

**CEBUCABLES**

INTERNATIONAL

“Powering The Philippines’  
Mega Rail Transit Projects.”

# The Railway Transit Portfolio.

The Complete Cable Portfolio for MMSP & NSCR Infrastructure.

**Dual Standards.  
One Source.  
Total Railway  
Compliance.**

⚡ **Powered By:**  
CebuCables International

⚡ **In Exclusive Partnership With:**  
Bangkok Cable & Marmon Industrial Energy & Infrastructure

# Hi There!

To the **Procurement and Project Managers** of the Metro Manila Subway Project (MMSP) and the North-South Commuter Railway (NSCR) Extensions:

You are **building the backbone of the nation's future mobility**, and you cannot afford compromises in your electrical and mechanical systems. Whether you are outfitting deep underground tunnels, massive railway depots, or elevated commuter stations, your projects demand power cables that meet the strictest government and international standards for safety, durability, and efficiency.

As **a trusted local supplier**, we specialize in supplying heavy-duty, high-performance power cables specifically engineered for the **rigorous demands** of mass transit and heavy infrastructure.

We supply railway cables that are **compliant to local and international standards: PEC 2017, PNS 1207, ICEA S-93-639, ICEA S-121-733, ICEA S-66-524, ICEA S-95-658, UL 83, UL 44, NFPA 130, UL 2196, IEC 60502-1, IEC 60502-2, IEC 60840, IEC 62067, BS 6387, IEC 60331, IEC 60332, IEC 61034, IEC 60754, AS/NZS 5000.1, AS/NZS 5000.2, AS/NZS 1429.1, TIA 568-B, ITU-T G.652b/G.653a.**

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## SECTION 1: REGULATORY FRAMEWORK & ENGINEERING STANDARDS

All railway infrastructure and transit cables featured in this catalogue are supplied under an exclusive project-specific framework. **Cebu Cables** holds the **sole authorized distribution and supply rights** for both **Bangkok Cable** and **Marmon Industrial Energy & Infrastructure** for all contract packages falling within the scopes of the Metro Manila Subway Project (MMSP) and the North-South Commuter Railway (NSCR).


This strategic partnership ensures that prime contractors receive **100% direct manufacturer backing**.

This includes:


- ✓ **Dedicated** factory **production scheduling priority**.
- ✓ **Coordinated** technical submittal clearance.
- ✓ **Uncompromised quality** tracking from raw materials to final reel delivery.

Because Cebu Cables is the single, designated nexus for both manufacturing tracks on these alignments, **procurement teams can:**

- ✓ **Consolidate** their technical submittals.
- ✓ **Streamline** quality audits.
- ✓ **Secure legal factory warranties** through a **single local counterparty**.



“Together, let's power the Philippines' future railway with uncompromising standards and unwavering reliability.”



# YOUR OPTIONS



Dual Standards.  
One Source.  
Total Railway  
Compliance.

▶ **Track A (IEC / PNS Blueprint):**

Managed via our exclusive channel with **Bangkok Cable**, delivering advanced **Low Smoke Zero Halogen** (LSZH – IEC 60332-3; IEC 61034; IEC 60754) and **fire-survival lines** (IEC 60331 / BS 6387) custom-manufactured natively to **Philippine National Standard (PNS) metric sizing**. Every physical cable system ordered under this track is fully validated at **Bangkok Cable's ISO/IEC 17025 accredited in-house testing laboratory**, ensuring **100% routine and type-testing verification** across all ordered cables prior to site delivery.

▶ **Track B (NFPA / UL Blueprint):**

Managed via our exclusive channel with **Marmon IEI**, supplying elite North American **UL-listed** transit wiring (Firewall®, HUB-Link®, and VITALink® technologies) engineered for strict **NFPA 130 and NFPA 72** pathway survivability mandates.

## 1.2 Legal Mandate & Philippine Electrical Code (PEC) Realignment

- Our **complete product portfolio** establishes **full compliance** with the legal mandates of the **Philippine Electrical Code (PEC) Part 1** under **Republic Act No. 7920 (New Electrical Engineering Law)**. All electrical characteristics are aligned natively with the nominal Philippine utility system parameters:

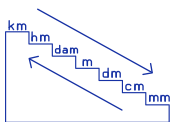
01



▶ **Electrical Frequency Compatibility:**

All AC power, control, and auxiliary cables are engineered to function optimally within the standard Philippine **60 Hz grid frequency**.

