Cable tray design guide

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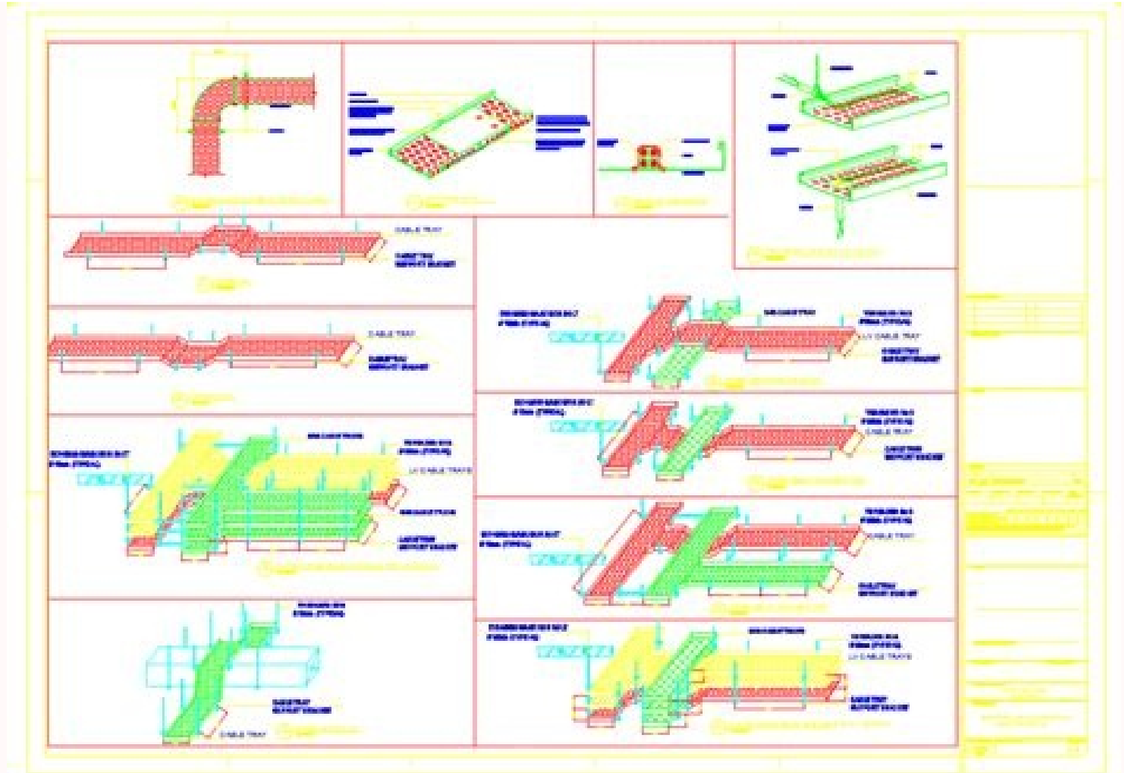

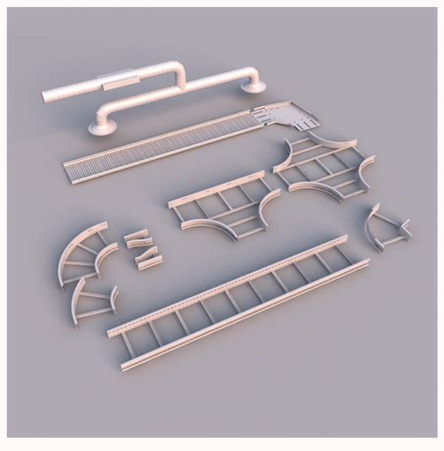

Cable tray ideas. Cable tray to cable tray distance. Cable tray standard size. Guide for design of electrical cable tray systems. Cable tray design standards.

