

What's Up in the Hoistway?

Geoff Brewer

Draka Elevator Products, Inc., USA

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ABSTRACT

With much change and innovation within today's Elevator Industry including the development of "hi-tech" drives and controllers in the machine room, does the hoistway need to continue to be the "low-tech" environment of any elevator installation? This paper examines the way we approach the data highway, command and communications functions within an elevator control system. It considers how a degree of standardization can still present total installation flexibility and provide both manufacturer and contractor with improved installation performance, and a higher degree of "Safety" through a Pre-Wire or Modular installation concept. It also looks at the changes in "Installed Safety" and the growing requirement for both LSF (Low Smoke & Fume) and HF (Halogen-Free) cable products within the building structure, and the especially within the elevator hoistway.

1. THE FORGOTTEN FRONT

While Engineers embrace the advantages of data bus and CAN control methods, many companies still rely on hoistway wiring methods, which have not changed very much since the 1960's. Should this environment be part of the new age control, or remain in suspended animation?

Within today's elevator installation arena, Engineers must offer their companies a fine balance between a modern attractive package of elevator control techniques, which include a wide range of the latest communication and information/data options, while meeting the demands of the latest lift standards or codes, combined with the added internal demand of providing a positive bottom line. While joining a magic circle is one solution to this multi-disciplined tight rope, looking a little closer at how we deal with the detailed installation, may be easier than pulling the proverbial rabbit out of a hat.

While Pre-wiring may not be a new approach to the installation of an elevator, hoistway wiring solutions are changing, through both evolution in car control and communications systems, and through the introduction of wiring methods and accessories which have been developed especially for the elevator industry. This may not be a revolution in the general approach to wiring concepts, but it is a subtle change in how a system can focus on the need to provide specific services, and meet a wide range of standard system requirements.

2. PRE-WIRE OR PRE-CON: A CHOICE OR A CHALLENGE

Pre-Wiring is an active part of many elevator installations, but making the final connection is both a Time/Labour and Cost/Safety issue. What is the next natural step in safe and secure wiring practices, and many may ask, what's really wrong with an on-site wiring approach?

While the noble and inexpensive Scotchlok™ has provided a simple and reliable wiring approach, its low cost can hide a much higher "Total" Installation Cost. There may still be a place for this simple "splice" routine, but reliability can be greatly improved, by the use of more appropriate connectors.

Installation error can generate costly rework and recall problems, which are the result of incorrectly wired control systems or poor termination procedures. These can be greatly reduced through dedicated cable assemblies and modern connector products that meet both electrical and environmental requirements.

Working with manufacturers and suppliers who fully understand the demands and requirements of the "Hoistway" and have the expertise, practical experience, and focus, can really make all the difference.

Pre-Tested "Pre-Wire" harnesses can reduce safety concerns and eliminate costly troubleshooting, focusing on "Point-to-Point" controller networks.

Traditional Pre-wiring methods used within the elevator industry have relied on either multiple or single conductor wiring looms being drawn into the shaft, and left hanging in coils within the hoistway until the cores are terminated. These methods rely heavily on experienced operative using cut and splice methods which have not changed greatly since the 1960's, and have the added risk of conductor damage or incorrect termination.

The advantages of a "Pre-Wire" approach, where the hoistway wiring fabrication takes place within a controlled factory environment, to the Total installation are twofold:

Pre-Connectorization places the hoistway wiring fabrication within a controlled factory environment and provides the manufacturer with two clear advantages:

- The option and selection of both conductors and specified connectors for use within the loom construction.
- Providing the ability to fully test and identify the wiring, prior to site installation, giving both the contractor and client a sense of security in this aspect of the installation.

2.1 Options

From Pre-Wiring to Pre-Con, many circumstances need to be considered when making the decision on what is the right approach for your company. Moving to a standard or custom WOJ hoistway cable is often the first design consideration.