02



▶ **Metric System Standardisation:**

In strict compliance with PEC Chapter 1, all conductor cross-sectional areas are designated primarily in **square millimetres (mm<sup>2</sup>)**. Standard American Wire Gauge (AWG/kcmil) sizes are provided strictly as secondary reference values.

03







▶ **Environmental Mitigation Features:**

To withstand the specific geographical and micro-climatic challenges of the MMSP and NSCR alignments, all cables are enhanced with advanced chemical deterrents and specialized physical barriers to permanently repel subterranean **termites and rodents** native to the Philippines, alongside water-blocking matrices for tunnel submersion.

**“Engineered for the Philippines. Compliant by Code, Built for the Climate.”**

# 1.3 Dual-Track Cable Standards Cross-Reference Matrix

Rail Application System	Core Cable Parameter	Track A: IEC Solution (Bangkok Cable)	Track B: NFPA Solution (Marmon IEI)
 <b>Trackside Signaling &amp; Train Control</b>	Interlocking, track circuits, and axle counters	BCC Rail-Signaling Series (IEC 60332-3 Cat A Flame Retardant)	Marmon HUB-Link® Series (First known NFPA 130 compliant Axle Counter Line)
 <b>Emergency Ventilation &amp; Life Safety</b>	1 to 2-hour continuous operation under fire	BCC CU/MICA/LSZH Series (Compliant with IEC 60331 / BS 6387)	Marmon VITALink® MC-Metric (UL 2196 Listed 2-hour Circuit Integrity Cable)
 <b>Enclosed Cable Trays &amp; Raceways</b>	Flame spread prevention and low smoke toxicity	BCC XLPE/LSZH Power Line (Meets IEC 61034-2 / IEC 60754-2)	Marmon Firewall® LSZH (Listed Type TC-LS per UL 1277 & UL 1685)
 <b>Station Fiber Backbone</b>	Station-to-station communication links	BCC Armoured Outdoor FO (Multi-tube Steel Wire/Tape Armoured)	Marmon HUB-Link® FO (UL Listed Type OFNP Plenum Rated)

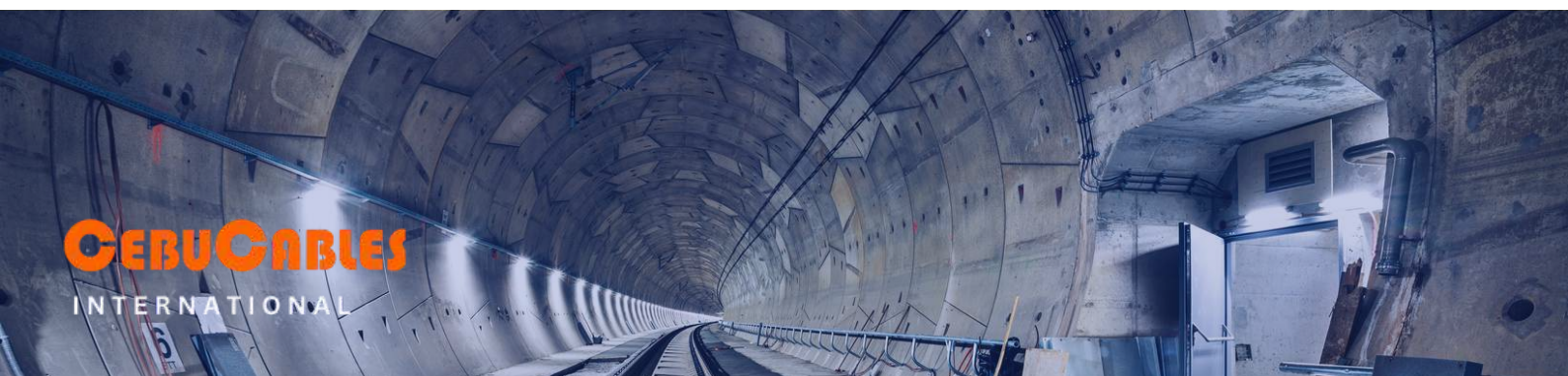


# SECTION 2: TRACK A: IEC / PNS CABLE PORTFOLIO (Powered by Bangkok Cable)

## 2.1 The PNS Manufacturing Integration Compliance

To eliminate the complex engineering tasks of derating or recalculating onshore cable geometries, **Cebu Cables** delivers true **Philippine National Standard (PNS)** conductor cross-sectional configurations across our **Bangkok Cable** IEC lines.

