

12.01 Tiled roofing with Mangalore pattern roof tiles, including teak reapers of size 50 mm. x 25 mm.

1.0 Materials : Mangalore Pattern roof tiles shall conform to M-25 and IS : 730. Teak wood shall conform to M-29.

2.0 Workmanship :

2.1 Laying : The maximum distance between center to center of rafters shall not be more than 600 mm. Teak wood reapers 50 mm. x 25 mm. size, shall be nailed to each rafter at center to center distances, suited to the size of the tiles, by means of nails, 50 mm. long. The reapers shall be made from well seasoned teak wood and shall be straight pieces of uniform size and colour and not shorter than the length necessary to cover at-least 4 rafters. The under face and sides of the reapers shall be planed before fitting. Joints shall come over the rafters. The joints of two adjacent rows of reapers shall not come over the same rafter. At the caves, there shall be two reapers of such thickness and shape, that the uniformity of the top slope of the roof shall be preserved.

2.2 The work of valleys shall be executed as under:

Galvanised iron sheet, 1200 mm. wide and 1.25 mm. thick, shall be used for valleys. The sheet shall be extended by about 450 mm. under the tiles on either side, with a depth of 100 mm. at center. The sheet shall be carried 75 mm. into the wall and set with cement mortar unless flashing is specified. The laps, if any, on the slope, shall be 300 mm. The sheets shall be laid over the reapers and nailed. Two reapers, 50 mm. x 25 mm. each, shall be fixed over the galvanised iron sheet, 150 mm. away from the centre line of the valley, on either side, to keep the tiles and mortar from falling into the gutter of the valley.

2.3 Laying : The tiles shall be laid from the caves towards the ridges after fitting of the reapers is done. The rebate of the tiles shall rest fully against the reapers. The joints of the hip and ridge tiles and also those between them and the plain tiles shall be set watertight and well grouted with lime mortar and the mortar surface shall be painted and finished off with a mixture of red paint and portland cement to match the colour of the tiles. The finished slope of the roof shall be uniform from ridges to caves. The cave line shall be perfectly straight, horizontal and parallel to each other. The end over gables shall be protected by line borders and neatly finished.

2.4 At the side of the valleys and for 230 mm. on either side of the roof at valleys, cement plastering, 12 mm. thick shall be done to prevent the rain water collected in the gutter to leak by the side of the valleys.

2.5 At the caves, wind tie shall be placed over the ends of the last tiles and secured by means of galvanised iron washers and screws, 25 mm. deep into the rafter, to prevent tiles from being blown off. Care shall be taken to put the screws in the ridges and not in the gutter of the tiles. Where full tiles are not necessary, half tiles manufactured for the purpose, shall be used.

3.0 Mode of Measurements and Payment :

3.1 The measurements of the roof shall be taken for the finished work, for the superficial area, flat in the plan of the roof and not girth. Laps shall not be measured.

3.2 No deduction in measurements of roof shall be made for openings of area upto 0.40 m². nor shall any extra be paid for labour and wastage in forming such openings.

3.3 The rate includes the cost of all materials and labour, including forming ridges, hips, caves and battens.

3.4 The rate shall be for an unit of one m².

12.02 Tiled roofing with Mrudul roof tiles, including teak reapers of size 50 mm. x 25 mm.

1.0 **Materials:** Mrudul roof tiles shall conform to M-60. Teak wood shall conform to M-29.

2.0 **Workmanship and Mode of Measurements and Payment :** he relevant specifications of item no. 12.01 shall be followed, except that Mrudul roof tiles of approved colour, quality and make shall be used instead of Mangalore pattern roof tiles.

12.03 Providing and fixing aluminium sheets of 20 gauge, of trapezoidal or circular corrugation, with aluminium alloy 'J' or 'L' hook, bolts and nuts, with aluminium alloy washers etc., as per detailed drawings and design, including 3 coats of aluminium paint, excluding the cost of purlins, rafters etc., complete.

1.0 **Materials :** Corrugated Aluminium sheets shall conform to IS : 1254-1975 for profile of sheet and IS : 737-1979 for alloy. Aluminium sheet shall be of best quality like INDAL or equivalent. It shall conform to M-78.

2.0 **Workmanship :**

2.1 Spacing of the purlins shall be provided such that one purlin rests at the ridge and one at the eaves. The other purlins, for 18 gauge thick aluminum sheet, shall not exceed a distance of 1.80 m., center to center. The purlin shall coincide with the center line of the end lap. The ridge purlins shall be placed in such a way that the ridges can be fixed properly.

2.2 The portion overhanging the wall support shall not be more than one fourth of the spacing of purlins.

2.3 The top surface of the purlins shall be painted before the sheets are fixed over them. Embedded portions of purlins shall be finished with two coats of coal-tar.

