

PARTICULAR SPECIFICATION**1. GENERAL**

1.1 Work under this contract shall be carried out in accordance with Particular Specifications, General Specifications and other provisions contained in scope of work, in MES Schedule Part-I (2009) and Part-II (2020) read in conjunction with each other.

1.2 Term "General specifications" referred to hereinbefore as well as referred to in IAFW-2249 (General Conditions of contracts) as amended shall mean the specifications contained in the MES Schedule 2009 (Part-I).

1.3 General Rules, specifications, special conditions and all preambles in the MES Schedule shall be deemed to be applicable to the work under this contract, unless specifically stated otherwise in these documents in which case shall take precedence over the aforesaid provisions in the MES Schedule. The term "as specified" wherever appears in the tender documents and drawings, relates to relevant particular specifications and in its absence, general specifications. All references to MES Schedule/SSR in these specifications relate to Part-I of MES Schedule 2009 unless otherwise mentioned. Reference to only some paragraphs of MES Schedule has been made in these particular specifications but other paragraphs and provisions, as applicable, are also to be followed the entire work even though not particularly mentioned hereinafter.

1.4 Where specifications for any item of work are not given in the tender documents, particular specifications, the specifications as given in relevant Indian Standard Code of Practice shall be followed.

1.5 The lump sum amount quoted by the tenderer shall be deemed to include for any minor details/items of work and/or constructions which are obviously and fairly intended and which may not have been included in these documents but which are essential for the execution and entire completion of work.

1.6 MATERIALS:-

1.6.1 Unless specific makes/manufacturers are specified in the tender documents all the materials to be procured by the contractor for incorporation in the work under this contract (with the exception of local materials like bricks, stone aggregate, stones, sand etc) shall be with ISI certifications mark. For materials of specific make/manufacturer's names refer in clause 1.6.2 here-in-after.

1.6.2 If any specific makes/manufacturers names are specified in Particular specifications or in Appendix - D" to Particular Specifications, materials shall be of these specific makes/manufacturers only. ISI marking will not be mandatory for such items where makes/manufacturers have been specified in this document unless the items of makes/manufacturers specified are available both with IS marking and without ISI marking. If any material is not manufactured with IS certifications mark in the country, it shall be conforming to relevant IS and other specifications specified elsewhere and shall also conform to samples displayed in CE's/ CWE's/ GE's office as applicable. However steel windows/ventilators and doors shutters shall be of makes specified in Appendix -D" to the particular specifications and conforming to relevant IS.

1.6.3 Indian Standard (IS) of the year of publication/edition listed or specified in the SSR (Part-I) or revised thereafter shall be applicable for the work under this contract unless specifically indicated otherwise elsewhere in these tender documents.

1.6.4 **LOCAL MATERIALS:-** Irrespective of actual distance involved, local materials such as stones, aggregates, sand, road metals etc shall conform to or superior to the specifications given here in after and to the samples kept in the office of CEs/ CWEs/ GEs. The tenderers are advised to inspect these samples. The tenderers shall be deemed to have inspected the samples and have full knowledge thereof whether they inspect them or not before quoting their tender. No claim whatsoever on this account shall be admissible.

1.6.5 SAMPLES OF MATERIALS:-

(a) Refer condition 10 of IAFW-2249.

(b) Specific requirements regarding dimensions, strength, weight and finishes, as per IS, MES SSR and the particular specifications given hereinafter vis-à-vis actual properties check, tests carried out, reference to test certificates and markings, etc based on which samples of each materials are approved as Conforming to relevant specification shall be recorded in the sample approval register.

(c) The contractor shall produce samples of all materials and shall obtain approval in writing from GE before he places bulk order for the materials for incorporation in the work. The contractor shall not procure materials unless the samples are first got approved from the Garrison Engineer.

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PARTICULAR SPECIFICATION (CONT...)**1.6.6 RECORD OF MATERIALS:-** (Refer Special condition 18)

(a) The quantity of all the proprietary materials (including the materials the quantity of which cannot be checked after incorporation in the works) shall be recorded in measurement books and signed by the contractor and the Engineer-in-Charge as a check to ensure that the required quantity has been brought at site for incorporation in the work.

(b) Materials brought to site shall be stored as directed by the Engineer-in-Charge and shall be suitably marked for identification.

(c) The contractor shall procure all the materials (where specific makes/manufacturer's specified) directly from their manufacturers or from their authorized dealers only. The contractor shall ensure that the materials are brought to site, in original sealed containers/packing, bearing manufacturers marking except in the case of the requirement of material(s) being less than smallest packing.

(d) The contractor shall produce to the GE original printed and machine numbered purchase vouchers/invoices including manufacturer's test certificate (where applicable) for all the materials mentioned here-in-before in Special Conditions No 18. Copies of orders placed on the manufacturer/authorized dealers shall also be provided by the contractor to GE along with above documents. Whenever procured and brought to site of work for incorporation in the work, a Xerox copy of such vouchers/invoices shall be stamped (office stamp) and defaced in ink by the Engineer-in-Charge stating "verified for materials purchased and brought to the site of work for incorporation in the subject work and signed with date before allowing payment for these materials through RAR.

(e) Payment for the materials shall neither be made in the RARs nor will these be allowed for incorporation in the work unless documents as stated above are produced by the contractor and are verified by the Engineer-in-Charge/GE. In case of any disputes on account of above CWE's decision shall be final and binding.

1.7 **MAKING GOOD:-** The contractor shall cut, leave or form holes, recesses, chases etc, in concrete, brick work, walls, ceilings, floors and in any other situations as required or as directed by the Engineer-in-Charge and make good in cement and sand mortar (1:3)/PCC (1:2:4) type Bo as decided by Engineer-in-Charge and finish to match the adjoining surfaces.

1.8 **SCOPE OF WORK:-** The scope of work under this contract comprises of full, final and entire completion of works as defined under scope of work and as specified in these Particular specifications, General specifications and as directed by GE.

1.9 The makes of products mentioned here-in-after are to be selected from List of Approved Manufacturer/Makes in Appendix -D' of the tender.

2. EXCAVATION AND EARTH WORK

2.1 **EXCAVATION IN TRENCHES AND OVER AREAS IN SOIL :** Excavation in trenches and over areas shall be in any type of soil and soil shall be carried out all as specified in clause 3.13 of SSR Part I.

2.2 **FILLING IN TRENCHES FOR PIPES, DRAINS, CABLES ETC:** Filling in trenches for pipes, drains, cables etc shall be carried out all as specified in clause 3.20 of SSR Part I.

2.3.1 All excavation shall be measured in successive stages of 1.5 meter depth starting from the commencing level.

2.3.2 Boulder/hard rock, if any, obtained from excavation shall become property of the contractor for which he will be charged @ Rs. 750.00 per cum. The method of measurement shall be as laid down in clause 3.1 on page 18 &19 of SSR-2020 Part -II. The measurement shall be properly recorded in MB and signed by the Engineer-in-Charge and contractor.

2.3.3 In case of any dispute with regards to the classification of various strata and their depth, the decision of GE will be final and binding.

2.4 In case timbering for excavation is required and specially ordered by the GE in writing, the same shall be provided without any extra cost.

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PARTICULAR SPECIFICATION (CONT...)

2.5 The contractor's lump sum shall include for dewatering/pumping/bailing out water, if met with during excavation due to high water table and no extra payment shall be admissible to the contractor on any such account.

2.6 **FILLING IN TRENCHES / UNDER FLOORS:-**The approved earth obtained from excavation of foundations shall be used for filling in trenches, under floors and any other situations after removing big stones, grass, roots and vegetables and other organic matter. Earth mixed with small stones/pebbles (if approved by OC Contract) is permitted for use in filling under floors and foundations. The fillings around pipes after the pipes are laid and tested shall, however be with earth free from pebbles/stones. Any additional earth required for the purpose of filling shall be arranged by Contractor at no extra cost to the Department from outside the Defence land. For purpose of lump sum the entire earth obtained from excavation except surface dressing and surface excavation shall be deemed to be fit for reuse. Lump sum price shall include for any extra soil, if required, for filling even after reusing all the useful excavated soil obtained by the contractor from his own source without any extra cost to the department.

2.7 Filling under floors/sides of trenches shall be in layers not exceeding 250mm thick, and each layer shall be watered and well rammed.

2.8 Surplus spoil shall be removed, spread and leveled at places as directed by the Engineer-in-Charge at a distance not exceeding 50 m.

2.9 **TRENCHES FOR FOUNDATIONS AND PIPES:** The excavation shall be restricted to dimensions as specified in MES schedule. Excavation made, if any, in excess of required depth/width shall be made good by the contractor with cement concrete mix (1:5:10) without extra cost to the Govt.

2.9.1 The bed of the trenches, if in soft or made up earth, shall be watered and well rammed and any depressions thus formed shall be filled with approved earth as required to the level and slope as directed by Engineer-in-Charge.

2.10 **BAILING/PUMPING OF WATER:** All water that may accumulate in trenches of foundation, column footings, rafts etc, during the progress of work from rains, sub soil water, spring etc shall be bailed/pumped out or otherwise removed all as per clause 3.17 of MES SSR Part-I and nothing extra except as provided for vide special condition 3.11 on page 22 of MES SSR Part-II shall be payable on this account. Contractors are therefore advised to ascertain level of sub soil water at site of work before tendering.

2.11 **HARD CORE:** Unless otherwise specified, the hard core shall be of hard broken stone or boulders broken to gauge not exceeding 63mm. The material of hard core shall be well graded for providing dense and compact sub grade. Hard core shall be deposited, spread and levelled in layers not exceeding 15cm thick and watered and well rammed to a true surface and compacted with sufficient fine material. The thickness of hard core specified or indicated in the drawing, is the thickness after consolidation. Where thickness has not been mentioned it shall be 150mm consolidated.

2.12 **CONCRETE FILLING / CINDER FILLING:-** Wherever concrete filling/cinder filling, if required as shown on drawings or specified elsewhere, it shall be PCC (1:4:8) type D2 with brick aggregate not exceeding 40 mm gauge mixed with water proofing compound @ 3% by weight of cement. Bricks aggregate shall be well graded so that after consolidation it provides dense and compact sub base.

3. **CONCRETE:-**

3.1 **MATERIALS FOR CONCRETE:-**

I. **LIME:** Lime shall be eminently hydraulic lime (Class - A') and shall conform to IS:712 as specified in clause 4.2 of SSR (Part I).

II. **CEMENT:** The contractor shall procure cement from manufacturer as specified here-in-after. Cement shall be stored in dry a place covered all round and no stacks shall be more than 15 bags high.

III. **COARSE AGGREGATE:** Coarse aggregate shall be crushed stone aggregate and shall conform to specifications given in clause 4.4 on Srl page 52 of SSR (Part I). However in case of controlled quality concrete the provisions made in IS-456 shall be applicable. Where due to less thickness of concrete the use of 20mm graded is not possible, the aggregate shall be of 12.5mm grading as specified in clause 4.4.7.1 on Srl Page 53 of MES Sch (Part-I) without any price adjustment.

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PARTICULAR SPECIFICATION (CONT...)**3.2 SOURCE OF PROCUREMENT**

- 3.2.1 Wherever mild steel reinforcement bars have been shown on drawings/ specified in tender documents the same shall be TMT bars of respective size and shall be of grade Fe500/Fe500D /Fe550/Fe550D meeting the requirements of IS-1786-2008 and shall be procured from the following approved manufacturers:-

Ser No.	Firm Name	Size / Dia & Type
1	2	3
1	Steel Authority of India Ltd (Brand: "SAIL")	For all types & Dia of TMT Bars
2	Tata Iron & Steel Company (TISCO or Tata Steel) (Brand: "TATA")	For all types & Dia of TMT Bars
3	Rashtriya Ispat Nigam Limited (RINL) (Brand: "RINL")	For all types & Dia of TMT Bars
4	M/S SRMB Srijan Private Ltd (Brand: "SRMB")	TMT Bars of Gde Fe-500, Fe-500-D, Fe 550 & Fe- 550-D (8mm to 32mm)
5	M/S Jindal Steels and Power Ltd (Brand: "JINDAL PANTHER")	TMT Bars of Gde Fe-500, Fe-500-D, Fe 550 & Fe- 550-D (8mm to 40mm)
6	M/S Electrotherm (India) Ltd (Brand: "ET TMT")	TMT Bars of Gde Fe-500, Fe-500-D & CRS (8mm to 32mm)
7	M/S Jai Balaji Industries Ltd (Brand: "Balaji Shakti")	TMT Bars of Gde Fe-500 & Fe-500-D
8	M/S Shyam Steel Industries Ltd (Brand: "SHYAM")	TMT Bars of Gde Fe-500 & Fe-500-D CRS
9	M/s Adhunik Industries Ltd (Brand: "ADHUNIK Fe 500 SD")	TMT Bars of Gde Fe500D (Size 8-32mm)
10	M/S Sri Bajrang Power & Ispat Ltd, (Brand: "GOEL TMT")	TMT Bars of Gde Fe-500 & Fe-500D (8mm to 32mm)
11	M/S JSW Steel Ltd, (Brand: "NEOSTEEL")	TMT Bars of Gde Fe-500 & Fe-500D & CRS Steel bars (8mm to 40mm)
12	M/S Gallantt Metal Ltd (Brand: "GALLANTT TMX")	TMT Bars of Gde Fe 500, Fe 500D & CRS (Size 8-32mm)
13	M/S Shyam Metalics & Energy Ltd. (Brand: "SEL")	TMT Bars of Gde Fe 500, Fe 500D (Size 8-32mm)
14	M/S Kamachi Industries Ltd (Brand: "KAMACHI")	TMT Bars of Gde Fe 500, Fe 500D, Fe 550, Fe 500D HCRM (Size 8-40mm)
15	M/S Rashmi Metaliks Ltd (Brand: "RASHMI TMT")	TMT Bars of Gde Fe 500 (Size 8-32mm), Fe 500D, Fe550D (Size 8-25mm)
16	M/S Real Ispat & Power Ltd (Brand: "GK TMT")	TMT Bars of Gde Fe 500, Fe 500D (Size 8-36mm)
17	M/S Super Smelters Ltd (Brand: "SUPER SHAKTI")	TMT Bars of Gde Fe 500, Fe 500D, Fe550 (Size 8-32mm)
18	M/S Steel Exchange India (Brand SIMHADRI TMT)	TMT Bars of Gde Fe 500, Fe 500D & HSCRM

The documents in support of purchase of steel, BIS License and validity with MES shall be verified by the Engineer-in- Charge and the GE.

3.2.2 STRUCTURAL STEEL: Structural steel any section/plate (except hollow steel section) shall be procured from main producers of steel like SAIL, Rashtriya Ispat Nigam Limited (RINL), Tata Iron & Steel Company (TISCO, or TATA Steel) and M/S Jindal Steel & Power Ltd. However In case of non availability from approved primary manufacturers / main producers (non availability certificate obtained from the producers) it can be procured from approved secondary producers with a reduction of 5% (Five percent) of the accepted rates of structural steel. In case the desired section of structural steel is not rolled/ manufactured by primary producers, there shall be no price adjustment in use of structural steel procured from approved secondary producers.

(a) **STRUCTURAL STEEL (HOLLOW STEEL SECTION):-** Structural Hollow Steel Section shall be directly procured from main producers as mentioned in para 14.4.2.2.

(b) Galvanised Steel sheet & Fabric Reinforcement for concrete : These shall be ISI Marked and shall be procured directly from Main manufacturers.

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PARTICULAR SPECIFICATION (CONT...)

(c) Structural steel of ordinary quality may however be procured by the contractor locally, provided the quantity is less than two tones and the manufacturer is a BIS licensee holder.

(d) Steel, when procured from main producers/approved secondary producers (stipulated in above paras) shall have to be procured directly from the storage depots of the main producers/approved secondary producers and not from their authorized agents/ dealers.

(e) The particulars of the manufacturer/supplier of steel shall be submitted by the contractor to the Asst Garrison Engineer prior to procurement for every lot of steel separately. The original documents in support of purchase of steel shall be verified by the site staff and Asst Garrison Engineer and certified true copy of the result shall be retained in GE's office. The form given here in after will be used for this purpose.

3.2.2.1.1 The manufacturer is to carry out inspection and testing of steel in accordance with the relevant BIS provisions. The contractor shall submit the manufacturer's test certificate along with the Test Sheet giving the result of each mechanical test as applicable and the chemical composition of the steel or authenticated copy thereof duly signed by the manufacturer with each consignment. The Engineer-in-Charge shall record these details in Steel Acceptance Register (as per proforma given herein-before) after due verification and send a certified true copy of test sheet to GE for his records. Any particular size of bar/steel section of any consignment, not meeting the requirement shall be rejected and the same shall be removed from the site by the contractor at his own cost and the contractor shall have no claim on this account.

3.3 **FINE AGGREGATE (SAND):**

3.3.1 Fine aggregate for all concrete work shall conform to material specifications and grading within the limits of grading Zones II to III all as specified in clause 4.4 of MES Sch Part-I. Sample of sand shall however, be got approved from the GE before incorporation in the work. Other provision in the respective clauses shall remain unchanged.

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3.3.4 **Coarse Aggregate:** Coarse aggregates for all Plain and reinforced cement concrete work shall be graded crushed stone of approved quality and from approved crusher all as specified in Clause 4.4 of MES Schedule Part -I shall be used.

3.3.5 **Grading of Coarse Aggregate:** Graded aggregate of nominal sizes given hereunder, shall be used, unless specified otherwise, in the specifications hereinafter:-

(a) Reinforced Cement Concrete (Nominal mix)

- | | | |
|-------|--------------------------|-----------------|
| (i) | Under 30mm thickness | : 12.5mm graded |
| (ii) | 30 to 80mm thickness | : 20mm graded |
| (iii) | Exceeding 80mm thickness | : 25mm graded |

(b) Reinforced cement concrete (Design mix) : As per design mix approved.

(c) Plain Cement concrete in Foundation of Brick/Stone, Walls, Pillars, Floors & Sub-base to Floors.

- | | | |
|-------|--------------------------|-----------------|
| (i) | Under 30mm thickness | : 12.5mm graded |
| (ii) | 30 to 80mm thickness | : 20mm graded |
| (iii) | Exceeding 80mm thickness | : 40mm graded |

3.4 **Water:** Water shall conform to the requirement stipulated in IS-456 and as per Clause 4.9 of MES Schedule (Part-I). Water shall be rested before use.

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PARTICULAR SPECIFICATION (CONT...)

3.5 **Mix of Concrete:** Unless otherwise specified either in drawings or in the specifications elsewhere), mix of cement concrete in various situations. shall be as under :-

- (a) Lean concrete in foundation for brick wall, dwarf wall, steps, lean concrete under plinth beams and below RCC Col footings : PCC of grade M-7.5 (Nominal Mix)
- (b) PCC in plinth protection, PCC cills, Coping and PCC block for holder bats, back of pressed steel door frames and plugging for scaffolding holes. : PCC of grade M-10 (Nominal Mix)
- (c) All RCC work of building work : Grade M-25 (Design mix) as per IS-456 of 2000.
- (d) Overhead reservoir : As per drawing
- (e) PCC in bed plate, benching, padding to staging for PVC storage tank and per-cast articles which are not specified here-in-after : Grade M-15 (Nominal Mix)

3.6 **SPECIFICATION FOR DESIGN MIX CONCRETE M-25 GRADE**

3.6.1 This shall be done as per clause No 4.11.2.1 on page 60 and 61 of MES SSR Part-I. Volumetric mixing of concrete will not be permitted. Weigh batching alongwith system of measured water either through calibrated pump or calibrated tank is to be adopted strictly for all design mix concrete work.

3.7 **BATCHING**

Irrespective of what is specified in MES SSR and else wherein these tender documents, weigh batching & mixing shall be governed by following specifications:

- a. The weigh batcher shall be Automatic/Semi-automatic type.
- b. Weigh Batchers shall comply to IS latest IS 4925:2004.
- c. Capacity of weigh batcher shall be more than 8 cum/ hr.
- d. Weigh batcher shall be computerized and shall have automated water control system
- e. Weigh batcher shall have printing arrangements for batching report.
- f. Weigh batching along with system of measured water either through calibrated pump or calibrated tank is to be adopted strictly for all design mix concrete work.

The contractor shall be instructed to furnish the details of manufacturer of batching plant along with model number to the GE. The GE shall first approve those details before use of that plant.