Calculate Size of Cable Tray for Following Cable Schedule. Cable Tray should be perforated and 20% spare Capacity. Distance between each Cable is 10mm. Cable are laying in Single Layer in Cable Tray. (1) 2 No's of 3.5Cx300 Sq.mm XLPE Cable having 59.7mm Outer Diameter and 5.9 Kg/Meter weight (2) 2 No's of 3.5Cx400 Sq.mm XLPE Cable having 68.6mm Outer Diameter and 6.1 Kg/Meter weight (3) 3 No's of 3.5Cx25 Sq.mm XLPE Cable having 25mm Outer Diameter and 0.5 Kg/Meter weight Calculation: Total Outer Diameter of all Cable Passing in to Cable Tray: Diameter of 300Sq.mm Cable =No of Cable X Outer Diameter of Each Cable Diameter of 300Sq.mm Cable =2X59.7 = 119.4 mm Diameter of 400Sq.mm Cable =No of Cable X Outer Diameter of Each Cable Diameter of 400Sq.mm Cable =2X68.6= 137.2 mm Diameter of 25Sq.mm Cable =No of Cable X Outer Diameter of Each Cable Diameter of 25Sq.mm Cable =3X28= 84 mm Total Diameter of All Cables laying in Tray = (119.4+137.2+54)mm Total Diameter of All Cables laying in Tray = 340.6mm Total Weight of Cables Passing in to Cable Tray: Weight of 300Sq.mm Cable =No of Cable X Weight of Each Cable Weight of 300Sq.mm Cable =2X5.9= 11.8 Kg/Meter Weight of 400Sq.mm Cable = No of Cable X Weight of Each Cable Weight of 400Sq.mm Cable =2X6.1= 12.2 Kg/Meter Weight of 25Sq.mm Cable = No of Cable X Weight of Each Cable Weight of 25Sq.mm Cable =3X0.5= 1.5 Kg/Meter Total Weight of All Cables laying in Tray = (11.8+12.2+1.5) Kg/Meter Total Weight of All Cables laying in Tray =25.5 Kg/Meter Total Width of all Cables: Total Width of all Cables = (Total No of Cable X Distance between Each Cable) + Total Cable Outer Diameter Total Width of all Cables = (7 X 10) + 340.6 Total Width of all Cables = 410.6 mm Taking 20% Spare Capacity of Cable Tray Final Width of all Cables = 1.2%X4106.6 Calculated Width of All Cables = 493 mm Total Area of Cable: Total Area of Cable = Final width of Cables X Maximum Height Cable Total Area of Cable = 493 X 69.6 =28167 Sq.mm Taking 20% Spare Capacity of Cable Tray Final Area of all Cables = 1.2%X28167 Calculated Area of all Cable =33801 Sq.mm CASE-(I): Considering Single Run of Cable Tray having Size of 300X100mm, 120Kg/Meter Weight Capacity Area of Cable Tray =Width of Cable Tray X Height of Cable Tray Area of Cable Tray =300X100 = 30000 Sq.mm Checking Width of Cable Tray Calculated Width of Cable Tray as per Calculation=No of Layer of Cable X No of Cable Tray Run X Width of Cables Width of Cable Tray as per Calculation=1X1X493 =493 mm Checking Depth of Cable Tray Actual depth of Cable Tray = No of Layer of Cable X Maximum Diameter of Cable Actual depth of Cable Tray=1X68.6 =68.6mm Checking Weight of Cable Tray Actual Weight of Cables=25.5 Kg/Meter Results: Calculated Cable Tray width (493mm)> Actual Cable Tray width (300mm) = Faulty Selection Calculated depth of Cable Tray (68.6mm)< Actual Depth of Cable Tray (100mm) = O.K Calculated Weight of all Cables (25.5Kg/Mt) < Actual Weight of Cable Tray (125.5 Kg/Mt) =O.K Required to select higher size Cable Tray due to small Cable Tray width. CASE-(II): Considering Single Run of Cable Tray having Size of 600X100mm, 120Kg/Meter Weight Capacity Area of Cable Tray =Width of Cable Tray X Height of Cable Tray Area of Cable Tray =600X100 = 60000 Sq.mm Checking Width of Cable Tray Width of Cable Tray as per Calculation=No of Layer of Cable X No of Cable Tray Run X Width of Cables Width of Cable Tray as per Calculation=1X1X493 =493 mm Checking Depth of Cable Tray Actual depth of Cable Tray = No of Layer of Cable X Maximum Diameter of Cable Actual depth of Cable Tray=1X68.6 =68.6mm Checking Weight of Cable Tray Actual Weight of Cables=25.5 Kg/Meter Results: Calculated Cable Tray width (493mm)< Actual Cable Tray width (600mm) = O.K Calculated depth of Cable Tray (68.6mm)< Actual Depth of Cable Tray (100mm) = O.K Calculated Weight of all Cables (25.5Kg/Mt) < Actual Weight of Cable Tray (125.5 Kg/Mt) =O.K Remaining Cable Tray width Area =100%-(Calculated Cable tray width/ Actual Cable Tray Width) Remaining Cable Tray width Area =100%-(493/600)% =17.9% Remaining Cable Tray Area =100%-(Calculated Cable tray Area/ Actual Cable Tray Area) Remaining Cable Tray Area =100%-(33801/60000) =43.7% Selection of 600X100 Cable Tray is O.K Conclusion Size of Cable Tray= 600X100mm Type of Cable Tray=Perforated No of Cable Tray Run= 1No No of layer of Cables in Cable Tray=1 Layer Remaining Cable Tray width Area =17.9% Remaining Cable Tray Area =43.7% About Jignesh.Parmar (B.E,Mtech,MIE,FIE,CEng)Jignesh Parmar has completed M.Tech (Power System Control), B.E(Electrical). He is member of Institution of Engineers (MIE) and CEng,India. Membership No:M-1473586.He has more than 16 years experience in Transmission -Distribution-Electrical Energy theft detection-Electrical Maintenance-Electrical Projects (Planning-Designing-Technical Review-coordination -Execution). He is Presently associate with one of the leading business group as a Deputy Manager at Ahmedabad,India. He has published numbers of Technical Articles in "Electrical Mirror", "Electrical