2.4 **Laying of Sheets :**

2.4.1 The sheets shall be laid on purlins to a true plane with the line of corrugations truly parallel or normal to the sides of area to be covered. The sheets shall not generally be built into gables and parapets. They shall be bent up along their side edges close to the wall, and the junction shall be protected by suitable flushing or by projecting drip course.

2.4.2. The laps at the end shall be provided, 150 mm. minimum for roof slopes of 1 in 2 (1 vertical:2 horizontal) and steeper but a lap of 200 mm. shall be provided for flatter slopes than those above. The side lap shall be provided between two ridges of the corrugations, at each side.

2.4.3 The sheets shall be cut to the dimensions and to the shape of the roof, either along their lengths or their width and in slant across the line of corrugations, at hips and valleys. The sheets shall be cut carefully cut with a straight edge and chisel, to give a straight finish. The sheets shall be laid such that the laps are turned away, from the usual direction of local heavy rain.

2.5 Fixing of Sheets :

- 2.5.1 Sheets shall be fixed to the purlins or other roof members such as hips and valleys, rafter etc., with 'J' or 'L' galvanised hook bolts and galvanised nuts, 8 mm. dia., with bitumen limpet washers and G.I. washers. Limpet washers with white lead shall be used. Length of hook bolt shall be varied to suit the site requirement. Bolts shall be sufficiently long so that after fixing, they project above the top of their nuts by not less than 12 mm. The grip of 'J' or 'L' hook bolts on the side of purlins shall not be less than 25 mm. There shall be minimum of 3 hooks bolts, placed at the ridge of corrugations in each sheet, on every purlins, and their spacing shall not exceed 300 mm. Coach screws shall not be used for fixing the sheets to purlins, where the slopes of roof are not less than 1:2 (1 vertical and 21/1.2 horizontal). Sheets shall be joined together at the side laps, by galvanised iron bolts and nuts, 25 mm. x 6 mm. size, each bolts shall be fixed with bitumen and G.I. limpet washer filled with white lead. Where overlaps at the sides extend to two corrugations, these bolts shall be placed zig-zag over the two overlapping corrugations, so that the ends of the overlapping sheets are drawn tightly towards each other. The spacing of these bolts shall not exceed 600 mm. along each of the staggered rows.
- 2.5.2 Holes for all bolts shall be drilled and not punched in the ridges of the corrugations from below, while the sheets are on the ground. The holes in the sheets shall be at-least 50 mm. from the edge. Sheets drilled wrongly shall be rejected. The holes in the washers shall be of the exact diameter of hook, bolts or the seam bolts. The nuts shall be tightened from above to give a leak-proof roof.
- 2.5.3 The roof when complete, shall be true to lines and slopes and shall be leak-proof.
- 2.5.4 Cement concrete vata shall be done, as and where directed, as per the relevant specification provided under item no. 7.14
- 2.5.5 Aluminium sheet shall be painted with approved shade of aluminium paint, over a coat of aluminium primer. The painting shall be done with spray gun only. The sample of the same shall be got approved. The relevant specification of item no. 11.08.a and 11.09 shall be followed except that aluminium paint and primer of approved make like ICI or equivalent shall be used.

3.0 Mode of Measurements and Payment :

- 3.1 The measurements of the corrugated aluminium sheets both at their ends and along the side edges shall be measured. The overlaps of the sheets over the valley piece and their under-lap under the ridge, hip and flashing piece shall be included in the measurements. No extra payment shall be made for overlaps of two sheets.
- 3.2 No deductions in measurements shall be made for openings like chimney stacks, sky-light etc., having area upto 0.40 m². nor extra be paid for extra labour in cutting and for wastage, etc., in forming such openings.
- 3.3 The rate of roof shall include the cost of all materials and labour involved in all operations described above. The rate also includes the cost of provision, erection and removal of the scaffolding, benching, ladders, templates and tools required for the proper erection and completion of the work. The rate excludes the cost of purlins, rafters and trusses. The rate shall be inclusive of making vata at the junction of aluminium sheet with wall/concrete surface. The rate shall be inclusive of cost of painting.
- 3.4 The rate shall be for a unit of one m².

12.04 Providing corrugated G.I. sheet roofing, fixed with galvanised iron 'J' or 'L' hook bolts and nuts, 8 mm. dia., with bitumen and G.I. limpet washers filled with white lead etc. complete, excluding the cost of purlins, rafters and trusses.

1.0 Materials : Corrugated G.I. Sheets shall conform to M-23.

2.0 Workmanship :

2.1 Spacing of the purlins shall be provided such that one purlin rests at the ridge and one at the eaves. The other purlins for 0.8 mm. thick G.I. sheet shall not exceed a center to center distance of 1.80 m. The purlin shall coincide with the centre line of the end lap. The ridge purlins shall be placed in such a way that the ridges can be fixed properly. The portion overhanging the wall support shall not be more than one fourth of the spacing of purlins.

