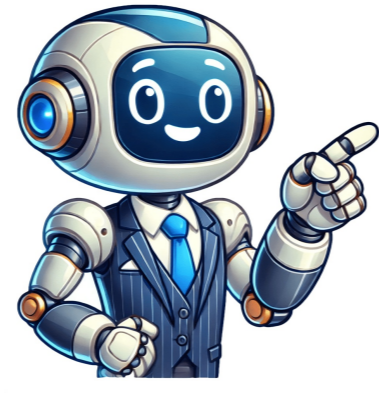


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The purpose of this article is to define the sequence and methodology for the installation of electrical cable trays, cable trunking, cable raceways and boxes, junction and pull boxes. The method gives details of how the work will be carried out and what health and safety issues and controls that are involved. The content of this electrical method statement also reflects the findings of the relevant risk assessment. Below is list of necessary plant and equipment for this electrical work method. Cutting tools 1 machine Drilling machine Screw driver Spanner Grinding machine Measuring tape Working Platforms: Scaffolding as required within the specific work area. Full PPE as per risk assessment and site safety plan and procedures Cable tray and related materials will be shipped via an enclosed van, trailer, or flatbed trailer. The shipments will be hand unloaded or by using forklift. If the provision for unloading of materials is crane the safety lifting plan is mandatory for the work activity. Below is list of necessary plant and equipment for this electrical work method. Cutting tools 1 machine Drilling machine Screw driver Spanner Grinding machine Measuring tape Working Platforms: Scaffolding as required within the specific work area. Cable Tray, trunking and ladder will be properly supported and stacked in a flat surface. Tray, trunking and ladder will be stored in a covered area to prevent water or other foreign materials from staining or adhering. Cable Tray, trunking and ladder will be protected from sunlight and moisture by covering them using tarpaulin. Painted cable tray and trunking will be protected and stored indoors if possible. Cable tray will be protected from scratching and marring of finish. Accessories will be stored to prevent loss. Containment materials will be stored away from high traffic areas. All the cable containment materials will be stacked by width and type. Containment materials and accessories will be sorted as per manufacturer recommendations. Cable Tray Pre-Installation Requirements A pre-start meeting prior to the commencement of the cable containment installation works will take place with the Site Engineer, H&S Officer, QC Engineer, Supervisor/Foreman in charge to address the following: Ensure that the area has been surveyed as per approved drawings. Check that the installation area is clean from debris and foreign matter. Ensure that material is as per approved Material Submittal and Contract Specifications. Make sure that adequate number of tradesmen and proper tools are present. Ensure that latest approved shop drawings for the installation are present, and all personnel are working to the same drawing. Verify that area is safe to carry out the work. The Supervisor must ensure that the workers working at height are trained and all safety precautions are taken according to HSE requirements and the JSEA. Before any permanent work will proceed, pre-inspection of all materials, tools and access for installation to be carried out. Method of Installation of Cable Tray, Trunking and Ladders Cable Tray, trunking and ladder will be installed according to approved shop drawings, checklist and as per contract specifications. Installation will be carried out by skilled and suitably experienced electricians under supervision of highly competent site supervisors and engineers to be ensured the correctness and quality of installation. Establish the route on slab soffit and walls, mark with chalk liner. Ensure that the route conform to the latest coordinated drawing. Mark the location of supports for vertical and horizontal cable containment installations. Install the threaded rod and Unistrut channels as per the typical details shown in the approved drawing. Installation will be coordinated to other services to avoid clashes and conflicts. Burrs and sharp edges will be removed from cable trays and cable trunking. Cable Tray, trunking and ladder supports will be fasten to building structure and seismic restraints will be installed where required. Cable Tray, trunking and ladder supports will be install directly to slab surface and using other services supports will not be allowed. Installation of cable trays, trunking and ladders are properly fixed to its supports. Spring knot will be used to make sure cable tray will be firm and not be displaced. Space connector and set gaps according to applicable standard. Make cable tray, trunking and ladder connections using standard fittings. Cable tray and trunking will be installed with enough space to permit access for installing cables. Containment trays will be properly aligned and securely fixed at intervals not exceeding 1.2m on centre in straight runs. Trunking will be fixed and supported at 2m interval. Trunking angles, bends, and offsets will be fixed with additional fixings at distance not exceeding 150 mm on each side of the fitting. Where trunking which is installed in such a position that the cables would fall out when the cover is removed, shall be fitted with cable/wire retaining bars or other suitable devices of non-hygroscopic insulating material at to prevent the cables from falling out. All un-used holes in cable containment to be fix with grommet. When cable tray and trunking are used or installed in direct sun exposure, it will be cover to protect from heat radiation. Direct mounting for the cable trays, trunking to the ground should be avoided, 50 mm clearance or spacing to be maintain over the floor. Cable tray cutting will be made using a hand held hack saw or jigsaw machine. It is important to get a square cut to ensure a good splice connection. After cutting, smooth the cut edges to remove any burrs and painting with rust