

Part-A
Technical Specifications
for
Terminal Building

**TECHNICAL SPECIFICATIONS
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GENERAL

All the civil works & Electrical installations, Mechanical equipments, display systems, Audio visual equipments etc shall be confirming to the respective Indian Standards specified in the latest issue namely, Buro of Indian standards (BIS), Ministry of Road Transport & Highways (MoRTH), Indian Road Congress (IRC), & National Building Code (NBC). The Concessionaire shall procure and deploy all the materials, works/services from authorized manufactures/dealers who produce/supply the items confirming to the specifications mentioned as above. The list of glossary of technical Specifications applicable is indicated in the subsequent sections. The concessionaire shall be fully responsible for the standards of material deployed and its safety and suitability to use in public places.

2. In case of Technical & Materials specifications, those are not available in BIS, MoRTH, IRC & NBC; the applicable specifications shall be adopted from International Standards. The Priority of international Standards shall be as follows.

- a. British Standards
- b. American Standards
- c. Any other international Standards as applicable.

**SECTION - I
PILING WORK**

1.0 INDIAN STANDARDS

1.1 Work shall be carried out to Indian Standards and Code of Practices. In absence International Standards shall be followed. These shall be latest issue. List given hereunder is not to be considered as conclusive and is for reference and guidance only. Any discrepancies /conflict noticed shall be directed to the Independent Engineer/Authority for his direction/approval. However as a general rule more stringent specification shall take precedence.

- | | | |
|------|--------------|--|
| (1) | IS 456-2000 | Code of practice for plain and reinforced concrete |
| (2) | IS 516 | Method of test for strength of concrete |
| (3) | IS 2911 | Code of practice for design and construction of pile foundation. |
| | Part I Sec 2 | Concrete piles, Bored cast-in-situ concrete piles. |
| (4) | IS 4999 | Recommendation for grouting of pervious soil |
| (5) | IS 383 | Specification for Coarse and fine aggregates from natural sources for concrete |
| (6) | IS 2386 | Method of test for aggregate for concrete (Part I, II & III)
i) Particle size and shape
ii) Estimation of deleterious materials and organic impurities
iii) Specific gravity, density, voids, absorption and bulking. |
| (7) | IS 3025 | Methods of Sampling and test (Physical and Chemical for water) |
| (8) | IS 4031 | Methods of physical test for Hydraulic cement |
| (9) | IS 9417 | Recommendation for welding cold worked steel bars for reinforced concrete construction |
| (10) | IS 277 | Galvanized steel sheets (Plain and corrugated) specification. |

SECTION - II
EARTH WORK

1.0 GENERAL

1.1 Standards

Work shall be carried out to Indian Standards and Code of Practices. In absence International Standards shall be followed. These shall be latest issue. List given hereunder is not to be considered as conclusive and is for reference and guidance only. Any discrepancies/conflict noticed shall be directed to the Independent Engineer/Authority for his direction/approval. However as a general rule more stringent specification shall take precedence.

- | | | |
|-----|----------------|---|
| (1) | IS 1200 | Method of measurement of Building and Civil Engineering works |
| (2) | IS 1498 | Classification and identification of soils for general engineering purpose |
| (3) | IS 2720 | Method of test of soil |
| (4) | IS 3764 | Safety code for excavation work |
| (5) | IS 4081 | Safety code for blasting and related drilling operation |
| (6) | IS 6313 Part 1 | Code of practice for anti-termite measures in buildings :
constructional measures |
| | Part 2 | Code of practice for anti termite measures in buildings :
Pre constructional chemical treatment measures |
| (7) | SP 27 | Hand book of method of measurement of building works |
| (8) | | Explosive Rules 1940 |

SECTION – III / A

CONCRETE WORK

1.0 GENERAL

1.1 Standard

Work shall be carried out to Indian Standards and Code of Practices. In absence International Standards shall be followed. These shall be latest issue. List given hereunder is not to be considered as conclusive and is for reference and guidance only. Any discrepancies /conflict noticed shall be directed to the Independent Engineer/Authority for his direction/approval. However as a general rule more stringent specification shall take precedence.

- | | | |
|------|----------|--|
| (1) | IS 269 | Specification for Ordinary and low heat, portland cement |
| (2) | IS 8112 | Specification for 43 grade ordinary portland cement |
| (3) | IS 12269 | Specification for 53 grade ordinary portland cement |
| (4) | IS 383 | Specification for Coarse and fine aggregates from natural sources for concrete |
| (5) | IS 456 | Code of practice for plain and reinforced concrete |
| (6) | IS 460 | Specification for test sieves (Part I,II & III) |
| | | i) Wire cloth test sieve |
| | | ii) Perforated plate test sieve |
| | | iii) Method of examination of test sieves |
| (7) | IS 515 | Specification for natural and manufactured aggregates from natural sources for concrete. |
| (8) | IS 516 | Method of test for strength of concrete |
| (9) | IS 875 | Design loads for building structure. |
| | | (Part I, II, III) |
| (10) | IS 1199 | Method of Sampling and analysis of concrete |
| (11) | IS 1791 | Batch type concrete mixers |
| (12) | IS 1893 | Earthquake resistant design. |
| (13) | IS 2386 | Method of test for aggregate for concrete (Part I,II & III) |
| | | i) Particle size and shape |
| | | ii) Estimation of deleterious materials and organic impurities |
| | | iii) Specific gravity, density, voids, absorption and bulking. |
| (14) | IS 2505 | General requirements for concrete vibrators |
| (15) | IS 2645 | Specification for Integral cement water proofing compound |
| (16) | IS 3025 | Methods of Sampling and test (Physical and Chemical for water) |
| (17) | IS 4326 | Code of practice for earthquake resistant design and construction of building. |
| (18) | IS 4926 | Specification for ready mixed concrete |

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- | | | |
|------|----------|--|
| (19) | IS 7861 | Code of practice for extreme weather concreting |
| | i) | Recommended practice for hot weather concreting |
| | ii) | Recommended practice for cold weather concreting |
| (20) | IS 9103 | Specifications for admixture for concrete |
| (21) | IS 12118 | (Part I)
Specification for two parts polysulphide based sealant :
general requirements |
| (22) | SP 23 | Handbook on concrete mix |
| (23) | SP 24 | Explanatory handbook on Indian Standards code for plain
and reinforced concrete (IS 456) |
| (24) | SP 27 | Handbook of method of measurement of building works |

SECTION – III / B

REINFORCEMENT WORK

1.0 GENERAL

1.1 Standards

Work shall be carried out to Indian Standards and Code of Practices. In absence International Standards shall be followed. These shall be latest issue. List given hereunder is not to be considered as conclusive and is for reference and guidance only. Any discrepancies /conflict noticed shall be directed to the Independent Engineer/Authority for his direction/approval. However as a general rule more stringent specification shall take precedence.