Rather than forcing project engineers to adapt to non-standard regional dimensions (such as 2.5 mm<sup>2</sup> or 4.0 mm<sup>2</sup>), our Track A portfolio provides drop-in compatibility with standard local circuit breakers and strict alignment with **Philippine Electrical Code (PEC)** ampacity tables using native PNS **2.0 mm<sup>2</sup> and 3.5 mm<sup>2</sup> layouts**. This guarantees cost effective cable solutions with seamless integration and removes the need for on-site material variances.





## 2.2 Low-Voltage Power & Auxiliary Control Cables (IEC 60502-1)

Designed for station lighting, facility utility feeds, and trackside aux equipment.

- ▶ **Specifications:** Extruded XLPE insulation, Low Smoke Zero Halogen (LSZH) inner bedding, available in both unarmoured and heavy-duty Galvanized Steel Wire Armoured (SWA) styles.
- ▶ **Voltage Class:** 600/1000V.
- ▶ **Sizing:** Native PNS Metric Sizing (2.0 mm<sup>2</sup> up to 50.0 mm<sup>2</sup> and above).



## 2.3 Medium-Voltage Traction Feeders (IEC 60502-2)

Engineered for connection loops from local substations to track feeders.

- ▶ **Specifications:** Circular stranded copper conductors, extruded semi-conducting conductor screen, EPR insulation, copper tape screen, and an anti-termite LSZH protective outer sheath.
- ▶ **Voltage Class:** 15kV to 35kV.





## 2.4 Signaling & Vital Control Cables (EN 50288)

Vital trackside signaling infrastructure links.

- ▶ **Specifications:** Multi-core or multi-pair twisted layouts with overall aluminum foil shielding and tinned copper braid options to prevent electromagnetic interference near track lines. Designed to meet severe vertical tray fire suppression tests under IEC 60332-3-22 Cat A.



## 2.5 Telecommunications Cables (IEC 60794)

Main station-to-station network data backbones.

- ▶ **Specifications:** Multi-tube loose buffer single mode optical fiber cable protected by corrugated steel tape armor and an outer water-blocked LSZH jacket to withstand permanent underground track trackside dampness.



# SECTION 3: TRACK B: NFPA / UL LISTED CABLE PORTFOLIO (Powered by Marmon IEI)

## 3.1 Signaling, Communication & Life Safety Pathways (NFPA 72 & NFPA 130)

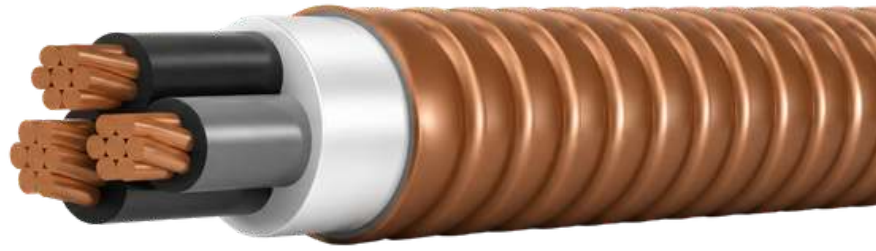


- ▶ **Marmon HUB-Link® Axle Counter Series:** Advanced, high-reliability signaling control links engineered specifically to meet **NFPA 130** mass transit trainway parameters.



- ▶ **Marmon HUB-Link® Optical Fiber (Type OFNP):** Optical Fiber Nonconductive Plenum rated cables designed to stop vertical fire tracking through indoor drop ceilings.





- ▶ **Marmon VITALink® Circuit Integrity Line:** High-survivability wiring systems listed to **UL 2196** for continuous **2-hour emergency pathway operations** during public evacuations.

## 3.2 Industrial Transit Tray Cables (UL1277 / UL 1685)



- ▶ **Marmon Firewall® LSZH Type TC-LS (Tray Cable - Low Smoke):** Multicore transit power and logic distribution wires routed through indoor cable trays. Certified with a **Low Smoke (ST-1)** modifier meeting the severe flame spread limits mandated under **UL 1685 tests**.