proofing agent. There will be no site fabrication for all fittings that will be used. All fittings will be from approved manufacturer. Trunking connections to conduits, multiple boxes, switchgear and distribution boards will be made with flanged units. Steel flush and steel under floor trunking will be installed directly in the concrete floor, positioned and secured before the slab is poured. Flush floor trunking lids will be perfectly flush with adjacent concrete floor, to allow covering by floor finishes. Cable ladder will be installed wherever applicable like as horizontal and vertical containment for cables going to HV and LV panels or as illustrated in approved drawings. Paint retouch up will be provided to all cut ends as required. Prior to cable pulling, trays and trunking will be ensure to be free from dust, dirt or any construction debris. After the cable pulling, end cap will be provided for cable trays and cable trunks as well as trunking cover. Expansion fittings will be provided for expansion joint connection. Earth bonding jumper will be provided to cable trays and trunking joints. Label indicating the system to be provided for proper identification as per contract specifications. After installation, Inspection Request will be raised to the consultant to ensure high accuracy and quality of works. Checklist for Quality Control of Containment Installation Approved material used (MIR Approval) Shop drawing is approved. Installed hanger and supports are inspected and approved. Distances between support are as per approved drawing. Installed cable tray, trunking or ladder are levelled and straight. Spring knot is used to connect cable tray or trunking to channel. Approved and correct fittings are used. Bonding jumper is installed. Expansion fittings are used as required. Painting is applied to cut ends. Tagging/labelling is provided. Installed containments are free of damages and scratches. Subscribe to get the latest posts sent to your email. Electrical cable trays are an integral part of modern electrical installations, providing a structured, organized, and secure route for cables and wiring systems. Their installation is critical in maintaining safety standards, reducing the risk of electrical accidents, and ensuring the longevity of your electrical infrastructure. This extensive guide delves deep into the comprehensive process of installing electrical cable trays, from preliminary design considerations to final inspection, with detailed steps, safety measures, and compliance with relevant regulations. Step 1: Project Planning and Design Requirements Analysis: Start by assessing the projects requirements, considering the types and quantities of cables that need routing, their current carrying capacity, voltage levels, and future expansion plans. This will help determine the size, shape, and material (metal, PVC, or fiberglass) of the cable trays required. Site Survey: Conduct a thorough site survey to identify potential routes, taking into account structural constraints, fire ratings, environmental factors, and accessibility for maintenance. Note any obstructions, penetrations, or points where tray supports can be anchored. Design Layout: Develop a detailed layout using AutoCAD or other engineering software. The design should include precise dimensions, tray sections, bends, and transitions, as well as support spacing and locations. Ensure compliance with the National Electric Code (NEC), International Building Code (IBC), or other local regulatory guidelines. Step 2: Material Selection and Preparation Procurement: Purchase the appropriate cable trays, accessories, and fasteners based on your design. Be sure to choose materials with the right corrosion resistance, load-bearing capacity, and fire retardant properties as per the project specifications and codes. Pre-Fabrication: For complex designs, pre-fabricate customized sections at a workshop, including cutting, bending, drilling, and welding if necessary. Ensure all fabricated components meet industry standards and tolerances. Component Inventory: Organize and inventory all parts, including brackets, hangers, bolts, nuts, grounding kits, and clamps. Check that all hardware meets the manufacturers recommendations and complies with applicable codes. Step 3: Installation Procedures 1. Installation of Supports: Install the structural supports for the cable tray system. This may involve attaching strut channel, threaded rod hangers, or direct-to-concrete anchors following the manufacturers instructions and code-compliant methods. 2. Mounting the Cable Tray: Begin installation from one end of the designated path, securely fixing the first section of the tray onto its supports, making sure it is level and plumb. Use torque wrenches to tighten bolts to recommended specifications. 3. Splicing and Expansion Joints: As you progress, join tray sections using splice plates, couplers, or expansion joints, ensuring they're properly aligned, connected, and braced to prevent sagging or movement. Follow manufacturers guidelines for joining and sealing joints to maintain integrity and water-tightness. 4. Support Spacing and Alignment: Continuously check the tray alignment and adjust supports as needed to maintain proper spacing according to the manufacturers recommendations and NEC guidelines. Over long spans or when carrying heavy loads, additional intermediate supports might be required. 5. Routing Cables: Once the cable tray system is installed, route cables through the tray, adhering to separation requirements and fill ratios. Properly secure cables using ties or clips, avoiding sharp bends and kinks. Clearly label and document each cable run for easy identification and maintenance. 