1. IS 226 Specification for steel standard quality
2. IS 228 Methods for chemical analysis of steels
3. IS 280 Specification for mild steel wire for general engineering purpose.
4. IS 432 Specification for mild steel and medium tensile steel burn and hard drawn steel wires for concrete requirement.
Part 1 Mild steel and Medium tensile steel bars.
Part 2 Hard drawn steel wire.
5. IS 456 Code of practice for construction and design of reinforced concrete.
6. IS 816 Code of practice for use of metal arc welding for general construction in mild steel
7. IS 961 Specification for structural steel : high tensile steel bars
8. IS 1566 Hard drawn steel wire fabric for concrete reinforcement.
9. IS 1599 Method of Bend test
10. IS 1642 General requirements for fire protection.
11. IS 1785 Cold drawn stress relieved wire (part I)
12. IS 1786 Specification for high strength deformed steel bars and wires for concrete reinforcement.
13. IS 2751 Code of practice for welding of MS bars.
14. IS 2502 Code of practice for bending and fixing of bars for concrete reinforcement.
15. IS 2751 Code of practice for welding of Bars
16. IS 3696 Safety Code of scaffolds and ladders :
Part 1 Scaffolds
Part 2 Ladders
17. IS 4014 Code of practice for steel (Part 1 & 2) tubular scaffolding
18. IS 4082 Recommendation on stacking and storage of

- construction materials at site.
- | | | |
|-----|----------|--|
| 19. | IS 5525 | Recommendation for detailing of reinforcement in RCC work. |
| 20. | IS 9417 | Recommendation for welding cold worked steel bars for reinforced concrete construction |
| 21. | IS 10790 | Method of sampling of steel for prestressed and reinforced concrete |

SECTION – III / C
FORM WORK

1.0 GENERAL

1.1 Standards

Work shall be carried out to Indian Standards and Code of Practices. In absence International Standards shall be followed. These shall be latest issue. List given hereunder is not to be considered as conclusive and is for reference and guidance only. Any discrepancies/conflict noticed shall be directed to the Independent Engineer/Authority for his direction/approval. However as a general rule more stringent specification shall take precedence.

1. IS 303 Specification for plywood for general purpose.
2. IS 456 Code of practice for construction and design of reinforced concrete.
3. IS 2751 Code of practice for welding of M.S bars used for RCC
4. IS 3696 Safety Code of scaffolds and ladders :
Part 1 Scaffolds
Part 2 Ladders
5. IS 4014 Code of practice for steel (part 1 & 2) tubular scaffolding
6. IS 4082 Recommendation on stacking and storage of construction materials
7. IS 8989 Safety code of erection of concrete formed structures

SECTION – III / D
STRUCTURAL STEEL WORK

1.0 GENERAL

1.1 Description

This section covers the requirements for providing fabrication, erection and placing of structural steel work for building construction including temporary supports and all other work as required for structural steel construction.

1.2 Applicable Codes and Standards

The codes and standard generally applicable to the work of this section is listed hereinafter.

- | | | |
|------|---------|--|
| (1) | IS 210 | Grey iron castings |
| (2) | IS 226 | Structural steel (Standard quality) |
| (3) | IS 451 | Technical supply conditions for wood screws |
| (4) | IS 800 | Code of Practice for use of structural steel in general building construction. |
| (5) | IS 801 | Code of practice for use of cold formed light gauge steel structural members in general building construction. |
| (6) | IS 803 | Code of practice for design, fabrication and erection to vertical mild steel cylindrical welded storage tanks. |
| (7) | IS 806 | Code of Practice for use of steel tubes in general building construction. |
| (8) | IS 808 | Dimension for hot rolled steel sections. |
| (9) | IS 813 | Scheme of symbols for welding. |
| (10) | IS 814 | Covered electrodes for metal arc welding of (Part I & II) structural steel. |
| (11) | IS 816 | Code of practice for use of metal arc welding and general construction in mild steel. |
| (12) | IS 822 | Code of Practice for inspection of welds. |
| (13) | IS 961 | Structural steel (high tensile) |
| (14) | IS 1024 | Code of practice for use of welding in bridges and structures subject to dynamic loads. |
| (15) | IS 1030 | Carbon Steel casting for general engineering purpose. |
| (16) | IS 1120 | Coach Screws. |
| (17) | IS 1149 | Specification for light tensile steel rivet, bars for structural purposes. |
| (18) | IS 1161 | Steel tubes for structural purposes. |
| (19) | IS 1182 | Recommended practice for Radiograph examination of |

		fusion welded butt joints in steel plates.
(20)	IS 1200	Method of measurement in Building Civil Engineering work.
(21)	IS 1239	Mild steel tubes, tubulars and other wrought steel fittings
	Part I	Mild Steel
	Part II	Mild steel tubulars and other wrought sheet pipe fittings.
(22)	IS 1363	Black hexagonal bolts, nut and black hexagon screws product of Grade C (size range M25 to M64) (Part 1 to 3).
(23)	IS 1365	Slotted counter sunk screws.
(24)	IS 1367	Technical supply conditions for threaded fasteners.
(25)	IS 1477	Code of practice for painting of (Part I and II) ferrous metal in buildings.
(26)	IS 1852	Rolling and cutting tolerances for hot rolled steel products.
(27)	IS 1915	Code of Practice for steel bridges.
(28)	IS 1977	Structural steel (ordinary quality)
(29)	IS 2016	Plain washer.
(30)	IS 2062	Structural steel (fusion welding quality)
(31)	IS 2079	Ready mix paint, air drying, red oxide zinc chrome and priming.
(32)	IS 2595	Code of practice for Radiographic testing.
(33)	IS 3063	Single coiled rectangular section spring washers for bolts, nut and screws.
(34)	IS 3443	Crane rail sections.
(35)	IS 3600	Code of practice for testing of fusion welded (Part-I) joints and weld metal in steel
(36)	IS 3658	Code of practice for liquid penetrant
(37)	IS 3757	Specification for High Tensile Friction grip bolts
(38)	IS 4000	High strength bolts in steel structures Code of practice.
(39)	IS 4923	Hollow steel sections for structural use.
(40)	IS 5334	Code of practice for magnetic particle flaw detection of welds.
(41)	IS 5369	General requirements for plain washer and lock washers.
(42)	IS 5372	Taper washers for channels.
(43)	IS 5374	Taper washers for I beam
(44)	IS 5624	Specification for foundation bolts.
(45)	IS 6227	Code of practice for use of metal arc welding in tubular

- structure.
- (46) IS 6610 Heavy washers for steel structures.
 - (47) IS 7215 Tolerances for fabrication of steel structures.
 - (48) IS 8500 Structural steel- Micro alloyed (medium and high strength qualities)
 - (49) IS 9595 Recommendations for metal arc welding of carbon and carbon manganese steel.

SECTION – IV / A
MASONRY WORK – BRICK WORK

1.0 GENERAL

1.1 Standards

Work shall be carried out according to Indian Standards and Code of Practices. In absence International Standards shall be followed. These shall be latest issue. List given hereunder is not to be considered as conclusive and is for reference and guidance only. Any discrepancies/conflict noticed shall be directed to the Independent Engineer/ Authority for his direction/approval. However as a general rule more stringent specification shall take precedence.

- | | | |
|-----|---------|--|
| (1) | IS 226 | Specification for Structural steel standard quality |
| (2) | IS 269 | Specification for 33 grade OPC |
| (3) | IS 1077 | Specification for common burnt clay building bricks |
| (4) | IS 2116 | Specification for sand for masonry mortars |
| (5) | IS 2212 | Code of practice for brick work |
| (6) | IS 2250 | Code of practice for preparation and use of masonry mortars. |
| (7) | IS 8112 | Specification for 43 grade OPC |
| (8) | IS 3495 | Method of test for burnt clay building bricks |

1.2 Quality assurance

- 1.2.1 Material shall be tested through an independent authorised approved testing laboratory / agency who is equipped and experienced to carry out test as per IS standards.
- 1.2.2 Bricks shall be of uniform quality, uniform texture, colour / blend within acceptable ranges / characteristics. Source of supply shall be restricted to one or two.
- 1.2.3 Samples shall be tested for strength, moisture content, dimensional tolerances, and efflorescence prior to approval and during construction at independent laboratory.
- 1.2.4 Build sample panels of about 1800x1800mm for each type using materials tested and approved prior to actual work proceeds.
- 1.2.5 Build mockup to verify selections made under sample submittals and to demonstrate aesthetic effects, qualities of material and execution.

