15.3.2 Materials

A. Cement, sand and water shall conform to those of concrete work. Grading of sand, however, shall be as in Table 3.2.

Grading of Sand	Mortar Plastering	Plaster
5 mm Those Sifting Through 100% 0.15 mm Those Sifting Less Than 10%	For First and Second Coat	For First Coat and Dubbing Out
2.5 mm Those Sifting Through 100% 0.15 mm Those Sifting Less Than 10%	For Finish Coat	For Second Coat

B. White cement shall conform to the requirements of Portland cement, JIS.

C. Pigment shall be alkali-proof and inorganic and one which does not go through noticeable color change under direct sunshine or temperature below 100°C. and which does not rust metals by dissolving in the water.

D. Hydrated lime for plaster work, dolomite plaster and gypsum plaster shall conform to the requirements of JIS A 6902 (Hydrated lime for plaster work), 6903 (Dolomite plaster), 6904 (Gypsum plaster).

E. The use of admixture shall be approved by the supervisor before its use. The amount of admixture shall be such that affects mortar strength very little.

F. Water-proof agent shall conform to the requirements of JIS A 1404 (Test method of water-proof agent for architectural cement).

15.3.3 Mixing Ratio Mixing volume ratio of mortar shall be as in Table 3.3.

Table 3.3 Mixing volume ratio of mortar

Base	Area of Application	First Coat or First Coat on Lath Cement: Sand	Dubbing Out Cement: Sand	Finish Coat Cement: Sand Hydrated Lime
Concrete Concrete Block	Floor	-	-	1:2
	Interior Wall	1:2	1:3	1:3:0.3
	Ceiling/Eaves	1:2	-	1:3:0.3
	Exterior Wall/Others	1:2	1:3	1:3
Metal Lath Rib Lath Wire Lath	Interior Wall	1:3	1:3	1:3:0.3
	Ceiling/Eaves	1:2	1:3	1:3:0.3
	Exterior Wall/Others	1:3	1:3	1:3

Table 3.3 Mixing volume ratio of mortar - continued -

Base	Area of Application	First Coat or First Coat on Lath Cement: Sand	Dubbing Out Cement: Sand	Finish Coat Cement: Sand Hydrated Lime
Excelsior Plate	Interior Wall	1:2	1:3	1:3:0.3

Note: (1) One part of coarse sand of 3 - 5 mm shall be allowed to add to first coat on wire lath.
(2) Hydrated lime shall be allowed to be replaced by other admixture.
(3) Fiber shall be mixed for first coat on lath if work calls for it.

15.3.4 Thickness of Coating

A. Standard thickness of coating shall be as in Table 3.4.

Table 3.4 Standard thickness of coating (mm)

Base	Area of Application	First Coat	Dubbing Out	Second Coat	Finish Coat	Total
Concrete	Floor	-	-	-	15	15
Concrete	Interior Wall	6	-	6	3	15
Concrete Block	Ceiling/Eaves	4.5	-	4.5	3	12
	Exterior Wall/Others	6	-	6	6	18
Metal Lath Rib Lath Wire Lath	Interior Wall	Thickness of 2 mm on the Face of Lath.	6	6	3	15
	Ceiling/Eaves		4.5	4.5	3	12
	Exterior Wall/Others		6	6	6	18

B. Thickness of coating shall be standard thickness of coating unless otherwise specified in the particular specification.

C. Thickness of first coating shall be 6 mm except in the case of floor and coating on lath.

15.3.5 Finish

Type of finish and work schedule shall be as in the Table 3.5.

Table 3.5 Types of finish and work schedule

Type	Work Schedule	Note
Trowel Finish	1. Shall be applied flat by wood trowel. 2. Shall be finished by pressing with trowel.	Before applying second coat corner & edges shall be screaded well.
Wood Trowel Finish	Shall be applied and finished flat with wood trowel.	
Brush Finish	1. Shall be applied flat by wood trowel. 2. Shall be brushed.	Care shall be taken not to wet brushes.
Spray Finish	1. Cracks in base shall be fixed. 2. Shall be sprayed more than twice.	Mixing for spraying on exterior wall cement: (plaster & pigment = 1 < 1 spray shall be applied perpendicular to the surface.
Cement Wash	1. Openings and projections in base shall be fixed. 2. Cement water solution shall be applied with brush.	
Color Mortar Finish	Shall be applied and finished with mortar of specified color on base.	Mixing of color mortar shall comply with that of spray finish.
Scratch Surface Finish	1. Mortar with rough finish materials shall be applied. 2. Shall be scratched by metal comb after checking dryness.	Mixing shall be cement ≥ (plaster + pigment)
Floor Plastering	1. Cement paste shall be smoothed. 2. Hard mortar shall be applied with trowel.	Dry mortar shall be hammered and screaded after checking dryness.
Floor Concrete Polish Finish	1. Concrete shall be plate hammered or smoothed by vibrator. 2. Shall be polish-finished by wood trowel or trowel.	Whether finish is by wood trowel or trowel shall be as shown in the drawing or specified in the particular specification.

15.4 Gypsum Plaster

15.4.1 Scope — This section shall apply to plaster work by mixed gypsum plaster, pure gypsum plaster and keen's cement.

15.4.2 Material

A. Gypsum plaster and keen's cement shall conform to the requirements of JIS.
B. Bond (Prime coat) plaster shall conform to the requirements in Table 4.2 B. The method of test shall conform to JIS A 6904 (Gypsum plaster).

Table 4.2 B Bond (Prime coat) plaster

Amount of Plaster of Pa Measured from SO_3 (%)	Setting Time		Amount of Finess Left (%)		coefficient of Clay (150°C)	Strength kg/cm^2		Crack Test
	Start	Finish	420μ	149μ		Flexure	Tension	
More than 70	More than 2	2.5-24	-	More than 10	More than 7	More than 20	More than 8	Pass

C. Cement, sand and water shall conform to those of concrete work. Pigment and grading of sand shall conform to those of cement mortar.
D. Fiber shall be dry hempfiber of strong strand without impurity and knots.
E. Material for preventing peeling and crack shall be dry, strong hemp. length and weight shall be as in the Table 4.2 E.

Table 4.2 E Material for preventing peeling and crack

Area of Use	Length (mm)	Weight (g/100 pieces)	Note
Ceiling	600	About 140	@ Less than 250 mm in staggered arrangement
Wall	700	140	@ Less than 300 mm in staggered arrangement
Edges	350	70	@ Less than 150 mm in straight arrangement

15.4.3 Mixing and Thickness of Coating

Table 4.3 Mixed plaster

Base	Type		Plaster For Finish	Plaster For Base	Sand	Hempfiber (g) per 25 g of Plaster	Thickness of Coating mm Ceiling	Eave	Wall	
Concrete Concrete Block Metal Lath Excelsior Plate	A	First Coat		1	1.5	250	4.5		6.0	
		Second Coat		1	2.0	250	6.0	12	7.5	15.0
		Finish Coat	1				1.5		1.5	
	B	Second Coat		1	2.0	250	6.0	7.5	7.5	9.0
		Finish Coat	1				1.5		1.5	
Wood Lath		Finish Coat		1	1.0	250	3.5		4.0	
		Dubbing Out		1	1.5	250	4.0	15	6.0	18.0
		Second Coat		1	2.0	250	6.0		6.5	
		Finish Coat	1				1.5		1.5	

15.5 Dolomite Plaster

15.5.1 Scope

This section shall apply to plaster work by dolomite plaster.

15.5.2 Material

A. Dolomite plaster shall conform to the requirements of JIS A 6903 (Dolomite plaster).
B. Cement, sand and water shall conform to those of concrete work and pigment shall conform to that of cement mortar.
C. Fiber shall be dry hemp of strong strand without impurity and knots.

15.5.3 Mixing and Thickness of Coating

Mixing and standard thickness of coating shall be as in Table 5.3.

Table 5.3 Mixing and thickness of coating for dolomite plaster.

Base		Dolomite Plaster For Finish	Dolomite Plaster For Base	Cement	Sand	Per 25 g Plaster High Quality Fiber	Per 25 g Plaster Fiber	Thickness of coating (mm) Ceiling	Eave	Wall	
Concrete Concrete Block Metal Lath Excelsior Plate	First Coat		0.8	0.2	2	900		4.5		7.5	
	Second Coat		0.9	0.1	2	1100		6.0	12	9.0	18
	Finish Coat	1.0					200	1.5		1.5	

Table 5.3 Mixing and thickness of coating for dolomite plaster. - continued -

Base		Dolomite Plaster For Finish	Dolomite Plaster For Base	Cement	Sand	Per 25 g Plaster High Quality Fiber	Per 25 g Plaster Fiber	Thickness of coating (mm) Ceiling	Thickness of coating (mm) Eave	Thickness of coating (mm) Wall
Wood Lath	First Coat		1.0	1.5		900		3.0	15	3.0 18
	Dubbing Out		1.2	2.0		1000		4.0		6.0
	Second Coat		1.0	2.0		1100		6.5		7.5
	First Coat	1.0					300	1.5		1.5

In case second coat is applied on ceiling and eave of wood lath base within 6 days after first coat, first coat of plaster shall be mixed with cement of about 20% mixing ratio with approval of the supervisor. Total thickness of coating for ceiling and eave shall be less than 15 mm.

15.6 Artificial Stone Finish and Terrazzo Field Finish

15.6.1 Scope

This section shall apply to artificial stone finish and terrazzo field finish by the use of Portland cement, Portland blast furnace cement, silica cement (called cement) or white Portland cement (called white cement) and marble, other crushed stone, crushed sand, or river sand as main materials.

15.6.2 Materials

A. Cement, white cement, river sand, water, pigment shall conform to the respective regulations of JIS or in this specification.

B. Stone chips shall be marble, other crushed stone or crushed sand of firm quality. Size of grain shall be as in the Table 6.2 unless otherwise specified.

Table 6.2 Size of grain

Type	Size of Grain Amount Passing Through Sift Weight % 1.2 mm	2.5 mm	5.0 mm	12.0 mm
For Artificial Stone	0-10	50-100	100	-
For Terrazzo	-	0-10	50-100	100

15.6.3 Mixing and Thickness of Coating

A. Mixing volume ratio and standard thickness of coating shall be as in Table 6.3.

Table 6.3 Mixing and thickness of coating for artificial stone finish and terrazzo field finish.

Type		Cement	River Sand	Cement or White Cement	Stone Chips	Thickness of Coating (mm)	
Artificial Stone Finish	Finish Coat			1	1.5	7.5	
Terrazzo Finish	Base Coat	1	3			18	30
	Finish Coat			1	3.0	12	

B. The amount of stone chips for terrazzo field finish in Table 6.3 shall be changed to 2.5 for floor and 2.0 for wall with approval of the supervisor. The amount of stone chips for artificial stone finish shall be increased or decreased depending on samples.

15.6.4 Sample and Drawing — Sample and layout drawing shall be submitted for approval of the supervisor.

15.6.5 Finish Method of Application — Finish and method of application shall be as set forth in Table 6.5.

Table 6.5 Finish and method of application.

Type	Work Schedule	Remarks
Artificial Stone Finish	1. Shall conform to cement mortar work as far as second coat. 2. Shall apply 1:1 mortar in light scraping. 3. Shall apply finish coat with stone chips thoroughly.	For floor 15 mm thickness of 1:3 mortar shall be used as base coat.
Artificial Stone Exposed Finish By Washing	1. Shall apply finish coat as in artificial stone finish. 2. Shall wipe off the surface with brush more than twice shall adjust stone arrangement. 3. Shall wash the surface by spraying water by pump after checking dryness.	Shall conform to cement mortar work as far as second coat.

Type	Work Schedule	Remarks
Artificial Stone Grind Finish	1. Shall apply finish coat as in artificial stone finish. 2. Shall grind roughly after checking firmness. 3. Filling. 4. Shall apply cement wash. 5. Shall grind. 6. Shall apply cement wash. 7. Shall repeat 3 to 6.	In case of luster finish 1 through 7 shall be the same. 8. Shall apply wax.
Artificial Stone Dabbed Finish	1. Shall apply finish coat in thickness of about 9 mm. 2. Shall dab it with chisel, bush-hammer, etc. after the applied finish is firm.	Shall use stone chips 6 mm.
Terrazzo Finish	1. Shall be left to be hard for more than 7 days after application of finish coat. 2. Shall grind roughly. 3. Shall fill voids. 4. Shall apply cement wash. 5. Shall repeat 2 to 4 shall grind until the surface gets luster. 6. Shall finish by buff with polish powder. 7. Shall apply wax.	In case of mand grinding finish coat shall be left to be hard for more than a day. Machine grinding shall be used as in artificial stone grind finish except wall or other area approved to be excluded by the supervisor. Shall take off lye before polishing.

