



Why Building Controls Cable Can Be The Weakest Link

By Andre Sabourin

Building controls manufacturers engineer and develop complex systems geared towards maximizing performance and efficiency. It's a multi-billion dollar industry. From the large multi-national corporation to the contractor who takes care of the installation, countless hours are spent on every detail in the engineering, marketing, sales and installation of the HVAC system, yet little attention is actually spent on the vital link to product performance: the cable. The quality of this critical link can mean the difference between a seamless interface, constant hiccups, and even total failure. In the efficiency game where systems are designed for incremental gains (or reductions in energy use), proper cable selection needs to be taken seriously.

The New Breed Of Cable

The best-kept secret of building design is that wiring has evolved as electronics have evolved, ranging in quality, price, and concurrently, in end-user satisfaction. To put it simply, the use of generic multi-conductor for your average integrated electronic system is the equivalent of outfitting a top-of-the-line home theatre system with only 8-track players. Will it work? Most of the time. Is it the best technology available? Obviously not.

Specialty cable is designed to transmit information, as opposed to merely transmitting power. This new breed has little in common with its generic cousins. Whereas a typical low-grade connecting cable does not adhere to standards such as twists per foot, diameter, impedance or capacitance, specialized brands do this and more.

Spec In A "Building Controls Cable"

Typically, a systems engineer or designer does not stipulate cable specifications, causing a disconnect between the project on paper and the project in reality. If a systems design requires say, an 18 ga, 4 conductor cable, several formats may be used ranging from a conventional multi-conductor wire to four individual 18 ga, hook-up wires. Left unspecified, it becomes the installer's choice – a choice which is often motivated by material (cost) savings or routine, rather than by performance. Conventional grey cable has many applications and is used in several industries ranging from alarm to security to OEM. This multi-conductor can have a wide range of readings and still be within the acceptable tolerance range, but as with any generic product, its capabilities can only extend so far. Only a specifically designed building automation cable with

a very tight production specification can assure optimal performance over time and from one installation to another. It's a bit like playing a round of golf using only a seven iron as opposed to having access to the right club. You'll eventually get there with the seven iron, however, using the right club for a certain distance greatly improves your chances.

When a system is designed, it should take into account the particular requirements of a project and spec-in a very specific building controls cable exclusively designed for the given application. If there are any uncertainties, there are companies that specialize in controls cables that can be consulted in order to ensure that the cable is up to the job. For system optimization one should consider the required number of conductors, gauge, shielding requirements, impedance, capacitance, voltage, resistance, lays (twists) per foot, and appropriate building code demands when setting a specification. This closes the loop on ensuring that the proper product is proposed and ultimately selected.

Today's systems are engineered for high efficiency and versatility. Increasingly, building controls rely on convergent technologies like climate control, energy efficiency, lighting, alarms, security, etc. With the increasing push towards converging technology and optimal efficiency a neglected detail such as poor cable selection is like building a weak link into your system. It stands to reason that the more precise your cable specification, the better the system will perform. Consistent and suitable use of specialized cable are paramount to a system's seamless operation, and ultimately, to customer satisfaction.

Protocols For Building Controls Cables

Protocols like BACnet and Echelon have built industries on this very premise. Both are standard communications protocols for the HVAC controls industry. Their goal of developing an

accepted standards solution that is inter-operable, makes both BACnet and Echelon valuable resources in the planning of any project. By developing protocols for a specific segment of an industry, BACnet and Echelon have eliminated many proprietary communications methods that may be unsuited to the HVAC industry.

Specific standards for building automation cable exist as well. Companies like Honeywell, Johnson Controls, Siemens, Trane, etc. have basic cable requirements to optimize the efficiency of their system's. Cables have also been designed and created according to Echelon protocol. Again, Echelon and BACnet are all about standards and consistency. It stands to reason that the more you adhere to the specs created by the systems designers, the better it will function. Yet, in a surprising number of installations there is an important gap between the product specification and what is actually used. Again, this speaks to the need for precise cable standards to be set and adhered to from conceptualization to installation.

Building Codes: A Hidden Pitfall

Another potential drawback of taking a detour around specialized cable is that North American standards often don't apply to the Canadian market. The Canadian building code is different than U.S. specifications, and a building inspection may prove an unwelcome surprise should corners be cut on wiring. While CSA sets the basic safety standard, provincial building codes do vary slightly from province to province. For example, an FT-4 rating for a plenum application does change regionally. Since the average project represents a significant investment of both money and time, this can be a considerable setback. Again, speaking to the electrician or to a cable technician who is familiar with the local building codes is a great way to ensure your product is to code.

An Inexpensive Solution

Another surprising fact is that the cable component of a system's overall cost is relatively minute. Estimates of the actual cable cost, as a portion of a project's overall cost, ranges from 0.5-2%. Using a building controls cable versus a conventional multi-conductor is slightly more expensive, an expense that becomes insignificant when you consider inefficiencies over time with a system that is not running optimally.

Code Orange: Colour-Coded For Simplicity

In any installation, sorting out which cable belongs to which connection can be a nightmare. Moreover, many cables are left over from previous tenants, having outlived their use. More often than not, installations used primarily grey, or to a lesser degree blue for telecomm and red for fire alarm. Increasingly, orange has become accepted as an industry standard for controls cable. This allows the product to really stand out from the rest of the cable when installing or troubleshooting.

Conclusion

A great deal of confusion exists as to what cable to use for today's building controls technology. While many installers continue to use conventional grey multi-conductor, this can lead to a reduction in optimal systems performance and headaches down the road. To ensure the best possible performance on your next project, spec in and use a specifically designed cable product that has been conceived for building controls (HVAC). This will ensure suitability, long-term cost efficiency, installation and maintenance simplicity, and a system that meets your local building codes. **Ω**

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