3.8 **MIX PROPORTION AND STRENGTH**

(i)	Strength to be achieved	As per IS-456-2000
(ii)	Type of cement	As per clause 4.1 here-in-before
(iii)	Target mean strength of cement concrete	To be taken as per mix designed as per IS-10262 clause 2.2
(iv)	Aggregate/cement ratio by weight	As per mix design based on IS 10262 and IS-456-2000
(v)	Workability	As per clause 7.1 of IS-456-2000 slump shall be 25 mm to 75 mm compacting factor 0.85 to 0.92
(vi)	Max free water cement ratio	As per mix design based on IS-10262 and IS-456-2000
(vii)	Degree of quality control	Good (Refer Appx `A' of IS-10262)
(viii)	Durability	Exposure - Moderate
(ix)	Minimum cement content	As per IS-456:2000 Table-5
(x)	Type of aggregate	Crushed stone aggregate
(xi)	Max nominal size of aggregate	20mm or as specified

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PARTICULAR SPECIFICATION (CONT...)**NOTE**

- (i) In case there is any variation of cement content between design mix approved and minimum cement indicated here-in-before, there shall be no price adjustment for the same and contractor shall have no claim what so ever for using more quantity of cement
- (ii) If cement contents as per actual mix design are worked out lower than minimum cement content indicated here-in-before, the contractor shall have to provide minimum cement content indicated here-in-before and nothing extra shall be payable on this account.
- (iii) Lump sum amount quoted by the contractor shall deemed to be include the cost for quantity of cement as per design mix and nothing extra on this account shall be admissible
- (iv) No element of wastage of cement shall be allowed while working out the cement consumption details for design mix concrete work.
- (v) Mix design shall be prepared based on SP-23, handbook on concrete mixes and IS-10262. Recommendations guide lines for concrete mix design.
- (vi) Design mix with suitable admixture / plasticizer for workability of concrete shall be done separately while using pumpable concrete.

3.9. APPROVAL OF DESIGN MIX

- (a) Soon after commencement of work, contractor shall arrange the design mix. Design mix concrete shall be got carried out from National Test House, SEMT, CME, Regional Research Laboratories, any Govt approved laboratories such as Govt Engineering College, Chief Engineer Siliguri zone laboratory. Cost of designing the mix shall be borne by the Contractor. Cost of designing the mix in Chief Engineer Siliguri zone laboratory shall be Rs 5000 per design mix and shall be recovered from RARs/final bill. The design mix shall be got approved from GE before implementation in the work. In case contractor fails to submit the samples of design mix soon after commencement of work, the delay shall solely be attributable to the contractor and no claim of whatsoever nature shall be admissible on this account.
- (b) As soon as possible after receiving the design mix from the above agency same shall be verified at site by casting the final cubes.
- (c) Frequency of sampling shall be as per clause 15 of IS-456. Each sample shall consist of three numbers of preliminary test cubes (except as stated in para (d) below) of size 15x15x15 cm, and shall be made as per clause 2.8, 2.9 and 2.10 of IS-516. The concrete cube shall be tested as per IS-516 at site laboratory. The cubes will be tested after 28 days from the date of casting.
- (d) One sample for every design mix in the initial stage shall consist of seven numbers of preliminary test cubes of size 15x15x15 cm, and shall be made as per clause 2.8, 2.9 and 2.10 of IS-516. The concrete cube shall be tested as per IS-516 at site laboratory. Out of seven cubes, three will be tested after seven days (on 8th day) from the date of casting and three will be tested after 28 days from the date of casting & one No. cube shall be kept for record.
- (e) The test after seven days (ie on 8th days) is intended only to give an early indication of the strength likely to be achieved. The strength thus achieved should be comparable with the above design mix report with specified design parameter. However, 28 days compressive strength shall alone be the criterion for acceptance and rejection of the concrete.
- (f) GE can also carry out seven days strength test of more samples at his option. However, if the test report is found satisfactory, then the cost of testing including cost of cubes shall be borne by the Deptt. But if the result is found unsatisfactory, then the cost of cubes and cost of testing shall be borne by the contractor. The cost of conveyance of test cubes shall however be borne by the contractor in all cases.
- (g) On the result of the above test, the mix actually to be used shall be agreed to and approved by the GE. The approval of the GE shall not relieve the contractor of his responsibility for obtaining the required minimum strength of quality concrete in the works.
- (h) All testing charges including cost of cubes, conveyance, etc shall be born by the contractor except that the cost of optional seven days test be regularised as stipulated in para (f) here-in-before.

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PARTICULAR SPECIFICATION (CONT...)**3.10 ACCEPTANCE CRITERIA**

(a) The contractor shall be deemed to comply with the strength requirement as per clause 16 of IS-456.

(b) Whenever there is any change in the type of grading of material, the mix should be rechecked and modified suitably to the desired compressive strength.

(c) Standard deviation to be rechecked after collecting the result of actual concrete work (compressive strength actually achieved at site) to review for Design mix.

3.10.1 Testing of cubes shall be carried out at the site laboratory as per Annexure 'I'

3.11 TRANSPORTATION

3.11.1 Refer para 4.11.9 of MES Schedule Part-I.

3.12 PLACING & CURING OF CONCRETE

3.12.1 Placing & curing of concrete shall be as specified in SSR Part-I and as per IS.

3.13 MIXING AND COMPACTION OF PLAIN CEMENT CONCRETE

(i) All plain cement concrete shall be mixed in approved mechanical mixer. The mixer must also have a water container with a water meter for adding measured quantity of water in each batch. Mixing of concrete shall be as per clause 4.11.5 of MES SSR Part-I.

(ii) All RCC work shall be consolidated with approved mechanical vibrators except where not practicable in the opinion of the Engineer-in-Charge. RCC in slabs shall be compacted with plate/surface type vibrator and in beams/columns with needle/pin vibrator.

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3.20 **PLINTH PROTECTION:** Plinth protection shall be in PCC M-10 (Nominal mix) using 20 mm graded stone aggregate 75 mm thick over 100 mm thick hard core of broken brick aggregate of gauge not exceeding 63 mm over 30 cm compacted earth filling in layers over rammed earth along with PCC saucer drain 30cm wide on all sides of buildings. The width of plinth protection (including drain) shall be 900mm from external face of wall. Top of plinth protection concrete shall be finished fair without using extra cement. Construction joints shall be provided at 3 meter intervals and at corners with 50 mm deep and 10 mm wide joints as specified in clause 13.32.3 of MES Schedule Part I. The joints shall be filled with epoxy sealant.

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5. **FORMWORK**

5.1 Refer Clause No. 7.15 on pages 142 of MES Schedule Part-I. Form work shall be of steel/plywood. Formwork shall be for fair finish as specified in clause 7.15.2(b) on page 142 of SSR Part-I. No camber in form work as mentioned in Para 7.15 of MES Schedule Part-I shall be provided.

5.2 Design of formwork shall be got approved by the Engineer-in-Charge before commencement of work and recorded in works passing register.

5.3 The vertical props shall consist of steel sections only. The props consisting of ballies/bamboos or brick pillars as mentioned in clause 7.15.4 of MES schedule part-I shall not be used. The steel props shall rest firmly on steel plates/wooden planks. The bricks shall not be used below vertical props to adjust/make up length of props.

5.4 In case the height of centering exceeds 3.5 Meters, the props shall be provided in multistage. All the props shall be firmly braced in both directions horizontally.

6. **Concrete under Special Condition**

6.1 During hot or cold weather concreting should be done as per the procedure set out in IS-7861.

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PARTICULAR SPECIFICATION (CONT...)**7. Lime Concrete**

- 7.1 Lime shall be factory made by hydrated lime powder conforming to IS-712.
- 7.2 Lime concrete filling shall be with lime mortar (1:2) mix using 40mm graded coarse aggregates (well burnt brick aggregates broken to 40mm gauge).

8. MASONRY WORK

- 8.1 **Cement:** Refer Clause 4.1 hereinbefore.

- 8.2 **Sand:** Sand for mortar shall be as specified in Clause 5.4 of MES Schedule Part-I.

8.3 Brick Work:

- 8.3.1 Bricks shall be kiln burnt 250mm X 125mm X 75mm. Nominal size, locally available best quality with minimum crushing strength 75 Kg/Sq cm. The dimensions of bricks shall not vary more than + or - 8% of the dimensions given above of nominal size. Centre line dimensions shall invariably be maintained. In all other respect, brick shall conform to requirements of sub class 'B'. Brick shall be got tested by the contractor in site laboratory if established by the Department or in the Zonal laboratory and the recovery as specified in Annexure 'I' shall be effected from the contractor. If facility for these tests is not there in the site lab established by the Deptt or Zonal lab, the tests shall be carried out in Command Test Lab. The cost of materials and transportation charges shall be borne by the contractor without any extra claim for testing at Command Test Lab. Lintel/Tie beams/Roof Beams shall not be cast directly over brick work. The last course of the wall shall be built after the form work underneath the slabs or beams is removed.
- 8.3.2 The contractor shall produce brick etc, as require for such testing and carry the bricks to the place of testing as directed by the Engineer-in-Charge without extra cost to the Govt. Brick walls 750mm, 625mm, 500mm, 375mm, 250mm and 125mm thick shall mean 3 bricks, 2½ bricks, 2 bricks and 1½ bricks , 1 bricks and half brick thick wall respectively and vice-versa. Sub class 'B' bricks or brick works with sub class 'B' bricks mentioned in items of various parts of Schedule 'A' and in MES Schedule shall be deemed to be same as first class brick or brick work with first class bricks as specified above. In case of deviation, irrespective of size/type of bricks used brick work shall be priced at appropriate rate for sub class 'B' bricks(old size) as given in the MES Schedule, irrespective of the fact that locally available best quality bricks have been used.
- 8.3.3 Half brick thick wall of height more than 90cm shall be reinforced with two Nos 8 mm dia MS TMT bar horizontally at every fourth course starting from floor level. The first layer of reinforcement shall be started with 2nd course of brick work above floor level.
- 8.3.4 At the junction of RCC wall/column and brick wall, 40 mm x 3 mm FI wall ties shall be provided at every fourth course of brick work starting from the floor level as shown on TD Drg.
- 8.3.5 In the event of deviations, brick work as specified above, shall be priced at the applicable rates in MES Schedule (Part-II) for M & L sub class 'B' bricks (old size), subject to contractor's percentage, as applicable.
- 8.3.6 Provision contained in clause 5.23.1 of SSR Part -I shall not be applicable.
- 8.3.7 (a) Mix of mortar for brick work shall be in cement sand mortar (1 : 6).
- (b) Brick work less than one brick thick wall shall be in cement sand mortar (1 :4) .
- 8.4.1 Width of concrete lintels, beams, cills, and the like coming in conjunction with brick walls/pillars shall be kept to the actual width of brick work of that place unless otherwise have been specifically shown, in which case, the width as shown on structural drawings shall be maintained.
- 8.4.2 Centre line dimensions of rooms, verandahs, etc shown in drawing shall be maintained. Internal and overall dimensions, if at variance from whatever shown in drawings, shall be deemed to have been amended accordingly. The dimensions for various height shall be maintained as shown on the drawings.

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PARTICULAR SPECIFICATION (CONT...)

8.4.3 Mortar bed joints shall be such that four courses of brick work and three joints taken consecutively shall measure 3cm to 4cm in addition to the combined height of bricks themselves. The provision regarding above, made in Para 3.26 of MES Schedule shall be deemed to be modified accordingly and no price adjustment shall be done on this account.

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12. **WOOD WORK AND JOINERY**

12.1 **Timber**

12.1.1 Timber for all joinery and wood work shall conform to specifications given in clause 7.3 of the MES Schedule and shall be within the permissible limits of defects defined in Clauses 7.4 and 7.5 of the MES Schedule Part-I .

12.1.2 Timber shall be well seasoned, weathered, air or kiln dried, at the discretion of the contractor but without any price adjustments. The moisture content of timber shall not exceed the limits laid down vide Clause 7.7 of the MES Schedule Part-I.

12.2 **Preservation of Timber**

12.2.1 Preservative/ antitermite treatment shall be carried out to all wood work and joinery fabricated by the contractor at site. Factory made Ply/Boards are also deemed to be provided with antitermite treatment.

12.2.2 Chemical used for antitermite treatment to wood work and joinery shall be COPPER NAPHTHANATE, ASCU or any other chemical specified in IS-401, applied in any one of the manners specified in ibid IS.

12.3 Except where specifically indicated elsewhere in these particular specifications, the species of timber for joinery/furniture items fabricated at site and prefabricated wood products i.e. Plywood, particle/block/medium density fibre (MDF) board etc, shall be as specified here under :-

(i) Fully panelled or partly panelled/ glazed/ wire gauged shutters : Factory made as per IS-1003 – 2nd Class HW (Hollock/ Bjsal/ Benteak).

(ii) Frames of built-in cupboards/cabinets and furniture items if provided with timber shall be Second Class hard wood(Sal/ Hollock/ Kalasiris/ Chaplash).

(iii) Panelled/ flush shutters of built-in cupboards/cabinet and furniture items as indicated on drawings and fabricated at site : Frame of second class hardwood and facing/inserts as indicated on drawings.

(iv) Edging/ beading for particle/block/medium density fibre board exposed to view in shutters, shelves and tops of built-in furniture, cupboards and cabinets, handrail of stair : Teak/Shishu wood.

(v) Gutties, plugs, cleats/stoppers, beading and fillets for shutters and frames : Second Class hardwood, (Sal/ Kalasiris/ Chaplash/ Hollock).

(vi) All other woodwork and joinery not otherwise specified : Second Class hardwood,(Sal/ Kalasiris/ Chaplash/ Hollock).

12.4 **Paneled Door Shutters/Wire gauge shutters**

12.4.1 Door shutters shall be 35 mm thick factory made using 2nd class hardwood conforming to IS-1003 (Part-I). Styles and rails shall be kiln seasoned and chemically treated (under vacuum pressure). Panel inserts shall be 12mm thick plywood ventured finish BWR conforming to IS-3097 exterior grade (grade 1) solid core, general purpose commercial veneered on inside and decorative veneered on outside, the shade of veneering shall be approved by GE. The details and specifications unless otherwise specified of Panel Shutters and mosquito proof door shutters shall be as TD drawings Factory shall be approved/nominated from the any one of those in the list mentioned in Appendix 'B' to Particular Specifications here-in-after, which are located and active in the area as suggested by the contractor and approved by the GE. The door / window to be got approved from the GE duly factory visit prior to placing order for bulk delivery of all types of door / window for incorporation of work.

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PARTICULAR SPECIFICATION (CONT...)

12.4.2 Panelled shutters & Wire gauge shutters shall be provided with beading around the panel insert on both sides of shutter. Size of beading irrespective what is shown in TD drawing, shall be 20mm in width and tapered thickness from 10mm to 5mm.

12.4.3 Frame (Door): Frame shall be made from pressed steel frame using CR steel of thickness 1.25 mm conforming to latest IS 513:2008. The size of frame will be as indicated in drawing. The Gap between frame and brickwork and the jamb will be filled with PCC (M-10 Nominal mix). Both will be done simultaneously.

12.4.4 All doors shall have Mortice Lock and Latch (vertical type and rebated type). The type of lock shall be provided with prior approval from GE.

12.5 Flush Door Shutters

Frame (Door): Frame shall be made from pressed steel frame using CR steel of thickness 1.25 mm conforming to latest IS 513:2008. The size of frame will be as indicated in drawing. The Gap between frame and brickwork and the jamb will be filled with PCC (M-10 Nominal mix). Both will be done simultaneously.

Door Shutter: 35 mm thick flush door shutter (factory made best quality, ISI marked) shall be fixed with above door frame. The teak wood particle board (pre-laminated) core finished flush door with decorative veneered outside and commercial veneered inside, shall conform to IS 2202(Part 1):1999. The shade of veneering shall be approved by GE. The details and specifications unless otherwise specified of Flush door shutters shall be as TD drawing.

12.6 **Wood based products:** Wherever shown on drawings or indicated elsewhere in the specifications for built-in furniture wood based products shall be as specified below :-

12.6.1.1 **Un-veneered Particle Board:** Shall be flat pressed, three layered, medium density, phenol-formaldehyde synthetic resin bonded (BWR type adhesive) and stamped IS : 3087, specification for wood particle board (medium density) for general purposes.

12.6.1.2 **Veneered Particle Board:** It shall comply with the requirements of IS:3097, specifications for veneered particle boards. The board shall be exterior grade with solid core, general purpose type.

12.6.3 **Ply wood:** General purpose ply wood shall be BWR grade, type BB conforming to the requirements of IS : 303. PVC laminates 1mm thick, type-1 quality conforming to IS : 1328. Teak ply wood shall have teak veneer on one or both faces as indicated/ specified.

12.7 **Decorative Laminates:** Decorative laminates where indicated on drawings shall be 1mm thick plastic laminated sheet type I as specified in Clause 12.7 of MES Schedule Part-I. The laminates shall be fixed to base with approved adhesive as per manufacturer's instructions.

12.8 Workmanship

12.8.1 Joinery shall be wrought all over, Timber surface exposed to view shall be wrought and for surface not exposed to view shall be clean sawn. The workmanship and fixing of joinery shall be as per Clauses 8.15 to 8.28 of MES Schedule Part -I.

12.8.2 The dimensions of the various components of joinery (other than block board shutters) shown on drawings, wherever at variance shall supersede the standard dimensions mentioned in the MES Schedule. However, for pricing deviation involving any joinery work the rates in MES Schedule for the corresponding joinery item shall be applicable without any price adjustment for variation in dimensions given in clause 8.25.5 of MES Schedule.

12.8.3 Unless otherwise specified, all work both carpenter's and joiner's shall hold full dimensions shown on drawings except that an allowance of 1.5mm shall be allowed for each wrought face. Wooden beads and fillets shall however, hold the full dimensions as shown on drawings. The contractor shall also maintain the overall sizes of the doors and windows etc as shown on drawings.

12.8.4 Timber up to 3M length shall be in one piece.

12.8.5 Plugging to walls, shall be done with wooden plugs as per clause 7.29 of MES Schedule Part-I and specified here-in-before.

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PARTICULAR SPECIFICATION (CONT...)**12.9 FRP DOORS & frames for WC, Bath and toilets:-**

Doors and frame of WC, Bath and toilets shall be of fibre glass reinforced plastic (FRP) and as specified here under:-

(a) FRP frames shall be of cross section 90mm x 45mm having single rebate of 32mm x 15mm to receive shutter of 30mm thickness. Door frame laminate shall be 2mm thick and shall be filled with suitable wooden block in all the three legs. MS stay shall be provided at the bottom to steady the frame.

(b) The thickness of FRP shutters shall be 30mm & thickness of FRP sheet shall be 03mm Shutters shall be in depressed panel design and colour as approved by GE and shall be include extra reinforcement on edges. The core of shutter in styles and rails area shall be of polyurethane foam the panel area shall have ply-FRP sandwich construction having 4mm thick ply to have embedded wooden blocks for taking fixtures shutter shall have recesses to take hinge to fix with frame. The whole shutter shall have resistant to mild acid/alkali. Aluminium mongery to FRP shutter shall be fixed as per manufacturer's instructions. Any tenderer offering FRP shutter with more thickness of FRP will not be paid any thing extra cost to dept.

(c) FRP door shutter shall be of make as specified in Appx 'D'

(d) 03 Nos MS hold fasts/lugs on either side shall be fixed as per manufacturers instructions. Other joineries shall be provided as shown for relevant drawings for PVC doors.

BUILDER'S HARD WARE**13. General**

13.1 **Item and Quantities:** All Builders hard ware shall be as per BOQ.

13.1.2 **Sizes:** In case the size of particular fitting is not given in the BOQ, it shall be of size as per common engineering practice as directed by the GE.

13.1.3 All articles of builders hardware shall bear ISI marking. In case any item/fittings with ISI mark is not manufactured than it shall conform to the relevant IS specifications and the specifications given in the MES Schedule for the relevant item.

13.1.4 Screws used for fixing items of builders hardware shall be as specified in clause 9.2.6 of MES Schedule Part-I and shall match the material of respective builder hardware.

13.1.5 Articles of builders hardware, for built-in-furniture, where specified of aluminium, these shall be of anodised aluminium

13.2 ARTICLES**13.2.1 Hinges**

Butt Hinges: Butt hinges shall be of stainless steel with 3 mm thick SS plate all as specified in clause 9.7.2 of MES Schedule Part I.

13.2.2 **Tower bolts:** Tower bolts shall be Aluminium anodised conforming to specifications given in MES Schedule. Diameter of bolt shall be 10mm (ISI Mark).

13.2.3 **Sliding Door bolts:** Sliding bolts where shown on drgs, shall be of Aluminium anodised bolt not less than 16mm dia (ISI mark).

13.2.3.1 **Handle:** Handle shall be aluminium anodised with finger plate 1mm thick aluminium (ISI Marked) wherever shown on drgs.

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13.2.3.2 **Door stopper:** Door Stopper shall be aluminium with rubber / PVC stopper.

13.2.4 Door Springs

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PARTICULAR SPECIFICATION (CONT...)

13.2.4.1 **Door Springs Rat Tail Type:** All wire gauzed shutters shall be provided with door springs Rat Tail Type made of mild steel all as specified in clause 9.7.8 of MES Schedule Part-I.

13.2.5 **Pegs:** Pegs where shown on drgs shall be of aluminium anodised cast integral with base plate. If the same is shown to be fixed on wall, the same shall be fixed on second class HW Base.

13.2.7 **Towel Rails:** Towel rails shall be chromium plated 'D' shape with flanged ends for fixing. It shall be of minimum dia 19mm and 75cm long, in case length not mentioned in drawings

13.2.8 **Wire Cloth:** wire cloth to be used for wire gauzed shutter shall be of stainless mild steel wire cloth conforming to IS having "not less than 0.36 mm dia" of wire and 1.40 mm average width of aperture all as specified in SSR Part I

13.2.9 **Curtain Rods with Brackets(CR) :** Curtain rod with brackets and end cap shall be provided to door and window and openings of rooms. The brackets shall be of decorative type. Curtain rods shall be of stainless steel of not less than 25 mm dia, and gauge not less than 0.8mm and shall be extended up to 150 mm on both side of opening.