2.2 The top surface of the purlins shall be painted before the sheets are fixed over them. Embedded portions of purlins shall be finished with two coats of coal-tar.

2.3 Laying of Sheets :

2.3.1 The sheets shall be laid over the purlins, to a true plane with the line of corrugations truly parallel or normal to the sides of area to be covered. The sheets shall not generally be built into the gables and parapets. They shall be bent up along their side edges close to the wall and the junction shall be protected by suitable flashing or by projecting drip course.

2.3.2 The laps at the end shall be provided, 150 mm. minimum, for roof slope of 1 in 2 (1 vertical:2 horizontal) and steeper but a lap of 200 mm. shall be provided for flatter slopes than those above. The side lap shall be provided between two ridges of corrugations, at each side.

2.3.3 The sheets shall be cut to the dimensions and to the shape of the roof, either along their lengths or their width and in slant across the line of corrugations, at hips and valleys. The sheets shall be cut carefully with a straight edge and chisel, to give a straight finish. The sheets shall be laid such that the laps are turned away, from the usual direction of local heavy rain.

2.4 Fixing of Sheets :

2.4.1 Sheets shall be fixed to the purlins or other roof members such as hips and valleys, rafters, etc., with 'J' or 'L' galvanised hook bolts and galvanised nuts, 8 mm. dia, with bitumen impact washers and G.I. washers. Limpet washers with white lead shall be used. Length of hook bolt shall be varied to suit the site requirement. Bolts shall be sufficiently long so that after fixing they project above the top of their nuts by not less than 12 mm. The grip of 'J' or 'L' hook bolts on the side of the purlins shall not be less than 25 mm. There shall be minimum of 3 hook bolts placed at the ridge of corrugations, in each sheet, on every purlin, and their spacing shall not exceed 300 mm. Coach screw shall not be used for fixing the sheets to purlins, where the slopes of roof are not less than 2 horizontal, (1 vertical:2 horizontal). Sheets shall be joined together at the side laps by galvanised iron bolts and nuts, 25 mm. x 6 mm. size, each bolts shall be fixed with bitumen and G.I. limpet washer filled with white lead. Where overlaps at the sides extend to two corrugations, these bolts shall be placed zig-zag over the two overlapping corrugations, so that the ends of the overlapping sheets are drawn tightly towards each other. The spacing of these bolts shall not exceed 600 mm. along each of the staggered rows.

2.4.2 Holes for all bolts shall be drilled and not punched in the ridges of the corrugations from the under side, while the sheets are on the ground. The holes in the sheets shall be at least 50 mm. from the

edge. Sheets drilled wrongly shall be rejected. The holes in the washers shall be of the exact diameter of hook, bolts or the seam bolts. The nuts shall be tightened from above to give a leak-proof roof.

2.4.3 The roof when complete, shall be true to lines and slopes and shall be leak-proof.

3.0 Mode of Measurements and Payment :

3.1 The measurements of the sheets, both at their ends and along the side edges shall be measured. The overlaps of the sheets over the valley piece and their underlap under the ridge, hip and flashing piece shall be included in the measurements.

3.2 No deductions in measurements shall be made for openings like chimney stacks, sky-light, etc., having area upto 0.40 m² nor extra be paid for extra labour in cutting and for wastage, etc., in forming such openings.

3.3 The rate shall include the cost of all materials and labour involved in all operations described above. The rate also includes the cost of provision, erection and removal of the scaffolding, benching, ladders, templates and tools required for the proper erection and completion of the work. The rate excludes the cost of purlins, rafters and trusses.

3.4 The rate shall be for an unit of one m².

12.05.a Providing Asbestos cement corrugated sheet roofing, fixed with G.I. plain and bitumen washers etc. complete and excluding the cost of purlins, rafters and trusses.

1.0 **Materials :** Corrugated Asbestos cement sheets shall conform to M-24.

2.0 Workmanship :

2.1 The maximum spacing of purlins shall be 1.6 m. in case of 7 mm. thick A.C. sheets and 1.35 m. for 6 mm. thick A.C. sheets.

2.2. **Laying and fixing of sheets :** The sheets shall be laid on the purlins and other roof members, as indicated on the drawings and as directed, as per the code of practice. Top bearing surfaces of all purlins and other roof members shall be in one plane so that the sheets when being fixed, shall not be forced down to rest on the purlins/roof members. The sheets shall be laid with the smooth side upwards.