15.7 Other Special Finish — Japanese wall, asphalt mortar finish and acid-proof mortar finish shall be as specified in the particular specification and directed by the supervisor. Sample shall be submitted for approval of the supervisor.

16. Metal Sash and Door

16.1 Steel Sash and Door

16.1.1 Material — A. Sheet steel shall be less than 3 mm thick and conform to SPHC (1-grade) of JIS G 3131

(hot-rolled, mild-steel plate and band) and SPCC (general 1-grade), SPCD (2-grade) and SPCE (3-grade) of JIS G 3141 (cool-rolled steel-plate and tie-plate). Galvanized steel plate shall conform to SPG-F of JIS G 3302 (galvanized iron plate) and thickness shall be otherwise stated. Bonderized steel plate or bonderized galvanized steel plate shall be used for sash and door exposed to rain.

B. Sash-bar shall conform to JIS A 5503 (carbon-steel sash-bar) and shall be expanded to remove rust and black-coat before use.

C. Stainless steel shall conform to JIS G 4305 (cool-rolled stainless steel plate) and SUS 27 CP.

D. Brass plate shall be polished plate and conform to JIS H 3201 (brass plate) and JIS H 3304 (tough-pitched brass).

E. Phosphored bronze shall conform to JIS H 3731 (phosphored bronze plate and wire).

F. Steel plate, band-steel, flat-steel and bar-steel shall conform to SS 41 (2-grade) or SS 50 (3-grade) of JIS G 3101 (rolled-steel for general structure).

G. Polished band-steel shall conform to JIS G 3141 (cool-rolled steel plate and band) SPCC, SPCD or SPCE.

H. Arc-welding electrode shall conform to JIS Z 3211 (coated arc-welding electrode for Mild-steel).

I. Gas-welding electrode shall conform to JIS Z 3201 (gas-welding electrode for mild-steel).

J. Screw shall conform to JIS B 1101 and JIS B 1111 (screw). Rivet shall conform to JIS B 1213 (cool-mounded rivet). Wood-screw shall conform to JIS B 1135 and JIS B 1112 (screw). Bolt and nut shall conform to JIS B 1180 - 1185 (hexagonal bolt and nut square bolt and nut).

K. Glass fastener shall conform to JIS G 3521 (hard-steel wire), JIS G 3522 (piano-wire), JIS G 4309 (stainless steel wire) and JIS G 3131 (hot-rolled mild steel plate and band).

16.1.2 Manufacturing

A. Manufacturer shall be stated in the particular specification or approved by the supervisor.

B. Full-scale and shop drawing shall be prepared in accordance with sash and door drawing and list and submitted for approval of the supervisor.

C. Reinforcing plate, tie-plate, anchor-plate, structure and hardware of door and sash shall be clearly indicated on full-scale and shop drawing. Furthermore, thickness of glass and installation of glass shall be indicated.

D. Thickness of steel plate shall conform to the following Table 1.2 Thickness of steel plate.

Table 1.2 Thickness of steel plate

		Portion	Thickness (mm)
Sash	Frame	Mullion, Transom, Frame, Flashing	1.5 - 2.0
		Stool Casing	1.5
	Fitting	Frame, Mullion, Bead	1.5
Door	Frame	Frame	1.5 - 2.0
		Casing	1.5
		Saddle	1.5 - 2.0
	Fitting	Frame, Middle Rail	1.5
		Panel-Plate, Flush-Plate	1.0 - 1.5

E. Steel-plate frame shall be complied with the followings:
(1) Frame shall be jointed mitre or abutt and welded.
(2) Saddle shall be extended more than side frame and welded from back.
(3) Sill shall be welded from back to side frame with flashing.
(4) Transom and mullion shall be jointed abutt to side frame and welded.
(5) Casing shall be jointed mitre and welded and shall be jointed abutt and welded to stool.
(6) Anchor bolt or plate shall be folded during transporting and anchor firmly to structure. Anchor shall be provided at all ends and approximately every 600 mm of frame.
(7) Outlet for water shall be provided at suitable position of frame exposed out-door.
(8) Additional plate of 2.3 mm thick shall be provided at bottom of side frame in case saddle is not required.

F. Steel-plate fitting shall be complied with the followings:
(1) Sides and top frame of fitting shall be jointed mitre and welded, splice jointed and welded or screwed or jointed abutt and welded. Bottom frame shall be ⌒-shaped (thickness 2.3 mm), through splice added and welded.
(2) Panel-plate shall be screwed or welded to frame and bead shall be screwed.
(3) Clip fastener for glass shall be provided at both ends and every 400 mm or less on external side, bead shall be provided on internal-side.

G. Frame and mullion for sash-bar shall be complied with the followings:
(1) Frame shall be jointed abutt or tennon and welded.
(2) Mullion shall be jointed to frame as specified in the above items, and cross-joint shall be halving joint and spot-welded.
(3) Clip fastener for glass shall be provided at both ends and every 400 mm or less.

H. Corner and exposed welded part shall be grinded or sanded after frame and fitting assembled.

I. Tolerance shall be less than stated below:
Width and Height ..... ±2 mm
Dimension of Frame ..... ±1 mm
Diagonal Length of Frame ..... ±2 mm

J. In case wire-glass is required for fire-door, fall-out proof shall be provided.

16.1.3 Rust-Proof

A. Frame and mullion shall be rust-proofed in accordance with the followings:
(1) a-class: Varnish-galvanize-plating
(2) b-class: Electro-galvanize-plating
(3) c-class: Phosphoric acid-plating

B. Rust-proof shall be applied to assembled door and sash. Certificate shall be submitted.

C. Transom, middle-rail and other parts, unable to apply rust-proof at assembled state shall be properly rust-proofed individually.

D. Proper rust-proof treatment shall be applied to defected portion of rust-proof due to damage or re-touched.

16.1.4 Installation

A. Installation shall conform to the followings:
(1) Concrete, concrete blocks and bricks structure;
Wedged or other proper means to temporary set in designated position. Anchor shall be welded to inserted-jointer and packed with mortar. Anchor shall not be welded to reinforcement. All wedges shall be removed.
(2) Steel structure;
Temporary set, tied firmly to structure at all direction and welded, screwed or clipped to steel frame without any damage to structure. Interval for welding, screwing and clipping shall be approximately 60 mm. Flashing plate shall be provided.
(3) Wood-structure;
Anchor shall be screwed to post, stud and lintel. Preservative paint shall be applied to post, stud and lintel in case mortar is packed.

B. Installation of door and sash before concreting or structural work shall be stated in the particular specification.

C. Mixture of mortar for packing shall be 1:3 (cement: sand volume ratio) and waterproof mortar shall be packed for exterior door and sash.

D. Mortar shall be placed on metal-lath ϕ 4 mm under saddle, sill, stool and other difficult portion to pack mortar after installation of door and sash.

E. L-shape (11 mm x 2.3 mm) metal shall be provided for caulking under sill. L-shape metal shall be indicated on shop drawing.

F. Door frame and fittings shall be temporary set and inspected for opening and closing. Door shall be closed until packed mortar hardened.

16.1.5 Protection

Door and sash shall be protected by board, vinyle sheet, paper, cloth or other means from damage

and stain. Glass shall be clearly marked and hard-ware shall be protected by paper, cloth and other coatings.

16.1.6 Hard-Ware

A. Hard-ware shall conform to drawing and specification and comply with JIS. Sample of all hard-ware shall be submitted for approval of the supervisor.

B. Hard-ware shall conform to the followings.

(1) Lock and knob;
Pin for cylinder-lock shall be more than 5 pieces. Tumbler for bit-key-lock shall be more than 3 pieces and back-set shall be 64 mm.

(2) Bolt shall be flush-bolt.

(3) Hinge shall be brass or stainless steel and number and dimension as in the following Table 1.6 Number and dimension of hinge.

Table 1.6 Number and dimension of hinge.

Door Fitting Size Width x Height (mm)	Dimension of Hinge (mm)	Thickness of Hinge: Brass	Thickness of Hinge: Stainless SUS 27	Number for Each Fitting
Larger than 900 x 2,100	153	6	3	3
Smaller than 890 x 2,090	127	6	3	3
Smaller than 700 x 1,200	100	4.5	3	2

(4) Runner shall be brass or nylon with bearing. Diameter shall be more than 60 mm for door and more than 38 mm for door.

(5) Floor-hinge shall be provided with stopper.

(6) Pivot for pivot-hinge shall be brass.

(7) Fire-door shall be equipped with automatic switch.

(8) Electric and fuse apparatus shall be otherwise specified.

(9) Door-check shall be cast-iron and stopper shall be provided in case otherwise specified.

(10) Door-stopper shall be brass or gun-metal and provided with door-catch.

(11) Operating-handle shall be otherwise specified.

C. In case master-key is otherwise specified, classification and number shall be determined in accordance with key-plan.

16.1.7 Miscellaneous

A. Ready-made sash shall conform to JIS A 4706 (steel and aluminum alloy sash).

B. Maximum dimension of sheet glass shall conform to the following Table 1.7 Maximum dimension of sheet glass.

Table 1.7 Maximum dimension of sheet glass

Safety Factor 2.5 C=0.8

Height from Ground	Number of Story	Ordinary Plate Glass 1.9 mm	3.0 mm	5.0 mm	6.0 mm	Polished Plate Glass 3.0 mm	5.0 mm	6.0 mm	8.0 mm	10.0 mm	12.0 mm
2 m	1	1.32	2.63	5.30	6.55	1.90	3.83	5.15	8.90	12.60	17.70
5	2	0.83	1.67	3.35	4.12	1.21	2.45	3.28	5.45	7.95	11.30
8	3	0.66	1.33	2.65	3.30	0.95	1.93	2.60	4.42	6.30	8.90
11	4	0.56	1.13	2.26	2.77	0.81	1.64	2.20	3.77	5.31	7.50
14	5	0.50	1.00	2.00	2.47	0.73	1.45	1.96	3.35	4.71	6.70
17	6	0.46	0.92	1.84	2.28	0.67	1.35	1.80	3.10	4.35	6.20
20	7	0.44	0.88	1.76	2.18	0.64	1.29	1.73	2.97	4.18	5.93
23	8	0.43	0.85	1.70	2.10	0.62	1.25	1.68	2.85	4.00	5.70
26	9	0.41	0.83	1.66	2.04	0.60	1.21	1.62	2.78	3.93	5.55
29	10	0.40	0.81	1.62	1.99	0.58	1.81	1.59	2.70	3.80	5.40
35	12	0.38	0.76	1.52	1.89	0.56	1.12	1.50	2.60	3.65	5.20
44	15	0.36	0.72	1.44	1.79	0.53	1.06	1.42	2.45	3.45	4.90
60	20	0.34	0.67	1.34	1.65	0.49	0.98	1.31	2.25	3.19	4.53

C. Putty shall conform to JIS A 5752 (Glass-putty for metal door and sash).
(1) 1-grade for steel door and sash.
(2) 2-grade for aluminum door and sash if specified.
(3) First-coat of paint shall be applied to glass-adjoining surface of door and sash.

16.2 Steel-Shutter

16.2.1 Material

A. Heavy-weight-shutter shall conform to JIS A 4705 (fire-proof shutter).
B. Thickness of steel plate and in the following Table 2.1 Thickness of steel plate.

Table 2.1 Thickness of steel plate

Portion and Classification		Thickness (mm)
Slat	1st-Grade Fire-Proof	1.6
	2nd-Grade Fire-Proof	1.2
Rail		2.3
Casing	Closed Casing	1.6
	Half Casing	1.2

Other Portions shall Conform to Drawing or Instruction

C. Cast-iron shall conform to JIS G 5501 (gray-cast-iron product).
D. Net for net-shutter shall be galvanized steel wire 5.15 mm diameter and 50 mm mesh and conform to JIS G 3532 (steel wire).
E. Wire-rope shall conform to JIS G 3525 (wire-rope).
F. Stainless steel shall conform to JIS G 4305 (cool-rolled stainless steel plate) and detail shall be indicated on drawing or otherwise specified.