## 3.3 Building Wire & General Power (NFPA 70 / NEC Compliant)

- ▶ Type THHN / THWN-2 Thermoplastic Infrastructure Conductor Wires
- ▶ Type XHHW-2 / RHW-2 Thermoset Moisture-Resistant Wires [1, 2]



# SECTION 4: CIRCUIT INTEGRITY & SPECIAL SURVIVABILITY LINES

**Standard transit-grade cables** are designed to be fire-retardant and limit smoke emission to delay the spread of fire. **However, they are not engineered to survive direct fire exposure.**

For critical life-safety and emergency infrastructure within the underground tunnels of the Metro Manila Subway Project (MMSP) and the elevated structures of the North-South Commuter Railway (NSCR), **cables must maintain continuous functionality while directly engulfed in flames.**

This section features our **premier circuit-integrity cable systems**, powered by our exclusive partnerships with **Bangkok Cable** and **Marmon Industrial Energy & Infrastructure**. These high-value cable assemblies are specifically engineered to preserve the electrical pathway and data transmission networks of vital emergency equipment – such as tunnel jet fans, station deluge fire pumps, emergency path lighting, and public address evacuation systems – during a structural fire.

By delivering verified, dual-track survival configurations, **Cebu Cables** provides the **exact technical submittals** required to satisfy strict transit fire regulations, backed by **elite international fire laboratory certifications** and built-in protection against local subterranean pests.

# 4.1 Bangkok Cable – Fire Performance Line (IEC 60331 / BS 6387 CWZ)

(O) (O) (O) <-- 1. Class 2 Stranded Circular Copper Conductors  
 [=][=][=][=][=] <-- 2. High-Density Dual Layer Fire Barrier Mica Tape  
 ( ) ( ) <-- 3. Cross-Linked Polyethylene (XLPE) Core Insulation



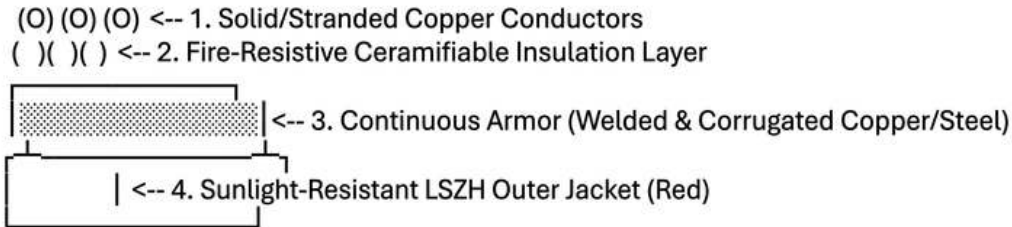
- ▶ **Core Design Standard:** IEC 60502-1 and IEC 60331-21 (90 mins at 750°C).
- ▶ **Fire Safety Ratings:** **BS 6387 Categories C, W, and Z** (Tested under direct flame at 950°C, direct flame with water spray, and mechanical shock integration).
- ▶ **The IEC Safety Triad:** Fully certified under **IEC 60332-3-22 Cat A** (Flame Retardant), **IEC 60754-2** (Zero Halogens / Non-Corrosive), and **IEC 61034-2** (Low Smoke Emissivity).

## Dimensional Data Grid (PNS Metric Sizing Track)

Part Number	Conductor Area (PNS mm <sup>2</sup> )	Standard AWG/kcmil Equiv.	Multi-Core Layout	Armor Wire Dia (mm)	Nominal O.D. (mm)	Approx. Net Weight (kg/km)	PEC Allowable Ampacity (90°C Wet/Dry)
BCC-FR-PNS-2.0	2.0	(14 AWG)	3C + Earth	1.25	17.1	510	25 A
BCC-FR-PNS-3.5	3.5	(12 AWG)	3C + Earth	1.25	18.2	580	30 A
BCC-FR-PNS-5.5	5.5	(10 AWG)	3C + Earth	1.25	20.4	710	40 A
BCC-FR-PNS-8.0	8.0	(8 AWG)	3C + Earth	1.60	23.9	1,020	55 A
BCC-FR-PNS-14.0	14.0	(6 AWG)	3C + Earth	1.60	26.8	1,410	75 A
BCC-FR-PNS-22.0	22.0	(4 AWG)	3C + Earth	1.60	29.1	1,810	95 A
BCC-FR-PNS-30.0	30.0	(2 AWG)	3C + Earth	1.60	31.9	2,190	115 A
BCC-FR-PNS-38.0	38.0	(1 AWG)	3C + Earth	2.00	35.4	2,950	130 A
BCC-FR-PNS-50.0	50.0	(1/0 AWG)	3C + Earth	2.00	38.2	3,640	150 A