SECTION – IV / B
MASONRY WORK - CONCRETE BLOCK

1.0 GENERAL

1.1 Indian Standards

Work shall be carried out to Indian Standards and Code of practices. In absence International standards shall be followed. These shall be latest issue. List given hereunder is not to be considered as conclusive and is for reference, guidance only. Any discrepancies / conflict noticed shall be directed to the Independent Engineer/ Authority for his direction / approval. However as a general rule more stringent specification shall take precedence.

1. IS 269 Specification for ordinary and low heat portland cement grade 33
2. IS 383 Specification for coarse and fine aggregates from natural sources for concrete.
3. IS 456 Code of Practice for plain and reinforced concrete.
4. IS 2185 Specification for concrete masonry units
Part – 1 Hollow and solid concrete blocks
Part – 2 Hollow and solid light weight concrete blocks
Part – 3 Autoclave Cellular (Aerated) concrete blocks
5. IS 2572 Code of Practice for construction of hollow concrete block masonry.
6. IS 8112 Specification for ordinary portland cement grade 43.
7. IS 9103 Specifications for admixtures for concrete.

1.2 Quality assurance

1.2.1 Concessionaire shall procure block from approved concrete block manufacturer.

1.2.2 Block manufacturer should have minimum five years experience in manufacturing of blocks.

1.2.3 Manufacturer shall give certificates that blocks manufactured are of specified minimum crushing strength conforming to IS and are fully cured.

1.2.4 Manufacturer shall confirm materials used and method of casting, required plants, equipments meets conform to IS.

SECTION – IV / C
MASONRY WORK – STONE MASONRY

1.0 INDIAN STANDARDS

Work shall be carried out to Indian Standards and Code of Practices. In absence International Standards shall be followed. These shall be latest issue. List given hereunder is not to be considered as conclusive and is for reference and guidance only. Any discrepancies /conflict noticed shall be directed to the Independent Engineer/ Authority for his direction/approval. However as a general rule more stringent specification shall take precedence.

- | | | |
|-----|---------|---|
| (1) | IS 1121 | Methods of test for determination of strength properties of natural building stones. |
| | Part 1 | Compressive strength |
| | Part 2 | Transverse strength |
| | Part 3 | Tensile strength |
| | Part 4 | Shear strength |
| (2) | IS 1124 | Methods of test for determination of water absorption apparent specific gravity and porosity of natural building stone. |
| (3) | IS 1127 | Recommendations for dimensions and workmanship of natural building stones for masonry work. |
| (4) | IS 1597 | Code of Practice for Part 1 construction of stone masonry : Rubble stone masonry |
| (5) | SP 27 | Handbook of method of measurement of building works. |

SECTION – V
PLASTERING WORK

1.0 GENERAL

1.1 INDIAN STANDARDS

Indian and other international standards followed for this section shall be as listed below. In case any discrepancies or ambiguities noticed it shall be brought to notice of the Independent Engineer/Authority and clarification/confirmation sought. His decision shall be final. However as general rule more stringent specifications shall be followed.

- (1) IS 383 Specification for coarse and fine aggregates for natural sources for concrete.
- (2) IS 412 Specifications for expanded metal steel sheets for general purposes.
- (3) IS 1489 Specification for Portland pozzolana cement.
- (4) IS 1542 Specifications for sand for plaster
- (5) IS 1661 Code of practice for application of cement and cement-lime plaster finishes.
- (6) IS 2402 Code of practice for external rendered finishes.
- (7) IS 2645 Specifications for integral cement water proofing compound.
- (8) IS 6452 Beads for internal plastering and dry lining specification for galvanized steel beads.
- (9) IS 8112 Specification for 43 grade ordinary Portland Cement.

1.2 Quality Assurance

- 1.2.1 All materials used shall be tested as per standards and samples approved by Independent Engineer.
- 1.2.2 GI beads shall be of approved quality.
- 1.2.3 metal reinforcement used shall be as specified and conforming to IS.

**SECTION – VI
FLOORING WORK**

1.0 GENERAL

1.1 INDIAN STANDARDS

Indian and other international standards followed for this section shall be as listed below. In case any discrepancies or ambiguities noticed it shall be brought to notice of the Independent Engineer/Authority and clarification/confirmation sought. His decision shall be final. However as general rule more stringent specifications shall be followed.

- (1) IS 269 Specification for ordinary and low heat Portland cement.
- (2) IS 383 Specification for Coarse and fine aggregates from natural sources for concrete.
- (3) IS 8042 Specification for white Portland cement
- (4) IS 8112 Specification for 43 grade ordinary Portland cement
- (5) IS 12118 Specifications for two parts polysulphide based sealants: Part 1 General requirements.
- (6) IS 13712 Ceramic tiles, definitions, classifications, characteristics and marking
- (6) IS 13753 Dust pressed ceramic tiles with water absorption of $E > 10\%$ (Group B III)
- (7) IS 13755 Dust pressed ceramic tiles with water absorption of $3\% < E \leq 6\%$ (Group B IIa)
- (8) IS 287 Recommendation for maximum permissible moisture content for timber used for different purposes.
- (9) IS 401 Code of practice for preservation of timber.
- (10) IS 11215 Methods of determination of moisture content of timber and timber products.

1.2 Quality Assurance

1.2.1 Comply with standard specified for material and workmanship.

1.2.2 Stones received shall be from approved quarries and of approved lot.

1.2.3 Tiles manufacturer shall confirm that material is as per specification and within acceptable tolerances. Tiles shall be of one production run, of consistent quality, appearance and physical properties.

1.2.4 The Concessionaire shall procure mortar, adhesive, grout etc. of approved quality design and standard and he will not change source of supply without written permission and with revised samples being approved.

1.2.5 Supervision and workmen employed shall be experience in field of wood flooring work and shall be able to guarantees workmanship, finish and in-service performance.

SECTION – VII / A
WOODEN JOINERY

1.0 GENERAL

1.1 INDIAN STANDARDS

Work shall be carried out to Indian Standards and Code of practices. In absence International standards shall be followed. These shall be latest issue. List given hereunder is not to be considered as conclusive and is for reference and guidance only. Any discrepancies / conflict noticed shall be directed to the Independent Engineer/ Authority for his direction / approval. However as a general rule more stringent specification shall take precedence.

1. IS 287 Recommendation for maximum permissible moisture content for timber used for different purposes in different zones.
2. IS 401 Code of practice for preservation of timber.
3. IS 848 Specification for synthetic resin adhesives for plywood (phenolic and amino plastic).
4. IS 851 Specification for synthetic resin adhesive for construction (non-structural) in wood.
5. IS 852 Specification for animal glue for general wood working purposes.
6. IS 1003 Specification for timber paneled and glazed shutters
Part 1 Door shutters
7. IS 1141 Code of practice for seasoning of timber
8. IS 1328 Specification for veneered decorative plywood
9. IS 1508 Specification for external for use in synthetic resin adhesives (urea-formaldehyde) plywood.
10. IS 2036 Phenolic laminated sheet
11. IS 2202 Specification for wooden flush door shutter (Solid core type)
Part I Plywood face panels
Part II Particleboard and hard board face panels
12. IS 2221 Method of test for Amino plastic moulding material
13. IS 4020 Method of tests for shutters
Part 1 to 15
14. IS 4021 Specification for timber doors, window and ventilator frames.
15. IS 4913 Code of practice for selection, installation and maintenance of timber doors and windows.
16. IS 7196 Specification for hold fast
17. IS 7638 Method of sampling for plywood, fibre hardboard, insulation boards and particle boards
18. IS 9307 Method of Test for wood based structural sandwich construction.
Part 2 Edgewise compression test.

