

# Causes of Vibration in Cable Tray Hangers

## Article Overview

Cable tray hangers are prone to vibration from machinery, seismic activity, or structural motion, and proper isolation and bracing are essential to prevent damage and maintain system integrity.

## Causes of Vibration

Cable tray hangers can experience vibration due to mechanical equipment, motors, fans, or seismic events. In industrial environments, harmonic resonance and continuous shaking can loosen bolts and fasteners, causing trays to bounce and cables to rub against metal edges, potentially damaging insulation and creating safety hazards . Seismic activity can also induce motion in suspended trays, requiring specialized bracing .

## Effects of Vibration

Uncontrolled vibration can lead to:

- o Loosening of bolts and nuts, which is a primary cause of support failure .
- o Fatigue and cracking of tray materials, especially in high-frequency vibration zones .
- o Damage to cables, including insulation wear and potential electrical hazards .
- o Increased maintenance costs and potential downtime due to repeated failures .

## Mitigation Strategies

### Flexible and Damped Hangers

Introducing flexible elements or vibration isolation hangers between the support and the tray can significantly reduce transmitted motion. Properly designed stiffness and damping characteristics allow trays to move slightly without transferring damaging forces to the cables . Spring-based vibration mounts are commonly used to isolate trays from structural vibrations .

### Material Selection

Choosing materials with natural damping properties helps absorb vibration energy. Wire mesh trays or trays with inherent flexibility can reduce stress on cables and supports . Heavy-duty materials with fatigue resistance are recommended in high-vibration or chemical processing environments .

### Seismic Bracing

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For areas prone to earthquakes, cable bracing or rigid bracing systems can stabilize trays. Cable bracing works in tension and requires opposing braces, while rigid bracing handles both tension and compression but may be limited by drop length. Pre-engineered seismic bracing solutions, such as Eaton's B-Line series, provide tested assemblies for vibration and seismic control.

## Hardware and Maintenance

Using locking hardware, vibration-resistant fasteners, and regular inspections ensures that supports remain secure. Approximately 70% of support failures occur due to loose nuts rather than material failure, highlighting the importance of proper fastening. Routine checks and torque verification are essential in high-vibration environments.

## Best Practices

- o Combine flexible hangers with seismic bracing for maximum protection.
- o Select materials and tray types suited to vibration frequency and amplitude.
- o Implement preventive maintenance schedules to inspect and tighten supports.
- o Consider full-scale testing for critical installations to validate vibration isolation performance. By integrating these strategies, cable tray systems can maintain structural integrity, protect cables, and reduce maintenance costs in environments subject to vibration.

Vibration mechanisms of hanger cables are complicated and have not been fully understood. When large-amplitude

Practical/ fission reactor safety nuclear power stations/ electrical cables seismic loads cable tray hangers rigid support systems

Cable tray structures are ubiquitous in modern infrastructure, supporting critical electrical and communication systems.

In designing supports for a cable tray system, consideration should be given to the loads associated with future cable additions and

Effects of Unstable Cable Tray Hanger and Bracket Installation Reduced Cable Tray Stability

Learn about common cable tray failures, their causes, and practical solutions for ensuring

It is concluded that Stockbridge dampers are well suited for mitigation of vortex induced vibrations if properly

designed

Vibration is ever present within our environment, the consequential oscillations caused by movements and sounds. A threaded

The final results demonstrate the need to consider the effects of random variables in modeling assumption in seismic

Overloading cable trays can lead to a breakdown of the tray, its connecting points, and/or supports, causing hazards to persons

Eliminate cable tray failure in high vibration environments. Learn the method of how to lock

Cable Tray Technical Guide A practical guide to product selection and installation This guide for engineers and installers has been

This study aims to understand the seismic fragility of typical suspended cable trays in civil buildings through full-scale

This paper presents a comprehensive review of recent advances in stay cable vibration mitigation, including

The seismic performance levels of cable tray systems are presented according to current seismic design codes. A

NEMA VE 1-2017 Specifies requirements for metal cable trays and associated fittings designed for use in accordance with the rules

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