13.2.10 **Tie Hanger:** Standard tie hanger 'D' shaped 300mm long of aluminium anodised tubular of dia 10mm shall be provided as directed by GE.

13.2.11 **Hasp and Staple:** Shall be aluminum alloy (anodised), safety pattern conforming to IS : 363-1976.

13.2.12 **Blank**

14. **STEEL AND IRON WORK**

14.1 The entire steel required for incorporation in the work shall be arranged by the contractor and shall comply with the requirement of following specifications:-

(a) **REINFORCEMENT STEEL:** High strength deformed steel bars produced by Thermo Mechanical Treatment process (TMT) steel bars of Grade Fe 500 (D) meeting all other requirements of IS-1786-2008. The procurement shall be done as per procedure given below.

(b) **STRUCTURAL STEEL:** Standard quality: Fe-410-S Conforming to IS- 2062, Structural Steel Tube shall be YST-310 grade.

(c) **HOLD FASTS,GRILLS ETC & OTHER THAN STRUCTURAL:** Fe-310-0 conforming to IS - 1977.

(d) **GALVANISED SHEETS PLAIN OR CORRUGATED:** Conforming to IS -227.

(e) **FABRIC REINFORCEMENT FOR CONCRETE:** Conforming to IS- 1566. Wire fabric for General use, window Grills, etc shall be conforming to IS-4948 and all as per MES Sch Part I clause

10.33

14.2 to 14.20 **BLANK**

14.21 **STEEL WINDOWS/VENTILATORS**

14.21.1 Steel windows/ventilators shall be ISI Marked with IS-1038. Rolled steel sections used for fabrications shall conform to IS-7452.

14.21.2 Steel windows/ventilators with only flash butt welding shall be incorporated in the work.

14.21.3 Both fixed and openable frames shall be constructed of sections mitred at corners. The Hinges shall be as per drawing for side hung shutters openable outside and friction type for openable inside. Size of projecting type hinges shall be 65mm to 75mm wide. The hinges pin shall be of electro galvanized steel of suitable thickness. Friction hinges shall be provided with stainless steel washers. The handle of minimum thickness 3mm and peg stays (minimum thickness 2mm) for side hung shutter shall be of mild steel copper oxidised or stove enamelled finish at the choice of contractor. Peg stays shall be 300mm long with steel peg and locking arrangement riveted or welded to the fixed frames. Machine screws as specified in IS -1038 shall only be used for fixing. Side hung shutters fitted with friction hinges shall not be provided with peg stays. Stay shall have three holes for keeping the shutters open in these different positions.

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PARTICULAR SPECIFICATION (CONT...)

14.21.4 Fixing lugs to fixed frames shall be as per provision of IS-1038 except that the top lugs shall not be provided. The bedding of steel frames shall be done in cement mortar (1:4).

14.21.5 The sub dividing/sash bars of windows and vents shall be tennoned to frame and rivetted as specified in IS-1038.

14.21.6 All steel surfaces shall be thoroughly cleaned, free of rust, mill scales, dirt, oil etc. either by mechanical or chemical process and shall be treated with a coat of anticorrosive red oxide primer.

14.21.7 Centre hung windows shall be mounted on antifriction brass pivots.

14.21.8 Handle to fly proof window shall be pressed type.

14.21.9 Steel windows and ventilators shall be obtained from any of the firms mentioned as indicated in Appx-'B'

15. MILD STEEL GRILL/GUARD BARS

(i) All steel windows and ventilators shall be provided with grills of 12 mm square mild steel bars welded to window frame. The pattern of guard bar/grills shall be as per TD drg No SZ/TD/219/99.

(ii) Size of guard bars for Guard room, detention room and like shall be provided as per TD Drg.

(iii) Size of guard grill for gun store, telecom store etc to be specified by user unit.

16. ANODISED ALUMINIUM DOORS, WINDOWS, VENTILATORS, PARTITIONS, COMPOSITE:

All aluminium sections shall have powder coating with minimum thickness 50 micron if not mentioned in scope of work. Aluminium sections in various locations including sections to be used in false ceiling shall be extruded built up standard tubular and other sections of approved make conforming to IS: 733 and IS:1285, anodised dyed to required shade according to IS: 1868. (Minimum anodic coating of grade AC 15), fixed with rawl plugs and screws or with fixing clips, or with fixing clips, or with expansion hold fasteners including necessary filling up of gaps at junctions, at top, bottom and sides with required PVC / neoprene felt etc. Aluminium sections shall be smooth, rust free, straight, mitred and jointed mechanically wherever required including cleat angle, Aluminium snap beading for glazing / panelling, C.P. brass / stainless steel screws, all complete as per the directions of Engineer-in-Charge. These shall be of procured from approved manufacturers as specified. Aluminium joinery shall be manufactured out of heavy extruded section.

16.1 All external window / vents in md accn / living accn shall be provided with double shutter i.e. glazed shutter + gauged shutter. The size of various components such as frame, styles and rails, beading and other components, the thickness of aluminium sheet out of which these are fabricated shall be all as per details shown on schedule.

16.2 Any variation/deviation from the above shall be provided only after obtaining written approval from the Accepting Officer. However, the contractor shall note that the variation if found on plus side no extra payment will be admissible and if found on lower side the same will be adjusted through a minus deviation.

16.3 The aluminium fittings shall be fitted/fixed all as per manufacturer's instructions and as directed by Engineer-in-Charge.

16.4 The panels such as Glass panels/Prelaminated particle board panel with decorative lamination on both sides etc, shall be all as described elsewhere in the specifications. The panels shall be fixed with standard aluminium beading self-interlocking type with EDPM rubber gasket.

16.5 All screws shall be cadmium plated. EDPM rubber shall be provided for all glazing for giving cushion to glass. Everite/Hardwyn make floor spring conforming to IS-6315 with set of special brass pivot with weighing capacity up to 130 Kg with stainless steel cover plate of ISI mark shall be provided to the door shutters.

16.6 **GRILLS FOR ALUMINIUM WINDOWS/VENTS:** Where shown on schedule aluminium windows/vents shall be provided with aluminium grills of the design as approved by GE. The aluminium grills shall be Polyester powder coating in any colour with minimum thickness 50 micron if not shown in schedule. The grills shall be fixed all as direction of engineer-in-charge.

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PARTICULAR SPECIFICATION (CONT...)

16.7 **FROSTED GLASS IN DOORS / WINDOWS:** Thickness of glass pane shall be as shown on drawing. Frosted glass panes shall be fixed with frosted face on the inside. Glass panels shall be fixed by providing a thin layer of putty conforming to IS 419.

16.8 **GFRP/FRP DOOR** GFRP/FRP door specification shall be as per IS 14856-2000 and one door shall be tested at random from Govt. approved laboratory, cost of the same shall be borne by the contractor.

17. **COLLAPSIBLE GATE:** Collapsible gate shall be as specified in SSR part-I clause 10.24

18 **PRESSED STEEL FRAMES FOR DOORS**

18.1 Pressed steel frames shall be factory made fabricated from 1.25mm thick mild steel plain sheet and shall be provided all as per details shown on drawings and as specified in Clause 10.27 of MES Schedule. Pressed steel frames shall be filled with PCC of grade M-10 (Nominal mix) . Bedding of frames shall be done in cement mortar (1:3).

18.2 MS tie bar of 16mm dia round bars shall be provided at the bottom of frames by welding to the frame and tie bar shall be embedded and left in floor.

18.3 The frames shall conform to specification given in IS-4351 with regard to fittings, hinges and shock absorbers except that hinges shall be of mild steel. Cleat hinges may be welded on top of frames.

18.4 MS conduit 19mm dia of 16 gauge closed at one end and shall be welded to inner face of frame for receiving shoot of bolt. MS sockets for housing shoots of tower bolt shall also be provided as directed by Engineer in Charge.

18.5 Pressed steel door frames shall be supplied by manufacturers with a shop coat of zinc chrome primer.

19 **STRUCTURAL STEEL GATE/DOOR:** Structural steel gates/doors shall be made of MS Channel, Rolled steel beams, angle, flat and plates etc. riveted/welded joints, all as per drawing. Steel sheet covering to steel doors shall be with PGI/PBI sheet of thickness as shown on drawings. Where thickness is not indicated it shall be of 0.80mm thick.

20 **STAIR CASE RAILING:** Railing consisting of flat iron and/or square bars duly welded shall be provided as per details shown on drawings. Mortice hole left in concrete for fixing balusters of the railing shall be grouted in cement mortar (1: 2) and finished to match the adjoining surface of concrete.

21 **STEEL ROLLING SHUTTER:** Steel rolling shutter shall be provided all as specified in clause No 10.23 of SSR Part-I for manual type. The rolling shutter shall be without ball bearing as specified including top cover, anchoring rod, haps and staple with safety lever locks mild steel with four levers. The thicknesses of laths shall be 1.25mm. The rolling shutter complete in all respect shall be fixed in position as shown on drgs. The rolling shutter shall be of standard make as approved by the GE"

22 to 24 **BLANK**

25 **WATER PROOFING TREATMENT TO RCC ROOF:**

25.1 Water proofing treatment to the building shall be carried out as follows:-

[A] **Water Proofing treatment to NON ACCESSIBLE RCC Roof:** Water proofing treatment to the buildings with non-accessible RCC roof shall be carried out as follows:-

(a) Over the RCC roof slab, 10 mm thick plaster in CM (1:4) shall be provided mixed with water proofing compound, ISI marked as per manufacturer instructions. The plaster shall be provided when the concrete is green. The plaster surface shall be steel troweled to get a smooth surface

(b) After the plaster has dried up, the membrane treatment shall be applied as under:-
(i) The plastered surface shall be prepared by thoroughly wire brushing, washed, dried up and cleaned of all foreign matter and dust.
(ii) On the prepared surface, one coat of approved bituminous primer @ 0.40 Ltr per Sqm shall be applied. The primer and the membrane to be used shall be of same manufacturer.

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PARTICULAR SPECIFICATION (CONT...)

(iii) Over the primed surface, 4 mm thick APP modified polymeric membrane with non-woven polyester reinforcement shall be laid by torch application method. The make of APP membrane shall be M/S TEXSA INDIA LTD (MOPLY-FP) / M/S STP LTD (SUPER THERMOLAY) / PIDILITE INDUSTRIES. Technical characteristics of the membrane shall be as under:-

CHARACTERISTIC	SPECIFICATIONS
(i) Thickness	Minimum 3mm
(ii) Weight	Minimum 3.50 Kg per Sqm of membrane
(iii) Softening point	Min 150° C.
(iv) Cold flexibility	(-)5° C
(v) Reinforcement	Non-woven polyester Mat Minimum 160 gm /m ² .
(vi) Tensile strength:-	
Lengthwise	> 650N / 5cm
Crosswise	> 450N / 5cm
(vii) Elongation :-	
Lengthwise	Min 40%
Crosswise	Min 35%
(viii) Heat Resistance	Does not Drip at 120°C
(ix) Tear Strength :-	
Lengthwise, N	> 300
Crosswise, N	> 250
(x) Water	
Absorption, %	<0.15

The side overlaps shall be minimum 75mm and the end laps shall be minimum 100 mm. All overlaps and joints shall be sealed as per manufacturer's instructions.

(iv) The finished surface shall be given aluminum paint @ 0.11Kg/M² as per manufacturer's instructions.
(v) APP membrane shall be extended to downward facia for roof projection.

(c) For parapets/vertical surfaces of walls, the membrane shall be taken to a height of min 60 cm & then inserted inside the parapet in a groove. The same shall be finished by a membrane flashing.

(d) All angles and abutments should be sealed well with extra care to ensure full bondage.

(e) The entire work of APP membrane treatment to plastered RCC roof slabs shall be carried out by engaging **authorized applicator of the manufacturer**. For this purpose, contractor shall submit the details of authorized applicator alongwith supporting documents to GE well in time and the work shall be executed only after written approval by GE. However the main contractor shall give guarantee for efficiency of water proofing treatment for a period of ten years as specified here-in-before.

(f) Random samples of Polymeric Water Proofing membrane, as selected by GE, shall be got tested from National Test House / Govt approved lab where such facilities exists before incorporation in the work. Cost of testing shall be borne by the contractor.

(g) In case the test results does not meet the specifications given above, the entire lot shall be rejected by the GE. In such a case, the contractor shall bring the fresh lot of desired quantity of APP modified Water Proofing Membrane and the same procedure of testing repeated till the time satisfactory test results are obtained. Nothing extra will be paid to contractor on this account.

[B] **Water Proofing treatment to ACCESSIBLE RCC Roof/ Terrace**

(a) Over the RCC roof slab, 10 mm thick plaster in CM (1:4) shall be provided mixed with water proofing compound, ISI marked as per manufacturer instructions. The plaster shall be provided when the concrete is green. The plaster surface shall be steel troweled to get a smooth surface.

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PARTICULAR SPECIFICATION (CONT...)

(c) For parapets/vertical surfaces of walls, the membrane shall be taken to a height of min 60 cm & then inserted inside the parapet in a groove. The same shall be finished by a membrane flashing.

(d) All angles and abutments should be sealed well with extra care to ensure full bondage.

(e) The entire work of APP membrane treatment to plastered RCC roof slabs shall be carried out by engaging **authorized applicator of the manufacturer**. For this purpose, contractor shall submit the details of authorized applicator alongwith supporting documents to GE well in time and the work shall be executed only after written approval by GE. However the main contractor shall give guarantee for efficiency of water proofing treatment for a period of ten years as specified here-in-before.

(f) Random samples of Polymeric Water Proofing membrane, as selected by GE, shall be got tested from National Test House / Govt approved lab where such facilities exists before incorporation in the work. Cost of testing shall be borne by the contractor.

(g) In case the test results does not meet the specifications given above, the entire lot shall be rejected by the GE. In such a case, the contractor shall bring the fresh lot of desired quantity of APP modified Water Proofing Membrane and the same procedure of testing repeated till the time satisfactory test results are obtained. Nothing extra will be paid to contractor on this account.

[B] **Water Proofing treatment to ACCESSIBLE RCC Roof/ Terrace**

(a) Over the RCC roof slab, 10 mm thick plaster in CM (1:4) shall be provided mixed with water proofing compound, ISI marked as per manufacturer instructions. The plaster shall be provided when the concrete is green. The plaster surface shall be steel troweled to get a smooth surface.

(b) After the plaster has dried up, the membrane treatment shall be applied as under :-

(i) The plastered surface shall be prepared by thoroughly wire brushing, washed, dried up and cleaned of all foreign matter and dust.

(ii) On the prepared surface, one coat of approved bituminous primer @ 0.40 Ltr per Sqm shall be applied. The primer and the membrane to be used shall be of same manufacturer.

(iii) Over the primed surface 4 mm thick APP modified polymeric membrane with non-woven polyester reinforcement weighing not less than 4Kg/SM, shall be laid by torch application method. All other properties of APP modified polymeric membrane shall be all as specified in Para (A) (iii) here-in-before. The side overlaps shall be minimum 100 mm and the end laps shall be minimum 100 mm. All overlaps and joints shall be sealed as per manufacturer's instructions.

(iv) Provide 20-22mm thick the hydraulically pressed concrete tiles of size 250 X 250mm as per IS-1237 laid over 15mm thick bedding in cement mortar (1:4), joints grouted and flush pointed in cement mortar (1:3) mixed with 5% crude oil by weight of cement. The tiles shall be laid either through authorized applicator who has laid the APP membrane or by the contractor under the supervision of the authorized applicator of APP membrane.

(c) For parapets/vertical surfaces of walls, the membrane shall be taken to a height of min 60 cm & then inserted inside the parapet in a groove. The same shall be finished by a membrane flashing.

(d) All angles and abutments should be sealed well with extra care to ensure full bondage.

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PARTICULAR SPECIFICATION (CONT...)

(e) The entire work of APP membrane treatment to plastered RCC roof slabs shall be carried out by engaging **authorized applicator of the manufacturer**. For this purpose, contractor shall submit the details of authorized applicator alongwith supporting documents to GE well in time and the work shall be executed only after written approval by GE. However the main contractor shall give guarantee for efficiency of water proofing treatment for a period of ten years as specified here-in-before.

(f) Random samples of Polymeric Water Proofing membrane, as selected by GE, shall be got tested from National Test House / Govt approved lab where such facilities exists before incorporation in the work. Cost of testing shall be borne by the contractor.

(g) In case the test results does not meet the specifications given above, the entire lot shall be rejected by the GE. In such a case, the contractor shall bring the fresh lot of desired quantity of APP modified Water Proofing Membrane and the same procedure of testing repeated till the time satisfactory test results are obtained. Nothing extra will be paid to contractor on this account.

[C] Roof treatment of garages/covered garages

Roof treatment shall be carried out while concrete is green, a layer of minimum 10mm thick CM (1:4) admixed with approved W.P.C and laid over to roof with proper slope all as directed.

26 WATER PROOFING TREATMENT TO SUNKEN FLOOR

26.1 Treatment to sunken floor shall be carried out as under :-

(i) Cleaning top surface of floor slab and laying 50mm thick (average) PCC of grade M-10 (Nominal Mix), mixed with WPC as per manufacturer instruction laid in slope 1 : 20 towards spouts including coveting corners.

(ii) 15mm thick plastering in CM (1:4) on sides mixed with water proofing compound as per manufacturer instruction.

(iii) Applying first layer of slurry at the rate of 0.488Kg/Sqm mixed with acrylic based polymer modified cementious compound at the rate of 0.253 Kg/sqm. This layer shall allowed to air cured for 4 hours.

(iv) Applying second layer of slurry at the rate of 0.242Kg/Sqm mixed with acrylic based polymer modified cementious compound at the rate of 0.126 Kg/sqm. This layer shall allowed to air cured for 4 hours followed with water curing for 48 hours.

(v) Applying a coat of industrial bitumen 85/25 penetration @ 1.50Kg/Sqm on plastered & concrete surfaces.

(vi) Laying a layer of 200 micron polythene film.

(vii) Two nos 25mm bore GI medium grade 450mm long spout shall be provided through external wall to drain out accumulated water. .

(viii) Sunken floor shall be tested for water tightness by filling water for 72 hrs before and after treatment work is carried out and ensure that no leakage/seepage exists.

(ix) Sunken portion shall be filled with lean cement concrete of grade M-7.5 using broken brick aggregates.

27 TESTING OF WATER PROOFING TREATMENT

27.1 After the water proofing treatment is completed, leak proof tests shall be done by ponding. For this purpose in roof, mud, mortar, fillet ponds shall be made longitudinally one meter apart over entire treated surface of roof to form pond of suitable size as directed by the Engineer-in-Charge. (These ponds shall be filled with potable water so that an average 50 mm(minimum 25mm and maximum 75mm) height of water is maintained during the test period.

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PARTICULAR SPECIFICATION (CONT...)

27.2 Tests shall be carried out continuously for a period of 48 hours. Any seepage notified shall be rectified by the contractor and making good the defective portion to entire satisfaction of the GE, who will pass this stage.

27.3 All mud fillet bends shall be removed and surface made clear and tidy after completion of satisfactory testing.

27.4 Satisfactory completion of test shall not absolve the contractor from his responsibility of rectification of defects, which may arise during defect liability period.

28 **RAIN WATER PIPES** : Rain water pipe shall be provided of 160mm dia and shall be UPVC (SWR) pipe. These shall comply with the requirements of IS :13592-1002 (4 Kg / Sqcm) including PVC grating at top.

28.1 For PVC (SWR) pipe reference may be made to clause 18.27A of the MES Sch Part-I.

29 FLOORING**29.1 GENERAL**

(a) Floors shall be laid to levels and to falls as indicated in drawings and as directed by Engineer-in-Charge. Floors shall be sunk to required depth where shown in drawings.

(b) Floors shall be carried out through threshold of all openings in walls. In case of Kota stone flooring thresholds of all openings in walls shall be finished with Kota stone floors.

(c) In case of first floor and above, flooring as indicated in drawing shall be laid directly over RCC slab after applying cement slurry as specified in MES SSR Part-I.

(d) Type of flooring shall be as per the schedule of finishes and as specified. If type of flooring is not indicated for any location it shall be same as in other similar locations. No extra claim shall be admissible to the contractor on this account.

(e) Where thickness and type of floor topping is not shown in drawing, the same shall be 40mm thick PCC (1:2:4) type B-1.

(f) Steps and landings of stair case shall be finished as given in schedule of finishes / drawings. If specification of steps and landing is not shown on drawings, the same shall have the finish as that of adjoining floor topping

29.2 SUB BASE TO FLOOR

(a) Bay system of use of glass dividing strips not to be adopted in case of sub base.

(b) It shall be 75 mm thick PCC (1:4:8) type D-2.

(c) Where hardcore to sub base of floor is necessary the same shall be provided as specified herein before. Thickness of sub base of hardcore where not shown shall be 150 mm compacted thickness.