India", "Lighting India","Smart Energy", "Industrial Electrix"(Australian Power Publications) Magazines. He is Freelancer Programmer of Advance Excel and design useful Excel base Electrical Programs as per IS, NEC, IEC,IEEE codes. He is Technical Blogger and Familiar with English, Hindi, Gujarati, French languages. He wants to Share his experience & Knowledge and help technical enthusiasts to find suitable solutions and updating themselves on various Engineering Topics. TDMM can be obtained from www.bicsi.org. This method explains the Procedures or sequence of activity for safely installation and Testing of cable tray, and it's accessories as per the standard Practice and Code. (2) General Equipment & Tools: . The equipment that will be engaged for Installation of Cable Tray will be Tool Box with Screwdriver, Pliers, Spanner , Hammer Drilling Machine with various Bits , Grinding & Cutting

Machine Electrical Tester , Continuity Tester ,Multi Meter Cutter , Blower Knockout punch and Flat File Galvanizing paint Marker, Measuring tape, Level gauge / Spirit level. Ladder / Scaffolding / Mobile scaffold Chain Block and Pipe Wrench Portable Lights Removable Barricades (3) Storage & Material Handling: . The storage area must be free from dust and Water leakages / seepages. Manufacturer recommendation shall always be followed in loading/unloading and storing of Material. Material and its accessories shall be unloaded handle with care in designated area of the Store (Do not directly drop to Ground) to avoid any damages. Materials shall be stored in a dry place which is free from water or from weather effects and protection should be given to the material by means of covering the material with Tarpaulin sheet. The Material will be stacked / unload in the site store on a proper stand on wooden loft on a flat surface at a sufficient height from Ground. If Material are dispatch in packs or pallets, each pack or pallet shall be lifted individually with suitable lifting equipment. The material shall be transported / Shifted in their original packing to Site location. The Material should be visually inspected for damage, which may have occurred during transport. When bringing down materials, they should be handled with care and lowered carefully to the ground. They should not be dropped. To prevent damage to cable tray, never pull cable tray from a truck trailer by chaining to the bottom rung and dragging cable tray out of the trailer If the Material is found defective it shall not be installed and the cable shall be returned to the supplier for replacement. Cable Tray and its accessories (pre-galvanized, hot dipped galvanized) shall be stored in a dry place, fully enclosed / ventilated store. (4) Inspection of Materials: Check The Material according to its Type, Size, Make Visual inspection: Type of Cable Tray Type of Cable Tray Material Type of Cable Tray Coating Standard width of Cable Tray Standard length of Cable tray Cable Tray thickness Flange height of Cable Trays Proper painting / Galvanization and identification numbers of the cable trays Physical Damages Inspection: Damage on trays and ladders Damage on galvanizing Fittings and accessories are of proprietary type Testing of galvanizing: Uniformity of coating Thickness Test Electrical continuity of connection TRs not more than five year old from date of purchase order shall be reviewed for acceptance. Otherwise test shall be carried out. BS EN ISO 1461 Table-1 Control Sample Size Related to Lot Size Number of Lot Min. Sample 1 To 3 All 4 To 500 3 501 To 1200 5 1021 To 3200 8 3201 To 10000 13 >10000 20 Inspection Lot: Single Order or Single Delivery Order ISO 1461:2009 TABLE-3 Minimum coating thickness and mass on samples that are not centrifuged Article and its thickness Local coating thickness (minimum)µm Local coatingmass(minimum)g/m2 Mean coating thickness (minimum)µm Mean coatingmass(minimum)g/m2 Steel > 6 mm 70 505 85 610 Steel > 3 mm to < 6 mm 55 395 70 505 Steel > 1.5 mm to < 3 mm 45 325 55 395 Steel < 1.5 mm 35 250 45 325 Casting > 6 mm 70 505 80 575 Castings < 6 mm 60 430 70 505 NOTE This table is for general use: individual product standards may include different requirements including different categories of thickness. Local coating mass and mean coating mass requirements are set out in this table for reference in such cases of dispute. (5) Sequence of Cable Tray Installation Works: (A) Installation of Cable Tray: (i) Shifting of Cable Tray on Site Cable Tray shall be carefully unloaded or shifted to the site by using Crane/Hydra or by sufficient manpower and moved to a defined installation location. Remove the packing and ensure that the Cable Tray is free from transportation damages Check and ensure that approved drawings, the correct size and type of cable trays, trunking & accessories are ready for installation. Ensure that cable trays/trunking and accessories received from site store for the installation are free of rusty parts and damages. (ii) Marking the Route: Mark the route of Cable Tray and Trunking as per approved drawings