The finished roof shall present an uniform slope and the line of corrugations shall be straight and true. The sheets shall be laid, starting at the eaves either from left to right or right to left, depending upon the direction of wind, which shall be checked before actual laying of the sheets is started. The purlin spacing and the size of sheets shall be checked to ensure that the arrangements shall provide the laps required and the specified overhang at the eaves. In case the sheets are laid from right to left, the first sheet shall be laid uncut but the remaining sheets in the bottom row shall have the top left hand corners cut or mitred. The sheets in the second and other immediate rows shall have the bottom right hand corner of the first sheet cut. All other sheets except the last sheet shall have both bottom right hand corners and top left hand corners cut. The last sheet shall have only top left hand corner cut. The last of the top row sheets shall have the bottom right hand corner cut with exception of the last sheet which shall be left uncut, if the sheets are laid from left to right, the first sheet shall be laid uncut and the remaining procedure shall be reversed.

2.3 The free overhang of the sheets, at the caves shall not exceed 400 mm. in case of 7 mm. thick sheets

and 300 mm. in case of 6 mm. thick sheets.

2.4 The mitring described above is necessary to provide a snug fit. Where 4 sheets meet at a lap the length of mitre shall be 150 mm. and the width of mitre shall be equal the width of the side lap. The cutting may be done with ordinary wood saw at site. Cat ladders or planks shall be used while laying and fixing the sheets to avoid damage to the sheets.

2.5 **Laps :** The sheet shall be laid with an end lap of 150 mm. minimum, in case of roof with a pitch flatter than 1 vertical to 2.5 horizontal (Approx. 22⁰) and for roofs flatter than mentioned above or for very exposed situation, end lap shall be 225 mm. The side lap shall be sheltered from the prevailing wind direction. The sheets shall be laid with side lap of half a corrugation.

2.6 **Fixing Accessories :**

2.6.1 The sheets shall be secured to the purlins and other roof members by means of 8 mm. dia. galvanised iron bolts 'J' type hook bolts, in case of angles, iron purlins and 'L' type bolts, incase of R.S. joists, precast concrete or timber purlins, and nuts, bearing on the galvanised iron washers and bitumen washers. The grip of 'J' or 'L' bolts on the side of purlins shall not be less than 25 mm. Each galvanised iron 'J' or 'L' hook bolts shall have a bitumen washer and galvanised iron washer placed over the sheets before the nuts are screwed down from above. On each purlin there shall be one hook bolt, on the crown adjacent to the side lap, on either side. Bitumen washer shall be of approved quality. The G.I. flat washer shall be 25 mm. in diameter and 1.60 mm. thick and bitumen washer shall be 35 mm. in dia and 1 mm. thick with a hole to suit the required size of fixing accessory. Each nut shall be screwed lightly at first. After a dozen or more sheets are laid, the nuts shall be tightened to ensure a leak-proof joint and the nuts shall be tightened only to an extent so as to prevent damage to the sheets. The length of the 'J' bolts or crank bolts shall be 75 mm. more then the depth of purlins for single sheets fixing and 90 mm. more, where two sheets overlap or where ridges or other accessories are to be fixed. The minimum length of coach screw for timber purlins shall be 110 mm.

2.7 **Holes :** The holes for fixing the sheet shall be drilled and never punched in the crown of the corrugations, to suit the purlins i.e. on the centre line of the purlins, if these are of timber and square head coach screws are used, or as close as possible to the back of purlins if 'J' or 'L' bolts are used, as with steel angles or precast concrete or timber purlins. Holes for hook bolts, etc. shall be 2 mm. more than the diameter of the fixing bolts. No holes shall be nearer than 40 mm. to any edge of sheet or accessory.

3.0 **Mode of Measurements and Payment :**

3.1 The relevant specifications of item 12.04 shall be followed except that the overlap of the corrugated sheets over valley, gutters, roof lights, caves, filler pieces and underlay of the corrugated sheets below ridges, hips, north light curves, flashing pieces, roof light sheets and barge board shall be included in the measurement. No deduction shall be made for holes cut for extractors, cowl type ventilators. Deductions shall be made for roof light sheets.

3.2 The rate shall be for an unit of one m².

12.05.b Providing Asbestos cement semi-corrugated sheet roofing, fixed with G.I. plain and bitumen washers etc. complete and excluding the cost of purlins, rafters and trusses.

The relevant specifications of item no. 12.05.a shall be followed except that the following additional measures shall be taken.

- (a) The sheets shall invariably be laid from right to left, starting at the eaves with necessary procedure of mitring.
- (b) The side laps provided shall be of one corrugation.
- (c) An Asbestos cement expansion joint shall be inserted at every 45 mm. or so in the length of the roofing.
- (d) There shall be additional hook bolt through one of the two intermediate corrugations, on each sheet.

12.05.c Providing Asbestos cement curved sheet roofing, fixed with G.I. plain and bitumen washers etc. complete and excluding the cost of purlins, rafters and trusses.

1.0 Materials : Asbestos cement curved roofing sheets shall be of Everest or equivalent as approved by the Architect and Engineer-in-charge. It shall conform to M-75.