29.3 **PCC Flooring** : PCC flooring shall be provided as specified in schedule of finishes drawing and SSR part I. PCC flooring shall be laid in panels using 3mm thick glass dividing strip and finished even & smooth using extra cement. The top surface of RCC floor slab shall be provided with cement slurry @ 3Kg/sqm.

29.4 **NON SKID CERAMIC TILES** : Non skid ceramic tiles where ever indicated in schedule of finishes shall be 1st class superior/premium quality, rectified type, confirming to grade B-II(A) as per IS- 13712. The size and finish of tiles shall be as indicated in schedule of finishes. Thickness of tiles shall be 9 to 10 mm thick for 600 mm x 600 mm size tiles and 7 to 8 mm for tiles of size 400 mm x 400 mm. In case the size & thickness of floor tiles is not mentioned in Schedule of Finishes, the tiles shall be of 400mm x 400mm x 7 to 8mm thick. Tiles shall be of coloured as approved by GE. Tiles shall be laid, set and jointed in neat cement slurry and pointed with white cement (mixed with colour pigment to match colour of tile). Tiles shall be provided all as specified in clause 13.40 of MES SSR Part-I. The makes of tiles shall be as in Appendix 'B'

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PARTICULAR SPECIFICATION (CONT...)

Non skid ceramic tiles flooring shall be provided as shown in schedule of finishes drawing and as specified in SSR part-I.

29.5 **VITRIFIED TILES FLOORING:** Vitrified tiles shall be 1st class superior/premium quality, confirming to grade B-II (a) as per IS-13712. The tiles shall be light coloured and plain shade. Make of tile shall be as specified in Appendix 'B'. Tiles shall be provided all as specified in MES SSR Part-I. Size and thickness of tile shall be 600 mm x 600 mm x 9-10 mm thick.

Vitrified tiles flooring shall be provided as shown in schedule of finishes drawing and as specified in SSR part-I.

29.6 **POLISHED KOTA STONE SLAB FLOORING:** Polished (mirror polish) kota stone slab flooring shall be laid all as specified in clause 13.47 of MES SSR Part-I and as directed by the Engineer-in-Charge. Thickness of stone slab shall be 18 to 20 mm. Size of the stone slabs shall be 550 mm x 550 mm except for area less than 2 Sqm where the size of kota stone shall be 250 x 250mm.

Kota stone flooring shall be provided as shown in schedule of finishes drawing and as specified in SSR part-I.

29.7 **Acid Resistance Tiles:** Acid resistance tiles flooring shall be provided as shown in schedule of finishes drawing and as specified in SSR part-I.

29.8 **Interlocking Tiles :** Interlocking tiles flooring shall be provided as shown in schedule of finishes drawing and as specified in SSR part-I

30. **Skirting/Dado**

30.1 **Glazed tile dado :** Dado shall be provided with glazed ceramic tiles 1st class superior/premium quality confirming to grade B-III as per IS-13712. Size shall be 300 X 200 mm x 6 to 7 mm thick / 450x 300 mm 7 to 8 mm thick. Tiles shall be coloured as approved by GE. Tiles shall be laid over 10mm thick backing layer in cement mortar (1:3). Tiles shall be laid, set and jointed in neat cement slurry and pointed with white cement mixed with pigment to match the shade. The make of tiles shall be as in Appx 'B'.

30.2 **Ceramic tile skirting :** The tiles shall be glazed ceramic tile 1st class superior/premium quality confirming to grade B-III as per IS 13712, 100 mm high, 7 to 8 mm thick. This shall be coloured as approved by GE. Tiles shall be laid over 10 mm thick screed bed in cement mortar 1:3 jointed in neat

30.3 **Cement skirting :** Cement plaster in skirting shall be 15 mm thick in two coats. First coat shall be in cement mortar 1:4 and second coat shall be 5mm thick in cement mortar 1:3 trowelled to smooth and even finish using extra cement. It shall be in line with plastering and separated with groove. Junction of floor and skirting shall be rounded to a minimum radius of 5mm.

30.4 Kota stone skirting and vitrified tiles skirting shall be provided all as specified in schedule of finishes drawing.

30.5 **TESTING OF TILES:** All tiles before incorporation in the work shall be tested in Command / Zonal Test Lab. However cost of materials and transportation charges to command / Zonal Test Lab shall borne by the contractor without any extra claim. In case the required testing facility is not available in Command Lab/Zonal Lab, the same be done either at National Test House/Any Govt Engg College/ Any Govt Approved lab at the direction of the GE.

31. **PLASTERING**

31.1 **General**

31.1.1 Plaster (even if external wall faces is pointed) and/or Skirting/Dado shall be returned in jambs, soffits of lintels and window cills etc.

31.1.2 Where plaster on concrete surface is shown to match the adjacent wall surfaces, the mix of plaster shall be as for the brick surfaces.

31.1.3 All internal plastered surfaces (except where wall putty is stated to be provided) shall be trowel led to a smooth and even surface without using extra cement and external plastered surfaces shall be finished even and fair.

31.1.4 All external finishes shall be carried out up to 150mm below ground level.

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PARTICULAR SPECIFICATION (CONT...)

31.1.5 Thickness of cement plaster mentioned here in after shall be finished thickness exclusive of dubbing. Dubbing may however be done in one operation with plaster.

31.1.6 All corners, angle, junctions and edges shall be truly vertical or horizontal as one case may be and shall be carefully, finished corners round jambs of openings and junction of walls shall be rounded to minimum radius of 5mm, 12mm wide groove at the junction of all walls and RCC slabs to the entire thickness of wall plaster shall be provided in internal plaster only for load bearing structures.

31.1.7 Particular attention on the contractor is invited to take note of local practices on local availability of materials like bricks/stones from work etc, for any extra quantity of mortar require for re-tendering smooth, extra dubbing, required to reaching properly and achieving smoothly and even surfaces. This shall be deemed to have been included in the lump sum or one from rate quoted for plasterwork as applicable.

31.1.8 12mm wide groove at junction of all walls and RCC slabs to the entire thickness of wall plaster shall be provided. Also trowel grooves shall be provided at junction of walls and RCC columns or any other dissimilar material i.e. wooden/steel chowkhats etc.

31.1.9 No grooves to be provided at junction of RCC and Masonry on the external surfaces. Instead a strip of chicken wire mesh 150mm wide shall be fixed over the junction before plastering to act as reinforcement for plaster. However, grooves to be provided inside the building.

31.2 Materials

Cement : Refer Clause 3.2 here in before.

Sand : Refer Clause 4.2.4 of MES Schedule.

31.3 Cement Plastering to Surfaces

31.3.1 Internal surfaces of masonry work indicated in schedule of finishes of building including inside surfaces of CBs/SCBs, and lofts 1/2/3 tier shelves etc shall be plastered with 15mm thick in cement mortar (1:6). RCC Shelves, Shelves of Cupboards, shall be finished even & fair without using extra cement. Raisers of steps if not indicated on drawings shall be plastered with 10mm thick cement mortar (1:4).

31.3.2 All external masonry surfaces except where otherwise specified shall be plastered 20 mm thick in cement mortar (1:4) in two layer of 10mm thick rendering coat and 10mm thick setting coat in cement mortar (1:4). The rendering coat to be finished rough with scouring marks to receive the setting coat which will be applied after not less than a gap of two days over the first one. External (2nd)layer of plaster shall be mixed with ISI marked liquid water proofing compound. Make: CICO(brand CICO No -1) or equivalent in Pidilite/Sika. The quantity of water proofing compound shall be taken as per manufacturer instruction.

32. Grit Finish as specified in sch of finishes shall be carried out as specified in clauses 14.22 of SSR Part-I (2009) and as the directed by Engineer – in - Charge.

33. White Washing, Colour Washing ,Cement Base paint, and Distemper

33.1 **General** : Surfaces shall be prepared as specified in section 15 of MES Schedule Part-I. The workmanship shall be as described in MES Schedule applicable to new works.

33.2 White wash coats of white (lime) shall be provided as indicated in BOQ and as specified in MES schedule. For white washing on ceiling, adequate quantity of zinc oxide shall be added to lime wash for achieving egg white shade, skirting and dado are not to be white.

33.3 DISTEMPER OIL EMULSION

33.3.1 The internal plastered surfaces shall be finished with thin layer (3 mm thick) wall putty of approved make all as specified.

33.3.2 Two coats of distemper OIL emulsion over a coat of primer shall be provided on internal surfaces wherever shown in schedule of finishes. Colour / shade of the paint shall be as approved by GE. Distemper oil emulsion shall conform to IS - 428 and also refer para 15.6 of SSR Part-I. The workmanship shall be as described in para 15 .14 of MES Schedule Part-I.

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PARTICULAR SPECIFICATION (CONT...)

33.4. **WEATHER PROOF PAINT** : Weather proof paint shall be provided as shown in schedule of finishes drawing and as specified in SSR part-I

34 WEATHER PROOF EMULSION (EXTERIOR WALLS)

34.1 The acrylic emulsion paint shall be of premium quality. The paint shall be of the following make :-

(i)	APEX ULTIMA	:	M/s Asian paints Ltd
(ii)	Weather Coat	:	M/s Berger Paints Ltd
(iii)	Nerolac Excel	:	M/s Kansoi Nerolac Paints Ltd

34.2 PREPARATION OF SURFACES

The surface shall be thoroughly cleaned to removed loose dirt or dust, lichen, algae, fungi or any organic growth by use of stiff brush. Then the surface is washed well and allows water to dry. It shall then be sand papered and apply a thin layer (3 mm thick) of wall care putty of approved make to give smooth and even surface and then the sand papering the same again when surface is dry.

34.3 PRIMER COAT

Over this prepared surface apply a coat of acrylic primer as per manufacturer's instructions. This shall be allowed to dry for 4 to 6 hours before application of final paint.

34.4 FINISHING COAT

Acrylic paint of premium quality 100% acrylic shall be applied in at least two coats as per manufacturer's instruction. The acrylic paint shall be prepared as per manufacturer's instruction by adding water in proportion in order as suggested. No other thinner shall be used. Paint shall be applied with brushes or roller and shall be allowed to dry for 3 to 4 hours between subsequent coat.

35. Where no finish has been shown on drgs, internal plastered surfaces shall be provided with three coats of white wash and external plaster surfaces shall be provided with two coats of weather coat paint over a coat of white base cement primer .

36. PAINTING

36.1 **General** : All synthetic enamel paint shall be of brand and make as given in appendix 'B'.

36.1.1 The contractor shall inform the GE, within four weeks of the acceptance of the tender, the brand names of the manufacturers of paint proposed to be used in the works and submit sample there of well in time and obtain prior written approval of the GE before their use in work.

36.1.2 The contractor shall when so required by the GE, produce certificate from the manufacturer or their representative to establish that the brands of paints purchased by the contractor from then, satisfy the requirement of the relevant Indian Standard.

36.1.3 Paints for priming coat, under coat and finishing coat shall be of same manufacturer.

36.1.4 Tint of paint, if not mentioned in drgs/schedule of finishes will be approved by the GE.

36.1.5 The Painting (Wooden and steel surface) at all locations wherever specified in Sch of Finishes shall be provided. Design, color, texture and other attributes shall be first approved by GE before commencing the work. The Surface Finishes shall be as per schedule of finishes and drawing wherever specified and shall conform to latest Indian standard and as specified in MES SSR Part-1. Only first quality paint shall be incorporated in the work

36.2 Workmanship

36.2.1 All wood work required to be painted shall be smoothened, sized and knotted and then applied with priming coat. Stopping and filling with filler coat shall be done after priming coat and surface rubbed down to a level of smooth surfaces and thereafter under coat and finishing coat applied, all as specified in Clause 17.6 of MES Schedule. Steel and iron work shall be painted in the manner as specified in Clause 17.8 of MES Schedule.

36.2.2 Hidden surfaces of pressed steel chowkhat shall be given one coat of black bituminous paint over a coat of red oxide.

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PARTICULAR SPECIFICATION (CONT...)

36.2.3 No treatment shall be given to reinforcement.

36.2.4 Other steel surfaces (except GI pipes) exposed to view but not covered in schedule of finishes or their finishing if not specifically indicated in any other drawings or specified else where, shall be given two coats of synthetic enamel paint over a coat of primer of tint as directed by the GE.

36.2.5 Bottom of door shutters shall be given one coat of primer only.

36.2.6 Finishes to plastered surfaces in side cup-boards/ward robes shall be with two coats of synthetic enamel paint over a coat of primer.

36.3 **Tarring** : The backs and hidden of wooden articles in contact with brick work/plaster etc. and also wooden/steel surfaces embedded in walls shall be given two coats of tar. Hold fast shall be given two coats of tar and sanded.

36.4 Fire retardant paint where indicated in the schedule of finishes shall be provided with and including two coats of appropriate primer as per manufacturer's recommendations. The paint shall be of make Sukri Paints and chemical Pvt Ltd, or any other equivalent as approved by the GE.

36.5 **Cement Slurry** : Portions of MS bolts, lugs, anchor bolts etc. embedded in concrete shall be treated with neat cement slurry.

37. **GLAZING**

37.1 Glazing to window/doors etc shall be with 3mm thick float glass up to 0.5 Sqm and 4mm thick beyond 0.5 Sqm in each panel unless otherwise shown on drawings. Glass used shall be plain float glass except in baths/WC/Toilet/Labs where it shall be frosted glass (one side frosted) 4mm thick, all as specified in MES Schedule. The lower panels of WC/Bath window of GF shall be of pin headed glass.

37.2 The glass in steel shall be fixed with special spring glazing clips with oil putty as specified in MES Schedule. However, glazing for wooden joinery shall be fixed with wooden beading including panel pins, bedding with putty as specified in MES Schedule.

38. **BLANK**

39 **Brick Steps**

- (i) PCC (1:4:8) type D-2 as in foundation.
- (ii) Brick work in CM (1:4) using old size sub class 'B' bricks.
- (iii) Risers and sides shall be plastered, 15 mm thick in CM (1:4) and treated with two coats of cement base paint.
- (iv) Treads of steps & risers were shown on drawings shall have finish as shown of drawing.
- (v) Rest all as required.

40 **WATER STORAGE TANKS** : Water storage tanks shall be of rotational moulded polyethylene and as per Para 18.60 and 18.60-A of SSR-1991, Part-I (Specifications). Water storage tanks shall be ISI marked (multi layers), as approved by the GE.

41. **SANITARY AND TOILET FITTINGS**

41.1 **General**

41.1.1 All sanitary appliances shall be of vitreous china (white), first quality and shall conform to IS-2556 for general requirements and the specific requirements as mentioned in relevant clause of MES Schedule. These shall be of an approved make from the list given in Appendix 'B'.

41.1.2 All waste pipes and fittings up to floor/Nahani trap shall be of galvanized steel tubing medium grade conforming to IS-1239 (Part-II).

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PARTICULAR SPECIFICATION (CONT...)

Flush pipe and socket of flushing rim of WC shall be of brass (chromium plated) and shall be jointed with white and red lead (white and red lead in equal proportion by weight) and specified in clause 18.48.2 of SSR Part-I with adding linseed oil in the form of paste.

41.1.3 'P' and/or 'S' trap shall be of centrifugally cast iron and jointed to WC pan with cement joints as specified in clause 18.48.5 of MES Schedule Part -I .

41.1.4 The sizes, given here in after are approximate sizes. The size of sanitary fittings to be provided shall be the nearest size as per manufacturers catalogue as approved by AGE

41.2 **Wash Hand Basin:** Wash hand basin shall consist of :-

(i) Wash hand basin of size 55 X 45CM, white, Vitreous china glazed ware, flat back type with waste union and perforated grating (both fittings of brass chromium plated).

(ii) A pair of cast iron brackets.

(iii) 32mm dia galvanized steel medium grade waste pipe fitted with brass Chromium plated waste coupling outlet complete length of water pipe shall be as indicated on drawing.

(iv) Chromium plated steel chain and rubber plug.

41.2.A. The size of counter top wash basin shall be as per user / site requirement.

41.3 **MIRROR OVER WHB**

Mirror of polished sheet glass 5.5mm thick of make as per Appendix 'B' and fixed on 4mm thick, 3 ply, ply wood commercial type backing fixed Aluminium frame chrome plated including necessary provision for fixing. Mirror size shall be of equal length of counter slab/WHB.

41.4 **Soap Niche:** Soap niche shall be provided as per requirement. All sides of niche shall be finished with 5.5mm thick white glazed tiles.

41.5 **Shelf/Niche for wash hand basin:** Shelf/niche of size 450 X 100 X 100mm for wash hand basin shall be provided. All sides of niche shall be lined with white glazed tiles of 5.5mm thick.

41.6 **Indian type WC with cistern:** Vitreous china water closet (squatting pan) shall be white of Orissa pattern of size 630 x 540 mm and shall be as per clause No 18.32.3 of SSR Part I. These shall be provided with cast iron P or S trap and shall be fixed as specified in clause 18.86.1 of SSR part I. 10.00 litres capacity PVC flushing cistern valve-less, white, syphonic action type, low level, manually operated mounted to wall on two nos. CI bracket shall be provided for each WC and connected to type water closets with 32mm dia polythene (low or high density) or PVC flush pipe as per manufacturer instructions.

41.7 **WASH DOWN PEDESTAL TYPE WATER CLOSETS (EUROPEAN & ANGLO INDIAN) & CISTERN**

(i) Wash down water closet European type shall be all as per Clause no. 18.32.2 of SSR Part-I with P or S trap. Water closet shall be of pattern-I and of height 390mm and fixed with brass screws to floors.

(ii) Water closet anglo Indian type shall be of suitable size as directed and shall be of vitreous china with S trap in ground floor and providing with long arm 'P' trap in upper floors so that joint is avoided inside sunken portion as well as in walls and outlet straight away come out of wall in intermediate floors all as per IS-2556 (Part-II 1981) and fixed with brass screws to floors.

(iii) Plastic water closet seat & cover shall be provided to all wash down (pedestal) and anglo Indian water closets & shall be of thermosetting material and shall confirm to IS-2548 (Part-I) . Plastic Seat & cover shall be white closed pattern with flat bottom and as per clause no.18.36 of SSR Part-I.

(iv) 10.00 litres capacity PVC flushing cistern valve-less, white, syphonic action type, low level, manually operated mounted to wall on two nos. bracket and connected to all type water closets with 32mm dia polythene (low or high density) or PVC flush pipe as per manufacturer instructions.

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PARTICULAR SPECIFICATION (CONT...)

41.8 (a) **URINALS:** Urinals shall be of vitreous china, bowl urinal flat back of size 465mmx355mmx265mm (minimum) white with 32mm dia GI pipe (medium grade) upto nahani/floor trap shall be provided in the toilets.

(b) Screen wall between urinals shall be of 12 mm thick granite slab of size 450 x 750 mm including rounding of exposed edges and fixing arrangement to wall.

41.9 **SINK WITH DRAINING BOARD**

Stainless steel sink with draining board shall be provided. The overall size of sink of single bowl with one drain board shall be minimum 915 X 460mm bowl size 410 X 330 X 160mm made of stainless steel 1mm thick. The overall size of sink of single bowl with double drain board shall be minimum 1600 X 500 mm bowl size 500 X 400 X 200 mm made of stainless steel 1mm thick In case the above size is not manufactured by any particular manufacturer the next higher size manufactured shall be provided by the contractor without any price adjustment.

42. **PLUMBING WORKS**

42.1 **General**

42.2 Plumbing work shall be carried out as specified in clauses 18.7,18.8, 18.8.1, 18.13 to 18.22.1, 18.40 18.67.7A of MES Schedule Part - I of MES Schedule (Part-I).

42.3 & 42.4 BLANK

42.5 **Fixing of pipes to Walls:** CI pipes and fittings shall be fixed to wall all as specified in clause 18.67.4 to 18.67.6 of MES Schedule (Part-I) irrespective of whatever shown on drawing CI soil/waste pipe shall be provided upto Gully Trap.

42.6 **Nahani/Floor Traps:** Nahani/Floor traps shall be provided in situations as shown on drawings. These shall conform to IS -3989. These shall have nominal dia 50mm & 75mm as indicated and approx weight of Nahani traps shall be not less than 5.50Kgs and 6.50Kgs for traps with outlet dia of 50mm and 75mm respectively. Nahani traps shall be provided with CP grating. Floor traps shall be provided with CP grating.

42.7 **Shorter Lengths:** Except for WC connection, the contractor may use pipe pieces without sockets in shorter lengths(less than one pipe length) if approved by GE and connect these to pipes fitting with double sockets/collars, including additional joints as specified above without extra cost to the Government.

42.8 **Gully Traps**

(a) Gully traps shall be of salt glazed stone ware complying with the requirements of IS-651.

(b) Gully traps shall be square mouthed, 100mm size, type 'P' set in PCC of grade M-10 (Nominal Mix) block measuring 45cms square, thickness of bed concrete shall be 10cm jointing to drain pipe shall be done in cement mortar (1:1).

(c) Cast iron perforated grating shall be 150mm X 150mm bituminous coated and fixed as directed by the Engineer-in-Charge.