2.1.1 Pre-Wiring

Pre-Wiring offers a simple wiring solution, which can easily be enhanced by selecting a standard or custom wiring loom, similar in design to the WOJ (with-out jacket) cable shown here. (Figure 1) This type of construction can provide an ideal wiring medium for the hoistway, through the provision of standard cores, made easily accessible through an open weave construction. The cables can contain any number of cores, to either EN or UL/CSA format, with the option to include specific data or communication cable components. In practical terms, it often pays to restrict the number of cores to something less than 20, making the installation of the cable a much simpler operation. Several looms can then be used to complete the total-system core requirement.

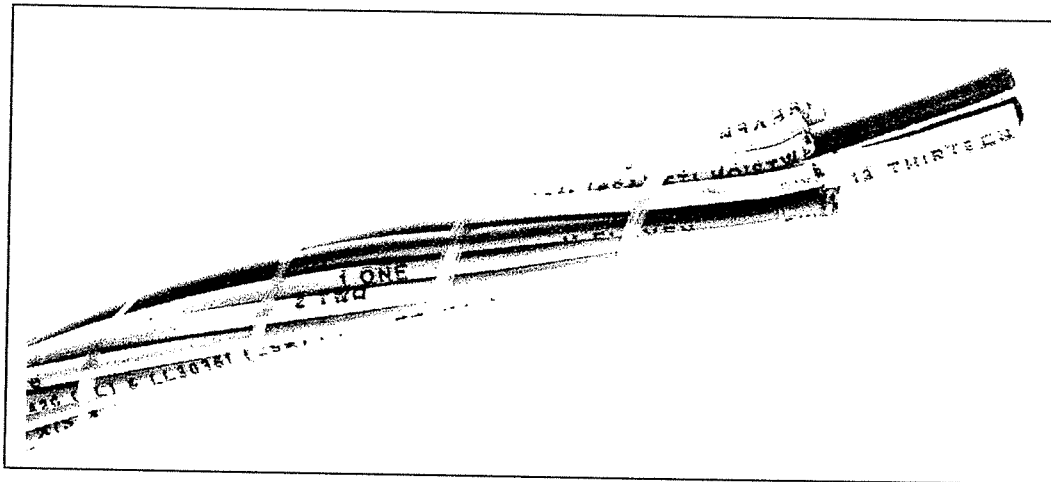


Figure 1. Super-Duct[®] Hoistway Cables

2.1.2 Pre-Connectorization

The term “Pre-Connectorization” is used in this Paper to describe the termination of a conductor, or group of conductors, using a range of standard or specified connectors, within a controlled factory environment. It also assumes the provision of identification labels, appropriate packaging, and the Pre-Testing of the complete assembly or loom, prior to final inspection, packing and shipment. In real terms, a ready-to-fit “Elevator Wiring Component.”

These wiring components can also build-in flexibility to allow for actual site conditions, where estimated distance may vary. They can also accommodate changes in the requirements of the installation or client, through spare core capacity or additional connector availability. In some cases, it is not always possible to determine the final shaft dimensions, and in these circumstances, Pre-Connectorization of just one end of the travelling cable, is a prudent strategy.

How does Pre-Connectorization achieve real advantages and value through increased “off-site investment”?

Using a Specialist Contractor for Pre-Connectorization places both the material and production responsibility for this work with a third party, whose supply arrangements can be co-ordinated to meet your specific contractual responsibilities. While there is an increased cost through the contractor’s “Added-Value Services,” specified materials can still be supplied at “contract” or agreed price levels, not only providing service benefits, but also real cost benefits to the prime contractor.