## 4.2 Marmon IEI – VITALink® 2-Hour Fire-Resistive Line (UL 2196)



- ▶ **Core Transit Protection:** Meets full **NFPA 130** and **NFPA 72** Level 2 and Level 3 pathway survivability.
- ▶ **Circuit Integrity Certification:** **UL 2196** and **ASTM E119** (Certified 2-Hour Structural Fire Integrity with high pressure water hose stream validation).
- ▶ **Mechanical Armor Protection:** Outfitted with a continuous, gas-tight welded corrugated steel or copper outer armor ring to withstand severe track vibration profiles.

### Dimensional Data Grid

Part Number	Conductor Area (mm <sup>2</sup> )	AWG/kcmil Equiv.	Core Count	Nominal O.D. (mm)	Approx. Net Weight (kg/km)	Ampacity at 90°C Wet/Dry
VTL-MC-3.5	3.5	(12 AWG)	3C + G	17.5	490	30 A
VTL-MC-5.5	5.5	(10 AWG)	3C + G	19.8	610	40 A
VTL-MC-8.0	8.0	(8 AWG)	3C + G	23.4	880	55 A
VTL-MC-14.0	14.0	(6 AWG)	3C + G	27.1	1,290	75 A
VTL-MC-30.0	30.0	(2 AWG)	3C + G	33.2	2,150	120 A



# SECTION 5: TECHNICAL ANNEX, QUALITY ASSURANCE & FIRE TESTING

## 5.1 Advanced Laboratory Accreditations (ISO/IEC 17025)

Every product batch supplied and powered by **Cebu Cables** is verified by elite, **in-house technical testing laboratories**. Both **Bangkok Cable** and **Marmon Industrial Energy & Infrastructure (Marmon IEI)** operate advanced testing facilities accredited to **ISO/IEC 17025** – the international standard for laboratory technical competence and calibration accuracy.



- ▶ **Bangkok Cable Testing Capabilities:** Bangkok Cable leads Southeast Asia's transit sector with premier testing infrastructure. Their facilities are certified under **TIS 17025 (ISO/IEC 17025)** by the **Ministry of Industry's Thai Industrial Standards Institute:**

- ▶ **FIRST-EVER CERTIFIED FIRE LAB:**

Established in 2000, this was Thailand's **first specialized cables-under-fire testing laboratory accredited with ISO/IEC 17025.** It performs precise real-time analyses of flame retardancy, zero-halogen toxic gas limits, and smoke density levels.

- ▶ **EXTRA-HIGH VOLTAGE (EHV) LABORATORY:**

One of only two facilities nationwide capable of simulating electrical loads up to **700 kV** and handling currents up to **6,000 A.** This lab tests infrastructure cables **up to 230 kV** to ensure absolute engineering safety for rail mega-projects.



- ▶ **Marmon IEI Laboratory Qualifications:** Cables from Marmon IEI's transit lines (including Firewall®, HUB-Link®, and VITALink®) are validated by **top-tier North American lab networks:**

- ▶ **A2LA ISO/IEC 17025 ACCREDITATION:**

Marmon Electrical's specialized transit laboratories are fully accredited by the **American Association for Laboratory Accreditation (A2LA)** to International Standard **ISO/IEC 17025:2017**.

- ▶ **NIST-TRACEABLE THERMAL LABS:**

Their automated calibration laboratories are directly calibrated by and traceable to the **National Institute of Standards and Technology (NIST)**. This ensures precision matching for critical signal, fire alert, and pathway data networks.



# 5.2 Advanced Fire Testing

## ▶ Bangkok Cables Under Fire Conditions Laboratory

Bangkok Cables Under Fire Conditions Testing Laboratory was established in 2000 and became the first laboratory in Thailand **accredited** for **cable fire testing under ISO/IEC 17025**, in January 2006.