Part 3 Flat wise compression test.

Part 4 Shear test

19. IS 12120 Code of practice for preservation of plywood and other panel products.

1.2.0 Quality Assurance

1.2.1 Comply with standards specified for material and workmanship

1.2.2 Supervision and workmen employed shall be experienced in field of carpentry works and shall be able to guarantee workmanship and finish of standards as established and approved by the INDEPENDENT ENGINEER.

1.2.3 Shutters manufacturer shall have ISI certification and each shutter received at site shall bear stamp of ISI, manufacturer and type of product, batch no., etc.

1.2.4 Shutter manufacturer shall have minimum 7 (seven) years experience in this product.

SECTION – VII / B
STEEL FRAME AND SHUTTERS

1.0 GENERAL

1.1 INDIAN STANDARDS

Work shall be carried out to Indian Standards and Code of practices. In absence International standards shall be followed. These shall be latest issue. List given hereunder is not to be considered as conclusive and is for reference and guidance only. Any discrepancies / conflict noticed shall be directed to the Independent Engineer/ Authority for his direction / approval. However as a general rule more stringent specification shall take precedence.

1	IS 226	Structural steel (Standard quality) superseded by IS 2062:1992
2	IS 277	Specification for galvanized steel sheets
3	IS 1038	Specification for steel doors, windows and ventilators
4	IS 1081	Code of practice for fixing and glazing of metal (steel & aluminium) door, windows and ventilators
5	IS 1361	Specification for steel windows for industrial buildings
6	IS 1367	(Part 1-19) Technical supply conditions for threaded steel fasteners
7	IS 1977	Structural steel (ordinary quality)
8	IS 2062	Steel for general structural purposes
9	IS 4351	Specification for steel door frames
10	IS 4736	Hot - dip zinc coating on mild steel tubes

1.2 Quality Assurance

1.2.1 Material used shall conform to IS. It shall withstand stresses and strains to which it is subjected.

1.2.2 Fabrication, assembly, erection, fastening, etc. shall be in accordance to details approved by INDEPENDENT ENGINEER.

1.2.3 Manufacturer shall have minimum five years experience in these products. Works shall be carried out under qualified supervisions.

SECTION – VII / C
FITTINGS AND FIXTURES

1.0 GENERAL

1.1 Standards

Work shall be carried out to Indian Standards and Code of Practices. In absence International Standards shall be followed. These shall be latest issue. List given hereunder is not to be considered as conclusive and is for reference and guidance only. Any discrepancies/conflict noticed shall be directed to the Independent Engineer/Authority for his direction/approval. However as a general rule more stringent specification shall take precedence.

- | | | |
|------|----------|---|
| (1) | IS 204 | Specification for tower bolts |
| | Part – 1 | Ferrous metal |
| | Part – 2 | Non-ferrous metal |
| (2) | IS 205 | Specification for non - ferrous metal butt hinges |
| (3) | IS 208 | Door handles |
| (4) | IS 281 | Specification for mild steel sliding door bolts for use with padlocks |
| (5) | IS 362 | Specification for Parliament hinges |
| (6) | IS 363 | Specification for hasps and staples |
| (7) | IS 364 | Fanlight catch – Specification |
| (8) | IS 452 | Specification for door spring rat tail type |
| (9) | IS 453 | Double acting spring hinges – Specification |
| (10) | IS1019 | Specification for Rim latches |
| (11) | IS 1341 | Steel butt hinges – Specification |
| (12) | IS 1823 | Specification for floor door stoppers |
| (13) | IS 2209 | Specification for mortice locks (vertical type) |
| (14) | IS 2681 | Non-ferrous metal sliding door bolts (aldrop) for use with pad locks |
| (15) | IS 3564 | Hydraulically reregulated door closers – Specification |
| (16) | IS 3818 | Continuous (piano) hinges – Specification |
| (17) | IS 3843 | Steel back flap hinges |
| (18) | IS 3847 | Mortice night latches – Specification |
| (19) | IS 4621 | Specification for indicating bolts for use in public baths and lavatories |
| (20) | IS 4992 | Specification for door handles for mortice locks (vertical type) |
| (21) | IS 5187 | Specification for flush bolts |
| (22) | IS 5899 | Specification for bath room latches |
| (23) | IS 5930 | Specification for mortice latch (vertical type) |

- | | | |
|------|----------|--|
| (24) | IS 6315 | Floor springs (hydraulically regulated) for heavy door – Specification |
| (25) | IS 6343 | Specification for door closers (Pneumatically regulated) for light door weighing upto 40kg |
| (26) | 6607 | Specification for rebated mortice locks (vertical type) |
| (27) | IS 7196 | Specification for hold fast |
| (28) | IS 9197 | Specification for double action floor springs (without oil check) for heavy doors |
| (29) | IS 7534 | Specification for sliding locking bolts for use with padlocks |
| (30) | IS 7540 | Specification for mortice dead locks |
| (31) | IS 8756 | Specification for ball catches for use in wooden almirahs |
| (32) | IS 8760 | Specification for mortice sliding door locks with lever mechanism |
| (33) | IS9899 | Specification for Hat, coat and wardrobe hooks |
| (34) | IS 10090 | Specification for numericals |
| (35) | IS 12817 | Stainless steel butt hinges – Specification |

**SECTION – VII/ D
SUNDRY METAL WORK**

1.0 GENERAL

1.1 INDIAN STANDARDS

Work shall be carried out to Indian Standards and Code of practices. In absence International standards shall be followed. These shall be latest issues. List given hereunder is not to be considered as conclusive and is for reference and guidance only. Any discrepancies / conflict noticed shall be directed to the Independent Engineer/Authority for his direction / approval. However as a general rule more stringent specification shall take precedence.

1. IS 226 Specification for structural steel standard quality.
2. IS 277 Specification for galvanized steel sheets.
3. IS 806 Code of practice for use of steel tubes in general building construction.
4. IS 814 Welding electrodes.
5. IS 815 Classification and coding of covered electrodes for metal arc welding of structural steels.
6. IS 816 Code of practice for use of metal arc welding for general construction in mild steel.
7. IS 817 Code of practice for training and testing of metal arc welders.
8. IS 822 Code of procedure for inspection of welds.
9. IS 823 Code of procedure for Manual for metal arc welding in mild steel.
10. IS 1239 Specification for mild steel tubes, tubular and other wrought steel fittings.
11. IS 1977 Structural steel (ordinary quality)
12. IS 2062 Steel for general structural purposes
13. IS 2713 Part I Specification for Tubular steel poles

1.2 Quality Assurance

- 1.2.1 Material used shall conform to IS. Members shall withstand stresses and strains to which they are subjected.
- 1.2.2 Fabrication, assembly, erection, fastening, etc. shall be in accordance to details approved by INDEPENDENT ENGINEER.
- 1.2.3 Manufacturer shall have minimum five years experience in these products. Works shall be carried out under qualified supervisions.
- 1.2.4 Welders employed shall be certified welders as per IS 817.