Wiring Component Advantages:

- It offers a secure and safe connection made within a controlled environment.
- It offers the opportunity to “Pre-Test” the complete elevator system, prior to installation.
- It can place the control wiring responsibility with a sub-contractor, releasing space and skilled elevator technicians to concentrate on the “specialist” aspects of the elevator “system”.
- It provides cost benefits including reduced raw material inventory, reduced waste and scrap material, and “just-in-time deliveries” to meet contract requirements

2.1.3 Modular Installation: A Practical Advantageous Concept or a Step Too Far?

A Modular wiring approach offers a totally flexible approach to shaft wiring, through a dedicated floor-by-floor Wiring Unit installation concept. Each Unit is produced to provide a specific number of control and data cores, based on the total requirements of the hoistway, but connected on a floor-by-floor basis. In essence, it provides a simple “Packaged” solution for standard low-rise elevator installations up to 10/12 floors. Each unit typically covers a 3.0 metre zone, and is connected to the next floor unit through a connector link, which can be easily accommodated within the dedicated shaft wiring trunking.

Typical core arrangements can include dedicated floor conductors, as well as common cores, “door lock” and “shaft limits” circuits.

Which method offers the best approach for your elevator package? Modular has some real advantages on “Standard” unit packages, while a Custom or Standard hoistway approach tends to suit both Modernization packages as well as the more complex units or higher rise units.

Modular Advantages:

- Specified Dedicated and Group conductors combined within single floor unit
- Colour coded to provide simple and effective circuit recognition
- Multiple connection options, linked by Fly-Lead connections

Concerns:

- Meeting Local Wiring Regulations!
- How reliable is the connector?
- With so many connectors, will the system be reliable and cost effective?

Most of these concerns can be overcome, by addressing the specific needs of the installation and the enduring wiring regulations or codes. If the project is for export, or in a special environment, check the "General Specification" or use your "local" Representative, to confirm the required Standard.

Connector reliability is a genuine concern, so select a quality component, which not only meets the electrical application and working environment, but also is specifically designed or recommended by the manufacturer. (Figure 2)

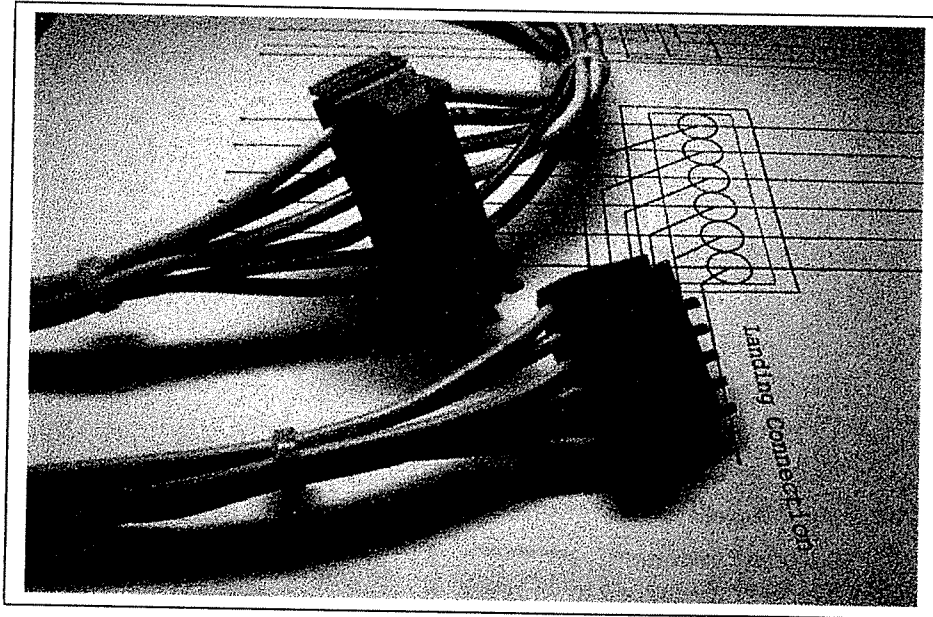


Figure 2. Super-Duct® Hoistway Cable and WAGO Connectors

Quality connectors incorporated within Quality hoistway wiring looms can be designed to provide both reliability and a "cost effective" approach to a complete shaft wiring solution. Site labour is the one aspect of an installation, which is very difficult to control, and can easily turn a project balance sheet from black to red. Keeping control of the installation costs is the one key area where Pre-Wiring and Pre-Connectorization can help, viewing the amount of on-site labour as quantifiable, and not a bottomless pit.