16.2.2 Type and Structure

A. Inter-locked type:
End of slat folded around and inserted.
B. Net type:
Hexagonal mesh of steel wire netting.
C. Grill type:
Pipe assembled with chain-lock.
D. Hinge type shall be stated in the particular specification.

16.2.3 Mechanism

A. Type of opening-closing mechanism shall conform to the followint Table 2.1 (1) Opening-closing mechanism.

Table 2.1 (1) Opening-closing mechanism

Type		Mechanism
Manual-Type	Handle-Type	Axis leveled in upper-class and connected to wire-rope for opening-closing. Hanole turn with less than 3.5 kg of rotary-force.
	Chain-Type	Mechanism installed in case and connected to chain, chain pulled with less than 3.5 kg of force.
	Push-Up-Type	Axis equipped with spring and handle provided on slat. Force for up and down, less than 6 kg.
	Hook-Type	Mechanism installed in case and slat roll-up with pulling handle, provided at bottom of case, a few times and close with pulling once. This mechanism restricted to shuttel less than 3 m width and 1.7 m height.
Automatic-Type	Upper-Automatic-Type	Mechanism installed in upper-case switch (open, close, stop) box placed on floor as directed by the supervisor and operater.
	Lower-Automatic-Type	Mechanism and switch installed on floor as directed by the supervisor and operater.

Automatic mechanism shall be provided with handle or chain to open or close at time of power-break-out.

B. Type of opening and closing by direction shall conform to the following Table 2.3 (2) Type of opening and closing.

Table 2.3 (2) Type of opening and closing

Type	Mechanism
Up-Down Type	Leveled axis turned to open and close, up and down.
Slide Type	Vertical axis turned to open and close laterally.
Horizontal-Type	Leveled axis turned to open and close horizontally.

Oblique-type and other special types shall be stated in the particular specification.

16.2.4 Accessory

A. Shutter of door-way, partition and other places exceed 15 m^2 or 6 m height shall be equipped with safety-device for sudden-close.

B. Side-door shall be hinge-type or other types able to dismount and shall conform to Section 1 Steel sash and door.

C. Fuse shall be otherwise specified, however standard dissolving temperature shall be between 70 - 90°C.

D. Finish and quality of handle-box, switch box and other exposed portion shall be otherwise specified.

16.2.5 Manufacturer

Manufacturer shall be otherwise specified or submitted for approval of the supervisor.

16.2.6 Shop-Drawing

Full-scale and shop drawing shall be prepared and approved by the supervisor before production.

16.2.7 Manufacturing

A. Process:

(1) Form of slat shall be produced by shutter-roll and slat shall be inserted and assembled with end-covering.

(2) Rail shall be folded and welded or screwed plate and anchor 2.3 mm thickness shall be firmly provided at approximately 600 mm.

(3) Case shall be welded or screwed plate and fastener shall be firmly provide in accordance with dimension and weight. Inspection-hatch shall be fastened by hinges to case.

B. Depth of rail shall conform to the following Table 2.7 Depth of rail.

Table 2.7 Depth of rail

Width of Shutter (mm)	Depth (mm)	Remark
Less than 4,000	Deeper than 60	Bottom of rail shall be with same material and granded for water.
4,000 - 7,000	Deeper than 75	
7,000 - 8,500	Deeper than 90	

Slat shall be inserted more than 80% of rail depth.

C. Rust proof shall conform to the followings:
(1) Refer to Section 1 Steel sash and door.
(2) In case material of slat complied to JIS G 3131 (Hot-rolled mild steel plate and band) slat shall be dipping-treated.
(3) Additional rust-proof treatment shall be applied in accordance with instruction of the supervisor for improper rust-proof.

16.2.8 Installation

A. Installation shall be performed by manufacturer unless otherwise specified or directed by the supervisor.

B. Installation method shall conform to the following Table 2.8 Installation of shutter.

Table 2.8 Installation of shutter

	Connection to Structure		
	Reinforced Concrete or Block Structure	Steel Structure	Wood Structure
Rail	Anchor weld to reinforcement	Screw or weld to steel	Wood-screw
Case	Anchor weld to reinforcement	Screw, bolt or weld to steel	Wood-screw or bolt
Rope-Case Handle-Case Conduit-Tube	Secure in concrete or pack by mortar	Hanger screw or bolt	Bolt or clip bolt

Mortar shall be included in automatic-shutter work however electrical work (power supply) shall be included in II Electrical work.

C. Axis for shutter-slat shall be free from any damage, rust and impurities and shall be well-inspected and firmly placed. Strength and dimension such as diameter length shall be carefully determined.

D. Shaft shall be inspected for defect.
E. Opening and closing mechanism shall be cleaned and inspected for rust, loose-bolt and other defects.
F. Wire-pipe shall be gass-pipe or vinyle-pipe of full-length.

16.2.9 Light-Weight Shutter

A. Light-weight shutter shall conform to JIS A 4704 (light-weight shutter).
B. Slat shall be interlocking type of steel 0.6 mm or 0.8 mm thick.
C. Shutter shall be opened or closed manually by handle attached to slat, and spring shall be provided to balance the weight of shutter. Hook-bar shall be prepared in case position of handle is too high.
D. In case middle-post is required due to large area of shutter, middle-post shall be removal-type.
E. Shaft shall be provided with bearing and plate and attached to spring conformed to JIS G 3502 (piano-wire) or JIS G 3506 (hard-steel wire).
F. Rubber-stopper shall be provided on lintel in case otherwise specified.
G. Case shall be complied to the particular specification or drawing.
H. Manufacturer shall be otherwise specified or submitted for approval of the supervisor.
I. Rust-proof shall conform to Section 2.7 and any damage occured during handling shall be remedied in accordance with instruction of the supervisor.
J. Proper lock shall be provided.

16.3 Aluminium Sash and Door

16.3.1 Material

A. Frame, mullion, fitting and other main-numbers shall conform to JIS H 4100 (aluminium and aluminium alloy) A3003P, A3203P, A5052P, A5005P, A1100P, or A1200P.
B. Stainless steel (SUB27), galvanized cast alloy and mild-steel shall conform to requirements of JIS. Milk-steel shall be provided with isolating treatment.
C. Stainless steel for bolt, nut and screw shall conform to grade-27 of JIS G 4303 (stainless steel bar), JIS G 4308 (stainless steel wire product) and JIS G 4309 (stainless steel wire). Aluminium alloy for rivet shall conform to JIS H 4120 (aluminium and aluminium alloy rivet) A5056BR or A6061BR. A2017BR, A2117BR or A2074BR shall be used in case otherwise specified.
D. Anchor shall conform to JIS G 3131 (hot-roll mild steel plate and band) or JIS G3141 (cool-roll steel plate and band).

16.3.2 Accessory

A. Hard-ware for aluminium sash and door shall be aluminium alloy, galvanized alloy or stainless steel (SUS27) and surface properly treated.
B. Runner shall be hard-nylon product with bearing. Stainless steel runner shall be otherwise specified.
C. Door-stopper shall be aluminium and hard-rubber or vinyle bumper equipped.

D. Anchor shall be mild-steel isolated according to JIS H 8610 (electro-galvanize-plating) or JIS H 8641 (varnish-galvanize-plating). Anchor shall be provided at less than 500 mm interval.

16.3.3 Production

A. Manufacturer shall be stated in the particular specification or approved by the supervisor.
B. Full-scale and shop drawing shall be prepared in accordance with sash and door drawing and list and submitted for approval of the supervisor.
C. Sash-bar shall not be defected or deformed.
D. Sash and door shall be acculately produced and tolerance shall be less than 1.5 mm for width and height and less than 2.0 mm for diagonal dimension.
E. Joint and corner of frame shall be properly and firmly rivetted, screwed or welded and caulking shall be provided from back.

16.3.4 Surface

A. Surface shall be provided with anodic-treated-coating in accordance with JIS H 8601 (anodic oxydation coating to aluminium and aluminium alloy) O-W-6KL_1-R_1 or S-W-9L_2-R_2. Coating thicker than 14μ shall be otherwise specified.
B. Anodic-treated-coating shall be applied to processed members or treated otherwise approved by the supervisor.
C. Thickness of coating for electrolysis shall be stated in the particular specification color sample shall be submitted for approval of the supervisor.
D. In case coloring-paint is required, material shall be chemical-treat-coated with phosphor oxidize, chrome oxidize and others. Sample of coating shall be submitted and approved by the supervisor for thickness and color.

16.3.5 Surface Painting

Painting shall conform to JIS A 4706 (steel and aluminium alloy sash) and thickness of coat shall be more than 12μ.

16.3.6 Insulation

Connection to alkali-type material (concrete mortar) and different metal shall be treated with insulation.

16.3.7 Transportation

A. Material and product shall be protected with water-proofed cover.
B. Product shall be packed in wood-frame and transported vertically.

16.3.8 Installation

Manufacturer shall install and hold responsibility. Position of sash and door shall be confirmed and adjusted by temporary placing before installation.

16.3.9 Protection and Cleaning

Proper protection shall be provided after installation.

16.3.10 Adjustment

Required dimension of glass shall be fixed and adjusted.

16.3.11 Ready-Made Sash — Ready-made sash shall conform to JIS A 4706 (steel and aluminium alloy sash).

16.4 Stainless-Steel Sash and Door

16.4.1 Material

A. Main-member shall conform to JIS G 4305 (cool-roll stainless steel plate) or JIS G 4307 (cool-roll stainless steel band). External sash and door shall be SUS27 as standard.
B. Accessory such as screw and rivet shall conform to JIS G 4303 (stainless steel bar), JIS G 4308 (stainless steel wire product) and JIS G 4309 (stainless steel wire) and SUS27 as standard.

16.4.2 Production

A. Manufacturer shall be stated in the particular specification or approved by the supervisor.
B. Assembling shall be done with screw and bolt and avoid welding as possible.
C. Adjuster shall be prepared at welding. Welding rod shall be SUS27 and welding shall be arc-weld.
D. In case thin-plate of less than 1 mm thick is welded, additional plate shall be provided.

16.4.3 Finish and Installation

A. Stainless steel shall be finished with mechanically-buff-polished as follows:
Buff finish; Buff polish with No.300 - 400 emery.
Hair-line finish; Buff polish with No.250 emery and sandpaper either horizontally or vertically to mark straight pattern.
Rough finish; Emery blasted or liquid honing treated.
B. Installation shall conform to Section 1 Steel sash and door.
C. Thickness of stainless steel plate shall conform to the following Table 4.3 Thickness of stainless steel plate.

Table 4.3 Thickness of stainless steel plate

		Portion	Thickness (mm)
Sash	Frame	Lower frame, flashing plate	2.3
		Side and top frame, mullion, transom	1.6
		Stool, casing	1.6
		Top frame (Hanging fitting)	2.3
	Fitting	Frame, mullion	1.6
Door	Frame	Saddle, back-plate	2.3
		Side and top frame	1.6
		Casing	1.6
		Top frame (Hanging fitting)	2.3

Table 4.3 Thickness of stainless steel plate - continued -

		Portion	Thickness (mm)
Door	Fittings	Frame, mullion, middle rail, panel-plate, flush-plate	1.6
		Reinforcing-frame, anchor-plate	2.3
	Miscel-laneous	Reinforcing-plate for hinge, lock, door-check, etc.	3.2

16.5 Accordion Door. Accordion door shall conform to drawing or the particular specification and the followings:
A. Finish shall be vinyle cloth or other cloth.
B. Frame shall be adjustable cross-type-steel plate.
C. Hanger-rail shall be ⊔ shape and runner shall be equipped for opening and closing.

16.6 Automatic Door Automatic door shall be mat-type, touch-type and ray-type, and type, structure and manufacturing shall conform to drawing and the particular specification.

17. Wood Sash and Door

17.1.1 Scope Material and performance shall conform to this Chapter 17 Wood sash and door unless otherwise specified.

17.1.2 Standard Standard shall conform to "Raw-Material of Japan Agriculture and Forestry Standard".

17.1.3 Material
A. Wood material shall be all but lumber-center and dried of water-contain less than 18%.
B. Species of wood shall be otherwise specified or directed by the supervisor.
C. Plywood shall conform to "Ordinary-Plywood of Japan Agriculture and Forestry Standard". Grade and classification shall conform to the following Table 1.3 C Grade and classification of plywood.

