Sl. No.	PART NO	SOR NO	ITEM NO	DESCRIPTION	QTY	UOM	RATE	AMOUNT
239	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.6.17	Earthwork in filling with borrow earth for all heights and depths for road embankments, shoulders or any other place as directed to proper levels, slopes, grades and camber with selected earth (having CBR 8%) obtained from approved borrow areas for all leads from Complex Limit including excavation of earth at borrow areas, clearing and stripping at borrow areas (if necessary) loading, unloading, transportation etc., clearing and stripping as per specifications, uprooting of vegetation, roots and disposal of the shrubs, bushes, roots etc., breaking clods, spreading in layers not exceeding 20 cm loose thickness, watering, ramming and compacting with road roller to give at least 97% of laboratory dry density with heavy compaction as per IS:2720 Part-VIII, providing testing apparatus and testing the degree of consolidation, dressing and leveling, etc. complete including disposal of all unserviceable materials if any beyond the boundary limit for all leads etc. as per drawings, specifications and directions of Engineer-in-Charge. (Borrow areas shall be arranged by Contractor at his own cost. The rate quoted shall include all royalties, right-of-way etc. complete)	65	cum	938	60 970
240	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.6.18	Supplying and laying of stone aggregate of 53mm and down size for GRANULAR SUB-BASE COURSE (conforming to the Grading II of Table 400-1 and physical properties of Table 400-2 of MORTH Specification of Road & Bridge works) tough, sound, clean and durable including cost of stone aggregate, all royalties, taxes, handling, transportation to site, unloading the same by the side of road with all leads and lifts, spreading and laying to form Granular Sub-base layer in layers not exceeding 100mm compacted thickness to proper grade, camber and level, filling voids with screenings and binding the surface with binding material of plasticity index up to 6% including cost of supply of screening and binding material, consolidating with power driven road roller, watering, with all leads and lifts including preparation of camber below first layer etc. complete as per drawings, specifications (MORTH, EIL) and directions of Engineer-in-Charge.	12	m^3	2 802	33 624

Sl. No.	PART NO	SOR NO	ITEM NO	DESCRIPTION	QTY	UOM	RATE	AMOUNT
241	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.6.19	Supplying and Laying of Wet Mix Macadam (WMM) in BASE COURSE (Section 406 of MORTH Specification of Road & Bridge works) using tough, clean, sound & durable stone aggregates including premixing the material (mixing in Plug Mill/ Pan Type Mixer), including transportation to site, laying & spreading in layers not exceeding 125 mm compacted thickness & rolling with vibratory roller 80-100 KN static weight or equivalent capacity to proper grade, camber & level with all leads & lifts etc. complete as per drawing, specifications (MORTH, EIL) & directions of Engineer-in-Charge.	20	cum	2 895	57 900
242	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.7	CONCRETE PAVEMENTS				
243	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.7.2	Providing and laying Reinforced Cement Concrete with 20mm and down size graded crushed stone aggregates in flooring, pavements etc. including leaving pockets, if necessary, making recess/drains, laying in alternate panels, etc. for all depths including shuttering, tamping, curing, etc. as specified in any shape, thickness, position and finishing the top surface smooth etc. all complete as per drawings, specifications and directions of Engineer-in-Charge.				
244	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.7.2.2	For RCC of M-30 grade concrete (all materials including cement but excluding cost of providing & fixing reinforcement and joint sealing shall be supplied by the contractor).	170	m^3	10 898	18 52 660
245	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.7.6	Supplying and laying of 150 micron thick HM HDPE (Grade-I) FILM lining conforming to IS 10889 below concrete pavements, Hard stand, at any other place etc. including royalties, taxes, handling, transportation, unloading, storage, joining etc. all complete as per drawings, manufacturer's specifications and directions of Engineer-in-charge.	870	m^2	146	1 27 020
246	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.7.7	Supply of all materials and Construction of DRY LEAN CEMENT CONCRETE SUB-BASE (7 days compressive strength of 10.0 MPa) with 26.5mm and down size aggregate including cement , water, and approved additives on a prepared sub-grade, mixed in batching plant, transported to site, for all leads & lifts, laid, compacted, finished and cured etc. complete as per IRC:SP:49 (Guidelines for the use of Dry Lean Concrete as Sub-Base), drawings, standards, specifications and directions of Engineer-in-charge.	90	m^3	3 858	3 47 220

Sl. No.	PART NO	SOR NO	ITEM NO	DESCRIPTION	QTY	UOM	RATE	AMOUNT
247	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.7.10	Providing 20mm wide Expansion Joints in pavement slabs as per standard/ drawing including cleaning the joints of all loose material, filling with 20mm thick impregnated fibre boards for the full depth of slab except for 25mm depth from top and sealing the top 25mm with Polysulphide base joint sealant of approved make conforming to BS:5212, including applying 2 coats of approved primer compatible with the brand of Polysulphide etc. all complete as per drawings, specifications and directions of Engineer-in-Charge.				
248	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.7.10.1	For type-I pavement (Upto and inclusive of thickness of 200 mm). (Including providing and laying MS dowel bar, painting as required, GI pipe and cap and cotton waste).	58	m	2 071	1 20 118
249	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.7.10.3	For type-II pavement (Upto and inclusive of thickness of 150 mm)	2	m	546	1 092
250	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.7.10.4	For type-III pavement (Upto and inclusive of thickness of 100 mm).	7	m	485	3 395
251	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.7.11	Providing joints in pavements and around foundations as per standard/ drawing including cleaning the joints of all loose materials and sealing with Polysulphide base joint sealant of approved make conforming to BS:5212, including applying 2 coats of approved primer compatible with the brand of Polysulphide etc. complete as per drawings, specifications and directions of Engineer-in-Charge for.				
252	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.7.11.1	Construction joints 20mm wide x 25mm deep.	35	m	392	13 720
253	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.7.11.2	Sealing joint around pedestal and column etc. 20mm wide x 200 mm deep including filling with 20mm thick impregnated fire board for the full depth of slab except for 25mm depth from top and sealing the top 25mm with Polysulphide base joint sealant of approved make conforming to BS:5212, including applying 2 coats of approved primer compatible with the brand of Polysulphide etc. complete as per drawings, specifications and directions of Engineer-in-Charge.	20	m	608	12 160
254	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.7.11.3	Sealing joint around pedestal and column etc. 20mm wide x 150 mm deep including filling with 20mm thick impregnated fire board for the full depth of slab except for 25mm depth from top and sealing the top 25mm with Polysulphide base joint sealant of approved make conforming to BS:5212, including applying 2 coats of approved primer compatible with the brand of Polysulphide etc. complete as per drawings, specifications and directions of Engineer-in-Charge.	3	m	546	1 638

Sl. No.	PART NO	SOR NO	ITEM NO	DESCRIPTION	QTY	UOM	RATE	AMOUNT
255	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.7.11.4	Sealing joint around pedestal and column etc. 20mm wide x 100 mm deep including filling with 20mm thick impregnated fire board for the full depth of slab except for 25mm depth from top and sealing the top 25mm with Polysulphide base joint sealant of approved make conforming to BS:5212, including applying 2 coats of approved primer compatible with the brand of Polysulphide etc. complete as per drawings, specifications and directions of Engineer-in-Charge for.	15	m	485	7 275
256	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.8	FLEXIBLE PAVEMENTS WEARING COURSE and miscellaneous road works				
257	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.8.4	Providing and laying 30mm thick BITUMINOUS CONCRETE as per Section 507 of MORTH Specification of Road & Bridge works including design mix, trials, heating bitumen, mixing aggregates, grit, laying to proper grade and camper including preparation of surface, filling pot holes, rolling to proper grade and camber, finishing and clearing of surfaces, spraying tack coat of bitumen, etc. complete all as per drawings, specifications and directions of Engineer-in-Charge for following Bitumen Grade:-				
258	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.8.4.3	VG-30	75	m²	495	37 125
259	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.8.7	Providing and Laying of Dense bituminous macadam of the of 60mm compacted thickness as per Section 505 of MORTH Specification of Road & Bridge works, including supply of all material, preparation of underlying course, application of tack coats over underlying bituminous surface, preparation of mix, spreading, rolling etc. complete as per drawings, specifications and directions of Engineer - in-Charge.	75	m²	842	63 150
260	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.9	RCC PIPE CULVERTS & ELECTRICAL ROAD CROSSINGS ETC.				
261	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.9.1	Supplying and laying in position RCC pipes with collars conforming to IS:458 for pipe culverts, cable crossings etc. including cutting the pipe if necessary, lowering, laying in position to proper levels, slopes etc. caulking the joints with spun yarn soaked in neat cement slurry and finishing with cement mortar 1:2 (1 cement : 2 sand) curing etc. all complete as per drawings, specifications and directions of Engineer-in-Charge. For following Class and Internal PIPE DIA (MM)				
262	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.9.1.1V2	PIPE CLASS NP3 Internal Pipe dia. 700 mm	2	m	4 079	8 158
263	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.9.1.1V4	PIPE CLASS NP3 Internal Pipe dia. 500 mm	3	m	2 884	8 652
264	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.13	Supply and installation of valves				

Sl. No.	PART NO	SOR NO	ITEM NO	DESCRIPTION	QTY	UOM	RATE	AMOUNT
265	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.13.1	Supply and installation of screwed valves as per piping material specification including fixing in position with threaded connections complete as per drawings, specifications and directions of Engineer-in-charge.				
266	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.13.1.1	Gate valve for following nominal sizes and piping material class				
267	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.13.1.1.1V1	Dia 2 Inch Piping Material Class J2A	1	each	14 163	14 163
268	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.13.1.1.1V2	Dia 1 Inch Piping Material Class J2A	1	each	4 584	4 584
269	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.13.1.1.1V4	Dia 1.5 Inch Piping Material Class J2A	1	each	13 195	13 195
270	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.13.1.1.1V24	Dia .75 Inch Piping Material Class J2A	1	each	4 491	4 491
271	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.13.1.1.1V27	Dia 3 Inch Piping Material Class J2A	1	each	20 765	20 765
272	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.13.1.1.1V50	Dia 1.25 Inch Piping Material Class J2A	1	each	10 991	10 991
273	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.15	MISC. CIVIL AND STRUCTURAL WORKS FOR U/G PIPING AND OTHER CIVIL WORKS				
274	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.15.1	Providing and laying brick masonry with locally available bricks of specified class (Brick of class lower than specified shall not be accepted) in cement mortar 1:4 (1 cement : 4 Coarse sand) in one or more brick thickness and in any shape in foundation and plinth for valve pits, drains, circular/square maholes, wing walls, etc. including providing recesses, openings, etc. including curing, finishing the joints flush below ground level and raking out joints in plinth with all labour and material, etc. complete as per drawings, specifications and direction of Engineer-in-Charge. For following Brick Class.				
275	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.15.1.2	All materials including cement supplied by the Contractor and Following Brick Class				
276	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.15.1.2.1V2	Brick Class 7.5	15	m^3	8 714	1 30 710
277	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.15.2	Providing 13mm thick average cement plaster in cement mortar 1:3 (1 cement: 3 sand) on brick walls/stone masonry/pitching or on concrete surfaces for manholes, valves pits, culverts, wing walls, etc. including cleaning and preparation of the surface, scaffolding, curing etc. for all depths and heights complete as per drawings specifications and direction of Engineer-in-Charge.				
278	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.15.2.2	All materials including cement supplied by the Contractor.	130	m^2	485	63 050

Sl. No.	PART NO	SOR NO	ITEM NO	DESCRIPTION	QTY	UOM	RATE	AMOUNT
279	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.15.3	Providing 16mm thick average cement plaster in cement mortar 1:3 (1 cement: 3 sand) on brick walls/stone masonry/pitching or on concrete surfaces for manholes, valves pits, inspection chambers, septic tanks,Compound wall, culverts, wing walls, etc. including cleaning and preparation of the surface, scaffolding, curing etc. for all depths and heights complete as per drawings specifications and direction of Engineer-in-Charge.				
280	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.15.3.2	All materials including cement supplied by the Contractor.	1	m²	546	546
281	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.15.5	Providing flush/recessed cement pointing on brick masonry/stone masonry with cement mortar 1:3 (1 cement: 3 sand) including scaffolding, raking out joints if necessary, curing etc. complete as per drawing specifications an direction of Engineer-in-Charge.				
282	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.15.5.2	All materials including cement supplied by the Contractor.	2	m²	382	764
283	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.15.6	Supplying and fixing in position medium/ heavy duty CI manhole frame with lugs and cover conforming to IS-1726 including breaking of brick masonry or concrete surface to receive frame with lugs and making good the same with CM 1:3 including applying two coats of anticorrosive paint inclusive of all labours and materials etc. complete				
284	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.15.6.1	circular size 500 mm dia. Medium duty of grade MD-10	1	each	9 814	9 814
285	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.15.6.2	circular size 560 mm dia. Heavy duty of grade HD-20	1	each	15 672	15 672
286	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.15.8	Providing cement mortar grouting on brick masonry / RCC wall for filling free space between pipe body and masonry wall/concrete wall with 1:2 (1 cement: 2 sand) mortar including packing, consolidating, curing, finishing, etc. complete as per drawings specifications and directions of Engineer-in-Charge.				
287	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.15.8.2	All materials including cement supplied by the Contractor.	1	m³	14 328	14 328
288	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.15.9	Supply and laying of gravel/ crush stone of size ranging between 27mm to 37mm in compacted thickness of 100mm in valve pit, open area within the unit battery limit or at any other place as directed, etc. complete as per drawings, specifications and direction of Engineer-in-Charge.	7	m²	567	3 969
289	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.15.11	Supplying, fabricating and fixing in position in RCC or brick masonry walls MS rungs made out of 20mm dia. reinforcement bar of grade Fe500 TMT bar conforming to IS: 1786 .Including laying or welding to keep in proper position etc. complete as per drawings, specifications and instructions of Engineer-in-Charge.	8	each	108	864

Sl. No.	PART NO	SOR NO	ITEM NO	DESCRIPTION	QTY	UOM	RATE	AMOUNT
290	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.15.12	Supply of all materials, fabrication and erection in position, funnels, clean outs, plugs, flame arrester in vent pipe, bird mesh in vent pipe etc. including the cost of cutting, bolting/welding, painting with two coats of chlorinated rubber zinc phosphate primer @ 40µ DFT per coat and finish painting consisting of 2 coats of chlorinated rubber paint @ 40µ DFT per coat, etc. complete as per drawings, specifications and direction of Engineer-in-Charge.	10	kg	196	1 960
291	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.15.13	Supplying, construction , testing & commissioning of RCC Neutralisation pit concrete , providing lean concrete 1:5:10 (1 cement : 5 sand : 10 aggregate) at bottom of Neutralisation pit and PCC 1:2:4 at Finished Grade Level, rungs, lime fill, acid proof lining, chequered plate with lifting hooks, grouting in 1:2 cement mortar(1 cement :2 sand), painting with bitumen primer and Epoxy paint, grouting between pipe and pit wall in 1:2 cement mortar (1 cement : 2 sand), reinforcement steel including straightening, cleaning, cutting, bending, keeping in proper position, centering, shuttering etc. including earth work in excavation in all types of soil except soft rock and hard rock, backfilling & disposal of surplus earth for all leads within the complex limit etc. complete as per standards, drawings, specifications and directions of Engineer-in-charge.				
292	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.15.13.2	All material including cement supplied by the Contractor For following grade of concrete.				
293	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.15.13.2.1V2	grade of concrete M30	1	each	2 29 587	2 29 587
294	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.15.14	Supplying, construction , testing & commissioning of RCC Neutralisation pit including providing lean concrete 1:5:10 (1 cement : 5 sand : 10 aggregate) at bottom of Neutralisation pit and PCC 1:2:4 at Finished Grade Level, rungs, lime fill, acid proof lining, chequered plate with lifting hooks, grouting in 1:2 cement mortar(1 cement :2 sand), painting with bitumen primer and Epoxy paint, grouting between pipe and pit wall in 1:2 cement mortar (1 cement : 2 sand), reinforcement steel including straightening, cleaning, cutting, bending, keeping in proper position, centering, shuttering etc. including earth work in excavation in all types of soil including soft rock but excluding hard rock which shall be paid extra under relevant item, backfilling & disposal of surplus earth for all leads within the complex limit etc. complete as per standards, drawings, specifications and directions of Engineer-in-charge.				
295	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.15.14.2	All material including cement supplied by the Contractor For following grade of concrete.				

Sl. No.	PART NO	SOR NO	ITEM NO	DESCRIPTION	QTY	UOM	RATE	AMOUNT
296	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.15.14.2.1V2	grade of concrete M30	1	each	2 34 428	2 34 428
297	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.22	PLUMBING AND BUILDING DRAINAGE				
298	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.22.1	Supplying and fixing approved quality heavy grade cast iron Floor/Nahani Trap with CP pressed steel grating including cutting floors and making good the same, etc., making inlet and outlet connections, etc. complete for 100mm inlet and 100mm outlet as per drawings, specifications and directions of Engineer-in-Charge.	2	each	1 964	3 928
299	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.22.2	Supplying and fixing approved quality heavy grade cast iron Floor/Nahani Trap with CP pressed steel grating including cutting floors and making good the same, etc., making inlet and outlet connections, etc. complete for 100mm inlet and 75mm outlet as per drawings, specifications and directions of Engineer-in-Charge.	2	each	1 854	3 708
300	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.22.3	Supplying and laying cast iron soil waste and vent pipe conforming to IS:1729 above ground including specials, bends, such as Y junction, T junction (both single and double) including plugs, shoes, cowls, jointing with jute gasket dipped in bitumen, caulking the joints in Cement mortar 1:2 (1 cement: 2 sand) and testing, cutting floors/walls and making good the same etc. complete as per drawings, specifications and directions of Engineer-in-Charge.				
301	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.22.3.1	100mm dia (All materials including cement supplied by contractor)	4	m	1 841	7 364
302	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.22.3.4	75mm dia (All materials including cement supplied by contractor)	4	m	1 478	5 912
303	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.22.4	Supplying and fixing approved quality Cast Iron soil/waste pipe conforming to IS3989 below ground with necessary specials, bends such as Y-junction, T- junction (both single and double) including plugs, shoes, cowls, jointing with lead caulked joints and testing, cutting in floors, earth work in excavation, encasing the pipe in 50mm THK, PCC M20, backfilling and removal of surplus earth upto a lead of 50M etc. complete as per drawings, specifications and directions of Engineer-in-Complete.				
304	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.22.4.1	100mm dia (All materials including cement supplied by contractor)	9	m	2 346	21 114
305	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.22.4.2	75mm dia (All materials including cement supplied by contractor)	3	m	1 926	5 778

Sl. No.	PART NO	SOR NO	ITEM NO	DESCRIPTION	QTY	UOM	RATE	AMOUNT
306	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.22.8	Supplying, laying and fixing GI water pipe and fittings as per piping material Specification class in trenches, floors, walls including embedding if necessary, jointing with white lead and yarn, with socket and screw including bends, elbows, tees, reducers, sockets, unions and other specials, supplying and fixing with hooks in wooden plugs or embedding in walls and floors, cutting pipes to required lengths, making connections, threading, cutting chases or holes in walls & making good the same, testing, disposal of unserviceable material within a lead of 500m as directed etc. all complete as per drawings, specifications and directions of Engineer-in-Charge. For the following Nominal Bore(NB) pipe :				
307	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.22.8.1V7	Dia 1 Inch PMS J2A	5	m	1 267	6 335
308	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.22.8.1V8	Dia 2 Inch PMS J2A	2	m	2 246	4 492
309	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.22.8.1V14	Dia 3 Inch PMS J2A	2	m	3 327	6 654
310	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.22.8.1V16	Dia .5 Inch PMS J2A	5	m	804	4 020
311	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.22.8.1V17	Dia .75 Inch PMS J2A	5	m	979	4 895
312	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.22.8.1V18	Dia 1.5 Inch PMS J2A	2	m	1 731	3 462
313	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.22.8.1V23	Dia 1.25 Inch PMS J2A	2	m	1 556	3 112
314	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.22.9	Providing and fixing approved stone ware 100mmx100mm dia. gully trap as per EIL Std. no.7-65-0214 including grating with CI frame and cover 400mmx400mm including brick masonry (brick class shall be as mentioned below) chamber in 1:4 cement mortar(1 cement: 4 sand) on M-20 grade cement concrete foundation, plastered inside and outside surfaces with 1:3 cement mortar (1 cement: 3 sand) with 13mm average thickness including providing and fixing light duty CI frame and cover, painting CI frame and cover with two coats of chlorinated rubber zinc phosphate primer @ 40µ DFT per coat and finish painting consists of two coats of chlorinated rubber paint @40µ DFT per coat, earth work in excavation, backfilling, removal of surplus earth, benching with M-20 grade cement concrete and rendering smooth with a neat coat of cement slurry etc. all complete as per drawings, specifications and directions of Engineer-in-Charge.				
315	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.22.9.4	All materials including cement supplied by contractor and following brick Class				

Sl. No.	PART NO	SOR NO	ITEM NO	DESCRIPTION	QTY	UOM	RATE	AMOUNT
316	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.22.9.4.1V2	Brick Class 7.5	1	each	5 387	5 387
317	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.22.19	Supply and installation on terrace/ staging, circular drinking water tank, of polyethylene with PUF insulation for temperature control, material conforming to BIS codes including supply and installation of all fittings, cover with suitable locking arrangement, float valve, making necessary holes for inlet, outlet and overflow connection and vent pipe etc. and the base supports for tank including supply of all necessary material all complete as per specifications and directions of Engineer-in-charge. For following capacities				
318	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.22.19.1V1	Capacity 1000 Litre	1	each	18 159	18 159
319	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.22.19.1V3	Capacity 500 Litre	1	each	9 466	9 466
320	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.22.23	Preparation of internal building plumbing and sanitary piping layouts for building as per National Building Code/ Relevant IS codes and getting the same approved by Owner/ PMC.				
321	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.22.23.1V52	Building Name Sub Stations	1	each	1 54 500	1 54 500
322	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.22.23.1V64	Building Name Control room	1	each	1 54 500	1 54 500
323	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.22.23.1V108	Building Name FIRE WATER PUMP HOUSE	1	each	77 250	77 250
324	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.25	ACID RESISTING BRICK/ TILE LINING				
325	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.25.1	Supply and laying of acid resisting brick lining 230mm x 115mm x 64mm thick class-I bricks conforming to IS:4860, applying 3mm/6mm silicate mortar/ rasin mortar as per IS:4832 part I/ part II on cement plaster surfaces /masonry/ RCC surfaces including applying one coat of bitumen primer, 19mm thick bitumen mastic and any other materials, finishing, curing, testing including supply of all materials etc. complete as per drawings specifications and directions of Engineer-in-charge.	500	m²	5 367	26 83 500
326	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.25.2	Supply and laying of unglazed vitreous acid resisting tiles confirming to IS: 4457, applying silicate/ resin mortar for jointing as per IS: 4832 (Part I/ II) including applying bitumen primer and 19mm thick bitumen mastic on cement plaster surfaces/ masonry/ RCC surface. The thickness of the tiles shall be minimum 16mm. The size of the tile shall be 300mm x 300mm. Including supply of all materials, finishing, curing, testing etc. as per drawings , specifications and directions of Engineer-in-charge.	92	m²	4 337	3 99 004
327	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.26	MISCELLANEOUS ITEMS				

Sl. No.	PART NO	SOR NO	ITEM NO	DESCRIPTION	QTY	UOM	RATE	AMOUNT
328	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.26.6	Supplying & laying random rubble pitching 225mm thick in 1:6 cement mortar (1 cement: 6 coarse sand) in one layer for embankments, road side slopes, holding ponds bunds, drains, channels or at any other place as directed including cost of stones, all royalties & taxes, transportation to site with all leads and lifts, dressing, preparation of sub grade for pitching, flush pointing in 1:4 cement mortar (1 cement: 4 sand), curing etc. complete as per drawings, specifications and directions of Engineer-in-Charge.				
329	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.26.6.3	On horizontal surfaces(All materials including cement supplied by contractor)	50	m²	1 751	87 550
330	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.26.6.4	On sloped surfaces (All materials including cement supplied by contractor)	200	m²	1 927	3 85 400
331	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.26.18	Supplying & Laying 60mm thick interlocking Paver Blocks for footpaths and any other place etc. including providing 40 mm thick sand filling below Paver Blocks including compaction of sand layer, filling the joints by dry sand, providing precast kerb stone of PCC M 30 at edges and at every 6.0m across the foot path, including preparation of compacted base/ sub base etc. all complete as per drawing, standard, specification and directions of Engineer-in-Charge. (All material including cement supplied by contractor, paver blocks shall confirm to category "A" as per IRC SP63. Colour and shape of paver block shall be as per Owner requirement.).	275	m²	1 247	3 42 925
332	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.28	NDT Testing				
333	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.28.1	DYE PENETRATION / MAGNETIC PARTICLE TEST Performing of magnetic particle test or dye penetration test including supply of all necessary materials, equipment and labour for carrying out the work as per specs. and direction of Engineer-in -charge				
334	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.28.1.1	DP TEST LENGTH(BW&SW)	140	Inch	83	11 620
335	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.28.1.2	MAGNETIC PARTICLE TEST	140	Inch	124	17 360

Sl. No.	PART NO	SOR NO	ITEM NO	DESCRIPTION	QTY	UOM	RATE	AMOUNT
336	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.28.3	RADIOGRAPHY :- Performance of radiographic inspection on piping of all types & thicknesses including providing or hiring of all necessary equipment and whatever else even though not expressly mentioned but required to perform the work as per specifications and instructions of Engineer-in-Charge. Radiographs shall be submitted to the Engineer-in-charge. (Repeat Radiography due to defective radiograph on repaired joints due to Contractor's fault and for additional radiography necessitated due to poor performance of contractor's welders shall be done at contractor's cost) Note: Unit for radiography quantity is 'Nos of circumferential weld joints'.				
337	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.28.3.1	FOR JOINTS THK. <= 8MM (FOR CS OTHER THAN CLASS IV OF SPEC FOR NDT REQUIREMENT OF PIPING)			330	
338	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.28.3.1.1V4	Nominal Dia. 8 Inch	1	nos	2 637	2 637
339	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.28.3.1.1V5	Nominal Dia. 12 Inch	1	nos	3 956	3 956
340	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.30	Installation of Valve				
341	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.30.1	Transportation of all kind of valves(including special and motor operated valves) from owner's storage point to contractor's store/ work site and installation of valves for all rating including assembly of valve accessories, if any, fixing of gaskets, bolts/ nuts etc. complete as per specifications drawings and direction of Engineer-in-charge including returning all unused/ surplus material to owner's storage point (valves along with accessories shall be supplied by owner as free issue material)				
342	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.30.1.1	Flanged/ Wafer Valves				
343	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.30.1.1.1V1	Nominal Dia. 6 Inch	1	nos	2 843	2 843
344	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.30.1.1.1V2	Nominal Dia. 8 Inch	2	nos	3 791	7 582
345	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.30.1.1.1V5	Nominal Dia. 4 Inch	12	nos	1 896	22 752
346	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.30.1.1.1V6	Nominal Dia. 12 Inch	2	nos	5 686	11 372
347	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.32	Dismantling works				
348	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.32.3	Dismantling of Flexible road				

Sl. No.	PART NO	SOR NO	ITEM NO	DESCRIPTION	QTY	UOM	RATE	AMOUNT
349	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.32.3.1	Dismantling of flexible road including shoulder consisting of wearing course of bituminous premix carpet and bituminous macadam, base and sub base course of WBM / WMM, including supply of all tools and tackles, labours, taking all necessary safety precautions etc., segregating of serviceable / unserviceable material, stacking of serviceable material anywhere within plant boundary limit and disposal of the unserviceable material anywhere outside the plant boundary etc. all complete for all levels, leads as specified and directed by Engineer-in-Charge.(Disposal areas shall be arranged by the Contractor at his own cost. The rate quoted shall include all royalties, right-of-way etc. complete.).	5	m^3	474	2 370
350	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.34	Rain Water Recharging Well				
351	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.34.1	Construction of rain water recharging well including earthwork in excavation in all types of soils excluding soft rock and hard rock, excavation in soft rock and hard rock shall be paid under relevant item, backfilling and disposal of the debris/surplus earth within a lead of 100 m, supply of all filler materials, mild steel perforated pipe, precast cover slab, brick masonry etc all complete as per EIL standard drawings, specifications and directions of Engineer-in-charge. (Depth of well upto 10.0m from ground level) For catchment area:				
352	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.34.1.1	Up to 500 Sqm	1	each	2 34 089	2 34 089
353	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.34.1.2	Above 500 sqm and up to 1500sqm	1	each	2 95 889	2 95 889
354	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.38	Painting of A/G pipes and valves				

Sl. No.	PART NO	SOR NO	ITEM NO	DESCRIPTION	QTY	UOM	RATE	AMOUNT
355	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.38.1	Supply of paints and primers, preparation of surfaces and application of primer and finish paints, identification (Line numbering), lettering, colour bands, colour coding etc. as specified including rubdown and touch up of shop primer wherever required, providing scaffolding for all heights, labour, material, tools and tackles, consumables supervision etc. to complete the work in all respects as per painting specification, drawings and direction of Engineer-in-Charge for all types of un insulated piping and insulated piping as specified including all pipes, fittings, flanges, supports, valves etc. Surface preparation by blast cleaning and application of first coat of primer (inorganic zinc silicate, F9) shall be done in fabrication yard prior to erection. The identification marks of the piping and joints shall be noted before blasting and the same shall be transferred on primed surface with Polyurethane paint (F2) or as per the instructions of Engineer-in-Charge. Notes: 1. All joints (fabrication as well as erection joints) shall be left unpainted till hydro testing. 2. No extra payment shall be made for identification (line numbering etc.) of insulated and uninsulated lines.				
356	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.38.1.3	Painting of uninsulated surfaces for 'Industrial ' environment as per painting specification for CS piping for design temp group: -14 to 80 (Deg C) including surface preparation. For following pipe sizes				
357	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.38.1.3.1V4	Nominal Dia. 6 Inch	1	m	474	474
358	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.38.1.3.1V5	Nominal Dia. 4 Inch	5	m	320	1 600
359	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.38.1.4	Painting of uninsulated surfaces for 'Industrial ' environment as per painting specification for CS piping for design temp group: -14 to 80 (Deg C) including surface preparation. For following valve sizes				
360	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.38.1.4.1V1	Nominal Dia. of valve 12 Inch	3	each	1 370	4 110
361	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.38.1.4.1V3	Nominal Dia. of valve 6 Inch	1	each	711	711
362	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.38.1.4.1V4	Nominal Dia. of valve 4 Inch	12	each	485	5 820
363	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.38.1.4.1V6	Nominal Dia. of valve 8 Inch	3	each	927	2 781
364	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.40	Fabrication and Erection of piping (underground)				

Sl. No.	PART NO	SOR NO	ITEM NO	DESCRIPTION	QTY	UOM	RATE	AMOUNT
365	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.40.1	FABRICATION AND ERECTION OF PIPING (SPEC. NO.6-65-0030 and 6-44-0012) : Laying and joining of Carbon Steel pipes and specials underground including transportation of all material from Owner's storage point to worksite, earthwork in excavation in all types of soil EXCLUDING SOFT ROCK AND HARD ROCK for pipe trenches, saddles, etc. including dewatering of rain and /or sub soil water, shoring & strutting if required, dressing of sides, levelining, grading & ramming of bottom of trench, cutting of pipes if required, fitup, edge preparation, providing corrosion protection tape coating as per specification, on pipes and specials, laying the pipes in trenches to required alignment and levels, welding the same after laying, installation of flanges, blind flanges, tapping for pressure gauges, temperature gauges and all other online instruments and fittings like elbows, reducers, tees, flanges, spectacle blinds and spacer blinds etc., as per piping material specification, fixing of nuts, bolts, gaskets and washers, welding, corrosion protection coating of field joints, cutting of road wherever required and making good the same, testing for the corrosion protection coating as per specification, cleaning and flushing by water/ compressed air, hydrostatic/ pnuematic testing of the system, flushing, backfilling the trenches with select material from available excavated soil including re-excavating the deposited soil excavated earlier, breaking clods and laying in layers of 15 cm compacted thickness, watering, compacting with mechanical means like vibro rammers etc. to 90% of dry density as per IS:2720 Part-VII, disposal of surplus earth/ unserviceable material to demarcated area anywhere within the complex limit etc. complete as per drawings, specifications and instructions of Engineer-in-Charge including connecting the pipes to manhole, including return of all unused / scrap pipe to owner's storage point (Pipes and fittings shall be supplied by owner as free issue material.) (Depth of excavation for pipe trench shall be upto 3.0m)				
366	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.40.1.1	Carbon Steel Piping (Non IBR), Thickness <=10 mm				
367	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.40.1.1.1	Fabrication, For the following nominal sizes				
368	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.40.1.1.1.2	NB 2 inch - 6 inch	165	Inch Dia	773	1 27 545
369	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.40.1.1.1.3	NB 8 inch - 14 inch	1000	Inch Dia	773	7 73 000
370	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.40.1.1.2	Erection including corrosion protection coating, for Water System (Pressure Piping), For following Nominal Sizes				
371	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.40.1.1.2.2	NB 2 inch - 6 inch	360	Inch Mtr	340	1 22 400
372	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.40.1.1.2.3	NB 8 inch - 14 inch	3000	Inch Mtr	340	10 20 000

Sl. No.	PART NO	SOR NO	ITEM NO	DESCRIPTION	QTY	UOM	RATE	AMOUNT
373	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.40.1.1.3	Erection including corrosion protection coating, for Waste Water Collection System (Gravity Flow), for following Nominal Sizes				
374	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.40.1.1.3.2	NB 2 inch - 6 inch	140	Inch Mtr	340	47 600
375	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.41	Supply, fabrication and Erection of piping(underground)				
376	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.41.8	Under Ground Sewer System - HDPE Pipe				
377	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.41.8.1	Supplying, laying and jointing of underground approved quality HDPE pipes to be used for soil and waste discharge or rain water application outside buildings confirming to IS: 14333 including all necessary fittings/ specials such as bends, Y junction, T junction (both single and double), plugs, coupler, flanges, adapter etc. including solvent welded jointing and testing as per manufacturers recommendations , including earthwork in excavation in all types of soil for pipe trenches, etc. including dewatering, shoring and strutting if necessary, dressing of sides, leveling, grading and ramming of bottoms, cutting the pipes to required lengths, lowering the pipes to proper grade and alignment, jointing, including connecting the pipes to manholes by using concrete manhole adapters and grouting the pipe body with manhole wall using cement mortar 1:2 (1cement : 2 sand), testing, draining of water and cleaning of pipe after testing, backfilling the trenches with select material from available excavated soil including re excavating the deposited soil excavated earlier breaking clods and laying in layers of 15cm compacted thickness , watering and compacting with mechanical means like vibro rammers etc. to 90% standard proctor density as per IS:2720 Part-VII, making good the surface, including cutting of roads wherever required and making good the same, disposal of surplus earth/ unserviceable material to demarcated area anywhere within the complex limit etc. complete for all depths as per drawings, specifications and instructions of Engineer-in-Charge. (Depth of excavation for pipe trench shall be upto 3.0m)				
378	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.41.8.1.3V2	(All material including cement supplied by contractor) Nominal Dia. 160 mm Pressure Rating(Kg/Cm2) 6	9	m	2 163	19 467
379	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.41.8.1.3V6	(All material including cement supplied by contractor) Nominal Dia. 75 mm Pressure Rating(Kg/Cm2) 6	4	m	773	3 092

Sl. No.	PART NO	SOR NO	ITEM NO	DESCRIPTION	QTY	UOM	RATE	AMOUNT
380	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.41.8.2	Supplying and laying HDPE pipes conforming to IS:4984 of approved make to proper grade and alignment, including earthwork in excavation for trenches etc. in all types of soil except soft and hard rock including dewatering till completion of subsequent works, shoring and strutting, if necessary, dressing the sides, leveling, grading and ramming the bottom, jointing the pipes using hot plates as per manufacturer's recommendation, lowering, providing and laying 1:5:10 (1 cement : 5 sand : 10 aggregate) plain cement concrete of minimum 100mm thickness on bottom and side of pipe as directed, connecting the pipes to manholes and grouting the pipes to manhole/valve chamber walls, including supplying and fixing the specials and fittings, such as bends, reducers, tees, elbows, caps etc. conforming to IS:8008 or fabricated from pipes as per specification, supplying and fixing of flanges, fixing of on-line valves, including fixing of bolts, nuts and gaskets etc. as per specifications, testing, draining of water and cleaning of pipes after testing, backfilling the trenches with select material from available excavated soil including re excavating the deposited soil excavated earlier breaking clods and laying in layers of 15cm compacted thickness, watering and compacting with mechanical means like vibro rammers etc. to 90% standard proctor density as per IS:2720 Part-VII, making good the surface, disposal of surplus earth/ unserviceable material to demarcated area anywhere within the complex limit, cutting of road wherever required, making good the same etc. complete for all depths as per drawings, specification and instruction of Engineer-in- Charge. For the following nominal diameter (mm) Pressure Rating(Kg/Cm2) (Depth of excavation for pipe trench shall be upto 3.0m)				
381	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.41.8.2.1V27	Nominal Dia. 80 mm Pressure Rating(Kg/Cm2) 6	5	m	1 422	7 110
382	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.41.10	UNDERGROUND SEWER SYSTEM - RCC PIPES				

Sl. No.	PART NO	SOR NO	ITEM NO	DESCRIPTION	QTY	UOM	RATE	AMOUNT
383	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.41.10.1	Supplying and laying underground R.C.C. pipes sewers with socket and spigot ends conforming to IS:458 of approved make, to proper grade and alignment, including earthwork in excavation in all types of soil except soft and hard rock for pipe trenches upto 2.0m depth of excavation, etc. including dewatering, shoring and shuttering if necessary, dressing of sides, leveling, grading and ramming of bottoms, cutting the R.C.C. pipes to required lengths, lowering the pipes, jointing, including connecting the pipes to manholes and grouting the pipe body with manhole wall using cement mortar 1:2 (1 cement : 2 sand), testing, draining of water and cleaning of pipe after testing, backfilling the trenches with select material from available excavated soil including re excavating the deposited soil excavated earlier breaking clods and laying in layers of 15cm compacted thickness , watering and compacting with mechanical means like vibro rammers etc. to 90% standard proctor density as per IS:2720 Part-VII, making good the surface, including cutting of roads wherever required and making good the same, disposal of surplus earth/ unserviceable material to demarcated area anywhere within the complex limit etc. complete for all depths as per drawings, specifications and instructions of Engineer-in-Charge.(All material shall be supplied by contractor) For following Pipe size (mm) and Class (pipe sizes are all internal diameter of the pipes)				
384	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.41.10.1.1V1	Dia. (Internal) 150 mm Pipe Class P1	9	m	1 133	10 197
385	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.41.10.1.1V2	Dia. (Internal) 100 mm Pipe Class NP2	2	m	804	1 608
386	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.41.10.1.1V8	Dia. (Internal) 250 mm Pipe Class P1	12	m	1 782	21 384
387	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.41.10.1.1V10	Dia. (Internal) 200 mm Pipe Class P1	4	m	1 453	5 812
388	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.42	Fabrication and Erection of piping (Above ground)				

Sl. No.	PART NO	SOR NO	ITEM NO	DESCRIPTION	QTY	UOM	RATE	AMOUNT
389	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.42.1	PIPING (ABOVE GROUND): Transportation of all piping items from owner's storage point to work site/workshop, fabrication including cutting, edge preparation (including grinding the edges of pipe, fittings, flanges etc. to match with the mating edges of uneven/different thickness wherever required), fitup, bending, preheating wherever required, welding, threading, and laying of pipes of all type and thickness over pipe sleepers, overhead on racks and at all elevations, connecting with equipment nozzles, strainers, orifice assemblies, tapping for pressure gauges etc., fixing of gaskets, bolts, nuts including application of torque wherever required and all other inline instruments and fitting like elbows, reducers, tees, vents, drains, SW valves upto 1.5 NB, alignment, cleaning & flushing by water/compressed air, hydrostatic, pneumatic, vacuum, spark testing and any other type of testing as specified, draining, drying by compressed air completing all such works in all respects (including preparation of isometrics as mentioned in the scope of work for the job) as per drawings, specifications and instruction of Engineer-in-charge. (Pipes and fittings shall be supplied by owner as free issue material)				
390	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.42.1.1	Carbon Steel Piping (Non IBR), Thickness <=10 mm				
391	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.42.1.1.1	Fabrication, For the following nominal sizes				
392	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.42.1.1.1.2	NB 2 inch - 6 inch	14	Inch Dia	773	10 822
393	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.42.1.1.1.3	NB 8 inch -14 inch	9	Inch Dia	773	6 957
394	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.42.1.1.2	Erection , for Water System (Pressure Piping), For following Nominal Sizes				
395	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.42.1.1.2.2	NB 2 inch - 6 inch	40	Inch Mtr	279	11 160
396	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.42.1.1.2.3	NB 8 inch -14 inch	20	Inch Mtr	279	5 580
397	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.99	Miscellaneous Items				
398	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.99.01	Miscellaneous				
399	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.99.01.MB04	Providing 1:2 (1cement: 2 sand) cement mortar levelling course on Brick Masonary / RCC surface or at any other place as directed including packing, consolidating, curing, finishing, etc. complete as per drawings, specifications and directions of Engineer-in-Charge.(All materials including cement supplied by the Contractor.)	2	m^3	8 683	17 366

Sl. No.	PART NO	SOR NO	ITEM NO	DESCRIPTION	QTY	UOM	RATE	AMOUNT
400	0	B889-000-81-45-CF-SOR-8202-0-0M	01GC.99.01.MB05	Providing 16mm thick average cement plaster in cement mortar 1:3 (1cement: 3 sand) with cement punning on brick walls/stone masonry/pitching or on concrete surfaces for manholes, valves pits, culverts, wing walls etc. including cleaning and preparation of the surface, scaffolding, curing etc. for all depths and heights complete as per drawings, specifications and direction of Engineer- in- Charge.(All materials including cement supplied by the Contractor.)	1	sqm	526	526
401	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR	ARCHITECTURE				
402	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.2	FLOOR FINISHING				
403	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.2.1	Providing and laying average 25mm cement concrete flooring in panels consisting of base course of 1:2:4 grade cement concrete (6mm down size stone aggregate) laid over sub-base of cement concrete and finishing with a layer of floating coat of neat cement slurry @ 2.75kg. of cement per Sq. M. of area including cleaning the sub-base surface, applying neat cement slurry @ 2.75 kg of cement per Sq. M. of area over the sub- base to receive the base course, compacting, tamping, trowelling, finishing, curing, providing, shuttering to the edges etc. all complete. CEMENT SUPPLIED BY THE CONTRACTOR AT THEIR COST .				
404	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.2.1.2	25mm thk. cement concrete flooring. CEMENT SUPPLIED BY THE CONTRACTOR AT THEIR COST .	50	m²	598	29 900
405	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.2.2	Providing and laying cement concrete granolithic flooring in panels consisting of base course (under layer of 1:2:4 grade cement concrete, 6mm down size stone aggregates) laid over sub-base, wearing top- layer of cement mortar (1 cement: 3 coarse sand by volume) finished smooth by tamping, trowelling, and with a finishing floating coat of neat cement slurry @ 2.75kg. of cement per Sq. M. of area including cleaning the sub-base surface, applying neat cement slurry over the sub- base @ 2.75Kg of cement per Sq. M of area to receive the base course, compacting, tamping, trowelling, finishing, curing, providing, shuttering to the edges etc. all complete.				
406	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.2.2.1	With average 25mm thick under-layer and 15mm thick top layer. CEMENT SUPPLIED BY THE CONTRACTOR AT THEIR COST.	117	m²	1 206	1 41 102
407	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.2.3	50mm thick heavy duty flooring				

Sl. No.	PART NO	SOR NO	ITEM NO	DESCRIPTION	QTY	UOM	RATE	AMOUNT
408	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.2.3.1	Providing and laying average 50mm thick heavy duty flooring in panels consisting of base course of 35mm thick cement concrete (1 cement : 1.5 coarse sand : 3.5 stone aggregates of 10mm to 6mm size by volume) laid over sub-base and 15mm thick finishing layer consisting of cement and integral hardening compound mixed in ratio of 4 cement :1 hardenar (by weight) :2 stone agrgregates of 6mm and down size laid integral with base course and finished smooth including cleaning the sub-base surface, applying neat cement slurry @2.75 Kg of cement per Sq.M of area over sub-base to receive the base course, levelling, tamping, trowelling, finishing, curing, providing shuttering to the edges etc. all complete. CEMENT SUPPLIED BY THE CONTRACTOR AT THEIR COST.	250	m^2	1 278	3 19 500
409	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.2.4	Providing and laying 125mm high cement plaster skirting with 1:3 cement mortar (1 cement : 3 coarse sand by volume) finished with a floating coat of neat cement slurry @ 2.75kg. of cement per Sq.M of area including rounding of junctions with floor, preparing the wall surface, making recess in the wall, finishing, curing etc. all complete.				
410	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.2.4.1	18mm thick. CEMENT SUPPLIED BY THE CONTRACTOR AT THEIR COST.	84	RM	105	8 820
411	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.2.6	Panel dividers in flooring/dado				
412	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.2.6.4	P.V.C. panel dividers (3mm x 20mm size.)	60	RM	82	4 920
413	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.2.6.5	P.V.C. panel dividers (3mm x 35mm size.)	175	RM	87	15 225
414	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.2.6.6	P.V.C. panel dividers (3mm x 40mm size.)	345	RM	89	30 705
415	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.2.10	Providing and laying machine cut chissel dressed kota stone slab of approved shade in floor tread, landing, riser, skirting, dado over and including a bed of cement mortar including preparing the base surface, applying neat cement slurry @ 2.75 Kg of cement per Sq.M of area to receive the mortar, providing neat cement slurry @ 4.4kg. of cement /Sq.M of area over the mortar bed, jointing each slab with neat cement paste/ grouting white cement and pigment (conforming to IS : 2114, Table-1, matching the shade of slabs), machine cutting of the slab edges square, true & plumb finishing, grinding, polishing, finishing etc. all complete.				

