Steel Tube Institute

The following article appeared in **Security + Life Safety Systems.** In it, writer Russ Munyan reviews the qualities and benefits that steel conduit provides: EMI shielding, built-in grounding, physical protection/strength, reusability for future additions or replacement of conductors and cable, noncombustibility, and chemical compatibility with concrete.

Mr. Munyan's contention is that too many members of the low-voltage cabling industry are excluding steel conduit because they feel its installation costs are higher. He feels that those contractors need to know, „when and where steel conduit is the right choice and need to advise their clients accordingly."

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Steel Conduit Holds Steady: Benefits continue to follow product

In these days of cable tray, wire mesh and Romex (brand name for National Electrical Code (NEC) wire with type nonmetallic, variant B insulation), the "heavy" steel conduit industry has a battle on its hands with self-promotion. Nonetheless, there is no shortage of qualities that steel conduit brings to a project, making it worth serious consideration by project owners, engineers and cabling contractors.

While steel conduit has been used since the early 1900s, it has only recently shown its ability to reduce the electromagnetic interference (EMI) from everyday electrical and power distribution systems. Those invisible electromagnetic fields (EMF) can cause distortion of monitor images, the alteration or destruction of electronic data and the disruption of communications to process control equipment. Such problems impact worker productivity and efficiency. At worst, EMI can also cause an alarm or signaling system to malfunction. Depending on the industry, that can range from irritating to costly to catastrophic.

Georgia Institute of Technology focused a three-year study on reducing the effect of EMF on electrical and electronic equipment. Research was sponsored by the Steel Tube Institute (STI) of North America, which is an advocacy group made up of steel conduit manufacturers. The study concluded that steel is the most effective shield for 60 Hz EMF, reducing these fields by as much as 95 percent. Aluminum conduit reduces such fields by about 5 percent, while nonmetallic materials are equivalent to conductors installed in free air.

Engineers and designers often have to balance appropriate products or construction methods with installed costs. Steel conduit certainly is not the least expensive wiring method, yet its effectiveness against magnetic forces can make its life-cycle cost a relative bargain.

Many building owners and managers have discovered the hard way that shielding EMF at the design and build stages is the most cost-effective approach. In addition to its EMF-reducing qualities, the Georgia Tech study also concluded steel conduit provides an excellent electrical path to ground. A properly installed metal conduit system is recognized by the NEC as an equipment-grounding conductor, eliminating the need for supplemental grounding conductors.

STI incorporated the results of the university's research into Grounding and ElectroMagnetic Interference (GEMI) analysis software, which is available free of charge at www.steeltubeinstitute.org. The software provides a factual basis for the cost of EMI, justifying steel conduit's higher up-front costs to building developers and owners. Also available on the Web site are recent case studies that demonstrate the benefits of the new software tools and of specifying steel for EMI shielding.

Of course, steel conduit shares many benefits with other metal conduit, such as strength and the resulting physical protection it offers the cables within, though the wall thickness and strength of steel provide the greatest mechanical protection to the enclosed wire conductors. Other benefits include steel conduit's adaptability/reusability for future additions or replacement cables and its noncombustible nature. But unlike other metal conduit, steel conduit is chemically compatible with concrete.

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There are three basic types of steel conduit: rigid steel conduit, intermediate metal conduit and electrical metallic tubing.

- Rigid steel conduit (RSC) is the heaviest-weight and thickest wall conduit. It is a threaded metal raceway that can have a primary coating of zinc, a combination of zinc and organic coatings or a nonmetallic coating, such as PVC. Supplementary coatings can be applied to all three where additional corrosion protection is needed. Galvanized rigid metal conduit (GRC) is noncombustible and can be used indoors, outdoors, underground, concealed or exposed. Rigid steel conduit with coatings that are not zinc-based may have temperature limitations and may not be listed for use in environmental air spaces.
- Intermediate metal conduit (IMC) was developed in the 1970s and is a lighterweight, thinner wall alternative to RSC, weighing in about one-third less than RMC. The outside is zinc-based coated for corrosion protection, and the inside has an approved organic corrosion-resistant coating. IMC is interchangeable with galvanized RSC. Both have threads with a 3/4-inch per foot taper, use the same couplings and fittings, have the same support requirements and are permitted in the same locations.
- Electrical metallic tubing (EMT), often called thin-wall, is an unthreaded steel raceway. The outside corrosion protection is zinc-based and the inside has a corrosion-resistant organic coating. It is installed by use of set-screw or compression-type couplings and connectors.

While some think that using steel conduit is always the right choice, others believe it is never the right choice. Too many members of the low-voltage cabling industry err by operating exclusively within the second category. Those contractors need to know when and where steel conduit is the right choice and advise their clients accordingly. That will prove advantageous for their clients and the industry in general.

3 BASIC TYPES

Rigid Steel Conduit (RSC),
Intermediate Metal Conduit (IMC)
and Electrical Metallic Tubing (EMT)

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