer in charge. Mode of measurement & Payment:- The finished item shall be measured on volumetric basis and paid on per Cubic meter basis.

|                   |                              |
|-------------------|------------------------------|
| Signed By         | : RAJESH SITARAMJI<br>ZANZAD |
| Organisation Unit | : MIDC                       |
| Signed Date       | : 05/06/2026                 |