Table 1.3 C Grade and classification of plywood

	Classification	Grade
Toilet, bath and other equipment rooms	2nd class High-water-proof	1-Grade
Other rooms (beside stated above)	3rd class Ordinary-water-proof	1-Grade

D. Plywood shall be more than 3 layers of veneer and thickness of plywood shall conform to the following Table 1.3D Thickness of plywood.

Table 1.3 D Thickness of plywood

	Thickness
Panel-plate, wainscot-plate	9 mm
Flush door-panel	4 mm

E. General adhesive shall conform to JIS K 6801 (urea-resin adhesive for wood) and adhesive for moistured portion shall conform to JIS K 6802 (phenol-adhesive for wood).

F. Other materials shall conform to drawing, particular specification or approval of the supervisor.

17.1.4 Dimension and General Performance

A. Thickness of sash and door shall conform to the following Table 1.4 A Thickness of sash and door unless otherwise specified, indicated on drawing or directed by the supervisor.

Table 1.4 A Thickness of sash and door

Sash and Door	Thickness (mm) Less than 1.0 m height	Less than 2.1 m height	Less than 2.3 m height
In and out door	-	40	45
Window-sash	33	36	40
Light-partition door	33	36	-

B. General performance shall conform to the following Table 1.4 B Performance.

Table 1.4 B Performance

Portion	Joint	Remarks
Number of Tenon	Double tenon for door thickness more than 36 mm.	Double stepped tenon for door thickness more than 120 mm. However, minor rail with single stepped tenon.
	Single tenon for door thickness less than 36 mm.	
Through Tenon	Wedged in general key or pin provided for door thickness more than 90 mm.	Wedge for rail and mullion of window omitted with approval.

Table 1.4 B Performance - continued -

Portion	Joint	Remarks
Stile	Male or female tenon to frame.	-
Astragal	T shape screwed and applied with adhesive.	Wood screwed (brass) at both ends and every 240 mm.
Panel Board	Plough-grooved all around.	Plywood
Bead	Wood screwed at both ends and every 240 mm.	-
Others		Stated in the drawing, particular specification or directed by the supervisor.

Note: Wedge may be replaced with synthetic resin type adhesives with approval of the supervisor.

C. Connection of fitting frame and middle rail shall be tenon jointed with adhesive.
D. In case sliding door rail frame is sloped for water outlet, fittings shall be provided with additional frame at bottom. Fitting frame cut or carved shall be reinforced with additional frame.
E. Sample and full-scale shop drawing shall be prepared and submitted as requested by the supervisor for approval.
F. Temporary assembling of sash and door shall be performed as requested by the supervisor.
G. Flush-door-fitting shall be inspected by the supervisor before flush-panel assembly.

17.1.5 Protection — Protection shall be provided to already installed sash and door in accordance with instruction of the supervisor and with other works concerned.

17.1.6 Production Method — Production of door shall conform to following Table 1.6 Production method of door.

Table 1.6 Production method of door

Door	Portion	Method	Remark
Panel Door	Top and bottom rail and other main-members	Penetrated nortise and tenon joint to stile.	
	Sub-members	Mortise and tenon joint to rail and stile.	
	Frame	Thickness 25 mm, interval appr. 150 mm, tenon joint to rail and stile, halving joint to each other ventilation-hole at appr. every 300 mm. Top and bottom rail 6 piece. Jointed board, stile 5 piece. Jointed all applied and jointed with adhesive.	Other equivalent methods shall be adapted with approval of the supervisor.
	Panel-plywood	Plywood press-jointed with adhesive to frame. End of plywood provided with finishing-bead.	

17.2 Hard-Ware

17.2.1 Quality

Hard-ware shall conform to the requirement of JIS standard or equivalent quality approved by the supervisor.

17.2.2 Classification

A. Hard-ware shall be marked with the manufacturer's name or brands, and sample shall be submitted for approval by the supervisor for color, finish, appearance, dimension, mechanism, quality and other necessary points.

B. Standard of classification, type and grade shall conform to the following Table 2.2 Classification, type and grade unless otherwise specified.

Table 2.2 Classification, type and grade

Type	Hard-Ware	Material	Remark
Hinged-Door	Hinge	Brass	
	Double acting spring hinge	Brass	Blass plating
Casement Window	Spring hinge	Painted iron	
	Lavatory hinge	Chromed brass	
	Floor hinge	Brass	
	Pivot hinge	Brass	
	Door-check (door closer)	Brass Light-metal	Two-step adjusting device for oil-pressure type
	Door-spring	Painted iron	
	Mortise lock	Brass	Cylinder lock with 5 pins, bar-lock with tambler
	Panic lock	Brass	With cylinder lock
	Indicator lock	Chrome brass	
	Indicator	Chrome brass	
	Flush bolt	Brass	
	Door stopper	Brass	
	Door holder	Bronze	
	Knob	Brass	
	Lever handle	Brass	
	Handle	Brass	
	Button	Brass	
	Push plate	Brass	
	Casement window adjuster	Brass	
	Gate bolt	Brass	
	Latch bolt	Brass	
	Latch	Brass	
Sliding-Door	Rail	Brass	
	Runner	Iron or nylon	
	Bottom-runner	Rubber	
Hanged-Sash	Roller	Brass	
	Handle	Brass	
	Screw fastener	Brass	
Hanged-Door	Door hanger and accessories	Painted iron	1 Round-hanger with hanger-rail, bracket,end-panel, joint

Table 2.2 Classification, type and grade - continued -

Type	Hard-Ware	Material	Remark
	Door hanger and accessories	Painted iron	2 Square-hanger with rail, bracket, guide-rail, runner, end-panel, joint
	Latch	Brass	
Double-Hung	Weight	Cast iron	
	Runner	Iron	
	Sash fastener	Brass	
Pivot-Sash	Handle fastener	Brass	
	Balance wheel	Brass	
	Pivot	Brass	
Awning-Sash	Catch	Brass	
	Awning bar	Brass	
	Hook bar	Brass	
Swing-Sash	Hook-bar bracket	Brass	
	Adjuster	Brass	
	Hinge		

17.2.3 Dimension and Number of Hard-Ware

A. Hinge:

Table 2.3 A Dimension and number of hinge

Sash and Door			Hinge	Number of Hinge for Height of Sash and Door			
	Thickness (mm)	Width (mm)	Size (mm)	Less Than 1.8 m	1.8m-2.0m	2.0m-2.4m	2.4m-3.0m
Small-Sash	-	-	64				
Sash Door	20-30	Less 800	76				
	30-33	Less 850	89				
	33-36	Less 750	102	2 pieces	3 pieces	3 pieces	4 pieces
	33-36	750-800	114				
	36-43	800-850	127				
	43-50	850-900	152				
	More 50	900-1,000	152	3 pieces	3 pieces		

B. Spring hinge:

Table 2.3 B Dimension and number of spring hinge

Dimension of Sash and Door			Size of Hinge		Number
Thickness of Stile (mm)	Width (mm)	Height (mm)	Double-Acting (mm)	Single-Acting (mm)	of Hinge (piece)
		Approximate			
19-25	650	1,800	76	76	2
22-30	700	" 1,800	102	102	2
28-38	750	" 1,800	127	127	2
30-45	800	" 1,800	152	152	2
35-50	850	" 2,000	178	173	3
38-57	850	2,000-3,000	203	203	3

C. Mortise-lock:

Table 2.3 C Back-set of mortise lock

Thickness of Stile (mm)	Back-Set (mm)	Diameter of Knob (mm)
75 - 85	38	Larger than 45
85 - 100	51	" 51
100 - 140	64	" 54
Thicker than 140	69	" 54

D. Door-check and floor-hinge:

Table 2.3 D Dimension of door-check and floor-hinge

Sash and Door			No. of Door-Check		No. of Floor-Hinge	
Width (mm)	Height (mm)	Weight (kg)	Ordinary	With Stopper	Ordinary	With Stopper
Less than 800	Approximate 1,800	20-30	71	171	110	210
" 900	" 2,100	30-40	72	172		
" 950	" 2,400	50-60	73	173	120	220
" 1,000	" 2,400	70-90	74	174		

Note: Door-check for fire-door shall be provided with fuse.

E. Runner and rail:

Table 2.3 E Dimension of runner and rail

Sash and Door Width x Height (mm)	Runner Dimension (mm)	Rail Name	Rail Dimension or Width x Height (mm)
Small Window: Approximate 150 x 850	24	Round 1	6
		Halve-round 2	5.1 x 6.1
Window: " 900 x 900	30	Round 1	6
		Halve-round 3	6.4 x 7.6
Door and Large Window: " 900 x 900	36	Halve-round 4	7.6 x 9.0
		Square 1	7.3 x 7.3
Large Door: " 1,400 x 2,100	42	Halve-round 5	9.1 x 12.0
		Square 2	8.4 x 8.4
Large Door: " 1,500 x 2,400	60	Halve-round 5	9.1 x 12.0
		Square 3	12.0 x 12.0

Note: Iron-nail for iron rail and brass-nail for brass rail. Length of nail shall be height of rail multiplied by 3.5. Wood-nail shall be otherwise specified.

17.2.4 Installation — Hard-ware and other accessories for sash and door shall be correctly and firmly installed with required screw, bolt, rivet or nail. Screw hole shall be drilled and all screws shall be evenly fastened.

18. Glass and Plastic

18.1 Glass

18.1.1 Classification and Standard

A. Glass shall conform to the following Table 1.1 Classification and standard of glass.

Table 1.1 Classification and standard of glass

Classification		Standard	Dimension and Others
Plate-Glass	Ordinary Plate-glass	JIS R 3201 (Ordinary plate-glass)	(1) Class, dimension, color, position and other necessary information of plate-glass shall conform to drawing, or specification otherwise stated. (2) Any uncertain natter shall be reported and directed by the supervisor.
	Frosted Plate-glass	JIS R 3201 (")	
	Polished Plate-glass	JIS R 3202 (Polished plate-glass)	
	Float Plate-glass	JIS R 3202 (")	
	Template glass	JIS R 3203 (Template glass)	
	Wire template glass Plished Wire plate-glass	JIS R 3204 (Wire plate-glass)	
Special-Glass	Laminated glass	JIS R 3205 (Laminated glass)	(1) Production shall be in accordance with drawing or specification otherwise stated. (2) Product shall be provided with tests requested by the supervisor appearance shall be inspected by the supervisor.
	Electric-conducting glass (Special-laminated glass)	No standard	
	Electric- heating glass (Special-laminated glass)	No standard	
	Tempered glass	JIS R 3206 (Tempered glass)	
	Colored glass (Special-tempered glass)	No standard	
	Corrugated glass	Corresponding standard stated above	Corrugation, dimension and manufacturer shall be otherwise specified.

Table 1.1 Classification and standard of glass - continued -

	Classification	Standard	Dimension and Others
Special-Glass	Heat obsorbing plate-glass (Class shall refer to ordinary plate-glass)	JIS R 3208 (Heat obsorbing glass) JIS R 3201 JIS R 3202 JIS R 3203 JIS R 3204 Product not standardized (Gray, bronze)	(1) Dimension shall conform to drawing or specification otherwise stated. (2) Blue heat absorbing glass shall be standard and as following; (a) Thickness - 5 mm (b) Visible ray transmittance - More than 70% (c) Radiant heat transmittance - Less than 60%
	Heat reflecting glass	No standard (Blue-type gray-type laminated-type pair-type)	(1) Produce in accordance with dimension indicated on drawing and thickness and quality shall be otherwise specified or indicated on drawing. (2) Product shall be tested for tightness and inspected by the supervisor for appearance
	Pair-glass	JIS R 3209 (Pair glass)	
	X-ray-proof lead glass	JIS R 3701 (X-ray proof lead glass)	Amount of lead, dimension and manufacturer shall be otherwise specified or indicated on drawing.
	Channel glass	No standard	Dimension shall be otherwise specified or indicated on drawing.
	Curved glass Stend glass Ornamental window glass	No standard	Dimension and quality shall be otherwise specified or indicated on drawing.
	Mirror	JIS R 3202 (Polished plate-glass)	Dimension and quality shall be otherwise specified or indicated on drawing. Moisture proof shall be provided to mirror installed in bath room.
	Glass-block	JIS A 5212 (Glass block)	Dimension, ray-transmittance and manufacturer shall be otherwise specified or indicated on drawing.
	Prism glass	No standard	Dimension shall be otherwise specified or indicated on drawing.

Note: Glass shall be free from foam, crack, deformation and other defects. Glass with no standard shall be approved by the supervisor.