Sl. No.	PART NO	SOR NO	ITEM NO	DESCRIPTION	QTY	UOM	RATE	AMOUNT
416	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.2.10.1	25mm thick kota stone slab (with tolerance +_2mm for thickness, +_2mm for length/ breadth) in floor, landing tread over average 15mm thick cement mortar 1:4(1 Cement : 4 coarse sand by volume). CEMENT SUPPLIED BY THE CONTRACTOR AT THEIR COST.	13	m²	1 329	17 277
417	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.2.10.3	18mm thick kota stone slab in riser, dado, skirting over average12mm thick cement mortar1:3(1 cement:3 coarse sand by volume). CEMENT SUPPLIED BY THE CONTRACTOR AT THEIR COST.	10	m²	1 690	16 900
418	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.2.10.5	Extra for providing round nosing by machine cutting of the slab.	10	RM	564	5 640
419	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.2.11	Providing and laying tiles in flooring , dado, skirting etc. in approved colour, design and pattern, laid over and including a coating of approved adhesive as per manufacturers specifications, flush pointing of joints of tiles with cement paste/ grouting with white cement and pigment (conforming to IS:2114, Table-1, matching the shade of tiles) finishing, cleaning etc. all complete.				
420	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.2.11.5	Ceramic, matt finished non-slip type tiles of approved make and shade(s) in approved design/ pattern including cleaning the finished surface with oxalic acid, wax polishing etc. for size 300mm x 300mm x 8mm (+5%) thick tiles for flooring.	5	m²	1 638	8 190
421	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.2.11.6	Ceramic, matt/ glazed/ semi-glazed finished tiles of approved make & shade(s) in approved design/ pattern including cleaning the finished surface with oxalic acid, wax polishing etc. for size 300mm x 450mm x 8.5mm thick (minimum) tiles	7	m²	1 782	12 474
422	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.2.15	Providing and applying pigmented (approved shade) chemical and abrasion resistant, solvent based self levelling floor coating based on epoxy resin with amine curing agents, in 2 coats @ 125 gms/sq.m. (min.)per coat by brush or spraying over a levelling screed (min. 3mm thick) of a 3 part solvent free combination of epoxy resin, amine hardeners and graded chemically inert aggregate filler, laid over a coat of 2-part epoxy resin primer applied over existing flooring etc. all as per manufacturer's specifications.	14	m²	2 115	29 610
423	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.2.16	Providing and applying pigmented (approved shade) chemical and abrasion resistant, solvent based coating (on dado/wall) of epoxy resin with amine curing agents, in 2 coats @ 125 gms/sq.m. (min.) per coat by brush over plastering/ concrete surfaces including surface preparation, curing etc. all as per manufacturer's specification.	20	m²	424	8 480

Sl. No.	PART NO	SOR NO	ITEM NO	DESCRIPTION	QTY	UOM	RATE	AMOUNT
424	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.2.17	Providing and laying minimum 18mm thick approved premium quality and shade polished granite stone slabs in flooring, counters, treads, risers, skirting, dado etc. over and including a bed of cement mortar including preparing the base surface, applying neat cement slurry @ 2.75 kg. of cement per sq. mtr. of area to receive the mortar bed, jointing each slab with neat cement paste/ grout with white cement maixed with pigment (conforming to IS:2114, Table-1) to match the colour of the granite stone slabs, finishing etc. all complete.				
425	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.2.17.1	Granite stone slabs in flooring, counters, treads etc.(perfectly levelled) over and including a bed of cement mortar 1:4 (1 cement: 4 coarse sand by volume) CEMENT SUPPLIED BY THE CONTRACTOR AT THEIR COST	15	m²	5 346	80 190
426	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.2.17.3	Granite stone slabs in risers, skirting, dado etc. over and including a bed of cement mortar 1:3 (1 cement: 3 coarse sand by volume) CEMENT SUPPLIED BY THE CONTRACTOR AT THEIR COST.	5	m²	6 016	30 080
427	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.2.17.5	Extra for round nosing/ moulded edges (as per approved design) to Granite stone slabs.	10	RM	588	5 880
428	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.2.19	Extra over marble/ kota stone flooring/ skirting/ dado items for providing mirror polishing (in place of normal polishing) by grinding machine (suitable for mirror polishing) comprising of multiple grindings up to 6 nos. with carborundum stone (in descending order of hardness of grinding stone), one no. grinding with Italian grinding stone and one no. grinding with foam buffer set and polishing with Teno-oxide granite powder etc. all complete to give a smooth and mirror-like shining surface.	18	m²	598	10 764
429	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.2.21	Providing and laying anti slip (rough)Granite stone slabs, of thickness minimum 25mm, in flooring, landing, tread, ramps over minimum 20mm thick cement mortor1:4 (1 cement :4 course sand by volume) over and including a bed of cement mortar including preparing the base surface, applying neat cement slurry @ 2.75 kg. of cement per sq. mtr. of area to receive the mortar bed, jointing each slab with neat cement paste/ grout with white cement mixed with pigment (conforming to IS:2114, Table-1) to match the colour of the granite stone slabs, finishing etc. all complete.				
430	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.2.21.01	Cement supplied by the Contractor at there cost	4	m²	5 562	22 248
431	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.2.23	Providing 3 nos. of 3mm grooves at spacing of 30mm in Kota/ Marble/ granite stone laid in stairs¿ treads/ landings all complete as per the direction of Engineer-In-Charge. (Single measurement shall be considered for 3 parallel grooves)	5	RM	237	1 185

Sl. No.	PART NO	SOR NO	ITEM NO	DESCRIPTION	QTY	UOM	RATE	AMOUNT
432	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.3	WOOD WORK				
433	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.3.1	Wooden frames of doors, windows, ventilators Providing and fixing wooden frames of doors, windows, ventilators including cutting, shaping, jointing, applying a coat of bituminous paint on concealed surface, wood primer on exposed surface, fixing in masonry/RCC by means of 300mm x 25mm x 6mm thick M.S. hold fasts screwed to frame @ 600mm max vertically and grouted with M-15 grade concrete in min. 350mm x 100mm x 100mm sized hole made in masonry/96mm long, 12mm dia M.S. dash fastener, painting with two coats of approved shade and make (ICI or equivalent) synthetic enamel paint over approved quality primer coat, finishing etc. all complete.				
434	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.3.1.1	Wooden frames with second class teak wood conforming to IS : 4021.	1	m^3	1 44 369	1 44 369
435	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.3.2	35mm thick block board flush shutter Providing and fixing Factory made, overall 35mm thick block board flush shutter consisting of solid core block board bonded with phenol phormaldehyde synthetic resin conforming to IS : 848 and faced on both faces with commercial type plywood/teakwood veneering/ lamination bonded with phenol formaldehyde synthetic resin conforming to IS : 848, including providing and fixing second class teakwood perimeter beading fixed by means of approved quality neoprene based adhesive and nailing @ 300 mm max.. painting exposed surface with two coats of approved shade and make synthetic enamel paint over approved quality primer coat, providing and fixing 125mm long M.S. butt hinges [for each shutter (vertical spacing not exceeding 600mm)] including fixing with door frame, finishing etc. all conforming to IS : 2202.				
436	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.3.2.2	Door shutter faced with approved quality 1mm thick teakwood veneering conforming to IS : 303, BS : 476, Part-7.	1	m^2	4 357	4 357
437	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.3.2.3	Door shutter faced with 1mm thick approved quality lamination of approved shade/brand.	5	m^2	5 470	27 350

Sl. No.	PART NO	SOR NO	ITEM NO	DESCRIPTION	QTY	UOM	RATE	AMOUNT
438	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.3.3	Providing and fixing overall 35mm thick,panelled door shutter consisting of 100mm wide second class teakwood stiles and top rails and 150 mm wide lock and 200mm wide bottom rails jointed suitably and 12mm thick Teakwood Particle Board infill panels fixed with 12.5mm square moulded teakwood beading fixed by approved quality neoperene based adhesive and nailing @ max. 300mm c/c including painting the stiles, rails and panel board with two coats of approved shade and quality (ICI or equivalent) synthetic enamel paint over and including approved coat of primer, Providing and fixing 11.10mm dia, 150mm long Aluminium butt hinges (max. Vertical spacing not exceeding 600mm) for each shutter, fixing with door frame, all finishing, removing any stain etc. all complete.	7	m²	5 717	40 019
439	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.3.6	Extra for providing and fixing square or rectangular vision panels in door shutters of 4mm thick plain glass (wt. 7.2kg/Sq.M) and conforming to IS : 2835 with 20mm x 10mm Teakwood beading fixed by approved quality neoprene based rubber adhesive and nailing @ max. 300mm c/c, including all cutting, fixing, providing 2 coats of approved quality Polyurithane transparent coating with stainer mix to achieve the desired shade on the teak wood etc. all complete. (Measurement for payment to be made only for the glazed area of vision panel).	3	m²	5 195	15 585
440	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.3.7	Providing and fixing in position following items including all necessary fixtures, fittings, finishing etc. all complete.				
441	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.3.7.1	Approved make heavy duty overhead hydraulic door closer with adjustable spanners, metal screws etc. conforming to IS : 3564	1	nos	1 847	1 847
442	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.3.7.2	Approved make Chromium plated metallic (brass body) mortice lock, 6 levers conforming to IS : 2209 (inclusive of pair of handles of pressure die cast zinc alloy,satin finished).	1	nos	1 899	1 899
443	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.3.7.4	Approved make heavy duty hydraulically operated, adjustable floor mounted door closer conforming to IS:6315, Double action type.	1	nos	8 149	8 149
444	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.3.7.6	Approved make pressure die cast zinc alloy, chromium plated door handle. 300 mm long.	1	nos	551	551
445	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.3.7.7	Approved make pressure die cast zinc alloy, chromium plated door handle. 600mm long.	1	nos	993	993
446	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.3.7.8	Approved quality 3mm thick plastic kick/push plate fixed with brass screws.	1	m²	1 627	1 627
447	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.3.7.9	Approved quality anodized aluminium aldrop 300mm long, 19.05mm dia in bronze colour.	1	nos	421	421
448	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.3.7.10	Approved quality anodized aluminium tower bolts conforming to IS-204 in Bronze colour, 250 x 10mm.	1	nos	81	81

Sl. No.	PART NO	SOR NO	ITEM NO	DESCRIPTION	QTY	UOM	RATE	AMOUNT
449	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.3.7.11	Approved quality anodized aluminium tower bolts conforming to IS-204 in Bronze colour, 150 x 10mm.	1	nos	57	57
450	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.3.7.12	Approved quality zinc alloy pressure die cast, chromium plated spring loaded round door stopper with double heavy duty rubber shoes.	1	nos	237	237
451	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.3.7.13	Approved quality 75mm long aluminium toilet door latch with vacant/occupied indicator.	1	nos	803	803
452	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.3.7.14	Approved quality chromium plated brass coat and hat hook fixed with chromium plated brass screws.	1	nos	128	128
453	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.3.8	Providing and fixing minimum 12mm thick X 50mm wide teak wood Architrave (moulding) of approved design along frames etc. including lacquer polishing/ painting matching with adjoining wood work.	2	m	546	1 092
454	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.4	STEEL/AL./GLAZED/FULLY GLASS/PVC DOORS,WINDOWS & VENTILATORS				
455	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.4.5	S/F M.S. rolling shutters Supplying and fixing M.S. rolling shutters, conforming to IS : 6248 including providing all accessories like shutter (constructed with inter locking lath sections formed out of cold rolled steel strips 0.9mm thick, 80mm wide and 1.25mm thick, 80mm wide respectively for shutter width upto 3.5M and above 3.5M), jointless M.S. channel section for guide (min. 3.15mm thick), M.S. girders, pressed bottom rails, shutter suspension stud shaft with pully and cage, top rolling springs, locking arrangement etc. as per approved manufacturers drawings including painting with two coats approved make & shade and synthetic enamel paint over a coat of approved quality red oxide zinc chromate primer, making good of all damaged surfaces etc. all complete.				
456	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.4.5.9	Motor operated rolling shutter as per approved Manufacturer's design & drawing for rolling shutters for width upto 3.5 metre with all necessary electricals like motor, switching panels, switches, cables, wires etc. as required for smooth functioning of the shutter	2	m²	10 208	20 416
457	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.4.5.10	Motor operated rolling shutter as per approved Manufacturer's design & drawing for rolling shutters for width beyond 3.5 metre with all necessary electricals like motor, switching panels, switches, cables, wires etc. as required for smooth functioning of the shutter	2	m²	10 537	21 074

Sl. No.	PART NO	SOR NO	ITEM NO	DESCRIPTION	QTY	UOM	RATE	AMOUNT
458	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.4.5.11	Motor operated rolling shutter as per approved Manufacturer's design & drawing for rolling shutters for width upto 3.5 metre with MS grill (in place of interlocked lath sections), all necessary electricals like motor, switching panels, switches, cables, wires etc. as required for smooth functioning of the shutter	2	m²	7 478	14 956
459	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.4.5.12	Motor operated rolling shutter as per approved Manufacturer's design & drawing for rolling shutters for width beyond 3.5 metre with MS grill (in place of interlocked lath sections), all necessary electricals like motor, switching panels, switches, cables, wires etc. as required for smooth functioning of the shutter	2	m²	9 682	19 364
460	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.4.9	Fully Glass Door Providing and fixing frameless single piece Glass Doors (swing shutter) in partition made of 12mm thick toughened float glass (MODIGUARD or equivalent) single shutter with stainless steel finish patch fittings (DORMA or approved equivalent)and 150mm x 44mm extruded Aluminium frame at bottom , including all hardware such as SS patch fittings, floor spring, pivot on top, locking arrangement (EVERITE or approved equivalent make), 30mm dia, 350mm long SS pull handle (DORMA or approved equivalent make) etc. all complete.	2	m²	9 126	18 252
461	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.4.10	Etching Film on Glass Providing & applying translucent cast vinyl self adhesive washable type film with sandblasting effect (of '3M(TM) Scotchcal(TM) Frosted Crystal 7725-324' or approved equivalent) and of approved graphic design (electronic/ computer plotted & cut) having durability of 10-15 years, over glass surface in doors/ windows/ partitions etc. including preparation of base surface, cleaning, finishing etc. all complete.	2	m²	1 515	3 030
462	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.4.11	PVC Doors Providing and fixing in position plastic doors (with door frames), of UV stabilized compounds of PVC ('Sintex' or approved equivalent), consisting of 53x 60mm L-shaped door frame (BLR53 of 'sintex' or equivalent), 33x47mm shutter frame (DWUF 306 of 'sintex' or equivalent), 30mm thick infill panel slats, complete as per manufacturer's specifications and recommendations, including all fittings, fasteners, fixtures, sealing periphery with polymeric sealant etc all complete.	4	m²	3 482	13 928

Sl. No.	PART NO	SOR NO	ITEM NO	DESCRIPTION	QTY	UOM	RATE	AMOUNT
463	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.4.12	Pressed steel sheet door shutter Providing and fixing pressed steel sheet door shutter made of 18 SWG galvanized pressed steel sheet bent to form hollow box of 40 mm overall thickness; and consisting of/ including: (i) 3 mm thick MS flat all along perimeter (ii) Packing the shutter with mineral wool (48 kg/cum) without gap (iii) Strengthening with 18 SWG GI vertical stiffeners @200 c/c (iv) 3 mm thick MS pad plates welded inside at required locations for fixing of hardware etc. (v) Fixing to door frame by 100 mm long SS 304 grade heavy duty ball bearing hinge @600 c/c maximum (vi) Hardware and vision panel as required. (vii) Grinding and smoothening of welding, cleaning, finishing (synthetic enamel painting/ polyurethane (PU) coating/ electrostatic powder coating), making true alignments and surfaces etc. all complete. Notes: 1. Reference shall be made to EIL standard nos. 7-75-0070, 7-75-0071 Only the net shutter(s) area shall be measured for payment				
464	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.4.12.3	Single shutter painted with Electrostatic powder coating with following hardware: (i) Over head hydraulic door closer (heavy duty). (ii) SS 304 grade 16 mm dia 250mm long aldrop on both sides of shutter. (iii) Spring loaded heavy duty door stopper (iv) SS 304 grade 19 mm dia.200 mm long handle on both side of shutter. (v) 10 mm dia SS 304 tower bolt (250mm long for 2100mm height & 600mm long for 2500mm height)	2	m²	12 010	24 020

Sl. No.	PART NO	SOR NO	ITEM NO	DESCRIPTION	QTY	UOM	RATE	AMOUNT
465	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.4.12.6	Double shutter painted with Electrostatic powder coating with following hardware: (i) Over head hydraulic door closer (heavy duty). (ii) SS 304 grade 16 mm dia 300mm long aldrop on both sides of shutter. (iii) Spring loaded heavy duty door stopper. (iv) SS 304 grade 19 mm dia.200 mm long handle on both side of shutter. (v) 10 mm dia SS 304 tower bolt (250mm long for 2100mm height & 600mm long for 2500mm height) (vi) 2mm thick 25mmx 25mm GI angles (vertical) welded to each shutter at the meeting point of double shutter.	6	m²	13 215	79 290
466	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.4.14	Aluminium work for doors, windows, ventilators and partition Providing and fixing aluminium work for doors, windows, ventilators and partitions with extruded built up standard tubular sections/ appropriate Z sections and other sections of approved make conforming to IS: 733 and IS: 1285, fixing with dash fasteners of required dia and size, including necessary filling up the gaps at junctions, i.e. at top, bottom and sides with required EPDM rubber/ neoprene gasket etc. Aluminium sections shall be smooth, rust free, straight, mitred and jointed mechanically wherever required including cleat angle, Aluminium snap beading for glazing / paneling, C.P. brass / stainless steel screws, all complete as per architectural drawings and the directions of Engineer-in-charge. (Glazing, paneling and dash fasteners to be paid for separately) :				
467	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.4.14.2	For fixed portion of aluminium doors, windows, ventilators and partitions made from Powder coated aluminium (minimum thickness of powder coating 50 micron)	220	kg	732	1 61 040
468	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.4.14.5	For shutters of doors, windows & ventilators made from Powder coated aluminium (minimum thickness of powder coating 50 micron) including providing and fixing hinges/ pivots and making provision for fixing of fittings wherever required including the cost of EPDM rubber / neoprene gasket required (Fittings shall be paid for separately)	145	kg	855	1 23 975

Sl. No.	PART NO	SOR NO	ITEM NO	DESCRIPTION	QTY	UOM	RATE	AMOUNT
469	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.4.14.12	Providing and fixing double action hydraulic floor spring of approved brand and manufacture conforming to IS : 6315, having brand logo embossed on the body / plate with double spring mechanism and door weight upto 125 kg, for doors, including cost of cutting floors, embedding in floors as required and making good the same matching to the existing floor finishing and stainless steel cover plate of minimum thickness 1.25 mm with brass pivot and single piece M.S. sheet outer box with slide plate etc. complete as per the direction of Engineer-in-charge.	7	each	2 524	17 668
470	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.4.14.13	Providing and fixing double action hydraulic floor spring of approved brand and manufacture conforming to IS : 6315, having brand logo embossed on the body / plate with double spring mechanism and door weight upto 125 kg, for doors, including cost of cutting floors, embedding in floors as required and making good the same matching to the existing floor finishing and brass cover plate of minimum thickness 1.25 mm with brass pivot and single piece M.S. sheet outer box with slide plate etc. complete as per the direction of Engineer-in-charge.	13	each	2 637	34 281
471	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.4.14.15	Providing and fixing machine moulded aluminium covering of approved pattern & design, made out of machine cut Powder coated aluminium sheet, 2.5mm thick (minimum thickness of powder coating 50 micron) and machine holed for receiving dash fastener, over expansion joints on vertical surfaces/ceiling floors, the fixing on plate in one row on one side of joint only shall be done with stainless steel dash fasteners of 8 mm dia and 75 mm long bolt including providing aluminium washers 2 mm thick & 15 mm dia , at a staggered pitch of 200mm centre to centre including drilling holes in the receiving surface and providing expandable plastic sleeves in holes etc. complete as per direction of Engineer-in-charge.	7	kg	639	4 473
472	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.4.14.16	Filling gaps of size upto 5mm depth and 5 mm width in between aluminium frame & adjacent RCC/ Brick/ Stone work by providing weather silicon sealant over backer rod of approved quality as per architectural drawings and direction of Engineer-in-charge complete	4	m	61	244
473	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.4.14.18	Providing and fixing 255 X 19 mm adjustable friction window stays of approved quality made from Stainless Steel (SS 304 grade) with necessary stainless steel screws etc. to the side hung windows as per direction of Engineer-charge complete.	2	each	340	680

Sl. No.	PART NO	SOR NO	ITEM NO	DESCRIPTION	QTY	UOM	RATE	AMOUNT
474	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.4.14.19	Providing and fixing 355 X 19 mm adjustable friction window stays of approved quality made from Stainless Steel (SS 304 grade) with necessary stainless steel screws etc. to the side hung windows as per direction of Engineer-charge complete.	3	each	464	1 392
475	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.4.14.23	Providing and fixing Powder coated aluminium (minimum thickness of powder coating - 50 micron) tubular handle bar 32 mm outer dia, 3.0 mm thick & 2100 mm long with SS screws etc complete as per direction of Engineer-in-Charge.	3	each	546	1 638
476	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.4.14.25	Providing and fixing 100mm brass locks (best make of approved quality) for aluminium doors including necessary cutting and making good etc. complete.	3	each	567	1 701
477	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.4.14.27	Providing and fixing Powder coated minimum thickness 50 micron aluminium round shape handle of outer dia 100 mm with SS screws etc. complete as per direction of Engineer in-charge	1	each	96	96
478	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.4.14.29	Providing and fixing 100 mm long aluminium handles, ISI marked, anodised (anodic coating not less than grade AC 10 as per IS : 1868) transparent or dyed to required colour or shade, with necessary screws etc. complete	4	nos	361	1 444
479	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.4.14.30	Providing and fixing aluminium tower bolts of size 100mm x 10mm , ISI marked, anodised (anodic coating not less than grade AC 10 as per IS : 1868) transparent or dyed to required colour or shade, with necessary screws etc. complete	3	nos	330	990
480	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.4.14.31	Providing and fixing toughened glass panes of 6.0 mm thickness in aluminium door, window, ventilator shutters and partitions etc. with EPDM rubber/ neoprene gasket etc. complete as per the architectural drawings and the directions of engineer-in-charge. (Cost of aluminium snap beading shall be paid in basic item)	25	m²	1 875	46 875
481	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.4.14.32	Providing and fixing laminated glass panes of 6.3 mm thickness in aluminium door, window, ventilator shutters and partitions etc. with EPDM rubber/ neoprene gasket etc. complete as per the architectural drawings and the directions of engineer-in-charge. (Cost of aluminium snap beading shall be paid in basic item)	75	m²	2 514	1 88 550

Sl. No.	PART NO	SOR NO	ITEM NO	DESCRIPTION	QTY	UOM	RATE	AMOUNT
482	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.4.14.35	Providing and fixing in position decorative Powder Coated Aluminium grill (minimum thickness of powder coating 50 micron), made of approx. 7.5 mm wide, 6mm thick sections with gapping of approx. 85 mm x 70mm maximum of approved design, pattern and make fixed to the outer frame or shutter frame of door/ window/ ventilator with C.P brass/ stainless steel screws @ 200mm centre to centre, including cutting the grill to proper opening size for fixing and operation of handles and fixing approved powder coated aluminium standard section around the opening, all complete as per requirement and direction of Engineer-incharge.	25	kg	629	15 725
483	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.4.15	P/F pressed steel door and window frames Providing and fixing pressed steel door and window frames of size (assorted size out of) Overall 125mm x 60mm section, of required profile conforming to IS: 4351, made of 16 SWG pressed steel including/ consisting of: i)3 mm thick MS flat spacers welded to frame @ 500mm c/c and at holdfast locations. ii)Filling the hollow frame section with concrete. iii)MS angle (20mmx20mmx3mm) horizontal tie member below floor finish. iv)MS holdfasts (200mmx25mmx6mm) welded to spacers. v)Fixing to masonry (by grouting the holdfasts with M-15 grade concrete in minimum 250mm x 100mm x 100mm sized hole)/ fixing to RCC (by minimum 100mm long, 12 mm dia metallic counter sunk anchor fasteners) vi)MS pad plates (40mm x 150mm x 3mm) & GI mortar guard welded to frame at hinge and other hardware locations. vii)Metering of joints between horizontal and vertical members, grinding and smoothening of welding, cleaning of frame surface, finishing (synthetic enamel painting/ electrostatic powder coating/ polyurethane (PU) coating), making true alignments and surfaces etc. all complete. Notes: 1)Reference shall be made to EIL standard nos. 7-75-0070, 7-75-0071 2)Cumulative length of all horizontal and vertical frame members shall be measured for payment.				
484	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.4.15.5	Frames painted with Electrostatic Powder coating.	5	m	1 834	9 170
485	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.4.15.6	Extra for box type transoms & mullions	1	m	1 051	1 051

Sl. No.	PART NO	SOR NO	ITEM NO	DESCRIPTION	QTY	UOM	RATE	AMOUNT
486	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.4.16	P/F Gypsum Board/ Calcium silicate board Partitions Providing and fixing partition upto ceiling height consisting of G.I. frame and required board, including providing and fixing of frame work made of special section power pressed/ roll form G.I. sheet with zinc coating of 120 gms/sqm(both side inclusive), consisting of floor and ceiling channel 50mm wide having equal flanges of 32 mm and 0.50 mm thick, fixed to the floor and ceiling at the spacing of 610 mm centre to centre with dash fastener of 12.5 mm dia meter 50 mm length or suitable anchor fastener or metal screws with nylon plugs and the studs 48 mm wide having one flange of 34 mm and other flange 36 mm and 0.50 mm thick fixed vertically within flanges of floor and ceiling channel and placed at a spacing of 610 mm centre to centre by 6 mm dia bolts and nuts, including fixing of studs along both ends of partition fixed flush to wall with suitable anchor fastener or metal screws with nylon plugs at spacing of 450 mm centre to centre, and fixing of boards to both side of frame work by 25 mm long dry wall screws on studs, floor and ceiling channels at the spacing of 300 mm centre to centre. The boards are to be fixed to the frame work with joints staggered to avoid through cracks, M.S. fixing channel of 99 mm width (0.9 mm thick having two flanges of 9.5 mm each) to be provided at the horizontal joints of two boards, fixed to the studs using metal to metal flat head screws, including jointing and finishing to a flush finish with recommended jointing compound, jointing tape, angle beads at corners (25 mm x 25 mm x 0.5 mm), joint finisher and two coats of primer suitable for board as per manufacture¿s specification and direction of engineer in charge all complete.				
487	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.4.16.1	75 mm overall thickness partition with 12.5 mm thick double skin fire rated board conforming to IS: 2095: part I	9	m²	1 885	16 965
488	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.5	PLASTERING & POINTING				
489	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.5.1	Providing plain cement plaster in cement mortar (1 cement:4/6 fine sand by volume) on masonry, PCC/ RCC including preperation of base, finishing, curing etc; also including providing 20 gauge chicken wire mesh stretched tight at all RCC/ PCC and masonry meeting points in 300mm wide strips (150mm on on each surface) fixed with G.I. "U" type nails before plastering.				

Sl. No.	PART NO	SOR NO	ITEM NO	DESCRIPTION	QTY	UOM	RATE	AMOUNT
490	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.5.1.13	Plain cement plaster with waterproofing compound conforming to IS-2645 (CICO/ approved equivalent) mixed to cement mortar @ 3% by weight, Average 18mm thick 1:6 (1 cement : 6 sand) Cement supplied by the Contractor at their cost.	780	m²	598	4 66 440
491	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.5.1.15	Plain cement plaster with waterproofing compound conforming to IS-2645 (CICO/ approved equivalent) mixed to cement mortar @ 3% by weight, Average 15mm thick 1:4 (1 cement : 4 sand) Cement supplied by the Contractor at their cost.	65	m²	526	34 190
492	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.5.1.17	Plain cement plaster with waterproofing compound conforming to IS-2645 (CICO/ approved equivalent) mixed to cement mortar @ 3% by weight, Average 12mm thick 1:4 (1 cement : 4 sand) Cement supplied by the Contractor at their cost.	850	m²	464	3 94 400
493	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.5.1.19	Plain cement plaster with waterproofing compound conforming to IS-2645 (CICO/ approved equivalent) mixed to cement mortar @ 3% by weight. Average 6mm thick 1:4 (1 cement : 4 sand) Average 6mm thick 1:4 (1 cement : 4 sand). Cement supplied by the Contractor at their cost.	380	m²	392	1 48 960
494	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.5.4	Providing 20mm x 10mm Grooves in plastering in perfect straight line, plumb and uniform size throughout including finishing etc. all complete.	225	RM	91	20 475
495	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.5.7	Providing and applying 12 mm thick (average) premixed formulated one coat gypsum lightweight plaster having additives and light weight aggregates as vermiculite/ perlite respectively conforming to IS: 2547 (Part - 1 & II) 1976, applied on hacked / uneven background such as bare brick/ block/ RCC work on walls & ceiling at all floors and locations, finished in smooth line and level etc. complete.	2	sqm	557	1 114
496	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.6	ROOFING TREATMENT				
497	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.6.2	PCC 1:2:4 over concrete surfaces Providing and laying cement concrete (1 cement : 2 coarse sand : 4 aggregate) over concrete surfaces, laid to slope at all heights including, finishing, curing, tamping etc. all				
498	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.6.2.1	Cement supplied by the Contractor at their cost.	15	m³	9 579	1 43 685
499	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.6.6	Cinder Concrete (1:10) Providing and laying Cinder Concrete (1 cement : 10 cinder of 48mm size and down grade) in all sunk areas finished with 12mm thick plain cement plaster (1 cement : 6 coarse sand by volume) including consolidating, finishing, curing, maintaining slope etc. all complete.				

Sl. No.	PART NO	SOR NO	ITEM NO	DESCRIPTION	QTY	UOM	RATE	AMOUNT
500	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.6.6.1	Cement supplied by the contractor at their cost	2	m^3	10 691	21 382
501	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.6.10	P/L one component PU elastomeric membrane roof treatment Providing and laying one component urethane polymers based elastomeric membrane roof treatment/ waterproofing-cum-terracing system consisting of one or more coats of urethane based high solid content elastomeric membrane (having high viscosity to give a high build film) at approx. coverage of 0.5 kg per sq.M each coat applied over and including a coat of urethane primer EMP (cured to a slightly tacky film) at a coverage of 8 Sq.M per litre by brush applied to achieve overall thickness of 1.5 mm (+ or - 15%) as per ASTM C-836/898 over all exposed roof surfaces, continued up the parapets/ walls for a minimum of 150mm over the finished roof surface, continued into rain water pipes by at least 100mm; including the preparation of the surface which shall include thorough cleaning of roof surface with a wire brush and removal of all foreign matter etc.; well defined cracks on the surface cut to ""V"" section, cleaned and filled up with a suitable mastic; sprinkling of 300 micron layer of clean sand over the final coat of PU when tacky; providing finishing protective layer of 50 mm thk. P.C.C. (1:2:4) in panels of maximum size 1200mm x 1200mm chequered finish with 24 SWG chicken wiremesh interposed in between finished smooth with joints between panels sealed with suitable urethane based elastomeric compound as per manufacturer's specifications; providing fillets of 75 mm radius with P.C.C. (1:2:4) at junctions of horizontal and vertical surfaces finished smooth; providing 450mm x 450mm khuras (rain water collecting pits) in 1:2:4 cement concrete at all outlets, levelled down by min. 25mm, finishing, curing etc. all complete as per approved manufacturer's standard specifications and recommendations.				
502	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.6.10.1	Cement supplied by the contractor at their cost	5	m^2	1 535	7 675

Sl. No.	PART NO	SOR NO	ITEM NO	DESCRIPTION	QTY	UOM	RATE	AMOUNT
503	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.6.12	P/L A.P.P. modified reinforced bituminous memb. waterproofing Providing and laying 4mm thick A.P.P (atactic polypropelene) modified reinforced bituminous waterproofing membrane over terrace and parapet including cleaning and preperation of the surface consisting of making good all the cracks and damages, filling potholes/ depressions, removing weak foam concrete/ plaster and refilling with same wherever required thus preparing smooth surface of the terrace; providing and applying one coat of cold applied bitumen based primer @ 0.2 to 0.4 litre per sq. mtr.; laying the membrane by torch welding over primer, providing 100mm overlaps and appropriately pressing the membrane to remove any entrapped air, including fixing on parapet after providing 10mm x 20mm continuous groove in parapet for terminating the membrane and filling the groove with polyurethane sealant and continuing this treatment at rain water outlet points; providing finishing protective layer of 35 mm thk. P.C.C. (1:2:4) in panels of maximum size 1200mm x 1200mm chequered finish with 24 SWG chicken wiremesh interposed in between finished smooth with joints between panels sealed with suitable polyurethane sealant; providing fillets of 75 mm radius with P.C.C. (1:2:4) at junctions of horizontal and vertical surfaces finished smooth; providing 450mm x 450mm khuras (rain water collecting pits) in 1:2:4 cement concrete at all outlets, levelled down by min. 25mm, finishing, curing etc. all complete as per approved manufacturer's standard specifications and recommendations.				
504	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.6.12.1	Cement supplied by the contractor at their cost	225	m²	1 226	2 75 850
505	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.7	WHITEWASHING, PAINTING & POLISHING				
506	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.7.3	Providing and applying two or more coats (to give a smooth and even shade) of premium plastic emulsion paint conforming to IS:5411 of approved make and shade including cleaning and preparation of surface consisting of application of Plaster of Paris punning over entire surface, filling all holes and depressions with plaster of Paris, applying a coat of cement primer, two or more coats of oil based putty (as per manufacturer's recommendations to give a paste like putty), sandpapering etc. all complete.	2	m²	499	998

Sl. No.	PART NO	SOR NO	ITEM NO	DESCRIPTION	QTY	UOM	RATE	AMOUNT
507	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.7.5	Providing and applying two coats of synthetic enamel paint of approved make and shade to give an even shade including cleaning and preparation of surfaces, providing 2 coats of primer, stopping and filling etc. complete.	4	m²	301	1 204
508	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.7.6	Providing & applying 3 coats of waterproof decorative cement paint of approved make and approved shade, cleaning, including preparation of surfaces, curing etc. all complete.	12	m²	146	1 752
509	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.7.9	Providing and applying textured wall coating system consisting of twin pack fine grade silica granules/ dry flakes made of special grade of china clay/ granite type flakes of `Heritage' or equivalent in approved shade and texture; mixed in-situ with 100% acrylic polymer bonding agent; applied over plastered surfaces; the granules/ flakes etc., bonding material, mixing, method of application surface preperation etc. all shall be as per manufacturer's recommendations and specifications.				
510	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.7.9.1	Providing and applying textured granular type wall coating.	8	m²	670	5 360
511	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.7.10	Providing and applying min 2 mm thick white cement and polymer based wall putty (JK Wall care/ Birla Putty/ SARA or approved equivalent) over plastered surfaces (masonry wall/ RCC) and smoothening the surface with sand paper etc., preparation of surface etc. all complete as per the approved manufacturer's recommendations and directions of Engineer-in-charge.	200	m²	217	43 400
512	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.7.11	Providing and applying/ finishing the walls/ RCC surfaces with Premium Acrylic smooth exterior paint with silicon additives with low VOC (Volatile Organic Compound) content (Snowcryl-XT of 'Snowcem India Ltd. or approved equivalent) of required shades on new work applied in two or more coats at the rate of 1.43 ltr/ 10 sq.m over and including base coat of waterproof cement paint (of Snowcem Plus or approved equivalent) including cleaning, preparation of surfaces, curing etc. all complete.	42	m²	351	14 742
513	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.8	ROOFING				
514	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.8.5	Providing and fixing 6mm thick Corrugated A.C. sheet (conforming to IS : 459) in roofing, cladding, louver etc. with `J' or `L' type anticorrosive polymer coated GI hooks, bolts, nuts, and polymer cap, seal and thrust washers of approved make including cutting to proper size, mitering, laps, finishing, providing cut outs in sheeting for roofing accessories etc.all complete.	135	m²	472	63 720

Sl. No.	PART NO	SOR NO	ITEM NO	DESCRIPTION	QTY	UOM	RATE	AMOUNT
515	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.8.6	Providing and fixing A.C. sheet socketed gutter of approved make complete with all accessories like drop ends, stop ends, nozzles, including providing and fixing M.S. brackets of 40mm x 3mm section @ 1000mm max. 8mm dia anticorrosive polymer coated G.I. `J' or `L' type hooks, bolts, nutspolymer cap, seal and thrust washer, laps, finishing etc. all complete.				
516	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.8.6.1	Plain ended eaves gutter of size, 304.8mm x 152.4mm x 278.6mm	14	m	351	4 914
517	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.8.6.5	Valley gutter of size : 457.2mm x 127mm x 152.4mm	2	m	382	764
518	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.8.7	Providing and fixing following A.C. items of approved make & approved manufacturer=s size with 8mm dia anticorrosive polymer coated G.I. `J' or `L' type hooks, bolts, nuts, polymer cap, seal and thrust washers of approved make, including laps, all accessories, finishing etc. all complete.				
519	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.8.7.1	Close fitting adjustable ridges in pairs.	2	m	409	818
520	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.8.7.2	Barge Board	3	m	270	810
521	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.8.7.3	Apron piece.	3	m	213	639
522	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.8.7.4	Eaves filler piece.	3	m	319	957
523	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.8.7.5	North light curved sheet.	3	m	374	1 122
524	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.8.8	Providing and fixing A.C. air extractor of approved quality over A.C. sheeting including M.S. frame work, anticorrosive polymer coated G.I. hooks, nuts, bolts, and polymer cap, seal and thrust wshers of approved make, finishing etc. all complete.				
525	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.8.8.2	610mm dia extractor.	1	nos	12 608	12 608
526	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.8.9	Providing and fixing 1.5mm thick approved make machine moulded translucent reniforced corrugated fibre glass sheets (matching with main sheet corrugation) with anticorrosive polymer coated G.I. hooks, bolts, nuts,polymer cap, seal and thrust washers of approved make, including cutting to size etc. all complete.	2	m²	1 557	3 114
527	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.8.10	Providing and fixing 40mm x 6mm M.S. flat wind ties over sheeting with anticorrosive polymer coated G.I. nuts, bolts, polymer cap, seal and thrust washers of approved make iincluding painting with two coats of synthetic enamel paint of approved make over a coat of approved quality red oxide zinc chromate primer etc.all complete.	10	RM	192	1 920

Sl. No.	PART NO	SOR NO	ITEM NO	DESCRIPTION	QTY	UOM	RATE	AMOUNT
528	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.8.12	Providing and fixing rain water pipes with M.S. holder clamps including fixing/embedding into masonry/concrete, providing connections like shoes, vents, specials, bends etc. fixing in perfect plumb etc. all complete.				
529	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.8.12.5	110mm dia O.D. Size. exposed PVC rain water pipe jointed with bonding solution of approved quality and make with pressure rating of 4kg/cm2 including clamps, connections etc. all as per approved manufacturer's details.	6	RM	351	2 106
530	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.8.12.6	160mm dia O.D. Size. exposed PVC rain water pipe jointed with bonding solution of approved quality and make with pressure rating of 4kg/cm2 including clamps, connections etc. all as per approved manufacturer's details.	9	RM	588	5 292
531	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.8.12.7	110mm dia O.D. Size. embedded PVC rain water pipe jointed with bonding solution of approved quality and make with pressure rating of 4kg/cm2 including clamps, connections etc. all as per approved manufacturer's details.	9	RM	361	3 249
532	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.8.12.8	160mm dia O.D. Size. embedded PVC rain water pipe jointed with bonding solution of approved quality and make with pressure rating of 4kg/cm2 including clamps, connections etc. all as per approved manufacturer's details	210	RM	608	1 27 680

Sl. No.	PART NO	SOR NO	ITEM NO	DESCRIPTION	QTY	UOM	RATE	AMOUNT
533	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.8.17	Providing and laying in position approved quality profiled, precoated, steel sheets (for roofing, cladding etc.) made from cold rolled high tensile Zincalume/ Galvalume Steel of 550 MPA yield stress conforming to IS:513, IS:15961 and ASTM AS: 1397; the substrate shall be hot dip metallic coating of aluminium- zinc alloy (150 grams per sq. mtr. Total on both sides, coating class AZ150); the bottom unexposed surface shall be provided with alkyd backer of minimum 5 microns over a 5 micron coat of primer; top exposed surface shall have SDP (Super Durable Polyester) paint system MINIMUM 20 microns in approved shade applied over 5 microns primer; overall coated thickness of sheets not less than 0.52 mm having base metal thickness of minimum 0.45mm (negative tolerance not acceptable), profile depth not less than 28mm and pitch of 195 to 255mm; including cutting, mitering, laps, providing cutouts for fixing accessories, necessary fastners (approved quality anti corrosive polyester polymer coated, rivets, nuts, bolts, self drilling screws/ fasteners with integral washers and EPDM seals, and nylon colour caps and natural cure type joint sealants etc.) All complete as per approved manufacturer's specifications. Note: The steel sheet shall have brand marking of coated steel manufacturer (product details, date, mfg name, etc) on back side at regular interval confirming genuinity of the material.	95	m²	1 278	1 21 410
534	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.8.18	Providing and laying in position roofing and cladding accessories like ridge piece, corner piece, north light curve piece, apron piece, gutter, flashing etc. fabricated out of 0.5mm precoated Zincalume/ Galvalume Steel steel sheets of same material/ quality etc. as that of sheeting; bent and profiled to match with the roofing and cladding, including all cutting, fabrication, rivetting, fastners etc. all complete.	25	m²	1 278	31 950