(d) PCC of grade M-15 (Nominal Mix) kerb and RCC cover slabs shall be provided all as directed by the Engineer-in-Charge.

42.9 **HDPE PIPE:** HDPE pipe shall be used as drain pipe.

42.10 **Trenches for Pipe Lines up to "First Man Hole":** The excavation in trenches in any type of soil shall be done as per the width given in SSR Part-II and depth as required at site. The trenches shall be back filled after testing of pipes with excavation earth in layers not exceeding 25cm and surplus spoil disposed to a distance not exceeding 50 metres.

42.11 **Testing:** All soil waste and vent pipes shall be tested as specified in Clause 18.79.1 and 18.79.5 of MES Schedule. Record of testing shall be maintained separately for each building.

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PARTICULAR SPECIFICATION (CONT...)**45. INTERNAL WATER SUPPLY****45.1 MATERIALS****45.2 BIB TAPS/PILLAR TAPS/STOP VALVE/SHOWER ROSE**

45.2.1 Refer para 18.4 of SSR Part – I. Screw down bib taps, pillar taps, shower rose & stop valves shall be of cast copper alloy body bright finished.

45.3 WORKMANSHIP

45.3.1 **GENERAL:** Refer paras 18.41 of SSR Part – I. The exact position of water supply and fittings shall be as directed by the Eng-in-Charge. The mounting height of various fittings shall be as directed by Engr-in-Charge.

45.3.2 **LAYING OF GI PIPE:** Refer para 18.46, 18.50 and 18.50.3 and 18.51.1 to 18.51.5 of MES Schedule Part – I. Union shall be provided at suitable places as directed by the Engineer-in-Charge so that in case of repairs etc. long length of pipes are not disturbed.

45.3.3 Uncovered threaded portion of pipe shall be painted. GI tubing in chases shall be painted with two coats of anti corrosive bituminous paint.

45.3.4 The contractor shall use proper bends/elbows/tees at turning/corners. Bending of pipe is not permitted.

45.3.5 The contractor shall provide screwed plug to all open bends of fittings at the end or days work and at time when the work is stopped.

45.3.6 **FIXING OF WATER SUPPLY FITTINGS:** Refer para 18.62, 18.63, 18.64 & 18.66 of SSR Pt – I.

45.4 TESTING

45.4.1 Refer clause 18.55 of MES Schedule Part – I. The water supply installation shall be tested hydraulically at a pressure of 2.5 Kg/sqcm in the presence of Engineer-in-Charge for at least 24 hours continuously to ensure leak proof connections. All arrangements for testing shall be made by the contractor at his own cost. Any leakage/defects noticed shall be rectified to entire satisfaction of Engineer-in-Charge.

45.5 Necessary cuttings/leaving/forming holes, chases etc. in walls, floors and ceiling and making good involved shall be deemed to have been included in the unit rate quoted by the contractor. No adjustment shall however be made on this account.

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54. CAST IRON PRESSURE PIPE AND FITTINGS

54.1 Refer para 18.2, 18.2.1, 18.2.3 to 18.2.4.6 of MES sch part-I of 2009

54.2 Cast iron pipe shall be centrifugally cast (Spun) iron pipe, class LA conforms to IS-1536.2001.

54.3 LAYING OF CI PIPE

54.3.1 CI pipes shall be laid all as specified in schedule 'A' items and as specified para 18.4 of MES Sch part-I of 2009.

54.4 JOINTING OF CI PIPE

54.4.1 CI pipe shall be joined all as specified in sch 'A' items and as specified para 18.48 of MES Sch part-I of 2009.

54.5 RUN LEAD JOINTS

54.5.1 Run lead joint shall be provided all as specified in sch 'A' items and as specified para 18.48.2 of MES sch Part-I of 2009.

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PARTICULAR SPECIFICATION (CONT...)**54.6 HANDLING, INSPECTION AND PREPARING PIPES**

54.6.1 Refer para 18.43, 18.44 & 18.45 of MES Sch part-I of 2009.

54.7 TESTING OF PIPES

54.7.1 Refer para 18.48.7 & 18.48.8 of MES sch part-I of 2009.

55. DUCTILE IRON PIPES AND FITTINGS

55.1 Refer Para 18.94, 18.95 of MES schedule Part-I of 2009

55.2 DI pipes & fittings shall be of appropriate class K-7 or K-9 as per requirement of withstanding hydrostatic test pressure without showing any leakage sweating or defects of any kinds as laid down in IS.

55.3 The pipes shall be laid jointed and tested as per IS-12288-1987 code of practice for use and laying of DI pipes.

56 GI PIPE AND FITTINGS

56.1 GI pipe and fittings shall be of grade as specified in schedule 'A' and conforming to IS-1239 and having ISI certification markings.

56.2 Laying and fixing of pipes: The layout of pipe lines for supplying water and various fittings in the buildings shall be as approved at site by the Engineer-in-Charge. The pipes shall be laid maintaining horizontally /vertically. The work shall be executed by licensed plumbers.

56.3 Pipes (Water tubing and fittings) shall be laid , jointed and fixed as specified in MES Schedule Part-I. The height at which various fittings are to be fixed shall be directed by the Engineer-in-Charge.

56.4 After completion of work, entire water supply pipe line fittings shall be subjected to hydraulic test as specified in MES Schedule for at least 24 hours continuously. Any defect noticed will be rectified to the entire satisfaction of Engineer-in-Charge. The chasing of the walls, floors etc shall not be covered till satisfactory completion of all tests. The unit rates in Sch 'A' shall included for necessary testing..

57 SLUICE VALVE

57.1 It shall be of cast iron class PN-1 with flanged ends. It shall bear IS certification mark and shall comply with the requirements of IS-14846 of 2000. Sluice valve shall be long body type non rising type loaded with tin bronze sheet and stainless steel stem.

57.2 MASONRY VALVE PITS

57.3 Masonry valve pits shall be of size as given in relevant item of schedule 'A' and drawings. Pit shall be underground with foundation in PCC M-10(Nominal mix) brick work in CM (1:6), internally finished with 15mm thick cement plaster in CM (1:6) and externally flush pointed in same mortar as work proceeds. Flooring shall be 40mm thick PCC M-15(Nominal mix) laid over 75mm thick hardcore. Cover shall be 3.15mm thick MS sheet fixed with nuts/bolts having proper locking arrangements and shall be provided with two coats of synthetic enamel paint over a coat of primer. Excavation and earth work shall be in any type of soil, returning filling in and disposal of surplus spoil to a distance not exc. 50 metres.

57.4 Cast iron pipes and fittings shall be of class as per description of relevant item of Sch 'A' and shall conform to relevant IS.

57.5. WORKMANSHIP

57.6 The work shall be carried out in compliance with the requirement specified in Clause 18.41 to 18.48 of MES Schedule part-1 applicable to handling/laying of cast iron pipe.

57.7 Laying and jointing of GI pipe shall be in accordance with Clause 18.50 of MES Schedule part-1 laying and jointing of CI pipe shall be all as per Clause 18.48 of MES Schedule part-1 and as per description of Sch 'A'.

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PARTICULAR SPECIFICATION (CONT...)

58. **PRECAST PAVER BLOCK:** Precast Interlocking Paver blocks Precast concrete Paver blocks shall conform to IS 15658:2006, Specification for Precast concrete blocks for paving. Paver blocks shall be sound and free from cracks or other visual defects. The tolerance on length or breadth of paver blocks shall be +2mm and tolerance on thickness of tiles shall be +3mm. Water absorption shall not be more than 6 percent by mass. Shapes shall be triangular, Zigzag, Hexagon or other shape as indicated. Colour of paver blocks shall be as indicated or as decided by GE. Thickness and grade of concrete of paver blocks is decided based on intensity of traffic, which is as under (Refer Table 1 of IS 15658):

Traffic Category Paver block Grade of concrete Thickness Light Traffic 60mm M-35 Medium Traffic 80mm M-40 Heavy Traffic 100mm M-50

59. **Blank.**

60. **PVC (SWR) SOIL / WASTE PIPES / VENT PIPES** -PVC(SWR) pipes shall conform to IS-4985(4Kg/sqcm) and 110mm dia.The size of pipes shall be as indicated. Rubber rings for the pipes shall conform to IS-5382.

60.1 PVC(SWR) fittings shall be used as per recommendations of the manufacturer of the pipe. In case there is no IS code for the fittings , these shall generally conform to the requirements of BS:4515 DIN 19531 and DIN 19534. PVC(SWR) pipes and fittings shall be strong, dimensionally stable and shall be free from defects.

61. **BIB TAPS AND STOP VALVE** : These shall be screw down type and shall bear ISI marking. Bib taps & Stop valve shall be polished bright.

62. **GATE VALVES AND GLOBE VALVES:** These shall be of gun metal fitted with wheel head (iron or gun metal), screwed/ flanged both ends for iron pipe opening full way and of the size as specified. These shall be standard quality Class I conforming to IS:778, Specifications and as approved by the AGE(I). Valve shall be of Class I suitable for MPa Working Pressure.

62.1 **FIXING GUN METAL GATE VALVE:** The Gun Metal Gate Valve shall be carefully examined and cleared of all foreign matter before being fixed. The Gun Metal Gate Valve shall be fitted in the pipe lines in a workman like manner. The joints between Gun Metal Gate Valve and pipe shall be made leak-proof when tested to a pressure of 17.5 Kg/sq cm.

63. **NON-RETURN VALVES**

63.1 Only Wafer Type slim non return valves shall be used 27.3.9.3

63.2 **FOOT-VALVES:** Foot Valves shall be as per IS: 4038-1986. It shall be cast Iron body with leather flap sealing clamped on cast iron disc plates. It shall be with a strainer which will have cored holes / slots with straining equivalent to two and half times the area of the pipe bore. Valves below 50 mm size shall have screwed ends while those of 50 mm and higher sizes shall have flanged end connections with drilled holes conforming to IS: 1538.

64. **BUTTERFLY VALVES:** Butterfly valves shall conform to BS: 5155, MSS SP 67 & APT 609 and designed to fit without gaskets between mating flanges. The valves shall be suitable for flow in either direction and seal in both directions. The valve shall be of integral moulded design.

65. **GUN METAL GATE VALVE / SLUICE VALVE (ISI MARKED PN 1:6) / CPVC PIPE/ SAINITARY ITEMS/CGI SHEET/ANODISED ALUMINIUM/FLUSH SHUTTERS/APP BASED POLYMERIC/ MEMBRANE/NON-ASBESTOS CEMENT/ 2ND CLASS HARD WOOD KILN SEASONED/ SOLID PANEL DOOR/SOLID WINDOW (ANODISED)/PVC DOOR FRAME/WOOD SCANTLINGS/PVC BOARD (PRELAMINATED BOARD)/ VARIOUS TILES/ PAINTS ITEMS/PVC (SWR) GI TUBING PIPE/ CPVC (SDR-11)/ PAVER BLOCK (ISI MARKED)/FRAMED WITH GRILLS/GRATINGS ETC/SUBMAIN WIRINGS/WIRINGS (FRLSH)/LED LIGHT FITTINGS WITH WARRANTY/MCB/MCCB BOXES/EARTH PLATES/MCB (SP&SPN)/XLPE CABLES WITH WARRANTY.**

65.1 GUN METAL GATE VALVE / SLUICE VALVE (ISI MARKED PN 1:6) / CPVC PIPE/ SAINITARY ITEMS/CGI SHEET/ANODISED ALUMINIUM/FLUSH SHUTTERS/APP BASED POLYMERIC/ MEMBRANE/NON-ASBESTOS CEMENT/ 2ND CLASS HARD WOOD KILN SEASONED/ SOLID PANEL DOOR/SOLID WINDOW (ANODISED)/PVC DOOR FRAME/WOOD SCANTLINGS/PVC BOARD (PRELAMINATED BOARD)/ VARIOUS TILES/ PAINTS ITEMS/PVC (SWR) GI TUBING PIPE/ CPVC (SDR-11)/ PAVER BLOCK (ISI MARKED)/FRAMED WITH GRILLS/GRATINGS ETC/SUBMAIN WIRINGS/WIRINGS (FRLSH)/LED LIGHT FITTINGS WITH WARRANTY/MCB/MCCB BOXES/EARTH PLATES/MCB (SP&SPN)/XLPE CABLES WITH WARRANTY shall be as specified in the BOQ and these shall conform to relevant IS specification marked.

PARTICULAR SPECIFICATION (CONT...)

65.2 The contractor shall GUN METAL GATE VALVE / SLUICE VALVE (ISI MARKED PN 1:6) / CPVC PIPE/ SAINITARY ITEMS/CGI SHEET/ANODISED ALUMINIUM/FLUSH SHUTTERS/APP BASED POLYMERIC/MEMBRANE/NON-ASBESTOS CEMENT/ 2ND CLASS HARD WOOD KILN SEASONED/ SOLID PANEL DOOR/SOLID WINDOW (ANODISED)/PVC DOOR FRAME/WOOD SCANTLINGS/PVC BOARD (PRELAMINATED BOARD)/ VARIOUS TILES/ PAINTS ITEMS/PVC (SWR) GI TUBING PIPE/ CPVC (SDR-11)/ PAVER BLOCK (ISI MARKED)/FRAMED WITH GRILLS/GRATINGS ETC/SUBMAIN WIRINGS/WIRINGS (FRLSH)/LED LIGHT FITTINGS WITH WARRANTY/MCB/MCCB BOXES/EARTH PLATES/MCB (SP&SPN)/XLPE CABLES WITH WARRANTY from the manufacturer specified/Dealer here-in-after & shall submit manufacturers test certificate for verification of the Engr-in-ChargE / AGE (I).

66 to 88 Blank

89. PRE-PAINTED GALVALUME STEEL SHEETS

89.1 The galvalume steel sheet shall be 0.50mm thick (total minimum thickness of base metal sheet) and shall have 550 Mpa minimum yield strength. The base metal steel plate shall be coated with minimum 150 gram/sqm (total on both sides) coating of hot dip alloy consisting of 55% Aluminium, 43.5% Zinc and 1.5% Silicon confirming to ASTM792M or AS 1397. The sheet shall then be factory finished with corrosion resistant paint system on both surfaces as per manufacturers instructions and literature. The sheets shall be fixed using hot dip galvanized, self drilling and self tapping screws neoprene and EPDM washers and as per manufacturers instructions and literature. The profile of the sheet shall be trapezoidal as defined in SSR Part I, Clause No. 10.39 or similar profile as commercially available and approved by GE. The end laps shall be provided as per manufacturers guidelines to eliminate any possibility of leakage of roof. Penetrations and laps in sheet shall be sealed as per manufacturers instructions and literature. F1DPE fillers shall be provided wherever required to close voids between sheets, sheet & fasteners etc. The color of the sheets shall be as approved by GE.

89.2 Spacing of purlins shall be as per drawing and all as directed by GE.

89.3. Side laps shall be one corrugation.

89.4 Single length sheet shall be provided in each side of the roof and all as directed by GE.

89.5 Ridge shall be as per manufacturer's instruction of 0.50mm thick.

89.6 Further Pre-painted Galvalume Steel Sheet of MAKE M/S DYNA ROOF PVT LTD, factory at 10th Mile Mawsamai Village (near Jorabat), Meghalaya or M/s PRESTAR INFRASTRUCTURES PROJECTS LTD, 11 DR RAJENDRA PRASAD SARANI, KOLKATA — 700001 or M/S TATA BLUE SCOPE, WAKDE WADI, SHIVAJI NAGAR, PUNE — 05 meeting the above specification shall be used.

90. CEILING & LININGS**90.1. GI SNAP GRID & GYPSUM BOARDS CEILINGS****90.1.1. SNAP GRID FRAME**

90.1.1.1. Wherever shown/mention on drawing, galvanized iron snap grid frame/metal framed suspended ceiling(seamless finish)/gypsum board/E-Board/ Perforated particle board shall be provided of CI suspended ceiling(seamless finish) as specified here-in after.

90.1.1.2. The ceiling grid system shall consist of hot- dip galvanized steel sections. GI Frame work for seamless ceiling shall comprise of GI perimeter channel 0.55mm thick with two unequal flanges of 20 and 30mm and web of 7 mm fixed to surrounding wall using nylon sleeves and screws at 450 mm centre to centre/intermediate channel 0.9mm thick having two equal flanges of 15mm each and web of 45mm suspended form soffit at approx 900mm centre to centre with GI cleat and steel expansion fasteners with and including ceiling section (not exc 1.2 m length) of 0.55 mm thickness having kurlled web of 50mm and flange of 26mm each with lips of 10.5 mm fixed to the intermediate channel with connecting clips across the intermediate channel at 457mm centre to centre. The Hangers shall be of 6mm dia. G.I (upto) 1200mm length) adjusting level fixed to roof slabs by means of ceiling cleats made out of G.I flat 40 x3 mm size 60mm long and expansion hold fasteners 12.5mm dia. 40mm long complete all as specified. Ceiling work of non Asbestos fiber cement board shall be got executed through authorized fabricator of the manufacturer providing positions for light fixtures, air conditioning diffuser and ducts, sprinklers, smoke detectors etc. all as specified on page no XIII to XV of MES Schedule Rate Part-II, all complete as per directions of Engineer-in-Charge.

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PARTICULAR SPECIFICATION (CONT...)

- 90.1.1.3. Cost of Accessories such as Sleeves, Screws, Rawl Plug, Cleat Angle, etc. used for fixing/placing in Position the Snap Grid Frame shall be deemed to have been included in quoted Lump Sum.
- 90.2. **GYPSUM PLASTER BOARDS**
- 90.2.1. Gypsum Plaster Boards shall be all as specified in Clause No. 12.8 of MES Schedule Part-I and as approved by GE. Thickness if not shown on drawings shall be 12 mm. Gypsum board shall be provided with two coats of OBD over a coat of primer
- 90.3. **NON ASBESTOS FIBRE CEMENT BUILDING BOARDS**
- 90.3.1. Wherever shown/mention on drawing of E-Board shall be provide non-asbestos fibre cement board shall be jointless finish with jointing compound and jointing tape as per manufacturer instructions. Thickness if not shown on drawings shall be 6 mm thick High Pressure Steam Cured Non Asbestos Fibre Cement plain Board as per ES 14862. Non-asbestos fibre cement board ceiling hall be provided with two coats of white wash.
- 90.4. **PERFORATED PARTICLE BOARD**
- 90.4.1. Perforated particle board shall be all as specified in MES Schedule Part-I and as approved by GE. Thickness if not shown on drawings shall be 12 mm. Perforated particle board ceiling shall be provided with two coats of synthetic enamel paint over a coat of primer (white).
91. Sand for Mortar as specified in Clause No. 5.4, 5.4.1 of MES Schedule Part-I.
92. **WATER** : Refer Clause No. 5.18 of MES Schedule Part-I.
- 93 to 94 **Blank**
95. **SOLID PCC BLOCK MASONRY** : Solid PCC Block Masonry shall be of size 300 x 200 x 200 mm / 300 x 100 x 200 mm and shall be semiautomatic machine made. This shall be of grade 'C' (5.0) confirming to provision of IS 2185-9083 (Part-II). The coarse aggregate shall be 20 mm graded stone aggregate, confirming to IS-383-1970. Fine aggregate shall be sand, confirming to IS-383-1970. Sand shall not be finer than Zone-III of IS-383-1970.
96. **INTERNAL ELECTRIFICATION**
- 96.1 **SCOPE OF WORK**: The scope of work includes internal electrification to buildings all as described in Annexure 'I', and specified in the particular specifications here-in-after including testing and commissioning and also includes any other connected items of work required for entire completion, testing and commissioning, but not specifically mentioned.
- 96.2 **GENERAL**: Particular specifications given here in after are brief and are only to particularize, amend and emphasize the specifications of MES Sch (which are not repeated).
- (a) The IS mentioned in the MES Schedule and in the tender documents shall be deemed to be changed/modified as per latest amendments issued to IS upto date of receipt of tender.
- (b) The installation shall strictly comply with the provisions contained in the latest edition of the Indian Electricity Rules and Code of Practice, and IS-732 for electrical wiring and fittings in buildings (as applicable to these works) except where such regulations and rules are modified by these specifications.
- (c) All electrical works shall be executed properly by skilled and licensed electricians under the supervision of suitable, qualified electrical supervisors. The contractor shall produce to GE evidence of such qualifications of his workmen & supervisor(s) at the time of commencement of the work and if required by the deptt, at any time thereafter during contract period, on demand by Engineer-in-charge.
- (d) The layout of internal electrification network & system shall be as directed on ground. The work shall finally be executed as per approval of GE in writing and no price-adjustment what so ever shall be admissible to the contractor on this account.
- (e) The wire runs shall be marked on the walls and soffits of roofs/floors slabs and approval of the Engineer-in-charge shall be obtained in writing before fixing plugs, cables & fittings etc.
- (f) All electrical fittings & wiring shall be laid / fixed clear of doors and windows and other openings.

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PARTICULAR SPECIFICATION (CONT...)

