

Industry Insights into Seismic Supports for Cable Trays



Overview

The assembly connects the structure such as a beam or ceiling, to a brace member which could be cable, channel, or pipe to a non-structural support, such as pipe, trapeze, cable tray, duct, and more.

Key Takeaways

Seismic supports for cable trays are critical for maintaining electrical system integrity during earthquakes, with solutions ranging from cable bracing to rigid bracing, guided by building codes and performance-based analyses.

Importance of Seismic Supports

Cable trays are essential non-structural components that carry electrical cables, often considered “lifeline engineering” due to their role in ensuring continuous power during seismic events. Seismic supports prevent damage or collapse of cable trays, protecting both equipment and personnel. Even though many cable tray systems were not originally designed for earthquake loading, studies show they often outperform other non-structural systems under strong-motion events.

Proper bracing ensures that trays move with the building structure, reducing the risk of cable disconnection or system failure.



Types of Seismic Bracing

Seismic supports are generally categorized into cable bracing and rigid bracing:

Cable Bracing: Works in tension and requires two opposing brace assemblies at each location. It is flexible and suitable for long-span or multi-directional support.

Rigid Bracing: Functions in both tension and compression, requiring only one brace per location.

Its use is limited by drop length and structural constraints. Bracing assemblies typically include a system brace, brace member, and structural attachment, installed in both lateral (transverse) and longitudinal directions to stabilize the tray system.

Regulatory Standards and Guidelines

Seismic supports must comply with international and national standards, including: International Building Code (IBC) ASCE 7 (American Society of Civil Engineers) NFPA 13 (National Fire Protection Association) Local building codes in earthquake-prone regions, such as California, Japan, or South America, often mandate seismic bracing for all cable trays to ensure system integrity. Walkdown and analytical review guidelines, such as those from EPRI, help identify potential vulnerabilities and ensure that support systems meet seismic performance expectations.

Performance and Analysis

Cable tray systems are long, multi-span, and carry significant mass, making them vulnerable to seismic forces. Sensitivity analyses using methods like Latin Hypercube Sampling and modal analysis help quantify the impact of material properties, geometry, and connection stiffness on seismic performance. Shake table tests confirm that properly braced trays can withstand high-level seismic inputs, with minor damage like member buckling considered acceptable.

Industry Solutions and Best Practices

Leading manufacturers, such as Eaton (TOLCO) and Eurotray, provide pre-engineered seismic support systems that simplify installation and ensure compliance with codes. Key considerations include: Selecting the appropriate bracing type based on tray length, load, and drop height. Ensuring proper attachment to structural members.

Using rod stiffeners or suspension elements to maintain system rigidity. Considering vibration isolation for sensitive mechanical or fire protection systems. Modern seismic bracing kits can reduce installation time by up to 50% compared to traditional methods, improving efficiency while maintaining safety standards.

Conclusion

Seismic supports for cable trays are a critical component of resilient electrical infrastructure. By understanding the types of bracing, adhering to regulatory standards, and applying performance-based analyses, engineers can design systems that maintain functionality during earthquakes, minimize damage, and protect both personnel and equipment. Advanced solutions from industry leaders provide practical, code-compliant options for both new installations and retrofits.

Article Content

Seismic MEP Solutions | Eaton

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Cable Tray Checklist for High-Seismicity Projects

High-seismicity projects place much greater demands on cable tray systems than ordinary installations. During an earthquake, cable trays are exposed not only to gravity loads and

Seismic fragility analysis of suspended cable trays in civil buildings ...

The suspended cable tray is mainly composed of seismic supports, gravity supports, and tray components. Two full-scale cable tray specimens were tested, one with A-type seismic supports

Deepening the Seismic Support System for Cable Trays

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Design and Installation Manual for Seismic Bracing of Cable Trays

Overview of a cable tray seismic bracing load path from tray rail to structure. This guide serves EPC engineers, MEP contractors, procurement teams, and site inspectors working on

Cable Trays Seismic Design: Protecting Power in

Learn how I approach Cable Trays Seismic Design to protect power and data in earthquake-prone areas. Understand key principles, methods, and

How Cable Trays and Seismic Bracing Systems Mitigate Earthquake

As manufacturers of cable trays, seismic brackets, and light steel keels, we recognize that integrating purpose-built seismic support systems into buildings and critical facilities can dramatically

Deepening the Seismic Support System for Cable Trays

Technical overview of seismic cable tray design considerations including bracing splice reinforcement movement accommodation cable retention and support verification. High-seismicity projects place

Performance-based optimum seismic design of cable tray system

A performance-based optimum seismic design procedure for cable tray systems is given and verified by three studied cases.

Seismic analysis and design of electrical cable trays and support ...

Most cable trays in nuclear power plants are classified as seismic category I components. Current safety requirements dictate that all such components be adequately designed in order to

Seismic analysis and design of electrical cable trays and support ...

The design aspects of electrical cable trays and support systems are discussed from the seismic and structural standpoint. The effects of the inherent flexibility of commonly used cable trays

Seismic fragility analysis of suspended cable trays in civil buildings ...

This study aims to understand the seismic fragility of typical suspended cable trays in civil buildings through full-scale shaking table tests and numerical simulation. Based on the shaking table

Understanding the Seismic Resistance of Cable Trays

Factors Affecting the Seismic Resistance of Cable Trays Before diving deeper into the specifics, it's important to understand the various factors that

Cable Tray Seismic Performance Testing: What You

What is Cable Tray Seismic Performance Testing? Cable tray seismic performance testing evaluates how well cable trays withstand earthquakes. It's

SEISMIC ANALYSIS AND DESIGN OF ELECTRICAL CABLE TRAYS AND SUPPORT

SUMMARY Electrical cables constitute one of the vital systems of power plants, as they are relied upon for the monitoring, control and operation of a great number of safety-related equipment. This

Performance-based optimum seismic design of cable tray system

The results show that the proposed performance index (drift ratio between adjacent supports) for cable tray systems is a reasonable criterion for performance-based seismic design and

How Cable Trays and Seismic Bracing Systems Mitigate Earthquake

In April 2024, a magnitude 7.4 earthquake struck Hualien, Taiwan, causing widespread infrastructure damage and economic losses. This disaster, like many others, underscores the critical

SEISMIC BRACING OF A DISTRIBUTED CABLE TRAY SYSTEM

Above these cabinets, are cable trays that provide power and communications cabling to the cabinets. Since the facilities were located in a area of high seismicity, the cable tray system was required to be

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