2.0 Workmanship :

2.1 Curved roofing sheets form a self-supporting roofing system which does not require purlins, rafters or trusses. Hence the entire super structure is eliminated.

2.2 The maximum span shall be obtained by using 3 sheets of length 3048 mm. in a semi-circular arch of radius 2743 mm. The ends of the arch formed shall be supported on RCC channel which in turn may be supported by column or shall rest on a Gable wall, in case of Industrial structures. The end laps of the curved sheets shall be 406 mm. and the side laps shall be one and a half corrugations, so as to give total protection against rain.

2.3 The laps shall be formed by 50 mm. x 8 mm. galvanised iron bolts and nuts. Each galvanised iron 'J' or 'L' hook bolts shall have a bitumen washer and galvanised iron washer placed over the sheets and a galvanised iron washer beneath the sheet, before the nuts are screwed down from above. Bitumen washer shall be of approved quality. The G.I. flat washer shall be 25 mm. in diameter and 1.60 mm. thick and bitumen washer shall be 35 mm. in diameter and 1 mm. thick, with hole to suit the required size of fixing accessory. Each nut shall be screwed lightly at first. After a dozen or more sheets are laid, the nuts shall be tightened to ensure a leak-proof joint and the nuts tightened only to an extent so as to prevent damage to the sheets. For making holes and laying the sheets, the relevant specifications of item no. 12.05.a shall be followed.

3.0 Mode of Measurements and Payment :

3.1 The relevant specifications of item no. 12.04 shall be followed.

3.2 The rate shall for an unit of one m².

12.06 Providing and fixing PVC sheet roofing in different structural roofing structures, of approved make and design as per Architect's instructions.

1.0 Materials : PVC sheets for roofing shall conform to M-77.

2.0 Workmanship : The sheet shall be fixed as per the manufacturer's instructions using sealants or adhesive solutions, as instructed.

3.0 Mode of Measurements and Payment :

3.1 The relevant specifications of item no. 12.04 shall be followed.

3.2 The rate shall be for an unit of one m².

12.07 Providing and fixing Fibre glass in skylights and other structures for roofing etc., of approved make and design as per Architect's instruction.

1.0 Materials : Fibreglass translucent roofing sheets shall conform to M-79. The sheets shall be corrugated or semi- corrugated, its corrugations matching with Asbestos cement sheets.

2.0 Workmanship : The sheets shall be fixed to the purlins as per the Manufacturer's instructions and as per the relevant specifications of A.C sheets, item no. 12.05.a and b. Care shall be taken to make the joints leakproof. The sheets shall be drilled with the help of a hand drill or power drill and shall be cut with Hacksaw blades. Holes shall never be punched but only drilled through the crowns of the corrugations.

3.0 Mode of Measurements and Payment: The relevant specification of item no. 12.05.a and b shall be followed. The rate shall be an unit of one sq.m.

12.08 Providing and fixing Polycarbonate sheets in different structural roofing structures, of approved make and design as per Architect's instructions.

1.0 Materials : Polycarbonate sheets for roof glazing shall conform to M-80.

2.0 Workmanship : The sheet shall be fixed as per the manufacturer's instructions using silicone sealant and dry rubber profiles or setting blocks, as instructed.

3.0 Mode of Measurements and Payment :

3.1 The relevant specifications of item no. 12.04 shall be followed.

3.2 The rate shall be for an unit of one m².

12.09.a Providing and fixing 0.55 mm thick SMP Top coated and alkyd backer coated, trapezoidal profile of meta colour or equivalent, fixed with SDST bolts - Self Drilling Self Tapping Bolts of HILTI and necessary overlaps (minimum 150 mm) including cutting, erecting at all levels, providing openings, all fixtures and fixing accessories with EPDM seals, for end laps silicon sealant profiled foam fillers etc. at ends below ridge and valleys, including all materials labour scaffolding wastage, tools, tackles, equipment, transportation, preparation of shop drawing, and excluding the cost of purlins, rafters etc. all complete as per specifications drawings and as directed by architect/engineer-in-charge. Rate shall include end laps, side laps, bolts etc complete excluding the cost of purlins, rafters and trusses. The sheets shall be supplied in custom lengths upto 12.0 m. All overlaps shall be sealed with silicone sealants.

a) Cladding. Fixed from inner side.

b) Curved Portion. Fixed from bottom.

c) Sloped Roof. Fixed from bottom.

d) Flat Roof. Fixed from inside.

1.0 Materials : Pre-coated 0.55 mm thick SMP top coated and alkyd backer coated meta colour sheet with trapezoidal profile and as per the supplier's specifications. The colour and length shall be approved by the Architect/Engineer-in-charge. The shape of sheet shall be as shown in the drawings.