- (g) Wiring shall be done strictly in conformity with IS rules and specifications and lay outs shall be in conformity with modern engineering practice. Loop-in type of wiring shall invariably be adopted throughout the installation.
- (h) No twisting/jointing in earth wire is allowed. All continuous earth wires shall be connected to main earth / switch boxes / DBs / MCCB, socket outlets, fittings etc by use of suitable size lugs/sockets and application of crimping tools only.
- (i) Cables shall be connected to a terminal only by crimping using suitable sleeves, lugs or ferrules and application of proper crimping tools. In case where this is not feasible, the ends may be soldered together. Cables in each circuit shall be bunched together.
- (j) Proper phase identification code should clearly be provided at the main in-coming switch.
- (k) The name of functions of each distribution board like 'POWER' 'LIGHT' or 'SUB-MAIN DB' as applicable shall be clearly and neatly painted on the distribution boards with white synthetic enamel paint.
- (l) The height of the incoming & distribution switch boards and various electrical fittings / sockets outlets / switch boards etc shall be as per E-in-C's TI. However, the height of the distribution boards shall not be less than one metre. Socket outlets may be installed at the height of one metre from the finished floor level.
- (m) The contractor shall submit, within two weeks from the date of placement of work order to commence the work, the wiring diagram to the Garrison Engineer for his approval. Approval of the Garrison Engineer shall be obtained in writing for the proposed run of wires and exact positions of fittings before resorting to the fixing of conduits, cable, fittings etc.
- (n) General conditions and specifications as given in para 19.2 of MES Schedule (Part-I) shall be complied with.
- (o) The main supply in the buildings shall be LT AC 50 Hz single phase (230V) or three phase (415 V)

96.3 MATERIAL AND SAMPLES:-

- (a) The main items to be incorporated in work like cables, switches, sockets, fittings, MCBs, DBs etc shall invariably be ISI marked. Where ISI marked products are not available in the country, these shall conform to relevant BS specifications.
- (b) Approval of GE referred to in clause 19.2 of MES Sch (Part-I) shall be in writing.
- (c) Samples of all materials, fittings & fixtures to be supplied by the contractor shall be submitted to GE for his approval. The contractor shall procure the items in bulk and commence the work only after the samples are approved in writing by the GE. The contractor shall ensure that all the materials incorporated in the work are identical in all respect. Samples approved and samples destroyed in testing shall be returned to the contractor after completion of contract. No payment shall be made for samples destroyed in testing.
- (d) Out of the makes specified, materials shall be arranged of the best available make, as approved by the GE.
- (e) All manufactured articles required for incorporation in work shall be brought to site in the manufacturer's original packing with the seal intact. The materials shall be procured from the manufacturer (s) or their authorized dealers only and original purchase vouchers (duly machine numbered & bearing the ST/CST number) and manufacturer's test certificates shall be submitted by the contractor to the department for inspection and perusal before approval of material. Incorporation shall be done after material is approved by GE in writing.
- (f) Executives and the contractor are to clearly understand that sample approval and material approval are two distinct activities & phases and proper record for both these activities in a proper sample and material approval register is to be kept.

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PARTICULAR SPECIFICATION (CONT...)

96.4.1 **SCREWS AND NAILS ETC** : All screws and nails used in the point / sub main wiring work shall be cadmium plated steel. Screws which are visible such as over switch boxes, laminated sheet top covers etc shall be of brass chromium plated.

96.4.2 **SYSTEM OF WIRING** :

- (a) Wiring shall be of the type with conductor size as described in indicative schedule.
- (b) Cables used for point and sub main wiring shall be of FRLS variety, with multi-stranded copper conductors and invariably be ISI marked.
- (c) Wiring shall be done without any junction or connection boxes on line.
- (d) Special attention is drawn to termination of cable ends of point and sub main wiring cables. All exposed ends of multi stranded cables, whether terminating at MCBs or switches (including piano switches) or at electrical fittings shall be crimped together with suitable lugs using proper crimping tools. In exceptional, cases where the Engineer-in-charge is convinced that crimping / provision of lugs is not possible, these ends shall be soldered together.
- (d) Proper colour coding viz red / yellow / blue wires for phases, black wire for neutral and green wire for earthing, shall be adopted strictly in point wiring.
- (e) The conduits and casing-capping shall be ISI marked and proper accessories at junctions, bends and successive lengths shall be provided. For fixing of conduits/casing-capping and their accessories etc, PVC sleeves and cadmium plated screws shall invariably be used.

96.5. **POINT WIRING** :-

96.5.1 A point (other than socket outlet point) shall include all work necessary in complete wiring to the following outlets from the controlling switch or MCB. The scope of wiring for a point shall, however, include the wiring work necessary in tapping from another point in the same distribution circuit.

- (a) Ceiling rose or connector (in the case of points for ceiling/ exhaust fan points, prewired light and call bells)
- (b) Ceiling rose.
- (c) Back plate.

Note: In case of call bell points, the words controlling switch or MCB shall be read as from the ceiling rose meant for connection to bell push.

96.5.2 Following shall be deemed to be included in point wiring.

- (a) Supplying and fixing/ drawing of cables including connections.
- (b) Metal switch boxes for control switches, regulators, sockets etc. recessed or surface type,
- (c) Laminated sheet covers over the same for piano type switches.
- (d) Modular covers over the same for modular type switches and MCBs.
- (e) Supplying and fixing all accessories such as screws, clips, plugs, clamps etc. as specified for securing, cables, battens, conduits etc. to walls, steel joists etc.
- (d) Supplying and fixing of bushed conduit or porcelain tubing for wiring to pass through walls, floors, etc.
- (e) Supplying and fixing of joint and junction boxes.
- (f) Control switch piano type, modular type, MCB as specified in the Sch _A'.

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PARTICULAR SPECIFICATION (CONT...)

- (g) Cutting holes in or through walls, taking up and re-fixing floor boards, notching or drilling holes through joists and making good all disturbed work to match the existing.
- (h) Shellac varnishing as specified to wood battens, wood blocks and other wood fittings and fixtures.
- (i) Pointing of battens and cables or surface conduits along with painting of walls.
- (j) Testing as specified.
- (k) The rates for wiring includes for:-
 - (i) Cutting chases for conduits and sinking's for boxes and making good to walls; floors etc. in case of recessed or concealed conduit wiring.
 - (ii) Supplying and fixing terminal boxes for power plugs, fan regulators, switches, socket outlet etc., fixed flush to the walls, as specified for surface wiring on wood battens.

96.6 MEASUREMENTS:-**(a) POINT WIRING (OTHER THAN SOCKET OUTLET POINT)**

- (i) Unless otherwise specified there shall be no linear measurement for point wiring, light points, fan points, ex fan points & call bell points. These shall be measured on unit bases by counting.
- (ii) No separate measurement shall be made for interconnections between points in the same distribution circuits & for the circuit protective (loop earthing) conductors between metallic switch boxes.

(b) POINT WIRING FOR SOCKET OUTLET POINTS:-

- (i) The light plug 5A/ 6A & power plug 15A/ 16A points wiring shall be measured on linear basis/ on unit bases by counting, as per SCHEDULE 'A', from the respective tapping point of live cable viz switch box, another socket outlet points, or the sub distribution board as the case may be upto the socket outlet. The metal box with cover, switch/ MCB, socket outlet & other accessories shall be measured and paid as a separate item.
- (ii) The power point outlet may be 15A/ 15A or 16A/ 16A six/ three pin socket outlet, where so specified in the tender documents.

(c) GROUP CONTROL/ LOOP POINTS WIRING:-

- (i) In the case of points with more than one point controlled by the same switch, the same point shall be measured in parts i.e. (a) from the switch to the first point outlet as one point and (b) for the subsequent points, shall be treated as separate point(s).
- (ii) No recovery shall be made for non provision of more than one switch/ MCB.

(d) TWIN CONTROL LIGHT POINTS WIRING :-

- (i) A light point controlled by 2 Nos. of two way switches shall be measured as two separate points from the fitting to switches on either side.
- (ii) No recovery shall be made for non provision of more than one ceiling rose or connector in such cases.

(e) MULTIPLE CONTROLLED CALL BELL POINTS :-

- (i) In the case of call bell with a single call bell outlet, controlled from more than one place, the points shall be measured in parts i.e. (a) from the call bell outlet to the nearest ceiling rose meant for connection to bell push treated as one point and (b) from that ceiling rose to the subsequent points, shall be treated as separate point(s).

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PARTICULAR SPECIFICATION (CONT...)

(ii) No recovery shall be made for non provision of more than one ceiling rose connector for connection to call bell in such cases.

96.6.1 PVC insulated copper conductor cable shall be run in the conduit as continuous earthing and connected to all light fittings, ceiling fans, socket points and regulators. The cost of the same shall be deemed to be included in the unit rates of point wiring.

96.7 **OUTLET BOXES:** The switch box shall be made of metal on all side except on the front. In the case of cast iron boxes, wall thickness shall be at least 3 mm and in case of welded mild steel/ G.I. boxes the wall thickness shall not be less than 2 mm for boxes upto a size of 20 x 30 cm and above this size 2 mm M.S. boxes shall be used. Clear depth of the box shall not be less than 50 mm and this shall be increased suitable to accommodate mounting of fan regulators in flush patter. All fitting shall be fitted in flush pattern. Outlet boxes shall be suitable for light & power accessories as specified elsewhere. Cost of outlet boxes, modular cover plates(for modular switches/ sockets & MCB points) & laminated sheets (for piano type switch/ sockets) shall deemed to be included in the rate of points wiring. In case of piano type switches 3 mm thick laminated sheet shall be fixed on the front with brass screws.

96.8 **LIGHT FITTINGS:** The blocks used for fixing 'SK' type light fittings shall be of first class hard wood, cost of attachment of fittings shall be deemed to be included in the rates of point wiring.

These fittings shall be fixed on walls/ceiling with GRIP' brand or equivalent nylon plugs (sleeves) with suitable cadmium plated brass screws. Minor items of fittings like screws etc shall be of standard quality, gauge and easy for operation.

Heavy duty brass lamp holders shall be incorporated with fittings.

Wherever specifications have not been specified, the materials/component shall comply with relevant IS specifications. In its absence of such specifications, code of practice or good engineering practice shall be followed.

The surface finish on the outside surfaces of all fittings with black stove enameled CRCA sheet shall be 'MAT DULL'.

96.9 **SWITCHES, SOCKET- OUTLETS, BUZZER / BELL PUSH:** Switches, socket-outlets and bell push shall be flush piano type, white ivory finish and shall be of the makes specified in the tender. Switches shall have marking for 'LIGHT', 'FAN' 'Bell' etc and shall invariably be ISI marked.

96.10 **EARTHING:** Earthing shall be provided of the types as mentioned in indicative schedule and shall be executed as per IS-3043 and clause 19.137 to 19.146 of MES schedule Part-I. The overall earth resistance of the earthing system (electrode) shall not exceed one ohm. Earthing shall be done in a manner that the inner edge of earth pit is at least 2 metre from the building foundation (extreme outside end) and the minimum distance between two earth electrodes shall be regulated as per IS-3043. All pipes used shall be of medium grade, IS-1239 marked. It shall be ensured that, as per NEC-85, the size of earth continuity conductor shall not be less than half the size of main current carrying conductor subject to a minimum of 1.5 sq mm for copper and 2.5 sq mm for aluminium.

For checking the efficiency of earthing, the following tests shall be carried out, preferably during the summer months:-

(a) The earth resistance of each electrode shall be measured.

(b) The earth resistance of earthing grid shall be measured.

(c) All electrodes shall be connected to the grid and the earth resistance of the entire earthing system shall be measured.

96.11 **MCBs & DBs:** MCBs shall be of 10 KA rupturing capacity, duly IS-8828 marked. DBs shall be manufacturer's factory made and shall be of the same make as the MCB.

96.12 **MCCB:** MCCBs shall have serial number of manufacturer marked on them and will be supplied with manufacturers test certificate.

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PARTICULAR SPECIFICATION (CONT...)

- 96.13 **PVC Conduit:** PVC conduit to be used for point wiring shall be heavy grade and all as specified in clause 19.29 of MES Schedule Part -I.
- 96.14 **Record of Installation:** Three copies of line plan of complete work indicating the diagram of electrical wiring with size of cable, position of fittings, switch boards etc shall be submitted to Engineer-in-Charge on completion of work.
- 96.15 (a) **Testing:** Testing of all internal electrical installation shall be carried out by the Contractor in accordance with relevant IS specifications for flame proof wiring & fittings in presence of Engineer-in-Charge. If the test results are not acceptable, all repairs & replacement and extra work for removal and relaying or refixing shall be carried out by the contractor at his expense and installation retested until test result indicate compliance with the prescribed requirement. Three copies of accepted Test results shall be submitted by the Contractor with duly signed by the contractor and Engineer-in-Charge. Engineer-in Charge shall maintain such test result in his record.
- (b) All the apparatus, instruments, labours & electricians etc required for the purpose of testing shall be provided by the contractor. However electricity required for the purpose of testing shall be provided by the department on payment. The unit rate of respective item of Schedule 'A' shall be inclusive of provision of testing complete.
- 96.16 Necessary cuttings/leaving/forming holes, chases etc. in walls, ceiling etc and making good involved shall be deemed to have been included in the unit rate quoted by the contractor. No adjustment shall however be made on this account.

97. EXTERNAL ELECTRIFICATION

97.1 Scope of work: The brief extent of work under this contract is as indicated in Annex XI particular specifications and drawings with all reference to clauses in succeeding paragraphs pertain to MES Schedule. The layout of conductors/cable route shall be as directed by the Engineer-in-Charge.

97.2 General requirement:

97.2.1 The requirement pertaining to materials, conformity with Indian Electricity Act and Rules, workmanship, testing, record of installations, safety procedures and fire safety, shall be all as specified in MES Schedule Part -I Clause No.19.2.All the Electrical works shall be got executed through licensed Electrician and the contractor shall produce the EIC in support of Electrician provided by him before commencement of work.

97.2.2 The contractor is deemed to have included in rates, cost of making holes/chases where required through roads/masonry or concrete work for taking in cable/conduits/pipes and conductor etc, and making good the same to match with existing work without any extra cost.

97.2.3 Electrical Works General:

(a) All electrical works shall be carried out in conformity with the requirements of the Indian Electricity Act- 1910 and Indian Electricity Rules 1956 framed there under and Fire Insurance Act as applicable and also the Regulations of Electric Supply authorities concerned amended from time to time.

(b) Unless otherwise exempted under the Rules of the Indian Electricity Rules, the work of electrical installation shall be carried out under the supervision of a person holding a certificate of competency issued by the recognized authority. The workman shall also hold certificate of competency. Good workmanship is an essential requirement for compliance with these specifications.

(c) The contractor shall adhere to safety procedures instructions for working on low, medium and high voltage mains and apparatus and safety practices listed in IS : 5216, Guide for safety procedures and practices in electrical works shall be followed to the extent applicable. The contractor shall provide workman with safety devices and appliance.

(d) All electrical equipment shall satisfy the requirement laid down in IS : 1646 Code of practice for fire safety of buildings (general) electrical installations and IS : 3034, code of practice for fire safety of electric generating and distribution stations to the extent applicable.

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PARTICULAR SPECIFICATION (CONT...)

(e) All electrical works shall be systematically tested by the contractor in presence of the Engineer-in-Charge to ensure compliance with the specifications laid down. Test results shall be recorded and signed by the Contractor and the Engineer-in-Charge. If the test results are not acceptable, all repairs and replacements and extra work of removal and relaying or re fixing shall be carried out by the contractor at his expense and installation retested until test results indicate compliance with the prescribed requirements.

(f) The contractor shall supply the three copies of layout diagram of complete External Electrification work executed under this contract to Engineer-in-Charge on completion of work.

97.2.4 Conductors: These shall conform to relevant IS specification and as given in MES Schedule Part-I. Laying of conductor should be as per Clause 19.56 to 19.66 of MES Schedule Part-I.

97.3 UNDERGROUND CABLES, Armoured Cables XLPE Insulated (HT & LT)

97.3.1. **General** All material shall conform to relevant standard as per BIS and shall carry ISI mark. 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 Clause 19.74 to 19.76, 19.88 to 19.92 of MES Schedule Part-I.

97.3.2 **Cables: (Armoured)** The following list records those Indian Standards in force, which are acceptable as good practice, and accepted standards:-

SP 30: 1984	: National Electrical Code
SP 7 (Group 4): 2016	: 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 10810: Part 63; 1993	: Method for Test of cables, Part 63 Smoke density of electric cables under fire condition.
7098-(Part 1)-1988	: Cross linked Polyethylene (XLPE) insulated PVC Sheathed Cables: Part 1 For working voltage upto and including 1100 Volts. (Second revision)
7098 (Part 2)-1985	: Cross linked Polyethylene (XLPE) insulated PVC Sheathed Cables: Part 2 For working voltage from 3.3 KV upto and including 33 KV (First revision).

97.3.3 Acceptance Test of HT XLPE Cable: Before accepting the lot of cable for incorporation in the work, it shall be tested in accordance with clause 18.2.1 of IS-7098 (Part-II) to ensure the quality of the cable supplied.

97.3.4 Material: Cables

All LT cables shall be of 2/3/3 ½ or 4 core aluminium conductors, XLPE insulated heavy duty and suitable for 1100 volts grade and conforming to IS-7098 (Part-1 - 1988). The aluminium conductors used shall be stranded, compacted and circular/shaped and the main insulation shall be of cross linked polyethylene (XLPE) with inner sheathing PVC extruded and each core of the cable shall have colour identification all as specified in IS. Armour over the inner sheath shall be either of strip or wire type and outer sheath shall be of Extruded PVC conforming to ISS. The cables shall be suitable to withstand maximum conductor temperature of 90°C and 250° Deg C during operation and short circuit respectively.

HT Cables shall be XLPE insulated and shall conform to IS : 7098 part (II) 1985, manufactured by using either Sio-plass Technology or Dry curing with nitrogen gas technology. All HT cables shall be of three core aluminium conductors, XLPE insulated, armoured. These cables shall be suitable for Earthed system. The aluminium conductor used in HT Cables shall be stranded, compacted and round to achieve minimum electrical stresses. The aluminium conductor shall have a semi-conducting layer of XLPE of suitable thickness wrapped in such a way that it covers the conductor entirely. The main insulation shall be of cross linked polyethylene (XLPE) in natural colour and shall be free of air voids and foreign materials. The main insulation shall be covered with another layer of semi conducting layer followed by copper Tape to provide suitable earthing around the each core to keep the electrical stresses radial. Each core shall have a numbered/coloured polyester tape applied over the copper tape for identification of all the three cores. Inner sheath over the laid up cores shall be of thermoplastic extruded type and armouring over the inner sheath shall be of galvanised steel wire or strips of adequate size to give mechanical protection and PVC FRLS (Flame Retardant Low Smoke) outer sheath over the armour shall also be of adequate thickness all as specified in the IS.

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PARTICULAR SPECIFICATION (CONT...)

The XLPE cables shall be suitable to with stand maximum conductor temperature of 90 Deg C and 250 deg C during operation and short circuit respectively and these cables shall be manufactured by triple extrusion using single (Common) cross head extrusion technique and dry cure inert gas cured cross linking process.

Laying of the cables shall be carried out as described in clause 19.74 to 19.76,19. 88 to 19.92 of the MES Schedule Part-I. Testing of the underground cable during and after laying shall be done as per relevant IS code and as mentioned in MES Schedule Part-I, Cable shall carry ISI mark, IS No, manufacturer's name, size, duly embossed / screen printed at every metre and having the total count of progressive length in meter at each mark. Earth wire: Galvanized Iron (GI) wire of appropriate gauge.

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 GI 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.

97.3.5 Method of Laying

Laying of cable shall be done as per the routes and layout finalized. The work of underground cables shall be carried out as specified in IS-1255-1983. Cables shall be laid as mentioned in Clause No. 19.74 to 19.76, 19.88 to 19.92 of MES Schedule of Rate Part-I. Before laying of the cable the trench shall be provided with a layer of sand of 8cm depth for the purpose of cushioning. After the cable has been uncoiled and laid in to the trenches over the rollers, the cable shall be lifted slightly over the rollers beginning from one end by helpers standing about 10 meter apart and drawn straight. The cables shall then be taken off the rollers by additional helpers lifting the cable and then laid straight into the route. When the cable has been properly straightened, it shall be covered with sand to a depth of 15cm. This is then gently punned down to a depth of 10cm above top of the upper most cable, thus providing a good bedding for the protective cable covers on warning covers which are placed centrally over the cable i.e. by bricks. The punning shall be done by hand; mechanical punners shall not be used.

The cables under road crossing railway tracks etc (existing or proposed) shall be enclosed in GI pipes. Size of the pipe shall be such that the suitable space around the cable is available. The pipe shall be provided through out the width of roads, drains and extended for 1200mm either side of the road. GI pipes shall be of light grade conforming to IS :1239 - Part1 2004 specifications. The two ends of pipes shall be sealed with wooded plug/pegs and bitumen compound after drawing the cable through pipe.