SECTION – VII / E
MILL WORKS

1.0 GENERAL

1.1 Indian Standards

Work shall be carried out to Indian Standards and Code of practices. In absence International standards shall be followed. These shall be latest issue. List given hereunder is not to be considered as conclusive and is for reference and guidance only. Any discrepancies / conflict noticed shall be directed to the Independent Engineer/Authority for his direction / approval. However as a general rule more stringent specification shall take precedence.

- (1) IS 204 Specification for tower bolts :
 - Part – 1 Ferrous metals
 - Part – 2 Non-ferrous metal
- (2) IS 208 Specification for door handles
- (3) IS 287 Recommendation for maximum permissible moisture content for timber used for different purposes.
- (4) IS 303 Specification for plywood for general purposes
- (5) IS 401 Code of practice for preservation of timber.
- (6) IS 710 Specification for marine plywood
- (7) IS 729 Specification for drawer locks, cupboard locks and box locks
- (8) IS 848 Specification for synthetic resin adhesives for plywood
- (9) IS 851 Specification for synthetic resin adhesives for construction work (non structural) in wood
- (10) IS 852 Specification for animal glue for general wood working purposes.
- (11) IS 1328 Specification for veneered decorative plywood
- (12) IS 1341 Specification for steel butt hinges
- (13) IS 1508 Specification for external for use in synthetic resin adhesives (urea-formaldehyde) plywood.
- (14) IS 1659 Specification for block boards
- (15) IS 1734 Methods of test for plywood
 - Part 2 Determination of resistance to dry heat
 - Part 3 Determination of fire resistance
 - Part 1 Determination of density and moisture content
 - Part 10 Determination of compressive strength
 - Part 5 Test for adhesion of piles
 - Part 18 Impact resistance test on the surface of plywood
 - Part 19 Determination of nail and screw holding power
 - Part 20 Acidity and alkalinity resistance test
 - Part 4 Determination of glue shear strength
 - Part 6 Determination of water resistance

- (16) IS 2209 Specification for mortice locks (vertical type)
- (17) IS 2380 Methods of test for wood particle boards and boards from other lignocellulosic material :
 - Part 4 Determination of static bending strength
 - IS nos. of hardware
- (18) IS 3087 Specification for wood particle board for general purpose
- (19) IS 3513 Specification for high and medium density wood laminates (compreg):
 - Part 4 Sampling and tests
- (20) IS 4962 Specification for wooden side sliding doors
- (21) IS 5509 Specification for fire retardant plywood
- (22) IS 5187 Specification for flush bolts
- (23) IS 5930 Specification for mortice latch(vertical type)
- (24) IS 7534 Specification for sliding locking bolt for use with padlocks
- (25) IS 7540 Specification for mortice dead locks
- (26) IS 7638 Method of sampling for plywood, fibre hardboard, insulation boards and particle boards.
- (27) IS 9188 Performance requirements for adhesive for structural laminated wood products for use under exterior exposure condition.
- (28) IS 9460 Specification for flush drop handles for drawer
- (29) IS 11215 Methods of determination of moisture content of timber and timber products.
- (30) IS 12077 Code of practice for testing of timbers for plywood manufacture
- (31) IS 12120 Code of practice for preservation of plywood and other panel products.
- (32) IS 12817 Specification for stainless steel butt hinges
- (33) IS 12823 Specification for pre-laminated particle boards

1.2 Quality Assurance

1.2.1 Comply with standards specified for material and workmanship

1.2.2 Supervision and workmen employed shall be experienced in field of carpentry works and shall be able to guarantee workmanship and finish of standards as established and approved by the INDEPENDENT ENGINEER.

1.2.3 Items specified from specific manufacturer with code no and of approved manufacturer shall be with quality assurance certificate from manufacturer shall be guaranteed for 5 years.

1.2.4 Installer Qualifications

An experienced installer who has completed architectural woodwork (Furniture) similar in material, design and extent to that indicated for this project and whose work has resulted in construction with a record of successful in service performance.

1.2.5 Fabricators Qualifications

A firm experienced in producing architectural woodwork similar to that indicated for this project and with a record of successful in service performance, as well as sufficient production capacity to produce required units.

1.2.6 Mock-ups

Before fabricating and installing interior architectural woodwork, build mock-ups for each form of construction and finish required to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build comply with the following requirements, using materials indicated for the completed work:

1. Build mock-ups in the location and size indicated or, if not indicated, as directed by Architect
2. Notify Architect seven days in advance of dates and times when mock-ups will be fabricated and installed.
3. Demonstrate the proposed range of aesthetic effects and workmanship.
4. Obtain Architect's approval of mock-ups before starting interior architectural woodwork fabrication
5. Maintain mock-ups during construction in an undisturbed conditions as a standard for judging the completed work.
6. Demolish and remove mock-ups when directed.
7. Approved mock-ups may become part of the completed work if undisturbed at time of substantial completion.

SECTION – VIII / A

STRUCTURAL GLAZING

1.0 STANDARDS

The Concessionaire must comply with all relevant Indian and International Standards (British Standards Code of Practice and technical literature relating to best practice pertaining to Structural Glazing). The equivalent European and International Standards may be used where these are not lower. Nothing in this clause shall relieve the Concessionaire of his obligation to provide a higher standard where required and directed.

1.1.1 Indian Standards

- | | | |
|----|---|--------------------|
| 1) | Plain and reinforced concrete. | IS 456 |
| 2) | Designed loads for building structures.
(Part I, II, III) - 1987 | IS 875 |
| 3) | Earthquake resistant design | IS 1893 |
| 4) | Glazing in building | IS 3548 |
| 5) | Patent glazing | IS 3548 |
| 6) | Aluminium Extrusion | HE9WP (IS 63400WP) |

1.1.2 British Standards

- | | | |
|-----|---|---|
| 1) | Loading for buildings | BS 6399 |
| 2) | Non load bearing vertical enclosures | BS 8200 |
| 3) | Structural fixing in concrete | BS 5080 |
| 4) | Extruded Aluminium sections | BS 1161, BS 12020
BS EN 486, BS EN 515
BS EN 573, BS EN 755 |
| 5) | Plate, sheet and strip of Aluminium | BS EN 485, BS EN 573 |
| 6) | Alloy for Aluminium Windows | BS 4873 |
| 7) | Structural use of Aluminium | BS 8118 |
| 8) | Anodising | BS 3987 |
| 9) | Bi-metallic corrosion | PD 6484 |
| 10) | Sills and copings | BS 5642 |
| 11) | Stainless steel plates, sheets & strips | BS 1449 (Part 2) |
| 12) | Stainless steel fasteners | BS EN ISO 3506(Pt 1-3) |
| 13) | Welding procedures & testing | BS 288 (Part 1-4) |
| 14) | Window safety | BS 8213 (Part 1) |
| 15) | Workmanship | BS 8000 (Part 7-16) |

1.1.3 Other Standards

- | | | |
|----|---|----------------|
| 1) | Steel structure standards | AS 4100 - 1990 |
| 2) | Structural steel welding | AS 1554 |
| 3) | Method of fire tests on building materials, | AS 1530 |

