



Lowering your total installed cost through structural steel savings

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Overview / Introduction

Eaton's B-Line series metallic cable ladder systems are engineered to provide superior strength to weight ratio while providing the lowest total installed cost of any cable management system in the industry today. This is achieved through continuous innovation, market and customer based knowledge.

To achieve the lowest total installed cost, Eaton's engineers developed an innovative means to significantly reduce the number of structural steel supports needed in cable ladder installations, without diminishing the load carrying capacity of the system.

In addition, extensive laboratory testing has enabled the Eaton B-Line series cable ladder to exceed the National Electrical Manufacturer's Association (NEMA) VE-2 support recommendations for cable ladder installations.

The NEMA recommendations are created by active cable ladder manufacturers in North America, and are intended to provide a basic installation guideline for all cable ladder systems.

However, individual manufacturers can provide recommendations for their systems that exceed the basic guidelines outlined by NEMA VE-2 (section 3.5.1).



Eaton has been an active member of NEMA for two decades and our representative has held the chair position with the NEMA VE-2 Technical Committee. NEMA guidelines are written by cable tray manufacturers for cable tray manufacturers. "Unless otherwise recommended by the manufacturer" allows cable tray manufacturers to highlight differentiating factors for their cable tray.

When assessing a project for the lowest total installed cost, Eaton recommends focusing on four key design considerations:

- (1) Longer straight section spans
- (2) Fittings support locations
- (3) Vertical adjustable support locations
- (4) Thermal expansion support locations

Utilizing Longer Straight Section Spans

NEMA VE-2, (section 3.4.1) defines an allowable straight section support span as the following: "straight section support span should not exceed the straight section length".

Therefore, to eliminate supports, one option is to increase the length of cable ladder.

For example, transitioning from 10ft (3m) spans to 20ft (6m) spans reduces supports by 50%.

To create even more savings, Eaton offers B-Line series cable ladder systems that are capable of 30ft (9m) and 40ft (12m) support spans; dramatically reducing the overall quantity of structural supports needed on a job site.

The B-Line series cable ladder features a highly engineered I-beam rail, which maximizes the strength to weight ratio of the system, and allows for longer span capability.



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The breadth of materials and sizes enables Eaton to offer the ideal B-Line series solution to meet a variety of customer applications and load criteria. (Refer to *Structural Steel Savings (SSS-17) technical reference for support design considerations.*)



B-Line series aluminum cable ladder can range up to 40ft (12m) in length while steel can range up to 24ft (7.3m). This difference in length is due to the strength to weight ratio of aluminum.

Fitting Support Location Recommendations

When it comes to installing supports, cable tray fittings are one of the biggest challenges. Eaton's B-Line series cable ladder is engineered to provide flexibility in selecting the proper support locations for fittings.

Eaton's industry-leading 3in (75mm) or 4in (100mm) tangents help maximize the strength and load carrying capacity of splice plates at fitting locations which allows for a reduction in support requirements.

In fact, NEMA documentation does not require the testing of fitting locations altogether. However, Eaton has conducted extensive testing on its B-Line series cable ladder to provide several alternative options for supporting horizontal bends, tees, crosses, and vertical bends as compared to the NEMA VE-2 section 3.5.1 recommendations.



NEMA VE-2 (section 3.5.1) states, "Recommended support locations follow, unless otherwise recommended by the manufacturer". (Refer to *Structural Steel Savings (SSS-17) technical reference for support design considerations.*) Supports are not limited to structural steel, but can be defined as strut channel and angle iron. The same recommendations apply to these supports as well.

Vertical Adjustable Supports Locations

For changes in elevation, with intermediate angles, and for cables not requiring a large radius, vertical adjustable splice plates are often the best solution.

NEMA VE-2 (section 3.4.3) states that a support is required within 2ft (600mm) on both sides of every vertical adjustable splice plate regardless of series or span.

Eaton has conducted extensive testing to prove that pairing B-Line series cable ladder and vertical splice plate, installers can forego transitional supports up to half span for steel, stainless steel, and aluminum cable ladder systems (2-5 and metric cable ladder series). This allows a 20ft (6m) ladder to span 10ft (3m) unsupported between adjustable splice plates.

Similarly, cable ladder series are designed for 30ft (9m) spans and can be unsupported up to 15ft (4.5m) between vertical adjustable splice plates and up to 20ft (6m) unsupported spans can be utilized with 40ft (12m) ladders.



Refer to *Structural Steel Savings (SSS-17) technical reference for support design considerations.* The vertical adjustable splice plate is an unparalleled "Eaton B-Line series only solution", and is applicable for both NEMA and IEC industrial style cable ladders.

Thermal Expansion Support Location

Designing and accounting for proper thermal expansion and contraction is key to the longevity of a cable ladder installation.

As NEMA VE-2 details in section 3.4.1, "it is ideal to lay out the system so that splice joints fall between the support and the quarter point."

It is important to note that placing expansion splice plates directly on top of supports does not comply with NEMA VE 2 section 3.4.2, and is therefore not recommended.

Conversely, Eaton's patented B-Line series heavy duty expansion splice plate eliminates the need to install additional supports within 2ft (600 mm) on each side of the expansion location when placed at the quarter point of a support span.

Similar to the fitting supports detailed above, the performance of Eaton's highly engineered B-Line series heavy duty expansion splice plate complies with and exceeds NEMA VE-2 recommendations as detailed in section 3.4.2.

This equates to the elimination of 2 supports every 65ft (20m) with the typical 20ft (6m) aluminum ladder with a 100°F temperature differential.



The heavy duty expansion splice plate is available for all industrial B-Line series cable ladder. Reach out to B-Line series technical sales for more information.

Conclusion

In conclusion, Eaton is committed to supplying its customers with innovative solutions that will result in the lowest total installed cost.

The most significant cost driver of cable ladder installations is the cost of the supports, whether it is an industrial or commercial application.

Depending on the complexity and location of the project, supports can range anywhere from \$500 to over \$15,000 each.

By incorporating Eaton's support recommendations with straight sections, fittings, vertical adjustable splice plates, and heavy duty expansion splice plates, B-Line series cable ladder solutions can help eliminate substantial costs in both labor and support materials on any given project.

Please feel free to contact your local Eaton B-Line series cable ladder representative to address any additional questions regarding this information or for assistance in optimizing your support layout.

For more information, visit Eaton.com/sss

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