97.3.5.1 Spacing Between Cables When more than one multicore cable or trefoil group of single core cables is laid in the same trench a horizontal inter axial spacing 25 to 40 cm shall be provided to reduce the effect of mutual heating and to ensure that a fault occurring in one cable, will not damage the adjacent cable. When more than one tier of cable is necessary, riddled soil shall be filled in the trench, and rammed down to form a solid bed to a height of 25 to 40 cm above that of the first tier. The mesh of the screen through which the soil is riddled shall not exceed 12.5 mm IS sieve. The width of the trenching shall in no case be less than 45 cm so as to facilitate working on the cables. Laying of cables in tier formation shall be avoided as far as possible as loading of cables is very much reduced.

97.3.5.2 Cables Laid in Tier Formations When more than one tier of cables is necessary the trench shall first to be provided with a layer of sand to a depth of 8 cm for the purpose of cushioning. After laying one tier of cables sand shall be filled in the trench and punned down to form a bed to a minimum height of 25 cm above that of the first tier. This shall be continued keeping the top most tier at a minimum depth of 60 cm below ground level.

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PARTICULAR SPECIFICATION (CONT...)

97.3.5.3 Road Crossing When crossing roadways, it is preferable to cross on the skew to reduce the angle of the bend as the cable enters and leaves the road crossing. The cable shall pass through a RCC/CI/Steel pipe.

97.3.5.4 Railway Crossing When the cables are laid under railway tracks, the cables shall be laid in reinforced concrete or cast iron or steel pipes as indicated at such depths as may be specified by railway authorities but not less than 1 metre below the surface of formation level. In case of single core cables, the pipes shall be large enough to contain all the three phases of the power circuit. Long lengths of pipes shall be laid with a gradient to facilitate drainage.

97.3.5.5 Pulling Out the Cable On no account the cable shall be allowed to twist or kink as it is likely to spring the armour and fracture the paper insulation and outer serving of the cable. When pulling cable around the bends, rollers should be placed sideways so as to keep the cable on a safe radius. Cable drums should be rolled in the direction of arrow.

Care shall be taken during laying to avoid sharp bending and twisting. Cable shall be unwound from the drum by lifting the drum on the center shaft supported both ends with suitable Jacks/stands. Under no circumstances the cable winding shall be lifted off a coil or drum lying flat at the flanges to avoid serious twist and damages. Further the minimum bending radius of 15 x Diameter of the cable shall be ensured.

The cable shall be snaked to provide a 4 meters length of cable for further joints at all straight joints (both side of the joint i.e. 4 meters on each side) of cable laid in trenches and a 3 mtrs lengths at terminal cable boxes.

97.3.5.6 Minimum Bending Radius Cables shall always be bent (or straightened) slowly; they should never be bent to a small radius. The minimum safe bending radius may be taken as given below, but wherever possible large radius shall be used.

Voltage	Minimum Bending radius		
	Single Core cables	Multicore Cables	
		Unarmoured	Armoured
Upto 11 KV	20 D	15 D	12 D
Upto 22 KV	25 D	20 D	15D
Upto 33 KV	30 D	25 D	20 D

'D' is the overall diameter of the cable. At joints and terminations, the individual cores of multiple cable should never be bent so that the radius of the bend is less than 15 times the diameter over the insulation.

97.3.5.7 Cable laid in Ducts or Floors Cable ducts shall be of such dimensions that the cables laid in it do not touch one another. If necessary, cable may be fixed with clamps on the walls of the duct. The duct shall be covered with removable slabs or chequered plates.

97.3.5.8 Cable Laid along the Surface of the Wall Cables shall be fixed by means of suitable MS clamp or bracket or on cable racks, as directed. If necessary, the cable may also be laid in a chase cut in the wall and fixed with clamps. The chase may be covered with removable MS sheet.

97.3.6 Cable Jointing Cable as far as possible shall be laid in complete lengths, uncut lengths from one termination to the other. Before start of cable laying, cable schedule shall be prepared and approved by EIC to minimize/avoid straight through required in the entire network shall be worked out and approved by the EIC. All cable jointing in terminal or through joint boxes shall be carried out by experienced/trained/licensed and qualified cable jointers.

97.3.7.1 Cable Terminations and Straight Through Joint Kits for 3 Core HT XLPE Cables The cable termination kits and straight through joint kits shall be suitable for HT XLPE cables shall be of Cold shrinkable or push type on with sound and proven technology. These terminations shall be environmental friendly and flame retardant. Each kit shall contain all necessary components accessories, including cable glands wherever required cable lugs (climping type) jointing materials and consumables to make a complete termination in such a way that no live parts of the terminal and connecting lugs are exposed.

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PARTICULAR SPECIFICATION (CONT...)

The basic raw material used in construction of Joints and termination shall be Electrical grade EPDM (Ethylene Propylene Diene Monomer Rubber component) with high dielectric strength. The termination shall control the voltage distribution of electrical field effectively and shall minimize the surface stress by uniformly redistributing the electrical field over the entire surface of the insulator. Insulators shall be made of silicon rubber with long service life. The straight through joint kits shall be suitable for underground buried installation with uncontrolled back fill and chances of flooding by water and suitably designed to be protected against rodent and termite attack. Further the joint kit shall be in capsulated in cast resin compound to provide excellent mechanical & moisture protection in sub soil conditions. While making termination, earthing connection & outer protection arrangement shall also be ensured.

The test certificates from the manufacturer for termination kits and straight through joints kits shall mention results of the following tests :-

- (i) AC Voltage withstand test (as per IEC-68)
- (ii) Partial discharge test
- (iii) Impulse withstand test (as per IEC-68)
- (iv) Load cycling test (as per VDE-2078)
- (v) Thermal short circuit test.
- (vi) DC Voltage withstand test.
- (vii) Humidity test (as per IEC-166)
- (viii) Dynamic short circuit test (as per VDE-2078)
- (ix) Salt Fog (outdoor termination only) test.
- (x) Impact test (for joints only)

97.3.7.2 Cable Terminations All cables shall be terminated at the end in such a manner as to prevent ingress of moisture into cable. The type and method of termination of cable shall depend on the voltage of cable and type of termination whether indoor or outdoor. All types of cable and termination joints shall be indicated as prescribed by the cable manufacturers. However Cold shrinkable or push type on shall be used.

97.3.7.3 Cable Ends All cables upto 1100 volts grade shall be terminated into the equipment by means of compression type cable glands having screwed nipples and check nuts. The cable conductors shall be provided with crimped type solder less cable sockets or connectors to suit the termination arrangement of the equipment. The crimping shall be done by hand/hydraulically operated crimping tool after applying conducting jelly. The insulation of the cable shall be removed just immediately before the crimping is done.

97.3.8 Protection of Cables The final protection shall be provided by laying precast concrete cable converse for HT Cable of the type and size as per IS and Bricks sub class B for LT Cable. The un-reinforced pre cast cover and bricks are provided for protection of cable for covering the cables. The un-reinforced pre cast cover shall be laid flat (width of protection being equal to length of brick). After the layer of un-reinforced pre cast cover is laid the remaining trenches will be filled with excavated earth.

97.3.9 Cable Path Indicators Cable path indicators shall be provided at distance of every 100 meters and at cable joints and turning of all cables except for street light cables and 2 core cables size and voltage written on it. The CI path indicator shall be fixed on MS angle iron. The cable path indicators shall be erected at the time of refilling the trenches and the cable path indicator shall be painted as under.

- (i) For HT 11 KV cables - "BROWN"
- (ii) For LT cables - "BLUE"

97.3.10 Earthing and bonding Earthing of cables, metal pipes or conduits in which the cables have been installed shall be efficiently bonded and earthed. At specified points on the route, where the presence of stray currents is suspected the joints, the metal sheet and armour, if any, of the cables shall be bonded to the earthing system, and connected to one or more earth electrode The cross-sectional area of every bond shall be not less than 65 sq.mm and in any case shall be such that the resistance of each bond connection shall not exceed the combined resistance of an equal length of metal sheath and armour any, of the cable.

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PARTICULAR SPECIFICATION (CONT...)

97.3.11 Clearance from Communication Cable When power cables are laid in the proximity of communication cables, the minimum horizontal and vertical separately between the power and communication cables shall normally be 60 cm but in any case not less than 40 cm for single core cables and 30 cm for multicore cables. Where there is no sufficient space to allow such minimum separation, either the communication cable or the power cable or preferably both should be laid solid over the distance affected unless the communication cable is specially designed so as to be suitable for laying close to the power cable in the same trend. The power and communication cables should as far as possible cross at right angles to each other.

97.3.12 Testing of Cables

- (a) **Testing During Laying** All new cables shall be megger tested before jointing. After jointing is completed all low voltage (LV) cables shall be megger tested and high voltage (HV) cables pressure tested before commissioning. The cables shall be tested for:
- (i) Continuity,
 - (ii) Absence of cross-phasing,
 - (iii) Insulation resistance to earth, and
 - (iv) Insulation resistance between conductors
- (b) **Testing after Laying and Jointing** Immediately after the initial laying and jointing work is completed, a high voltage test shall be applied to HV cables to ensure that they have not been damaged during or after the laying operations and that there is no flaw in the jointing.
- The following tests shall also be carried out on all cables:-
- (i) Insulation resistance test-sectional and overall,
 - (ii) Continuity test-sectional and overall,
 - (iii) Full load test,
 - (iv) Earth test.
- (c) Insulation resistance test shall be carried out between conductors, and conductors and earth by Megger. High voltage test shall be carried out by applying test voltages between conductors and each conductor to sheath as given in Appendix F to IS:1255-1983.
- (d) The contractor shall provide all apparatus required for the test and render all assistance for carrying out tests without any extra cost to the Deptt.

97.3.13 Cable Records The following essential data shall be furnished by the Contractor as cable record of all the buried cable installations:

- (a) Size and type of cable and manufacturer's cable drum number;
- (b) Location of the cables in relation to the buildings, kerb line, etc., with depth;
- (c) Cross-sections showing where cables are laid in pipes or ducts, giving their sizes, types and depths together with an indication of any spare ways available;
- (d) Positions and types of all joints;
- (e) Location of other cables which run alongside or across the cable route;
- (f) Position and depths of all pipes, ducts etc., which are met as obstructions to the cable route; and
- (g) Accurate lengths from joint to joint.

98. DEMOLITION/DISMANTLING/TAKING DOWN

- 98.1 Refer to relevant Para under section 21 of MES Schedule Part-I.
- 98.2 The contractor shall take proper precaution for demolition/dismantling work. If any damage caused due to dismantling/demolition to the existing structure, the contractor shall make good the same at his own cost without any extra cost to the Govt.
- 98.3 Unserviceable materials obtained from demolition/dismantling shall be property of the contractor and shall be credited as per schedule of credits. All demolished/dismantled materials shall be removed from the site of the contractor as directed by the Engineer-in-Charge without any extra cost to the Govt.

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PARTICULAR SPECIFICATION (CONT...)**Note:-**

1. The make have been given trade wise only for the purpose of easily locating the items and otherwise makes given are applicable to the entire contract.
2. Wherever word "equivalent make" has been specified the option of equivalent make will only be considered after approval from the Accepting Officer and only where products of brand/ manufacturer specified are not available in market
3. Makes specified in Sch 'A' shall only be provided when makes are mentioned in Sch 'A'.
4. Makes specified in Particulars Specifications shall be provided only when no makes are specified in Sch 'A'.
5. Makes specified in this Appendix shall be provided only when no makes are mentioned in Sch 'A' and Particulars Specifications.
6. Contractor will supply the material only after obtaining the written approval from AGE (I) regarding use of specific make of items and will supply the material at appropriate time as and when required by the GE
7. To ensure genuineness of material the contractor will order only on manufacture or authorized dealer and the Engineer-in-Charge will receive material after verifying the delivery challan of the supplier and after satisfying the genuineness of material.

All other materials :-Make and sample as approved by GE

Notes:	
1.	Makes specified in Schedule 'A' / BOQ shall only be provided when makes are mentioned in Schedule 'A'/BOQ.
2.	Makes specified in Particulars Specifications shall be provided only when no makes are specified in Schedule 'A'/BOQ.
3.	Makes specified in this Appendix shall be provided only when no makes are mentioned in Schedule 'A'/BOQ and Particular Specifications.
4.	Contractor will supply the material only after obtaining the written approval from GE regarding use of specific make of items and will supply the material at appropriate time as and when required by the GE.
5.	To ensure genuineness of material the contractor will order only on manufacture or authorised dealer and the Engineer-in-Charge will receive material after verifying the delivery challan of the supplier and after satisfying the genuineness of material.
6.	Delete the make whichever is not applicable.

Note: - Materials and equipments for which any makes have not been specified or additional makes to be added should be of any command/ E-in-C approved makes and shall strictly comply with appropriate IS Specifications shall bear ISI / BIS Marking as per direction of GE.

99. **Verification of Voucher/Production of Vouchers:-**

The following are the list of items which are required for verification of vouchers/ production of vouchers: -

- (i) Cement and TMT Bar.
- (ii) Anodized window / ventilator shutters Framed grills , gratings conforming with Fe-290 gde -E-165.
- (iii) Non -Asbestos fiber cement /Paints items / tiles
- (iv) Hard Wood/ Flush Shutter/ plywood/Paver Blocks.
- (v) Anodized aluminum GI snap grid powder coated / GI pipe / Sluice valve/ CPVC(SDR) Pipe/ I
- (vi) Cable (FRLS), MCB, MCCB
LED Lights fittings with all accessories.

SIGNATURE OF CONTRACTOR

ACWE (CONTRACTS)

PARTICULAR SPECIFICATION (CONT...)

DATE : _____

**FOR ACCEPTING OFFICER
APPENDIX 'A'****LIST OF PRODUCTS FOR WHICH SPECIFIC MAKES
ARE TO BE INCORPORATED IN WORKS****GENERAL**

Materials to be incorporated in the work shall be any one of the following make as approved by the AGE (I) in writing before incorporated in the work. These shall strictly comply with latest appropriate Indian Standard Specification or where IS Specification is not available these shall comply with the latest BS Specification.

SI No	MATERIALS	MAKE/NAME OF MANUFACTURER
1	VITRIFIED FLOOR TILES/CERAMIC GLAZED WALL TILES/ NON SKID CERAMIC TILES.	ORIENT BELL LTD/ NITCO/ KAJARIA CERAMICS LTD/ ASIAN GRANITO INDIA LTD/ SOMANY / VERMORA.
2	ALUMINIUM DOOR AND WINDOW FITTINGS	BHARAT/ CLASSIC/ ALANS/ HOTLINE/ IPSA OR ANY MAKE BEARING ISI MARK.
3	MS BUILDERS HARDWARE	MEDIUM GRADE (ISI MARKED)
4	SYNTHETIC ENAMEL PAINT	BROLAC (JENSON & NICHOLSON) / SUPERLAC (SHALIMAR) / NEROLAC (GOODLASS-NEROLAC) / APCOLITE (AISAN) / LUXOL (BERGER)
5	PINK/RED OXIDE CHROME PRIMER	BERGER /JENSON & NICHOLSON /SHALIMAR/ NEROLAC/ASIAN
6	FRENCH POLISH	BERGER / ASIAN
7	CEMENT BASE PAINT	SNOWCEM PLUS/ BERGER PAINTS/ ASIAN PAINTS (GUTUCEM)/ JOTUN INDIA PVT LTD/ CRIMOCEM SUPER CEMENT PAINTS.
8	OIL EMULSION DISTEMPER	ASIAN PAINTS / BERGER PAINTS / JENSON & NICHOLSON PAINTS/ NEROLAC /
9	EXTERIOR ACRYLIC EMULSION WEATHER COAT PAINT	ASIAN PAINTS(APPEX ULTIMA)/BERGER PAINTS(WEATHER COAT)/DULAX/SHALIMAR PINTS LTD (EXTRA MAXIUM ULTRA)/ ROYAL ACRYLIC (CRIMSON PAINTS PVT LTD).
10	WHITE CEMENT/ WALL PUTTY	BIRLA WHITE / BERGER / SHALIMAR PAINTS / ASIAN PAINTS
11	ALUMINIUM SECTIONS FOR DOOR WINDOW AND CEILING	JINDAL/ HINDALCO/INDALCO/ HALCO.
12	STAINLESS STEEL TUBES FOR RAILING	CONFORMING TO IS:6911, GRADE 304 OF MAKE: JINDAL
13	SHEET GLASS	ATUL/ MODI GUARD/SAINT GOBIN
14	APP WATER PROOFING MEMBRANE	STP/ TEXAS/ IWL/ FOSROC
15	PRESSED STEEL FRAMES FOR DOOR/WINDOW/VENTILATORS	M/S B A ENTERPRISES/ M/S MULTIWYN INDUSTRIAL CORPORATION/ M/S DOORWYN INDUSTRIES/ M/S MODERN FABRICATOR/ M/S MADHU INDUSTRIES/ M/S AJANTA ISPAT.
16	INTERLOCKING TILES	CONFORMING TO IS AS APPROVED BY GE/AGE(I)
17	RCC HUME PIPE/ HUME PIPE SEPTIC TANK	(I) MAHESHWARI INDUSTRIES GUWAHATI-14, (II) MEGHALAYA HUME PIPE INDUSTRIES GUWHATI-03 OR CONFORMING TO IS AS APPROVED BY GE/AGE(I)
18	GI PIPE (ISI MARKED)	TATA / JINDAL/ZENITH/PRAKASH
19	PPR PIPES & FITTINGS	SFMC/ VECTUS/ FINOLEX/ SUPREME/ RELIANCE.
20	HDPE/ LDPE WATER TANK (ISI MARKED)	SINTEX/ POLYCON/ SUPREME/ROTEX

PARTICULAR SPECIFICATION (CONT...)*Contd...*

SI No	MATERIALS	MAKE/NAME OF MANUFACTURER
21	UPVC/ HDPE PIPES FOR SEWERAGE	KISAN/ PRINCE/ SUPREME/ FUSION/ FINOLEX/ PRAYAG.
22	CI CENTRIFUGALLY CAST PIPES AND FITTINGS	ELECTRO STEEL CASTING LTD/ KESORAM/ TISCO
23	DI PIPES AND FITTINGS	ELECTRO STEEL CASTING LTD/ JINDAL SAW LTD/ TATA METALIKS/ TATA KABUTO
24	PVC SOIL/ WASTE/ RAIN WATER (SWR) PIPES AND FITTINGS	KISAN/ PRINCE/ SUPREME/ FUSION/JAIN IRRIGATION/ ORIPLAST/PRAYAG
25	UPVC/ CPVC PIPES FOR WATER SUPPLY	KISAN/ PRINCE/ SUPREME/ FUSION/ FINOLEX/ PRAYAG
26	JOINT SEALING COMPOUND	STP/ CHOWKSY CHEMICAL/TIKI TAR/CIPY/ SIKA/ FOSROC
27	GALVALUME SHEET	DYNA ROOF/TATA BLUSCOPE/METCO ROOF / CRIL/DURA ROOF
28	CP BATH FITTINGS	JAQUAR/ MARC /CERA/ PARRYWARE/ HINDWARE/JAINKO/ ESSCO.
29	WASH BASIN/ WCS	CERA/ HINDWARE/ PARRYWARE/PRAYAG
30	PTMT FLOAT VALVES/ BALL COCKS, BATH FITTINGS.	PRAYAG/ POLYTUFF/JAINKO.
31	FLUSHING CISTERN	CERA/ HINDWARE/ PARRYWARE/PRAYAG.
32	GLASS MIRROR	PRAYAG /CERA/ SAINT GOBAIN/ MODIGUARD.
33	CERAMIC SANITARY FITTINGS (ISI MARK)	CERA/ HINDWARE/ PARRYWARE/ PRAYAG/ JAQUAR.
34	GUN METAL GATE VALVE	LEADER/ZOLOTO/KIRLOSKAR / BIR/ UPADHYAYA.
35	HEALTH FAUCET	JAGUAR/HINDWARE/PARRYWARE
36	ALUMINIUM POWDER COATED GRILL(DECO GRIL)	M/S ELESAR / M/S ROYAL GRILL / M/S NATIONAL GRILL ASSOCIATED PROFILES & ALUMINIUM LIMITED
37	ANODIZED/ POWDER-COATED ALUMINIUM FRAMES	JINDAL / HINDALCO / AJIT INDIA / INDAL
38	PLAIN SHEET GLASS/ FLOAT GLASS/ FROSTED GLASS	SAINT-GOBAIN GLASS / MODIGUARD FLOAT GLASS / ASAHI INDIA / IAF / HINDUSTAN PILKINGTON GLASS / TRIVENI FLOAT GLASS
39	ANODIZED ALUMINIUM PARTITION SYSTEM WITH SOLID GLAZED PANEL	JINDAL / HINDALCO / INDALCO
40	FRAMELESS GLASS PARTITION SYSTEM/ WALL/ PANELING	SAINT GOBAIN GLASS / IAG
41	STAINLESS STEEL KITCHEN SINK	(I) PRAYAG POLYMER PVT LTD / JAIN BROTHERS SANITATION PVT LTD / CERA/ DIAMOND/ ANUPAM INDUSTRIES /NIRALI
42	TOUGHENED GLASS/ LAMINATED GLASS.	SAINT-GOBAIN GLASS /MODIGUARD FLOAT GLASS/ ATUL TUF/TRIVENI FLOAT GLASS
43	BUILDERS HARDWARE	CLASSIC / MULTYWN / MOWJEE / HARDWYN
44	BIB COCK/STOP VALVES/HOT & COLD MIXER	JAGUAR/GEM/DRIPLESS/ZIM/ESSCO/PARCO
45	WATER CLOSET (PEDESTAL PATTERN)	HINDWARE / PARRY WARE / CERA / NEYCER
46	PVC (SWR)	PRINCE/ FUSION
47	INTEGRAL WATER PROOFING COMPOUND	SIKA / PEDILITE / FOSROC / DR. FIXIT
48	JOINT SEALING COMPOUND	STP/ CHOWKSY CHEMICAL/TIKI TAR/CIPY/ SIKA/ FOSROC.