2.0 Workmanship :

- 2.1 Spacing of the purlins shall be provided such that one purlin rests at the ridge and one at the eaves. The other purlins for 0.55 mm. thick Meta color pre-coated sheet shall not exceed a center to center distance of 1.40 m. The purlin shall coincide with the centre line of the end lap. The ridge purlins shall be placed in such a way that the ridges can be fixed properly. The portion overhanging the wall support shall not be more than one fourth of the spacing of purlins.
- 2.2 The bottom surface of the purlins shall be painted before the sheets are fixed to them. Embedded portions of purlins shall be finished with two coats of coal-tar.

2.3 Laying of Sheets :

- 2.3.1 The sheets shall be fixed to the purlins from underside, to a true plane with the line of corrugations truly parallel or normal to the sides of area to be covered. The sheets shall not generally be built into the gables and parapets. They shall be bent up along their side edges close to the wall and the junction shall be protected by suitable flushing or by projecting drip course.
- 2.3.2. The laps at the end shall be provided, 150 mm. minimum, for roof slope of 1 in 2 (1 vertical:2 horizontal) and steeper but a lap of 200 mm. shall be provided for flatter slopes than those above. The side lap shall be provided between two ridges of corrugations, at each side.
- 2.3.3 The sheets shall be cut to the dimensions and to the shape of the roof, either along their lengths or their width and in slant across the line of corrugations, at hips and valleys. The sheets shall be cut carefully with a straight edge and chisel, to give a straight finish. The sheets shall be laid such that the laps are turned away, from the usual direction of local heavy rain.
- 2.3.4 Rate shall be inclusive of mobile platform, scaffolding, for fixing the cladding and sheets from inside/ underside of the shed.

2.4 Fixing of Sheets :

- 2.4.1 Sheets shall be fixed to the purlins or other roof members such as hips and valleys, rafters, etc., with SDST bolts with EPDM seals complete as per supplier's specifications. As far as possible they shall be fixed over the ridges. The fixing of ridge with the sheets shall be done with GI seam bolts.
- 2.4.2 The roof when complete, shall be true to lines and slopes and shall be leak-proof.

3.0 Mode of Measurements and Payment :

- 3.1 The measurements of the sheets, both at their ends and along the side edges shall be measured. The overlaps of the sheets over the valley piece and their under lap under the ridge, hip and flashing piece shall be included in the measurements.
- 3.2 No deductions in measurements shall be made for openings like chimney stacks, sky-light, etc., having area upto 0.40 m² nor extra be paid for extra labour in cutting and for wastage, etc., in forming such openings.
- 3.3 The rate shall include the cost of all materials and labour involved in all operations described above. The rate also includes the cost of provision, erection and removal of the scaffolding, benching, ladders, templates and tools required for the proper erection and completion of the work. The rate excludes the cost of purlins, rafters and trusses.

3.3 The rate shall be for an unit of one m².

12.10 Providing and Fixing flashing, ridge or hips 0.8 mm thick in plain pre-coated meta colour sheet fixed with SDST bolts/ GI seam bolts and bitumen or EPDM washer including side laps, bending the sheets as per the drawing and fixing the same as per the material used for roofing etc. complete. As per the instructions of architect/Engineer-in-charge.

The relevant specification of 12.09 shall be followed. It shall be measured and paid in sqm.

12.11 Providing, fabricating and Fixing Gutter 900 mm wide and 0.8 mm thick from the same materials of roofing including end laps, side laps, bending, making the joints water tight and construction of gutter as per the profile in the detail drawing. The clear visible area of the gutter sheet will be considered for the calculation of measurement. Rate shall also inclusive the making any cutout in the gutter for rain water disposal, fixing arrangement on the structural steel support system. Structural system will be measured and paid under the relevant item.

The relevant specification of 12.09 shall be followed. It shall be measured and paid in RMT

12.12 Providing and fixing Polycarbonate sheets 3 mm thick embossed of profile equivalent to Meta colour pre-coated sheets as a part of trapezoidal pre-coated meta colour sheets with SDST bolts or as recommended by the manufacturer of polycarbonate sheets, of approved make and design as per Architect's instructions. Structural fabrication shall be as per drawing and design and shall be measured and paid under relevant item of work.

1.0 Materials :

Polycarbonate sheets for roof glazing shall conform to M-80.

2.0 Workmanship :

The sheet shall be fixed as per the manufacturer's instructions using silicone sealant and dry rubber profiles or setting blocks, as instructed.

3.0 Mode of Measurements and Payment :

3.1 The relevant specifications of item no. 12.04 shall be followed.

3.2 The rate shall be for a unit of one m².

12.13 Providing and fixing polycarbonate domes 2 mm thick, embossed / transparent / milky white with side step including fixing with brass screws / neoprene / EPDM gaskets / neutral grade silicon sealant etc complete as per the instructions of Architect / Engineer-in-charge.