B. Additional touching to plate-glass shall be otherwise specified or indicated on drawing.
C. Sample of glass shall be submitted for approval of the supervisor.

18.1.2 Sealer

Classification as the following Table 1.2 Classification of sealer for glass installation.

Table 1.2 Classification of sealer for glass installation

Elasticity	Solubility			Remark
		Non-Form-Type Sealer		
Non-Elastic-Type		Glass Putty	Hardening	Ordinary glass for wood and steel sash.
			Un-Hardening	
		Caulking	Coating	Expansion joint around sash
			Non-Coatingg	Ditto (not exposed)
Elastic-Type	Solvent Release		Butyl	Ditto
	Curing	1-Liquid		Glass sealer and expansion joint of sash
			Silicon	Ditto
			Polyurethane	Ditto
		2-Liquid	Polysulfide	Ditto
				Heat obsorbing and pair glass
		Moulded-Type Sealer		
Non-Elastic-Type			Polybutene	Glass and jointer
			Butyl	Ditto
Elastic Type			Vinyle	Aluminium sash and glass
			Neo-plain	Ditto
			Butyl	Ditto
			Polyurethane	Glass

A. Hardening glass putty (for ordinary glass for wood and steel sash and door):
Component shall be properly mixed for required elasticity and hardness to avoid pealing, cracking, shrinkage, dripping and other defect after applied. Main agents for thinner shall be dried-oil and alcoholic-mineral oil and pure. Thinner shall be added less than 15% (weight-ratio) with approval of the supervisor. Maximum joint dimension as 5mm x 10mm - 10mm x 20mm.

B. Non-hardening glass putty (for ordinary glass for aluminium sash and door):
Refer to above stated item. Maximum joint dimension as 5mm x 10mm - 10mm x 10mm.

C. Coating caulking (for joint around sash and expansion joint):
Refer to above stated item. Maximum joint dimension as 5mm x 10mm - 10mm x 10mm.

D. Non-coating caulking (for not exposed portion):
Refer to above stated item. Maximum joint dimension as 5mm x 10mm - 10mm x 10mm.

E. Butyl sealer (for not exposed portion):
Refer to above stated item. Maximum joint dimension as 5mm x 5mm - 10mm x 10mm.

F. Polysulfide sealer (for glass-fitting of metal sash and door):
Refer to above stated item. Maximum joint dimension as 3mm x 3mm - 25mm x 25mm.

G. Silicon-sealer (for glass-fitting of metal sash and door):
Refer to above stated item. Maximum joint dimension as 3mm x 3mm - 25mm x 25mm.

H. Polyurethane sealer (for glass-fitting of metal sash and door):
Refer to above stated item. Maximum joint dimension as 3mm x 3mm - 25mm x 25mm.

I. Polysulfide sealer (for glass-fitting of metal sash as heat-absorbing-glass, heat-reflecting-glass, laminated-glass and pair-glass):
Refer to above stated item. Maximum joint dimension as 3mm x 3mm - 25mm x 25mm.

J. Metal fastener for glass, in case sealer stated in item C - J is in use, shall be galvanized iron sheet or stainless steel sheet and 0.8mm thick, 10mm length triangle-shape-nail for wood sash and door and piano-wire 1.2mm diameter clip for metal sash and door. Bead for glass shall be brass or stainless steel for wood and metal sash and door.

K. Polybutene sealer (for glass-fitting of metal sash and door):

L. Butyl sealer (for glass-fitting of metal sash and door):

M. Vinyl sealer (for glass-fitting of metal sash and door):

N. Neoprene sealer (for glass-fitting of metal sash and door and glass-packing):

O. Butyl sealer (for glass-fitting of metal sash and door):

P. Polyurethane sealer (for glass-fitting of metal sash and door and glass-packing):
Maximum joint dimension as 10mm x 10mm - 40mm x 80mm.

Q. Sealer stated in item L - Q are mould-type sealer and shall be applied as bead or packing as directed by the supervisor. These sealers shall also be applied for joint of metal sash to sash, sash to structure and structure to structure as packing.

18.1.3 General Performance

A. Glass shall be correctly cut less 1.2mm - 2.0mm than net dimension of glass at top and both ends. Glass shall be inserted at least 5mm and more than a thickness of glass plus 2mm into frame.

B. Sash and door frame grooved for glass shall be painted and properly dried for fitting glass.

C. Putty shall be placed and pressed by glass to complete tightness.

D. Glass for exterior wood-sash shall be fastened by triangle-nail at all corners and every 90 - 120 mm.

E. Putty shall be tightly packed immediately and surface shall be evenly finished.

F. Paint over putty shall be applied after one-week of packing and properly dried.
G. Bead for glass in interior sash and door shall be fastened by brass or stainless steel screw at every 240 mm or less, after putty is evenly packed.
H. Dimension of glass exceed 2 m^2 shall be directed by the supervisor or stated in the particular specification for special packing.
I. Frosted-glass and mould-glass shall be directed by the supervisor for placement of side.
J. Other performances shall conform to the particular specification or shall be directed by the Supervisor.

18.1.4 Special Glass Performance

A. Glass-wall and glass-roof:
(1) Tempered-glass;
(a) Sucker shall be prepared for handling, and special attention shall be paid not to damage edges.
(b) Frame, handle, hinge and other accessories for tempered-glass door shall be indicated on drawing or stated on particular specification.
(2) Pair-glass and channel-glass;
(a) Elastic-mould-type sealer shall be provided as cushion and non-hardening-putty or poly-sulfide sealer shall be applied for complete air-tightness.
(b) Space between glass and frame shall be 3 mm as standard and edge shall be free from unreasonable force. In case in cold-local glass shall be isolated from expansion and shrinkage of frame.
(3) Curved-glass, steno-glass and ornamental-glass;
Performance shall conform to drawing or particular specification.
(4) Mirror;
(a) Chamfering, edge-polishing, frame, thickness, position, fastener and other accessories shall conform to drawing, particular specification or instruction of the supervisor.
(b) Elastic-mould-type sealer shall be provided as cushion, in case mirror is directly installed to concrete, mortar, plaster, plywood and other boards with urea-adhesive.
(c) Back of mirror shall be free from salinity, alkali and acid and agent applied on back shall not be damaged. In case installed in moisturous room, mirror shall be moisture-proof as directed by the supervisor. Detail of installation shall be reported for approval of the supervisor.
(5) Flat-Plate-Glass shall be wire-templated-glass unless otherwise specified. Performance shall conform to drawing and particular specification and detail of installation shall be reported for approval of the supervisor.
(6) Heat-absorbing-glass and heat-reflecting-glass;
(a) Space between glass and frame shall be approximately 4 mm all around.
(b) Glass sealer shall be silicon-sealer, polysulfide sealer, neo-plain-sealer and other heat-isolating types.

(c) Glass shall be clear-cut.
(d) Glass shall be avoided from marking and painting on surface.
(e) Glass shall not be shodowed by appentice and other projected objects.
(f) Performance in cold-local shall be refered to item (2).

(7) Corrugated-glass;
(a) Corrugated-glass for lapped roofing shall be lapped more than 150 mm vertically and 1.5 corrugation horizontally for small-corrugated-glass, and cover cap provided for horizontal joint of large-corrugated-glass. Lap shall be packed with rope-putty or halved-felt and corrugated-felt shall be packed at connection to purlin. Fastener shall be chrome-plated-iron-sheet of 2 mm thick and 2 pieces for each glass.
(b) Corrugated-glass for flat-roofing shall be lapped more than 150 mm vertically and special cover cap provided for horizontal joint. Flat-roofing-corrugated-felt shall be packed at connection to purlin and lap and joint shall be packed with rope-putty. Fastener shall be hook-bolt or particular nail.
(c) Corrugated-glass for wall shall refer to above stated item (a) and (b).

B. Glass-block and prism-glass:
(1) Glass-block;
(a) Glass-block shall be placed with mortar (portland cement 1: Sand 4 volume ratio mixture) of less water and water-proof-agent added for exterior portion.
(b) Reinforcing bar shall be 2-ϕ6 mm at every 450 mm.
(c) Proper expansion joint shall be provided at joint to blocks, bricks concrete and other structures as directed by the supervisor or stated on particular specification.
(d) Performance shall conform to approved execution drawing with care for even joint width, complete compaction of joint mortar, level and reinforcement.

(2) Prism-glass;
(a) Prism-glass shall be fixed in cast-iron frame with approved rust-proof paint applied. Frame shall be provided with four lead-base 4 mm square, caulking compound evenly placed, prism-glass correctly installed and rust-proof-painting finished.
(b) After paint is dried, joint shall be finished with water-proof agent added mortar.
(c) Surrounding frame shall be provided with caulking compound.
(d) Prism-glass directly concreted in wall or slab shall be otherwise indicated on drawing or stated on particular specification.

18.1.5 Protection and Cleaning

A. Glass shall be marked or pasted with paper to notify existance of glass and protect it from damage. Any glass damaged shall be immediately replaced. Heat-absorbing glass and heat-reflecting-glass shall not be marked or pasted with paper to avoid crack due to heat.
B. Glass shall be cleaned at completion without applying any chemical agent.
C. Glass-block and prism-glass shall be properly protected from surrounding structure's force.

18.2 Plastic

18.2.1 Material

A. Material as following Table 2.1 Plastic:

Table 2.1 Plastic

Material	Portion	Dimension	Remark
Acrylic-Type	Roof wall ceiling	Standard size of acrylic-sheet as 1.3m x 1.1m and 0.8mm-50mm thick. Dimension conform to drawing or particular specification.	(1) Plastic for exposed finish protected by pasting paper or cloth for damage and care to handle. (2) Surface cleaned with soft cloth dipped in water, soap or spirit at completion. (3) Acrylic type prastic protected from chemical agent affect crack, deformation solution, expansion, etc.
Vinyl-Type	Floor partition gutter	Dimension, quality and material of vinyl-sheet, corrugated-sheet, tile-leather-sheet, film conform to drawing or particular specification.	
Melamine-Type	Partition fittin	Dimension, quality and material of melamine laminated sheet conform to drawing or particular specification.	
Poly-Styrene-Type Poly-Ethylene-Type	Insulation for wall and roof	Ditto	
Poly-Ester-Type (F.R.P.)	Roof wall bath-tub high-tank	Ditto	

B. Classification and dimension of plastic shall be otherwise specified.

C. Plastic shall conform to requirements of JIS, and plastic not standardized shall be directed by the supervisor. Sample of plastic shall be submitted for approval of the supervisor for classification, color, luster, surface and finish.

D. Plastic shall be free from crack, deformation and irregularity.

E. Wooden plastic shall be free from damage and irregularity.

F. Polyester-type for roof and exterior wall shall be fibre-reinforced-polyester (F.R.P.).

G. Gutter shall conform to JIS A 5706 (Hard-chrolidized-vinyl gutter). Leader shall conform to JIS A 6741 (Hard-chrolidized-vinyl pipe). Non-standardized material shall be refered to manufacturer's standard and approved by the supervisor. Sample of fastener or hanger shall be submitted for approval by the Supervisor.

18.2.2 Cutting and Assembling

A. Cutting and assembling shall conform to the following Table 2.2 Cutting and assembling plastic.

Table 2.2 Cutting and assembling plastic

Hard-Material (All flat-sheet, corrugated-sheet and laminated-sheet)	(1) Saw for cutting and drill for hole, particular adhesive, nail or screw for jointing. (2) Cut section grinded or polished. (3) Hole slowly drilled and avoid heating or burning.
Soft-Material (Tile, leather, sheet, film)	(1) Cutting-machine, scissor, blade, or awl for cutting. Adhesive for jointing. (2) Cut section finished with high-frequency-sawing machine, bar-sealer or welder.

B. Joint finish shall be cared for irregularity, deforming and other defects.

C. Joint of heat-elastic material shall be considered for expansion of material. Acrylic-polyethylene joint shall be allowed for 1.0 - 1.5 mm expansion on 1.0 m at 10°C difference. Vinyl-sheet joint shall be allowed for 0.7 - 0.8 mm expansion on 1.0 m at 10°C difference.

D. Heat-elastic-material shall be kept at less than 50°C (60°C for short period) to avoid change of hardness.

E. Material affected by heat shall be kept within allowable temperature as stated below:
Reinforced-polyester and urea-resin; less than 80°C (short period 100°C)
Phenole-resin and melamine; less than 100°C (short period 120°C).