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	components and structures	
4)	Fire resistance test (elements of building construction)	AS 1530.4 - 1994
5)	Metal finishing, preparation & pre-treatment of surfaces	AS 1627
6)	Hot-dipped galvanised coatings on ferrous articles	AS 1650 – 1989
7)	Guide to the protection of iron & steel against exterior & atmospheric corrosion	AS 2312
8)	Standard Specification for Heat-treated flat glass Kind HS, Kind FT coated and uncoated glass	ASTM C1048 (1997)
9)	Standard test method for determining compatibility of liquid-applied sealants with accessories used in Structural Glazing Systems	ASTM C1087 (2000)
10)	Standard test method for Apparent Shear Strength of single lap joint adhesively bonded metal specimens by tensile load (Metal to Metal)	ASTM D1002 (2001)
11)	Standard test method for tensile testing of adhesive bonds	ASTM D897 (2001)
12)	Standard test method for peel adhesion of Pressure Sensitive Tapes	ASTM D3330 (2000)
13)	Standard practice for Quality Assurance of Pressure Sensitive Tapes	ASTM D3715 (1989)
14)	Standard test method for determining sound transmission	ASTM E90
15)	Standard test methods for strength of Anchors in concrete and masonry elements	ASTM E488 (1990)
16)	Aluminium Sheet and Plate	ASTM B209
17)	Aluminium Extruded Bars, Rods, Shapes and Tubes	ASTM B221
18)	Aluminium Extruded Structural Pipe and Tubes	ASTM B429
19)	Stainless Steel	ASTM A666
20)	Steel inserts	ASTM A123 / ASTM A153
21)	Hot-rolled steel sheets and strips	ASTM A570
22)	Architectural Class I integrally colored or electrolytically deposited color coating (Color Anodic Finish)	AAMA-606.1 AAMA-608.1
23)	Architectural Class I & II clear Anodic Finish	AAMA-607.1
24)	Welding Rods and Bare Electrodes	AWS-A-5.10

1.1.4

Abbreviations

Following abbreviations are used in the specification.

AS	-	Australian Standard (issued by SAA)
ASTM	-	American Society for Testing and Materials
BS	-	British Standard
CP	-	Code of Practise
EPDM	-	Ethylene-propylene-diene-monomer
IS	-	Indian Standard
SAA, SA	-	The Standard Association of Australia, Standards Australia
SS	-	Singapore Standards

1.2 Quality Assurance

1.2.1 The specialist agency engaged to carry out the external glazing installation and supply shall have atleast 5 years of relevant experience and should have completed external glazing systems of similar nature and equivalent (minimum 75%) scale of works as shown in the tender documents in last 5 years.

1.2.2 The design engineer of the Concessionaire shall have minimum five years experience in designing of similar work. He should be able to prepare detail computation for each member, fixing details of Structural Glazing and associated works.

1.2.3 The Concessionaire's design engineer shall follow quality requirement of IS 9001 – 2000 and certify that design meets standards, are safe and acceptable to local authorities.

1.2.4 Design Engineer along with design shall submit documented assurance plan consisting.

- Quality Control
- Work procedure
- Check list
- Audit plans

1.2.5 Pre-construction testing should be performed on specimen representative of proposed material and construction including perimeter components through approved testing agency according to AAMA 501 recommendations.

1.2.6 Mockups : Mockups for each type / form of construction and finish required should be constructed, prior to installation, to verify selection made and to demonstrate aesthetic effects and qualities of materials and execution. Mockup shall be constructed at site at location approved by Independent Engineer/Authority. Concessionaire shall notify Independent Engineer/Authority 7 days in advance of dates and times when mockups will be constructed. Mockups constructed to be retained and maintained during construction in an undisturbed condition as a standard for judging the completed work. Approved mockups may become part of the completed work or demolished as directed by Independent Engineer/Authority.

1.2.7 Concessionaire shall organize pre-installation conference to review methods and procedures related to installation of glazing system. This includes (but not limited to)

- Inspection and discussion conditions of substrates and other preparatory works, including those performed by other trades.
- Construction scheduling including availability of materials, installers, equipments and facilities etc.
- Inspection, testing and certifying procedures
- Weather conditions

SECTION – VIII / B

GLAZING WITH PATCH FITTING

1.0 SCOPE OF WORK

1.1 The Concessionaire shall be responsible for design, fabrication, supply, installation, test and guarantee of all items including taking all measures that may be required to complete the work as per Architectural concept drawings and specifications details.

The specialist agency engaged to carry out the external glazing installation and supply shall have atleast 5 years of relevant experience and have completed external glazing systems of similar nature and equivalent scale of works as shown in the tender documents.

The specialist Concessionaire shall submit an outline of recent comparable works (illustrated by appropriate drawings, sketches, photographs, brochures) by the firm / it's technical partner to illustrate the competence, experience and suitability of the firm.

The brief scope of work is :

- a) Design, preparation of shop drawings, calculations, engineering data and test reports.
- b) Fabrication and installation of Glass Entrances and Glazing with Patch Fittings system.
- c) All anchors, fixings, attachments, reinforcements, steel reinforcing for mullions and transoms required for a complete installation, except those specifically indicated as being provided by other trades.
- d) Exposed Architectural mullions and other support members.
- e) Finishes, protection coatings and treatments.
- f) Sealing with approved sealants within and around the perimeter.
- g) All thermal insulation, firesafing etc. including supports and/or backing.
- h) All caulking, sealing, electrometric and metal flashing, and gaskets including sealing at junctions with roof, ground-floor waterproofing and building expansion joints between structures.
- i) Electrical bonding and earthing of all metal cladding elements.
- j) Provisions to receive electrical outlets and cutouts for conduits and other electrical work.
- k) Glass and glazing.
- l) Scheduling and monitoring of the work.
- m) Samples, mock-ups and test units including testing at approved laboratory.
- n) Co-ordination with the work of main Concessionaire and other trades.
- o) Provision for interfacing with exterior window cleaning equipment.
- p) Testing and verification of design, components and total assembly for the system at approved laboratory.
- q) Transportation, storage, handling, protection and cleaning.
- r) Guarantee for 10 years
- s) All final exterior and interior cleaning.

SECTION – VIII / C
GLASS, GLAZING & ACCESSORIES

1.0 STANDARDS

Work under this Project shall be carried out to following Indian or International standards. Any conflict noticed in various standards and building regulations shall be reported to the Independent Engineer/Authority and his direction and approval to be obtained. However it shall be noted as general rule that the more stringent specification shall apply. All standards shall be the latest revisions.

1. ASTM C 1036 Standard specification for flat glass
2. ASTM C 1046 Standard specification for Heat treated flat glass FT & HS coated and uncoated glass.
3. IS 3548 Glazing in building
4. CP 152 Glazing and fixing of glass for Building.

SECTION – VIII / D
COMPOSITE ALUMINIUM CLADDING

1.1 GENERAL

An Aluminium panel used for the exterior cladding of building shall be 4 mm thick Aluminium Composite Panel (ACP) 25 micron anodised aluminium sheet as manufactured treated and supplied by ALPOLIC or equivalent approved.

1.2 Work shall include as detailed in BOQ, drawings without being limited to following

- Aluminium cladding system as of ALPOLIC or equivalent approved
- All hardware
- All anchors fixing, attachments, reinforcements, sections as required in supports & backing
- Finishes, protections coatings & treatments
- All thermal insulation and firesafing
- All caulking, sealing, elastomeric and metalflashing, and gaskets including seating at junctions with building.
- Electrical bonding and earthing of all metal claddings elements.
- Provision for electrical contents and conduits and other electrical work.
- Shop drawings, calculations, engineering data and transports
- Scheduling & monitoring of work
- Samples, mock-ups and test units
- Co-ordination with the work of other agencies
- Testing and verification of design, component and total assembly.
- Storage handling protection and cleaning
- Final cleaning interior and exterior prior to handover
- Guarantees
- Fixing to be done in conjunction with Curtain Wall system.