Bangkok Cables conducts all tests with skilled, competent personnel and advanced testing equipment, ensuring **full compliance with international standards and alignment with customer requirements.**

### SCOPE OF TESTING



**FLAME PROPOGATION TEST (IEC 60332-2)**



**SMOKE DENSITY TEST (IEC 61034)**



**ACIDITY & CONDUCTIVITY TEST (IEC 60754-2)**



**HALOGEN ACID GAS CONTENT TEST (IEC 60754-1)**

### FIRE RESISTANCE TEST (BS 6387)



**RESISTANCE TO FIRE ALONE TEST (CATEGORY C)**



**RESISTANCE TO FIRE WITH WATER TEST (CATEGORY W)**



**RESISTANCE TO FIRE WITH MECHANICAL SHOCK TEST (CATEGORY Z)**





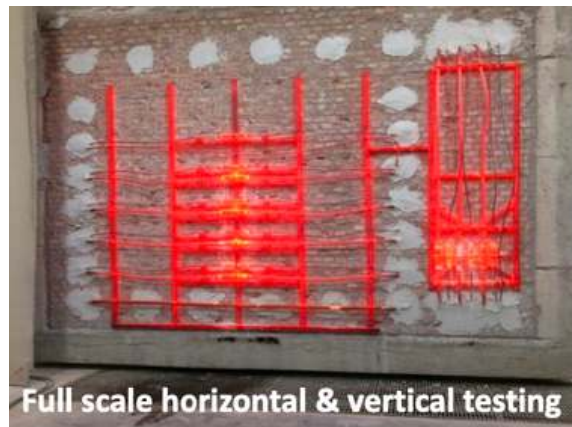
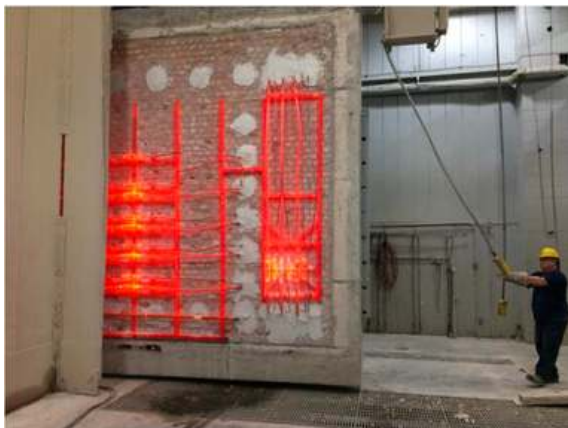
## ▶ Marmon Industrial Energy & Infrastructure Advanced Fire Testing

Marmon IEI Flame and Fire Testing includes:

- Flame Propagation Test (IEC 60332-1)
- Smoke Emission Test (IEC 61034)
- Halogen Content Test (IEC 60754-1)
- Fire Resistance Test (UL 2196)

**The Marmon IEI Fire Testing Advantage: Full-scale UL 2196 testing.** Most of the world tests fire-resistant cables using small-scale "bench top" flame tests (IEC 60331, BS 6387) that are 40–53 years old and test individual cable samples on a lab bench. Marmon IEI's VITALink® cables, however, are tested and listed to **UL 2196**, the **toughest standard**, rated "Good" performance across every category, and designed and tested for **both vertical and horizontal installation** (many standards only test horizontal). It is also verified to meet BS 6387 CWZ and IEC 60331.

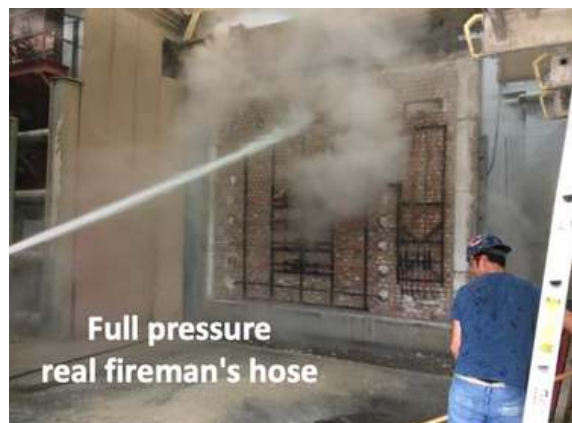
### AMERICAN FULL SCALE UL 2196 CABLE FIRE TESTS



Full scale horizontal & vertical testing



No failures allowed.  
All sizes big to small  
must pass



Full pressure  
real fireman's hose

# MARMON IEI CERTIFICATES

## Confirmation Letter

**UL Solutions Customer**

Marmon Wire & Cable Inc  
20 BRADLEY PARK RD  
EAST GRANBY, CT 06026 United States