- a. 450 mm dia clear opening
- b. 600 mm dia clear opening
- c. 900 mm dia clear opening

1.0 Materials :

Polycarbonate domes shall be as per the supplier's specification and Item description and as approved by Architect/Engineer-in-charge.

2.0 Workmanship :

The dome shall be fixed as per the manufacturer's instructions using brass screws/anchor fasteners with PVC grip from the sides to RCC, neutral grade silicone sealant and dry rubber profiles or setting blocks, as instructed.

3.0 Mode of Measurements and Payment :

3.1 The relevant specifications of item no. 12.04 shall be followed. The rate shall be for a unit of one no.

O01 Skylight

Providing and installing circular shape Double glazed unit of combination 12mm toughen glass + 1.52mm sentry PVB + 12mm toughen glass laminated) at terrace as sky light. All periphery of DGU shall be supported on existing terrace floor with necessary baker rod, exterior grade pu sealant, mortar, grout for including finishing, necessary scaffolding, curing etc complete for all height as per design and as directed by engineer in charge. . Note: Design shall be done for square panel with higher area to perimeter ratio and same shall be consider for payment.

The structural steel frames will be seperately measured and paid for in the respective tender items.

These shall be fixed as per the manufacturers specifications. Care shall be taken to avoid water leakage from the junction of turbo ventilator with roof/ slab, rate shall be inclusive of /EPDM/Neoprene rubber, brass/SS screws/anchor fasteners, silicone sealant etc. complete. Rate shall be for per no. The rate shall also include the cost of FRP collar with all necessary provision to install / fixing in the position the same.

Mode of Measurement and Payment.

The work shall be measured under relevant item in the schedule of quantities and paid for.

12.15 Providing & fixing 0.8mm thick BMT of colored galvalume (LOCAL) proflex or equivalent systems roofing of desired color at top according to manufacturer specifications & guidelines etc complete upto the satisfaction of engineer in charge. Rates shall be inclusive of careful unloading by hydra or crane & safe storage erection, fixing bolts / anchor fasteners at the ends & cleaning the site as per drawing and or directed by engineer in charge etc complete. The contractor to furnish 10 years gurantee for the water leakage.

1.0 Materials & workmanship:

1.1 The relevant specifications of item no. 12.04 shall be followed.

1.2 Material shall be as described in item description.

1.3 The work shall be carried out to the best workmanship manner with scaffolding, bolts, nuts & accessories etc.

3.0 Mode of Measurements and Payment :

3.1 The curved roof with measurements taken from the hem -top end of the panels

3.2.1 The rate shall be for a unit of one m².

N01 Providing and fixing at all height in all floor with all lead seamless type M/F suspended False Ceiling of India GYPSUM using GI perimeter channel of size 0.55mm thick (having one flange of 20mm and another flange of 30mm and a web of 27mm) along with perimeter of ceiling, screws fixed to brick wall / partition with help of nylon sleeves and screws at 610mm centres. Then suspending GI intermediate channels of size 45mm (0.9mm thick with two flanges of 15mm each) from the soffit at 1220mm centres with ceiling angle of width 25mmx10mmx0.5mm thick fixed to soffit with GI cleat and steel expansion fasteners. Ceiling section of 0.55mm thickness having knurled web of 51.5mm and two flanges of 26mm each with lips of 10.5mm are then fixed to the intermediate channel with the help of connecting clip and in direction of perpendicular to the intermediate channel at 5/457mm centres. 12.5mm tapered edge gypboard (conforming to IS 2095-1982) is then screw fixed to ceiling section with 25mm dry wall screws at 230mm centres. Screws fixing is done mechanically either with screw driver or drilling machine with suitable attachment. Finally the boards of 12.5mm thick gyp board are to be jointed and finished so as to have a flush look which includes filling and finishing the tapered and square edges of the boards with jointing compound, joint paper tape and two coats of drywall topcoat suitable for gypboard including providing scaffolding and executing the work at all heights. (Please refer drawing for details and recommended practices of India Gypsum). The quoted rate shall be for all heights / all floors / all levels.
Note: For lighting fittings, grills diffusers and cutouts etc., have to be made with the frame of perimeter channels of sizes 20mmx27mmx30mmx0.55mm thick supported suitable and should be considered as per drawing.

All materials and installation should be strictly as per manufacturers specifications. The item will be paid in sqm of installed area.

Mode of Measurement and Payment.

The work shall be measured under relevant item in the schedule of quantities and paid for.