Sl. No.	PART NO	SOR NO	ITEM NO	DESCRIPTION	QTY	UOM	RATE	AMOUNT
535	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.8.20	Polycarbonate sheets roofing/ cladding Providing and fixing in position (for roofing and cladding) machine made 2mm thick corrugated polycarbonate sheets (conforming to IS :14434, 14443) of approved manufacturer (in approved shade) extruded from polycarbonate resin, having profiles as approved/ matching exactly with the surrounding pre-coated roofing/ cladding sheets and having following properties: (a) Specific gravity 1.2 g/ cm3 (b) Hardness 119 M Scale (c) Tensile Strength 64 Mpa (d) Compressive strength 66Mpa (e) Impact Strength 900 J/m The item includes fixing to steel structure members (truss/ purlins)/ brick masonry walls by means of polymer coated 'J' or 'L' hooks, bolts, nuts 8mm dia G.I. bitumen washers etc. all complete as per approved manufacturer's recommendations and specifications.	20	m²	3 018	60 360
536	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.8.24	Providing and fixing industrial grade wind driven turbine ventilator/ air-extractor having rotating turbine vents made of anodized aluminium (grade H24), with teflon bearings, teflon bush, teflon cap, translucent FRP base, stainless steel shaft having zero friction rotation etc. all complete as per manufacturer¿s specifications, including fixing on pitched metallic roof sheeting with required overlapping, providing supporting framework, anticorrosive polyester coated nuts, bolts, screws, sealing of all joints so that there shall not be any accumulation or leakage of water, making them waterproof etc. all complete.				
537	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.8.24.1	approx. size 700 mm outer dia. with minimum 2500 CFM capacity	2	nos	10 300	20 600
538	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.9	SANITARY FITTINGS & FIXTURES				

Sl. No.	PART NO	SOR NO	ITEM NO	DESCRIPTION	QTY	UOM	RATE	AMOUNT
539	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.9.1	Providing and fixing white glazed Earthenware Orissa pan type water closet with integral footrest of 550mmx440mm size conforming to IS : 2556, Part - III including glazed earthenware flushing cistern supported on MS brackets conforming to IS:774 of 10 litre capacity with CP brass handles,32mm dia telescopic flush pipe with fittings & clamps,15 mm dia overflow pipe with mosquitoproof net,15mm dia PVC connection pipe 450mm long,painting of all exposed metalic surfaces with 2 coats of approved shade and quality synthetic enamel paint (ICI or approved equivalent) over a priming coat of approved qualityred oxide zinc chromate, cutting walls, floors and making good of same,finishing, soldered joints, making inlet/ outlet connections,providing min. 150mm thick sand cushion, finishing etc. all complete.	1	nos	10 091	10 091
540	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.9.2	Providing and fixing white glazed Earthen ware double trap, syphonic pattern wash down water closet conforming to IS : 2556 Part II including white plastic solid seat and cover conforming to IS : 2548, CP brass hinges and rubber buffers,10 litres capacity glazed Earthenware low level cistern conforming to IS:774 with internal overflow system & fittings,CP brass 40mm dia flush pipe,15 mm dia ,450mm long PVC connection pipe,ball valve, painting of all exposed matalic surfaces with 2 coats of approved shade and quality synthetic enamel paint (ICI or approved equivalent) over a priming coat of approved quality red oxide zinc chromate, cutting walls, floors and making good of same, making inlet and outlet connections, finishing etc. all complete.	1	nos	11 661	11 661
541	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.9.3	Providing and fixing white glazed ceramic, flat back half stall type Urinals of 610mm x 400mm x 380mm size conforming to IS:2556 Part-VI including automatic glazed Earthenware cistern for every one 15mm dia CP brass cistern outlet 750mm long,32mm dia GI waste pipe with brass union,CP brass bottle trap,CP brass spreader,tee,distribution pipe etc.,MS brackets for cistern, painting of all exposed mettalic surface with 2 coats of approved shade and quality synthetic enamel paint (ICI or approved equivalent) over a priming coat of approved quality red oxide zinc chromate, making inlet and outlet connections, fixing with C.P. brass screws, finishing etc. all complete.				
542	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.9.3.1	One urinal.(with 5 litre capacity cistern)	1	nos	12 511	12 511
543	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.9.6	Kitchen Sink				

Sl. No.	PART NO	SOR NO	ITEM NO	DESCRIPTION	QTY	UOM	RATE	AMOUNT
544	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.9.6.1	Providing and fixing white glazed vitrous china Lab sink/kitchen sink of 610mm x 450mm x 250mm size conforming to IS : 2556, Part-V including approved M.S./C.I. brackets conforming to IS : 775, one 15mm dia CP brass bibcock, 15mm dia PVC conection, C.P. brass chain with 40mm dia GI pipe connected to floor trap with unions, painting all exposed metallic surfaces with 2 coats of approved shade and quality synthetic enamel paint (ICI or approved equivalent) over a priming coat of approved quality red oxide zinc chromate,cutting floor,Walls and making goodgood the same, making all connections, finishing etc. all complete.	1	nos	5 316	5 316
545	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.9.8	Glass Shelf				
546	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.9.8.1	Providing and fixing 600mm x 120mm x 4mm thick Glass shelf of approved quality with CP brass bracket and guard rails including fixing to wall with wooden cleats and CP brass screws, cutting walls and making good the same, finishing etc.all complete.	1	nos	1 135	1 135
547	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.9.9	Towel Rail				
548	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.9.9.1	Providing and fixing approved quality chromium plated brass towel rail of 20mm dia, 600mm length and 1.25mm thickness including fixing to wall with wooden cleats and CP brass screws, cutting walls and making good the same, finishing etc. all complete.	1	nos	1 738	1 738
549	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.9.10	Soap Container				
550	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.9.10.1	Providing and fixing approved quality chromium plated liquid soap container including fixing to wall with wooden cleats and CP brass screws, cutting walls and making good the same,finishing etc. all complete.	1	nos	675	675
551	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.9.11	Providing and fixing Heavy grade Bib cocks/ stop cocks of spring loaded self closing type conforming to IS : 781 including making connections, cutting walls and making good the same etc. all complete.				
552	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.9.11.1	15mm dia CP Brass stop cock.	2	nos	842	1 684
553	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.9.11.2	15mm dia CP Brass bib cock.	1	nos	1 207	1 207
554	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.9.13	Providing and fixing CP brass shower rose conforming to IS-2064:				
555	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.9.13.2	150mm dia shower rose.	1	nos	1 383	1 383
556	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.9.14	Toilet Paper Holder				

Sl. No.	PART NO	SOR NO	ITEM NO	DESCRIPTION	QTY	UOM	RATE	AMOUNT
557	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.9.14.1	Providing and fixing CP Brass Toilet paper holder of approved make with CP brass brackets including fixing to wall with wooden cleats, CP brass screws,cutting walls and making good the same, finishing etc. all complete.	1	nos	876	876
558	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.9.15	Providing and fixing in position round/ oval shaped counter Hand Wash Basin with anti-splash rims, conforming to IS:2556 Part IV, to fit in exactly and neatly in the cutout in the marble/ granite stone finished R.C.C counter; one 15mm dia CP brass pillar cock, rubber plug with C.P. brass chain, 32mm C.P. waste fitting of standard pattern type with 32mm dia G.I. pipe, C.P. brass bottle trap, cutting walls, counter etc. and making good the same, also including providing cut out in marble/ granite slab counter top (and R.C.C underneath) of exact size and shape for wash basin to fit in neatly and perfectly; making all connections, finishing etc. all complete. (Marble/ Granite counter top shall be paid seperately under relevant item of `Floor Finishing')				
559	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.9.15.1	Providing round/ oval shaped counter Wash Basin of glazed chinaware in White colour.	1	nos	7 097	7 097
560	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.9.15.2	Providing round/ oval shaped counter Wash Basin of glazed chinaware in approved colour.	1	nos	11 578	11 578
561	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.9.16	Stainless steel Kitchen/ Laboratory sink				
562	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.9.16.1	Providing and fixing stainless steel Kitchen/ Laboratory sink of approx. Size 610mm x 450mm x 200mm made of min. 1mm thick stainless steel sheet of `Salem Steel' or equivalent supported on and including M.S. brackets conforming to IS: 775; one 15mm dia C.P brass long body bib cock (if fixed to wall) or swivel type pillar cock (if fixed to counter), 15mm dia PVC/ G.I. connections to floor trap with unions etc.; painting all exposed metallic surfaces with min. 2 coats of synthetic enamel paint of approved make and shade over acoat of red oxide zinc chromate primer; cutting floor, walls, counter etc. and making good the same, making all connections, finishing etc. all complete.	1	nos	11 114	11 114
563	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.9.17	17mm thick polished granite stone partitions				
564	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.9.17.1	Providing and fixing minimum 17mm thick polished granite stone partitions (in approved quality, shade and design/ shape) with round edges for urinals including cutting walls, inserting (up to 100mm depth) and fixing the slab with Cement Mortar (1 cement : 3 coarse sand by volume), making good of all damaged work, finishing etc. all complete	1	m²	6 325	6 325
565	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.9.18	round edged mirror of 6mm thick				

Sl. No.	PART NO	SOR NO	ITEM NO	DESCRIPTION	QTY	UOM	RATE	AMOUNT
566	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.9.18.1	Providing and fixing round edged mirror of 6mm thick float glass with 6mm thick waterproof marine ply backing and rounded/ beveled edging, fixed on wall with wooden cleats and CP brass screws including cutting walls/ tiles, making good the same, finishing etc. all complete.	1	m²	2 246	2 246
567	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.9.19	CP Brass hand shower				
568	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.9.19.1	Providing and fixing CP Brass hand shower (health Faucet, of Jaquar or approved equivalent) with 8 mm Dia, 1 metre long PVC Tube and Wall hook in approved colour and finish with all necessary fittings etc. all complete.	1	nos	1 018	1 018
569	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.9.20	chromium plated brass towel ring				
570	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.9.20.1	Providing and fixing approved quality chromium plated brass towel ring of 150mm dia including fixing to wall with wooden cleats and CP brass screws, cutting walls and making good the same, finishing etc. all complete.	1	nos	1 463	1 463
571	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.9.21	chromium plated brass towel rack				
572	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.9.21.1	Providing and fixing approved quality chromium plated brass towel rack with towel rail, of 250mm width and 600mm length including fixing to wall with wooden cleats and CP brass screws, cutting walls and making good the same, finishing etc. all complete.	1	nos	3 300	3 300
573	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.9.23	white glazed Earthen ware double trap, syphonic pattern wall mounted (European type) wc				
574	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.9.23.1	"Providing and fixing white glazed Earthen ware double trap, syphonic pattern wall mounted (European type) water closet conforming to IS: 2556 Part 16 including white plastic solid seat and cover conforming to IS : 2548, CP brass hinges and rubber buffers, CP brass 40mm dia flush pipe,15 mm dia, ball valve, painting of all exposed metalic surfaces with 2 coats of approved shade and quality synthetic enamel paint (ICI or approved equivalent) over a priming coat of approved quality red oxide zinc chromate, cutting walls, floors and making good of same, making inlet and outlet connections, finishing etc. all complete.	1	nos	15 049	15 049
575	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.9.24	white glazed ceramic, flat back half stall type Urinals sensor based				

Sl. No.	PART NO	SOR NO	ITEM NO	DESCRIPTION	QTY	UOM	RATE	AMOUNT
576	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.9.24.1	"Providing and fixing white glazed ceramic, flat back half stall type Urinals of 610mm x 400mm x 380mm size conforming to IS:2556 Part-VI, having electronic, battery operated sensor based flushing system of approved make and model including 32mm dia GI waste pipe with brass union, CP brass bottle trap, CP brass spreader, tee, distribution pipe etc., painting of all exposed metallic surface with 2 coats of approved shade and quality synthetic enamel paint (ICI or approved equivalent) over a priming coat of approved quality red oxide zinc chromate, making inlet and outlet connections, fixing with C.P. brass screws, finishing etc. all complete.	1	nos	19 540	19 540
577	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.9.25	C.P. brass 2 way bib cock quarter turn type for health faucet				
578	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.9.25.1	Providing, fixing, testing and commissioning C.P. brass 2 way bib cock quarter turn type for health faucet of approved make or equivalent 15 mm nominal bore, all complete as per standard design, specifications and direction of Engineer-in-charge.	1	nos	2 133	2 133
579	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.9.26	C.P. brass wall mount Lavatory faucet mixer for wash basin				
580	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.9.26.1	Providing, fixing, testing and commissioning C.P. brass wall mount Lavatory faucet mixer for wash basin of following make or approved equivalent 15 mm nominal bore, all complete as per standard design, specifications and direction of Engineer-in-charge.	1	nos	3 518	3 518
581	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.9.27	Glass shelf				
582	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.9.27.1	"Providing and fixing 600mm x 120mm x 6mm thick Glass shelf of approved quality with 'D' or 'F' bracket (Stainless Steel 202 grade) and guard rails including fixing to wall with plastic rawl plugs and SS screws, drilling walls and making good the same, finishing etc., all complete.	1	nos	1 587	1 587
583	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.9.28	Providing and Fixing Concealed Flushing Cistern Size 550X95X500mm with dual flush Actuator, flush-stop function, noise less float valve and fast filling action with all component parts of high quality complete including frame for concealed cistern etc. all complete as per the instructions of the engineer-incharge.	1	nos	7 901	7 901
584	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.9.29	Providing and Fixing of Flushing plate with dual knobs chrome Finish in desired shape and size for Concealed Flushing Cistern including all tools, tackles etc., all complete as per the instructions of engineer-in-charge.	1	nos	2 771	2 771
585	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.10	FALSE CEILING, FALSE FLOORING, UNDERDECK INSULATION, PARTITIONING				

Sl. No.	PART NO	SOR NO	ITEM NO	DESCRIPTION	QTY	UOM	RATE	AMOUNT
586	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.10.1	Providing and fixing False Ceiling grid framework for supporting ceiling tiles consisting of main and cross runners supported from roof slab at desired height in desired pattern including finishing, making the frame work perfectly levelled and aligned etc. all complete.				
587	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.10.1.1	Anodised (25 micron) aluminium grid framework consisting of extruded anodized aluminium (2.50mm thick) main runners (`T'shaped, 25mm x 35mm size), cross runners (`T'shaped 25mm x 25mm size),Wall angles including suspending the main runners @ 600mm c/c max, by means of 6mm dia M.S. hooks slotted in 25mm x 25mmx3mm thick M.S. angle fixed to roof slab with dash fasteners and connected to 3mm thick M.S. clamp (connected to main runners with 25mm long M.S. Nut) with levelling nut @ 1200mm c/c max. assembling the main and cross runners by means of aluminium angle cleats inter locking each other to forn the grid work of 600mm of 600mm size (max) fixing the aluminium wall angles with dash fastners etc. all complete.	75	m²	1 102	82 650
588	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.10.3	Providing and fixing Mineral Fibre Tile false ceiling consisting of A. 600mm x 600mm x 15mm thick Mineral Fibre Acoustical tiles with durable tegular edging having noise reduction coefficient (NRC) value of min. 0.50, light reflectance value of min. 80%,thermal conductivity (K) value of 0.052-0.057 w/m deg.C and fire performance conforming to class-I as per BS-476,back of the tiles being provided with one coat of protective coating. B. Suspension system consisting of hot dipped galvanised steel main runners @ max. 1200mm c/c (0.33mm thk.,"T"shaped, 24mm x 38mm size with single rotary stiching), cross runners (0.25mm thk.,"T" shaped with double rotary stiching, 24mm x 30mm size, 1200mm long and 24mm x 25mm size, 600mm long), perimeter sections (0.45mm thick,22mm x 22mm size) including suspending the system by means of 4mm dia MS wire,6mm thk. MS cleat of 25mm x 25mm size, dash fasteners and level adjustors, providing 30 micron powder coating to exposed metallic members, providing slit openings for fixing supply/return air grill, lighting fixtures, AC ducts etc. all complete.				
589	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.10.3.2	With fine granulated surface tiles (Acoustical punchers (10mm deep) = 24000sm)	20	m²	1 834	36 680
590	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.10.7	Providing and fixing partition/ panelling boards over MS framework as per desired pattern including providing cut-outs for fixing wall fixtures, conduits etc. all complete.				

Sl. No.	PART NO	SOR NO	ITEM NO	DESCRIPTION	QTY	UOM	RATE	AMOUNT
591	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.10.7.3	12.5mm thick Gypsum board panels in partition (conforming to IS : 2095, having thermal conductivity of 0.16w/mk, thermal resistance of 0.085sq.m k/w, categorised as Class-1, when tested to BS 476 Part-7) painted and screw fixed to the GI framework with 12.5mm dia dry wall screws @ 230mm c/c, including finishing the joints in the board flush with fillers, to give a smooth, seamless joints, cleaning of surfaces, fixing etc. the panels being fixed on both sides of frame work including providing and fixing Gypsum boards along the exposed edges of frame work and painting the boards with aproved shade plastic emulsion paint conforming to IS:5411.	9	m²	1 515	13 635
592	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.10.7.4	12.5mm thick Gypsum board panels in panelling (conforming to IS : 2095, having thermal conductivity of 0.16w/mk, thermal resistance of 0.085sq.m k/w, categorised as Class-1, when tested to BS 476 Part-7) painted and screw fixed to the GI framework with 12.5mm dia dry wall screws @ 230mm c/c, including finishing the joints in the board flush with fillers, to give a smooth, seamless joints, cleaning of surfaces, fixing etc. the panels being fixed on one side of framework only and painted with approved shade plastic emulsion paint conforming to IS:5411.	2	m²	1 535	3 070
593	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.10.7.5	5.5mm thick toughened glass panels (conforming to IS :5437) in partitions with putty, 12mm x 10mm second T.W beading on Teak Wood frame (50mm x partition depth) fixed to MS frame work in the partition including adjustment of partition members, finishing etc. all complete.	2	m²	1 803	3 606
594	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.10.9	Tray type Aluminium plank false ceiling				

Sl. No.	PART NO	SOR NO	ITEM NO	DESCRIPTION	QTY	UOM	RATE	AMOUNT
595	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.10.9.1	Providing and fixing Tray type Aluminium plank false ceiling consisting of 254/305mm x 1264mm or 600mm x 600mm size Aluminium planks (profiled for positive engagement into clip-in profiles and demounting of individual planks) manufactured out of 0.7mm thk. Aluminium alloy 3105/3005/5052 (as per ASTM 209M) with stove enamelled (coil coated) finish in approved colour and suspension system consisting of 0.5mm thk. 40mm x 20mm galvanised steel clip-in main runner profiles (@ 1264mm or 600mm as per plank size) supported by and including 0.5mm thk. 25mm x 16mm GI suspension angle,1mm thk. 25mm x 34mm x 76mm CRCA zinc plated steel ceiling brackets (@ max. 1264mm c/c or 600mm as per profile) fixed to roof slab/beam,0.5mm thk. 40mm wide, 105mm high G.I. hold on clamps slotted for level adjustment, perimeter angles including providing slit openings for fixing supply/return air grill, lighting fixtures, AC ducts etc. all complete. .	138	m²	2 596	3 58 248
596	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.10.12	underdeck insulation consisting of rigid Polyisocyanurate foam (PIR) slabs				
597	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.10.12.1	Providing and fixing in position underdeck insulation consisting of rigid Polyisocyanurate foam (PIR) slabs of size 1000 x 500mm and thickness of 30mm (covered on one side with glass fibre tissue/ Aluminium foil having 50mm overlap) conforming to IS:12436 having density not less than 32 kg./ Cu. M., thermal conductivity (K- value) not more than 0.023 w/mk measured at 10 deg. C; classified as 'Class I' for surface spread of flame as per BS 476, part 7; fixed to R.C.C. slab by hot blow grade bitumen of 85/25 grade or cold adhesive CPRX applied over a coat of bituminous primer @ 0.5 Litres/ Sq.M. applied to bare R.C.C. surface and to the two surface of each PIR panel and pressed in position (while the bitumen is still tacky) with the help of G.I. screws (No. 8 x 75mm long) fixed into rawl plugs (holes in R.C.C. for the rawl plugs shall be drilled prior to applying coat of bituminous primer) of size 8 x 25mm inserted (5 nos. for each slab- One each at 4 corners and one at center) and G.I washers 25mm dia; including covering the overlaps with approved quality sealing compound (MAS-94 or equivalent); chicken wire mesh 24G x 19mm shall then be fixed to G.I screws and tightened with lacing wire; including preparation of surface consisting of cleaning R.C.C surface of all dust, dirt and loose particles by wire brushing; etc. all complete as per approved manufacturer's standard specifications and recommendations.	225	m²	1 463	3 29 175

Sl. No.	PART NO	SOR NO	ITEM NO	DESCRIPTION	QTY	UOM	RATE	AMOUNT
598	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.10.15	Providing and installing/ fixing in position 600mm-1000mm high truly levelled and aligned cavity/ false flooring system having load bearing capacity of uniformly distributed load of minimum 2025 kg/ sq.m. and point load of 675 Kg., the system consisting of: (i) Sub-structure/ pedestal assembly (designed for speedy assembly/ removal for relocation/ maintenance) of zinc electro plated steel comprising of: a. 90mm x 90mm x 4mm embossed pedestal head attachment mechanically riveted to a 90mm long, minimum 19mm dia threaded bright M.S. rod stud with check nuts for level adjustment (for upto 25mm) and arresting vertical movement, anti-vibrational PVC cap (for panel and stringer location), b. CRCA (Electrical resistant welded) Pedestal of 32mm dia (OD), 2mm thick pipe mechanically reduced to four ribs at top to accommodate head assembly, mechanically locked to maintain true plumb welded to pedestal base plate. c. Pedestal Base plate 150mm x 150mm x 4mm thick (with stiffening folds) fixed/ anchored to main concrete floor @ 600mm c/c both ways (for installing flooring tiles) by means of adhesive or fastener as recommended by Manufacturer. (ii) Stringers of minimum sectional size 20mm x 32mm x 1.2mm made of hot dip galvanized steel cold rolled construction with ribs embossed on 3 sides (designed for strength, lateral stability, rolling loads and to support panels on all four sides for alignment), having counter sunk holes at both ends for fixing to pedestal head assembly with M6 machine screws. (iii) Removable and re-usable Floor panels of size 600mm x 600mm made of all steel welded construction (cleaned, degreased and phosphated with 11 tank process, finished with 40-60 micron epoxy coating (and, heated to achieve adhesion to the panel surface and corrosion resistance) with bottom surface consisting of multiple hemispherical and reverse cones and top plain sheet (fuse welded at 129 locations) to form an enclosed panel of an overall depth 37mm; the inner empty core of the panel injected with light weight fire retardant, non-combustible cementitious				
599	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.10.15.1	False flooring panels with 2mm thick fire retardant floor grade high pressure laminate conforming to BS : 476 part - 7 on a semi-automated lamination line in approved design/ shade/ texture.	5	m²	11 238	56 190
600	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.10.15.3	False flooring panels with minimum 10mm thick polished mirror or mat finished vitrified tiles in approved design/ shade/ texture.	1	m²	7 839	7 839

Sl. No.	PART NO	SOR NO	ITEM NO	DESCRIPTION	QTY	UOM	RATE	AMOUNT
601	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.10.17	Providing and fixing false ceiling at all height including providing and fixing of frame work made of special sections, power pressed from M.S. sheets and galvanized with zinc coating of 120 gms/sqm (both side inclusive) as per IS : 277 and consisting of angle cleats of size 25 mm wide x 1.6 mm thick with flanges of 27 mm and 37mm, at 1200 mm centre to centre, one flange fixed to the ceiling with dash fastener 12.5 mm dia x 50mm long with 6mm dia bolts, other flange of cleat fixed to the angle hangers of 25x10x0.50 mm of required length with nuts & bolts of required size and other end of angle hanger fixed with intermediate G.I. channels 45x15x0.9 mm running at the spacing of 1200 mm centre to centre, to which the ceiling section 0.5 mm thick bottom wedge of 80 mm with tapered flanges of 26 mm each having lips of 10.5 mm, at 450 mm centre to centre, shall be fixed in a direction perpendicular to G.I. intermediate channel with connecting clips made out of 2.64 mm dia x 230 mm long G.I. wire at every junction, including fixing perimeter channels 0.5 mm thick 27 mm high having flanges of 20 mm and 30 mm long, the perimeter of ceiling fixed to wall/partition with the help of rawl plugs at 450 mm centre, with 25mm long dry wall screws @ 230 mm interval, including fixing of gypsum board to ceiling section and perimeter channel with the help of dry wall screws of size 3.5 x 25 mm at 230 mm c/c, including jointing and finishing to a flush finish of tapered and square edges of the board with recomme-nded jointing compound , jointing tapes , finishing with jointing compound in 3 layers covering upto 150 mm on both sides of joint and two coats of primer suitable for board, all as per manufacturer¿s specification and also including the cost of making openings for light fittings, grills, diffusers, cutouts made with frame of perimeter channels suitably fixed, all complete as per drawings, specification and direction of the Engineer in Charge but excluding the cost of painting with:				
602	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.10.17.2	12.5 mm thick tapered edge gypsum fire resistant board conforming to IS: 2095- Part I	200	m²	1 597	3 19 400
603	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.10.17.3	12.5 mm thick tapered edge gypsum moisture resistant board	190	m²	1 721	3 26 990
604	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.11	MISCELLANEOUS ITEMS				

Sl. No.	PART NO	SOR NO	ITEM NO	DESCRIPTION	QTY	UOM	RATE	AMOUNT
605	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.11.1	Sealing 25mm thick, 50mm wide expansion joints with premium grade two part poly-sulphide sealant (based on LP liquid sulphide) over and including primer (specially developed for use with polysulphide sealant material and as approved) and back-up materials of polyethylene strip or other bondbreaker (all as per manufacturer's specification), sealant being mixed (the base and the curing agent thoroughly mixed with slow speed electric mixer) and applied by sealant gun and `sealant application kit' including drying of surfaces before application by wire brushing, finishing etc. all complete.	18	RM	412	7 416
606	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.11.6	Providing and laying plinth protection with Bldg. drain as per EIL STD. No. 7-75-0065 consisting of				
607	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.11.6.1	Plinth protection of PCC (1:3:6) laid over rammed earth to slope and trowel finished. Cement supplied by the Contractor at their cost.	75	m²	835	62 625
608	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.11.6.3	Building drain consisting of brick work, PCC (1:3:6) laid over rammed earth and finished with 15mm thick plain cement plaster topped with neat cement finish @ 2.75kg. of cement per Sq.M of area including finishing curing etc. all complete. Cement supplied by the Contractor at their cost.	22	m²	3 647	80 234
609	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.11.6.6	Extra for providing 600mm long MS grating drain cover as per EIL STD No. 7-75-0065 made of 40mm x 6mm M.S. flat framework with 40mm x 6mm MS flats welded @ 35mm c/c including providing & fixing 50mm x 50mm x 6mm M.S. angle frame fixed to concrete portion of the drain.	103	nos	2 009	2 06 927
610	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.11.7	50mm dia GI pipe spouts				
611	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.11.7.1	Providing and fixing in position 50mm dia GI pipe spouts to slope for drainage of canopy, chajja etc., including puncturing the masonry /RCC and grouting with M-15 grade concrete, finishing etc. all complete.	1	RM	1 808	1 808
612	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.11.12	Anti-Termite coating				
613	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.11.12.1	Providing and applying Anti-Termite coating conforming to I.S. 401 coating to all woodwork (panel/frame) with approved quality aldrine- chlorinated phenol compound conforming to I.S. 401 to be applied in 3 or more coats (covering capacity-3 sq.m per coat) as required before finishing of the surface if any (viz.painting lamination etc.) all complete.	17	m²	309	5 253
614	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.11.15	2000mm high transformer gates				

Sl. No.	PART NO	SOR NO	ITEM NO	DESCRIPTION	QTY	UOM	RATE	AMOUNT
615	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.11.15.1	Providing and fixing 2000mm high transformer gates consisting of 50mm x 50mm x 6mm M.S. angle frame braced with 50mm x 50mm x 6mm thick M.S. Tee stiffeners, 50mm x 50mm x 8mm gauge welded mesh fixed to the frame by 25mm x 3mm M.S. flat beading including fixing the gate to masonry/RCC by M.S. hinge arrangement (65mm x 65mmx 6mm M.S. angles, bolt, washers) and M.S. hold fast grouted with M-15 grade concrete, providing and fixing M.S. pivot arrangement, MS aldrop, M.S. tower bolts, double coat of approved shade and make sythetic enamel paint over a coat of approved quality red oxide zinc chromate primer, finishing etc. all complete as per EIL-STD No. 7-75-0051, 0052 ensuring smooth operation of the gate.	5	m²	7 097	35 485
616	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.11.22	1000 mm high satin finish stainless steel (SS 304 grade) tubular railing				
617	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.11.22.1	Supplying, assembling and installing 1000 mm high satin finish stainless steel (SS 304 grade) tubular railing of approved design in staircases, ramps, around floor cut outs etc. consisting of: 1. 50mm dia SS pipe top handrail 2. 32 mm dia SS pipe balusters (at every third step for staircase, @ maximum 1200mm c/c for ramp, floor cutouts) 3. 3 nos minimum 18mm dia SS pipe intermediate handrails. Including: 1. Fixing balusters to floor with 4 nos bolts änd 8mm thick, 100mm dia SS base plate & SS cap/collar. 2. Fixing top handrail to the balusters with 12mm dia SS bar connector & 6mm thick SS saddle plate. 3. Fixing intermediate handrails to the balusters with 12mm dia SS bar connector. 4. All end caps, decorative caps over balustrades,necessary bending, welding, polishing of all welded joints (Length of top handrail shall be measured for payment).	10	RM	4 944	49 440

Sl. No.	PART NO	SOR NO	ITEM NO	DESCRIPTION	QTY	UOM	RATE	AMOUNT
618	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.11.25	Providing and fixing Toilet cubicle system of overall height of 2000mm made out of 18 and 12 mm thick compact laminated board , in select colours as per manufacturer shade card, with 18mm thick front panels and doors with SS U-section top rail on top side for better rigidity to be supported by adjustable SS leg 100 to 150 mm height, 12mm thick continuous divider/ intermediate panels of maximum depth 1500 mm without any joints fixed to wall and front by using U profile, door size 600 x 1800 (for handicap toilet 900 x 1800) with front panel cut and fixed as per the requirement, maximum width of the front panel including door to be 1100 mm (for handicap toilet 1600mm provided with a 10 x 10mm rebate on both the sides of door and front panel with 2mm thick silicon rubber lining pasted in the rebate for noise reduction of the door. Each cubicle shall be equipped with the following necessary hardware: SS316 - primary thumb turn/ indicator lock - 1no. SS316 - Door know. Handle set - 1 no. SS316 - Coat hoos - 1 no. SS316 - Auto reverse hinge with cap - 3 nos. SS316 - 150 mm height adjustable leg - 2 nos. SS316 - l-bracket, corner fixing wherever required. The square meter area of from panels and doorMode of measurement - Square meter basis , front panel and door measurement will be taken from wall to wall and floor to top rail, divider measurement to be taken from wall to front and the total height of the divider.				
619	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.11.25.1	Area of front panels and door measured from floor to top rail	4	m²	13 277	53 108
620	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.11.25.2	Area of divider/ intermediate panel measured as/actual	2	m²	4 759	9 518
621	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.11.26	Steel Entrance Gates				

Sl. No.	PART NO	SOR NO	ITEM NO	DESCRIPTION	QTY	UOM	RATE	AMOUNT
622	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.11.26.1	Providing and fixing in position Steel Entrance Gates consisting of 40mm x 80mm x 3.2mm M.S. tubular frame, 80mm x 40mm x 3.2mm rectangular M.S. hollow sections & 32x32x2.6 mm MS rectangular hollow sections, both horizontal & vertical members welded to the framework and intermediate curved rectangular hollow section as per standard design, locking arrangement, 25mm thick, 75mm dia M.S. wheel with ball bearing including fixing the gate to RCC/ masonry by M.S. hinge arrangement (fabricated/ machined as per detail) and M.S. hold fast (25 x 6 x 200mm long) grouted with M-20 grade concrete, providing and fixing M.S. pivot, 50mm x 50mm x 6mm M.S. Tee bent to shape and embedded in road surface for gate opening track, gate stopper, painting the gate with approved shade and quality synthetic enamel paint (two coats) and a coat of approved quality primer, ensuring smooth operation of the gate etc. all complete as per EIL- STD-No. 7-75-0054.	2	m²	7 921	15 842
623	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.12	LANDSCAPE CIVIL WORKS				
624	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.12.4	FINISHES FOR ROAD & PARKING AREA				
625	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.12.4.3	Providing and laying of approved INTERLOCK PAVERS (rough finish with solar reflectance index value higher than 0.5, size 100x200x80mm or as/ design) in road and parking area bands, laid over 100mm thick sand base over well compacted subbase/ WBM and mortar with joints filled in fine sand as per manufactured requirements etc. all complete.	20	m²	763	15 260
626	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.14	CLADDING,FACADES ETC.				

Sl. No.	PART NO	SOR NO	ITEM NO	DESCRIPTION	QTY	UOM	RATE	AMOUNT
627	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.14.6	Providing and erecting/ fixing/ installing in position aluminium composite panels system (for external application) of 'Alucobond'/ 'Eurobond'/ 'Reynobond' or approved equivalent comprising of aluminium framework consisting of 40mm x 40mm x 4mm thick x 100mm long aluminium angle cleats (bracket) suitably spaced and placed to comply to design/ elevation/ colour pattern etc. and fixed to masonry/ RCC column/ beam of the building by means of M8 x 65mm long G.I Anchor bolts, aluminium continuous vertical angle 40mm x 40mm x 4mm fixed/ bolted to angle cleats by means of M8 x 25mm long nut and bolt arrangement, suitable horizontal aluminium angle horizontal members as required; cladding panels 4mm thick (overall thickness) made of high quality extrusion grade LDPE/ LLDPE core material (3mm thick) sandwiched between 0.5mm thick aluminium foil (on either side) made of aluminium alloy 1100-H18 or approved equivalent and finished with minimum 35 micron (5 micron primer and 25 micron top coat) thermoplastic PVDF layer 'Kynar 500' (minimum 70%) and polyester coating in approved shade; all complete including providing approved silicon sealant at all joints, necessary accessories like backing rods, aluminium pop rivets, bolts, screws, corner pieces etc. as required for the completion of the work as per the approved manufacturer's specifications and recommendations, cleaning, finishing etc., all complete.	4	m²	4 357	17 428
628	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.16	Fire rated Doors/ Windows and Partitions				
629	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.16.3	P/F Fire rated Single glazed door with panic bar Providing and fixing 2 hours fire rated, fully glazed, single shutter doors consisting of steel door frame, shutter including stiles, rails, insulation, transparent glass, sealant and hardware such as hinges, panic bar, locks/ trims for panic bar, door closer, door stopper, concealed flush bolt including fixing with masonry, partition etc. all complete as per Specification and approved Manufacturer's details.	1	m²	51 676	51 676

Sl. No.	PART NO	SOR NO	ITEM NO	DESCRIPTION	QTY	UOM	RATE	AMOUNT
630	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.16.4	P/F Fire rated Double glazed door with panic bar Providing and fixing 2 hours fire rated, fully glazed, double shutter doors consisting of steel door frame, shutter including stiles, rails, insulation, transparent glass, sealant and hardware such as hinges, panic bar, locks/ trims for panic bar, door closer, door stopper, concealed flush bolt including fixing with masonry, partition etc. all complete as per Specification and approved Manufacturer's details.	3	m²	54 910	1 64 730
631	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.16.7	Fire rated Single Steel door with panic bar Providing and fixing 2 hours fire rated, single shutter steel doors consisting of steel door frame, shutter, vision panel, insulation and hardware such as hinges, panic bar, locks/ trims for panic bar, door closer, door stopper, concealed flush bolt etc. including fixing with masonry, partition etc. all complete as per specification and approved Manufacturer's details.	12	m²	14 946	1 79 352
632	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.16.8	Fire rated Double Steel door with panic bar Providing and fixing 2 hours fire rated, double shutter steel doors consisting of steel door frame, shutter, vision panel, insulation and hardware such as hinges, panic bar, locks/ trims for panic bar, door closer, door stopper, concealed flush bolt including fixing with masonry, partition etc. all complete as per specification and approved Manufacturer's details.	4	m²	18 170	72 680
633	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.16.9	Fire rated glazed partition Providing and fixing 2 hours fire rated, glazed partition of desired design consisting of steel frame, insulation and transparent glass and glazing beading, matrix mineral boards, intumescent putty, fire resistant acrylic sealant etc. all complete including preparing fabrication/ installation drawings including fixing with masonry, partition etc. all complete as per specification and approved Manufacturer's details.	4	m²	43 230	1 72 920
634	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.MC02	MISCELLANEOUS				

Sl. No.	PART NO	SOR NO	ITEM NO	DESCRIPTION	QTY	UOM	RATE	AMOUNT
635	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.MC02.1	Providing and laying waterproofing cum insulation system over roof consisting of: a) one coat of polyurethane primer @6-8 sq m area/ Litre over prepared roof surface, b) minimum 1.5mm DFT polyurethane water proofing coating applied by spray or brush (in minimum two layers, with scrim cloth reinforcement in between the layers) c) 40 mm thick polyurethane foam insulation applied in layers with spraying machine over the primer coat, d) minimum .8 mm DFT polyurethane water proofing coating applied by spray or brush (in minimum two layers, with scrim cloth reinforcement in between the layers) e) 150 GSM Geo textile membrane overcured Polyurethane water proofing coating f) finishing protective layer of minimum 50 mm thick PCC (1:2:4, inpanels of maximum size 2500mm x 2500mm, chequered finish, reinforced with 24 G wire netting, laid in slope), (PCC thickness more than 50 mm shall be paid extra) all including cleaning and surface preparation of the roof surface, providing 75mm radius fillets with P.C.C. (1:2:4) at junctions of horizontal and vertical surfaces finished smooth; 450mmx 450mm khuras (rain water collecting pits) at all outlets, testing for water leakage, scrim cloth reinforcements at junction of horizontal and vertical surfaces and also near openings for rainwater pipes/ outlets,continuing the waterproofing up the parapets/ walls for a minimum of 150mm over the finished roof surface, continuing into rainwater pipes by at least 100 mm etc, supply of all materials, finishing, curing etc. all complete as per job specification, drawings and directions of Engineer-In-Charge.	85	sqm	4 512	3 83 520
636	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.MC02.2	Grab Bar for specially abled toilet - Providing and Fixing CP Grab bar 600 mm long of approved make with SS Screws over Rawl plugs complete for Handicapped Toilet as directed by Engineer-incharge Make: (Kohler Cat No: 10701D-CP), (EURONICS EGR 01), (Jaquar AHS-CHR-1507)	1	nos	1 535	1 535
637	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.MC02.3	Providing and Fixing CP Hinged Arms (Sliding rail) of approved make for Handicapped Toilet with SS Screws over Rawl Plugs complete as per instructions ofthe engineer-incharge. Make: (Jaquar SHA-1187N)	1	nos	1 473	1 473

Sl. No.	PART NO	SOR NO	ITEM NO	DESCRIPTION	QTY	UOM	RATE	AMOUNT
638	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.MC02.4	Providing and laying tactile tile (for vision impaired persons as per standards) of size 300x300x9.8mm having with water absorption less than 0.5% and conforming to IS: 15622 of approved make in all colours and shades in for outdoor floors such as footpath, court yard, multi modals location etc., laidon 20mm thick base of cement mortar 1:4 (1cement : 4 coarse sand) in all shapes & patterns including grouting the joints with white cement mixed with matching pigments etc. complete as per direction of Engineer-in-Charge.	1	sqm	1 927	1 927
639	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.MC02.5	Aluminium louvered window/ventilator of minimum 2mm thick, overall 75mm wide approved shade electrostatically powder coated Aluminium sheet louvers fixed @ 50mm, bend to shape including providing minimum 3mm Aluminium sheet side members for framing the louvers including fixing the louver-frame to window/ ventilator frame, providing all accessories etc. all complete, all members (louvers, louver frame, window/ventilator frame etc.) being of Aluminium and of similar electrostatically powder coating finish.	50	Kg	721	36 050
640	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.MC02.6	Wooden fire rated door with panic bar Providing and fixing 2 hour wooden fire rated door consisting of door frame, shutter, vision panel, insulation and hardware such as hinges, panic bar, locks/ trims for panic bar, door closer, door stopper, concealed flush bolt including fixing with masonry, partition etc. all complete as per specification and approved Manufacturer's details. The door core is a high-performance solid particle core with a density in the range of 600 – 850 kg/m3 while the frame density is more than 640 kg/m3. The door frame is made using high-density hardwood Intumescent strips are attached to all sides of the frame to seal the gap between the door and frame to prevent the spread of fire and smoke. To ensure complete fire protection, fire-resistant doors and accessories are also fully certified and fire safe.	4	sqm	30 396	1 21 584
641	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.MC02.7	Providing and Fixing Bib Cock 2 in 1 for health faucet including all tools, tackles etc., all complete as per the instructions of Engineer-in-charge. Make: (Hindware: Cat. No.: F400003), (Jaquar: KUP- 35041PM), (Cera: F1003211), (Parryware: G3134A1)	1	sqm	2 380	2 380

Sl. No.	PART NO	SOR NO	ITEM NO	DESCRIPTION	QTY	UOM	RATE	AMOUNT
642	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.MC02.8	Providing and applying 02 coat of RFU ammn paint or approved magazine paint confirming to IND/ME/446(A) or relevant applicable IND/ME specification on interior surfaces of new /existing building walls, RCC coloums, beams ceilings , door, window , fittings by spraying/brushing applied in Gloss finish for process buildings or danger buildings where CE or nitro-phenolic bodies are handled /stored including applicable primer coat , surface preparation & treatment , filling of sealants in cracks if required etc. all complete as per satisfaction of engineer in charge. Paint used shall be lead free or lead restricted type confirming to IMD/ME specification.	250	sqm	1 834	4 58 500
643	0	B889-000-81-46-CF-SOR-8202-0-0M	01AR.MC02.9	Refer item no 01 AR.MD01.14 Extra for providing and applying additional 01 coat of RFU	20	sqm	1 706	34 120
644	0	B889-000-81-46-CF-SOR-8202-0-0M	11CS	CIVIL, STRUCTURE AND ARCHITECTURE				
645	0	B889-000-81-46-CF-SOR-8202-0-0M	11CS.11	FLOORING				
646	0	B889-000-81-46-CF-SOR-8202-0-0M	11CS.11.47	Providing and laying Vitrified tiles in different sizes (thickness to be specified by the manufacturer), with water absorption less than 0.08% and conforming to IS: 15622, of approved brand & manufacturer, in all colours and shade, in skirting, riser of steps, laid with cement based high				
647	0	B889-000-81-46-CF-SOR-8202-0-0M	11CS.11.47.2	Size of Tile 600x600 mm	3	sqm	1 927	5 781
648	0	B889-000-81-46-CF-SOR-8202-0-0M	11CS.11.47.4	Size of Tile 1000x1000 mm	4	sqm	2 380	9 520
649	0	B889-000-81-46-CF-SOR-8202-0-0M	11CS.11.48	Grouting the joints of flooring tiles having joints of 3 mm				
650	0	B889-000-81-46-CF-SOR-8202-0-0M	11CS.11.48.2	Size of Tile 600x600 mm	5	sqm	330	1 650
651	0	B889-000-81-46-CF-SOR-8202-0-0M	11CS.11.48.4	Size of Tile 1000x1000 mm	25	sqm	186	4 650
652	0	B889-000-81-46-CF-SOR-8202-0-0M	11CS.11.49	Providing and laying Vitrified tiles in floor with different sizes (thickness to be specified by the manufacturer), with water				
653	0	B889-000-81-46-CF-SOR-8202-0-0M	11CS.11.49.2	Size of Tile 600x600 mm	5	sqm	1 721	8 605
654	0	B889-000-81-46-CF-SOR-8202-0-0M	11CS.11.49.4	Size of Tile 1000x1000 mm	25	sqm	2 174	54 350
655	0	B889-000-81-46-CF-SOR-8202-0-0M	11CS.13	FINISHING				
656	0	B889-000-81-46-CF-SOR-8202-0-0M	11CS.13.41	Distempering with 1st quality acrylic distemper (ready mixed) having VOC content less than 50 gram/litre, of approved manufacturer and of required shade and colour				
657	0	B889-000-81-46-CF-SOR-8202-0-0M	11CS.13.41.1	New work (two or more coats) over and including water thinnable priming coat with cement primer having VOC	760	sqm	255	1 93 800
658	0	B889-000-81-46-CF-SOR-8202-0-0M	11CS.13.46	Finishing walls with Acrylic Smooth exterior paint of required shade :				
659	0	B889-000-81-46-CF-SOR-8202-0-0M	11CS.13.46.1	New work (Two or more coat applied @ 1.67 ltr/10 sqm	35	sqm	176	6 160
660	0	B889-000-81-46-CF-SOR-8202-0-0M	11CS.13.48A	Finishing walls with ready mixed Premium acrylic emulsion				

Sl. No.	PART NO	SOR NO	ITEM NO	DESCRIPTION	QTY	UOM	RATE	AMOUNT
661	0	B889-000-81-46-CF-SOR-8202-0-0M	11CS.13.48A.1	New work (Two or more coats applied @ 1.43 litre/ 10 sqm. Over and including priming coat of exterior primer applied @ 0.90 litre/10 sqm.	800	sqm	196	1 56 800
662	0	B889-000-81-46-CF-SOR-8202-0-0M	11CS.13.83	Wall painting with premium acrylic emulsion paint of interior grade, having VOC (Volatile Organic Compound) content less than 50 grams/ litre of approved brand and manufacture, including applying additional coats wherever required to achieve even shade and colour.				
663	0	B889-000-81-46-CF-SOR-8202-0-0M	11CS.13.83.1	One coat	17	sqm	114	1 938
664	0	B889-000-81-46-CF-SOR-8202-0-0M	11CS.13.83.2	Two coats	225	sqm	165	37 125
		SUB TOTAL						**8 64 67 266**
		TOTAL						**8 64 67 266**
		OVERALL REBATE %						
		FINAL AMOUNT						

FORM-SP02

STATEMENT FOR DETAILS OF GOODS AND SERVICES TAX

NAME OF WORK: **MISCELLANEOUS CIVIL AND STRUCTURAL WORKS FOR TRINITROTOLUENE (TNT) PLANT AT HIGH EXPLOSIVES FACTORY (HEF) OF MUNITIONS INDIA LIMITED (MIL) AT KHADKI, PUNE, MAHARASHTRA**

BIDDING DOCUMENT NO : **B889-000-81-46-CF-T-8202-0**

NAME OF BIDDER:_____

Sl. No.	SOR item code and Short description	Details of Taxes	HSN / SAC Code	Rate of GST (%)
1		**GST**		
2				
3				

Notes :

1 In case of more than one rate of GST, bidder to suitable added rows in the above format

2 The bidder shall quote percentage in **FORM SP-00 exclusive of GST** and the respective applicable GST percentages are to be filled in **FORM SP-02**

ENGINEERS INDIA LIMITED

(BIDDING DOCUMENT NO. B889-000-81-46-CF-T-8202-0)

BIDDING DOCUMENT

FOR

MISCELLANEOUS CIVIL AND STRUCTURAL WORKS FOR

TRINITROTOLUENE (TNT) PLANT AT HIGH EXPLOSIVES FACTORY (HEF) KHADKI OF MUNITIONS INDIA LIMITED (MIL), PUNE, MAHARASHTRA

PART III of III - TECHNICAL

PREPARED & ISSUED BY:

इंजीनियर्स इंडिया लिमिटेड
(भारत सरकार का उपक्रम)

ENGINEERS INDIA LIMITED
(A Govt. of India Undertaking)

HAR KAAM DESH KE NAAM

HAR KAAM DESH KE NAAM

MISCELLANEOUS CIVIL & STRUCTURAL WORKS

(Document No : B889-000-81-46-CF-T-8202-0)

इंजीनियर्स इंडिया लिमिटेड
(भारत सरकार का उपक्रम)
ENGINEERS INDIA LIMITED
(A Govt. of India Undertaking)

हर एक काम देश के नाम

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SCOPE OF WORK & SUPPLY

MISCELLANEOUS CIVIL & STRUCTURAL WORKS

TENDER NO.: B889-000-81-46-CF-T-8202-0

PROJECT : EXECUTION OF TRI-NITRO TOLUENE (TNT) PLANT ON OBE BASIS

OWNER : HIGH EXPLOSIVE FACTORY, KHADKI, PUNE

JOB NO : B889

Rev. No	Date	Purpose	Prepared by	Reviewed by	Approved by
A	01.04.2026	Issued for tender	SR	KP	ND

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1.0 SCOPE OF WORK

1.1 Broad scope of work

The broad scope of work of the Contractor shall be execution of Architectural works for Buildings or Sheds or Structures in accordance with detail scope of work, construction drawings, standards, specifications, schedule of quantities/ rates, contract provisions and as directed by Engineer-In- Charge including:

- Supply and provision of materials, labour, tools, tackles etc.
- Preparation and submission of fabrication or installation or execution drawings.
- Assistance for obtaining approvals from statutory or other Authorities.
- Co-ordination with other Contractors and agencies, Owner, Project Management Consultant (PMC) etc.
- Preparation and submission of “As-built” drawings.
- Any other incidental works not specifically mentioned but required for completion of the work.