Putting a "Pre" in to the installation gives you: "Planned Resource Engineering" and a great deal more.

3. ADDED SAFETY IN LOW SMOKE & FUME AND HALOGEN-FREE CABLES

In 1989 a tragic fire at London's Kings Cross Underground Station changed the approach we take to building-in Safety within the specification and structure of a building and the elevator environment. Halogen-Free and Low Smoke & Fume cables have become a growing requirement within the UK and Europe, and need to be "Standard" for all cables and installation material within the elevator shaft.

Halogen-Free cables follow the general specification of their “sister” LSF or LSOH building wire counterparts, but are also required to meet the total flexibility and dynamic demands of the travelling cable. Halogen-Free travelling cables provide this performance criterion, while LSF/LSOH cables provide the fixed or stationary hoistway medium.

The general specification for travelling and stationary hoistway cables within an LSF environment, is to follow both EN and IEC standards, which require the following additional fire performance:

- Burning Characteristics in accordance with IEC 332-1 (BS 4066 part 1)
- Measurement of Smoke Density in accordance with IEC 1034-1 and -2 (BS 7622 parts 1 and 2)
- Corrosiveness of Combustion Gases in accordance with IEC 754-2 (BS 6425 part 2)

Halogen-Free and LSF building installations are more than just a trend, they are a necessary and basic commitment to the Public, that within crowded and unfamiliar public building environments, a small fire in the basement will not be taking lives on the third floor.

Within the UK and some other European Union countries, Airports, Hospitals, Underground Stations and Government/Public buildings are following this standard, through the specification of Low Smoke and Fume cables and accessories. Let's hope that it does not take another major tragedy to create legislation on this important issue.

4. CONCLUSIONS

Meeting a wide range of different installation needs is just part of the secret of a successful material and service package. The key to their success is quite simple, and can be summarized as follows:

- Pre-connectorized hoistway wiring harnesses can be fabricated to meet the codes, standards or client preferences; all the while keeping the elevator installation environment safe and secure.
- Pre-wired and pre-tested harnesses provide the building owner with assurance that the hoistway and controller wiring match the building's installation requirements; with each element tested, and supplied with a detailed line drawings and component specification.
- Modular Wiring concepts can provide a simple and accurate hoistway solution for “Standard” elevator installations, providing a fast and cost efficient solution in this very competitive sector.
- Total Packages which include pre-connectorized travelling cables, hoistway cables and accessories/electrical hardware (and even compensating cables, such as Whisper-Flex[®]) can be fabricated from standard insulation materials, or from Halogen-Free material, meeting the latest standards within a modern safety trend within a sympathetic building environment.

Pre-Connectorization (Figure 3) builds flexibility into the wiring assembly, providing a simple solution to meet any system or structural change on site. Pre-Connectorization Packages provide "accuracy" combined with "flexibility" to suit any installation requirement, from a simple wiring assembly, through to a complete "hoistway kit".