**File Number**

R15365

**Category**

Fire-resistive Cable | FHUR

**UL Solutions Customer**

Marmon Wire & Cable Inc  
20 BRADLEY PARK RD  
EAST GRANBY, CT 06026 United States

**File Number**

R15365

**Category**

Fire-resistive Cable | FHUR

June 17, 2026

As of the above date, UL Solutions confirms that Marmon Wire & Cable Inc is the party associated with UL Solutions file number R15365 that appears in the UL Product IQ platform. Public information contained in UL Solutions file number R15365 can be viewed using the following link:

<https://iq.ulprospector.com/en/document?e=9605196>

Additional information regarding the intended use, limitations and further guidance on the use of the certified products in UL File # R15365 can be viewed using the following link:

<https://iq.ulprospector.com/en/document?e=207684>

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The manufacturer's products are not covered under UL Solutions' Surveillance Program unless they bear the authorized UL Mark. Therefore, only those products bearing the appropriate authorized UL Mark or UL Recognized Component Mark, the authorized company name, trademark, trademark and product designation shall be considered as being covered by the UL Solutions' Listing, Classification, or Recognition Service.

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Any information and documentation involving UL Mark services are provided on behalf of UL LLC (UL) or any authorized licensee of UL. For questions, please contact UL Customer Service at [help.ul.com@ul.com](mailto:help.ul.com@ul.com)

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## Confirmation Letter

**UL Solutions Customer**

Marmon Wire & Cable Inc  
20 BRADLEY PARK RD  
EAST GRANBY, CT 06026 United States

**File Number**

E31697

**Category**

Thermoset-insulated Wire | ZKST

**UL Solutions Customer**

Marmon Wire & Cable Inc  
20 BRADLEY PARK RD  
EAST GRANBY, CT 06026 United States

**File Number**

E31697

**Category**

Thermoset-insulated Wire | ZKST

June 18, 2026

As of the above date, UL Solutions confirms that Marmon Wire & Cable Inc is the party associated with UL Solutions file number E31697 that appears in the UL Product IQ platform. Public information contained in UL Solutions file number E31697 can be viewed using the following link:

<https://iq.ulprospector.com/en/document?e=7079578>

Additional information regarding the intended use, limitations and further guidance on the use of the certified products in UL File # E31697 can be viewed using the following link:

<https://iq.ulprospector.com/en/document?e=212665>

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## Confirmation Letter

**UL Solutions Customer**

Marmon Wire & Cable Inc  
20 BRADLEY PARK RD  
EAST GRANBY, CT 06026 United States

**File Number**

R15365

**Category**

Fire-resistive Cable | FHUR

**UL Solutions Customer**

Marmon Wire & Cable Inc  
20 BRADLEY PARK RD  
EAST GRANBY, CT 06026 United States

**File Number**

R15365

**Category**

Fire-resistive Cable | FHUR

### Fire-resistive Cable

**COMPANY**

**Marmon Wire & Cable Inc**  
20 BRADLEY PARK RD  
EAST GRANBY, CT 06026 United States

**R15365**

No. of Conductors or No. of Conductors x No. of Grounds	AWG/kcmil Size
VITALink Type MC (copper clad) with or without polymeric jacket or Type MC-HL (copper clad hazardous locations) with polymeric jacket for use in System No. <a href="#">FHIT_120</a> , FRR 2h, Maximum 600 VAC (line-to-line) when installed in accordance with manufacturer's installation instructions IM-120-0 and IM-120-1 dated Feb 2021; <a href="#">FHIT_120A</a> , FRR 2h, Maximum 480 VAC (line-to-line) when installed in accordance with manufacturer's installation instructions IM-120-2 dated Feb 2021; <a href="#">FHIT_60</a> , FRR 1h, Maximum 600 VAC (line-to-line) when installed in accordance with manufacturer's installation instructions IM-60-3 dated Feb 2021, <a href="#">FHIT_60A</a> , FRR 1h, Maximum 480A VAC (line-to-line) when installed in accordance with manufacturer's installation instructions IM-60-1 dated Feb 2021 and IM-60-2 dated Feb 2021.	
12	14, 12, 10
10	14, 12, 10
9	14, 12, 10
8	14, 12, 10, 8