6. Grounding and Bonding: Implement a robust grounding and bonding strategy throughout the cable tray system. This includes connecting the trays to the buildings earth electrode system via ground bars or straps, and ensuring continuity of the grounding conductor along the entire length of the tray. Step 4: Safety Measures During Installation Personal Protective Equipment (PPE): Always wear PPE such as hard hats, safety glasses, non-conductive gloves, and boots while working on the installation. Ensure tools are rated for electrical work and are regularly inspected. Worksite Safety: Clear the area of debris and conduct a job hazard analysis to mitigate risks like falling objects, electrocution, and tripping hazards. Use barricades and warning signs as needed. Step 5: Testing, Inspection, and Commissioning Inspection: After installation, inspect the entire cable tray system meticulously, checking for correct assembly, secure attachments, and adequate clearance from combustible materials. Confirm all cables are properly routed and secured within the trays. Testing: Perform electrical testing, including continuity checks, insulation resistance tests, and fault loop impedance tests, as per the electrical codes and project specifications. Final Approval: Obtain approval from a certified electrical inspector before energizing the system. They will verify that the installation adheres to all applicable codes and standards. Conclusion: Installing electrical cable trays demands precision, attention to detail, and strict adherence to safety protocols and regulatory requirements. This extensive guide provides a roadmap for professionals and DIY enthusiasts alike, emphasizing the importance of every step in achieving a reliable, safe, and efficient cable management system. Remember that safety must always come first, and consulting with experienced electricians and inspectors is crucial for successful execution. Document your work thoroughly to facilitate future inspections, repairs, and modifications. Proper cable tray installation is a critical aspect of establishing a well-organized and efficient cable management system. A seamless setup ensures the safe routing and support of cables, preventing potential hazards and minimizing maintenance requirements. In this blog post, we will take you through a step-by-step process to master cable tray installation, ensuring a smooth and reliable network infrastructure. The first step in mastering cable tray installation is careful planning and design. This phase sets the foundation for a successful setup and involves the following key considerations: Identify the types and quantity of cables that need to be routed through the cable trays. Consider future expansion needs to accommodate additional cables. Plan the cable tray layout, taking into consideration the location of electrical panels, network switches, and other connection points. Optimize the routing to avoid interference with other systems and equipment. Calculate the total weight of cables and choose cable trays with adequate load-bearing capacity to support them without sagging. Choosing the appropriate cable tray type and material is crucial to meet the specific requirements of the installation. Consider factors such as: For harsh environments or corrosive atmospheres, select materials like stainless steel or fiberglass that offer superior resistance to corrosion. Depending on the installation location, choose cable trays suitable for either indoor or outdoor use. Decide on the ideal cable tray type based on the application - ladder, solid bottom, wire mesh, trough, or channel. Before beginning the actual installation, ensure that the installation site is prepared: Clean the area where the cable trays will be installed, removing any debris, dust, or obstacles that could hinder the process. Use appropriate marking tools to indicate the positions where the cable trays will be mounted. Double-check measurements to avoid misalignment. The mounting process requires precision and attention to detail. Follow these steps: If the cable trays will be wall-mounted, fix the brackets securely to the wall using suitable anchors and screws. Ensure that the brackets are properly aligned and levelled to avoid any slant in the cable tray. Place the cable tray onto the brackets and secure it tightly using nuts and bolts. Ensure that it is level and stable. With the cable trays in place, it's time to install the cables: Position the cables within the cable tray and use appropriate supports, such as cable ties or clamps, to prevent sagging. Group and segregate cables based on their type and function to minimize the risk of interference and simplify maintenance. Label each cable for easy identification, which will streamline future troubleshooting and maintenance. Proper grounding and bonding are essential for electrical safety. Connect the cable trays to the grounding system to prevent the buildup of static charges and protect against electrical hazards. Ensure all sections of the cable tray are adequately bonded together to maintain continuity and prevent potential differences. Before concluding the installation, perform a thorough inspection and testing: Check for any loose connections, misalignment, or damages to the cable trays and cables. Conduct a load test to verify that the cable trays can bear the weight of the cables without any signs of stress or deformation. Mastering cable tray installation is crucial for creating a safe, organized, and efficient cable management system. By following this step-by-step guide, you can ensure a seamless setup that meets the specific requirements of your infrastructure. A well-installed cable tray system will provide you with the confidence of a reliable and robust network, ensuring optimal performance and safety for years to come. If you want to take a closer