N02 Providing and fixing Armstrong DUNE Supreme Microlook Edge ceiling tile in true horizontal level 600mmx600mm false ceiling manufactured by M/s. Armstrong World Industries using Armstrong XL 15mm grid, hot dipped galvanized steel section, exposed GI wire and 8mm dia anchor fasteners at every 1200mm intervals at the main tee and laying DUNE Supreme Microlook Edge ceiling tiles manufactured by M/s. Armstrong World Industries of size 600mm x 600mm X 16mm over the formed grid including providing necessary openings and additional frame work required for light fittings & AC fittings / grills etc., having NRC 0.50, light reflectance of >83% (WT), thermal conductivity k=0.052-0.057 W/mo K, Humidity Resistance of 99% (having lifetime guarantee against SAG), having fire performance class O / Class 1 (BS 476), surface having 3 coats of white paint - crisp surface with pre coated capping, main tee of size 15x32mm having 0.27mm thick at every 1200mm centre to centre (maximum) and rotary stitched cross tee of size 15x32mm having 0.27mm thick at every 600mm c/c and sub cross tee of size 15x32mm having 0.27mm thick at every 1200mm c/c and wall angel of size 19x19mm having 0.35mm thick fixed to the periphery at every 1200mm c/c in both directions using 2.0mm diameter pre-straightened finely granulated with micro perforations, back of the tile duly sanded and finished with a coat of protective paint over the formed grid complete all as per the manufacturers specifications and as per the direction of EIC.

All materials and installation should be strictly as per manufacturers specifications. The item will be paid in sqm of installed area.

Mode of Measurement and Payment.

The work shall be measured under relevant item in the schedule of quantities and paid for.

N03 TRAP DOOR FALSE CEILING (openable false ceiling)

Providing & fixing openable false ceiling inline with fix false ceiling of 12.5mm thick MR Gypsum board of Saint Gobain /India Gypsum or Armstrong or Anutone or Aerolite t as per approved make finished as per the architectural drawings. Board shall be fixed with MS box section framing of required sizes and shall be both side finished with paint including beads molding, curving, lipping, two L&key locking system, fittings, hardware (heavy duty - Tower bolt, pivot, offset hinges) etc. as per drawing & design. Gypsum board shall be fixed with required size s.s.countersunk sheet metal screws to the MS framework approximately at 300 mm C/C. The frameworks shall be fabricated and erected from having grid given as per drawing. M.S. section and fabrication shall be paid in separate item as per working drawing. Two back to back angle/ flat/ plate shall be provided at the joint of as per requirement. All the members of the frame work shall be painted with two coat of zinc chromate yellow oxide & two coat of enamel paint of approved make which is paid in separate item. The shop drawing, specification and sample mock of mininum 10 SQM with framework shall be approved from Architect/ EIC. Groove shall be provided at the junction of the false ceiling & the wall as per drawing. Rate shall also include cost of making of all cutouts for light fixtures, gadgets, gizmo, pelmets, grooves, beads and also provide support/ template where ever required. The rate shall be in SQM for all floors/ all heights/ all lelvels complete all. The contractor has to give company's (IGL) certification for performance of the product and installation. Ceiling installation should be as per manufacturers specifications.

All materials and installation should be strictly as per manufacturer's specifications. The item will be paid in sqm of installed area.

Mode of Measurement and Payment.

The work shall be measured under relevant item in the schedule of quantities and paid for.

O02 Wall Mounted Railing System

Supply, installation of readymade wall mounted railing of approved make like Arch / Magnum/ Kich make of 304 Grade Stainless Steel comprising Ø 38mm Handrail mounted on the wall through Wall Brackets & anchor fasteners to be fixed / installed at maximum 1200mm c/c distance and suit to site condition for any deviation than this. Joints to be filled with bushings for extra strength. Contractor to approve shop drawings, sample from EIC before material procurement and one installed sample before mass installation of work. The quoted rate shall be for all heights / all floors / all levels.

Product should be procured from approved manufacturer and installation should comply to manufacturers specifications and direction of engineer in charge.

Mode of Measurement and Payment.

The work shall be measured under relevant item in the schedule of quantities and paid for.

O03 Top Mounted Baluster With Horizontal Members Railing System

Supply, installation and finishing of Arch /Magnum/ Kich make 304 Grade Stainless Steel Knock Down railing system complete comprising Ø 38mm Handrail fixed on Ø 38mm S.S. Round baluster placed at maximum 1200mm c/c along with 3 Nos. Ø 16 mm mid rails connected at the side of baluster with fixtures. The balustrade would be fixed onto floor with casted base plate of minimum 6mm thickness. Base plate shall be concealed with suitable S.S. 304 grade cover Cap so that the mounting anchor fasteners are not visible after installation. Wall thickness of Handrail & Baluster Pipes shall be taken as 1.5mm & Mid Rail Shall be 1.2 mm along with all visible components developed in High Grade S.S. and whenever required, joints to be filled with bushings for extra strength. Railing height to be taken @ 1000mm from floor level. Contractor to approve shop drawings, sample from architect before material procurement and starting of any work on site.

Product should be procured from approved manufacturer and installation should comply to manufacturers specifications and direction of engineer in charge.

Mode of Measurement and Payment.

The work shall be measured under relevant item in the schedule of quantities and paid for.