18.2.3 Performance

A. Roof:
(1) Corrugated sheet shall refered to performance of corrugated-glass.
(2) Interval of purlin shall be 850 mm for 3 mm thick sheet and 600 mm for 2 mm thick sheet unless otherwise stated in particular specification.
(3) Vertical lap shall be 150 mm for roof-grade 3/10, 120 mm for roof-grade 4/10 and 100 mm for roof-grade 5/10 unless otherwise specified. Horizontal lap shall be more than 1.5 corrugation unless otherwise specified.
(4) Joint shall be provided on purlin, packed with felt, washer, rubber or other proper packing and caulking applied as required.

(5) Roof insulation shall be performed with installation of above stated insulation board (form-polystylene). Insulation board thicker than 25 mm shall be placed on slab-form work and concreted.

B. Gutter:

(1) Plastic leader shall be inserted more than 60% of diameter in length to cast-iron-roof-drain.
(2) Joint of leader (pipe) shall be provided at approximately every 4.0 m and lapped more than diameter in length.
(3) Proper jointer-pipe shall be provided at corners in accordance with angle approved on execution full-scale drawing.
(4) Leader shall be connected to drain with free type arm.
(5) Proper hanger and fastener shall be provided for leader.
(6) Designated joiner shall be provided for joint of eave-gutter.
(7) Leader head, elbow and other accessories shall conform to manufacturer's standard and specification.
(8) Valley gutter shall be folded hard-chloridized vinyl sheet and joint shall be welded or designated joiner provided. Performance shall conform to manufacturer's specification.

C. Wall:

(1) Corrugated sheet for exterior wall shall refer to performance of asbestos slate corrugated sheet.
(2) Vertical lap shall be 100 mm and horizontal lap shall be one corrugation.
(3) Corrugated sheet shall be jointed on ferring strip with washer and felt and proper caulking applied.
(4) Flat-sheet or laminated sheet for wall shall refer to performance of plywood.
(5) Joint shall be tightened with nail or screw within every 300 mm.
(6) Joint shall be also applied with adhesive.
(7) Curve of sheet shall conform to the drawing and the particular specification.
(8) Hard-plastic-material for wall shall be gather-placement or packed with packing and tightened by ornamental-hook.

D. Ceiling:

(1) In case corrugated plastic sheet is designated, incandescent lamp shall be provide to avoid deformation by heat.
(2) Flat-sheet and laminated-sheet shall refer to Chapter 19 Interior finish and care shall be taken for joint to avoid deformation.

E. Partition:

(1) Flat-sheet, corrugated-sheet and moulded-sheet for wall shall be installed with bead and refer to specification on glass unless otherwise specified.
(2) All sheet shall be bent with applying heat.
(3) Surface shall be cared for damage.

F. Sash and door:
(1) Any sheet for sash without frame shall be less than its thickness multiplied by 50 in length. Any sheet for swing-door without frame shall be less than its thickness multiplied by 100 in length.
(2) Any sheet with frame shall be refered to performance of glass and less than its thickness multiplied by 300 in length.
(3) Door shall be reinforced for push plate and other plastic accessories.
(4) Applying plastic-sheet for wood sash and door shall be refered to performance of clothing of Chapter 20 Interior finish.

C. Floor:
(1) Plastic flooring shall be placed with proper adhesive and protected for 24 hours and wax-polished for finish.
(2) Plastic flooring directly under the sun shall be non-fading color unless otherwise specified.

19. Painting

19.1 Material and General Conditions

A. Material shall be product stated in the particular specification or approved by the supervisor. Material shall be delivered to the job in the manufactures' sealed containers for approval of the supervisor.

B. Use of product by the same manufacturer shall be a general rule in each stage of work in this specification.

C. Paint shall be safely stored at storage exclusively for the use of paints. Care shall be given to fire protection.

D. Color, luster, color scheme, finish shall be decided by the supervisor after checking sample paint test.

E. The painting shall be performed by experienced, competent painter also approved by the supervisor.

F. Products of 7 manufactures listed in the back of this section shall be used unless otherwise specified.

19.2 Definition of Terminology

A. Surface sealing:
Surface to be painted shall be sealed to have uniform suction and prevent lye from oozing out.

B. Spot puttying:
All cracks and depressions shall be filled flush with putty.

C. Puttying:
All surfaces to be painted shall be puttyed to have uniformly flat surface.

D. Spot painting:
Spot puttyed area shall be touched up by paint.

E. Touch-up:
Any damaged area after the prime coat has been applied shall be touched up.

F. Drying hour:
The drying time of double coated paint shall be measured at the temperature of 20°C and humidity of 70%.

G. Amount of paint:
The paint amount shall be standard amount of paint itself not including thinner. It shall increase or decrease depending on shape and surface condition in the process of painting.

H. Drying time of double coated paint and paint amount shall not be listed in coating schedule when they vary with the conditions of surface to be painted.

19.3 Paint Finish Symbols

OP	Oil mix paint finish	JIS K 5511 Oil mix white zinc paint JIS K 5512 Oil mix titanium white paint JIS K 5513 Oil mix white zinc light coloring paint JIS K 5514 Oil mix titanium white light coloring paint JIS K 5515 Oil mix color paint
SOP	Synthetic resin mix paint finish	JIS K 5516 (Synthetic resin mix white paint) JIS K 5517 Synthetic resin mix light coloring paint JIS K 5518 Synthetic resin mix color paint
FE	Phthalic acid resin paint finish	JIS K 5572 Phthalic acid resin enamel
VP	Solvent-polyvinyl chrolide resin paint finish	JIS K 5581 Polyvinyl chrolide resin varnish JIS K 5582 Polyvinyl chrolide resin enamel JIS K 5583 Polyvinyl chrolide resin primer
EP	Polyvinyl acetate resin emulsion paint finish	JIS K 5663 2 class Synthetic resin emulsion paint

AEP	Synthetic resin emulsion paint finish	JIS K 5663 1 class Synthetic resin emulsion paint
RP	Lithin finish	
LC	Clear lacquer finish	JIS K 5531 2 class Clear lacquer
LE	Lacquer enamel finish	JIS K 5532 1 class Lacquer enamel
AC	Acrylic resin clear finish	
AE	Acrylic resin paint finish	
UC	Polyurethane resin clear finish	
UE	Polyurethane resin paint finish	
al-P	Aluminum paint finish	JIS K 5492 (Aluminum paint)
Heat-Proof	Heat-proof paint finish	
GP	Rubber chrolide paint finish	
E x P	Epoxy resin paint finish	
T/E x P	Tar epoxy resin paint finish	
W-AA	Amino-alkyd resin clear finish for wood	
Stipple (OP)	Stippled finish (Oil mix paint finish)	
Stipple (EP)	Stippled finish (Polyvinyl acetate resin emulsion paint finish)	

19.4 Index

Specification No.	Area of Use	Objects of Application	Finish Symbol
1	Exterior	Mortar, concrete, slate	VP
2	Exterior	Mortar, concrete, slate	AEP
3	Exterior	Mortar, concrete, light-weight foamed concrete	RP
4	Exterior	Large steel	GP
5	Exterior	Steel	SOP
6	Exterior	Steel products in general	SOP, OP
7	Exterior	Steel products	al-P
8	Exterior	Zinc plated-steel products	SOP
9	Exterior	Wood	SOP

Specifications No.	Area of Use	Objects of Application	Finish Symbol
10	Interior	Mortar, board	Stipple (EP)
11	Interior	Veneer, board	Stipple (OP)
12	Interior	Insulation-board	EP
13	Interior	Foaming plastic	EP, AEP
14	Interior	Mortar, plaster, concrete	VP
15	Interior	Mortar, plaster, concrete including cheese clothing	AEP
16	Interior	Mortar, plaster, concrete including cheese clothing	EP
17	Interior	Mortar, plaster, board veneer	
18	Interior	Mortar, plaster, board, veneer	
19	Interior	Steel products, steel	SOP
20	Interior	Wood products (clear finish)	LC
21	Interior	Wood products (clear finish)	UC
22	Interior	Wood products (clear finish)	W-AA
23	Interior	Wood products	LE
24	Interior	Wood products	FE
25	Interior	Wood products	SOP
26	Interior	Wood products	AEP, EP
27		Aluminum (clear finish)	AC, UC
28		Aluminum	AE, UE
29		Steel sash	EXP, VP
30		Steel sash	SOP
31		Stainless (clear finish)	AC, UC
32		Stainless	AE, UE
33		Steel fittings, machinery and tools plates	FE
34		Steel fittings, machinery and tools plates	SOP
35		Inside of steel duct inside of water tank	EXP
36		Inside of steel duct inside of water tank	T/EXP
37		Heat-proof steel	Heat-Proof
38	Floor	Wood (clear finish)	UC
39	Floor	Wood (clear finish)	W-AA
40	Floor	Concrete, mortar	EXP
41	Floor	Concrete, mortar	VP

19.5 General Notes on Paints

19.5.1 Preparation of Paint

19.5.1.1 Mixing — Paint content with pigment shall be thoroughly stirred to make a uniform consistency.

19.5.1.2 Thining — Potable water shall be used for thinning of emulsion paint and water-soluble paint. Proper thinner, product of the same manufacturer as paint as a rule, shall be used for other types of painting. Percentage of thining and viscosity shall be conducted with direction of manufacturer or catalogue as they vary with the method of paint, temperature, type of material to be painted.

19.5.1.3 Allowable Period of Use — Paint mixed with more than 2 types shall be used with direction of a manufacturer or catalogue as allowable period of use, mixing ratio and mixing method vary. That paint which has passed allowable period of use shall not be used.

19.5.2 Conditions at Painting

19.5.2.1 — Work shall not be executed in the following situations.

A. When temperature is below 5°C.
B. When humidity is above 85%.
C. When snowing or raining or it is forecast.
D. When dusts are present.
E. When temperature of surface to be painted is high under hot weather and bubbles are likely to develop on the painted surface.

19.5.2.2 Conditions of Surface to be Painted — Work shall not be executed or proper means shall be taken in the following situations.

A. When surface to be painted is dump and wet.
B. When condensation is likely to develop on the surface.
C. All nail holes on veneer, board, etc. shall be covered with proper rust-proof paint before the subsequent painting is applied in accordance with this specification.

19.5.3 Performance — Paint shall be evenly and uniformly applied on the surface. Areas of difficult application such as pointed part, internal angle, welded part, etc. shall be thoroughly painted and double coated as necessary to keep uniform coating thickness. Painting shall be properly done by carefully selecting the painting method by the shape of surface and types of paint.

19.5.4 Protection — Explosives such as paint, thinner, etc. excluding emulsion paint and water-soluble paint shall be kept in accordance with regulations concerned.

NO.1 EXTERIOR - SURFACE OF MORTAR, CONCRETE AND SLATE.

V.P. (Soluvent - Polyvinyle chrolide resin paint)

Coating Process	No.of Coats	Type of Paint	Drying hour	Amount kg/m^2
1. Surface preparation		Dry, clean and free from impurities		
2. Surface sealing	1	Sealer for polyvinyl chrolide resin paint	longer than 2 hrs.	
3. Puttying		Putty for polyvinyl chrolide resin paint		
4. Grinding		Grind with proper grinding tool		
5. Spot painting		Soluvent-polyvinyl chrolide resin enamel		
6. Second coating	1	- ditto -	longer than 4 hrs.	0.11-0.14
7. First coating	2	- ditto -	-ditto-	0.11-0.14

Notes:
1. Degree of dryness on the surface to be painted shall be kept under 6% in water content and below pH 9.5.
2. Puttying and sanding processes shall be allowed to omit depending on the conditions of the surface.
3. Drying time of puttying shall be long enough for sanding to proceed.
4. Amount of sealer for surface sealing shall be adjusted with direction of the supervisor as it varies with the surface conditions.

NO.2 EXTERIOR - SURFACE OF MORTAR, CONCRETE AND SLATE.

AEA (Synthetic resin emulsion paint)

Coating Process	No.of coats	Type of Paint	Drying hour	Amount kg/m^2
1. Surface Preparation.		Dry, clean and free from impurities		
2. Surface sealing	1	Sealer for emulsion paint	longer than 4 hrs.	
3. Puttying		Putty for emulsion paint		
4. Grinding		Grind with proper grinding tool		
5. Spot painting		Synthetic resin emulsion paint		
6. Second coating	1	- ditto -	longer than 4 hrs.	0.10-0.12
7. Finish coating	2	- ditto -	-ditto-	0.10-0.12

Notes:
1. Degree of dryness on the surface to be painted shall be kept under 6% in water content and below pH 9.5.
2. Puttying and sanding processes shall be allowed to omit depending on the conditions of the surface.
3. Drying time of puttying shall be long enough for sanding to proceed.
4. Amount of sealer for surface sealing shall be adjusted with direction of the supervisor as they vary with the surface conditions.