1.3 All work in this section shall comply with the standards, codes specified and also with local codes requirements and regulations.

1.3.1 Codes and Standards followed shall be

- Indian standards as published by Bureau of Indian Standards
- British Standards published by British Standard Institution.
- American Standard as published by American Institute
- Australian Standard
- Singapore
- European Coil Coating Association (ECCA)
- American Aluminium Manufacturers Association (AAMA)

SECTION – VIII / E
ALUMINIUM WINDOW AND GLAZING WORK

1.0 STANDARDS

1.1 Work under this Project shall be carried out to following Indian or International standards. Any conflict noticed in various standards and building regulations shall be reported to the Independent Engineer/Authority and his direction and approval to be obtained. However it shall be noted as general rule that the more stringent specification shall apply. All standards shall be the latest revisions.

1. IS 456-2000 Plain and reinforced concrete.
2. IS 875 Designed loads for building structures.
(Part I, II, III)
3. HE9 WP Aluminium Extrusion
(IS 63400 WP)
4. IS 1608 Tensile strength
5. IS 2853 Specification for toughened glass.
6. CP 118 Structural use of Aluminium
7. ASTM C 1046 Standard specification for Heat treated float glass FT and HS coated and uncoated glass.
8. IS 3548 Glazing in building

1.2 Quality Assurance

1.2.1 Manufacturer shall certify that sections extruded conforms IS / BS / ASTM standards specified.

1.2.2 Manufacturer shall have minimum ten years experience in extrusion.

1.2.3 The design engineer of the Concessionaire shall have minimum five years experience in designing similar work.

1.2.4 The Concessionaire's design engineer shall certify that design meets standards, are safe and acceptable to local authorities.

1.2.5 Obtain aluminium through one source for each type.

SECTION – VIII / F
WINDOW CLEANING EQUIPMENT

1.0 GENERAL

1.1 INDIAN STANDARDS

Indian and other International Standards followed for this section shall be as listed below. Any discrepancies or ambiguities noticed shall be brought to notice of the Independent Engineer/Authority and clarification/confirmation sought. His decision shall be final. However as general rule more stringent specifications shall be followed.

1. BS : 6037 Code of practice for Permanently installed suspended Access Equipments.
2. IS : 456 Plain Reinforced Concrete
3. IS : 875 Designed loads for building structure
(Part I,II,III)
4. IS : 1893 Earthquake resistance design
5. IS : 732 Electric Cables
6. IEC : 947 Electric Panels
7. PREN : 1808 Safety requirements on Suspended Access Equipment.

1.2 SYSTEM DESCRIPTION

1. Provide and install external facade access equipment to enable following
 - Cleaning of windows, stone, paint etc.
 - Spot (light) maintenance
2. Responsible for design, fabricate, deliver, install, test in accordance with codes of practices and stringent international safety regulations.
3. System to be roof mounted mono / double rail type and partly on davit socket.
4. System to be accessible to all part and peripheries.
5. System shall be well coordinated with all disciplines of construction and specially adjacent work.
6. System shall be self stable.
7. Positioning of guide rollers of cradle shall be well coordinated with facade elevations.
8. System shall have ease of operation; improved reliability.
9. System shall be suitable for Mumbai's environmental requirement.
10. System shall be with stringent safety norms to international standards.
11. System electrically shall conform to International Electromechanical Commission's requirement.

**SECTION - IX
WATERPROOFING WORK**

1.0 GENERAL

1.1 Standards

Indian and other International Standards followed for this section shall be as listed below. Any discrepancies or ambiguities seen shall be brought to the notice of the Independent Engineer/Authority and clarification / confirmation sought. His decision shall be final. However, as a general rule, more stringent specifications shall be followed.

1. IS 269 Specification for 33 grade ordinary and low heat Portland cement.
2. IS 383 Specification for coarse and fine aggregates from natural sources.
3. IS 2645 Specification for integral cement water proofing compound.
4. IS 6494 Code of practice for water proofing of underground reservoirs and swimming pool.
5. IS 8112 Specification for 43 grade ordinary Portland cement.
6. IS 12118 Specification for two part polysulphide based cement :
Part – I General requirements.
7. IS 13826 Method of Test.
8. IS 3495 Method of Test for Burnt clay building bricks.

1.2 Quality Assurance

1.2.1 Manufacturer's Qualification

- a) Not less than five years experience in manufacturing of membrane roofing.
 1. Obtain primary materials from single manufacturer. Manufacturer's name shall appear on containers and accessories.
 2. Provide secondary materials as required by manufacturer of primary materials.

1.2.2 Applicators Qualification

- a) Approved by manufacturer prior to execution of this Project, with experience on at least five projects.
- b) Foreman of Field Crew: Minimum five years experience with system of waterproofing being installed.

1.2.3 Certifications

Manufacturer's certifications on manufacturer's letterhead:

1. Certify system design; penetration, transition, and perimeter details; and system specifications are appropriate and satisfactory for this particular project.
2. Certify products proposed for use comply with standards.
3. Certify materials ordered and supplied are compatible with each other, suited for local and purpose intended and shipped in sufficient quantity to ensure proper timely installation.
4. Certify materials have express warranty of merchantability and fitness for particular purposes of this Project.
5. Certify manufacturer has reviewed Project and will issue warranty upon successful completion of installation.
6. Certify materials shipped to site meet membrane manufacturer's published performance standards and requirements of this Specification.

7. Membrane manufacturer's approval of insulation type and method of installation.
8. Manufacturer's approval of installer.

SECTION – X
PAINTING AND POLISHING WORK

1.0 INDIAN STANDARDS

1.1 Indian and other international standards followed for this section shall be as listed below. In case of any discrepancies or ambiguities noticed shall be brought to notice of the Independent Engineer/Authority and clarification/confirmation sought. His decision shall be final. However as general rule more stringent specifications shall be followed.

- 1.2
- IS 345 Specification for wood filler, transparent, liquid.
 - IS 533 Specification for gum spirit of turpentine (oil of turpentine)
 - IS 1477 Code of practice for painting of ferrous metals in buildings
 - Part I Pretreatment
 - Part II Painting
 - IS 2388 Code of practice for finishing of wood and wood-based materials
 - Part I Operation and workmanship
 - Part II Schedule
 - IS 2524 Code of practice for non-ferrous metals in building
 - Part I Pretreatment
 - Part II Painting
 - IS 3537 Specification for ready mixed paint, finishing, interior, for general purposes to IS colours
 - IS 4597 Code of practice for finishing of wood and wood-based products with nitrocellulose and cold catalysed materials.
 - IS 6005 Code of practice for phosphating of iron and steel.
 - IS 2395 Code of practice for painting of concrete, masonry and plaster surface.

1.3 Quality Assurance

- 1.3.1 Concessionaire shall provide and use product of single manufacturer in each paint system unless it is advised by the paint manufacturer.
- 1.3.2 Paint shall not contain compound harmful for health and banned by the authorities.
- 1.3.3 Paint used shall be of approved make and conforming to IS requirements.
- 1.3.4 Concessionaire shall engage applicator with minimum three years experience.

ELECTRICAL WORK

SECTION – XI / 1

GUIDE LINES

1.0 SCOPE

1.1 The scope of this section covers guidelines for the Concessionaire on the specification and schedule of material and the general requirements.