Contd...

PARTICULAR SPECIFICATION (CONT...)

SI No	MATERIALS	MAKE/NAME OF MANUFACTURER
49	STAINLESS STEEL TOWEL RAIL/TOWEL RACK/TOWEL RING/SOAP DISH/TPH	KOHLER / JAQUAR / CERA / HINDWARE
50	PLYWOOD/ PARTICLE BOARD	KITPLY/ GREENPLY INDUSTRIES LTD/ CENTURY/ ARCHID PLY/ BHUTAN BOARD.
51	BRICKS	LOCALLY AVAILABLE BEST QUALITY OF SUB CLASS 'B' BRICKS
52	CEMENT	M/S DALMIA CEMENT (BHARAT) LTD M/S CENTURY CEMENTS M/S BIRLA CORPORATION LTD M/S J K CEMENT M/S AMBUJA CEMENT LTD M/S MEGHALAYA CEMENTS LTD (TOPCEM)

SIGNATURE OF CONTRACTOR

DATE : _____

**ACWE (CONTRACTS)
FOR ACCEPTING OFFICER**

PARTICULAR SPECIFICATION (CONT...)**APPENDIX ` B`****LIST OF PRODUCTS FOR WHICH SPECIFIC MAKES
ARE TO BE INCORPORATED IN WORKS**

1.	<u>LT WIRES & CABLES (PVC INSULATED CABLE UPTO 1100 VOLTS COPPER/ALUMINIUM CONDUCTOR SHEATHED/UNSHEATHED AS PER IS 694:1990</u>		
	A) HPL INDIA LTD	B) HAVELLS INDIA LTD	C) RRKABELLTD
	D) FINOLEX	E) NICCO	F) KEI
	G) INDO AMERICAN ELECTRICALS LTD	H) PLAZA	J) MESCAB
	K) POLYCAB		
2.	<u>PVC/XLPE IN DULATED PVC SHEATHED HEAVY DUTY ARMOURED/UNARMOURED CABLES UPTO1100 VOLTS, ALUMINIUM/COPPER CONDUCTORS, SOLID/STRANDED AS PER IS 1554 PT1 : 1998 & IS7098PT1:1988</u>		
	A) HPL INDIALTD	B) HAVELLS INDIALTD	C) GLOSTER CABLES LTD
	D) KEI INDUSTRIESLTD	E) GRANDLEY	F) FINOLEX
	G) CRYSTAL CABLE INDUSTRIES	H) MESCAB	J) POLYCAB
3.	<u>HT XLPE CABLES</u>		
	A) HAVELLS INDIALTD	B) GLOSTER CABLESLTD	C) KEI INDUSTRIES LTD
	D) ASIAN(RPG)	E) CCI	F) CRYSTAL CABLE INDUSTRIES LTD
	G) RAVIN CABLES LTD	H) POLYCAB	
4.	<u>OTHER CAT OF CABLES/ABC CABLE</u>		
	A) RAVIN CABLES LTD	B) CRYSTAL CABLE INDUSTRIESLTD	
5.	<u>PIPES CI & DI PIPE FITTINGS</u>		
	A) ELECTROSTEEL	B) KESORAM	C) TATAMETALIKS
	D) LANCO	E) KEJRIWAL	
6.	<u>DI PIPES WITH ISI MARKES IN RANG OF 80MM TO1000MM</u>		
	A) RASHMIMETALIC LTD	B) JINDALSAWLTD	C) ELECTROSTEEL CASTINGLTD
	D) TATA METALIKS	E) LANCO INDUSTRIES LTD	F) ELECTROTHERM
	G) NECO		
7.	<u>ERW MS PIPES/GI PIPES/FITTINGS</u>		
	A) SURYA ROSHNILTD	B) TATA	C) JINDALSTEEL
	D) PRAKASH	E) ZENITH	F) BANSAL
	G) SWASTIK	H) BST	
8.	<u>PVC,UPVC & HDPE PIPES & FITTINGS(PVC PIPES & FITTINGS)</u>		
	A) KISAM MOULDINGS LTD	B) ORI-PLAST	C) SUPREME
	D) PRINCE	E) FINOLEX	F) JAIN IRRIGATION SYSTEMSLTD
	G) TRIPATI	H) DUTRON	
9.	<u>UPVC/CPVC/RWP</u>		
	A) ORI-PLAST	B) SUPREME	C) PRINCE
	D) FINONOS	E) DINESH IRRIGATION	F) TRIPTI
	G) DUTRON		
10.	<u>CONDUIT STEEL ERW</u>		
	A) TATA	B) JINDAL	C) KALINGA
	D) BEC	E) AKG	F) PRAKASH
	G) STEEL KRAFT		
11.	<u>CONDUIT PVC</u>		
	A) PRESTOPLAST	B) FINOLEX	C) INDO AMERICAN ELECTRICALS LTD
	D) KALINGA GOLD	E) PRINCE	F) PLAXA
	G) AKG	H) RICHA CABLES PVT LTD	J)

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PARTICULAR SPECIFICATION (CONT...)

12.	PVC CASING CAPING		
	A) PRESTO	B)FINOLEX	C) KALINGA
	D)PRINCE	E)PLAZA	F) AKG
13.	LIGHT FITTINGS/LAMPS(FLAME PROOF FITTINGS		
	A) BAJAJ	B) CROMPTON GREAVES	C) SUDHIR
	D) ATLAS	E)BALIGA	F)SHYAM
14.	FLUORESCENT TUBELIGHT/CFLFITTINGS		
	A)PHILIPS	B) CROMPTONGREAVES	C) HAVELLS
	D)SURYA ROSHNILTD	E)HALONIX	F)BAJAJ
	G) WIPRO	H)HPLINDIALTD	
15.	FTL/CFL/PLS /HPSV/HPMV/ METAL HALIDE FITTINGS/LAMPS(OUTDOOR LIGHTING)		
	A)PHILIPS	B) CROMPTONGREAVES	C) HAVELLS
	D)SURYA ROSHNILTD	E)HALONIX	F)BAJAJ
	G) WIPRO	H)HPLINDIALTD	J)
16.	LED LIGHT FITTINGS(EXTERNAL/INTERNAL)		
	A)PHILIPS	B) HAVELLSINDIALTD	C) SURYA ROSHNILTD
	D) INSTA POWER	E)ELECTRON LIGHTING SYSTEM	F) GOLDWYN
	G) SEMICONDUCTORS PVT LTD	VIN	
17.	SWITCH FUSE/CHANGE OVER SWITCH		
	A)L&T	B) LEEGRAND	C) ABB
	D) SIEMENS	E) C&S	F)HPL INDIA LTD
	G) GE	H)HAVELLS INDIA LTD	J)NOVATEUR ELEC & DIGITAL SYSPVT LTD
18.	MCB, RCCB, RCBO& DISTRIBUTION BOARDS FORMCBs		
	A)LEGRAND	B)L&T(HAGER)	C) SIEMENS
	D) ABB	E)SCHNIEDER	F) GE
	G)HPL INDIA LTD	H)HAVELLS INDIA LTD	J)NOVATEUR ELEC & DIGITAL SYS PVT LTD
19.	MCCB,AIRCB		
	A)LEGRAND	B)L&T	C) SIEMENS
	D) ABB	E)SCHNIEDER	F) GE
	G)HPL INDIA LTD	H)HAVELLS INDIA LTD	J)NOVATEUR ELEC & DIGITAL SYS PVT LTD
	K) C&S ELECTRIC		
20.	SWITCHES /BUZZER/SOCKET/BELL/ CEILING ROSE/REGULATOR PIANO TYPE		
	A)HAVELLS	B)ANCHOR	C)LEGRAND
	D) CONA	E)PLAZA	F)SSK
21.	SWITCHES/SOCKETS,REGULATOR MODULARTYPE		
	A)HAVELLS (CRABTREE)	B)ANCHOR (WOODS)	C)LEGRAND
	D) RRKABLELTD	E)NOVATEUR ELEC & DIGITALSYS PVT LTD	F) CONA
	G) PLAZA	H) EON ELECTRIC LTD	
22.	SUBSTATION/TRANSFORMER(POWER TRANSFORMER33/11KV)		
	A)CROMPTON GREAVES	B) BHEL	C) ABB
	D) SIEMENS	E)VOLTAMP	F) ANDREWYULE
	G)ELECTRIFIELD COMPANY		
23.	TRANSFORMERS 11KV, DISTRIBUTION TYPE STEP DOWN/UP <400KVA		
	A) ABB	B) SIEMENS	C) VOLTAMP
	D) CROMPTON GREAVES	E)INDIAN TRANSFORMERS AND ELECTRICALS	F) ELECTRIFIELD COMPANY
	G) POWER WARE	H)	J)

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PARTICULAR SPECIFICATION (CONT...)

24.	<u>TRANSFORMER 11KV,DISTRIBUTION TYPE STEM DOWN/UP<400KVA</u>		
	(A) ABB	(B) SIEMENS	(C) VOLTAMP
	(D) CROMPTON GREAVES	(E)INDIAN TRANSFORMERS AND ELECTRICAL(10 OCT2016)	(F)ELECTRIFIED COMPANY (24 APR 2016)
	(G) POWER WARE		
25.	<u>TRANSFORMER 11KV,DISTRIBUTION TYPE STEP DOWN/UP>400KVA</u>		
	(A) BHEL	(B) ABB	(C) SIEMENS
	(D) SIEMENS	(D) AREVAT&D	(E) CROMPTONGREAVES
	(F) INDIAN TRANSFORMERS ANDELECTRICAL(10OCT 2016)	(G) ELECTRIFIED COMPANY(24APR20 16)	
26.	<u>PACKAGED/UNIFIEDSUB STATION</u>		
	(A) CROMPTON GREAVES	(B) BHEL	(C) ABB
	(D) SIEMENS	(E) VOLTAMP	(F) ANDREW YULE
	(G) MEGA WIN SWITCHGEAR PVT LTD (07 AUG 2016)		
27.	<u>VACUUMCB AND SF6(11KV&33KV)AND RING MAIN UNITS</u>		
	(A) BHEL	(B) ABB	(C) AREVA T&D
	(D) SIEMENS	(E) ANDREWYULE	(F) CROMPTONGREAVES
	(G) ITE GURGAON	(H) MEGAWIN SWITCHGEARPVTLTD(07 AUG16)	
28.	<u>CURRENT AND POTENTIAL TRANSFORMERS(LT&HT)</u>		
	(A) AE	(B) ENGLISH ELECTRIC	(C) CROMPTON GREAVES
	(D) AREVA T&D	(E) KAPPA	(F) PARGATI
	(G) C&S ELECTRICAL AND ELECTRONICS PVT LTD(02 MAY 16)		
29	<u>ELECTRONICENERGYMETER (TEMPERPROOFWITHOPTICALPORT)</u>		
	(A) SIEMENS	(B) L&T	(C)HAVELLS INDIA LTD (11 SEP 2016)
	(D)HPL INDIA LTD (13 OCT 2017)	(E) BENTEC ELECTRICAL AND ELECTRONICS PVT LTD (02 MAY16)	(F) SECURE METERS
	(G)DELHI CONTROL DEVICES PVT LTD (17 SEP 2015)	(H) INDOASIAN	
30	<u>ELECTRICAL INSTRUMENTATION/ MEASURING INSTRUMENTS DIGITAL / ANALOG/ ENERGY METERSVOLTMETER/ AMMETER</u>		
	(A) HAVELLS INDIA LTD (11 SEP2016)	(B) HPL INDIA LTD (13 OCT2017)	(C) L&T
	(D) AE	(E) MECO	(F) SECURE METERS
31	<u>CAPACITOR BANK/APFC PANEL</u>		
	(A) ABB	(B) SEIMENS(ESPCOS)	(C) L&T
	(D) BCH	(E)ADHUNIK SWITCH GEARS PVT LTD(22 SEP2017).	(F) UNIVERSAL SWITCH GEAR CONTROL
	(G) RYCOENGINEERING	(H) POWER WARE	(J) ELSSPELSBERG
32	<u>THERMO PLASTIC STREET LIGHT JUNCTION BOX/DB</u>		
	(A) HENSEL	(B) SINTEX INDUSTRIES LTD(31MAR2016)	(C) ELSSPELSBERG
	(D) UNIVERSALSWITCHGEAR CONTROL		

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PARTICULAR SPECIFICATION (CONT...)

33	NATURE SWITCH/STREET LIGHT TIMBER		
	(A) LEGRAND	(B) L&T	(C) BAJAJ
	(D) HAVELLS	(E) GE	(F) KAKTIYA ENERGY SYSTEM PVT LTD(22 JUN2016)
34	LT SWITCH BOARD PANEL(INDOOR WALL MOUNTED PREWIRED)		
	(A) SCHNIEDER	(B) L&T	(C) ABB
	(D) HAVELLS	(E) C&S	(F)HPL INDIA LTD(13OCT2017).
35.	LT SWITCH BOARDPANEL(INDOOR WALLMOUNTEDPREWIRED)		
	(A) SCHNIEDER	(B) L&T	(C) ABB
	(D) HAVELLS	(E) E &S	(F) HPLINDIALTD (13OCT17)
36	LT CONTROL PANEL/ FEEDER PILLAR BOX		
	(A) L&T	(B) MILESTONE	(C) ADVANCE
	(D) UNILEC	(E)ADHUNIK SWITCH GEARS PVT LTD(22 SEP 2017)	(F) UNIVERSAL SWITCH GEARCONTROL
	(G) NEPTUNE	(H) RYCO ENGINEERING	
37	STEEL TUBULAR POLES		
	(A) JINDAL STEEL	(B) NATIONALTUBING CO	(C) CALCUTTA POLES AND TUBES
	(D) BANSAL POLES	(E) BOMBAY TUBE &STORE	
38	CABLE JOINT LT AND HT HOT AND COLD SHRINKABLE		
	(A) BIRLA-3M	(B) DENSON	(C) RAYCHEM
	(D) M-SEAL	(E) CAB-SEAL	(F) CAB-SEAL (G) MS-SEAL
39	AIR BREAK SWITCHES/HT ISLOATORS/GANG SWITCHES		
	(A) PACTIL	(B) BHEL	(C) JAIPURIA BROTHERS
	(D) ELPRO	(E) ATLAS	(F) OBLUM (F) JAYSHREE
40	DSC/PIN TYPE PORCELAIN INSULATORS		
	(A) BHEL	(B) JAIPURIA BROTHERS	(C) PACTIL
	(D) SOUTHERN INSULATORS	(E) JAYASHREE BORADA	(F) WS INSULATORS
	(G) RASHTRIYA ELECTRICAL		
41	DIESEL GENERATING SET ENGINES		
	(A) KIRLOSKAR GREEN	(B) CUMMINS	(C) ASHOK LEYLAND
	(D) GREAVSCOTTON	(E) MAHINDRA	(F) EICHER
	(G) CATERPILLAR	(H) RUSTON	
42	ALTERNATORS		
	(A) ALSTOM	(B) CROMPTON GREAVES	(C) KIRLOSKAR ELECTRIC
	(D) SIEMENS	(E) BHARAT BIJLEE	(F) STAMFORD
	(G) JOYTI	(H) MAHINDRA	
43	LIGHTNING ARRESTORS (STATIONCLASS)		
	(A) OBLUM	(B) ELPRO	(C) BHEL
	(D) AREVA T&D	(E) JAYPURIA BROTHERS	(F) MADRAS PROCELIN
	(G) MEI		
44	ACSR CONDUCTOR		
	(A) INDIAN ALUMINIUM LTD	(B) ALIND	(C) BHARAT CONDUCTORS
45	SINGLE PHASE PREVENTOR/ CONDUCTOR /THERMAL OVERLOAD RELAY		
	(A) ABB	(B) BCH	(C) L&T
	(D) SIEMENS	(D) GE	(E) HAVELLS
	(F) C&S	(G)MINILEC	
46	BATTERY MAINTENANCE FREE		
	(A) EXIDE	(B) AMCO	
	(D) AMARON		
	(G) AMARA RAJA		
47	BATTERYCHARGERS		
	(A) ESCORP	(B) SU-KAM	(C) MICROTEK
	(D) STATCON	(E) AMARA RAJA	(F) MASSTECH

Contd...

PARTICULAR SPECIFICATION (CONT...)

48	INDICATORLAMP/ SELECTORSWITCH		
	(A) L&T	(B) SIEMENS	(C) GE
	(D) RR MICRO	(E) KAYCEE	(F) HAVELLS
	(G) HPL INDIAL TD (13OCT2017)		
49	DIESELENGINE		
	(A) KIRLOSKAR GREEN	(B) CUMMINS	(C) ASHOK LEYLAND
	(D) GREAVS COTTON	(E) MAHINDRA	(F) EICHER
	(G) CATERPILLAR	(H) RUSTON	
50	FIREHOSEREEL		
	(A) MINIMAX	(B) FIREX	(C) SAFEX
51	PRESSURESWITCH		
	(A) SIEMENS	(B) HONEYWELL	(C) DANFOSS
	(D) BARRASOMATIC	(E) RAPIDCONTROL	(F) BELIMO
52.	SYNTHETICENAMEL/ACRYLICPAINT		
	A) JOTUN INDIA PVTLTD	B)APCOLITE(ASIAN)	C)LUXOL (BERGER)
	D)JENSON & NICHOLSON PAINTS LTD (BOROLAC)	E) GODAVARI PAINTSPVTLTD	F)BUTTER FLY(BERGER)
	G) GOODLASS NEROLAC PAINTS	H) DELUX VELVET TOUCH (ICI)	
53	TRANSFORMER OIL		
	(A) Servo	(B) Castro	(C) Shel
	(D) Gulf		
54	GATE VALVE:-		
	(A) KIRLOSKAR	(B) LEADER	(C) ZOLOTO
	(D) AUDCO	(E) SONA	(F) NE
	(G) AIP		
55	GI Pipe/ ERW MS PIPES		
	(A) JINDAL	(B)TATA	(C) NEZONE
	(D) OSAWAL	(E) PRAKASH TUBE	(D) BANSAL
56	CAST IRON SLUICE VALVE		
	(A) KIRLOSKAR	(B) LEADER	(C) ZOLOTO
57	BRONZE GATE VALVE		
	(A) KIRLOSKAR	(B) LEADER	(C) ZOLOTO
58	CAST IRON DOUBLE AIR RELEASE VALVE		
	(A) KIRLOSKAR	(B) LEADER	(C) ZOLOTO
59	DUCTILE IRON PIPE		
	(A) ELECTROSTEEL	(B) KESORAM	(C) TISCO
	(D) TATA	(E)JINDAL	(F) KISWOK
60	CI FITTING /DI FITTING		
	(A)ELECTROSTEEL CASTING	(B)JINDAL SANTT	©LANCO
61	PP-R PIPE/UPVC/HDPE		
	(A) SUPREME	(B) SFMC	© PRINCE
	(D) FINOLEX	(F)	

SIGNATURE OF CONTRACTOR

ACWE (CONTRACT)
ACCEPTING OFFICER

PARTICULAR SPECIFICATION (CONT...)**Note:-**

1. The make have been given trade wise only for the purpose of easily locating the items and otherwise makes given are applicable to the entire contract.
2. Wherever word "equivalent make" has been specified the option of equivalent make will only be considered after approval from the Accepting Officer and only where products of brand/ manufacturer specified are not available in market.
3. Makes specified in Sch 'A' shall only be provided when makes are mentioned in Sch 'A'.
4. Makes specified in Particulars Specifications shall be provided only when no makes are specified in Sch 'A'.
5. Makes specified in this Appendix shall be provided only when no makes are mentioned in Sch 'A' and Particulars Specifications.
6. Contractor will supply the material only after obtaining the written approval from AGE (I) regarding use of specific make of items and will supply the material at appropriate time as and when required by the AGE (I).
7. To ensure genuineness of material the contractor will order only on manufacture or authorized dealer and the Engineer-in-Charge will receive material after verifying the delivery challan of the supplier and after satisfying the genuineness of material.

Note: - Materials and equipments for which make have not been specified shall be of standard makes and shall strictly comply with appropriate IS Specifications shall bear ISI / BIS Marking.

➤ **VERIFICATION OF INVOICE VOUCHERS / RECEIPT VOUCHERS:-**

"DURING PROCESSING OF RAR / FB, THE RECEIPT VOUCHERS / INVOICES SHALL BE SUBMITTED WITH THE BILL AS SPECIFIED FOR EACH ITEMS MENTIONED IN BOQ."

SIGNATURE OF CONTRACTOR

ACWE (CONTRACT)
ACCEPTING OFFICER