1.2 Detail scope of work

~~1.2.1 Buildings or Sheds~~

~~Scope of work of the Contractor shall include (but not limited to) the MISCELLANEOUS/or Sheds as listed below as per Schedule of Rates (S.O.R), Standard Specifications and Engineering Standards included in the Tender~~

~~S.No.~~	~~Building Name~~
~~1~~	~~Control room (423)~~
~~2~~	~~Substation building (472)~~
~~3~~	~~Nitration Washing, Drying & Flaking (424)~~
~~4~~	~~Sulphite Storage and making House (426)~~
~~5~~	~~Fire water pump house (430)~~
~~6~~	~~Waste Acid tank (428)~~
~~7~~	~~Chiller Water Compressor house (470)~~
	~~Note: Any other Miscellaneous shed/ building not listed above, however required for the project completion.~~

1.2.2 Architectural works

Architectural works in the scope of work of Contractor shall include Architectural elements and finishes such as (but not limited to) Floor finishing, Wood work, Doors & Windows, Plastering, Pointing, Painting, Polishing, Paneling, partitioning, Roofing (roof sheeting, flashings, rain water drainage etc.), Waterproofing, Sanitary fittings & fixtures, Insulation, Partition, False ceiling, False flooring, External façade system, External & internal claddings etc. as applicable.

1.2.3 Supply and provision of materials, labour, tools, tackles etc.

Unless otherwise specifically mentioned, supply and provision (including procurement, transportation, storage, fabrication, installation and execution etc.) of all materials (consumables and non-consumables), products and all steel structures and its related accessories labor, tools, tackles, equipment, plant

machinery, staging, scaffolding, HSE (Health, safety, environment) gear etc as required for completion of work is included in the scope of work of the Contractor.

1.2.4 Preparation and submission of fabrication or installation or execution drawings

Preparation and submission of fabrication or installation or execution drawings of super-structure details, Façade system, Cladding system, Doors and Windows, False flooring, False Ceiling, Partitions etc. as applicable is included in the scope of work of the Contractor. Installation or execution of the works shall be in accordance with approved drawings.

1.2.5 Assistance for obtaining approvals from statutory or other Authorities

Contractor shall assist the Owner or PMC or Engineer-In-Charge and do necessary liaison activities as required for obtaining approvals from statutory or other Authorities.

1.2.6 Co-ordination

Contractor shall do all required co-ordination activities with other Contractors and agencies, Owner, Project Management Consultant (PMC) etc for smooth, sequential and complete execution works.

1.2.7 Preparation and submission of “As-built” drawings

Contractor shall prepare “As-built” mark-up prints on construction drawings and subsequently update the same in soft copy (Auto CAD) of the drawings. Contractor shall submit hard copy and soft copy to Engineer-in-charge as specified elsewhere in the Tender document.

1.2.8 Incidental works

Any other incidental works such as cleaning, cutting chases or holes, making good of the damaged works, protection of works, handing over the works in acceptable condition, which are not specifically mentioned but required for completion of work are also included in the scope of work of Contractor.

All items in the S.O.R. shall be inclusive of all material, labour, constructional infrastructures like scaffolding/ staging, finishing, cleaning, cutting chases/ holes etc. in brick work/ RCC work/ super structural steel works and making good the same and rectification of any damaged work shall be applicable for all heights and locations.

The Contractor shall obtain all necessary approvals from statutory authorities such as Factory Inspector, Local Municipal or Development Authorities for the design and construction.

2.0 SCOPE OF SUPPLY

2.1 Owner’s Scope of Supply

Nil

2.2 Contractor’s Scope of Supply

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All materials (consumables & non-consumables), tools tackles etc. as required for satisfactory completion of the job shall be supplied by the contractor.

All material shall be of approved brand/ make as per the list of approved brand/ vendors for architectural items attached elsewhere in the contract. However, in case of any deviation from the list of approved brand/ vendors, prior approval from Owner/ Engineer In-charge shall be obtained prior to use of the material at site.

3.0 LIST OF ATTACHMENTS

3.1 DRAWINGS

S. No	Drawing No.	Title
1	B889-000-81-46-12101	Ground Floor Plan & Section
2	B889-000-81-46-12102	Terrace Plan & Elevation
3	B889-000-81-46-12103	Elevation & Section
4	B889-000-81-46-12401	Ground Floor Plan & Section
5	B889-000-81-46-12402	First Floor Plan & Section
6	B889-000-81-46-12403	Terrace Plan & Elevation
7	B889-000-81-46-12404	Elevations
8	B889-000-81-46-13721	Ground Floor Plan
9	B889-000-81-46-13722	First Floor Plan
10	B889-000-81-46-13723	Terrace Plan
11	B889-000-81-46-13724	Section
12	B889-000-81-46-13701	Ground Floor Plan & Section
13	B889-000-81-46-12861	Ground Floor Plan & Section
14	B889-000-81-46-12871	Ground Floor Plan & Section
15	B889-000-81-46-12951	Ground Floor Plan & Section

3.2 STANDARD SPECIFICATIONS

S. No.	Specification No.	Rev. No.	Title
1	6-75-0001	7	Specification for Architectural Works - General.
2	6-75-0002	7	Specification for floor finishing
3	6-75-0003	7	Standard specification for woodwork (doors and windows)
4	6-75-0004	8	Specification for Steel/ Aluminum doors, windows & ventilators

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5	6-75-0005	7	Specification for plastering & pointing.
6	6-75-0006	7	Specification for roof treatment.
7	6-75-0007	7	Specification for whitewashing, Color washing, distempering, Painting & polishing.
8	6-75-0008	7	Specification for roofing.
9	6-75-0009	7	Specification for sanitary fittings and fixtures.
10	6-75-0010	7	Specification for False Ceiling, False Flooring Under deck Insulation & Partitioning
11	6-75-0011	2	Specification for fire check / fire resistant doors, windows & partitions
12	6-75-0016	0	Standard specification for aluminium composite panel (ACP) cladding system

3.3 SCHEDULE OF RATES

B889-000-81-41-CF-SOR-8202-0-0M

3.4 VENDOR LIST

S. No.	Document No.	Rev. No.	Title
1.	B889-000-81-46-LL-8202	0	List of Approved Manufactures of Architectural Products.

3.5 JOB SPECIFICATION

S. No.	Document No.	Rev. No.	Title
1.	B889-000-81-46-SP-8202	0	Job specification for roof treatment

3.6 STANDARDS

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S. No.	Standard No.	Rev. No.	Title
1.	7-75-0002	6	Skirting detail (with brick wall).
2.	7-75-0003	6	Skirting detail (with R.C.C. column).
3.	7-75-0004	6	Dado detail (with brick wall & RCC col.)
4.	7-75-0011	6	Wooden flush door (with pressed steel frame)
5.	7-75-0012	6	Wooden flush door (with wooden frame)
6.	7-75-0013	6	Wooden glazed door double shutter
7.	7-75-0014	6	Glazed Aluminium Door
8.	7-75-0015	6	Glazed Aluminium Window
9.	7-75-0020	5	Wooden wire-mesh door (Single shutter)
10.	7-75-0021	5	Wooden wire-mesh door (Double shutter)
11.	7-75-0036	7	Pipe handrail with square up right type
12.	7-75-0041	6	False ceiling details with aluminium grid.
13.	7-75-0042	6	Aluminium panel false ceiling (84C system).
14.	7-75-0043	6	Aluminium panel false ceiling (tray type).
15.	7-75-0049	3	False flooring
16.	7-75-0051	6	Transformer gate details (upto 6000mm. width).
17.	7-75-0052	5	Transformer gate details (beyond 6000mm. width).
18.	7-75-0054	6	Steel gate (for entrances upto 6.0m width)
19.	7-75-0060	6	Orissa pan W.C. (fixing detail).
20.	7-75-0062	6	European type WC (fixing detail).
21.	7-75-0063	6	Urinal fixing detail.
22.	7-75-0064	6	Wash basin fixing detail.
23.	7-75-0065	6	Plinth protection (with building drain)
24.	7-75-0066	6	Wooden panel door (toilet door)
25.	7-75-0068	6	Roof drainage and waterproofing
26.	7-75-0070	6	Steel Door (Pressed Steel) Single Shutter
27.	7-75-0071	6	Steel Door (Pressed Steel) Double Shutter
28.	7-75-0091	2	Metal sheet (flashing detail)
29.	7-75-0093	2	Stainless steel tubular handrail
30.	7-75-0094	1	Staircase railing (with SS member and glass panel)

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31.	7-75-0095	1	Toilet cubicles details
32.	7-75-0096	1	Toilet for differently abled persons (unisex accessible toilet)
33.	7-75-0097	1	Ramp detail (for wheel chair users)

4.0 PREAMBLE TO SCHEDULE OF QUANTITIES

4.1 Rate quoted by the Contractor for the items shall be inclusive of all materials, labour, tools, tackles etc. and other scope or works elaborated in this document, and tender/ contract document and shall be applicable for all heights and locations.

4.2 Works shall be executed in accordance with Item description, corresponding specification, standards, drawings and as directed by Engineer-In-Charge. Specification No. 6-75-0001 shall be applicable to all the items with reference to aspects like contradictions amongst items/specifications/ drawings, quality of material, mode of measurement, necessary testing etc.

4.3 Items/sub-items against which no quantity is given shall not be quoted by the Contractor and shall not be executed. Such items if any are for reference purpose only.

4.4 Quantities of the items are not final and may vary, actual executed quantities shall be paid.

4.5 All the items included in the schedule of quantities may not be executed.

4.6 Materials shall conform to items, specifications, standards and shall be as approved by Owner or PMC or Engineer-In-Charge. Materials shall be procured from approved Manufacturer or vendor, list of which is included in the Tender or contract document.

4.6.1 Only ‘first’ quality materials shall be used.

4.6.2 Owner/ PMC reserves the right to choose any of the approved make/ vendors as per the vendor or Manufacturer’s list.

4.6.3 In case of products not indicated in the vendor list, BIS marked products shall be used.

4.6.4 Specification of manufacturer’s item shall be checked against tender items and specifications before selecting any product or brand name. In case of any discrepancy, tender item/ specifications shall prevail, and any such brand of item shall not be used which is not conforming to tender specifications even if it is listed in this vendor list.

4.6.5 In case of non-availability of any material among approved vendors/ makes in a particular site, alternate vendor/ make conforming to national or international codes shall be used subject to approval by Owner/ PMC.

4.6.6 In case of non-availability of any vendor among approved vendors in a particular site/ region, alternate vendor’s name shall be proposed along with required credentials for Owner/ PMC approval.

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4.6.7 In case of any product neither covered in the vendor list nor having specifications, the contractor shall submit the proposed product along with technical literature/ specifications (as/ bid), test certificates etc. and other credentials of the manufacturer for Owner/ PMC approval.

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SCOPE OF WORK & SUPPLY

MISCELLANEOUS CIVIL & STRUCTURAL WORKS

TENDER NO.: B889-000-81-46-CF-T-8202-0

PROJECT : EXECUTION OF TRI-NITRO TOLUENE (TNT) PLANT ON OBE BASIS

OWNER : HIGH EXPLOSIVE FACTORY, KHADKI, PUNE

JOB NO : B889

Rev. No	Date	Purpose	Prepared by	Reviewed by	Approved by
B	01.04.2026	Issued for Bids	SR	KP	ND
A	01.04.2026	Issued for Comments	Preeti	ADP	RKS

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1.0 SCOPE OF WORK

The scope of work envisaged in this tender covers approach roads, RCC pavement, storm water drains, acid resistant brick lining, underground piping system for drinking, sanitary waste sewer, oily water waste, acid waste, storm sewer and fire water piping, plumbing and building drainage, valve pits, manholes, cleanouts, neutralization pit, Labyrinths, RCC sleepers etc., for **TNT Plant** of HEF Khadki as per specifications, drawings, codes, standards, SOR, good engineering practices and directions of Engineer- in- Charge etc. all complete.

During the tendering/ bidding stage, the CONTRACTOR shall review and verify the contents of Tender document and shall ensure his clear understanding of requirements, provisions and criteria of the same. For this purpose, the CONTRACTOR shall point out any errors, omissions, contradictions, or discrepancies etc. with suggestive rectification for review & necessary action/ decision before award of the job.

Contractor shall visit the sites to ascertain actual site conditions to quantify/ assess the job himself before quoting rates. No extra claim at a later date shall be entertained due to non-familiarization of site.

In general, scope of work covers the following but not limited to:

2.0 BROAD SCOPE OF WORK

Broad scope of work for TNT Plant covers the following but not limited to:

1. Earthwork in excavation, backfilling and disposal
2. Construction of RCC pavement.
3. Construction of RCC storm water drains with or without gratings and pipe culverts.
4. Providing approach roads, footpaths to buildings/ sheds, storages and facilities.
5. Random rubble pitching for earth slope protection.
6. Construction of RCC Labyrinths and Neutralization pits.
7. Transportation, fabrication, corrosion protection coating and laying / erection of fire water piping systems, Oily Water Sewer (OWS), Storm Sewer (SS), etc.
8. Transportation and installation of valves.
9. NDT testing and radiography of welding joints of pipes.
10. Painting of pipes and valves.
11. Supply and installation of sanitary sewer, drinking water piping, etc.
12. Construction of valve pits, clean outs, inspection chamber, gully traps etc. including covers and rungs, as applicable.
13. Construction of cast-in-situ manholes for sanitary sewer, OWS, SS etc. including supply & fixing of rungs and cover.
14. Supply, fabrication and erection of funnels, cleanouts, plugs, flame arrestors, bird mesh in vent pipes etc.
15. Providing cement mortar grouting on brick masonry/ RCC wall.

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16. Providing cement mortar levelling course, plaster with cement punning.
17. Plumbing and building drainage for the buildings.
18. Providing PUF insulated HDPE tanks for the toilet blocks of the buildings.
19. Providing paver blocks on road shoulders (new & existing) and footpaths.
20. Providing Acid resistant tile / brick lining on the storm water drains, pavement, tank farm, pump station, yellow water handling area etc.
21. Construction of piping sleepers.
22. Providing and laying brick masonry and plastering.
23. Supply and laying of gravel / crushed stone.
24. Dismantling of existing roads and drains.
25. Construction of Rainwater Recharging Wells.

3.0 DETAILED SCOPE OF WORK

Detail scope of work is as enumerated below:

1. Earthwork in excavation for roads, pavements, storm water drains, sanitary sewer system, underground piping system, culverts, sleepers, manholes, valve pits, inspection chamber, gully traps, cleanouts, neutralization pits, labyrinths etc.
2. Earthwork in filling/ backfilling for roads, pavements, storm water drains, sanitary sewer system, underground piping system, culverts, sleepers, manholes, valve pits, inspection chamber, gully traps, cleanouts, neutralization pits, labyrinths etc., transportation of soil, watering, rolling, compacting, dressing with selected soil and disposal of surplus earth/ material etc. complete.
3. Earthwork in filling with borrow earth for roads, embankments, shoulders etc. including transportation, spreading in layers, watering, rolling, compacting etc. complete.
4. Construction of RCC pavement including expansion joint, construction joint, sealing joints around pedestals/ columns/ foundations, providing DLC, HDPE film etc. complete.
5. Construction of RCC storm water drains with/without gratings, RCC pipe culverts for storm water drainage system etc.
6. Construction of bituminous approach roads comprising of earthwork for road, embankment and shoulders including subgrade, granular sub base course, base course, wearing course etc. complete.
7. Supply and laying of random rubble pitching including pointing on inclined and horizontal surface for soil protection.
8. Supplying, laying, jointing, testing and commissioning of neutralization pit, labyrinths, including supplying & installation of pipes, drains, etc. complete.

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9. Supplying, laying, jointing, testing and commissioning of sanitary sewer system including supplying & installation of RCC pipes, CI pipes, gully traps, inspection chamber, cast-in-situ manholes etc. complete.
10. Supply and installation of piping, valves, fittings and fixtures for plumbing and building drainage works including supplying and installation of PUF insulated overhead HDPE tanks, testing and commissioning including preparation of internal building plumbing and sanitary piping layouts for buildings as per National Building Code/IS codes.
11. Transportation, fabrication, wrapping/coating, earthwork, laying/erection of fire water piping underground and/or on sleepers/structures, testing, commissioning etc. all complete.
12. Transportation, fabrication, wrapping/coating, earthwork, laying, testing, commissioning of Oily water sewer, storm sewer piping, vents etc. complete.
13. Construction of cast-in-situ manholes for OWS, SS etc. including supply & fixing of rungs, and cover.
14. Taking tie-in/ hook- up with existing underground piping or aboveground piping on sleepers, manholes, storm water drain etc.
15. Jointing the fire water pipes with existing underground fire water piping at road crossings.
16. Carrying out Nondestructive testing (NDT) viz, Dye penetration (DP) and Magnetic particle test (MPT) on welding joints of the pipes.
17. Carrying out radiographic inspection on welding joint of pipes, if required.
18. Supplying & laying 60mm thick interlocking Paver Blocks for footpath, road shoulders etc. including sand filling below paver blocks and providing precast kerb stone at edges.
19. Supply, fabrication & fixing of rungs in manholes, providing manhole covers, etc.
20. Providing concrete bedding and encasement for pipes, if required.
21. Dismantling/ modification of existing, roads, drains, pavement, masonry works, fencing works etc.
22. Transportation and Installation of valves in pits and above ground as per requirement.
23. Supply of paints and primers, preparation of surfaces and application of primer and finish paints on above ground section of fire water pipes and valves (at all levels).
24. Providing cement mortar levelling course on brick masonry/RCC surface including packing, consolidation, curing, finishing etc.
25. Providing plaster with cement punning on brick walls/stone masonry/pitching or on concrete surfaces including cleaning and preparation of surfaces etc.
26. Providing and laying brick masonry with locally available bricks of specified class for valve pits, wing walls etc.

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27. Supply and laying of acid-resistant brick/tile lining along with silicate mortar/resin mortar, bitumen primer, bitumen mastic, finishing, curing, testing etc.
28. Construction of Rain Water Recharge Well as per EIL Standard including construction of pit, providing filter media, installation of borewell, earthwork etc.
29. Clearing of debris including thick bushes, roots, excess construction waste, surplus earth and disposal of material etc. all complete.

It shall be clearly understood that all the works mentioned above together with all incidental works whether specifically mentioned or not shall be deemed to have been included in the scope of work.

4.0 SPECIFIC REQUIREMENT TO BE FULFILLED BY THE CONTRACTOR

Note: In case of any contradiction between these Specific Requirements and Requirements/ Specification specified elsewhere in the tender document, the Specific Requirements given below shall have precedence.

4.1 Mandatory use of mechanical excavators for excavation, however manual excavation close to existing foundations & around existing Underground facilities can be taken up after due approval of Engineer-in-Charge.

4.2 In case borrowed earth is required from outside plant, location for borrow area to be identified by the contractor. Contractor shall obtain relevant statutory approval from all statutory authorities (like municipal etc.) and including payment of charges/ royalty/ octroi for the same. Contractor shall keep client indemnified of any liability and/ or complaint from local authorities/ municipal bodies.

4.3 Where ever disposal areas are to be arranged by the contractor outside plant boundary for disposal of surplus earth, debris etc., Contractor shall obtain relevant statutory approval from all statutory authorities (like municipal etc.) and including payment of charges/ royalty/ octroi for the same. Contractor shall keep client indemnified of any liability and/ or complaint from local authorities/ municipal bodies.

4.4 Dewatering wherever required shall be carried out by the contractor at his cost to keep the Ground water table down below the founding level.

4.5 Contractor has to take of all safety measures as per Factory/plant fire and safety standard.

4.6 Whenever new Construction or demolishing/dismantling is considered close to the existing structure, manual excavation shall be carried out as per direction of Engineer- in-Charge. Trial pit, if required, shall be carried out before excavation to check the existence of underground facilities.

4.7 The contractor shall ensure proper co-ordination / co-operation with other agencies, while working in the Construction area, without affecting others work front areas.

4.8 During execution of work, all existing facilities (Temporary /Permanent) shall be protected from any damage. In case of any damage / dismantling (if required) is required to be carried out for carrying out contractor's work, the same shall be restored to original condition to the satisfaction of Owner/ Engineer In-charge without additional time and cost implication.

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4.9 All works shall be done to the entire satisfaction of the Engineer-in-Charge. Any work not carried out in accordance with the instructions shall be dismantled and made good without any extra cost and time implication to the owner.

5.0 SCOPE OF SUPPLY OF MATERIALS:

5.1 Owner's Scope:

- Piping materials including fittings and valves for Fire water, OWS and SS.

5.2 Contractor's Scope:

All consumables and non-consumables including materials **(except materials specified in section 5.1)**, tools, tackles, plant machinery, labors, etc. required for completion of the works as per Scope of Work (SOW), Schedule of Rates (SOR), standards, specifications, drawings, P&IDs, data sheets, documents etc. shall be in contractor's scope of supply.

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SCOPE OF WORK & SUPPLY

FOR

MISCELLANEOUS CIVIL & STRUCTURAL WORKS

(TENDER NO.-B889-000-81-46-CF-T-8202-0)

PROJECT : EXECUTION OF TRI-NITRO TOLUENE (TNT) PLANT ON OBE BASIS

CLIENT : M/S MUNITION INDIA LIMITED (HEF), KHADKI, PUNE

JOB NO : B889

A	01.04.2026	ISSUED FOR TENDER	SR	KP	ND
Rev. No	**Date**	**Purpose**	**Prepared By**	**Checked By**	**Approved By**

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1.0 SECTION-I

SCOPE OF WORK

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1.0 SCOPE OF WORK

The scope of work in general shall include construction of Civil-Structural works for site enabling works of TNT Project as per the detailed scope of work, scope of Material Supply, Schedule of Rates, tender specifications, drawings, codes, standards, good engineering practice and directions of Engineer- in- Charge etc. complete.

The scope of works has been elaborated in detail under subsequent sections of this document as well as respective schedule of rates.

Contractor shall visit the sites to ascertain actual site conditions to quantify/ assess the job himself before quoting rates. No extra claim at a later date shall be entertained due to non-familiarization of site.

1.1 BROAD SCOPE OF WORK

1.1.1 Foundations for tanks, equipments, pumps, compressor, chillers, cooling tower etc.

1.1.2 Foundation and superstructure of RCC Traverse wall. Earth filling at all depths and above all heights between Traverse wall and Toe wall.

1.1.3 Foundation and superstructure of offsite pipe rack, pipe support, T-support, Electrical cable tray support, instrumentation duct/ tray support, sleepers etc.

1.2 DETAIL SCOPE OF WORK

Major Civil Structural activities shall include following but not limited to the following:

- Earthwork in excavation including dewatering for lowering of water table by deploying adequate capacity of pumps or dewatering techniques if required below ground level for all types of soils including soft & hard rock and providing shoring & strutting wherever required by open and or closed timbering method.

- Storing/stacking excavated earth at safe location near foundation or at designated place for reuse within the plant boundary as instructed by Owner/ Engineer-in-charge. Segregating unserviceable earth separately and disposing the same at designated place within or outside the plant boundary as instructed by Owner/ Engineer in charge.

- Backfilling at all depths with selected and approved earth available and transportation & disposal of surplus earth, debris and rocks to the areas designated by Engineer-in-charge.

- Backfilling at all depth using earth from borrow areas. In case borrowed earth or disposal is required from outside plant boundary, location for borrow area/ disposal of surplus earth, debris to be identified by the contractor. Contractor shall obtain relevant statutory approval from all statutory authorities (like municipal etc.) and include payment of charges/ royalty/ octroi for the same. Contractor shall keep client indemnified of any liability and/ or complaint from local authorities/ municipal bodies.

- PCC works including lean concrete at all depths below foundations of all types, plinth beams, walls, non-suspended slabs, trenches, manholes, pits, catch basins, pavements etc. and in screed at all depths below plinth level.

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- RCC works in sub-structure for all type of pile foundation, open foundation and raft including pedestal, plinth beams, tie-beams, walls, non-suspended floor slabs, trenches, pits, manholes (leak- resistant), catch basins, drains etc. at all depths below plinth.

- RCC works in super-structure at all height, columns, beams, walls, floor & roof slabs, etc.

- Supplying and mixing of approved brand of bipolar concrete penetrating corrosion inhibiting admixture in concrete in superstructure and substructure as per manufacturer's specification and EIL Specification for protection of reinforcement against corrosion.

- RCC (leak proof concrete) works in sub-structure and super structure for water retaining structure.

- Mixing of approved brand of integral/ crystalline water proofing compound in cement concrete for making leak proof concrete for manholes.

- RCC works for pre-cast elements, trenches (including covers), Manholes (leak-resistant), catch basins etc. and any other miscellaneous works required as per AFC drawings/ EIL standards and transportation of precast elements to site for erection.

- Masonry works by Burnt clay brick in Sub-Structure and Super-Structure for all depths and height as per specifications respectively.

- Supply, cutting, bending, binding, fixing of reinforcement of grade Fe 550D (TMT) for RCC works in sub-structure at all depths and in super-structure at all heights.

- Centering & shuttering (including curved shuttering) in sub-structure at all depths and in super-structure at all heights/ elevations.

- Providing and laying 40mm thick Damp Proof Course including cleaning, watering the top surface of walls, centering, shuttering, placing, tamping, curing, sprinkling an even layer of dry & sharp sand over the hot bitumen etc.

- Sealing of EXPANSION JOINTS at all locations and levels in Concrete Structures with POLYSULPHIDE SEALING COMPOUND as per IS:12118 including raking of joints etc.

- Fixing of BITUMEN IMPREGNATED FIBRE BOARD conforming to IS:1838 of approved quality in expansion joints at all locations and levels in concrete structures

- Providing construction joints, expansion joints, sealing joints etc. in pavements and around foundations.

- Providing MS Rungs in U/G pits etc.

- Fabrication of structural steel with rolled steel, parallel flange, built-up sections using rolled section &plates, tubular/hollow sections including supply of material as per scope of supply, transportation, unloading & storing at site, preparation of detailed fabrication drawings using TEKLA or similar 3D

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software, including submission of design calculation for connections, showing the master index of particular structures indicating nomenclature to facilitate sequence of erection activity, for all types of structures. Connections in fabrication drawing shall be prepared only after review of connection details by owner/ owner representative. Final model, all fabrication drawing, related files, catalogues along with all erection/ part marks and material reports etc. shall be submitted to owner/ owner representative for records.

- Surface Preparation, Primer & Finish Paint for Structural steel shall be as per EIL Job specification attached with tender.

- Applying shop primer/ finish paint to the structural steel members as per specifications and taking up of the repair works at field to cover the damages (if any), during the transportation and erection. Finish paint except final coat shall preferably be done at shop fabrication yard & final coat shall preferably be done at field.

- Fabrication & placing/ erection of miscellaneous steel items like Anchor Bolts, Metal Insert Plates, Pipe Sleeves, Steel ladders, Anchor fasteners, Rungs, hand railing, etc. as per standards/ specifications as directed by Engineer-in-charge at any location wherever required.

- Erection of standalone/ isolated new structural works on already erected existing structure.

- Sand filling below floor and at all locations as specified directed by Engineer-in-charge.

- Providing & fixing MS Chequered plates at all heights on structures.

- Providing and fixing electro-forged MS gratings at all heights on structures, platforms, stairs, drains, catch basin, etc. Final painting shall be done for MS grating as per EIL Job Specification attached with tender.

- Fabrication & placing/ erection of miscellaneous steel items like Anchor bolts, Metal Insert Plates, Pipe Sleeves, steel ladders, etc. as per standards/ specifications as directed by Engineer-in-charge at any location wherever required.

- Providing and injecting approved chemical emulsions for ANTI-TERMITE TREATMENT as specified and directed.

- Acid proof brick lining in pedestals acid handling and storage area.

- Dismantling/ Demolishing of PCC, RCC, masonry (brick/ block/ stone) works for all depths/ heights below/ above plinth level and structural steel, sheeting works at all heights above plinth level including disposal of unserviceable item and stacking & depositing of serviceable items in Owner's yard / location as approved by Engineer-in-Charge. Contractor shall consider recycling of construction & demolition wastes to the extent possible and to present the recycling philosophy during the kick-off meeting.

- Cutting of RCC piles & building pile heads.

- Preparation of Bar Bending Schedule (BBS) for concrete structures as per the 'Approved for Construction' (AFC) drawings.

- Providing anchor fasteners to fix structures/ pipe supports etc. on pavement/ foundations/ structures.

- Any other Civil-Structural work as specified elsewhere in the tender document.

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- Preparation of AS-BUILT mark-up prints on AFC drawings and subsequent updation of the same in soft copy (Auto Cad) of AFC drawing and submission of hard copy and soft copy to Engineer-in-charge as specified elsewhere in this Bid package.

- Removal of scrap generated during construction including segregation of scrap into serviceable and unserviceable material and transportation of serviceable material to Owner's storage.

- Clearing the site and removal of debris/unserviceable material from the site after completion of work and disposal of the same at a designated area as directed by Engineer- in- charge.

- Obtaining all approvals from owner, statutory authorities such as Factory Inspector, Local Municipal or Development Authorities and other designated authorities etc. for necessary construction works.

Any other Civil Structural Works, not specifically mentioned herein, but required for the satisfactory and successful completion of the Civil Structural Works as per directions of the Engineer-in-Charge shall also be in the scope of the contractor.

2.0 SCOPE OF SUPPLY OF MATERIALS

2.1 OWNER'S SCOPE OF SUPPLY:

NIL

2.2 CONTRACTOR'S SCOPE OF SUPPLY:

Procurement and supply of all materials (consumables / non-consumables), tools & tackles, equipment's, machinery etc. required for completion of all civil-structural works under this contract shall be in the scope of the Contractor.

3.0 SPECIFIC REQUIREMENTS TO BE FULFILLED BY THE CONTRACTOR

Note: In case of any contradiction between these Specific Requirements and Requirements/ Specification specified elsewhere in the tender document, the Specific Requirements given below shall have precedence.

3.1 Mandatory use of mechanical excavators for excavation, however manual excavation for minor foundation can be taken up after due approval of Engineer-in-Charge.

3.2 Mandatory installation of weigh batching plant of adequate capacity for concrete along with transit mixers and concrete pumps/ usage of Ready-Mix Concrete (RMC) as per the direction of Engineer-in-Charge.

3.3 In case of borrow earth is required from outside or disposal of surplus earth/debris to be done outside refinery; location for the same shall be identified by the contractor. Contractor shall obtain relevant statutory approval from all statutory authorities (like municipal etc.) and including payment of charges/ royalty/ octroi for the same. Contractor shall keep client indemnified of any liability and/ or complaint from local authorities/ municipal bodies.

3.4 For cutting & bending of rebar's mechanized equipment/ cutting-bending machine shall be used.

3.5 RCC concrete mix shall be as per approved Design Mix.

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3.6 Generally, the use of one of the following cements shall be considered:

- Portland Slag Cement (PSC) confirming to IS: 455 for substructure works.
- Portland Pozzolana Cement (Fly ash based - PPC) confirming to IS: 1489(Part 1) or Portland Slag Cement (PSC) confirming to IS: 455 or Ordinary Portland cement (OPC) of Grade: 53 or OPC of Grade: 43 confirming to IS: 269 for superstructure works.

3.7 Structural steel shall be of grade E250 Quality B0/BR confirming to IS: 2062. RHS/SHS/CHS shall be of grade Yst355. All field joint shall be bolted connection. Structural steel for insert plate, cover plate for fire proofing, grating & structural steel in platforms, Y Post Barbed wire and MS Rung shall be E250 A/BR/B0 conforming to IS 2062.

3.8 Structural steel for chequered plate, grating & steel structure in platforms taken from equipment shall be of Grade E250 Quality BR/B0 conforming to IS: 2062.

3.9 For all bolted connections high strength Dull Black bolts of property class 8.8 as per IS:3757 & IS:4000 shall be used. Nuts and washers shall conform to IS: 6623& IS: 6649 respectively. Shop primer and final paint for bolts, nut and washer shall be used as per EIL Job Specification No. B889-000-06-42-PLS-01 attached with tender.

3.10 Reinforcing steel shall be high strength deformed steel bars of grade Fe550D conforming to IS: 1786.

3.11 All lugs shall be of high strength deformed bars of minimum grade Fe550D confirming to IS: 1786.

3.12 All inserts/ sleeves shall be properly secured in position before pouring of concrete. Metal insert plates shall be of grade E250 Quality B0/BR conforming to IS: 2062. Primer/ epoxy except finish paint shall be applied to all insert/ sleeve prior to fixing in position before pouring of concrete.

3.13 Fabrication of anchor bolts shall be taken up on priority to ensure placement of the same at the time of concreting.

3.14 The construction of underground piping & drainage system, if provided at a depth lower than that of the structure/ equipment foundations, shall be taken up before construction of respective foundation. However, in general underground piping activity shall be executed before backfilling of soil.

3.15 The contractor shall ensure the required founding strata confirming to soil recommendation for all foundations. If the founding depth encountered is different from that specified in the drawings, the same shall be brought to the notice of Engineer-in-Charge before execution.

3.16 All shop connections at fabrication yard shall be welded & field/ site connections shall be bolted unless otherwise mentioned in AFC drawings or in approved fabrication drawings. To the extent possible erection of Structural steel shall be done in modules. The modules shall be prepared in areas defined by Engineer in-charge.

3.17 During the execution of the work, the contractor, at his own cost shall keep structures, materials and equipment adequately braced by guys, struts or otherwise approved means which shall be supplied and installed by the contractor as required till such time the installation work is satisfactorily completed. The provided guys, shoring, bracing, strutting, planking supports etc. shall not interfere with the work of other agencies and shall not damage or cause distortion to other works executed by him or other agencies.

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3.18 The contractor shall ensure proper co-ordination / co-operation with other agencies, while working in the area, without affecting others work front areas.

3.19 Various tolerances required as marked on the drawings conforming to code requirements/ specifications or as directed by the Engineer-in-Charge shall be maintained by the Contractor. Verticality shall be maintained at every stage and the same shall be verified with Theodolite / Total Station.

3.20 All works shall be done to the entire satisfaction of the Engineer-in-Charge. Any work not carried out in accordance with the instructions shall be dismantled and made good without any extra cost and time implication to the owner.

4.0 PREAMBLE TO SCHEDULE OF QUANTITIES

4.1 SOR indicates only estimated quantities. Unit rate quoted against each SOR item shall be applicable for any addition and deletion during execution of the project.

4.2 Depth of foundation in general shall be 1.5 to 3.5 m below FGL for Pile foundation/ Open foundation, for sleepers 1.25 to 1.5 m and for UG pits it shall go upto 6.0 m below HPP. (This data is for general guidance of the Contractors; however, deviation from the noted depth shall not form a basis for any extra claim).

4.3 The maximum height of structures shall be 20m (This data is for general guidance of the Contractors; however, deviation from the noted height shall not form a basis for any extra claim).

4.4 Item description provided in Schedule of Rates (Short Description) is in brief; while quoting and filling the rate in these Schedule of Rates (Short Description), Bidder shall take into consideration complete scope of work/item description as mentioned in Schedule of Rates (Detailed Description) for the relevant item. The rate quoted in Schedule of Rates (Short Description) shall be deemed to include all activities of work mentioned in item description of Schedule of Rates (Detailed), scope of work, specifications, standards etc. and stringent of all shall govern.

4.5 Wherever “plant boundary” is mentioned in the SOR or specifications, the same shall be read as “HEF property limit”.

4.6 Over the rate for backfilling using earth filling from borrow area outside or disposal of surplus earth/debris to be done outside refinery; location for the same shall be identified by the contractor. Contractor shall obtain relevant statutory approval from all statutory authorities (like municipal etc.) and including payment of charges/ royalty/ octroi for the same. Contractor shall keep client indemnified of any liability and/ or complaint from local authorities/ municipal bodies.

4.7 All items in the Schedule of Rates shall be inclusive of all materials, workmanships, constructional infrastructures like scaffolding/ staging, finishing, cleaning, cutting chases/ holes etc. in brick work/ RCC work for making it proper and rectification of any damaged work shall be applicable for all heights and locations.

4.8 The minimum cement content and maximum water-cement ratio for RCC & PCC works shall be as below:

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Exposure Condition	Type of concrete	Grade of Concrete	Minimum Cement content (kg/m3)	Maximum free water-cement ratio
Moderate	Plain cement concrete	M15	240	0.6
		M20	250	0.5
	Reinforced cement concrete	M25	350	0.45
		M30	350	0.45

5.0 ADDENDUM TO SPECIFICATIONS

Sl. No.	DOCUMENT NUMBER	CLAUSE NO.	MODIFICATIONS
1	6-68-0004 Rev.7	4.3	Clause "Irrespective of the grade of concrete required to be produced as per characteristic strength criteria, the minimum cement content and maximum water cement ratio in the design concrete shall be strictly maintained as stipulated in Table 5 of IS: 456." is withdrawn and shall be read as Irrespective of the grade of concrete required to be produced as per characteristic strength criteria, the minimum cement content and maximum water cement ratio shall be as per clause no. 4.8 of this document (B889-000-81-46-SOW-8202-0).
2	7-68-0697 Rev. 8	-	"Hot Dip Galvanized" mentioned anywhere in this document stands "deleted".