NO. 3 EXTERIOR - SURFACE OF MORTAR, CONCRETE AND AIR-ENTRAINED-CONCRETE.

R.P. (Lithin Finish)

Coating Process	No.of Coats	Type of Paint	Drying Hour	Amount kg/m^2
1. Surface preparation		Dry, clean and free from impurities		
2. Surface sealing	1	Sealer for lithin paint	longer than 4 hrs.	
3. Second coating	1	Second coating paint for lithin paint	-ditto-	
4. Finish coating	1-2	Finish coating paint for lithin paint	-ditto-	

Note: Number of coats and amount of paint shall be as directed by the supervisor as they vary with the surface and finish conditions.

NO.4 EXTERIOR - LARGE MEMBER STRUCTURAL STEEL.

G.P.. (Rubber chrolide paint)

Coating Process	No.of Coats	Type of Paint	Drying Hour	Amount kg/m^2
1. Surface preparation		Completely remove rust by sand-brust or shot-brust		
2. Priming		Shop-primer	longer than 24 hrs.	
3. First Coating	1	Rust-proof rubber chrolide paint		
4. Touch-up		Touch-up rust-proof paint		
5. First coating	1	Rust-proof rubber chrolide paint	longer than 15 hrs.	
6. Second coating	1	Rubber chrolide paint	-ditto-	
7. Finish coating	1	- ditto -	-ditto-	

Note: 1. Shop-primer shall be applied once upon surface preparation.
2. Paint for touch-up painting shall be the same paint used for first coat in process No. 3.

NO.5 EXTERIOR- STEEL

SOP (Synthetic resin mix paint finish)

Coating Process	No.of Coats	Type of Paint	Drying hour	Amount kg/m^2
1. Surface preparation.		Completely remove rust, moisture, oil and other impurities by sander, cleaner and scraper		
2. First coating.	1	Rust-proof oil paint		
		Red lead-type	longer than 48 hrs.	0.20-0.22
		Lead compound-type	longer than 24 hrs.	0.13-0.15
3. Touch-up		Touch-up rust proof paint		
4. First coating	1	Rust-proof oil paint		
		Red lead-type	longer than 48 hrs.	0.20-0.22
		Lead compound-type	longer than 24 hrs.	0.13-0.15
5. Second coating	1	Synthetic resin mix paint	longer than 15 hrs.	0.11-0.13
6. Finish coating	1	- ditto -	-ditto-	0.11-0.13

Note: Paint for touch-up painting shall be the same paint as used for first coat in process No.2.

NO.6 EXTERIOR - IRON PRODUCTS IN GENERAL

SOP.OP (Synthetic resin mix paint or oil mix paint finish)

Coating Process	No.of Coats	Type of Paint	Drying Hour	Amount kg/m^2
1. Surface preparation		Completely remove rust, moisture, oil and other impurities by sander, cleaner and surface		
2. First coating	1	Rust-proof oil paint	longer than 24 hrs.	0.13-0.15
3. Touch-up		Touch-up rust-proof oil paint		
4. First coating	1	Rust-proof oil paint	longer than 24 hrs.	0.13-0.15
5. Second coating	1	Synthetic resin mix paint	longer than 15 hrs.	0.11-0.13
		Oil mix paint	longer than 24 hrs.	0.12-0.15
6. Finish coating	1	Synthetic resin mix paint	longer than 15 hrs.	0.11-0.13
		Oil mix paint	longer than 24 hrs.	0.12-0.15

Note: Paint for touch-up painting shall be the same as used for first coat in process No. 2.

NO.7 EXTERIOR - IRON PRODUCTS

al-P (Aluminium paint finish)

Coating Process	No.of Coats	Type of Paint	Drying hour	Amount kg/m²
1. Surface preparation		Completely remove rust, moisture, oil and other impurities by sander, cleaner and surface.		
2. First coating	2	Rust-proof oil paint	longer than 24 hrs.	0.13-0.15
3. Touch-up		Touch-up rust-proof oil paint		
4. First coating		Rust-proof oil paint	longer than 24 hrs.	0.13-0.15
5. Second coating		Aluminium paint	longer than 18 hrs.	0.08-0.12
6. Finish coating		- ditto -	-ditto-	0.08-0.12

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NO.8 EXTERIOR - GALVANIZED STEEL PRODUCTS

SOP (Synthetic resin mix paint finish)

1. Surface preparation		Remove oil, dust and other impurities by volatilizer, remove rust by sanding		
2. Priming	1	Wash-primer	between 2-24 hrs.	0.06-0.08
3. First coating	1	Synthetic resin rust-proof or oil rust-proof paint	longer than 24 hrs.	0.12-0.15
4. Finish coating	2	Synthetic resin mix paint	longer than 15 hrs.	0.11-0.13

Note: Oil paint for galvanized sheet shall be directly applied on the exposed galvanized surface after disappearance of luster.

NO. 9 EXTERIOR - WOOD

SOP (Synthetic resin mix paint finish)

Coating Process	No.of Coats	Type of Paint	Drying Hour	Amount kg/m²
1. Surface preparation		Clean and sand to plane surface		
2. Knot Treatment	1-2	Lacquer varnish	longer than 2 hrs.	
3. First coating	1	First coat paint of synthetic resin mix paint	longer than 12 hrs.	0.13-0.15
4. Second coating	1	Synthetic resin mix paint	longer than 15 hrs.	0.11-0.13
5. Finish coating	1	- ditto -	-ditto-	0.11-0.13

Note: Puttying and sanding shall be done after process No.2 when there are cracks, etc. on the surface putty shall be oil-putty,but drying time shall vary depending on conditions.

NO. 10 INTERIOR - MORTAR, BOARD, etc.

STIPPLE (EP) Polyvinyl acetate resin emulsion paint finish

Coating Process	No.of Coats	Type of Paint	Drying Hour	Amount kg/m^2
1. Surface preparation		Dry, clean and free from impurities		
2. Surface sealing	1	Sealer for emulsion paint	longer than 4 hrs.	
3. Puttying		Putty for emulsion paint		
4. Grinding		Grind with proper grinding tool		
5. Spot painting		Second coating paint of polyvinyl acetate resin emulsion paint		
6. Second coating	2	Polyvinyl acetate resin emulsion paint	longer than 4 hrs.	0.11-0.13
7. Finish coating	1	Polyvinyl acetate resin emulsion paint for stipple-finish	-ditto-	0.25-0.35

Notes:
1. Degree of dryness on the surface to be painted shall be kept under 6% in water content and below pH 9.5.
2. Puttying and sanding processes shall be allowed to omit depending on the conditions of the surface.
3. Drying time of puttying shall be long enough for sanding to proceed.
4. Amount of sealer for surface sealing shall be adjusted with direction of the supervisor as it varies with the conditions of the surface.

NO. 11 INTERIOR - VENEER, BOARD, etc.

STIPPLE (OP) (Oil mix paint finish)

Coating Process	No.of Coats	Type of Paint	Drying hour	Amount kg/m^2
1. Surface preparation		Clean and sand to plane surface		
2. Knot treatment	1-2	Lacquer varnish	longer than 2 hrs.	
3. Puttying		Oil putty		
4. Grinding		Grind by proper grinding tool		
5. Spot painting		First coat paint of oil mix paint		
6. First coating	2	- ditto -	longer than 24 hrs.	0.13-0.15
7. Finish coating	1	Oil mix paint for stipple finish		0.35-0.45

Note: Drying time of puttying shall be long enough for sanding to proceed.

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NO. 12 INTERIOR - INSULATION BOARD, etc.

EP (Polyvinyl acetate resin emulsion paint finish)

1. Surface preparation		Dry, clean and free from impurities		
2. First coating	1	Polyvinyl acetate resin emulsion paint	longer than 4 hrs.	0.11-0.13
3. Finish coating	1	- ditto -	-ditto-	0.11-0.13

NO. 13 INTERIOR - FORMED PLASTIC

EP.AEP (Polyvinyl acetate resin emulsion paint or synthetic resin emulsion paint finish)

Coating Process	No.of coats	Type of Paint	Drying hour	Amount kg/m^2
1. Surface preparation		Dry, clean and free from impurities		
2. Surface sealing	1	Sealer for emulsion paint	longer than 4 hrs.	
3. Second coating	1	Polyvinyl acetate resin emulsion Synthetic resin emulsion	-ditto-	0.15-0.25
4. Finish coating	1	Polyvinyl acetate resin mulsion Synthetic resin emulsion	-ditto-	0.15-0.25

Note: The amount of paint for process Nos. (3) and (4) shall vary depending on the finish conditions.

NO. 14 INTERIOR - MORTAR, PLASTER, CONCRETE, etc.

VP (Solvent - Polyvinyl chrolide resin paint finish)

Coating Process	No.of Coats	Type of Paint	Drying hour	Amount kg/m^2
1. Surface preparation		Dry, clean and free from impurities		
2. Surface sealing	1	Sealer for polyvinyl chrolide resin paint	longer than 2 hrs.	
3. Puttying		Putty for polyvinyl chrolide resin paint		
4. Grinding		Grind with proper grinding tool		
5. Spot painting		Solvent-polyvinyl chrolide resin enamel		
6. Second coating	1	- ditto -	longer than 4 hrs.	0.11-0.14
7. First coating	2	- ditto -	-ditto-	0.11-0.14

Notes:
1. Degree of dryness on the surface to be painted shall be kept under 6% in water content and below pH 9.5.
2. Puttying and sanding processes shall be allowed to omit depending on the conditions of the surface.
3. Drying time of puttying shall be long enough for sanding to proceed.
4. Amount of sealer for surface sealing shall be adjusted with direction of the supervisor as it varies with the surface conditions.

NO. 15 INTERIOR - MORTAR, PLASTER, CONCRETE, etc. including CHEESE CLOTHING.

SOP (Synthetic resin emulsion paint finish)

Coating Process	No.of Coats	Type of Paint	Drying hour	Amount kg/m^2
1. Surface preparation		Dry, clean and free from impurities		
2. Surface sealer	1	Sealer for emulsion paint	longer than 4 hrs.	
3. Puttying		Putty for emulsion paint		
4. Grinding		Grind with proper grinding tool		
6. Spot painting		Synthetic resin emulsion paint		
6. Second coating		- ditto -	longer than 4 hrs.	0.10-0.12
7. Finish coating	1	- ditto -	-ditto-	0.10-0.12

Notes:
1. Degree of dryness on the surface to be painted shall be kept under 6% and below pH 9.5.
2. Puttying and sanding processes shall be allowed to omit depending on the conditions of the surface.
3. Drying time of puttying shall be long enough for sanding to proceed.
4. Amount of sealer for surface sealing shall be adjusted with direction of the supervisor as it varies with the surface conditions.
5. Cheese clothing process shall be executed in processes No.2 and No.3.
6. Drying time in the case of basement shall be longer depending on the conditions such as ventilation.

NO. 16 INTERIOR - MORTAR, PLASTER, CONCRETE including CHEESE CLOTHING.

EP (Polyvinyl acetate resin emulsion paint finish)

Coating Process	No.of Coats	Type of Paint	Drying hour	Amount kg/m^2
1 Surface preparation		Dry, clean and free from impurities		
2. Surface sealing	1	Sealer for emulsion paint	longer than 4 hrs.	
3. Puttying		Putty for emulsion paint		
4. Grinding		Grind with proper grinding tool		
5. Spot painting		Polyvinyl acetate resin emulsion paint		
6. Second coating	1	- ditto -	longer than 4 hrs.	0.11-0.13
7. Finish coating	1	- ditto -	-ditto-	0.11-0.13

Notes:
1. Degree of dryness on the surface to be painted shall be kept under 6% and below pH 9.5.
2. Puttying and sanding processes shall be allowed to omit depending on the conditions of the surface.
3. Drying time of puttying shall be long enough for sanding to proceed.
4. Amount of sealer for surface sealing shall be adjusted with direction of the supervisor as it varies with the surface conditions.
5. Cheese clothing process shall be executed in processes No.2 and No.3.