2.0 SCOPE OF WORK

2.1 The scope of work under this Project covers equipment, material, accessories and labour required for the specified works and to carry out the erection as specified and shown on the drawing and schedule of material.

2.2 Safety, good workmanship and quality are the prime requisites of the work covered under this Project. All the equipments, material and the work carried out shall meet the relevant codes, specification and the intents of specifications and the proper functioning of the systems and installation and shall be in correct lines, levels etc.,

3.0 MATERIAL

3.1 The equipments and material shall meet the specifications and requirements indicated in the technical specifications covered under specific section and the relevant equipment of work.

3.2 The makes of material shall be one of the recommended makes covered under Makes of Material.

4.0 SPECIFICATION

4.1 The technical specification attached herewith gives general guideline and minimum standards for equipments material and workmanship. However it is the responsibility of the Concessionaire to meet the statutory provision and local codes.

5.0 STANDARDS & REGULATIONS

5.1 Each section indicates the Indian Standard Specification to be followed. It is the responsibility of the Concessionaire to meet the statutory regulation local codes and other relevant standards and specifications connected to the work being carried out.

6.0 INSPECTION & TESTING

6.1 The Independent Engineer has the right to inspect the plants, equipment and materials at manufacturer's work or at site at any stage and reject the materials that is substandard or does not meet the requirements of the specification and codes.

6.2 The Concessionaire shall provide at his cost, at site or anywhere else instruments and appliances for testing of equipments at various stages of manufacturing / installation. These instruments shall be got tested and calibrated for their accuracy and performance from the approved institutions.

6.3 The inspection and testing carried out by the Third party does not relieve the Concessionaire of their responsibility of carrying out routine inspection during each stage of procurement, manufacture and installation and also meeting the intents and requirements of the specification and statutory requirements.

6.4 All equipments and installations are to be tested in the presence of the INDEPENDENT ENGINEER after carrying out necessary rectification, adjustments and balancing. Four

sets of test readings should conform to the specification, equipment data, standards and codes.

7.0 STATUTORY INSPECTION

7.1 The Concessionaire shall be fully responsible for meeting all the statutory obligations and local inspectorates pertaining to the works carried out by them. The Concessionaire should prepare all working drawings and obtain approval of competent authorities and also have the equipment and installation inspected and got approved.

All official fees will be paid by the Concessionaire for submission and approval of the various relevant statutory bodies shall be embodied in the tender prices.

7.2 However, the offer shall be strictly on the basis of tender specification and schedule of material. The offer for the deviated items shall be furnished separately.

8.0 WORKING DRAWINGS

8.1 Concessionaire shall prepare 'AS BUILT' drawing indicating :

- a) Layout of Electrical Distribution HT/LV indicating the details of poles, switches, accessories etc.,
- b) GA, schematic and control drawings for panels, distribution boards etc.,

9.0 HANDING OVER

9.1 The installation shall be handed over after a satisfactory testing along with the following documentation.

- a) Two sets of prints of the as installed drawings along with tracing.
- b) Four sets of test reading and certificate of local authorities.
- c) Four sets of detailed equipment data and operation and maintenance manuals.
- d) List of recommended spares.
- e) Performance guarantee in the prescribed form.

10.0 PERFORMANCE GUARANTEE

10.1 All equipment and the entire installation shall be guaranteed to yield the specified ratings and design conditions plus/minus 3% tolerance. Any equipment found short of the specified ratings by readings shall be rejected.

* * * * *

SECTION – XI / 2
MAKES OF MATERIAL

SCOPE

The scope of this section covers the recommended makes of equipments, material components. The final choice of makes shall be indicated at the time of finalization of the order.

The makes and model no. of material offered by the Concessionaire shall be indicated at the space provided for proper evaluation of the offer and shall be one of the recommended makes. In the absence of such indication, the decision rests with Independent Engineer.

MAKES RECOMMENDED

The makes of material recommended are as shown below. The offers shall be strictly on the basis of the makes recommended. However, the bidders can offer alternative makes under Section D deviation. Such deviation shall follow with technical literature of the material /equipment offer.

No.	Items	Approved Makes
1.	H/T Breaker	: ABB / Schneider
2.	Indoor Die Cast Resin Transformer	: Voltamp Transformer Baroda / Vijay Electric Hyderabad / Crompton Malanpur
3.	415 Volts Circuit Breakers	: Siemens/ ABB / L&T / Schneider
4.	Starters / Contactors / Push Buttons / Indicating Lamps	: Siemens / ABB / L&T / Schneider
5.	Switch Fuse / Isolator – TPN/DP	
	a) Sheet steel enclosed with HRC type fuses	: ABB / Siemens / L&T / Schneider
6.	Rotary type switches	: Kaycee / Thakur / Jyoti /L &T
7.	Miniature Circuit Breakers/ ELCB MCB's 10 KA	: MDS (Lexic) / Hager.
8.	DB's with MCBS 10 KA	: MDS (Lexic) / Hager.
9.	Cables – 101 KV grade.	: CCI / RPG / Gloster / Ravin.
10.	PVC insulated Wires 660 /1100 Volts	: RR Kabel(Superex)/ Finolex /Sundeeep / Rajnigandha
11.	Flexible wires 23/0.0076 size	: Pyroflex / V–Plast / R.R. Kabel / Rajnigandha
12.	Cables Glands / Socket / Lugs	: Dowells / Braco / Jainson / Comet/ HMI
13.	Meters	: Automatic Electric / IMP.
14.	Load Manager	: Enercon / Siemens / Alacrity
15.	Power Factor Meters / Controllers	: Syntron / Rudrashakti

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16.	Timers	:	L & T / Bharatiya Cutlet Hammer/ MDS
17.	Terminals Blocks	:	Elmex / Wago
18.	Conduit / Casing capping Accessories	:	Precision / National
19.	Steel Conduits	:	BEC / BI / Wimco.
20.	Screws	:	Tron – Nettlefold.
21.	Moulded type, Piano switches for Elevator	:	Ivory white – Anchor, Magic.
22.	Grid Type Switches etc.	:	MK / Clipsal / MDS – Mosaic.
23.	Metal clad socket.	:	Reyroll / Crompton / MDS
24.	Lightning Arrestor System	:	Erico / Conventional
25.	Ceiling Fans	:	Crompton / GEC / Usha.
26.	Exhaust Fans	:	G.E.C. / Crompton / Electromech.
27.	Lamps / Tubes	:	Philips / Osram.
28.	Light Fittings		
	a) Fluorescent HPMV, HPSV, halogen type	:	Philips/ Wipro / THORN
	b) Incandescent type / Halogens	:	THORN / Philips/ Wipro.
	c) Emergency	:	Marlex / Prolite.
	d) Neon Aviation Light	:	Bajaj
29.	Telephone Wires / Cables	:	Delton / I.T.L.
30.	Telephone Termination Blocks	:	'KRONE'
31.	TV Wires	:	Sumer / Finolex / RR Kabel
32.	Fire Alarm Panel / MCP / RI / Hooter		
	a) Analog Addressable	:	Morley/ Cebrus Notifier
33.	Detectors	:	From Original Panel Supplier
34.	Capacitors	:	Siemens
35.	APFC Panel	:	Antia Electrical /Arrow / Scoot Engg. Pvt. Ltd.
36.	LT Panel	:	Antia Electrical /Arrow / Scoot Engg. Pvt. Ltd.

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