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7	14, 12, 10, 8, 6
6	14, 12, 10, 8, 6, 4
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2	14, 12, 10, 8, 6
1	1/0, 2/0, 3/0, 4/0, 250, 350, 400, 500, 600, 750
3 x 3	8 x 14
3 x 3	6, 4 x 12
3 x 3	3, 2, 1, 1/0, 2/0 x 10
3 x 3	3/0, 4/0, 250 x 8
3 x 3	350, 500, 600 x 6
4 x 4	8, 6, 4 x 14
4 x 4	3, 2, 1, 1/0, 2/0 x 12
4 x 4	3/0, 4/0, 250 x 10
4 x 4	350, 500 x 8

Ceramic Block Splice between VITALink Type MC (copper clad) with or without polymeric jacket and VITALink 300 Type RHW-2-ST1 for use in System No. [FHIT\\_130H](#), FRR 1h, Maximum 480 VAC (line-to-line) when installed in accordance with manufacturer's installation instructions IM-130-3 dated January 2023.

1 thru 5 12 thru 2

**VITALink 300 Type RHW-2-ST1 for use in System No. [FHIT\\_130](#), FRR 1h, Maximum 480 VAC (line-to-line) when installed in accordance with manufacturer's installation instructions IM-130-0 dated April 2022, IM-130-1 dated Aug 2020, and IM-130-2 dated April 2022.**

**1** **12, 10, 8, 6, 4, 3, 2, 1, 1/0, 2/0, 3/0, 4/0, 250, 300, 350, 400, 500**

VITALink 502 Type RHW-2-ST1 for use in System No. [FHIT\\_502](#), FRR 2h, Maximum 480 VAC (line-to-line) when installed in accordance with manufacturer's installation instructions IM-502-0 dated January 2023.

5	12, 10, 8, 6, 4, 3, 2, 1, 1/0, 2/0, 3/0, 4/0
4	250, 300, 350, 400, 500

Any information and documentation involving UL Mark services are provided on behalf of UL LLC (UL) or any authorized licensee of UL. For questions, please contact UL Customer Service at [help.ul.com@ul.com](mailto:help.ul.com@ul.com)

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## 5.3 Factory Acceptance Testing (FAT) Protocol

To guarantee the structural integrity and electrical performance of all cable assets supplied to the MMSP and NSCR, all shipments undergo **strict Factory Acceptance Testing (FAT) prior to dispatch**. Client representatives and project management consultants are invited to witness testing directly at our partners' designated manufacturing facilities:

- ▶ **Bangkok Cable Venue:** Testing is conducted directly at **Bangkok Cable's core manufacturing plants in Samut Prakan and Chachoengsao, Thailand**. All testing procedures follow **IEC 60502-1 / IEC 60502-2** benchmarks. General contractors are provided with certified factory test data covering Conductor Resistance Tests (per **IEC 60228**), High-Voltage Insulation Breakout tests, and Insulation Resistance Measurement at maximum operating temperatures, fully validated at their in-house TIS 17025 certified laboratory.
- ▶ **Marmon IEI Venue:** Testing is conducted at **Marmon Industrial Energy & Infrastructure's advanced production and testing facility in East Granby, Connecticut, USA**. All testing procedures are audited in compliance with North American **UL standards** and **NFPA 130** protocols, covering Physical Dimension Audits, continuous inline Spark Testing to eliminate microscopic voids in the jacket, and **UL 2196** Batch tracking verification.



## 5.4 Site Delivery, Storage, & Reel Handling



- ▶ **Vertical Orientation Only:** Cable reels must always be transported, stored, and moved standing upright on both flanges. Reels must **never** be laid flat on their side (coiled configuration), as this can cause the cable layers to shift and lock.
- ▶ **Sealed Cable Ends:** Cable ends are completely sealed at the factory using heavy-duty, adhesive-lined heat shrink caps to prevent moisture ingress. If a cable is cut on-site, the exposed end must be **immediately resealed** with a new watertight cap to prevent moisture ingress within underground subway environments.
- ▶ **Minimum Bending Radius:** Engineers must observe the minimum bending radius specified during unspooling:
  - Bangkok Cable SWA Series: 12x to 15x the overall cable outer diameter (O.D.).
  - Marmon IEI VITALink® MC Series: 12x the overall cable outer diameter (O.D.).



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For tender document submittals, Request for Quotations (RFQs), or to schedule a Technical "Lunch & Learn" presentation for your engineering team, contact us at:

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