NO. 17 INTERIOR - IRON PRODUCTS, STEEL

SOP (Synthetic resin mix paint finish)

Coating Process	No.of Coats	Type of Paint	Drying hour	Amount kg/m^2
1 Surface preparation		Completely remove rust, moisture, oil and other impurities by sander, cleaner and scraper		
2. First coating	1	Synthetic resin rust-proof		
		(Red lead-type	longer than 24 hrs.	0.18-0.22
		(Lead compound-type		0.13-0.15
3. Touch-up		Touch-up rust-proof paint		
4. First coating	1	Synthetic resin rust-proof paint		
		(Red lead-type	longer than 24 hrs.	0.18-0.22
		(Lead compound-type		0.13-0.15
5. Second coating	1	Synthetic resin mix paint	longer than 15 hrs.	0.11-0.13
6. Finish coating	1	- ditto -	-ditto-	0.11-0.13

Notes:
1. Paint for touch-up painting shall be the same as used for first coat in process No. 2.
2. When oil rust-proof paint is used instead of. synthetic resin rust proof, its specification shall conform to No.5 and No.6.

NO. 18 INTERIOR - WOOD PRODUCTS IN CLEAR FINISH 7.3-176

LC (Clear Lacquer Finish)

Coating Process	No.of Coats	Type of Paint	Drying hour	Amount kg/m^2
1. Surface preparation		Clean and sand to plane surface		
2. Coloring	1-2	N.G.R. Stain	longer than 2 hrs.	
3. Coloring sealer	1	Wood-Sealer	-ditto-	0.08-0.10
4. Grain treatment	1-2	Oil sealer	longer than 12 hrs.	
5. Second coating	2	Sanding sealer	longer than 4 hrs.	0.10-0.13
6. Grinding		Grind with proper grinding tool		
7. Finish coating	2	Clear lacquer	between 3-12 hrs.	0.06-0.08
8. Grinding		Sanding with water		
9. Finish coating	1	Clear lacquer	longer than 24 hrs.	0.06-0.08
10. Polishing		Polish with polishing compound		

Notes:
1. Grain treating process shall be allowed to omit for certain trees approved by the supervisor.
2. Processes (2) through (4) shall be allowed to omit by the use of coloring and grain treating agents.
3. Number of coats for processes 5 and 6 and processes 7 and 8 shall indicate the repetition of process.

NO. 19 INTERIOR - WOOD PRODUCTS IN CLEAR FINISH

US (Polyurethane resin clear finish)

Coating Process	No.of coats	Type of Paint	Drying hour	Amount kg/m²
1. Surface preparation		Clean and sand to plane surface		
2. Coloring	1-2	N.G.R. Stain	longer than 2 hrs.	
3. Coloring	1	Urethane-resin wood-sealer	longer than 5 hrs.	0.09-0.11
4. Grain treatment	1-2	Water type grain sealer	longer than 2 hrs.	
		Synthetic-resin grain sealer	longer than 6 hrs.	
5. Second coating	1	Sanding sealer for synthetic resin	longer than 15 hrs.	0.09-0.11
6. Grinding		Grind with proper grinding tool		
7. Finish coating	1	Urethane-resin clear lacquer	longer than 20 hrs.	0.10-0.13
8. Grinding		Sanding with water		
9. Finish coating	1-2	Lacquer Enamel	longer than 20 hrs.	0.08-0.10

Notes:
1. Grain treating process shall be allowed to omit for certain trees approved by the supervisor.
2. Processes No.2 through No.4 shall be allowed to omit by the use of coloring and wood treating agent.

NO. 20 INTERIOR - WOOD PRODUCTS IN CLEAR FINISH

W-AA (Amino-alkyd resin clear finish for wood)

Coating Process	No.of Coats	Type of Paint	Drying hour	Amount kg/m²
1. Surface preparation		Clean and sand to plane surface		
2. Coloring	1-2	N.G.R. Stain	longer than 2 hrs.	
3. Coloring sealer	1	Wood-sealer for amino-alkyd resin	-ditto-	0.08-0.10
4. Grain treatment	1-2	Water-type grain sealer	-ditto-	
		Synthetic-resin grain sealer	longer than 6 hrs.	
5. Second coating	1	Sanding sealer for amino-alkyd resin	longer than 2 hrs.	0.10-0.12
6. Grinding		Grind with proper grinding tool		
7. Coloring	1-2	Amino-alkyd resin coloring clear	between 2-24 hrs.	
8. Finish coating	1	Amino-alkyd resin clear	between 2-10 hrs.	0.09-0.11
9. Grinding		Sanding with water		
10. Finish coating	1-2	Amino-alkyd resin clear	between 2-24 hrs.	0.08-0.10

Notes:
1. Grain treating process shall be allowed to omit for certain trees approved by the supervisor.
2. Coloring in processes either No.2 or No.7 shall be allowed to omit.

NO. 21 INTERIOR - WOOD PRODUCTS

LE (Lacquer enamel finish)

Coating Process	No.of coats	Type of Paint	Drying hour	Amount kg/m^2
1. Surface preparation		Clean and sand to plane surface		
2. Knot treatment	1-2	Wood-sealer	longer than 2 hrs.	0.08-0.10
3. Grain treatment	2-3	Oil grain sealer		
4. Second coat	2	Lacquer surfacer	longer than 4 hrs.	0.10-0.13
5. Grinding	2	Sanding with water		
6. Finish coating	2	Lacquer enamel	longer than 6 hrs.	0.06-0.08
7. Grinding	2	Sanding with water		
8. Finish coating	1	Lacquer enamel	longer than 6 hrs.	0.06-0.08

Notes: 1. Double coat drying time of H_1-solid lacquer enamel shall be more than 12 hours in finish coat.
2. Number of coat in processes No.4 and No.5 and processes No.6 and No.7 shall indicate the repetition of process.

NO. 22 INTERIOR - WOOD PRODUCTS

FE (Phthalic acid resin paint finish)

Coating Process	No.of Coats	Type of Paint	Drying hour	Amount kg/m^2
1. Surface preparation		Clean and sand to plane surface		
2. Knot treatment	1-2	Lacquer varnish		
3. First coating	1	First coating paint for phthalic acid resin paint	longer than 12 hrs.	0.13-0.15
4. Puttying		Oil putty		
5. Grinding		Sanding with water		
6. Second coating	1	Second coating paint for phthalic acid resin	longer than 16 hrs.	0.13-0.15
7. Grinding		Sanding with water		
8. Finish coating	2	Phthalic acid resin enamel	longer	0.11-0.13

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NO. 23 INTERIOR - WOOD PRODUCTS

SOP (Synthetic resin mix paint finish)

Coating Process	No.of coats	Type of Paint	Drying hour	Amount kg/m^2
1. Surface treatment		Clean and sand to plane surface		
2. Knot treatment	1-2	Lacquer varnish	longer than 2 hrs.	
3. First coating	1	First coating paint for synthetic resin mix paint	longer than 12 hrs.	0.13-0.15
4. Grinding		Grind with proper grind tool		
5. Finish coating	2	Synthetic resin mix paint	longer than 15 hrs.	0.11-0.13

Note: Puttying and sading shall be done after process No.2 when there are cracks, etc. on the surface. Putty shall be oil putty, but drying time shall vary with the conditions.

No. 24 INTERIOR - WOOD PRODUCTS

AEP, EP (Synthetic resin emulsion paint or vinyl acetate resin emulsion paint finish)

Coating Process	No.of coats	Type of Paint	Drying hour	Amount kg/m^2
1. Surface preparation		Clean and sand to plane surface		
2. Knot treatment	1-2	Lacquer varnish	longer than 2 hrs.	
3. First coating	1	First coat paint for synthetic resin emulsion.	longer than 4 hrs.	0.10-0.15
		First coat paint for vinyl acetate resin emulsion.		
4. Finish coating	2	Synthetic resin emulsion paint.	-ditto-	0.10-0.12
		Vinyl acetate resin emulsion paint.		0.11-0.13

Note: Puttying and sanding shall be done after process No.2 when there are cracks, etc. on the surface. Putty shall be that for emulsion, but drying time shall vary with the conditions.

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NO. 25 ALUMINUM IN CLEAR FINISH

AC (Acrylic resin clear or polyurethane resin clear finish)

1. Surface treatment		Oxidized aluminium chemical coat treatment or anodic oxidize coat treatment.		
2. Finish coating	2-3	Acrylic resin clear or polyurethane resin clear	longer than 5 hrs.	0.08-0.10

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NO. 26 ' ALUMINIUM

AE (Acrylic resin paint or polyurethane resin paint finish)

Coating Process	No. of coats	Type of Paint	Drying hour	Amount kg/m^2
1. Surface preparation		Oxidized aluminium chemical coat treatment		
2. Second coating	1	Second coating paint for acrylic resin paint or polyurethane resin paint		
3. Finish coating	2	Finish coating paint for acrylic resin paint or polyurethane resin paint		

Note: Wash-primer shall be applied as preliminary treatment when aluminium is not chemically treated.

NO. 27 STEEL SASH

7.3-180

EXP, VP (Epoxy resin paint or solvent polyvinyl chloride paint finish)

Coating Process	No.of Coats	Type of Paint	Drying hour	Amount kg/m^2
1. Surface preparation		Phospheric acid chemical coat treatment by metal surface treating agent		
2. Priming	1	Wash-primer	between 2-8 hrs.	0.06-0.08
3. First coating	1	Rust-proof epoxy resin	longer than 24 hrs	0.15-0.20
		Rust-proof solvent chrolide vinyl resin	longer than 5 hrs.	0.12-0.14
		Rust-proof by baking	100 - 170°C 10-30 minutes	0.13-0.16
4. Touch-up		Touch-up rust-proof		
5. First coating	1	Rust-proof epoxy resin	longer than 24 hrs	0.15-0.20
		Rust-proof solvent chrolide vinyl resin	longer than 5 hrs.	0.12-0.14
6. Second coating	1	Epoxy resin enamel	longer than 24 hrs.	0.12-0.15
		Solvent chrolide vinyl resin	longer than 5 hrs.	0.11-0.14
7. Finish coating	1	Epoxy resin enamel	longer than 24 hrs.	0.12-0.15
		Solvent chrolide vinyl resin	longer than 5 hrs.	0.11-0.14

Notes:

1. Wash-primer shall be omitted depending on the types of paint.
2. Drying time of double coat and amount of paint shall be determined by a manufacturer.
3. Paint for processes No.4 through No.7 shall be similar paint used for first coat in process No.3 or that recommended by a manufacturer.

NO. 28 STEEL SASH

SOP (Synthetic resin mix paint finish)

Coating Process	No.of coats	Type of Paint	Drying hour	Amount kg/m^2
1. Surface preparation		Phospheric acid chemical coat treatment by metal surface treating agent		
2. Priming	1	Wash-primer	between 2-8 hrs.	0.06-0.08
3. First coating	1	Primer for sash	longer than 10 hrs.	0.13-0.16
4. Touch-up		Touch-up primer		
5. First coating	1	Primer for sash	longer than 10 hrs.	0.13-0.16
6. Second coating	1	Synthetic resin mix paint	longer than 15 hrs.	0.11-0.13
7. Finish coating	2	- ditto -	-ditto-	0.11-0.13

Notes: 1. Wash-primer shall be omitted when surface is treated by phospheric acid in process No.1.
2. Paint for processes up to No.4 and No.5 shall be similar paint used for first coat in process No.3 or that recommended by a manufacturer.

NO. 29 STAINLESS IN CLEAR FINISH

UC, AE (Polyurethane resin clear or acrylic resin clear finish)

Coating Process	No.of Coats	Type of Paint	Drying hour	Amount kg/m^2
1. Surface preparation		Completely remove rust, moisture, oil and other impurities		
2. Finish coating	2	Polyurethane resin clear or acrylic resin clear	longer than 5 hrs.	0.08-0.10

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NO. 30 STAINLESS

EXP, UE (Epoxy resin paint or polyurethane resin paint finish)

Coating Process	No.of Coats	Type of Paint	Drying hour	Amount kg/m^2
1. Surface preparation		Completely remove rust, moisture, oil and other impurities		
2. First coating	1	Rust-proof for epoxy resin paint	longer than 24 hrs.	0.15-0.20
3. Finish coating	2	Epoxy resin paint or polyurethane resin paint	-ditto-	0.12-0.15