look at our range of cable trays, click here. If you want to contact or find out more about this blog posts author, Dave Dann, click here. posted by: Xu December 16, 2024 No Comments Share copy and redistribute the material in any medium or format for any purpose, even commercially. Adapt remix, transform, and build upon the material for any purpose, even commercially. The licensor cannot revoke these freedoms as long as you follow the license terms. Attribution You must give appropriate credit - provide a link to the license, and indicate if changes were made. You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use. Share Alike If you remix, transform, or build upon the material, you must distribute your contributions under the same license as the original. No additional restrictions You may not apply legal terms or technological measures that legally restrict others from doing anything the license permits. You do not have to comply with the license for elements of the material in the public domain or where your use is permitted by an applicable exception or limitation. No warranties are given. The license may not give you all of the permissions necessary for your intended use. For example, other rights such as publicity, privacy, or moral rights may limit how you use the material. When properly installed, cable trays prevent damage to cabling and the areas structural integrity. By being installed and engineered properly, cable trays also provide a safe and secure work environment for workers in any application. In this post, we will see how to install cable tray on-site. Firstly, we need to have an approved shop drawing that will show the cable tray route, its dimensions, installation height, support system, the number of layers of these trays, and the type of systems that these trays will serve. In our example today, we will have two-layer support. The bottom layer will be a solid bottom cable trunk for electrical circuits with 150x100mm, while the upper layer will be a basket tray for a structured cabling system with 150x100mm. You need to know that we need to maintain a vertical space between the basket tray and the cable trunk with a minimum distance of 30 cm. This is because we need to avoid any interference between electrical waves and telecommunication signals. The next step is to check your projects coordination drawings at the location of the installations. We need to ensure no clash between the cable trays and the other services like HVAC ducts, firefighting pipes, drainage systems, etc. If we find any clash, we shall make a coordination meeting with the responsible engineer to solve the problem before starting the work. Each engineer shall bring their systems drawings and check how to avoid this clash on-site. Let us consider no clash on site, and the drawings are Ok, so you can instruct your team to proceed with the installation process. But before the installation process starts, you need to check the availability of these materials in your projects store. If they are available and approved by the projects inspector, you need to issue them to the working area in the project. Also, we need to ensure that we have all the required hand and power tools to perform the job ideally. We can divide these materials into two categories: A- Consumable materials. B- The permanent materials So, I will now briefly describe the projects required tools and the different categories of materials. 1- Tools: We will need some hand and power tools to complete the support system installation. These hand tools are summarized as follows: 01- Measuring tape: We will need it to measure the length or height, either the required length to cut the channels or the height needed to install the support system of cable trays. 02- Hammer: We will need it to install the drop-in anchor or unifix inside its hole with the help of a pin punch. 03- Pin Punch: We will use it to ensure the unifix or the drop-in anchor completely fits its hole in the concrete slab. 04- Metal File: We will need it for filing any sharp edges after cutting. 05- Chalk line or Line Dori: We will use it to create a straight line for the trays support system route. 06- Permanent marker: We will use it to mark the locations of the holes and make a mark on the threaded rods and the Unistrut channel for the required length to cut. 07- Vise Grip: We will use it to catch the threaded rod and rotate it to ensure its completely inserted inside the drop-in anchor. 08- Spanner: We will use it to rotate and tighten the hexagonal nut with its threaded rod. 09- Steel or Aluminum scaffolding: We will use it to work at a high level. 10- Concrete Drill Bit: This bit its size will depend on the size of the drop-in anchor. If the drop-in anchors inner diameter is 10mm and the threaded rods outer diameter is 10mm, the concrete drill bit will be 12mm. 11- Knockout hole punch: We will use it to make a hole in the cable trunk to connect a pull box for each circuit that will be pulled inside. 12- Plumb bob: We will use it to transfer the marking on floors to be typical on the soffit of the concrete slab. 13- Spirit level: We will use it to check the leveling of the support installation to ensure its completely horizontal without any slope. 14- Screw Driver: We will use it to tighten the different screws, like the screw connecting the cable trunk with the Unistrut channel or the screw which connects the cable basket bracket with the spring nut. And the power tools are summarized as follows: 1- Combination Hammer Drill Machine: either battery-powered or electrical powered. We will need it to drill the locations of the holes for the support system. 2- Angle Grinder complete with a steel cutting disk: We will need it to cut the Unistrut channel and the threaded rods at specific lengths per on-site requirements. 