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2.0 SECTION – II
LIST OF ATTACHMENTS

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2.1 LIST OF ATTACHMENTS

2.1.1 STANDARD SPECIFICATIONS:

Sl. No.	Title of Document	Specification No.	Rev
	STRUCTURE		
1	Civil & Structural Works-General scope	6-68-0001	6
2	Civil & Structural Works-Materials	6-68-0002	7
3	Civil & Structural Works-Earthwork	6-68-0003	6
4	Civil & Structural Works-Plain and Reinforced Cement Concrete	6-68-0004	8
5	Civil & Structural Works-Plain and Reinforced Cement Concrete for liquid retaining structures.	6-68-0005	6
6	Civil & structural works - Structural steel works	6-68-0006	7
7	Structural Steel works (tubular/ hollow sections)	6-68-0007	7
8	Civil & structural works -Miscellaneous steel works	6-68-0008	7
9	Civil & Structural Works-Brick Masonry	6-68-0009	5
10	Civil & structural works- Demolition and dismantling.	6-68-0012	5
11	Civil & Structural Works-Miscellaneous items	6-68-0013	6
12	Civil & Structural works- Precast Concrete	6-68-0014	2
13	Civil and structural works - concrete block Masonry	6-68-0016	2
14	Civil and structural works - bipolar concrete penetrating corrosion inhibiting admixture	6-68-0017	1
15	Civil & structural works - water-proofing of underground concrete structures	6-68-0035	1
16	Standard specification for bonding fresh concrete to old concrete by epoxy resin bonding system	6-68-0056	5
17	Specification for quality management system requirements from bidders	6-78-0001	2
18	Specification for documentation requirements from contractors	6-78-0002	2
19	Specification for documentation requirements from suppliers	6-78-0003	2
20	Standard specification for health, safety & environment (HSE) management at construction sites	6-82-0001	2
21	Inspection & test plan (ITP) for civil, structural &architectural works (item rate contracts – with categorization)	6-82-3100	2
22	Standard quality assurance plan construction division (item rate contracts)	6-82-6100	4

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2.1.2 STANDARD:

Sl. No.	Standard	Document No.	Rev.
	STRUCTURE		
1	Pedestal for steel ladder	7-67-0008	8
2	Standard lifting hooks in Pre-cast slabs & Chequered plates	7-68-0051	7
3	Metal Insert Plate	7-68-0056	8
4	Handrail Tube and ball type	7-68-0060	1
5	Typical grating support	7-68-0202	8
6	Typical chequered plate support	7-68-0203	8
7	MS Anchor Bolt Assemblies	7-68-0417	9
8	Handrail	7-68-0501	8
9	Steel Stairs	7-68-0506	7
10	Steel Ladder	7-68-0507	9
11	Steel Ladder Joint Detail	7-68-0509	7
12	Cable trench inside the buildings	7-68-0625	2
13	Cable trench.	7-68-0626	6
14	Precast cable trench and joint detail	7-68-0627	2
15	Cable trench for class-AA tracked vehicle (crane approach).	7-68-0655	6
16	Detail of sliding T-support.	7-68-0691	4
17	Detail of sliding t-support using hollow sections.	7-68-0692	2
18	Electrical cable tray supporting structure.	7-68-0695	4
19	Electro forged grating type-I & type-II.	7-68-0697	6

2.1.3 JOB SPECIFICATION:

Sl. No.	Specification	Document No.	Rev.
1	Job specification for surface preparation and protective coating	B889-000-06-42-PLS-01	0

2.1.4 APPROVED VENDOR LIST:

Sl. No.	Specification	Document No.	Rev.
1	Vendor List for Structural Works	B889-000-81-41-LL-4001	A

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2.1.5 LIST OF DRAWINGS:

S. No.	Drawing No.	Rev	Title
1	B889-000-81-45-00001*	D	OVERALL PLOT PLAN
2	B889-000-81-41-49093	A	STAIR TOWER SKETCH

**** These drawings are conceptual in nature and are intended for general guideline to the contractor. Any change in dimensions/ requirements/ concept/ technology from these drawings during detail engineering shall no way form the basis of any extra claims for time and/ or cost.***

2.1.6 SCHEDULE OF RATES:

For schedule of rates of Structural Works refer Document Number

- B889-000-81-41-CF-SOR-8202

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STANDARD SPECIFICATIONS FOR ARCHITECTURAL WORKS (GENERAL)

Rev. No	Date	Purpose	Prepared by	Checked by	Standards Committee Convenor	Standards Bureau Chairman
					Approved by	
7	08.02.22	REAFFIRMED AND ISSUED AS STANDARD SPECIFICATION	ANISH MAHALA	ANISH KUNDU	SAMIR DAS	SANJAY MAZUMDAR
6	20.03.17	REAFFIRMED AND ISSUED AS STANDARD SPECIFICATION	PD	JS/ JKB	R. SRIVASTAVA	R.NANDA
5	15.03.12	REVISED AND ISSUED AS STANDARD SPECIFICATION	PD	SD	JKB	D. MALHOTRA
4	21.03.07	RENAMED & ISSUED AS STANDARD SPECIFICATION	SD	JKB	ARVIND KUMAR	V. CHATURVE
3	11.03.99	REAFFIRMED AS STANDARD SPECIFICATION	SD	MLB	SCJ	AS

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Abbreviations:

ASTM	:	American Society for Testing and Materials
BS	:	British Standards
BIS	:	Bureau of Indian Standards

Structural Standards Committee

Convener: Mr. Samir Das

Members:
Mr. Rajesh Gujral
Mr. Anish Kundu
Mr. Sandeep Sharma
Mr. Maitrayee Majumder (Strl)
Mr. Charanjeet Singh (Projects)
Mr. Ravindra Kumar (Construction)

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1.0 GENERAL

This specification establishes and defines various aspects of specifications of Architectural works such as codes, references, manufacturer, conflicts and contradictions, materials, workmanship, packaging, shipping, delivery and storage, testing, submittals and measurement etc. and shall be applicable for all the Architectural specifications.

2.0 DEFINITIONS

2.1 Contractor

The party which carries out all or part of the design, engineering, procurement, construction, commissioning or management of the Project. Contractor includes its approved Manufacturers, Vendors, Suppliers, and subcontractor's. Requirements of this specification shall be enforced at all levels of the Contractor's design, engineering, procurement, construction process.

2.2 Subcontractor

The party which is engaged by the "Contractor" and carries out all or part of the design, engineering, procurement, construction of the system (s).

2.3 Manufacturer/ Supplier/ Vendor

The party which manufactures and/or supplies equipment, materials, technical documents/ drawings and services to perform the duties specified by the "Contractor".

2.4 Shall

Indicates a mandatory requirement.

2.5 Should

Indicates a strong recommendation to comply with the requirements of this document.

3.0 CODES & SPECIFICATIONS

3.1 Codes and standards as indicated in the specifications form a part of specifications. When an edition date is not indicated for a code or standard, the latest edition and addendum or amendment in force at time of contract award shall apply.

3.2 Alternate codes and standards meeting the requirements of the referenced codes and standards may be used with the approval of the competent authority.

3.3 It shall be Contractor's responsibility to be, or to become, knowledgeable of the requirements of any referenced codes and standards.

4.0 MANUFACTURER

4.1 Name of the Manufacturers of products included in the tender documents are the acceptable Manufacturers for the particular product provided the products meet the requirements specified in the tender documents. Products by other Manufacturers which are of equal quality and performance and meet the specified requirements may be considered for approval upon review of information as required and submitted to the competent authority. However the contractor to ensure that the time schedule is adhered to in any case.

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4.2 Product data sheet, specifications, performance data, installation instructions and other recommendations of such approved Manufacturers also form part of the specifications provided that these are not in contradiction with other specified requirements.

4.3 Materials, installation method and other requirements for execution of any item if required by Manufacturer's installation instructions, recommendations and requirements shall also form part of the specifications whether specified or not.

4.4 In case, name of particular Manufacturers are mentioned in specification/ drawing/ item descriptions etc. the purpose is to set example of desired quality of the product. Product of other manufacturers having similar quality (in the opinion of Engineer- in- Charge) may also be considered.

5.0 CONFLICTS & CONTRADICTIONS

5.1 Specifications, Scope of Work, Schedule of rates and drawings for a particular Tender shall be read in conjunction with each other. In case of conflicts/ contradictions amongst them, the clarification shall be obtained from the Engineer-In-Charge whose decision shall be final & binding. Following procedure shall be followed for the necessary clarification.

5.2 Item description shall prevail over specifications for item rate tenders when provisions therein are different from those in specifications. Whenever any requirement is not covered in item description but are covered in specifications, the specifications shall be followed in addition to the requirements of item description .No extra payment shall be made to the Contractor for executing such item as per specification.

5.3 Whenever drawings call for requirements different from or additional to those in item description and specification, the decision of the Engineer-In-Charge shall be obtained in writing. However no extra payment shall be made to the Contractor for executing any work incorporating requirements additional to those in item description and specification but covered in applicable drawings or standards attached to the tender.

5.4 Any conflict between drawing, item description, specification etc. shall be got resolved by the Contractor from the Engineer-In- charge in writing before execution.

6.0 MATERIALS

6.1 All materials shall be of standard quality conforming to the specifications and other requirements of tender document and shall be obtained from the approved Manufacturer.

6.2 The Contractor shall get the samples of materials approved by the Engineer-In-Charge before ordering & procurement. Such approved samples shall be properly marked/ identified as approved sample and shall be kept as record for future reference.

6.3 Contractor shall arrange the samples along with necessary documentation, test certificates etc. so that the compliance with the specifications etc. can be ascertained.

6.4 Contractor shall arrange mock-ups if asked by the Engineer-In- Charge to facilitate approval of the samples.

6.5 Samples shall be approved subjected to compliance with specifications etc. Finishing, colour, texture and other aesthetic aspects shall also be considered for finishing/ interior items.

6.6 Contractor shall get the materials tested from approved test house if and as asked by the Engineers-In-Charge & submit the test certificate at his own cost for which no extra payment shall be made to him.

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6.7 The Engineer-In-Charge shall have the right to reject all or any of the materials intended to be used and such materials shall be immediately removed from the site by the Contractor at his own cost without any claim for compensation etc. due to such rejection.

7.0 WORKMANSHIP

7.1 Workmanship shall be in accordance with relevant codes or in accordance with Manufacturer's recommendations as approved by the Engineer-in-charge if not specified otherwise.

7.2 All work shall be executed to the complete satisfaction of the Engineer-in-charge. Necessary rectification etc. shall be done by the Contractor at no extra cost for works not accepted by the Engineer-in-charge until the work is accepted by him.

7.3 All works shall be done by qualified Contractors who have adequate equipment and skilled workers. All specialized items of work (e.g. Aluminium Doors and Windows, Waterproofing, Underdeck and Overdeck Insulation, roof sheeting/ cladding, False ceiling, False Flooring, Partitioning and Panelling, Expansion joint sealing, Fire Check Doors, Structural Glazing, Aluminium Composite Panels etc.) shall be got executed by the Contractor only through authorised applicators/ sub contractors of approved Manufacturer/ vendor or as approved by the Engineer-In-Charge.

7.4 All precaution and protection shall be taken during & after completion of work to prevent damages to work being done and other works. Any damages done shall be rectified by the Contractor at no extra cost.

7.5 Work area shall be cleaned after completion of each work and shall be kept clean and protected till final acceptance by the competent authority.

8.0 PACKAGING, SHIPPING, DELIVERY & STORAGE

8.1 All material shall be delivered in Manufacturer's original package bearing the name of the Manufacturer, product colour and pattern name, identification number and other related information.

8.2 All materials shall be stored, preserved and protected to safeguard against all adverse environments such as humidity, moisture, rain, dust, dirt, sand, mud, salt air, salt spray and sea water.

8.3 Specific requirement of packaging, shipping, storage and preservation and safety of materials/ items if any as per Manufacturer's recommendation shall also be ensured by Contractor.

8.4 Materials damaged in handling and storage shall not be used. In the event that any material for use deteriorates and become unusable due to inadequate and poor storage they shall be removed from site as instructed by Engineer-in-charge and replaced at the Contractor's expenses.

9.0 SUBMITTALS

If not mentioned otherwise, Contractor shall submit the following.

9.1 Samples

9.1.1 Samples of materials, components, accessories and complete range of finishing/ shades/ colours for verification as well as acceptance of pattern, colour and finish as applicable.

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9.1.2 Samples shall be re-submitted until approved. Approved samples shall be retained as mentioned in clause 6.0

9.2 Test and BIS Certificates

9.2.1 All applicable tests shall be conducted by the Contractor at no extra cost. Test Certificates shall be submitted for review/ approval of the Engineer-in-charge.

9.3 Shop/ fabrication Drawings

9.3.1 Shop or fabrication drawings indicating large scale details, lay-out, connections, anchoring, fastening, bracing, finishes etc. as applicable for review/ approval.

9.3.2 These drawings shall be prepared to achieve the desired design and quality of work expressed in design, drawings and specifications etc..

9.4 Product Information and Manuals

A. Product information (Technical).
B. Manufacturer's recommended installation instructions.

9.5 List of applicators/ Sub contractors

Contractor shall submit list of applicators/ sub contractors of specialized items of works along with there past track report for review/ approval before execution of such items.

9.6 Maintenance manuals

In case of specialized items, contractor shall submit the Operation & maintenance manual including guarantee/warranty card and its validity document.

9.7 Deviations

9.7.1 Deviations if any shall be raised and processed in accordance with conditions mentioned in the tender document.

9.7.2 Deviations shall be submitted before procurement and execution. Procurement, execution and other related works shall be taken up only after the deviation is accepted by the Engineer-In-Charge. Post facto approval of deviation shall not be entertained and Contractor himself shall be responsible for any procurement/ execution of any work or any action which are deviations and for whose, prior approval is not obtained.

9.8 Sample mock-up work

Contractor shall prepare mock-up work of specialized items or systems as specified or asked by the Engineer-In- Charge. Mock-up shall include the complete item or system with all associated items.

10.0 MEASUREMENT

Mode of measurement is generally specified in each Specification. Whenever mode of measurement is not specified, IS: 1200 shall be applicable.

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फ़र्श के परिष्करण के लिए मानक विनिर्देश

STANDARD SPECIFICATION FOR FLOOR FINISHING

Rev. No	Date	Purpose	Prepared by	Checked by	Standards Committee Convenor	GM (E)	Standards Bureau Chairman
					Approved by		
7	01.06.20	REVISED & ISSUED AS STANDARD SPECIFICATION	Anish Mahala	Samir Das	Rajanji Srivastava		Sunil Kumar Saxena
6	03.03.15	REVISED & ISSUED AS STANDARD SPECIFICATION	AM	SD	JKB	PKM (Addn GM)	S CHANDA
5	06.07.10	REVISED & ISSUED AS STANDARD SPECIFICATION	GB	JS	JKB	VK	N. DUARI
4	21.03.07	REVISED & ISSUED AS STANDARD SPECIFICATION	SD	JKB	ARVIND KUMAR		V. CHATURVEDI
3	12.03.99	REAFFIRMED AS STANDARD SPECIFICATION	SD	MLB	SCJ		AS
2	16.03.94	REVISED & ISSUED AS STANDARD SPECIFICATION	JS	JS	AKG		AS

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Abbreviations:

ASTM	:	American Society for Testing and Materials
BS	:	British Standards
IS	:	Indian Standards
PVC	:	Polyvinyl Chloride

Structural Standards Committee

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Mr. Anurag Sinha
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Mr. Samir Das
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Mr. Charanjit Singh (Projects)
Mr. Ravindra Kumar (Construction)

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1.0 GENERAL

This specification covers technical specification of various kind of floor finishes/ floorings to be used in building works.

1.1 Standards

Reference shall be made to the following Indian Standards for any further information etc. not covered in this specification.

IS: 2571	Code of practice for laying in situ cement concrete flooring.
IS: 3461	Specification for PVC asbestos floor tiles.
IS: 3462	Specification for unbaked flexible PVC flooring.
IS: 4441	Code of practice for use of resin type chemical resistant mortars.
IS: 4443	Code of practice for use of resin type chemical resistant mortars.
IS: 4457	Acid and/or alkali Resistant tiles.
IS: 4631	Code of practice for laying of epoxy resin floor toppings.
IS: 5318	Code of practice for laying of flexible PVC sheet and tile flooring.
IS: 5491	Code of practice for laying of in-situ granolithic concrete floor topping.
IS: 13630 (Part-1 to 15)	Methods of Testing of ceramic tiles, methods of test, sampling and basis for acceptance
IS 13712	Specification for ceramic tiles; definition, classification characteristic and marking.
IS 15622	Pressed ceramic tile - specification

Note: Wherever, codes other than IS codes are mentioned, equivalent IS codes are also acceptable.

1.2 Base/ sub base for floor finishing

Floor finishing shall be provided over base/ sub base of cement concrete or reinforced cement concrete (RCC) floor slab. In case of ground floor, the floor slab i.e. base/ sub base for floor finish shall be as per standard no. 7-67-0011 or as specified or as mentioned in drawings. For other upper floors, the floor slabs shall be the base/ sub base for floor finish.

1.3 Slope/ levelling of floor finishing

1.3.1 Finished floor shall be in slope towards drainage out-lets. Slope shall be ranging from 1: 48 to 60 or as directed by Engineer-In-Charge in Verandahs, Courtyards, Kitchen, Bath and other wet areas. Slope in Indian type water closet areas shall be 1:30 or as directed by Engineer-In-Charge. Further, necessary drop in flooring in bath, WC, kitchen near floor traps ranging from 6mm to 10mm will also be provided to avoid spread of water.

1.3.2 Necessary margin to accommodate these slopes and drops shall preferably be made in base/ sub base or base course of finishing layer.

1.3.3 Excepting above and if not mentioned specifically otherwise, top of floor finish of all areas/ rooms/ spaces in any particular floor shall be same throughout. If further filling on base floor slab is required for this purpose, the filling shall be done with cement concrete (1 cement: 2

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coarse sand: 4 graded stone aggregate, 20mm nominal size which shall be carried out in accordance with workmanship mentioned in the specification of cement concrete flooring for base course of cement concrete flooring) or cement mortar (1 cement: 3 coarse sand) as directed by Engineer-In-Charge.

1.4 Skirting

Skirting shall be provided with floor finish. If not mentioned otherwise skirting shall be of same finish as that of the flooring.

2.0 CEMENT CONCRETE FLOORING

2.1 General

Cement concrete flooring shall consist of a base course of cement concrete (laid over sub base/ base concrete floor) and a finishing layer.

2.2 Base course

Base course shall be of 40mm thick cement concrete (1 cement: 2 coarse sand: 4 graded stone aggregate, 20mm nominal size).

2.3 Finishing layer

Finishing layer shall be a floating coat of neat cement, including cement slurry (@ 2 kg of cement for area of one square metre).

2.4 Workmanship

2.4.1 The surface of floor slab shall be roughened with steel wire brushes without disturbing the concrete, cleaned, and the laitance shall be removed. Immediately before laying the floor finish, the base shall be wetted and a coat of cement slurry @ 2 kg of cement spread over an area of one square metre so as to get a good bond between the floor slab and base course.

2.4.2 Floor finish of specified thickness shall be laid in the pattern including the border as given in the drawings or as directed by the Engineer-in-Charge. The border panels shall not exceed 450mm in width and the joints in the border shall be in line with panel joints. The panels shall be of uniform size and no dimension of a panel shall exceed 2 metre and the area of a panel shall not be more than 2 square metre. The joints of borders at corners shall be mitred for provision of strips.

2.4.3 Cement concrete floor finish shall be laid in one operation using glass/ aluminium/ PVC/ brass / stainless steel or any other strips (as specified or as per instructions of the Engineer-in-Charge) at the junction of two panels to ensure uniformity in colour of all the panels and straightness at the junction of the panels. The strips shall be fixed with their tops at proper level, giving required slopes.

If, type of strip is not specified anywhere, minimum 3mm thick PVC strips shall be provided.

2.4.4 Base course of cement concrete shall be placed in the panels and be levelled with the help of straight edge and trowel and beaten with thapy or mason's trowel. The blows shall be fairly heavy in the beginning but as consolidation takes place, light rapid strokes shall be given. Beating shall cease as soon as the surface is found covered with a thin layer of cream of mortar. The evenness of the surface shall be tested with straight edge. Surface of flooring shall be true to required slopes. While laying concrete, care shall be taken to see that the strips are not damaged/disturbed. The tops of strips shall be visible clearly after finishing with cement slurry.

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2.4.5 The finishing layer of the floor finish shall follow immediately after the cessation of beating. The surface shall be left for some time, till moisture disappears from it or surplus water can be mopped up. Use of dry cement or cement and sand mixture stiffening the concrete to absorb excessive moisture shall not be permitted. Excessive trowelling shall be avoided. Fresh cement shall be mixed with water to form thick slurry and spread @ 2 kg of cement over an area of 1 sqm of flooring while the flooring concrete is still green. The cement slurry shall then be properly processed and finished smooth.

2.4.6 The junctions of floor with wall plaster, dado or skirting shall be rounded off.

2.4.7 The curing shall be done for a minimum period of ten days. Curing shall not be commenced until the top layer has hardened. Covering with empty gunnies bag shall be avoided as the colour of the flooring is likely to be bleached due to the remnants of cement dust from the bags.

3.0 HEAVY DUTY CEMENT CONCRETE FLOORING

3.1 General

Heavy duty cement concrete flooring shall consist of a base course of cement concrete (laid over sub base/ base concrete floor) and a finishing layer.

3.2 Base Course

Base course shall be of 40mm thick cement concrete (1 cement: 2 coarse sand: 4 graded stone aggregate, 20mm nominal size).

3.3 Finishing layer

Finishing layer shall be of 12mm thick cement hardener consisting of mix 1:2 (1 cement hardener mix: 2 graded stone aggregate 6mm nominal size) by volume laid over the base course.

Hardener/ hardening compound shall be mixed @ 2 litre per 50 kg of cement or as per Manufacturer's specifications.

3.4 Workmanship

3.4.1 Base course shall be laid in accordance with clause nos 2.4.1, 2.4.2, 2.4.3 & 2.4.4

3.4.2 The top surface of base course shall be roughened with brushes while the concrete is still green and the forms/strips shall be kept projecting up 12mm over the concrete surface, to receive finishing layer.

3.4.3 The topping shall be laid on base course within 2 to 4 hours of its laying, true to provide a uniform and even surface. It shall be firmly pressed into the bottom concrete so as to have good bond with it. After the initial set has started, the surface shall be finished smooth and true to slope with steel floats.

3.4.4 The junctions of floor with wall plaster, dado or skirting shall be rounded off.

3.4.4 The curing shall be done for a minimum period of ten days. Curing shall not be commenced until the top layer has hardened. Covering with empty gunnies bag shall be avoided as the colour of the flooring is likely to be bleached due to the remnants of cement dust from the bags.

4.0 CEMENT PLASTER SKIRTING

4.1 General

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Cement plaster skirting shall be provided in cases of all types of cement concrete floorings if not mentioned otherwise.

Cement plaster skirting shall be with cement mortar 1:3 (1 cement: 3 coarse sand) finished with floating coat/ slurry of neat cement. The cement to be applied in the form of slurry for smooth finishing shall be at the rate of 2 kg of cement per litre of water applied over an area of 1 sqm.

Average thickness of cement plaster skirting shall not be less than 18mm.

If not mentioned otherwise, height of the skirting shall be 125mm.

4.2 Workmanship

4.2.1 The surface on which the skirting is to be applied shall be prepared for laying skirting. The joints shall be raked out to a depth of at least 15mm in masonry walls. In case of concrete walls, the surfaces shall be roughened by hacking. The surface shall be cleaned thoroughly, washed with water and kept wet before skirting is commenced.

4.2.2 Skirting shall be laid immediately after the surface is prepared. It shall be laid along with the border or adjacent panels of floor. The joints in skirting shall be kept true and straight in continuation of the line of joints in borders or adjacent panels. The skirting shall be finished smooth with top truly horizontal and joints truly vertical except where otherwise indicated.

4.2.3 The finishing of surface shall be done simultaneously with the borders or the adjacent panels of floor. Where skirting is flush with plaster, a groove 10mm wide and upto 5mm deep shall be provided in plaster at the junction of skirting with plaster.

4.2.4 Curing shall be commenced on the next day of plastering when the plaster has hardened sufficiently and shall be continued for a minimum period of 7 days.

5.0 CERAMIC & VITRIFIED TILE FLOORING

5.1 Ceramic Tile

5.1.1 Ceramic Tiles shall conform to IS 15622 and shall be of 1st quality, flat, true to shape and free from blisters crazing, chips, welts, crawling or other imperfections detracting from their appearance.

5.1.2 Classification and Characteristics of pressed ceramic tiles shall be as per IS 13712.

5.1.3 The tiles shall be tested as per IS 13630.

5.1.4 The tiles shall conform to table10 of IS 15622 with water absorption 3 to 6% (Group BII).

5.1.5 The top surface of the tiles shall be glazed. Glaze shall be either glossy or matt as specified. The underside of the tiles shall not have glaze on more than 5% of the area in order that the tile may adhere properly to the base. The edges of the tiles shall be preferably free from glaze. However, any glaze if unavoidable, shall be permissible on only upto 50 per cent of the surface area of the edges.

5.1.6 The tiles shall be non-slip type for flooring application in wet areas and of colour and pattern as specified in drawings, Item descriptions, job specification, design basis or approved by Engineer-in-Charge.

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5.1.7 If not mentioned elsewhere i.e. drawings, Item descriptions, job specification, design basis etc. sizes of the tiles shall be:

Flooring : 300mm x 300mm
Dado : 300mm x 450mm
Thickness : As specified by the Manufacturer.

5.2 Vitrified Tiles

5.2.1 Specification of vitrified tiles shall be similar to 5.1 excepting following specifications which vitrified tiles shall conform.

5.2.2 The tiles shall conform to Table 12 of IS 15622 (Tiles with water absorption less than 0.08 per cent, Group BIa).

5.2.3 Sizes of the tiles shall be as per drawings/ Item descriptions/ job specification/ design basis etc. as directed by Engineer-In-Charge. Thickness shall be as specified by the Manufacturer.

5.2.4 If not mentioned elsewhere i.e. drawings, Item descriptions, job specification, design basis etc. 600mm x 600mm glazed tiles finished with digital printing shall be used.

5.3 Workmanship

The finished surface shall not sound hollow when tapped with a wooden mallet.

The tiles shall be laid in pattern as per drawing.

5.3.1 Base concrete or the RCC slab or plastered wall surface on which the tiles are to be laid shall be cleaned, wetted and mopped.

5.3.2 The tiles shall be laid over a coating of polymer modified, thin set, quick set tile adhesive conforming to IS 15477. The adhesive shall be thoroughly mixed with water and a paste of zero slump shall be prepared so that it can be used within 1.5 to 2 hours. It shall be spread over an area not more than one sqm at one time. Average thickness of adhesive shall be 3mm. The adhesive so spreaded shall be combed using suitable trowel. Tiles shall be pressed firmly in to the position with slight twisting action checking it simultaneously to ensure good contact gently being tapped with wooden mallet till it is properly backed with adjoining tiles. The tiles shall be fixed within 20 minutes of application of adhesive. The surplus adhesive from the joints, surface of the tiles shall be immediately cleaned.

5.3.3 The joints shall be kept as thin as possible and in straight lines or to suit the required pattern.

5.3.4 The surface of the flooring during laying shall be frequently checked with a straight edge about 2 m long, so as to obtain a true surface with the required slope. In bath, toilet W.C. kitchen and balcony/ verandah flooring, suitable tile drop or as shown in drawing will be given in addition to required slope to avoid spread of water. Further tile drop will also be provided near floor trap.

5.3.5 For vertical surfaces, the tiles shall be corrected to proper planes with joints truly vertical in required pattern and butt jointed. The fixing shall be done from bottom upward. The top of skirting and dado shall be truly horizontal.

5.3.6 If not mentioned specifically elsewhere such as design basis, item description, drawings, job specifications etc. the joints of tiles shall be cleaned off to a depth of 2-3mm and all dust, loose particles shall be removed and joints shall then be flush pointed with white cement added with pigment to match the colour of tiles.

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5.3.7 If mentioned specifically elsewhere such as design basis, item description, drawings, job specifications etc. tiles shall be laid with 3mm thick PVC spacers at joints. When the laid tiles have set, the spacers shall be removed and the joints shall be filled and finished with approved quality food grade, stain & chemical resistant coloured epoxy grout matching with the colour of tiles.

5.3.8 The tiled floor shall then be kept wet for 7 days. After curing, the tiled surfaces shall be washed and finished clean

6.0 ACID OR ALKALI RESISTANT TILES

6.1 The Acid or Alkali Resistant tiles shall be of vitreous ware and free from deleterious substances. The iron oxide content allowable in the raw material shall not exceed two percent. The tiles shall be vitrified at the temperature of 1100 deg C and above and shall be kept unglazed. The finished, tile, shall appear fine grained in texture, dense and homogenous. The tiles shall be sound, true to slope, flat and free from flows and manufacturing defects affecting their utility.

The tiles shall conform to IS 4457.

The tiles shall be tested for water absorption, compressive strength, acid resistance as per IS 4457. Sampling procedure for acceptance tests and criteria for conformity shall be as per IS 4457.

The tiles shall be 10mm thick (tolerance: + 2 percent). The depth of the grooves on the underside of the tile shall not exceed 3mm.

The tiles shall be of required colour.

6.2 Workmanship

The finished surface shall not sound hollow when tapped with a wooden mallet.

6.2.1 Base concrete or the RCC slab on which the tiles are to be laid shall be cleaned, wetted and mopped.

6.2.2 The bedding for the tile shall be with acid/alkali resistant cement mortar 1:4 (1acid/alkali resistant cement: 4 coarse sand).

6.2.3 The average thickness of the bedding shall be 10mm for flooring and 12mm for skirting/ Dado while the thickness under any portion of the tiles shall not be less than 10mm.

6.2.4 Mortar shall be spread, tamped and corrected to proper levels and allowed to harden sufficiently to offer a fairly rigid cushion for the tiles to be set and to enable the mason to place wooden plank across and squat on it.

6.2.5 Over this mortar bedding neat grey acid/alkali resistant cement slurry of honey like consistency shall be spread at the rate of 3.3 kg of cement per square metre over an area up to one square metre.

6.2.6 Tiles shall be soaked in water washed clean and shall be fixed in this grout one after another, each tile gently being tapped with a wooden mallet till it is properly bedded and in level with the adjoining tiles. The joints shall be kept as thin as possible and in straight lines or to suit the required pattern.

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6.2.7 For vertical surfaces, the tiles shall be corrected to proper planes with joints truly vertical in required pattern and butt jointed. The fixing shall be done from bottom upward. The top of skirting and dado shall be truly horizontal.

6.2.8 The surface of the flooring during laying shall be frequently checked with a straight edge about 2 m long, so as to obtain a true surface with the required slope.

6.2.9 Tiles which are fixed in the floor adjoining the wall shall enter not less than 10mm under the plaster, skirting or dado.

6.2.10 After tiles have been laid surplus cement slurry shall be cleaned off. The joints shall be cleaned off the cement slurry with wire/coir brush or trowel to a depth of 2mm to 3mm and all dust and loose mortar removed. Joints shall then be flush pointed with acid/alkali resistant cement added with pigment if required to match the colour of tiles.

6.2.11 The tiled floor shall then be kept wet for 7 days. After curing, the tiled surfaces shall be washed and finished clean.

7.0 MARBLE STONE FINISH

7.1 Marble Stone Slabs

The marble slabs shall be of specified size, thickness, type, grade and colour. The marble from which the slabs are made shall be of selected quality, hard, sound, dense, homogenous in texture, free from cracks, decay, weathering and flakes. The sample of marble stone slabs shall be got approved from the Engineer-in-Charge.

Marble stone shall be laid in desired pattern using stones of desired color.

If not mentioned elsewhere i.e. item description, drawings, job specifications etc. marble stone slab shall be second quality Makrana white.

This specification does not cover Marble stone wall cladding and veneering.

Dimensions:

Except for dimensions shown in drawing or cut sizes required to cover the balance areas along peripheries, dimensions of slabs shall be 600mm to 2500mm in length and 600mm to 1000mm in width as per drawing and as directed by Engineer-In-Charge.

Tolerance of + 3% shall be allowed for the thickness. In respect of length and breadth of slabs a tolerance of + 2% shall be allowed.

If not mentioned elsewhere i.e. i.e. item description, drawings, job specifications design basis etc. thickness shall be as below.

1. Thickness of stone slab in flooring and horizontal surfaces: 18mm.
2. Thickness of stone slab in skirting, dado and vertical surfaces: 12mm.

Marble stone in riser, tread of staircases, counter tops shall be of single piece upto 2000mm length. Nosing shall be provided in the treads &counter tops.

Physical properties:

Physical properties of Marble and method of testing shall be as follows:

Physical Property	Requirement	Method of test
Moisture absorption After 24 hours	Maximum 0.4%	IS: 1124

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Immersion in cold water		
Hardness	Minimum 3	Mhos scale
Specific Gravity	Minimum 2.5	IS: 1122

7.2 Workmanship

The slabs shall be washed clean before laying. Due care shall be taken to match the grains of slabs which shall be selected judiciously having uniform pattern of veins/ streaks or as directed by the Engineer-In-Charge.

The finished surface shall not sound hollow when tapped with a wooden mallet.

7.2.1 Laying

Laying on floor and horizontal surfaces:

Base slab on which the slabs are to be laid shall be cleaned, wetted and mopped.

Marble slabs shall be laid over average 22mm thick cement mortar 1:4 (1 cement : 4 coarse sand) bedding.

Mortar of the specified mix shall be spread under the area of each slab, roughly to the average thickness specified in the item. The slab shall be washed clean before laying. It shall be laid on top, pressed, tapped with wooden mallet and brought to level with the adjoining slabs. It shall be lifted and laid aside. The top surface of the mortar shall then be corrected by adding fresh mortar at hollows. The mortar shall be allowed to harden a bit and cement slurry of honey like consistency shall be spread over the same at the rate of 4.4 kg of cement per sqm. The edges of the slab already laid shall be buttered with grey or white cement with or without admixture of pigment to match the shade of the marble slabs.

The slab to be laid shall then be lowered gently back in position and tapped with wooden mallet till it is properly bedded in level with and close to the adjoining slabs with as fine a joint as possible.

Subsequent slabs shall be laid in the same manner. After each slab has been laid, surplus cement on the surface of the slabs shall be cleaned off.

Slabs which are fixed in the floor adjoining the wall shall enter not less than 12mm under the plaster skirting or dado. The junction between wall plaster and floor shall be finished neatly and without waviness.

The surface of the flooring as laid shall be true to levels, and, slopes as instructed by the Engineer-in-Charge. Joint thickness shall not be more than 1mm.

Laying on vertical surfaces i.e skirting/ dado/ risers:

The joints shall be raked out to a depth of at least 15mm in masonry walls. In case of concrete surfaces, the surface shall be hacked and roughened with wire brushes. The base surface shall be cleaned thoroughly, washed with water and kept wet before laying is commenced.

In case of skirting, the wall surface shall be cut uniformly to the requisite depth so that the skirting face shall have the projection from the finished face of wall as shown in drawings or as required by the Engineer-in-Charge. In no case the skirting should project by more than thickness of stone.

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The slabs shall be held in position by suitable temporary measure such as wooden/ bamboo supports, temporary hook etc. as approved by Engineer-In- Charge. The line of the slab shall be at such a distance from the wall that the average width of the gap shall be 12mm and at no place the width shall be less than 10mm, The outer face of the slabs shall be checked for plane and plumb and corrected. The joints shall be as fine as possible and shall be filled with neat cement paste/ grout with white cement and pigment to match the colour of the slabs. The joints shall thus be left to harden and then the rear gap between the slabs and backing surface shall be packed with average 12mm thick cement mortar 1:3 (1 cement : 3 coarse sand). Temporary supports shall be removed after the mortar filling in the gap has acquired sufficient strength.

The joints shall be as fine as possible but not more than 1mm. The top line of the skirting/ dado/ risers shall be truly horizontal and joints truly vertical.

7.2.2 Curing, Polishing and Finishing

The surface shall be kept wet for a minimum period of 7 days. The day after the slabs are laid, all joints shall be cleaned of the grout with a wire brush or trowel. The surface shall thereafter be grounded evenly using the following carborundum stones.

1st grinding — coarse grade stone (No. 60)
Second grinding — medium grade (No. 80)
Final grinding — fine grade (No. 120)

If desired appearance of the finished surface is not achieved, the surface shall be further polished using requisite carborundum stones (including finer grade) as directed by Engineer-In-Charge.

Visible top surfaces of skirting/ dado etc. and edges of nosing shall be polished.

Water shall be used profusely during grinding. After grinding the surface shall be thoroughly washed to remove all grinding mud, cleaned and mopped.

Each grinding shall be done one day after the previous grinding has been done.

After the final polish, oxalic acid shall be dusted over the surface at the rate of 33 gm per square metre sprinkled with water and rubbed hard with a 'namdah' block (pad of woollen rags).

The following day after the last grinding/ polishing, the surface shall be wiped with a moist rag and dried with a soft cloth and finished clean.

If any stone is disturbed or damaged, it shall be refitted or replaced and properly jointed and polished.

In case of pre-polished stones, any damage or unevenness on the surface shall be rectified.

8.0 KOTA STONE FINISH

8.1 Kota stone slabs

The Kota stone slabs shall be of specified size, thickness, selected quality and shade, hard, sound, dense, homogenous in texture, free from cracks, decay, weathering and flakes. These shall be machine cut to the requisite size and thickness and of the colour indicated in the drawings or as instructed by the Engineer-in-Charge. The sample of stone slabs shall be got approved from the Engineer-in-Charge. Kota stone shall be laid in desired pattern.

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The slabs shall have the top (exposed) face polished before being brought to site, unless otherwise specified.

All angles and edges of the slabs shall be true, square and free from chippings and the surface shall be true and plane.

Dimensions:

The slabs shall be machine cut to the requisite dimensions.

Except for dimensions shown in drawing or cut sizes required to cover the balance areas along peripheries, dimensions of slabs shall be 600mm to 2500mm in length and 600mm to 1000mm in width as per drawing and as directed by Engineer-In-Charge.

Tolerance of ±2mm shall be allowed for the thickness. In respect of length and breadth of slabs Tolerance of ± 2mm for machine cut slabs shall be allowed.

If not mentioned elsewhere i.e. item description, drawings, job specifications etc. thickness shall be as below.

1. Thickness of stone slab in flooring and horizontal surfaces: 25mm.
2. Thickness of stone slab in skirting, dado and vertical surfaces: 18mm.

Kota stone in riser, tread of staircases, counter tops shall be of single piece up to 2000mm length. Nosing shall be provided in the treads &counter tops.

8.2 Workmanship

The slabs shall be washed clean before laying.

The finished surface shall not sound hollow when tapped with a wooden mallet.

8.2.1 Laying

Laying on floor and horizontal surfaces:

Base slab on which the slabs are to be laid shall be cleaned, wetted and mopped.

Kota stone slabs shall be laid over average 15mm thick cement mortar 1:4 (1 cement: 4 coarse sand) bedding.

Mortar of the specified mix shall be spread under the area of each slab, roughly to the average thickness specified in the item. The slab shall be washed clean before laying. It shall be laid on top, pressed, tapped with wooden mallet and brought to level with the adjoining slabs. It shall be lifted and laid aside. The top surface of the mortar shall then be corrected by adding fresh mortar at hollows. The mortar shall be allowed to harden a bit and cement slurry of honey like consistency shall be spread over the same at the rate of 4.4 kg of cement per sqm. The edges of the slab already laid shall be buttered with grey or white cement with or without admixture of pigment to match the shade of the marble slabs.

The slab to be plaid shall then be lowered gently back in position and tapped with wooden mallet till it is properly bedded in level with and close to the adjoining slabs with as fine a joint as possible.

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Subsequent slabs shall be laid in the same manner. After each slab has been laid, surplus cement on the surface of the slabs shall be cleaned off.

Slabs which are fixed in the floor adjoining the wall shall enter not less than 12mm under the plaster skirting or dado. The junction between wall plaster and floor shall be finished neatly and without waviness.

The surface of the flooring as laid shall be true to levels, and, slopes as instructed by the Engineer-in-Charge.

The edges of the slabs to be jointed shall be buttered with grey cement, with admixture of pigment to match the shade of the slab. The thickness of the joints should be minimum as possible. In any location, it shall not exceed 1mm.

Laying on vertical surfaces i.e skirting/ dado/ risers and vertical surfaces:

The joints shall be raked out to a depth of at least 15mm in masonry walls. In case of concrete surfaces, the surface shall be hacked and roughened with wire brushes. The base surface shall be cleaned thoroughly, washed with water and kept wet before laying is commenced.

In case of skirting, the wall surface shall be cut uniformly to the requisite depth so that the skirting face shall have the projection from the finished face of wall as shown in drawings or as required by the Engineer-in-Charge. In no case the skirting should project by more than thickness of stone.

The slabs shall be held in position by suitable temporary measure such as wooden/ bamboo supports, temporary hook etc. as approved by Engineer-In- Charge. The line of the slab shall be at such a distance from the wall that the average width of the gap shall be 12mm and at no place the width shall be less than 10mm, The outer face of the slabs shall be checked for plane and plumb and corrected. The joints shall be as fine as possible and shall be filled with neat cement paste/ grout with white cement and pigment to match the colour of the slabs. The joints shall thus be left to harden and then the rear gap between the slabs and backing surface shall be packed with average 12mm thick cement mortar 1:3 (1 cement : 3 coarse sand). Temporary supports shall be removed after the mortar filling in the gap has acquired sufficient strength.

The edges of the slabs to be jointed shall be buttered with grey cement, with admixture of pigment to match the shade of the slab. The thickness of the joints should be as minimum as possible. In any location, it shall not exceed 1mm. The top line of the skirting/ dado/ risers shall be truly horizontal and joints truly vertical.

8.2.2 Curing, Polishing and Finishing

The surface shall be kept wet for a minimum period of 7 days. The day after the slabs are laid, all joints shall be cleaned of the grout with a wire brush or trowel. The surface shall thereafter be grounded evenly using the following carborundum stones.

First grinding — medium grade (No. 80)
Final grinding — fine grade (No. 120)

If desired appearance of the finished surface is not achieved, the surface shall be further polished using requisite carborundum stones (including finer grade) as directed by Engineer-In-Charge.

Visible top surfaces of skirting/ dado etc. and edges of nosing shall be polished.

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Water shall be used profusely during grinding. After grinding the surface shall be thoroughly washed to remove all grinding mud, cleaned and mopped.

Each grinding shall be done one day after the previous grinding has been done.

After the final polish, oxalic acid shall be dusted over the surface at the rate of 33 gm per square metre sprinkled with water and rubbed hard with a 'namdah' block (pad of woollen rags).

The following day after the last grinding/ polishing, the surface shall be wiped with a moist rag and dried with a soft cloth and finished clean.

If any stone is disturbed or damaged, it shall be refitted or replaced and properly jointed and polished.

In case of pre-polished stones, any damage or unevenness on the surface shall be rectified.

9.0 GRANITE STONE FINISH

The Granite stone shall be of specified size, thickness, type, and colour (such as jet black, cherry red, elite brown, cat eye etc.). They shall be of selected quality, hard, sound, dense, homogenous in texture, free from cracks, decay, weathering and flakes, machine cut and pre-polished/ of flamed finish. The sample of granite stone slabs shall be got approved from the Engineer-in-Charge.

Granite stone shall be laid in desired pattern using stones of desired color.

This specification does not cover Granite stone wall cladding and veneering.

Dimensions:

The slabs shall be machine cut to the requisite dimensions.

Except for dimensions shown in drawing or cut sizes required to cover the balance areas along peripheries, dimensions of slabs shall be 600mm to 2500mm in length and 600mm to 1000mm in width as per drawing and as directed by Engineer-In-Charge.

If not mentioned elsewhere i.e. item description, drawings, job specifications etc 18mm thick Granite slabs shall be provided.

Tolerance of + 1% shall be allowed for the thickness. In respect of length and breadth of slabs a tolerance of + 2% shall be allowed.

Granite stone in riser, tread of staircases, counter tops shall be of single piece upto 2000mm length. Nosing shall be provided in the treads &counter tops.

Finish:

If not mentioned elsewhere i.e item description, drawings, job specifications, design basis etc Granite stone shall be pre-polished finish.

Physical properties:

Physical properties of Granite and method of testing shall be as follows:

Physical Property	Requirement	Method of test
Moisture absorption After 24 hours	Maximum 0.5%	IS: 1124

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Immersion in cold water		
Specific Gravity	Minimum 2.6	IS: 1122

9.2 Workmanship

The slabs shall be washed clean before laying.

The finished surface shall not sound hollow when tapped with a wooden mallet.

9.2.1 Laying

Laying on floor and horizontal surfaces:

Base slab on which the slabs are to be laid shall be cleaned, wetted and mopped.

Granite slabs shall be laid over average 22mm thick cement mortar 1:4 (1 cement: 4 coarse sand) bedding.