with marking threads. The route of Cable Tray and Trunking need to be coordinated with other services and shall be confirmed by the Site Engineer. Minimum space from the building structure and other services to be maintained (200 mm from the nearest point) to facilitate easy handling and maintenance of cables. If Possible, Do not install Cable trays below water/sewage pipes. (iii) Hanging Support: The location of hangers and supports should be carefully marked as per the approved specifications and Drawings. Required sizes of holes should be marked and drilled by using a drilling machine. The threaded rod (M12 steel) or Specified rod should be fixed carefully into the anchor using clamping tools for a balance smooth twist. The threaded rod should be necessary thickness and length. Sizes should be as approved in the drawing. It should be done in such a way as to avoid damage to the threaded rod. When thread is done, a washer should be inserted into it. The washer should also be the required size and of quality. It should be fixed properly and the nut fastened tight to ensure that the threaded rod is strong and able to bare load. Trays and ladders shall be securely anchored to supports. They shall be secured such that the tray or ladder system will not move during cable installation. Ensure that rod is properly vertical under operating conditions. Tighten hanger load nut securely to ensure proper hanger performance. Tighten upper nut after adjustment The distance between supports is called SPAN. The support span should not be greater than the length of the tray. This will prevent two connecting points from being located within one support span. The support span should not be greater than the straight section length, or as recommended by the manufacturer, to ensure that no more than one splice is located between supports. Cable Tray and Trunking joints are to be positioned as close to the supports as possible, not more than 300 mm from either side. Splice joints fall between the support and the quarter point. When installing a 12-foot long section, for example, a support spacing of 3.7 m (12 foot) causes the splice joints to fall at the same position every time. The maximum tray overhang past the last support should not exceed 600 mm (2 ft). At every maximum of 1200 mm horizontally and 1500 vertically supports should be installed. Horizontal cable trays and ladders shall be supported by either wall mounted support bracket or a hanger rod system. The intervals between supports shall be as recommended by the manufacturer but this shall not exceed 1 meter for wall mounted support brackets, and 2 meter for the hanger rod system. The hanger, hanging support, cable tray bracket and the ladder should be trimmed to required size and galvanizing paint should be applied on the edges. Group parallel runs of trunking should be supported together where it is possible. For shaft cable trays and ladders that are vertical, all supports and fixings should be done as approved. Do not cut or drill structural building members (e.g., I-beams) without approval by the Main contractor. Warning: Do not use a cable tray as a walkway, ladder, or support for people; cable tray is a mechanical support system for cables and raceways. Using cable trays as walkways can cause personal injury and can damage cable tray and installed cables. Horizon Fitting Support: NEMA Standard Supports for horizontal fittings should be located at a distance, no greater than 610 mm (24″) from each end of the fitting on the attached ladder. Fitting must also be supported at the radius center point on both sides of the fitting as per below: At the midpoint (45°) of the arc for a 90° elbow. At the midpoint (30°) of the arc for a 60° elbow. At the midpoint (22.5°) of the arc for a 45° elbow, excluded are 305 mm (12″) radius fittings. At the midpoint (15°) of the arc for a 30° elbow, excluded are 305 mm (12″) radius fittings. About Jignesh.Parmar (B.E,Mtech,MIE,FIE,CEng)Jignesh Parmar has completed M.Tech (Power System Control), B.E(Electrical). He is member of Institution of Engineers (MIE) and CEng,India. Membership No:M-1473586.He has more than 16 years experience in Transmission -Distribution-Electrical Energy theft detection-Electrical Maintenance-Electrical Projects (Planning-Designing-Technical Review-coordination -Execution). He is Presently associate with one of the leading business group as a Deputy Manager at Ahmedabad,India. He has published numbers of Technical Articles in “Electrical Mirror”, “Electrical India”, “Lighting India”,”Smart Energy”, “Industrial Electrix”(Australian Power Publications) Magazines. He is Freelancer Programmer of Advance Excel and design useful Excel base Electrical Programs as per IS, NEC, IEC,IEEE codes. He is Technical Blogger and Familiar with English, Hindi, Gujarati, French languages. He wants to Share his experience & Knowledge and help technical enthusiasts to find suitable solutions and updating themselves on various Engineering Topics.

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