3- Crossline Combi Laser Machine: We will need it to mark where we need to drill the holes for the support system. This is the summary of the hand & Power tools to be used for installing the cable trays on-site. B- Consumable Materials: 01- Unistrut channel: We will need to carry the cable trunk and basket tray load complete with their cables and wires. 02- Threaded Rods: They will be used to carry the Unistrut channels and their loads. 03- Drop-in anchor: It will be used to hang the threaded rods complete with their loads. 04- Flat washers and hexagonal nuts will be used to ensure the completed support system is connected. Their sizes will be the same size as the threaded rod. 05- Spring Nut or Wing Nut: It will be used to hold the cable trunk and basket tray with the Unistrut channel. 06- Hold Down bracket: We will use it to hold the basket tray with the spring nut that is installed inside the Unistrut channel. 07- Junction or Pull box: We will attach it to the cable trunk for the professional connection of the metal conduit with the cable trunk. 08- Brass Male bush: We will use it to connect the junction box with the cable trunk. 09- Insulated bushing: We will use it to be installed at the end of the brass male bush to avoid any sharp edges while pulling the wires inside the cable trunk. 10- Spray paint: We will use it for labeling the cable trunk at its bottom for better identification, especially if we have multiple systems with different cable trunks like lighting system, normal power system, UPS, etc. C- Permanent Materials 1- Solid bottom cable tray or cable trunk complete with its fittings and accessories. 2- Basket Tray, or sometimes they call it wire mesh cable tray complete with its fittings and accessories. Now we will see how to install this support system step by step. 01- The technicians will identify the route of the trays and the support system size based on the width of the trays. 02- They will mark on the floor the route of the trays, then they will identify the locations of the support system of the trays on the floor, and after that, they will transfer these markings to the soffit of the slab using a plumb bob or the cross line combi laser machine. 03- As per the width of the widest cable tray on the same support, they will cut the Unistrut channel, and also they will cut the threaded rods to the required length to achieve the installation height of the support with maintaining some extra distance for any modification later. 04- As I said earlier at the beginning of this video, the upper layer will be a basket tray with a size 150x100, and the cable trunk at the bottom layer will have the same width. 05- For example, if the concrete slabs soffit height is three meters, and the cable trunk, which is the bottom layer, will be installed at the height of 2.1 meters, which means its distance from the soffit is 300 cm 210 cm = 90 cm. And as the height of the Unistrut channel is 2.1cm, and we need around 2 cm of the threaded rod to be inserted inside the drop-in anchor, so the minimum required length of the threaded rod is 2+90+2.1 almost equals 95 cm. But we need to add 10 cm more to the total length of the threaded rod as a safety factor so that the technician will cut the threaded rod at a distance of 105cm. 06- As the width of the cable trunk and the basket tray is 15 cm, plus we need to give around 3 cm right and left the cable trunk for proper alignment, so the total length of the Unistrut channel that will carry the cable basket and the cable trunk will be 15+3+3= 21cm. 07- After the technician marks the locations of the threaded rods of the support system, he will start to drill the holes to install the drop-in anchor. 08- The technician uses a battery-powered hammer drill machine to drill the required holes to install the drop-in anchor. 09- After the technician has drilled many holes, he will install the drop-in anchor and use the battery-powered hammer to ensure the drop-in anchor will be inserted entirely inside the concrete slab. Also, you can use a hammer with a pin punch to do the same function. 10- The technicians will prepare the support system, as we have two layers. Hence, they need to use two threaded rods. Each of them will be 10mm per the approved support system schedule. Also, they need to use two Unistrut channels. Each threaded rod will need five flat washers and five hexagonal nuts. Their size is 10mm, the same size as the threaded rods, so the total is ten flat washers and ten hexagonal nuts. 11- They will need one spring nut to be inserted at each Unistrut channel so that the total will be two spring nuts. 12- As you can see, they are installing flat washers and hexagonal nuts. 13- They will insert the threaded rods inside the drop-in anchors. 14- After that, the technician will use the vise grip to rotate the threaded rod inside the drop-in anchor to ensure its already completely inserted. 15- After that, the technician will use the spanner to tighten the nuts at the different locations, at the drop-in anchor, above, and under the Unistrut channel. 16- They will do the same at all the locations of the support system. 17- After that, they will fix the cable trunk and basket above their respective Unistrut channel with the help of the spring nuts. 18- In the end, the junction boxes will be attached to the side of the cable trunk, while for the basket Tray, a pipe connection bracket will be used. At the end, if you would like to read more about the cable trays installation, so you can get more information by reading this method statement which is available on this link. Join Our Professional Email List to be notified of the New Courses, Free Downloads, Articles, and much more

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