Mortar of the specified mix shall be spread under the area of each slab, roughly to the average thickness specified in the item. The slab shall be washed clean before laying. It shall be laid on top, pressed, tapped with wooden mallet and brought to level with the adjoining slabs. It shall be lifted and laid aside. The top surface of the mortar shall then be corrected by adding fresh mortar at hollows. The mortar shall be allowed to harden a bit and cement slurry of honey like consistency shall be spread over the same at the rate of 4.4 kg of cement per sqm. The edges of the slab already laid shall be buttered with grey or white cement with or without admixture of pigment to match the shade of the granite slabs.

The slab to be plaid shall then be lowered gently back in position and tapped with wooden mallet till it is properly bedded in level with and close to the adjoining slabs with as fine a joint as possible.

Subsequent slabs shall be laid in the same manner. After each slab has been laid, surplus cement on the surface of the slabs shall be cleaned off.

Slabs which are fixed in the floor adjoining the wall shall enter not less than 12mm under the plaster skirting or dado. The junction between wall plaster and floor shall be finished neatly and without waviness.

The surface of the flooring as laid shall be true to levels, and, slopes as instructed by the Engineer-in-Charge. Joint thickness shall not be more than 1mm.

Laying on vertical surfaces i.e skirting/ dado/ risers:

The joints shall be raked out to a depth of at least 15mm in masonry walls. In case of concrete surfaces, the surface shall be hacked and roughened with wire brushes. The base surface shall be cleaned thoroughly, washed with water and kept wet before laying is commenced.

In case of skirting, the wall surface shall be cut uniformly to the requisite depth so that the skirting face shall have the projection from the finished face of wall as shown in drawings or as required by the Engineer-in-Charge. In no case the skirting should project by more than thickness of stone.

The slabs shall be held in position by suitable temporary measure such as wooden/ bamboo supports, temporary hook etc. as approved by Engineer-In- Charge. The line of the slab shall be at such a distance from the wall that the average width of the gap shall be 12mm and at no place the width shall be less than 10mm, The outer face of the slabs shall be checked for plane

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and plumb and corrected. The joints shall be as fine as possible and shall be filled with neat cement paste/ grout with white cement and pigment to match the colour of the slabs. The joints shall thus be left to harden and then the rear gap between the slabs and backing surface shall be packed with average 12mm thick cement mortar 1:3 (1 cement : 3 coarse sand). Temporary supports shall be removed after the mortar filling in the gap has acquired sufficient strength.

The joints shall be as fine as possible but not more than 1mm The top line of the skirting/ dado/ risers shall be truly horizontal and joints truly vertical.

9.2.2 Curing, Polishing and Finishing

The surface shall be kept wet for a minimum period of 7 days. The day after the slabs are laid, all joints shall be cleaned of the grout with a wire brush or trowel. The surface shall be wiped with a moist rag and dried with a soft cloth and finished clean.

If any stone is disturbed or damaged, it shall be refitted or replaced and properly jointed and polished.

Any damage unevenness of the stone surface shall be rectified.

10.0 PVC FINISH

10.1 PVC Roll/ Tiles

PVC roll/ tiles shall be homogenous, of approved texture, colour, pattern, with polyurethane surface protection and shall be of class-1 category for surface spread of flame when tested in accordance with BS 476, part-7.

PVC rolls shall conform to IS: 3462 and PVC tiles shall conform to IS: 3462.

Antistatic PVC roll/ tiles shall conform to B.S.2050, Table-2.

Thickness of PVC roll/ tiles shall be 2mm.

Size of tiles shall be 600mm x 600mm.

If not mentioned elsewhere i.e item description, drawings, job specifications, design basis etc. PVC floor finish shall be with PVC rolls.

PVC roll/ tiles shall be laid in desired pattern in accordance with drawing or as directed by Engineer-In-Charge.

10.2 Workmanship

The base floor on which PVC finish is to be laid shall be prepared in accordance with PVC tile/roll Manufacturer's recommendation.

The base floor shall be made permanently smooth, firm, free of cracks and dry. If required, suitable leveling compound as recommended and approved by PVC tile/roll manufacturer shall be applied over the base floor.

PVC rolls/tiles shall be brought to the temperature of the area in which it is to be laid and stacked suitably near the site in accordance with manufacturer's recommendation.

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Laying of PVC roll/ tile shall be in accordance with manufacturer's recommendation using adhesive (Fevicol SR-505 or other adhesive as recommended by Manufacturer and approved by Engineer-In-Charge).

In case of rolls, minimum possible number of joints shall be provided.

PVC rolls shall be placed in position from one end onwards slowly without creation on any air pockets between roll and the base floor.

PVC rolls/tiles shall be placed only when the adhesive is set sufficiently for laying. After placing, the rolls/tiles shall be pressed suitably with a wooden roller weighing about 5 kg. The joint between adjacent rolls shall be thin hairline type.

PVC rolls in flooring shall he continued for skirting without any joints.

Joints, seams of the PVC flooring shall be sealed by thermo-welding the joints using PVC welding bar of matching colour.

Any excess adhesive squeezing out of the surface shall he wiped off immediately with a wet cloth. In case of such excess adhesive becoming hard, it shall be removed using suitable removing product.

After a minimum period of 24 hours after laying the rolls/tiles, the finished floor shall be cleaned with a wet cloth soaked in warm soap or detergent solution as per approved manufacturer's specifications.

11.0 ABRASION RESISTANT EPOXY FLOOR COATING SYSTEM

Abrasion resistant epoxy floor coating system shall consist of primer coat, levelling/ self smoothening screed and a top finishing coat. All components of the system shall be compatible to it's under and top layer/coat and shall be of single Manufacturer.

11.1 Material

Primer, screed and top coat shall meet the requirements of the table below :

Requirement	Primer	Screed	Top Coat
Material	Solvent free Epoxy resin.	Shall comprise of resin base, resin hardener and fillers and shall be self-smoothening.	Shall comprise of resin base, resin hardener and aggregate/ fillers , shall be self-smoothening and of approved colour.
Dry film Thickness (Minimum)	200 micron	2000 micron	2000 micron
Material coverage	Material shall be applied in quantity worked out considering minimum coverage mentioned in the data sheet (authenticated by the Manufacturer) for intended surface area for specified thickness.		
Tensile strength (Minimum Value) Material shall meet minimum value corresponding to any test method mentioned below.			
ASTM D 638	-	08 MPa at 7 days	51Mpa at 7 days

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ASTM C 307	-	-	25 MPa at 7 days
EN ISO 527	-	-	07 MPa at 7 days
BS 6319 Part-7	-	08 MPa at 7 days	10 MPa at 7 days
Compressive strength (Minimum Value) Material shall meet minimum value corresponding to any test method mentioned below.			
ASTM D695	-	40 MPa at 7 days	50 MPa at 7 days
ASTM C 579	-	-	40 MPa at 7 days
EN ISO 604	-	-	50 MPa at 7 days
BS 6319 Part-2	-	50 MPa at 7 days	50 MPa at 7 days
Abrasion resistance (Minimum Value)			
ASTM D 4060	-	-	45 Mg thickness loss/ 1000 cycle of CS 17 wheel
Shore D Hardness (Minimum Value)			
ASTM D 2240	-	75	75
Bond strength to concrete (Minimum Value) Material shall meet minimum value corresponding to any test method mentioned below.			
ASTM D 4541	1.5 MPa concrete failure	-	-
ASTMD 412	1.0 MPa concrete failure	-	-

11.2 Workmanship

The work shall be carried out by Applicator recommended by coating Manufacturer and approved by Engineer-In-Charge.

Waiting time between the coats i.e. primer, screed and top coat should be as recommended by Manufacturer.

Surface preparation:

Base concrete slab shall be grinded thoroughly (minimum upto 150-200 microns) to make the surface suitable for epoxy application and achieve desired surface profile.

Base concrete slab on which epoxy coating is to applied shall be cleaned and made free from oil, grease, foreign particles,dust, dirt, debris, loose epoxy coatings, paint, sealers etc. by using wire brushes or mechanical means.

Cutting of construction & control joints in concrete floor including Isolation joints in perimeter of column, Door & floor joint, Machine foundation should be done within 48 to 72 hours after the concrete floor is laid.

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These joints in the concrete floor shall be filled with Poly-Urathane sealant (Having Shore A hardness more than 60 and Movement Accommodation Factor (MAF) more than 10%).

Any damage or pot holes in the concrete floor shall be rectified as directed by Engineer-In-Charge.

Primer coat:

Primer coat shall be applied when the prepared surface is ready for such application.

Primer coat as per specification shall be applied by brush and in accordance with recommendations by the coating manufacturer to specified thickness and using specified coverage.

The primer will be left for minimum seven hours or as recommended by manufacturer. to dry before the application of screed.

Screed:

Screed as per specification shall be applied over the primed surface using steel trowel, mixing the ingredients in right proportion and in accordance with recommendations by the coating manufacturer to specified thickness and using specified coverage.

Spike Rollers shall be used to remove air entrapment in the screed.

The screed shall be left to get air cured for minimum time as recommended by manufacturer so asto get the floor dry and hard to take care of walking movement. Further it will be cleaned and inspected for pin holes which shall be patched up suitably.

Top coat:

Top coat as per specification and of approved colour shall be applied over the screed using steel trowel, mixing the ingredients in right proportion and in accordance with recommendations by the coating manufacturer to specified thickness and using specified coverage.

Spike Rollers shall be used to remove air entrapment.

Any damage or incorrect work/finish shall be suitably rectified.

The finished surface shall be left to dry and cure for minimum 24 hours (for human movement), 72 hours (for light weight movement), 7 days (for heavy movement) or as recommended by manufacturer.

11.3 Submittals by Contractor

Contractor shall submit following:

1. Product Data Sheet authenticated (signed and stamped) by the Manufacturer.
2. Test certificates in support of specified properties/ values.

12.0 ABRASION & IMPACT RESISTANT POLYURETHANE CONCRETE FLOOR COATING SYSTEM

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Abrasion & impact resistant Polyurethane (PU) concrete floor coating system shall consist of primer coat, screed or scratch-coat and a top finishing coat. All components of the system shall be compatible to it's under and top layer/coat and shall be of single Manufacturer.

12.1 Material

Primer, screed or scratchcoat and top coat shall meet the requirements of the table below :

Requirement	Primer	Screed or scratch-coat	Top Coat
Material	Waterborne Epoxy resin or other material compatible to other coats of the system.	Shall comprise of Polyurethane Resin base, resin hardener and fillers	Shall comprise of resin base, resin hardener and aggregate/ fillers , shall be self-smoothening, fast setting and of approved colour
Dry Film Thickness (Minimum)	50 micron	1000 micron	3000 micron
Material coverage	Material shall be applied in quantity worked out considering minimum coverage mentioned in the data sheet (authenticated by the Manufacturer) for intended surface area for specified thickness.		
Tensile strength (Minimum Value) Material shall meet minimum value corresponding to of any test method mentioned below.			
ASTM D 638	-	05 MPa at 28 days	05 MPa at 28 days
ASTM C 307	-	06 MPa at 28 days	06 MPa at 28 days
EN ISO R527	-	09 MPa at 28 days	09 MPa at 28 days
BS 6319 Part-7	-	06 MPa at 28 days	06 MPa at 28 days
Compressive strength (Minimum Value) Material shall meet minimum value corresponding to of any test method mentioned below.			
ASTM D695	-	40 MPa at 28 days	40 MPa at 28 days
ASTM C 579	-	40 MPa at 28 days	40 MPa at 28 days
BS 6319 Part-2	-	45 MPa at 28 days	45 MPa at 28 days
Abrasion resistance (Minimum Value)			
ASTM D 4060	-	-	50Mg thickness loss/ 1000 cycle of CS 17 wheel
Bond strength to concrete (minimum value) Material shall meet minimum value corresponding to of any test method mentioned below.			
ASTM D 4541	1.5 MPa concrete failure	-	-
ASTMD 412	1.0 MPa concrete	-	-

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	failure		
Impact Resistance (minimum Value)			
ASTM D 2794	-	-	8 Joules for 3mm thickness

12.2 Workmanship

The work shall be carried out by Applicator recommended by coating Manufacturer and approved by Engineer-In-Charge.

Waiting time between the coats i.e. primer, screed and top coat shall be as recommended by Manufacturer.

Surface preparation:

Base concrete slab shall be grinded thoroughly (minimum upto 150-200 microns) to make the surface suitable for epoxy application and achieve desired surface profile.

Base concrete slab on which PU coating is to applied shall be cleaned and made free from oil, grease, foreign particles,dust, dirt, debris, loose epoxy coatings, paint, sealers etc. by using wire brushes or mechanical means.

Cutting of construction & control joints in concrete floor including Isolation joints in perimeter of column, Door & floor joint, Machine foundation should be done within 48 to 72 hours after the concrete floor is laid.

These joints in the concrete floor shall be filled with Poly-Urethane sealant (Having Shore A hardness more than 60 and Movement Accommodation Factor (MAF) more than 10%).

Any damage or pot holes in the concrete floor shall be rectified as directed by Engineer-In-Charge.

Primer coat :

Primer coat shall be applied when the prepared surface is ready for such application.

Primer coat as per specification shall be applied by brush and in accordance with recommendations by the coating manufacturer to specified thickness and using specified coverage.

The primer will be left for minimum seven hours or as recommended by manufacturer to dry before the application of screed.

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Screed or Scratch coat:

Screed or Scratch-coat shall be applied over the primed surface using notched trowel, mixing the ingredients in right proportion and in accordance with recommendations by the coating manufacturer to specified thickness and using specified coverage.

Spike Rollers shall be used to remove air entrapment in the screed.

The screed shall be left to get air cured for 3-4 hours or as recommended by the Manufacturer to get the floor dry and hard to take care of walking movement. Further it will be cleaned and inspected for pin holes which shall be patched up suitably.

Top coat:

Top coat as per specification and of approved colour shall be applied over the screed or scratch coat using notched trowel, mixing the ingredients in right proportion and in accordance with recommendations by the coating manufacturer to specified thickness and using specified coverage.

Spike Rollers shall be used to remove air entrapment.

Any damage or incorrect work/finish shall be suitably rectified.

The finished surface shall be left to dry and cure for minimum 24 hours (for human movement), 72 hours (for light weight movement), 7 days (for heavy movement) or as recommended by the Manufacturer.

12.3 Submittals by Contractor

Contractor shall submit following:

1. Product Data Sheet authenticated (signed and stamped) by the Manufacturer.
2. Test certificates in support of specified properties/ values.

13.0 CHEMICAL RESISTANT NOVOLAC EPOXY FLOOR COATING SYSTEM

Chemical resistant Novolac Epoxy floor coating system shall consist of primer coat, levelling screed or scratch coat and chemical resistant top coat. All components of the system shall be compatible to it's under and top layer/coat and shall be of single Manufacturer.

13.1 Material

Primer, screed or scratch coat, coloured coat and final clear coat shall meet the requirements of the table below:

Note:

For chemical resistant top coat, any option (option 1 and option 2) mentioned in the table is acceptable.

Requirement	Primer	Screed or scratch coat	Top coat	
			Option1 – Top coloured coat over clear chemical resistance coat	Option 2 – Coloured chemical Resistance coat

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Material	Solvent free Epoxy resin	Shall comprise of resin base, resin hardener and fillers and shall be self-smoothening	Top coloured coat shall comprise of resin base, resin hardener and aggregate/ fillers , shall be self-smoothening and of approved colour Clear chemical resistance coat shall comprise of resin, hardener and shall be self smoothening and shall be solvent free.	Shall comprise of resin, hardener and shall be self smoothening and shall be solvent free and of approved colour.
Dry Film Thickness (Minimum)	200 micron	2000 micron	Total 1000 micron (500 micron for both clear and coloured coat)	500 micron
Material coverage	Material shall be applied in quantity worked out considering minimum coverage mentioned in the data sheet (authenticated by the Manufacturer) for intended surface area for specified thickness.			
Tensile strength (Minimum Value) Material shall meet minimum value corresponding to of any test method mentioned below.				
ASTM D 638	-	08 MPa at 7 days	14 MPa at 7 days	14 MPa at 7 days
ASTM C 307	-	-	-	-
EN ISO 527	-	-	-	-
BS 6319 Part-7	-	08 MPa at 7 days	-	-
Compressive strength (Minimum Value) Material shall meet minimum value corresponding to of any test method mentioned below.				
ASTM D 695	-	40 MPa at 7 days	60 MPa at 28 days/	-
ASTM C 579	-	-	85 Mpa at 28 days	-
EN ISO 604	-	-	-	-
BS 6319 Part-2	-	50 MPa at 7 days	-	-

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Abrasion resistance				
ASTM D 4060	-	45 Mg thickness loss/ 1000 cycle of CS 17 wheel	-	60 Mg thickness loss/ 1000 cycle of CS 17 wheel
ASTM D 4060	-	-	-	<0.10 Mg/ cycle of 1 Kg CS10 wheel
Shore D Hardness				
ASTM D 2240	-	70	70	70
Bond strength to concrete Material shall meet minimum value corresponding to any test method mentioned below.				
ASTM D 4541	1.5 MPa Concrete failure	-	-	-
ASTMD 412	1.0 MPa concrete failure	-	-	-

13.2 Workmanship

The work shall be carried out by Applicator recommended by coating Manufacturer and approved by Engineer-In-Charge.

Waiting time between the coats i.e. primer, screed or scratch coat, top coloured coat and top clear coat shall as recommended by Manufacturer.

Surface preparation:

Base concrete slab shall be grinded thoroughly (minimum upto 150-200 microns) to make the surface suitable for epoxy application and achieve desired surface profile.

Base concrete slab on which epoxy coating is to applied shall be cleaned and made free from oil, grease, foreign particles, dust, dirt, debris, loose epoxy coatings, paint, sealers etc. by using wire brushes or mechanical means.

Cutting of construction & control joints in concrete floor including Isolation joints in perimeter of column, Door & floor joint, Machine foundation should be done within 48 to 72 hours after the concrete floor is laid.

These joints in the concrete floor shall be filled with Poly-Urathane sealant (Having Shore A hardness more than 60 and Movement Accommodation Factor (MAF) more than 10%).

Any damage or pot holes in the concrete floor shall be rectified as directed by Engineer-In-Charge.

Primer coat:

Primer coat shall be applied when the prepared surface is ready for such application.

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Primer coat as per specification shall be applied by brush and in accordance with recommendations by the coating manufacturer to specified thickness and using specified coverage.

The primer will be left for minimum seven hours or as recommended by manufacturer. to dry before the application of screed.

Screed:

Screed as per specification shall be applied over the primed surface using steel trowel, mixing the ingredients in right proportion and in accordance with recommendations by the coating manufacturer to specified thickness and using specified coverage.

Spike Rollers shall be used to remove air entrapment in the screed.

The screed shall be left to get air cured for 7 hours or as recommended by the Manufacturer to get the floor dry and hard to take care of walking movement. Further it will be cleaned and inspected for pin holes which shall be patched up suitably.

Top coat:

Top coat as per specification and of approved colour shall be applied over the screed using steel trowel, mixing the ingredients in right proportion and in accordance with recommendations by the coating manufacturer to specified thickness and using specified coverage.

Chemical resistance top coat should be immediately applied to the prepared surface ensuring a continuous coating of uniform thickness. Stiff nylon brush or short nap roller is recommended for such application.

Chemical resistant, clear coating (option-1) shall be applied over cured top coloured coat using roller, mixing the ingredients in right proportion and in accordance with recommendations by the coating manufacturer to specified thickness and using specified coverage.

Spike Rollers shall be used to remove air entrapment.

Any damage or incorrect work/finish shall be suitably rectified.

The finished surface shall be left to dry and cure for minimum 24 hours (for human movement), 72 hours (for light weight movement), 7 days (for heavy movement) or as recommended by the Manufacturer.

13.3 Submittals by Contractor

Contractor shall submit following:

1. Product Data Sheet authenticated (signed and stamped) by the Manufacturer.
2. Test certificates in support of specified properties/ values.

14.0 CHEMICAL RESISTANT NOVOLAC EPOXY WALL COATING SYSTEM

Chemical resistant Novolac epoxy wall coating system shall consist of primer coat and a top coloured coat All components of the system shall be compatible to it's under and top layer/coat and shall be of single Manufacturer.

14.1 Material

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Primer and top coat shall meet the requirements of the table below :

Note :

For chemical resistant top coat, any option (option 1 and option 2) mentioned in the table is acceptable.

Requirement	Primer	Top coat	
		Option 1- Top coloured coat over chemical resistant clear coat	Option 2- Chemical Resistance coloured top coat
Material	Solvent free Epoxy resin	Chemical resistant clear coat shall comprise of resin, hardener and shall be self smoothening. Coloured coat shall comprise of resin base, resin hardener and shall be of approved colour	Shall comprise of resin, hardener and shall be self smoothening of approved colour.
Dry film Thickness (Minimum)	200 micron	Chemical resistant clear coat : 300 micron Coloured coat: 100 micron	400 micron
Material coverage	Material shall be applied in quantity worked out considering minimum coverage mentioned in the data sheet (authenticated by the Manufacturer) for intended surface area for specified thickness.		
Tensile strength (Minimum Value) Material shall meet minimum value corresponding to of any test method mentioned below.			
ASTM D 638	-	10 Mpa at 7 days	30 MPa at 7 days

14.2 Workmanship

The work shall be carried out by Applicator recommended by coating Manufacturer and approved by Engineer-In-Charge.

Waiting time between the coats i.e. primer, screed and top coat shall be as recommended by Manufacturer.

Surface preparation:

Base wall shall be grinded lightly or rubbed with a sand paper thoroughly to make the surface suitable for application and achieve desired surface profile.

Base on which coating is to applied shall be cleaned and made free from oil, grease, foreign particles, dust, dirt, debris, loose epoxy coatings, paint, sealers etc. using wire- brushes or mechanical means.

Putty may be applied to the base wall surface depending upon the exisiting condition of the surface and as directed by Engineer-In-Charge

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Any damage or holes or cracks in the wall shall be rectified as directed by Engineer-In-Charge.

Primer coat:

Primer coat shall be applied when the prepared surface is ready for such application.

Primer coat as per specification shall be applied by brush and in accordance with recommendations by the coating manufacturer to specified thickness and using specified coverage.

The primer will be left for minimum seven hours or as recommended by manufacturer to dry before the application of screed.

Top coat:

Top coat as per specification and of approved colour shall be applied over the screed using steel trowel, mixing the ingredients in right proportion and in accordance with recommendations by the coating manufacturer to specified thickness and using specified coverage.

Chemical resistance top coat should be immediately applied to the prepared surface ensuring a continuous coating of uniform thickness. Stiff nylon brush or short nap roller is recommended for such application.

Chemical resistant, clear coating (option-1) shall be applied over cured top coloured coat using roller, mixing the ingredients in right proportion and in accordance with recommendations by the coating manufacturer to specified thickness and using specified coverage.

Spike Rollers shall be used to remove air entrapment.

Any damage or incorrect work/finish shall be suitably rectified.

14.3 Submittals by Contractor

Contractor shall submit following:

1. Product Data Sheet authenticated (signed and stamped) by the Manufacturer.
2. Test certificates in support of specified properties/ values.

15.0 MEASUREMENTS

For measurement of floor finishing, skirting, wall finishing etc. mentioned in this specification, actual finished surface shall be measured.

No deduction shall be done for cutting or wastage of materials.

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लकड़ी के काम का मानक विनिर्देश (दरवाजे एवं खिड़कियाँ)

STANDARD SPECIFICATION FOR WOODWORK (DOORS & WINDOWS)

Rev. No	Date	Purpose	Prepared by	Checked by	Standards Committee Convener	Standards Bureau Chairman
					Approved by	
7	04.03.22	REVISED & ISSUED AS STANDARD SPECIFICATION	PIYALEE DAS	ATUL GUPTA	SAMIR DAS	SANJAY MAZUMDAR
6	27.03.17	REAFFIRMED & ISSUED AS STANDARD SPECIFICATION	PD	JS/ JKB	R.SRIVASTAVA	R. NANDA
5	15.03.12	REVISED & ISSUED AS STANDARD SPECIFICATION	PD	SD	JKB	D. MALHOTRA

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Abbreviations:

ASTM	: American Society for Testing and Materials
BS	: British Standards
CBRI	: Central Building Research Institute
EN	: European Standards
IS	: Indian Standard
ISO	: International Organization for Standardization
GI	: Galvanized Iron
NABL	: National Accreditation Board for Testing and Calibration Laboratories
NBC	: National building Code
NFPA	: National Fire Protection Association
PVC	: Polyvinyl Chloride
PUF	: Polyurethane foam
SS	: Stainless Steel
UL	: Underwriters Laboratories
CuM	: Cubic Meter

Architecture Standards Committee
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1.0 GENERAL

This standard specification lays down the requirements of wood or wood based doors and windows.

2.0 REFERENCES

2.1 The codes and standards listed below contains provisions which through reference in this specification constitute provisions of this standard specification if not specifically mentioned otherwise.

2.2 In case of similar codes of different organizations such as IS, ISO, BS, EN, BS-EN, ASTM, NFPA, NBC etc. conformity with any of the similar codes is acceptable.

2.3 Reference codes and standards:

Sl.no:	Standards	Document Title
1.	IS 204 Part-1	Specification for Tower bolts, Part-1: Ferrous metals.
2.	IS 204 Part-2	Specification for Tower bolts, Part-2: Non- Ferrous metals.
3.	IS 205	Specification for non ferrous metal butt hinges
4.	IS 208	Specification for Door handles
5.	IS 287	Specification for Permissible moisture content for timber used for different purposes
6.	IS 303	Specification for plywood for general purposes.
7.	IS 401	Specification for preservation of timber.
8.	IS 710	Specification for marine plywood.
9.	IS 848	Specification for synthetic resin adhesives for plywood (phenolic and amino plastic)
10.	IS 851 (1978)	Specification for Synthetic Resin Adhesives For Construction Work (Non-Structural) in Wood
11.	IS 1003 Part-1	Specification for Timber paneled and glazed shutters, Part-1: Door shutters
12.	IS 1141	Specification for seasoning of timber.
13.	IS 1328	Specification for veenered decorative plywood.
14.	IS 1341	Specification for steel butt hinges.
15.	IS 1659	Specification for block board.
16.	IS 1708	Methods of testing of small clear specimens of timber
17.	IS 1734 (Part 1)	Specification for method of test for plywood.
18.	IS 2202 Part-1	Specifications for wooden flush door shutters (solid core type), Part 1: Plywood face panels.
19.	IS 2202 Part-2	Specification for wooden flush door shutters (solid core type), Part 2: Particle board and hardboard face panels
20.	IS 2209	Specification for mortise locks- (vertical type)
21.	IS 2338	Code of practice for finishing of wood and wood based materials. (Part I & II)
22.	IS 2835	Specification for flat transparent sheet glass.
23.	IS 3087	Specification for particle boards at wood & other lingno cellulosic material (medium density) for general purposes.
24.	IS 3097	Specification for veneered particle boards.
25.	IS 3564	Specification for hydraulically regulated door closers.
26.	IS 4021	Specification for timber door, window and ventilator frames.

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27.	IS 4835 (1979)	Specification Polyvinyl Acetate Dispersion Based Adhesives for Wood
28.	IS 5437	Specification for figured rolled and wired glass.
29.	IS 5509	Specification for fire retardant plywood.
30.	IS 6315	Specification for floor springs (hydraulically regulated) for heavy doors.
31.	IS 11215	Specification for determining moisture content of timber and timber products.
32.	IS 12823	Specification for plywood for prelaminated particle board.
33.	IS 12896	Specification for Indian timbers for door and window shutters and frames- Classification
34.	IS 14587	Specification for plywood for prelaminated medium density fibre board.

3.0 DOORS, WINDOWS AND VENTILATORS

3.1 Doors and windows shall be complete with frame, shutter/ leaves and hardware with all operational fittings and fixtures as mentioned in the drawings, job specification, item description etc.

3.2 Doors

3.2.1 Door frames shall be as mentioned in the drawings, job specification, item description etc.

If type of door frame is not specifically mentioned in the drawings, Job specs, item description etc, pressed steel door frame as specified in specification no 6-75-0004 shall be used..

Door shutters shall be Block board flush shutter, panelled door shutter, glazed wooden door shutter, flymesh door shutter as mentioned in the drawings, job specification, item description etc.

3.3 Windows

Window frames shall be as mentioned in the drawings, job specification, item description etc.

If type of window frame is not specifically mentioned in the drawings, Job specs, item description etc, powder coated aluminum frame as specified in specification no 6-75-0004 shall be used.

Window shutters shall be panelled/ glazed shutter, flymesh shutter as mentioned in the drawings, job specification, item description etc.

4.0 MATERIAL

4.1 Timber

4.1.1 Teakwood

Teakwood shall be second class Indian Teakwood conforming to IS 12896 of good quality, well seasoned, close grained and free from defects such as cracks, dead knots, sapwood etc. Individual hard and sound knot shall not be more than 40mm in diameter and aggregate area of all the knots shall not exceed one per cent of the piece.

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4.1.2 Deodar wood/ Sal wood

Hard wood shall be first class wood conforming to IS 12896 of good quality, well seasoned and free from defects such as dead knots, cracks, sapwood etc. No individual hard and sound knot shall exceed 25mm in diameter and the aggregate area of all the knots shall not exceed 1% of the area of the piece.

4.1.3 Moisture content in timber

The maximum permissible percentage of moisture content for well seasoned timber shall be checked for every 1 cum or part thereof by electrical moisture meters as per IS: 287. Maximum permissible limit of moisture content of timber for different uses, shall be as per the procedure laid down in IS-11215, and as per table mentioned below:

No	Use	Max. Moisture content percent			
		Zone I	Zone II	Zone III	Zone IV
1.	Beams, Rafters & Posts	12	14	17	20
2.	Doors and windows a. 50 mm and above thickness b. Thinner than 50mm	10 8	12 10	14 12	16 14
3.	Flooring Strips	8	10	10	12
4.	Furniture and cabinet making	10	12	14	15

Tolerance on moisture content: Moisture content of individual samples shall be within +5 percent of maximum permissible moisture content as specified in Table above.

Seasoning of timber shall be done as per IS-1141 and preservative treatment of timber shall be as per IS 401.

4.1.4 Workmanship of wood work

Workmanship for wood and joinery shall be as per IS: 2338.

4.1.5 Painting/polishing of wood work

Painting/polishing of wood work shall be in accordance with specification No. 6-75-0007.

4.2 Plywood board

Plywood board shall be BWP grade or BWR grade as per IS 303.
Marine plywood shall confirm to IS 710.
Fire resistant plywood shall confirm to IS 5509.

Moisture content of the plywood boards when tested in accordance with IS 1734 (Part 1) shall not be less than 5 percent and not more than 15 percent. Testing shall be as per IS 303.

4.3 Particle Board

Particle board shall conform to IS 3087 and shall be flat pressed three layered or graded and of Grade 1, bonded with BWP type, Synthetic resin conforming to IS: 848. Testing shall be as per IS 3087.

4.4 Prelaminated Particle Board.

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Pre-laminated particle board shall conform to IS 12823 and shall be of Grade 1, bonded with BWP type Synthetic resin conforming to IS: 848. Testing shall be as per IS 12823.

4.5 Pre Laminated Medium density fibre Board

Pre-laminated medium density fibre board are available in two grades namely Grade I and II and shall conform to IS: 14587: 1998, laminated on both surfaces by synthetic resin conforming to IS: 848.

4.6 Block Board

Block board is a board having a core made up of strips of wood, not exceeding 30mm in width and shall conform to IS: 1659. Block board shall be of two grades: BWP grade, MR grade. The adhesives used for bonding shall be BWP type/ MR type Synthetic resin conforming to IS: 848.

4.7 Veneers

Veneers shall conform to IS 3097 (Veenered Particle board) and IS 1328 (Veenered decorative plywood).

4.8 Hardware

Reference shall be made to Clause 8.0

4.9 Glazing

Glass sheets for glazing shall be i) 4 mm thick plain glass (wt. 7.2 kg/m2) conforming IS:2835, or ii) 6.0 mm thick toughened glass conforming to IS:5437 as specified.

Glass sheets shall be free from flaws, scratches, cracks, bubbles etc.

If type of glass is not mentioned specifically, toughened glass shall be provided.

5.0 DOOR, WINDOW AND VENTILATOR FRAMES (TIMBER)

Timber for door, window and ventilator frames shall be as per IS 4021, and shall be in accordance with detailed drawings.

If not mentioned specifically, teakwood shall be used.

Timber shall be sawn in the direction of the grains. All members of a frame shall be of the same species of timber and shall be straight without any warp or bow. The wooden members of the frame shall have smooth, well planned surfaces except the surfaces touching the walls, lintels, sill etc. Rebates, rounding or moulding etc. shall be done before the members are jointed into frames.

Joints in the frame work shall be at right angles, pressed in position and shall be glued with adhesive confirming to IS 4835 or adhesive confirming to IS 851 and pinned with 10mm dia hard wood dowels or bamboo pins.

Wood work shall be painted/polished or otherwise treated as specified before fixing in position. All exposed portions shall be coated with wood primer and concealed surface by bituminous paints as per specification No. 6-75-0007.

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Before any surface treatment is applied, the wood work shall be got approved by the Engineer-in-charge. The frames shall be fixed to the masonry by 300mm x 25mm x 6mm MS hold fasts embedded in M-15 grade concrete size of 350mm x 100mm x 100mm in the hole of masonry. In case of concrete, frames shall be fixed by 12mm dia metallic anchor fasteners.

6.0 DOOR SHUTTERS

Door shutters shall be complete with all operational fittings & fixtures like hinges, overhead hydraulic door closers, Tower bolts, Locking device, handles, door stopper etc.

6.1 Block Board Flush Shutter

Block board flush shutter shall conform to IS: 2202. The shutter shall be minimum 35mm thick and shall be made of solid core block board. Width and height of the shutter shall be as shown in the drawings. The moisture content in timbers used in the manufacture of flush door shutters shall not be more than 12 percent when tested according to IS 1708.

Teak wood beading of minimum 12mm thickness fixed to the perimeter of the shutter. The shutter shall be faced on both sides with following finishes as specified and shall be factory made.

If not mentioned specifically, finishing shall be with lamination as described below.

A. 3mm thick commercial type plywood conforming to IS: 303, BS: 476 part-7 finished with two coats of approved quality and shade synthetic enamel paint over approved quality primer.

B. Approved quality 1mm thick teakwood veneering. Commercial face veneers shall conform to marine grade plywood and decorative face veneers shall conform to type I decorative plywood in IS 1328.

C. 1mm thick approved quality lamination of approved shade.

The edges of the shutters shall be painted/ varnished/ French polished as specified over a coat of primer as per specification No. 6-75-0007.

6.2 Panel Door Shutter

Panelled door shutters shall conform to IS 1003. Panel door shutters shall be minimum 35mm thick and shall consist of 100mm x 35mm teakwood stiles & top rail, 200mm x 35mm bottom rail and 150mm x 35mm lock rail and 12mm thick particle board infill panels. The infill panels shall be fixed with adhesive and moulded Teakwood beadings (minimum 12.5mm x 12.5mm size).

The shutter shall be painted with polyurethane paint or shall be varnished/ French polished as specified .

If not mentioned specifically, polyurethane paint shall be done.

6.3 Glazed Wooden Door Shutter

Glazed wooden door shutters shall confirm to IS 1003. Glazed wooden door shutter shall be minimum 38mm thick and shall consist of 100mm x 38mm Teakwood stiles and top rail, 200mm x 38mm bottom rail and 150mm x 38mm thick lock rail. 4mm thick plain glass or 6.0 mm thick toughened glass panels shall be fixed in the stiles & rails with neoperene adhesive and 12.5mm x 12.5mm moulded Teakwood beading. All the wood work shall be painted with

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polyurethane paint or shall be varnished/ French polished as specified.

If not mentioned specifically, toughened glass and polyurethane paint shall be provided.

6.4 Flymesh Door Shutter

Flymesh door shutter shall be minimum 38mm thick and shall consist of 100mm x 38mm Teakwood stiles and top rail, 200mm x 38mm bottom rail and 150mm x 38mm thick lock rail and net of SS/ galvanised MS wire gauge of IS gauge designation 856 & dia 0.56 mm fixed with moulded Teakwood beading. The shutter including wiremesh shall be painted with 2 coats of approved shade synthetic enamel paint or polyurethane paint or French polished.

If not mentioned specifically, SS net and polyurethane paint shall be provided.

7.0 WINDOW/ VENTILATOR SHUTTER/ PANEL

Window/ ventilator shutters / panels shall be glazed type with timber framing. Glass and timber shall be as specified.

If not mentioned specifically, teakwood and toughened glass shall be provided.

If flymesh shutter/ panels are specified, teakwood framing and SS nets (as specified for flymesh door shutter) shall be provided if not mentioned otherwise.

The timber framing shall be painted with synthetic enamel paint or polyurethane paint or shall be varnished/ French polished as specified .

If not mentioned specifically, polyurethane paint shall be done.

8.0 HARDWARE

8.1 Doors, windows and ventilators shall be provided with all required hardware for stability, proper operability. Hardware shall be fixed truly vertical or horizontal as the case may be.

8.2 Hardware used shall be well made, reasonably smooth, and free from all sharp edges and corners, flaws and other defects.

8.3 Hardware shall be of brass body (chromium plated) or powder coated Aluminum alloy or of Stainless Steel (SS-304) as mentioned in the drawings and as mentioned in the following table.

If not mentioned specifically, brass body (chromium plated) hardware shall be provided.

Sl. no:	Hardware	Specification
1	Hinges	Hinges shall be butt type conforming to IS. 205/ IS: 1341. Size of hinges shall be minimum 125mm long.
2	Overhead Hydraulic Door Closer:	Overhead hydraulic door closers shall be of heavy duty type and shall conform to IS: 3564.
3	Floor Mounted Door Closer	Floor mounted door closers shall be of heavy duty type and hydraulically operated and shall conform to IS: 6315
4	Mortice Lock	Mortice locks shall conform to IS: 2209.
5	Door Handles	Door handles shall conform to IS 208.
6	Aldrop	Aldrop shall be 300 mm long and minimum 18mm dia.

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7	Tower Bolt	Tower bolts shall conform to IS: 204.
8	Door Stopper	Door stoppers shall consist of heavy duty rubber shoes spring loaded type with zinc alloy pressure die cast chromium plated holders.
9	Toilet Door Latch	Toilet Door latch shall be with Vacant/occupied indicator.
10	Coat & Hat Hook	Coat & Hat hooks for Toilet doors shall be of chromium plated brass body or stainless steel.

8.4 Hardware of each shutter shall be as mentioned in drawing.

If not mentioned specifically, each door shutter shall be provided with hinges, tower bolts, overhead hydraulic door closer, door stopper, lock and door handles (on both side). Open type window/ ventilator shall be provided with handles, stays and tower bolts.

Lock and hydraulic door closer shall not be provided in toilet cubicles.

9.0 MEASUREMENT

9.1 Wood work in door/window frames shall be measured in Cu.M.
9.2 Door/window shutters shall be measured in Sq.M.
9.3 Hardware and fittings like locks, tower bolts, door closer etc. shall be counted in numbers provided.

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स्टील/अलुमिनियम दरवाजे, खिडकियों एवं रोशनदान का मानक विनिर्देशन

STANDARD SPECIFICATION FOR STEEL/ALUMINIUM DOORS, WINDOWS AND VENTILATORS

Rev. No	Date	Purpose	Prepared by	Checked by	Standards Committee Convenor		Standards Bureau Chairman
					Approved by		
8	19.10..23	REVISED & ISSUED AS STANDARD SPECIFICATION	PIYALEE DAS	ATUL GUPTA	SAMIR DAS		SANJAY MAZUMDAR
7	04.06.18	REVISED & ISSUED AS STANDARD SPECIFICATION	AG	SD	RS		R.K.TRIVEDI
6	03.03.14	REVISED & ISSUED AS STANDARD SPECIFICATION	AG	SD	JKB	S.CHATURVEDI	S.CHANDA
5	03.03.11	REVISED & ISSUED AS STANDARD SPECIFICATION	GJK	SD	JKB	VK	D. MALHOTRA

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Abbreviations:

ASTM	:	American Society for Testing & Materials
BS	:	British Standards
IS	:	Indian Standards
NBC	:	National Building Code of India
BIS	:	Bureau of Indian Standards
EN	:	European Standards
RCC	:	Reinforced Cement Concrete
VOC	:	Volatile Organic Compounds
ISO	:	International Organization for Standardization
NFPA	:	National Fire Protection Association

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1.0 GENERAL

This standard specification lays down the requirements of steel/ aluminium door, window and ventilator and rolling shutter assemblies for buildings.

2.0 REFERENCES

2.1 The codes and standards listed below contains provisions which through reference in this specification constitute provisions of this standard specification if not specifically mentioned otherwise.

2.2 In case of similar codes of different organizations such as IS, ISO, BS, EN, BS-EN, ASTM, NFPA, NBC etc. conformity with any of the similar codes is acceptable.

2.3 Reference codes and standards:

Sl.no:	Standards	Document Title
1.	IS 5	Colour for ready mixed paints and enamels.
2.	IS 325	Three phase induction motors
3.	IS 617	Specifications for aluminium and aluminium alloy ingots & castings for general engineering purposes.
4.	IS 733	Specifications for wrought aluminium and aluminium alloy bars, rods & sections for general engineering purposes.
5.	IS 737	Specifications for wrought aluminium and aluminium alloy sheet & strip for general engineering purposes.
6.	IS 1038	Specifications for steel doors, windows and ventilators.
7.	IS 1081	Code of practice for fixing and glazing of metal (steel and aluminium) doors, windows and ventilators.
8.	IS 1161	Steel Tubes For Structural Purposes - Specification
9.	IS: 1239	Steel tubes, tubulars and other wrought steel fittings — Specification
10.	IS 1285	Specifications for wrought aluminium and aluminium alloy extruded round tube & hollow sections for general engineering purposes.
11.	IS 1361	Specifications for steel windows for Industrial buildings.
12.	IS 1477 Part-2	Code of practice for painting of ferrous metals in buildings
13.	IS 1948	Specifications for Aluminium doors, windows and ventilators.
14.	IS 2062	Standard for hot rolled medium and high tensile structural steel
15.	IS 2074	Specifications for Ready mixed paint, air drying, red oxide zinc chrome, priming specification
16.	IS 2223	Dimensions of flange-mounted AC Induction motors
17.	IS 2253	Designation for types of construction and mounting arrangements of rotating electrical machines
18.	IS 2385	Designation for types of construction and mounting arrangements of rotating electrical machines
19.	IS 2553 Part-1	Safety glass – specification Part 1: General purposes
20.	IS 2835	Flat transparent sheet glass
21.	IS - 2968	Dimensions of slide rails for electrical motors
22.	IS 3548	Code of practice for glazing building

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23.	IS 3564	Specification for hydraulically regulated door closer
24.	IS 3614 Part-1	Specification for fire check doors. Part-1: Plate metal cover and rolling type
25.	IS 3614 Part-2	Specification for metallic and non metallic fire check doors. Part-2: Resistance test & performance criteria
26.	IS 4029	Guide for testing of three phase induction motors
27.	IS 4351	Specifications for steel door frames.
28.	IS 4454-part I	Steel wire for mechanical springs — specification
29.	IS 4691	Degree of protection provided by enclosure for rotating electrical machinery
30.	IS 4722	Rotating electrical machines
31.	IS 4889	Method of determination of efficiency of rotating electrical machines
32.	IS 5437	Figured rolled and wired glass
33.	IS 6248	Specifications for metal rolling shutters and rolling grill
34.	IS 6315	Specification for Floor springs (hydraulically regulated) for heavy doors.
35.	IS 6362	Designation of methods of cooling of rotating electrical machines
36.	IS: 7088	Recommended practice for anodizing aluminum and its alloys.
37.	IS 7452	Specification for hot rolled steel sections for doors, windows and ventilators.
38.	IS 12436 (1998)	Specifications for preformed rigid polyurethane (PUR) and polyisocyanurate (PIR) foams for thermal insulation..