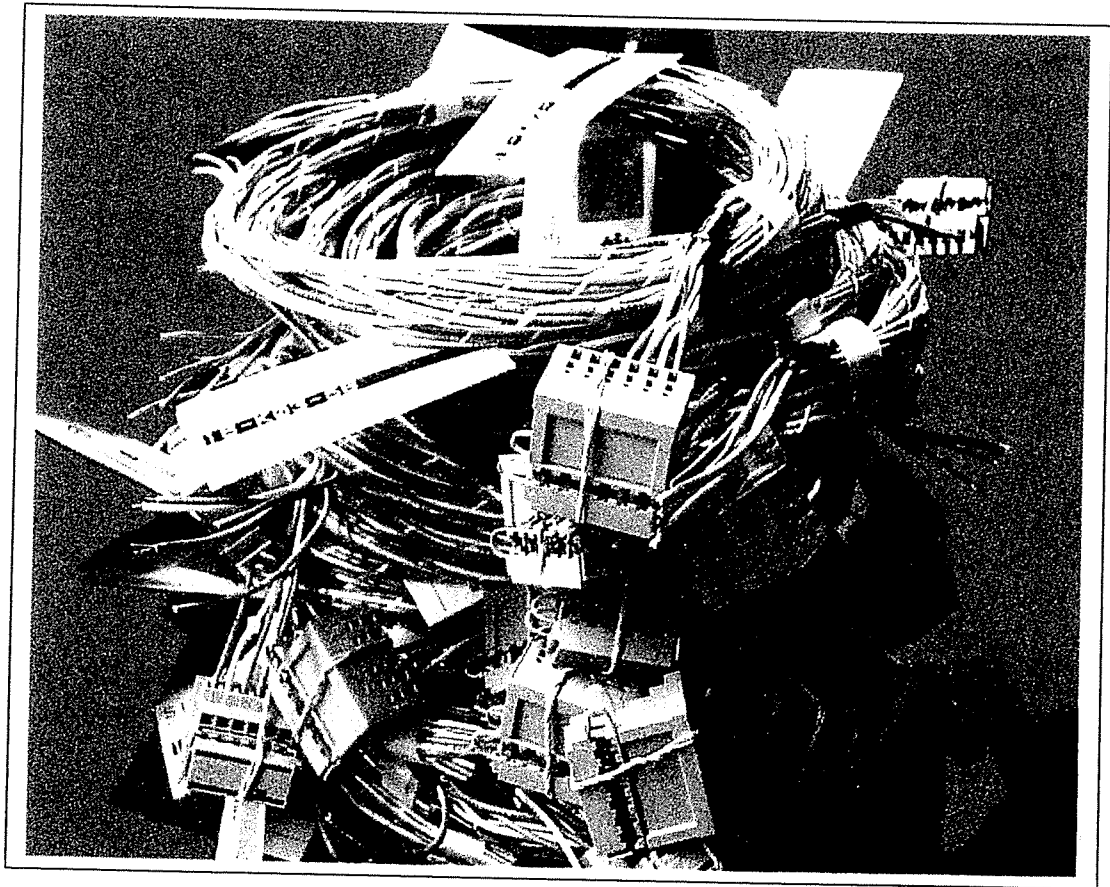


Figure 3. Examples of Super-Duct[®] Hoistway Cable Assemblies using WAGO connectors

Examples of hoistway wiring methods, materials and the "kitting" concept, are based on both the requirements of the project, and the philosophy of the elevator Manufacturer or Contractor. They can be as simple as a Hoistway WOJ cable or a Pre-Connected Travelling cable, through to a Modular "Package."

As the Chinese proverb says, "The First Step of any journey is the most important" so take a Step closer, and see for Yourself.

5. AUTOBIOGRAPHICAL NOTES

Geoff Brewer studied Electrical and Electronic Engineering to HCN level at Thurrock Technical College, Essex in the early 70's while working as an Electrical Technician, and later as an Industrial Electrical Contractor. After three years working with the Greater London Council as a Project Engineer, Brewer joined BICC in London, as a Sales Engineer, working in both the UK and the Middle East.

In 1991, after 12 years with BICC, Brewer joined Datwyler Cables, as Sales Manager Far-East, developing travelling cable sales within the Asian elevator markets, and establishing a Singapore office in 1993. In 1996, after three years in Singapore, Brewer joined Republic Wire & Cable - Siecor, as Sales Manager for Europe and the Middle East. RWC-Siecor was purchased by Draka USA in August 1999, and became Draka Elevator Products, Inc. Mr. Brewer brings to the elevator industry, over 20 years combined electrical and cable industry experience.