

# Sales Engineering Technical Paper Series

## Redi-Rail Cable Tray System: An Innovative Solution for Cable Management

As a manufacturer continuously working to develop quality innovative products for the cable tray industry, Cooper B-Line has done it again with a new product called Redi-Rail (Fig. 1). This newly designed cable tray system offers flexibility and installation advantages never before seen in an aluminum two side rail cable support product. One advantage in particular is a 30 to 35 percent reduction in total material and installation cost when compared to a traditional welded tray system. This system's remarkable performance relies on its enhanced flexibility and ease of installation without sacrificing rigidity and strength.

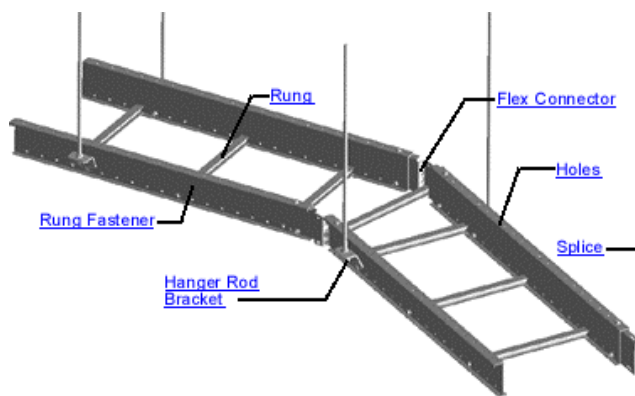


Figure 1 – Redi-Rail Cable Tray System

### Mechanically Connected Rungs

The mechanical connection used on the Redi-Rail system allows the rungs to be installed more efficiently and consistently than standard welded connections. The patented “I”-Beam shaped rung, as shown in Figure 2, provides the highest strength-to-weight ratio available. The hole at the center of the rung is designed to provide maximum grip for the fastener threads while minimizing wasted material. Pullout tests conducted on this connection consistently resulted in an average of 3000 lbs of applied tension before failure, which is equal to or stronger than similar tests conducted on welded connections.

To insure the consistency and performance of the mechanical connection, B-line has specifically designed the self-tapping screw to provide a built-in locking feature.

As shown in Figure 3, the head of the screw has a thin built-in washer with a V-groove, which allows locking to occur. The V-groove embeds itself into the side rail of the material as the thin washer allows the screw head to spring back when torque is applied. The V-groove creates a molecular compressive force between the surface of the side rail and the screw while the springing action amplifies these forces. To assure customers that each screw is attached in the same manner with the same torque, B-Line uses a guided air pressurized torque wrench that is calibrated monthly to 18 ft-lbs. To test the performance of this connection, B-Line has conducted months of vibratory testing. The testing was done at multiple frequencies, amplitudes, and at the natural frequency. Special attention was paid to ensure that all conditions were taken as worst-case scenarios. In reality, the vibration testing was far worse than could be experienced in actual use. The results from these tests were extremely positive, with no recorded damage to the system or loosening of the rung connections.

**FYI:** A sample video and description of this testing and test procedure can be viewed from B-Line's website at: [http://www.cooperbline.com/whatsnew/wn\\_13.asp](http://www.cooperbline.com/whatsnew/wn_13.asp).

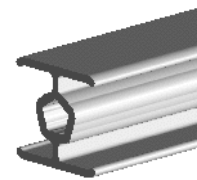


Figure 2 – Redi-Rail Rung



Figure 3 – 1/4"-20 thread self tapping screw

### Rung Strength

The strength of the Redi-Rail rung under cable loading can be compared to the average industry rung strength as shown in Table 1. B-Line conducts rung testing by applying a concentrated load on a simple beam as defined in the NEMA Standard, “VE-1 Section 5.4 - Rung Load

Capacity.” From this testing, it was determined that the Redi-Rail rung is capable of supporting a 200 lb concentrated load for tray widths of up to 30 inches. The ability to support a 200 lb concentrated load and to withstand a 3000 lb pull test strongly supports the use of this mechanically assembled cable tray system for most cabling applications.

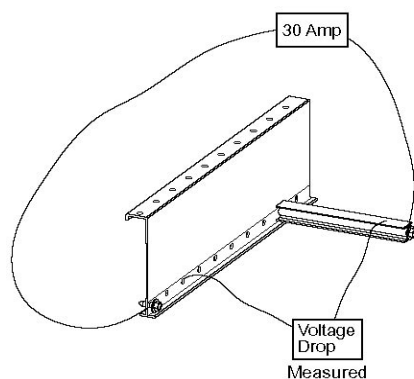
**Table 1 - Rung Strength of Redi-Rail versus Industry Average**

Rung Type	6"	9"	12"	18"	24"	30"	36"
Redi-Rail Rung	1008	672	504	336	252	202	168
Industry Average	996	664	498	332	249	199	166

**NOTE:** All loads are the maximum allowable concentrated at the mid-point and include a safety factor of 1.5

### Electrical Conductivity of the Rung Connection

Redi-Rail, like traditional welded cable tray products, is tested and UL Classified to be used as an equipment ground conductor. This classification is based on the product's ability to carry a current in the event of an electrical fault, and is an alternative means to running a separate ground wire or bonding jumpers between tray sections. To meet UL requirements, the resistance of the system must be below the NEC maximum allowable 0.00033 Ohms. UL testing is typically conducted on two cable tray sections joined by a splice plate. However, because a fault can occur over a rung, it is important to know that the resistance of the rung to tray connection will adequately transfer this current. Therefore, in addition to standard UL test procedures, B-Line has tested the mechanical connection and determined the resistance to be 0.000071 ohms, which is .000259 ohm below the maximum allowable (Fig. 4). Based on this additional testing, Redi-Rail can comfortably be used as an equipment ground conductor.



**Figure 4 – Electrical Conductivity Test**

### System Strength

The Redi-Rail system is not as heavy as many industrial tray systems, but was developed with both commercial and light industrial applications in mind. As shown in Table 2, the system is rated to support between 86 and 114 lb/ft on a 12 ft support span, which make it an ideal product for supporting either communication or power cables. Because cable loading in communication applications rarely reaches 80 lbs/ft and the majority of power applications never exceed 100 lbs/ft, this system proves to provide adequate strength for supporting either cable type.

**Table 2 - Redi-Rail Strength on a 12-Foot Support Span**

NEMA Load Depth	3"	4"	5"	6"
Load Capacity (lb/ft)	86	102	114	100

**Note:** These values were obtained from NEMA VE-1 test requirements and include a safety factor of 1.5.

### Environment

The tray system uses an extruded 6063-T6 marine grade aluminum side rail and rungs. This material works well in most indoor and outdoor environments and is used in 60 to 70 percent of all cable tray applications due to a high strength-weight ratio, corrosion resistance, and electrical conductivity. The standard hardware is chromium-plated zinc, which is ideal for either indoor or outdoor environments. Stainless steel hardware for use in corrosive or wet environment is also available at special request.

### Concluding Thoughts

Redi-Rail is an innovative well-designed cable tray system that will reduce both installation and material costs. The extensive testing performed on this product has provided an insurance of this systems strength, performance, and quality, which are standard to B-Line cable tray products. The rigidity, strength, and material composition of this product enable it to be used for the majority of cable distribution applications. Whether the cabling is communication or power or the application is commercial or industrial, Redi-Rail is a strong choice when short or intermediate support spans are required or desired.

For further information on the topics covered in this article, please feel free to consult B-Line's Sales Engineering Department.