3.0 DOOR,WINDOW AND VENTILATORS

3.1 Door, window and ventilator assemblies shall be complete with frames, shutters and required, hardware ensuring stability, safety and smooth operation.

3.2 Type of Door, window and ventilator assemblies shall be as mentioned in job specifications or construction drawings.

4.0 STEEL DOORS

4.1 Steel door assemblies shall have following components. For further details reference shall be made to EIL Standard Nos.7-75-0070, 7-75-0071 and 7-75-0074

Component	Specification
Door frame	Made of 16 SWG galvanized steel pressed and profiled to required size with 3mm thick MS flat spacers welded towards jamb size, 3mm thick MS pad plate and 18 SWG galvanized steel mortar guard welded at all hinge & lock locations. The vertical members shall be provided with 20mm x 20mm x 3mm welded MS angle threshold which shall be embedded in flooring. The hollow frame shall be filled up with concrete or any other approved suitable material.

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	Continuous "D" profile EPDM gasket shall be provided in the rebate of the frame in case of air-tight doors.
Door Shutter	Made of 18 SWG galvanized steel pressed and profiled to required size and thickness (minimum thickness – 40mm) with 3mm thick MS flat welded continuously along the perimeter of the shutter, profiled vertical stiffeners made of 18 SWG galvanized steel. The shutter shall be filled up with mineral wool (density – 48 Kg/ cum). Other approved filler material is permissible for large doors/shutters. In case of double shutters, suitable profiling/ rebating shall be done at the junction of meeting shutters for proper closure of the shutters.
Vision Panel	Vision panels shall be provided in the shutters as per project drawings. Glass shall be as mentioned in the drawings. Glass pane shall be fixed by means of 18 SWG galvanized steel "Z" angle welded to the shutter along the periphery of the opening and continuous EPDM gasket. If nothing is specified 350mm x 450mm sized vision panel with 5mm thick toughened glass shall be provided.
Louvers	Louvers shall be provided in the shutters if specified or mentioned in the project drawings. Louvers shall be made of 18 SWG galvanized steel "Z" profiled blades welded to the shutter. Louvers shall not be provided in air conditioned and pressurized area.

4.2 Hardware

Following hardware shall be provided in the steel door assemblies

Hardware	Specification
Hydraulic door closer	1 no. heavy duty hydraulic door closer confirming to IS 3564 for each shutter .
Tower/ Flush bolt	1 no. 10mm dia stainless steel Tower/ Flush Bolt (SS 304 grade, 250mm long upto 2100mm high door and 600mm long upto 2500 mm high door) for each shutter on both sides. For large size door (width- above 2000mm to 3000mm, height- above 2500mm to 3000mm), tower/ flush bolt shall be upto 1400mm long and shall be surface mounted or concealed type.
Aldrop	1 no. 16mm dia stainless steel Aldrop (SS 304 grade, 300mm long) for each shutter on both sides. For large size door (width- above 2000mm to 3000mm, height- above 2500mm to 3000mm), Aldrop shall be 400mm long.
Door Handle	1 no. 18mm dia stainless steel door handle (SS 304 grade, 200mm long) for each shutter on both sides. For large size door (width- above 2000mm to 3000mm, height- above 2500mm to 3000mm), door handles shall be 300mm long.
Door Stopper	1 no. spring loaded heavy duty door stopper for each shutter.
Hinges for shutters	100mm long stainless (SS 304 grade) steel heavy duty ball bearing hinge. Number of hinges shall be : 3 (for upto 2100mm high door)

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	4 (for upto 2400mm high door) 5 (for upto 2700mm high door) 6 (for upto 3000mm high door)

4.3 Fabrication & Installation

4.3.1 Doors shall be true to the plumb, size and design and smooth operation shall be ensured.

4.3.2 All metallic components shall be shall be welded or rigidly fixed together by mechanical means. Joints between horizontal and vertical frame members shall be mitred. All welding shall be finished smooth.

4.3.3 The frames shall be fixed to the masonry by means of 200 mm x 25 mm x 6 mm MS hold fast welded to the spacers and grouted with M-20 grade concrete in minimum 250 mm x 100 mm x 100 mm sized hole in the masonry.

4.3.4 In case of concrete, the frames shall be fixed by minimum 100 mm long, 12 mm dia metallic counter sunk type anchor fasteners through the frame and spacers.

4.3.5 Vertical frame member shall be tied together below floor finish by mean of 20mmx20mmx3mm MS Angle welded to both faces of frame.

4.3.6 40mmx150mmx3mm thick MS pad shall be welded to frame at all hinges and lock locations. 18 SWG GI mortar guard shall be provided at the back of hinges and lock.

4.3.7 The metallic surfaces shall be thoroughly cleaned of rust, mill scale, dirt, oil etc. and then finished with painting or powder coating as specified. If not specifically mentioned elsewhere, Finishing of the door assemblies shall be minimum 40 micron powder coating in desired colour. The thickness of powder coating shall be subjected to verification at site (on random basis) as directed by Engineer- in- Charge with appropriate measuring instruments supplied by contractor.

5.0 STEEL WINDOW & VENTILATORS

5.1 Steel window and ventilator assemblies shall have steel frames and shutters (glazed/with wire mesh/ with louvers as specified) with required hardware. For further details reference shall be made to EIL Standard Nos.7-75-0025, 7-75-0027 to 7-75-0032.

5.2 Steel windows and ventilators shall in general conform to IS 1038 and IS 1361.

5.3 Materials/ Assembly components

5.3.1 Frame and shutter shall be made of rolled steel sections conforming to IS: 7452.

5.3.2 Glass for glazed shutters shall be as specified. If nothing is mentioned specifically, minimum 5 mm thick toughened glass shall be provided.

5.3.3 Louvers shall be made of 18 SWG MS steel profiled sheets.

5.3.4 Wire mesh shall be of stainless steel (SS-304 grade) or wire of galvanized steel as specified. If nothing is mentioned specifically, stainless steel wire mesh shall be provided.

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5.4 Hardware

5.4.1 All hardware required for smooth operation, durability and safety such as handles, Peg-stays, hinges, closure of shutters etc. shall be provided.

5.5 Fabrication & Installation

5.5.1 Steel window and ventilator assemblies shall be true to the plumb, size and design and smooth operation shall be ensured.

5.5.2 All metallic components shall be shall be welded together. Joints between horizontal and vertical frame members shall be mitred. All welding shall be finished smooth.

5.5.3 Frames shall be fixed in the opening by means of 100mm x 15mm x 6 mm thick MS lugs @ grouted with M-20 grade concrete or with minimum 100 mm long, 12 mm dia metallic counter sunk type anchor fasteners. when fixing to steel work, mastic shall be applied to the sill of the opening and the unit shall be placed on it with the jambs and head buttered with mastic and the unit shall be fixed with special fixing dips or with nuts and bolts.

5.5.4 Where larger units are to be formed by coupling individual units, the mullions, transoms shall be bedded in mastic to ensure weather tightness. Mastic shall be applied liberally to the channels of the outside frame sections before assembly, and the two units being coupled shall be drawn together tight with clamps, the mastic being squeezed out and cut off neatly when the units shall be screwed together tight.

5.5.5 Where fixed glazing units are placed over openable units, a push fit weather bar shall be provided.

5.5.6 Before glazing, all opening parts shall be checked for their operational smoothness. The frame shall be completely cleaned and bedding putty shall be placed in the rebate before glazing. Glass then shall be cushioned into the bedding and shall be fronted with front putty in a manner so as to enable the painting to be done up to the sight line. The back putty oozing out over the glazing rebate shall be cut off square and smoothed down.

5.5.7 For panels exceeding 600 x 300 mm in size, glass shall be secured by special glazing clips inserted in holes already provided in the steel sections, before applying the front putty.

5.5.8 For glazing of very large areas, rust proof steel beading with mitred corners shall be provided with screws @ 10 cm. from each corner and @ 20 cm. apart from each other. Putty shall be provided to the face of the bead in contact with glass, in addition to back putty.

5.5.9 Side hung shutters shall be connected to the frame by means of friction hinges. The handle for side hung shutters shall be of pressed brass mounted on a steel handle plate welded to the opening shutter frame and shall not be removable easily after glazing. The handle shall have a two point nose which shall engage with a brass striking plate on the fixed frame in a slightly open as well as in a fixed position.

5.5.10 Top hung shutters shall be provided with steel butt hinges welded to the fixed frame after cutting a slot in it. Top hung casements shall be provided with peg stay of 3 holes of pressed brass; 300 mm long which when closed shall be held tightly by the locking bracket fitted to the fixed frame or to the window.

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5.5.11 All the steel surfaces shall be thoroughly cleaned free of rust, mill scale, dirt, oil etc. by sand and shot blasting and then finished with painting by priming with red oxide zinc chromate primer conforming to IS:2074 and minimum two coats of synthetic enamel paint conforming to IS:1477 (Part II). Putty shall also be provided with painting in a manner so as to seal the putty glass junction. Surfaces not meant for painting shall be cleaned of any strains of paint.

6.0 ALUMINIUM DOORS, WINDOWS AND VENTILATORS

6.1 Aluminium door, window and ventilator assemblies (glazed/with wire mesh/ with louvers as specified) shall have frames and shutters made of extruded profiled tubular Aluminium sections with required hardware. Aluminium window shutters shall be side hung or sliding type as mentioned in the design basis, job specifications or construction drawings. For further details reference shall be made to EIL Standard Nos. 7-75-0014, 7-75-0015, 7-75-0016, 7-75-0017 etc.

6.2 Materials/ Assembly components

6.2.1 Aluminium sections shall be extruded profiled tubular sections of approved Manufacturers having aluminium alloy as per IS: 733 and IS: 1285.

6.2.2 Aluminium sections shall be anodised as per IS: 7088 or electrostatically powder coated to as specified. The thickness of anodizing/ powder coating shall be subjected to verification at site (on random basis) as directed by Engineer- in- Charge with appropriate measuring instruments supplied by contractor.

6.2.3 If not mentioned specifically, the finishing of Aluminium sections shall be of powder coating in approved colour.

6.2.4 Thickness of powder coating shall be as specified. If not specified the minimum thickness shall be 50 micron.

6.2.5 Glass used for glazing shall be as specified. If not mentioned specifically minimum 5 mm thick toughened glass conforming to IS: 2835 shall be provided.

6.2.6 Louvers shall be made of 2 mm thick bend and profiled Aluminium sheets framed suitably and shall be fixed to the door/ window/ ventilator frame. The profiles and spacing of louver blades/ sheets shall ensure prevention of water ingress.

6.2.7 Wire mesh shall be of stainless steel (SS-304 grade) or wire of galvanized steel as specified. If nothing is mentioned specifically, stainless steel wire mesh shall be provided.

6.3 Hardware

6.3.1 If not specifically mentioned, following hardware shall be provided in the Aluminium door assemblies.

Hardware	Specification
Hydraulic door closer	1 no. heavy duty hydraulic door closer confirming to IS 3564 for each shutter .
Tower/ Flush bolt	1 no. 10mm dia aluminium or stainless steel (SS-304 grade), 250mm long upto 2100mm high door and 600mm long upto 2500 mm high door) for each shutter on both sides.

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	For large size door (width- above 2000mm to 3000mm, height- above 2500mm to 3000mm), tower/ flush bolt shall be upto 1400mm long and shall be surface mounted or concealed type. Finishing of Aluminium tower/ flush bolts shall be similar to aluminum profiled sections of the door assembly.
Door Handle	1 no. 10mm dia aluminium or stainless steel (SS-304 grade), minimum 250mm long for each shutter on both sides. For large doors, longer door handles shall be provided as mentioned in design basis, job specification or construction drawings. Finishing of Aluminium handles shall be similar to aluminum profiled sections of the door assembly.
Door Stopper	1 no. spring loaded heavy duty door stopper for each shutter.
Double action hydraulic floor spring	1 no for each shutter conforming to IS 6315 with double spring mechanism and pivot.
Lock	Brass body, minimum 4 lever

Note: In case of Aluminum doors, either Double action hydraulic floor spring as per IS 6315 or Hydraulic door closer as per IS 3564 will be applicable.

6.3.2 If not mentioned elsewhere, window/ ventilator assemblies shall be provided with hardware such as hinges, handles, peg-stays, tower/flush bolts, sliding mechanism etc. as required for safety, operation and durability.

6.3.3 If not mentioned elsewhere, visible hardware shall be of Aluminium having finishing similar to aluminum profiled sections of the window/ ventilator assembly.

6.4 Fabrication & Installation

6.4.1 Frames and shutters shall be square and flat, the corner of the frame being fabricated to true right angles. Aluminium sections of frames, shutters etc. shall be mitred and jointed rigidly.Details of construction of frames, shutters etc. shall be as per construction drawings and EIL standards.

6.4.2 In case of composite Door/window/ventilator units, the units shall be coupled as per drawing. Weather bar shall be provided whenever a coupling member is fitted over an external opening shutter.

6.4.3 The Aluminium frames shall be fixed in the openings by means of aluminium lugs fixed to the frame (by counter sunk brass machine screws) and grouted with concrete or by means of anchor fasteners.

6.4.4 Glazing shall be fixed to the extruded sections by means of extruded Aluminium beading. Glass panes shall be provided with EPDM gasket/rubber lining before fixing.

6.4.5 Side hung window shutters shall be fixed to the frame with pivots or hinges.

6.4.6 Gaps at the junction of opening and frame shall be filled up with weather silicon sealant.

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7.0 STEEL, ALUMINIUM ROLLING SHUTTERS

7.1 Rolling shutters shall be of steel or Aluminium as specified and shall conform to IS 6248.

7.2 Rolling shutters shall be push or pull type or operated by mechanical means or by electrical motors as specified. However, rolling shutter beyond 10 square metre in area shall not be push and pull type. If nothing is mentioned specifically, rolling shutters shall be electrical motor operated type.

7.4 Steel Rolling Shutters

7.4.1 Rolling shutter components

Components of steel rolling shutters shall have following specification.

1. Shutter

Shutter shall be built-up of inter locking lath section formed from cold rolled steel strips.

The thickness of the steel strips shall not be less than 0.90 mm for shutters upto 3.5 m width.

The lath sections shall have interlocking curls at both the edges and deep corrugation at the centre with a bridge depth of minimum 12 mm.

Each lath section shall be a continuous single piece without any welded joint.

When interlocked, the lath sections shall have a distance of 75mm rolling centers.

Each alternate lath sections shall be fitted with MS clips securely riveted at either ends to prevent lateral movement of the individual lath sections.

2. Guide channels

Guide channels shall be of mild steel . Width shall be minimum 25mm. Minimum depth (shutter clear width wise) shall be as below :

Upto 3.5 metre wide shutter – 65mm
3.5 metre to 8 metres – 75mm
8 metre and above – 100mm

The gap between the two legs of the guide channels shall be sufficient to allow free movement of the shutter and at tthe same time close enough to prevent rattling of the shutter.

3. Roller and brackets

The suspension shaft of the roller shall be heavy duty steel pipe conforming to IS 1161.

For shutter upto 6 metre width and height not exceeding 5 mitre, steel pipe of minimum 50 mm nominal bore shall be used.The shaft shall be supported on MS brackets.

Size of the brackets shall be minimum 375mm x 375mm x 3.15 for shutters upto clear height of 3.5 metre, minimum 500mm x 500mm x 10mm for clear height above 3.5 metre and upto 6.5 metre.

The suspension shaft shall be fitted with rotatable cast iron pulleys to which the shutter is attached. The pulleys and the pipe shaft shall be connected by means of pretensioned helical

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springs to counter balance the weight of the shutter and to keep the shutter in equilibrium in any partly open position.

When the width of the opening is greater than 3.5 metre, the pullies shall be interconnected with a cage formed out of MS flats and dummy rings to distribute the torque uniformly. Self aligning two row ball bearing with cast iron casing shall be provided at the extreme pully.

4. Spring

The spring shall be built of coiled type manufactured from high tensile spring steel wire or strips of adequate strength conforming to IS 4454-part I

5. Cover

Top cover shall be of mild steel sheets not less than 0.90mm thick and shall be stiffened with MS angle or flat stiffeners.

6. Hardware

Lock plates with sliding bolts, handles and anchoring rods conforming to IS 6248 shall be provided.

7. Grills

If specifically mentioned, rolling grills shall be provided in the shutter. In general, height of grill portion shall not exceed 500mm. In case of grills at multiple locations, cumulative height of the grill portions shall not exceed 1000mm. Grills shall be made of 8 mm dia MS round bars.

8. Finishing

All metallic parts shall be painted with minimum 2 coats of red oxide zinc chromate primer conforming to IS 2075. Visible parts shall be further painted with minimum two coats of synthetic enamel paint conforming to IS 2933.

7.4.2 Sizes and dimensions of various components mentioned in above clause are for normal conditions. For larger sizes and windy locations, the sizes and dimensions shall be suitably modified as directed by the Engineer-In-Chief.

7.4.3 Mechanically operated rolling shutters shall have suitable gear mechanism for smooth operation.

7.4.4 Motor operated rolling shutters shall be provided with necessary and suitable electrical fittings like motors, switch panel, switches, wires, cables etc. all complete and conforming to India standards.

7.4.5 Installation

Rolling shutters shall be installed true to the plane and fixed in the opening ensuring smooth operation as per IS 6248.

7.5 ALUMINIUM ROLLING SHUTTER

7.5.1 Aluminium Rolling Shutters shall be motorized gear operated and either double walled Insulated type or non- insulated type as specified complete with all accessories.

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The Brackets and hood cover shall conform to IS: 6248. The clear opening dimensions shall not exceed 5000 mm x 5000 mm.
The motorised rolling shutters shall be suitable for electrical motor operation (automatic) as well as manual operation with chain-wheel & hand chain. The rolling shutters shall be provided with mechanical reduction / bevel gear box for operation either mechanically or with electrical device.

7.5.2 Rolling shutter components

Components of Aluminium rolling shutters shall have following specification.

1. Shutter curtain

The shutter curtain shall be fabricated using aluminium alloy profiled slats. Aluminium alloy shall have composition of Magnesium 0.4-0.9 %, Silicon 0.3-0.7 %, Manganese 0.3% (maximum) and remaining Aluminium. Aluminium Alloy shall have UTS (Ultimate tensile strength) – 19 Kg/mm2 and Elongation – Min 7%.

The surface of these aluminium alloy shall be micro ribbed with the ends of alternate profiles fitted with end locks to prevent lateral movements of the laths.

The shutter curtains shall have interlocking aluminium alloy slats with integral bottom lock plate.

The non-insulated shutter curtains shall generally be of 80mm x18mm (minimum size) double-walled /skinned slats and the insulated shutter curtains shall be 80mm x 18mm double-walled / skinned slats (minimum size) with thermal PUF (Polyurethane Foam) insulation packing (within the walls).

The PUF packing shall be tight enough so as to fill all irregular voids and at joints. The PUF shall be non-toxic and fire retardant / self-extinguishing. The PUF density shall not be less than 40 kg / cu. meter and its thermal properties & characteristics shall be in accordance with IS-12436

2. Bracket

The bracket shall be made of mild steel conforming to relevant IS having minimum size of 350 mm x 350 mm x 3 mm thick for clear opening dimensions up to 4000 mm x 4000 mm & 350 mm x 350 mm x 4 mm thick for clear opening dimensions beyond 4000 mm x 4000 mm and up to 5000 mm x 5000 mm.

3. Shaft

MS Pipes used for the suspension shaft of the roller shall be heavy duty pipe suitable for mechanical purposes and shall conform to IS: 1239. Minimum diameter shall be 100mm.

4. Side Guides/ Channels

The side guides/ channels shall be joint less (single piece construction) made of aluminium alloy of minimum 3mm thickness. The guide rails shall be provided with PVC / Rubber / Brush seals to ensure silent shutter travel & effective sealing. Size shall be 105mm x 42mm or as required.

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5. Bottom Profile

Aluminium Bottom bar / locking plate shall be minimum 100mm high having a special non-degradable neoprene / rubber profile for providing a complete sealing upon closure.

6. Hood & Side-Motor Cover

The covers shall be made of painted GI sheets not less than 0.8 mm thick. They shall be of rectangular or cylindrical contour depending on the contour of the bracket / end plate. The hood cover shall be stiffened with angle or flat stiffeners at top and bottom edges to retain shape. The hood cover shall be fixed to the bracket plate by means of angle cleats and supported at the top at suitable intervals for preventing sagging. The hood & motor/actuator assembly - covering shall be a water-tight arrangement for ensuring no water seeps through to the internal mechanical & electrical components. Adequate slopes & guide-ways are to be provided to avoid any water accumulation on the hood-covers.

7.5.3 Finishing

All components of rolling shutter except springs and inside of guide channel shall be thoroughly cleaned with a mild non-corrosive chemical to free the substrate of rust, mill-scale, dirt, oil, etc.

Aluminium sections and other visible metallic surfaces shall be electrostatically powder coated (approved colour) to minimum 50 microns. The thickness of powder coating shall be subjected to verification at site (on random basis) as directed by Engineer- in- Charge with appropriate measuring instruments supplied by contractor.

All coated surfaces shall be free from flaking / peeling. Each shutter shall be clearly and legibly marked with the Manufacturer's Name or Trade Mark / Shutter Size / Year of Manufacture.

7.5.4 Electrical Operation of Rolling shutter

The rolling shutters shall be operated by electric motor actuators - operating on 415 Volts, 3-phase or 240 Volts, 1-phase - 50 Hz. AC supply.

All associated electrical components for motor control shall be compatible for working at the above mentioned voltage profile. The motor shall be of side-mounted type installed in alignment with the roller shaft inside the shaft-hood or adjacent to the rolling-shutter box. In either case, the rolling shutter motor & actuator assembly enclosure shall have IP-55 (or better) ingress protection against water & dust. The rolling shutter motor shall be rated for intermittent periodic duty (Duty Type – S3) or intermittent periodic duty with starting (Duty Type – S4). Arrangements shall also be made for emergency manual operation of the rolling shutter with mechanical reduction-gear, wheel & hand-chain override assembly - in the event of failure of the electric equipment or electricity.

For buildings in safe area, all electrical equipment's shall be in weatherproof executive with IP-54 protection for direct drive and IP 44 Protection for indirect drive ingress protection.

For buildings in hazardous are, if specified in Tender/MR, following shall be ensured:

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1. For hazardous area buildings, all electrical equipment's such as motor, actuators, push button control stations, PDB/Local panels etc. shall be flameproof type Exd suitable for applicable Gas Group and Temperature Class.

2. All hazardous area equipment shall have test certificates issued by recognised independent test house (CIMFR/ERTL/BASEEFA/LCEI/UL/FM/KLP or equivalent). All indigenous equipment shall conform to Indian standards and shall be certified by recognised testing agencies. All equipment (indigenous & imported) shall have valid statutory approval (e.g. PESO/DGMS etc.) as applicable for the specified location. All indigenous flameproof equipment shall have valid BIS license and marking as required by statutory authorities.

Make of all hazardous area equipment (for hazardous area building) and weatherproof equipment (for safe area building) shall be approved by owner / Engineer-In-Charge before selection & order placement. The motor shall be heavy duty type & sturdy - suitable for lifting shutters weighing up to 600 kilograms. The motors shall have BIS or equivalent approvals & relevant performance guarantee track records. The motor drive unit for the rolling shutter shall be complete with Drive-Chain / Gear, Plate-Wheel, Bush, Drive-Sprockets, mounting base-plates, integrated safety brakes & limit-switches, etc. Ideally all metallic components of the drive system shall be constructed out of non-corrosive high-grade stainless steel.The motor speed shall be regulated with gear drives such that the speed of the shutter (during up & down movement) for indirect drive shall be up to 0.05 m/s .The motor operating time within the intermittent duty cycle shall be long enough to ensure that the motor does not get heated up excessively, thereby resulting in tripping and / or damaging of motor windings for up to three continuous up & down (full height traverse) operation of the rolling shutter.

The motor shall be automatically protected from thermal overload by internal thermal probes / overload relays. The motor shall be compact and motor operation shall be with minimum of noise & vibration. Ideally, the motor controls (including motor-starter / over-load protections / contactors / etc) shall be placed within the motor-actuator enclosure.

The automation of the shutter shall have local control with a directional push button control station flush-mounted with the wall-surface, with 3 buttons marked UP, DOWN and STOP. The STOP Button must be of Mushroom-head type with lockable arrangement & push to release type. All the push-buttons shall be of latching type (single press & release) – without the need to continuously press the buttons during the traverse time of the shutter. The shutter traversing shall be prohibited if the STOP button is pressed & locked. The push-button unit shall have an enclosure with a minimum degree of IP-44 dust & water protection

7.5.5 Installation

Rolling shutters shall be installed true to the plane and fixed in the opening ensuring smooth operation as per IS 6248.

All fixing / mounting accessories shall be made of stainless steel only.

All necessary control wiring / cabling for the side-motor with the limit switches / controller panel shall be done with 3 / 5 core X 2.5 sq. mm. PVC insulated multi-stranded Copper Conductor armoured and flame retardant Low Smoke (FRLS) cables. All power cabling from PDB to the side motor shall be with 3 core X 4 sq. mm (minimum) Cu conductor, FRLS cable . Only fire rated & PVC insulated cables / wires with multi-stranded copper conductors shall be used for internal wiring of the motor / actuator / push-button. All cabling & wiring shall be concealed type with heavy-duty PVC conduits. Works include termination of the incoming power cable from the owner's Main Power Distribution Board to the motor / actuator /

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controller unit & all outgoing power & control cables from the controller panel to individual electrical components with supply & installation of cable glands & copper lugs of adequate sizes.

7.5.6 Mandatory & commissioning spares

The entire consignment of motorized rolling shutters for the shed / buildings shall be supplied with the following mandatory spares for each rolling shutter.

1. One set of the complete motor / actuator drive unit (of each rating) – duly assembled with limit switches, drive-chain / worm-gear, plate-wheels / bush / sprockets & mounting base-plates.
2. One set of motor controller (PCB / Controlling Unit).

8.0 MEASUREMENT

Doors, windows, ventilators and rolling shutters shall be measured in the following manner.

Pressed steel frames for doors	Length (vertical and horizontal members) in Running metres (RM)
Pressed steel door shutter	Actual shutter area in square metre (SqM)
Steel Windows/ ventilators with MS sections	Actual area of window/ ventilator in square metre (SqM)
Aluminium Doors/windows/ventilators	Aluminium sections by weight (Kg) Glazing - Actual area in square metre (SqM)
Rolling shutters	Actual area of Rolling shutter in square metre (SqM)
Loose hardware	In numbers

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पलस्तर एवं पॉइन्टिंग का मानक विनिर्देशन

STANDARD SPECIFICATION FOR PLASTERING & POINTING

Rev. No	Date	Purpose	Prepared by	Checked by	Standards Committee Convener	Standards Bureau Chairman
					Approved by	
7	31.05.23	REVISED & ISSUED AS STANDARD SPECIFICATION	SANDEEP SHARMA	GURSHARAN JEET KAUR	SAMIR DAS	SANJAY MAZUMDAR
6	31.05.17	REAFFIRMED & ISSUED AS STANDARD SPECIFICATION	AM	JS/ JKB	R. SRIVASTAVA	R. NANDA
5	05.04.12	REVISED & ISSUED AS STANDARD SPECIFICATION	AM	SM	JKB	D. MALHOTRA
4	21.03.07	REVISED & ISSUED AS STANDARD SPECIFICATION	SD	JKB	ARVIND KUMAR	V.CHATURVEDI
3	10.03.99	REAFFIRMED AS STANDARD SPECIFICATION	SD	MLB	SCJ	AS
2	16.03.94	REVISED & ISSUED STANDARD SPECIFICATION	JS	JS	AKG	AS

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Abbreviations:

ASTM	:	American Standards of Testing of Materials
BS	:	British Standards
EN	:	European Standards
IS	:	Indian Standards
ISO	:	International Organization for Standardization
NBC	:	National Building Code of India

Architecture Standards Committee

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Mr. Sandeep Sharma
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1.0 GENERAL

1.1 This specification covers requirements of plastering and pointing in civil work, on building or Architectural or structural elements and as interior or exterior finishing or decorations etc.

1.2 Unless otherwise specifically mentioned in design basis, job specification, drawings, item descriptions etc. all masonry, block work, RCC surfaces shall be plastered.

2.0 REFERENCES

The codes and standards listed below contain provisions, which through reference in this specification constitute provisions of this standard specification, if not explicitly mentioned otherwise.

2.1 In case of similar codes of different organizations such as IS, ISO, BS, EN, BS-EN, ASTM, NBC etc. conformity with any of the similar codes is acceptable.

2.2 Reference codes and standards:

Standards	**Document Title**
IS: 1542	Sand for Plaster - Specification
IS: 1661	Code of Practice for application of cement and cement- lime plaster finishes
IS: 2114	Code of practice for laying in-situ terrazzo floor finish
IS: 2250	Code of Practice for Preparation and Use of Masonry Mortars
IS: 2386 (Part 2)	Methods of test for aggregates for Concrete Part II: Estimation of Deleterious materials and organic impurities
IS: 2402	Code of Practice for External Rendered Finishes
IS: 2542 (Part 1)	Methods of test for Gypsum plaster, Concrete and products, Part I - Plaster and Concrete
IS: 2547 (Part 2)	Specification for Gypsum building plasters, Part II - Premixed lightweight plasters.
IS: 2645	Integral waterproofing compounds for Cement Mortar and Concrete – Specification.
IS: 4031 (Part 1)	Methods of physical tests for hydraulic cement.

3.0 TYPE AND THICKNESS OF PLASTERING

3.1 Plastering shall be of plain cement plastering or plain cement plastering with waterproofing compound or Gypsum plastering or ready-mix plastering as mentioned in design basis, job specification, drawings, item descriptions etc.

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3.2 Unless otherwise specified in design basis, drawings, item descriptions, job specifications etc, the external surfaces shall be plastered with or plain cement plastering with waterproofing compound and internal surfaces shall be plastered with plain cement plastering.

3.3 Unless otherwise specified in design basis, drawings, item descriptions, job specifications etc, thickness of plastering shall be as per following table.

Type of plaster	Surface	Average thickness
Plain cement Plaster	Plumb surface of the internal masonry/ all block work walls & RCC Columns coming in line (flush) with this side of wall.	12 mm
Plain cement Plaster	Rough side of the internal masonry/ all block work walls & RCC Columns coming in line (flush) with this side of wall.	15mm
Plain cement Plaster with waterproofing compound	External surface	18 mm
Plain cement Plaster	Internal RCC surface	06 mm
Gypsum Plaster	Plumb surface of the internal masonry/ all block work walls & RCC Columns coming in line (flush) with this side of wall.	12 mm
Gypsum Plaster	Rough side of the internal masonry/ all block work walls & RCC Columns coming in line (flush) with this side of wall	12 -15 mm
Gypsum Plaster	Internal RCC surface	06 mm
Ready mix plaster	Similar to Plain cement plaster	Similar to plain cement plaster

Note:
However, if the undulation in the surface is beyond proper finishing with specified thickness of plaster, extra thickness of plaster shall be applied as required for proper finish without any extra cost.

4.0 MATERIALS

4.1 Cement

Cement shall conform to 'Standard Specification for Civil and Structural Works- Materials' (Structural Specification no. 6-68-0002)

4.2 Sand

Sand for plaster and pointing shall consist of natural sand, crushed stone sand or crushed gravel sand or a combination of any of these and shall conform to IS: 1542. Sand shall be hard, durable, clean and free from adherent coatings and organic matter and shall not contain any appreciable amount of silt, day bails or pellets. Sand shall not contain harmful impurities such as iron pyrites, coal particles, lignite, mica shale etc in such form or in quantities as to affect adversely the hardening, strength or durability of the mortar.

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The maximum quantities of clay, fine silt, fine dust and organic impurities in the sand shall not exceed the following limits:

Clay, fine silt and fine dust when determined in accordance with IS 2386 (Part 2):

a. In natural sand or crushed gravel sand & crushed stone sand: Not more than 5% by mass

b. Organic impurities when determined in accordance with IS 2386 (Part 2): Color of the liquid shall be lighter than that indicated by standard specified in IS 2386 (Part-2)

Grading of sand for use in Plaster shall conform to IS 1542 (as below)

IS sieve designation	**Percentage passing**
10mm	100
4.75mm	95 to 100
2.36mm	95 to 100
1.18mm	90 to 100
600 micron	80 to 100
300 micron	20 to 65
150 micron	0 to 15

4.3 Water

Water for plastering and pointing shall conform to `Standard Specification for Civil and Structural Works- Materials' (Structural Specification no. 6-68-0002)

4.4 Cement Mortar

Cement mortar shall conform to `Standard Specification for Civil and Structural Works- Brick Masonry' (Structural Specification no. 6-68-0009) unless otherwise mentioned.

4.5 Cement Mortar with Waterproofing Compound

Waterproofing compound shall conform to IS: 2645 of approved make.

4.6 Gypsum Plaster

Gypsum plaster shall conform to IS 2542 (Part I) and IS 2547 (Part II). The plaster shall consist of retarded hemihydrate gypsum plaster and light weight aggregate. Other additions may be incorporated to impart desired properties.

4.7 Ready Mix Plaster

Ready Mix Plaster shall be ready mix cement plaster rendered with polymer additives, well graded sand and fillers. Compressive strength of the material shall be minimum 7.5 Mpa in 28 days as per IS: 2250.

Ready Mix Plaster shall be pre packed material requiring only water addition at site.

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5.0 PLAIN CEMENT PLASTER

5.1 The mortars of specified mix as per the specifications of 'Cement Mortar' (Refer clause 4.4) shall be used for plain cement plaster. Proportions of ingredients of cement mortar for various thicknesses of plaster shall be as per following table:

20mm thick plaster	1 cement: 6 sand (by volume), in two layers
18mm thick plaster	1 cement: 6 sand (by volume), in two layers
15mm thick plaster	1 cement: 4 sand (by volume)
12mm thick plaster	1 cement: 4 sand (by volume)
06mm thick plaster	1 cement: 4 sand (by volume)

6.0 CEMENT PLASTER WITH WATERPROOFING COMPOUND

6.1 The mortars of specified mix as per the specifications of 'Cement Mortar' (Refer clause 4.4) shall be used. Proportions of ingredients of cement mortar for various thicknesses of plaster shall be as per clause no 5.1

6.2 Waterproofing compound shall be mixed to cement mortar as recommended by the approved Manufacturer but @ 3% by weight as minimum.

7.0 SAND FACE PLASTER

7.1 Sand face plaster shall be 20mm thick consisting of 13 mm thick under layer and 7 mm thick top layer.

7.2 Under layer shall be 13 mm thick (1 cement: 4 sand, by volume) plain cement plaster.

7.3 Top layer shall be 7 mm thick (1 cement: 2 sand, by volume, granule size 2 to 2.5mm) plain cement plaster.

7.4 The mortars of specified mix as per the specifications of 'Cement Mortar' (Refer clause 4.4) shall be used for plain cement plaster.

7.2 Application of sand face plaster shall be as described in `two-layer plaster work' in clause no. 9.7. The surface of the sand face plaster shall be finished rough with sponge or as directed by the Engineer-in-charge.

8.0 EXPOSED AGGREGATE FINISH

8.1 Exposed aggregate finish plaster shall consist of 12 mm thick under layer and 20 mm thick top layer.

8.2 Under layer shall be 12 mm thick plain cement plaster (1 cement: 4 coarse sand, by volume) finished rough. The mortars of specified mix as per the specifications of 'Cement Mortar' (Refer clause 4.4) shall be used for plain cement plaster. The under layer shall be applied in accordance with `One layer plaster work' described in clause no. 9.6.

8.3 Top layer shall be 20 mm thick admixture of white cement and grey cement (mix. ratio 1:1 by volume) mixed with white/colored marble chips/pebbles (as required for desired shade/ colour

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of the finished surface) of 6mm to 12mm nominal size. Mix ratio shall be 1 cement: 1 marble chips/pebbles by volume. Marble dust @ 15% by volume with pigment (conforming to IS:2114, as required for obtaining desired colour/ shade of the finished surface) shall be added to the admixture.

The pebbles to be used shall be well washed and drained. The admixture shall be thrown wet on to the under layer while it is still plastic using strong whipping motion at right angles to the face of the wall.

One coat of neat cement slurry @ 2.75 kg cement per square meter of area shall be applied on to the under layer to receive the top layer.

The whole plastering shall be laid in panels of maximum 1200mm x 1200mm size or as per drawing with 12mm x 20mm grooves in between formed by holding removable wooden batons over the under layer.

Loose mortar etc. on the top surface shall be cleaned/removed by brushing/washing/spraying with water jet after initial setting of mortar.

9.0 APPLICATION OF PLASTER

9.1 Finishing

Plastered surface shall be plumb, without any undulations and defects such as cracks etc. Patterns/ grooves etc. shown in the drawing shall be provided. Any cracks, damages, any part of work which sound hollow when tapped or found damaged or defective otherwise shall be cut out in rectangular shape and redone as directed by Engineer-in-charge

9.2 Preparation of Background Surface

9.2.1 The background surface shall be cleaned of all dust, loose mortar droppings, traces of algae, efflorescence and other foreign matter by water or by brushing.

9.2.2 Smooth surfaces shall be roughened by wire brushing or hacking for non-hard and hard surfaces respectively.

9.2.3 Projections on surfaces shall be trimmed wherever necessary to get even surfaces. In case of brick/stone masonry, raking of joints shall be carried out wherever necessary.

9.2.4 The background surface shall be allowed to dry out for sufficient period before carrying out the plaster work. The background surface shall not be soaked but only damped evenly thereafter before applying the plaster.

9.2.5 In case of concrete work, projecting blurs of mortar formed due to the gaps of joints in shuttering shall be removed. Such surface shall be scrubbed clean with wire brushes. The surface shall be pock marked with a pointed tool at spacing of not more than 50 mm centers, the pocks being made not less than 3 mm deep to ensure a proper key for the plaster. The surface shall be washed off and cleaned of all oil, grease etc. and well wetted before the plaster is applied.

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9.3 Sequence of Operations

9.3.1 The surfaces to be plastered, shall first be prepared as described in `Preparation of background surface' in clause no 9.2

9.3.2 For external plaster, the plastering operations shall be started from the top floor and carried downwards.

9.3.3 The first under layer shall then be applied to ceilings. After the ceiling plaster is complete and scaffolding for the same removed, plastering on wall shall be started.

9.3.4 After a suitable time interval, the secondary layers if required shall be applied. After a further suitable time interval, the finishing coat shall be applied first to the ceiling and then to the walls.

9.3.5 Plastering of cornices, decorative features, etc. shall be completed before the finishing coat is applied.

9.4 Scaffolding/Staging

Scaffolding/staging for plastering/pointing shall be as per `Standard Specification for Civil and Structural Works- Brick Masonry' (Structural Specification no. 6-68-0009)

9.5 Chicken Wire Mesh

150mm wide, closely knit, 20-gauge chicken wire mesh stretched tight and fixed with G.I. "U" type nails shall be provided at all the masonry/ block work and RCC joints.

9.6 One Layer Plaster Work

9.6.1 To ensure even, specified thickness, plaster of 150 mm x 150 mm shall be first applied horizontally and vertically at not more than 2-meter interval over the entire surface to serve as gauges.

9.6.2 The surface of these gauged areas shall be truly in the plane of the finished plaster surface. The mortar shall be brought to true surface by working with a wooden straight edge reaching across the gauges with small upward and sideways movements at a time.

9.6.3 Finally the surface shall be finished off true with a trowel or wooden float to obtain a smooth texture. Excessive trowelling or overworking the float shall be avoided.

9.6.4 All corners, arises. angles and junctions shall be truly vertical/ horizontal and shall be carefully finished. Rounding or chamfering of corners, arises, junctions etc. shall be carried out with proper templates to the size required.

9.6.5 In suspending the work, the plaster shall be left cut clean to line, both horizontally and vertically. When recommencing the plastering, the edge of the old work shall be scrapped clean and wetted before plastering the adjoining area.

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9.6.6 Plastering work shall be closed on the border of the wall and nearer than 150 mm to any corners or arises and shall not be closed on the body of the features such as plaster bands, cornices nor at the corners or arises.

9.7 Two Layer Plaster Work

9.7.1 The first or under layer of the specified thickness shall be applied as described in clause no. 9.6.

9.7.2 Before the first coat hardens, surface of it shall be beaten up by edges of wooden tapers and close dents shall be made on the surface. The subsequent coat shall be applied after this coat has been allowed to set for 3 to 5 days depending upon weather conditions. The surface shall not be allowed to dry during this period.

9.7.2 The second layer shall be complete to the specified thickness in the same manner as for first layer.

9.8 Curing of plaster

Curing shall be started 24 hours after finishing the plaster. The plaster shall be kept wet for a period of 7 days. During this period the plaster shall be suitably protected from all damages at the contractor's expense by such means as approved by the Engineer-in-charge. The date of execution of plastering shall be marked on the plastering to ensure the proper duration of curing.

10.0 GYPSUM PLASTER

10.1 Gypsum plastering shall be done using premixed gypsum plaster and aggregates as mentioned in clause no. 4.6

10.2 Preparation of Gypsum plaster shall be in accordance with approved Manufacturer's standard and recommended practice. The powder (gypsum plaster) shall be mixed with clean water in clean plastic buckets to avoid mixing with impurities, ensuring thorough mixing by help of mixing rod so as to avoid formation of lumps and unmixed residues. The water to plaster ratio should be maintained as per approved manufacturer's specification.

10.3 Application of Gypsum plaster shall be in accordance with clause nos. 9.1 to 9.7

10.4 Curing

There is no requirement of curing. Gypsum plaster dries in 3 days, after which painting can be done directly over the finished surface.

11.0 READY MIX PLASTER

11.1 Ready-mix plastering shall be done using pre packed plaster ingredients as mentioned in clause 4.7

11.2 The powder (ready mix) shall be mixed with clean water, preferably in clean plastic buckets to avoid mixing with impurities, ensuring thorough mixing by help of mixing rod or mechanical

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stirring for 2-3 minutes as to avoid formation of lumps and unmixed residues. The water to plaster ratio shall be maintained as per approved manufacturer's specification.

11.3 Application of ready-mix plaster shall be in accordance with clause nos. 9.1 to 9.7. The plaster mix shall be applied within the time (after preparation of the mix) recommended by the approved Manufacturer. Curing shall be done in accordance with clause no 9.8 or as recommended by the approved Manufacturer as approved by the Engineer-In-Charge.

11.4 Curing

Curing shall be done in accordance with clause no 9.8 or as recommended by the approved Manufacturer and as approved by the Engineer-In-Charge.

12.0 POINTING

Pointing shall be of the type specified such as flush, cut or weather struck, raised and cut etc.

12.1 Preparation of Base Surface

The joints shall be raked to such a depth that the minimum depth of the new mortar measured from either the sunk surface of the finished pointing or from the edge of the brick shall be less than 20 mm.

12.2 Cement Mortar

Cement Mortar shall be in accordance with the specifications of cement mortar described in clause no. 4.4.

12.3 Application of Mortar and Finishing

The cement mortar (1 cement: 4 sand, by volume) shall be pressed into the raked out joints with a pointing trowel according to the type of pointing specified. The mortar shall be spread over the corner edges or surfaces of the masonry. The pointing shall then be finished with the pointed tool. The superfluous mortar shall be cut off from the edges.

12.4 Flush Pointing

The cement mortar shall be pressed into joints and shall be finished off flush and leveled. The edges shall be neatly trimmed with trowel and straight edges.

12.5 Cut or Weather Struck Pointing

The mortar shall first be pressed into joints. The top of the horizontal joints shall then be neatly pressed back by about 15 mm with the pointing tool so that the joint is sloping from top to bottom. The vertical joint shall also be similarly pointed. The junctions of vertical joints with the horizontal joints shall be at true right angles in case of brick & coursed rubble masonry.

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12.6 Raised and Cut Pointing

This type of pointing shall project from the wall facing with its edges cut parallel so as to have a uniformly raised band about 6 mm and width 10 mm more as directed. The pointing shall be finished to a smooth but hard surface.

12.7 Curing

Curing shall be as described in clause no. 9.8

13.0 MEASUREMENT

13.1 Plastering shall be measured by the area of actual plastered surface.

13.2 Pointing shall be measured by the actual area of the surface on which pointing is done.

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STANDARD SPECIFICATION FOR ROOF TREATMENT

Rev. No	Date	Purpose	Prepared by	Checked by	Standards Committee Convenor	Standards Bureau Chairman
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Abbreviations:

ASTM	:	American Standards of Testing of Materials
BS	:	British Standards
EN	:	European Standards
IS	:	Indian Standards
ISO	:	International Organization for Standardization
NBC	:	National building Code
NFPA	:	National Fire Protection Association
NABL	:	National Accreditation Board for Testing and Calibration Laboratories
PUF	:	Polyurethane
CuM	:	Cubic Meter
GSM	:	Grams per square meter
PCC	:	Plain cement concrete
Sq.M	:	Square meter
MPa	:	Mega Pascal

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3.0 ROOF WATER PROOFING SYSTEMS

3.1 General

3.1.1 Roof waterproofing system shall be a complete system including base preparation and top finishing ensuring leak proof, water tight roof/ terrace surface and efficient rain water drainage. Following types of roof waterproofing systems shall be provided as specified in design basis, job specifications, item descriptions, drawings etc.

1. Polymer modified bituminous (APP) roof waterproofing system.
2. Polyurethane (PU) coating (single component) waterproofing system.
3. Waterproofing cum insulation system.

If roof waterproofing system is not mentioned specifically, the roofing treatment system shall be provided as below :

1. Polymer modified bituminous (APP) roof waterproofing system shall be provided in case of buildings which are not centrally air conditioned.
2. For centrally air conditioned buildings, Waterproof cum insulation system shall be provided.

3.1.2 The roof waterproofing system shall be leak-proof, water tight, properly finished and levelled with necessary slope for efficient roof water drainage.

3.1.3 All waterproofing materials of the system shall be from a single approved Manufacturer. Mix of waterproofing materials procured from different Manufacturers shall not be permitted.

3.1.4 The roof waterproofing system shall be laid by agencies approved by Engineer-In-Charge.

4.0 POLYMER MODIFIED BITUMINOUS (APP) ROOF WATER PROOFING SYSTEM

APP (Atactic Polypropylene polymer) roof waterproofing system shall consist of cement concrete screed on prepared base, primer coat, Bituminous (APP) membrane and a top protective finishing layer.

4.1 Materials

4.1.1 Cement concrete screed

Cement concrete screed shall be of PCC (plain cement concrete – 1 cement : 2 coarse sand : 4 aggregate) or M15 grade concrete .Thickness of the screed shall be minimum 50 mm. Thickness at various locations of the roof/ terrace shall be as required for maintaining required slope to ensure proper roof drainage. If not mentioned specifically otherwise, slope of the finished screed shall be 1: 100.

4.1.2 Primer

Bituminous solvent based primer of approved quality conforming to IS: 3384 or ASTM D41.

4.1.3 Bituminous membrane for waterproofing

Bituminous membrane for waterproofing shall be 4 mm thick prefabricated polymer (APP-Atactic Polypropylene) modified and shall be reinforced with nonwoven Polyester and shall have following properties.

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1.0 GENERAL

This standard specification lays down requirements of water proofing treatment for RCC roofs and terraces of buildings.

2.0 REFERENCES

2.1 The codes and standards listed below contain provisions which through reference in this specification constitute provisions of this standard specification if not specifically mentioned otherwise.

2.2 In case of similar codes of different organizations such as IS, ISO, BS, EN, BS-EN, ASTM, NFPA, NBC etc. conformity with any of the similar codes is acceptable.

2.3 Reference codes and standards:

Standards	Document title
ASTM C165	Standard Test Method for Measuring Compressive Properties of Thermal Insulations
ASTM C177	Standard Test For Measuring the Thermal Conductivity of a Material by Means of a Guarded-hot-plate Apparatus.
ASTM C423	Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
ASTM C518	Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
ASTM C836	Standard Specification for High Solids Content, Cold Liquid- Applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course
ASTM C1363	Standard Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus.
ASTM D5	Standard Test Method for Penetration of Bituminous Materials
ASTM D36	Standard Test Method for Softening Point of Bitumen (Ring-and-Ball Apparatus)
ASTM D41	Standard Specification for Asphalt Primer Used in Roofing, Damp-proofing, and Waterproofing
ASTM D146	Standard Test Methods for Sampling and Testing Bitumen- Saturated Felts and Woven Fabrics for Roofing and Waterproofing
ASTM D412	Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension
ASTM D570	Standard Test Method for Water Absorption of Plastics
ASTM D1621	Standard Test Method for Compressive Properties of Rigid Cellular Plastics
ASTM D1622	Standard Test Method for Apparent Density of Rigid Cellular Plastics
ASTM D1623	Standard Test Method for Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics
ASTM D1970	Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection
ASTM D2842	Standard Test Method for Water Absorption of Rigid Cellular Plastics
ASTM D6226	Standard Test Method for Open Cell Content of Rigid Cellular Plastics
ASTM D7425	Standard Specification for Spray Polyurethane Foam Used for Roofing Applications
IS 3384	Bitumen primer for use in waterproofing and damp-proofing
IS12432 (Part-3)	Indian Standard Application of Spray Applied Insulation - Code of Practice

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Property	Value	Testing Method
Thickness	4 mm	ASTM D751
Penetration at 25deg. C, 100g, 5 seconds	25 +/- 5 mm	ASTM D5
Softening point	110 to 155 deg C	ASTM D36
Low Temp. Flexibility	-2 deg C to -10 deg C	ASTM D1970
Tensile strength		
- Longitudinal	> 500 N/ 5cm	ASTM D146
- Transverse	> 450 N/ 5cm	ASTM D146
Elongation		
- Longitudinal	> 40%	ASTM D146
- Transverse	> 40%	ASTM D146
Water absorption	0.12% max.	ASTM D570

4.1.4 Top protective finishing layer

Top protective layer shall be of PCC (plain cement concrete – 1 cement : 2 coarse sand : 4 aggregate) or M15 grade Concrete with 24 SWG chicken wire mesh. Thickness of the layer shall be minimum 50 mm.

4.2 Workmanship

4.2.1 The waterproofing system shall be laid in accordance with approved Manufacturer's standard practice as approved by Engineer-In-Charge and following clauses.

4.2.2 In order to avoid damages in the roofing system, the system shall be laid after the pedestals, structures etc. to be placed on the roof/ terrace are done.

4.2.3 Any pipes or openings / protrusions which are required to be provided on the roof shall be provided prior to taking up the base surface preparation.

4.2.4 The system application shall be done at suitable weather condition as mentioned/ recommended in the product data sheet etc. of the materials / system.

4.2.5 Base surface preparation

a. The entire base surface of the roof/ terrace shall be thoroughly cleaned with wire brush or mechanically and all foreign matter including loose concrete etc. shall be removed.

b. Well defined cracks on the surface shall be cut to "V" section, cleaned and filled up with polymerised mastic or a paste of liquid single component elastomeric waterproofing and fine sand mix or with Polysulphide Sealant.

c. Potholes or depressions shall be filled up after removing weak cement concrete or cement plaster etc. with PCC (1 cement :1.2 coarse sand :3.5 stone aggregate of 6mm & down size by volume,) or M15 grade concrete laid over a coat of neat cement slurry @2.75 Kg of cement per Sq.M of area, to achieve a smooth prepared surface.

d. The finished surface shall be perfectly dry and any dampness should be allowed to evaporate

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4.2.6 Screed

a. PCC or M15 grade concrete screed shall be laid over prepared base surface in required slope. If not mentioned specifically otherwise, slope of the finished screed shall be 1: 100.

b. Continuous angular fillet/coving of minimum 75mm x 75mm size with PCC or cement sand mortar (in 1: 3 proportion) as approved shall be provided at all junction of horizontal and vertical surfaces.

c. The screed shall be finished and cured to receive the primer coat. The screed layer and the angular fillet/ coving shall be cured in accordance with regular concrete curing practices.

4.2.7 Primer coat

a. The finished and cured screed shall be cleaned and Bituminous solvent based primer shall be applied over the entire area to be waterproofed including abutting vertical surfaces.

b. If required, the surface of the screed layer shall be prepared in accordance with clause no 4.2.5.

c. Primer coat shall be cold applied. Minimum coverage shall be 0.2 to 0.4 litre per square metre.

d. The primer coat shall be allowed to dry for minimum 24 hours.

4.2.8 Fixing of APP membrane

a. The APP polymer modified bituminous membrane shall be laid over the primer coat by torch welding. The membrane shall be properly pressed during laying to remove any entrapped air.

b. The joints should be sealed properly with necessary side laps of 100 mm and end laps of 150 mm.

c. The membrane shall be continued along the vertical surfaces up to a minimum height of 300mm above the fillet/ coving. The continued membrane shall be terminated in minimum 20 mm x 10 mm chase to be provided in the vertical surface and shall be sealed with approved quality polyurethane sealant. Alternatively, the membrane can be continued over the entire vertical surface and suitably covered by coping at top.

d. After the membrane is laid, water ponding test for leakage shall be done on waterproof treated surface in locations as directed by Engineer-In-Charge by making sand/mud bundhs in panels of 2 metre x 2 metre and water ponding for minimum 72 hours. Any leakage or defect found in the test shall be rectified as directed by Engineer-In-Charge

4.2.9 Top protective finishing layer

a. The top protective finishing layer of PCC or M15 grade concrete (minimum 50 mm thick) with chicken wire mesh shall be laid over APP membrane without sprinkling of clean sand. The finished surface shall be in desired slope.

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b. Continuous angular fillet/coving of minimum 75mm x 75mm size with PCC or cement sand mortar (in 1: 3 proportion) as approved shall be provided at all junction of horizontal and vertical surfaces.

c. The PCC or M15 grade concrete shall be laid in panels of maximum 1200 x 1200 mm size.

e. The PCC or M15 grade concrete and the angular fillet/ coving shall be cured in accordance with regular concrete curing practices.

f. The joints between panels shall be raked out neatly (after stipulated curing period) to a minimum 10mm X 10mm V groove and shall be filled up approved quality polyurethane sealant.

e. Khura (minimum size 450 mm x 450 mm) shall be provided at every rain water outlets.

4.2.10 Finishing of waterproofing treatment over parapets/ vertical surfaces

APP membrane continued over parapets/ vertical surfaces shall be finished with minimum 12 mm thick plaster.

4.2.11 Waterproofing treatment in RCC gutters

a. Water proofing treatment over Parapets/ Vertical surfaces of gutter shall comprise of APP membrane continued over parapets/ vertical surfaces finished with minimum 12 mm thick plaster.

b. Waterproofing treatment on horizontal surface of gutter shall comprise of screed of PCC or approved light weight material such as cinder concrete, APP waterproofing membrane and top finishing layer of plaster or PCC or M15 grade concrete as approved.

c. Base horizontal surface shall be prepared in accordance with clause 4.2.5

d. Necessary slope shall be provided by means of PCC or M15 grade concrete or approved light weight material such as cinder concrete.

e. APP membrane over roof surface shall be continued over the sloped surface and continued on vertical parapet of the gutter and inside the rain water pipes similar to roof application of the APP membrane.

f. Continuous angular fillet/coving of minimum 75mm x 75mm size with PCC or cement sand mortar (in 1: 3 proportion) as approved shall be provided at all junction of horizontal and vertical surfaces.

g. After the membrane is laid, water ponding test for leakage in the gutter shall be done as directed by Engineer-In-Charge by making sand/mud bundhs and water ponding for minimum 72 hours. Any leakage or defect found in the test shall be rectified as directed by Engineer-In-Charge.

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h. APP membrane shall be finished with minimum 12 mm thick plaster or PCC as approved. PCC or M15 grade concrete shall be laid in accordance with clause 4.2.9

4.3 Testing

Test for leakage shall be done in two stages.

Stage 1:

After the APP membrane is laid, water ponding test for leakage shall be done on waterproof treated surface in locations as directed by Engineer-In-Charge by making sand/mud bundhs in panels of 2 meter x 2 meter and water ponding for minimum 72 hours.

Stage 2:

After the top protective finishing layer is cured, water ponding test for leakage shall be done for finished surface in locations as directed by Engineer-In-Charge by making sand/mud bundhs in panels and water ponding for minimum 72 hours. Smooth roof water drainage through roof water outlets shall also be checked during this stage of testing.

Any leakage or defect found in the test shall be rectified as directed by Engineer-In-Charge.

5.0 POLYURETHANE (PU) COATING (SINGLE COMPONENT) WATERPROOFING SYSTEM

Single component PU waterproofing system shall consist of cement concrete screed on prepared base, primer coat, PU waterproof coating, Geo-textile membrane and a top protective finishing layer.

5.1 Materials

5.1.1 Cement concrete screed

Cement concrete screed shall be of PCC (plain cement concrete – 1 cement : 2 coarse sand : 4 aggregate) or M15 grade concrete. Thickness of the screed shall be minimum 50 mm. Thickness at various locations of the roof/ terrace shall be as required for maintaining required slope to ensure proper roof drainage. If not mentioned specifically otherwise, slope of the finished screed shall be 1: 100.

5.1.2 Primer

Primer shall be polyurethane primer compatible to single component Polyurethane water proofing coating (which shall be applied over the primer) and shall be as per approved Manufacturer/ system provider's standard specification and as approved by Engineer-In-Charge.

5.1.3 Polyurethane (PU) water proofing coating

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Polyurethane water proofing coating/ membrane shall be single component (moisture cured, elastomeric, free from bitumen and tar) viscous liquid containing urethane polymers having following properties:

Property	Value	Testing Method
Solid content	Minimum 85%	ASTM C 836
Elongation	Minimum 400%	ASTM D 412
Tensile Strength	2-3 MPa	ASTM D 412

5.1.4 Top protective finishing layer

Top protective layer shall be of PCC (plain cement concrete – 1 cement : 2 coarse sand : 4 aggregate) or M15 grade concrete with 24 SWG chicken wire mesh. Thickness of the layer shall be minimum 50 mm.

5.1.5 Geo-textile membrane

Geo textile membrane shall be of 150 GSM (grams per square meter) as per approved Manufacture/ system provider's specification and as approved by Engineer-In-Charge.

5.2 Workmanship

5.2.1 The waterproofing system shall be laid in accordance with approved Manufacturer's standard practice as approved by Engineer-In-Charge and following clauses.

5.2.2 In order to avoid damages in the roofing system, the system shall be laid after the pedestals, structures etc. to be placed on the roof/ terrace are done.

5.2.3 Any pipes or openings / protrusions which are required to be provided on the roof shall be provided prior to taking up the base surface preparation.

5.2.4 The system application shall be done at suitable weather condition as mentioned/ recommended in the product data sheet etc. of the materials / system.

5.2.5 Base surface preparation

e. The entire base surface of the roof/ terrace shall be thoroughly cleaned with ire brush or mechanically and all foreign matter including loose concrete etc. shall be removed.

f. Well defined cracks on the surface shall be cut to "V" section, cleaned and filled up with polymerised mastic or a paste of liquid single component elastomeric waterproofing and fine sand mix or with Polysulphide Sealant.

g. Potholes or depressions shall be filled up after removing weak cement concrete or cement plaster etc. with PCC (1 cement :1.2 coarse sand :3.5 stone aggregate of 6mm & down size by volume,) or M15 grade concrete laid over a coat of neat cement slurry @2.75 Kg of cement per Sq.M of area, to achieve a smooth prepared surface.

h. The finished surface shall be perfectly dry and any dampness should be allowed to evaporate

5.2.6 Screed

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a. PCC or M15 grade concrete screed shall be laid over prepared base surface in required slope. If not mentioned specifically otherwise, slope of the finished screed shall be 1: 100.

b. Continuous angular fillet/coving of minimum 75mm x 75mm size with PCC or cement sand mortar (in 1: 3 proportion) as approved shall be provided at all junction of horizontal and vertical surfaces.

c. The screed shall be finished and cured to receive the primer coat. The screed layer and the angular fillet/ coving shall be cured in accordance with regular concrete curing practices.

5.2.7 Primer coat

Polyurethane primer shall be brush applied @ 6-8 square meter area/ Litre over the entire prepared roof surface.

5.2.8 Polyurethane (PU) water proofing coating

a. Polyurethane water proofing coating of specified thickness shall be spray or brush applied as directed by Engineer-In-Charge in minimum two layers over primer. If thickness is not mentioned specifically, thickness shall be minimum 1.5 mm DFT (dry film thickness)

b. Scrim cloth reinforcement shall be provided in between the layers. Scrim cloth reinforcement shall also be provided in places where there is a change in surface profile. eg. junction of horizontal and vertical surface of wall, pedestal etc and also near openings for rainwater pipe etc. Scrim cloth to be placed for a distance of 150 mm on either side of junction. Scrim cloth shall be continued upto minimum 100mm inside the rain water pipes.

c. The coating shall be properly cured.

d. After the waterproofing coating is cured, water ponding test for leakage shall be done on waterproof coated surface in locations as directed by Engineer-In-Charge by making sand/mud bundhs in panels of 2 metre x 2 metre and water ponding for minimum 72 hours. Any leakage or defect found in the test shall be rectified as directed by Engineer-In-Charge.

5.2.9 Top protective finishing layer

a. Geo textile member shall be provided over the cured PU coating as a separation layer for subsequent screed layer after emptying the water used for ponding test for leakage.

b. The top protective finishing layer of PCC or M15 grade concrete (minimum 50 mm thick) with chicken wire mesh shall be laid over Geo textile member. The finished surface shall be in desired slope.

c. Continuous angular fillet/coving of minimum 75mm x 75mm size with PCC or cement sand mortar (in 1: 3 proportion) as approved shall be provided at all junction of horizontal and vertical surfaces.

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d. The PCC or M15 grade concrete shall be laid in panels of maximum 1200 x 1200 mm size.

e. The PCC or M15 grade concrete and the angular fillet/ coving shall be cured in accordance with regular concrete curing practices.

f. The joints between panels shall be raked out neatly (after stipulated curing period) to a minimum 10mm X 10mm V groove and shall be filled up approved quality polyurethane sealant.

g. Khura (minimum size 450 mm x 450 mm) shall be provided at every rain water outlets.

5.2.10 Waterproofing treatment over parapets/ vertical surfaces on roof

Waterproofing treatment over Parapets/ Vertical surfaces shall comprise of Polyurethane water proofing coating (refer clause 5.1.3) over primer coat (refer clause 5.1.2) finished with cement plaster. Sand shall be sprinkled over the Polyurethane water proofing coating when still in tacky state, to form key for holding cement plaster finishing on polyurethane waterproofing coating.

a. Entire surface shall be prepared in accordance with clause 5.2.5

b. Continuous angular fillet/coving of minimum 75mm x 75mm size with PCC or cement sand mortar (in 1: 3 proportion) as approved shall be provided at all junction of horizontal and vertical surfaces. The angular fillet/ coving shall be cured by means of regular wetting.

c. Polyurethane Primer coat shall be applied over the prepared surface in accordance with clause 5.2.7.

d. The Polyurethane water proofing coating (minimum 1.5mm DFT -Dry Film Thickness) applied on roof shall be continued over parapet/ vertical surface over the primer coat.

e. The Polyurethane water proofing coating shall be continued over vertical surface as per drawing or as directed by Engineer-In-Charge subjected to upto minimum 300 mm height from the finished roof surface.

f. Scrim cloth reinforcement shall be provided in between the layers of the coating and in places where there is a change in surface profile. eg. junction of horizontal to vertical surfaces and also near openings for rainwater pipes/ outlets etc. Scrim cloth shall be placed for a distance of 150 mm on either side of junction.

g. Scrim cloth shall be continued upto minimum 100mm inside the rain water pipes.

h. The coating shall be properly cured.

5.2.11 Finishing of parapet/ vertical surfaces

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a. Sand shall be sprinkled over the Polyurethane water proofing coating when still in tacky state, to form key for holding cement plaster finishing on polyurethane waterproofing coating.

b. Minimum 12mm thick cement plaster (1 cement : 4 sand, with polypropylene fibers @ 125 gms per bag of cement or as per recommended dosage by manufacturer to avoid cracking and disintegration) finishing shall be provided over the Polyurethane water proofing coating.

5.2.12 Roofing treatment in concrete gutters

a. Roofing treatment over Parapets/ Vertical surfaces of gutter shall comprise of Polyurethane water proofing coating over primer coat finished with minimum 12mm thick cement plaster similar to clause 5.2.10 & 5.2.11. The treatment shall be done on entire vertical surfaces/Parapet including gutter facia top.

b. Roofing treatment on horizontal surface of gutter shall comprise of screed of PCC or M15 grade concrete approved light weight material such as cinder concrete, Polyurethane water proofing coating over primer coat, Geotextile membrane and top finishing layer of plaster or PCC as approved.

c. Entire surface shall be prepared similar to the base surface preparation of roof surface.

d. Necessary slope shall be provided by means of PCC or M15 grade concrete or approved light weight material such as cinder concrete.

e. Continuous angular fillet/coving of minimum 75mm x 75mm size with PCC or cement sand mortar (in 1: 3 proportion) as approved shall be provided at all junction of horizontal and vertical surfaces. The angular fillet/ coving shall be cured by means of regular wetting.

f. Polyurethane Primer coat as per clause 5.1.2 shall be applied over the prepared surface in accordance with clause 5.2.7.

g. The Polyurethane water proofing coating (Minimum 1.5mm DFT -Dry Film Thickness) applied over roof shall be continued over horizontal and parapet/ vertical surface of gutter in accordance with clause 5.2.8 over the primer coat.

h. Scrim cloth reinforcement shall be provided in between the layers and in places where there is a change in surface profile. eg. junction of horizontal to vertical surfaces and also near openings for rainwater pipes/ outlets etc. Scrim cloth shall be placed for a distance of 150 mm on either side of junction.

i. Scrim cloth shall be continued upto minimum 100mm inside the rain water pipes.

j. The coating shall be properly cured.

k. After the waterproofing coating is cured, water ponding test for leakage in the gutter shall be done as directed by Engineer-In-Charge by making sand/mud bundhs and water

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ponding for minimum 72 hours. Any leakage or defect found in the test shall be rectified as directed by Engineer-In-Charge.

l. PU waterproof coating shall be finished with minimum 12 mm thick plaster or Screed as approved. The screed shall be laid in accordance with clause 5.2.9

m. Ponding test for leakage of the finished roof surface shall be done after the top layer has cured in locations as directed by Engineer-In-Charge by making sand / mud bundhs water ponding for 72 hours. Any leakage or defect found in the test shall be rectified as directed by Engineer-In-Charge.

5.3 Testing

Test for leakage shall be done in two stages.

Stage 1:

After the waterproofing coating is cured, water ponding test for leakage shall be done on waterproof coated surface in locations as directed by Engineer-In-Charge by making sand/mud bundhs in panels of 2 meter x 2 meter and water ponding for minimum 72 hours.

Stage 2:

After the top protective finishing layer is cured, water ponding test for leakage shall be done for finished surface in locations as directed by Engineer-In-Charge by making sand/mud bundhs in panels and water ponding for minimum 72 hours. Smooth roof water drainage through roof water outlets shall also be checked during this stage of testing.

Any leakage or defect found in the test shall be rectified as directed by Engineer-In-Charge.

6.0 WATERPROOFING CUM INSULATION SYSTEM

Waterproofing cum Insulation system shall consist of cement concrete screed on prepared base, primer coat, Polyurethane foam insulation, PU waterproof coating, Geo-textile membrane and a top protective finishing layer as below :

Layer	Material
1st layer	PCC screed over prepared roof surface
2nd layer	Polyurethane primer coat
3rd layer	40 mm thick machine sprayed Polyurethane Foam insulation
4th layer	Minimum 1.5mm DFT (Dry Film Thickness) single component Polyurethane (PU) water proofing coating
5th layer	Geo-textile membrane
6th layer	PCC top protective finishing layer

6.1 Materials

6.1.1 Cement concrete screed

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Cement concrete screed shall be of PCC (plain cement concrete – 1 cement : 2 coarse sand : 4 aggregate) or M15 grade concrete. Thickness of the screed shall be minimum 50 mm . Thickness at various locations of the roof/ terrace shall be as required for maintaining required slope to ensure proper roof drainage. If not mentioned specifically otherwise, slope of the finished screed shall be 1: 100.

6.1.2 Primer

Primer shall be polyurethane primer compatible to sprayed Polyurethane Foam insulation or single component Polyurethane water proofing coating as applicable (which shall be applied over the primer) and shall be as per approved Manufacturer/ system provider's standard specification and as approved by Engineer-In-Charge.

6.1.3 Sprayed Polyurethane Foam insulation

Polyurethane Foam insulation shall be CFC (Chlorofluorocarbons) and HCFC (hydro chlorofluorocarbon) free with closed cell structure having following properties. (Reference: Properties for type-1 foam as mentioned in Table-1 of ASTM D 7425.)

Property	Value	Testing Method
Thermal resistance of 25mm thickness	Minimum 0.98 K-sqM/W at mean temperature 24 degree C	ASTM C177, C1363 or C 518
Compressive strength	Minimum 276 KPa at yield or 10% deformation	ASTM C165 or ASTM D 1621
Density	Minimum 40 Kg/CuM	ASTM D 1622
Water absorption	Maximum volume % 5	ASTM D 2842
Tensile Strength	Minimum 276 KPa	ASTM D 1623
Closed cell content	Minimum 90%	ASTM D 6226

6.1.4 Polyurethane (PU) water proofing coating

Polyurethane water proofing coating/ membrane shall be single component (moisture cured, elastomeric, free from bitumen and tar) viscous liquid containing urethane polymers having following properties:

Property	Value	Testing Method
Solid content	Minimum 85%	ASTM C 836
Elongation	Minimum 400%	ASTM D 412
Tensile Strength	2-3 MPa	ASTM D 412

6.1.5 Top protective finishing layer

Top protective layer shall be of PCC (plain cement concrete – 1 cement : 2 coarse sand : 4 aggregate) or M15 grade concrete with 24 SWG chicken wire mesh. Thickness of the layer shall be minimum 50 mm thick

6.1.6 Geo-textile membrane

Geo textile membrane shall be of 150 GSM (grams per square meter) as per approved Manufacture/ system provider's specification and as approved by Engineer-In-Charge.

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6.2 Workmanship

6.2.1 Base Surface Preparation

Surface preparation shall be in accordance with clause 5.2.5

6.2.2 Screed

Screed shall be laid in accordance with clause 5.2.6

6.2.3 Primer coat

Primer coat shall be applied in accordance with clause 5.2.7

6.2.4 Polyurethane Foam insulation

Polyurethane Foam insulation shall be spray applied conforming to IS : 12432, part-3 over the primer coat in layers with compatible spraying machine to form a seamless, crack free and monolithic insulation layer. Public movement shall be restricted over the insulation layer.

6.2.5 Polyurethane (PU) water proofing coating

Polyurethane water proofing coating shall be applied in accordance with clause 5.2.8. Water After the coating is cured, ponding test shall be done in accordance with clause 5.2.8.

6.2.6 Geo-textile membrane

Geo-textile membrane shall be provided over the cured Polyurethane water proofing coating as a separation layer for subsequent PCC layer after emptying the water used for ponding test for leakage.

6.2.7 Top protective finishing layer

Top protective finishing layer of PCC or M15 grade concrete shall be laid in accordance with clause 5.2.9.

6.2.8 Waterproofing treatment over parapets/ vertical surfaces

Waterproofing treatment over parapets/ vertical surfaces on roof shall be done in accordance with clause 5.2.10

6.2.9 Finishing of parapet/ vertical surfaces

Finishing of parapet/ vertical surfaces shall be done in accordance with clause 5.2.11

6.2.10 Roofing treatment in concrete gutter

Roofing treatment in concrete gutter snall be done in accordance with clause 5.2.12

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6.3 TESTING

Test for leakage shall be done in two stages.

Stage 1:

After the polyurethane waterproofing coating is cured, water ponding test for leakage shall be done on waterproof coated surface in locations as directed by Engineer-In-Charge by making sand/mud bundhs in panels of 2 meter x 2 meter and water ponding for minimum 72 hours.

Stage 2:

After the top layer is cured, water ponding test for leakage shall be done for finished surface in locations as directed by Engineer-In-Charge by making sand/mud bundhs in panels and water ponding for minimum 72 hours. Smooth roof water drainage through roof water outlets shall also be checked during this stage of testing.

Any leakage or defect found in the test shall be rectified as directed by Engineer-In-Charge.

7.0 DELIVERABLES BY THE CONTRACTOR

The Contractor shall furnish product data sheets and test certificates (by Government or NABL approved Laboratories) in support of properties/ performance of specified materials/ systems. Method of tests shall be as mentioned in related standards.

8.0 WARRANTY

Warranty of minimum 10 years shall be provided by the contractor for leak proof roof or any other damage/ defect of the complete roofing system. Any leakage, damage, defect (excepting any leakage, damage caused by 3rd party and causes not attributable to waterproofing contractor) within the warranty period shall be rectified by the contractor at his own cost to the satisfaction of Engineer In charge.

9.0 MEASUREMENT

Measurement of waterproofing treatment shall be the measurement of actual surface area on which waterproofing has been done.

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पुताई, रंगीन पुताई, डिस्टेम्परिंग, पैन्टिंग और पालिशिंग का मानक विनिर्देश

STANDARD SPECIFICATION FOR WHITE/ COLOUR WASHING, DISTEMPERING, PAINTING AND POLISHING

Rev. No	Date	Purpose	Prepared by	Checked by	Standards Committee Convenor	Standards Bureau Chairman
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Abbreviations:

ASTM	:	American Society for Testing and Materials
BS	:	British Standards
IS	:	Indian Standards
NBC	:	National Building Code of India
BIS	:	Bureau of Indian Standards
EN	:	European Standards
RCC	:	Reinforced Cement Concrete
VOC	:	Volatile Organic Compounds
ISO	:	International Organization for Standardization
NFPA	:	National Fire Protection Association
POP	:	Plaster Of Paris

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1.0 GENERAL

1.1 This Specification covers requirements of White/ Colour Washing, Distempering, Painting & Polishing on building works as interior or exterior finishing or decorations etc.

1.2 Unless otherwise specifically mentioned in design basis, job specification, drawings, item descriptions etc. all plastered, wooden and bare metal surfaces shall be painted.

1.3 For energy efficient and green or sustainable buildings job specification, item descriptions specific to these buildings shall be referred.

2.0 REFERENCES

The codes and standards listed below contain provisions which through reference in this specification constitute provisions of this standard specification if not specifically mentioned otherwise.

2.1 In case of similar codes of different organizations such as IS, ISO, BS, EN, BS-EN, ASTM, NFPA, NBC etc. conformity with any of the similar codes is acceptable.

2.2 Reference codes and standards:

Standards	Document title
IS 2395	Code of practice for painting concrete, masonry and plaster surfaces.
IS 6278	Code of practice for white washing and colour washing.
IS 712	Specification for building limes
IS 55	Specification for Ultramarine blue for paints.
IS 63	Specification for whiting for paint and putty.
IS 427	Distemper (dry), colour as required.
IS 428	Washable Distemper
IS 15489	Paint, Plastic Emulsion- Specification
IS 2338 Part-1	Code of practice for finishing of wood, and wood based materials. Part-1 : Operations & workmanship
IS 2338 Part-2	Code of practice for finishing of wood, and wood based materials. Part-2 : Schedule
IS 5410	Cement paint, colour as required.
IS 2524 Part-1	Code of practice for painting non-ferrous metals in buildings. Part-1 : Pre-treatment
IS 2524 Part-2	Code of practice for painting non-ferrous metals in buildings. Part-2 : Painting
IS 1477 Part-1	Code of practice for painting ferrous metals in buildings. Part-1 : Pre-treatment
IS 1477 Part-2	Code of practice for painting ferrous metals in buildings. Part-1 : Painting
IS 384	Brushes, paints and varnishes, flat.
IS 486	Brushes, sash, tool, for paints and varnishes.
IS 110	Ready mixed paint, brushing, grey filler enamels for use over primers
IS 3585	Ready mixed paint, aluminium brushing priming water resistant for wood work.
IS 110	Ready mixed paint, brushing, grey filler for enamels for use over primers
IS 2395 Part-1	Painting of concrete, masonry & plastered surface, code of practice. Part-1 : Operations and workmanship
IS 2395 Part-2	Painting of concrete, masonry & plastered surface, code of practice

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	Part-2 : Schedule
IS 3536	Ready mixed paint, brushing, wood primer - Specification
IS 109	Specification for ready mixed paint, finishing, priming, plaster, to indian standard colour no. 361 light stone and no. 631 light grey, white and off - White
IS 2074	Ready mixed paint air drying red oxide zinc chrome priming specification

3.0 TYPES OF PAINTS /POLISHING

3.1 Type of Painting/ polishing shall be as mentioned in design basis, job specification, drawings, item descriptions etc.

3.2 Unless otherwise specified in design basis, drawings, item descriptions, job specifications etc, Type of Painting/ polishing shall be as per following table.

Surface	Paint/ polishing type
Internal Masonry/ Block work/ RCC wall and ceiling surface	Interior grade Acrylic Emulsion paint
External Masonry/ block work/ RCC/ plastered surface	Exterior grade Acrylic Emulsion paint
Local/ Hard wood, engineered wood and bare metal surface	Synthetic Emulsion paint
Teak or superior wood surface	French polishing

Note :

For energy efficient and green or sustainable buildings job specification, item descriptions specific to these buildings shall be referred.

4.0 MATERIALS

4.1 All materials required for the execution of painting work shall be obtained direct from approved manufacturers and shall be brought to the site in makers drums, bags etc. with seals unbroken.

4.2 In case of ready mixed paints, thinning if necessary, the brand of thinner shall be as per recommendations of the manufacturer.

4.3 Wall putty shall be minimum 2 mm thick and white cement and polymer based wall putty type.

4.4 Primer shall be compatible with the finishing paint.

4.5 The allowable limits of quantity of VOC (Volatile Organic Compounds) in different types of paints and primer shall be as defined in the following parameters:

A. Primer

Type of Primer		**Allowable VOC Content**
Pink & Grey primer on wood	:	< 50 gms/ltr
Ready mix red oxide zinc chromate primer	:	< 250 gms/ltr

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Water thinnable cement primer on wall	:	<50 gms/ltr

B. Paints

Type of Paint		Allowable VOC Content
Acrylic Emulsion	:	<50 gms/ltr
Plastic Emulsion	:	<50 gms/ltr
Acrylic Distemper	:	<50 gms/ltr
Synthetic Enamel	:	<150 gms/ltr

5.0 WORKMANSHIP

5.1 Colour/ texture of the wash/ distemper/paint/ polishing shall be as approved by the Engineer-in-charge. Sample painting shall be done as directed by the Engineer-In- charge for approval/ selection of the colour/ texture.

5.2 Washed/ distempered/Painted/ polished surface shall be even and uniform without patches, marks, without any defect and of finish as desired by the Engineer-In-Charge. Any defect or shortcomings in the finishing shall be rectified to the satisfaction of the Engineer –In- Charge.

5.3 Wherever scaffolding is necessary, it shall be erected on double supports tied together by horizontal pieces, over which scaffolding planks shall be fixed. No ballies, bamboos or planks shall rest on or touch the surface which is being white washed.

For all exposed brick work or tile work, double scaffolding having two sets of vertical supports shall be provided. The supports shall be sound and strong, tied together with horizontal pieces over which scaffolding planks shall be fixed.

Where ladders are used, pieces of old gunny bags shall be tied on their tops to avoid damage or scratches to walls.

For ceiling, proper stage scaffolding shall be erected.

5.4 Surface preparation shall be done as mentioned for various type of wash/ distemper/paint/ polishing. The surface affected by moss, fungus, algae, efflorescence shall be treated in accordance with IS: 2395.

5.5 Preparation and application of wash/ distemper/paint/ polishing shall be done as mentioned for various types. However, in case of excessive un-even surfaces, punning with Plaster of Paris shall be done on the surface if and as directed by the Engineer-In-Charge.

5.6 Paint shall be applied by brushing or spraying or by using rollers as directed by the Engineer-In-Charge. The brushing operations are to be adjusted to the spreading capacity advised by the manufacturer. During painting, every time after the paint has been worked out of the brush bristles, the bristles shall be opened up by striking the brush suitably.

Spray machine used may be of high pressure type or low pressure depending on the nature and location of work. After work, the brushes shall be completely cleaned of paint and shall be hung in a thinner if intended to be used afterwards. The spray guns shall be cleaned thoroughly after every break in work. The paint/ polish containers, when not used shall be kept close and free from air.

5.7 After the finishing of work, the adjacent surfaces not intended to be washed/ distempered/painted/polished shall be thoroughly cleaned of all paint patches and shall be

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finished in accordance with surface finishing of such surfaces. Doors, windows, floors, articles of furniture etc. and such other parts of the building not to be white washed, shall be protected from being splashed upon. Splashing and droppings, if any shall be removed by the contractor at his own cost and the surfaces cleaned.

5.8 Number of coats of paint as mentioned is the minimum number of coats. Additional coats shall be provided as required for obtaining desired colour and finishing.

5.9 The operation for each coat shall consist of stroke of the brush/ roller from the top to down wards, another from the down to upwards over the first stroke, similarly one stroke horizontally from right and another stroke from the left. Each coat shall be allowed to dry before the next coat is applied.

5.10 The painting on ceiling should be done prior to that on walls.

6.0 WHITE WASHING

White washing in general shall conform to IS 6278.

6.1 Preparation of Surface

The surface shall be thoroughly cleaned of all dirt, dust, mortar dropping and other foreign matter before white wash is to be applied. Surfaces already white/colour washed shall be broomed down to remove all dust, dirt, loose scales of lime wash or other foreign matters.

All damaged portions of the surface plaster shall be removed to full depth of plaster in rectangular patches and plastered again after raking the joints in masonry properly. Such portions shall be wetted and allowed to dry before any operation.

All holes, cracks, patches etc. not exceeding 0.1 sq. m. in area shall be made good with material similar to that of the surface. Surfaces affected by efflorescence, moss, fungi, algae, lichen etc. shall be treated in accordance with IS: 2395.

6.2 Preparation of White Wash

The fat lime conforming to IS: 712 shall be slaked at site and shall be mixed and stirred with about 5 litres of water for 1 kg. of unslaked lime to make thin cream. This shall be allowed to stand for a period of 24 hours and then shall be screened through a clean coarse cloth. 4 kg of gum dissolved in hot water shall be added to each cubic metre of lime cream. Approved quality ultramarine blue conforming to IS 55 @ 3 gram per kg. of lime shall also be added to the solution. The whole solution shall be stirred thoroughly before use.

6.3 Application

White wash shall be applied with "MOONJ" brush to the specified number of coats. Minimum number of coats shall be three. The operation for each coat shall consist of stroke of the brush from the top to down wards, another from the down to upwards over the first stroke, similarly one stroke horizontally from right and another stroke from the left.

7.0 COLOUR WASHING

7.1 Preparation of Surface shall be similar to clause no 6.1

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7.2 Preparation of colour wash

Sufficient quantity of colour wash enough for the complete job shall be prepared in one operation to avoid any difference in colour. The basic white wash solution shall be prepared in accordance with clause no 6.2. Mineral colours of approved shade and quality not affected by lime shall be added to the white wash solution in proportions as directed by Engg.in-charge. Solid lumps etc. in the colour powder shall be ground to fine powder, sieved and mixed evenly and thoroughly to the white wash solution. No colour wash shall be done until a sample of the colour wash of the required tint or shade has been got approved from the Engineer-in-Charge. The colour shall be of even tint or shade over the whole surface.

7.3 Application

Colour wash shall be applied with "MOONJ" brush to the specified number of coats. Minimum number of coats shall be three. The operation for each coat shall consist of stroke of the brush from the top to down wards, another from the down to upwards over the first stroke, similarly one stroke horizontally from right and another stroke from the left.

For new work, a priming coat of white wash with lime or with whiting shall be provided. Three or more coats of colour wash shall then be applied on the entire surface till it represents a smooth and uniform finish.

For old work, after the surface preparation, a coat of colour wash shall be applied over the patches and repairs. Then coats of colour wash shall be applied over the entire surface. The colour washed surface shall present a uniform finish.

The finished dry surface shall not be powdery and shall not readily come off on the hand when rubbed.

8.0 ACRYLIC DISTEMPER

8.1 Preparation of Surface

The surface shall be thoroughly cleaned of dust, old finish by washing and scrubbing. The surface shall then be allowed to dry for at least 48 hours. It shall then be sand papered to give a smooth and even surface. Any unevenness shall be made good by applying putty, made of Plaster of Paris (POP) mixed with water on the entire surface including filling up the undulations and then sand papering the same after it is dry.

In case of distempering over existing distempered surface, all loose pieces and scales shall be removed by sand papering. The surface shall be cleaned of all grease, dirt etc.

Pitting in plaster shall be made good with plaster-of-paris mixed with the colour to be used. The surface then shall be rubbed down again with a fine grade sand paper and made smooth. A coat of distemper shall be applied over the patches. The surface shall be allowed to dry thoroughly before the regular coat of distemper is allowed.

8.2 Priming Coat

The priming coat shall be with distemper primer or cement primer, as required. If the wall surface plaster has not dried completely, cement primer shall be applied before distempering the walls. But if distempering is done after the wall surface is dried completely, distemper primer shall be applied. For old work no primer coat is necessary.

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A priming coat of whiting conforming to IS 63 shall be applied over the prepared surface. The priming coat shall be prepared by mixing 2.5 kg. of whiting and one litre of glue solution (prepared by mixing 250 gm. glue conforming to IS: 852 with boiling water) together and placing it in a covered vessel with enough water to cover the mixture which shall be left to cool until it becomes a jelly.

Priming coat shall be applied with "MOONJ" brush or roller to the specified number of coats. Minimum number of coats shall be minimum one. The operation for each coat shall consist of stroke of the brush from the top to down wards, another from the down to upwards over the first stroke, similarly one stroke horizontally from right and another stroke from the left. Each coat shall be allowed to dry before the next coat is applied.

8.3 Preparation of Distemper

1st quality Acrylic distemper having VOC content less than 50 gms/litre of approved brand and manufacture shall be used for preparation of distemper. The Acrylic distemper shall be diluted with water or any other prescribed thinner in a manner recommended by the manufacturer. Only sufficient quantity of distemper required for day's work shall be prepared.

8.4 Application of Distemper

For new work, after the primer coat has dried for at least 48 hours, the surface shall be lightly sand papered to make it smooth for receiving the distemper, taking care not to rub out the priming coat. All loose particles shall be dusted off after rubbing. One coat of distemper properly diluted with thinner (water or other liquid as stipulated by the manufacturer) shall be applied with brushes or roller in horizontal strokes followed immediately by vertical ones which together constitutes one coat.

The subsequent coats shall be applied in the same way. Two or more coats of distemper as are found necessary shall be applied over the primer coat to obtain an even shade.

A time interval of at least 24 hours shall be allowed between successive coats to permit proper drying of the preceding coat.

For old work, the distemper shall be applied over the prepared surface in the same manner as in new work. One or more coats of distemper as are found necessary shall be applied to obtain an even and uniform shade.

The finished surface shall be even and uniform without patches, marks, distemper drops etc.

9.0 WATERPROOF CEMENT PAINT

9.1 Preparation of Surface

Preparation of Surface shall be similar to clause no 6.1. The surface so prepared shall be thoroughly wetted with clean water before the paint is applied.

9.2 Preparation of Paint

Waterproof cement paint conforming to IS 5410 shall be mixed with water and stirred to obtain a thick paste which shall then be diluted to brushable consistency. The proportion of mixture shall be as per manufacturer's recommendation. The paint shall be mixed in such quantity which can be used up within an hour of mixing to avoid setting and thickening of the paint.

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