CebuCables
INTERNATIONAL

"Bridging IEC and NFPA Standards for Philippine Rail"

The Railway Transit Portfolio.

The Complete Cable Portfolio for MMSP & NSCR Infrastruture.

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

⚡ **Powered By:**
CebuCables International

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

CEBUCABLES INTERNATIONAL

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.

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

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

YOUR OPTIONS

- **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

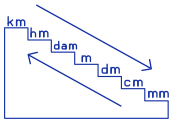
- Our **complete product portfolio** establishes **full compliance** with the legal mandates of the **Philippine Electrical Code (PEC) Part 1** under **Republic Act No. 7920 (New Electrical Engineering Law)**. All electrical characteristics are aligned natively with the nominal Philippine utility system 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 (mm2)**. 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)
	Trackside Signaling & Train Control	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)
	Emergency Ventilation & Life Safety	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)
	Enclosed Cable Trays & Raceways	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)
	Station Fiber Backbone	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)

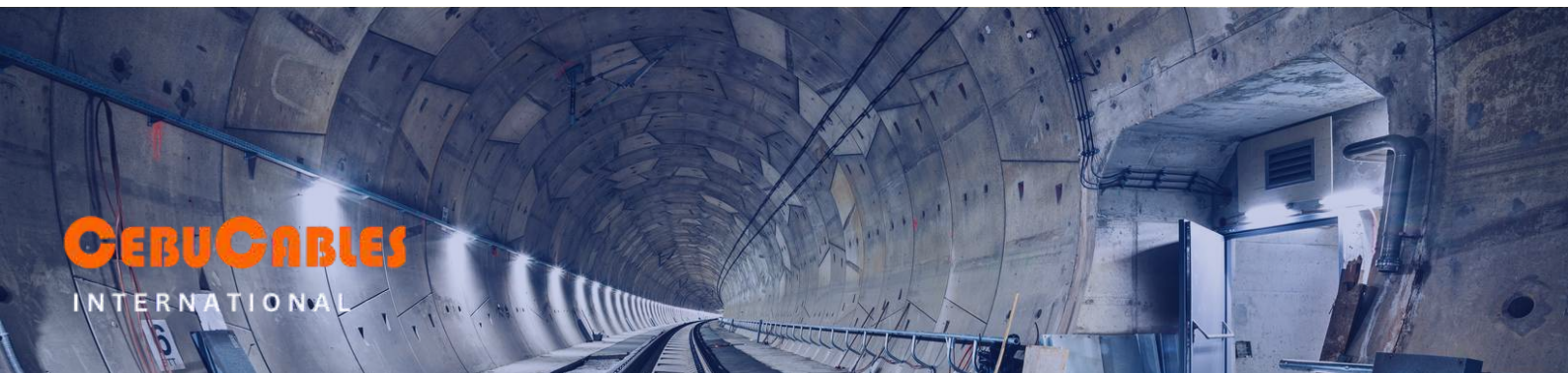
SECTION 2:

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 mm2 or 4.0 mm2), 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 mm2 and 3.5 mm2 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

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. Performance characteristics align with ICEA S-95-658 (NEMA WC 70) and UL-44 for power cables rated 2000 Volts or less.
- **Core Standards:** PNS 1207, IEC 60502-1, IEC 60332-3, IEC 61034, IEC 60754,
- **Conductor & Sizing:** Class 2 Stranded Annealed Copper, Native Metric Sizing (2.0 mm2 up to 50.0 mm2 and above) cross-referenced PNS 1207 parameters for grounding configurations.
- **Temperature Rating:** Up to 90°C in normal operation
- **Voltage Class:** 600/1000V

2.3 Medium-Voltage for Traction Sub-station (TSS) and Station Sub-station (SSS)

Engineered for open-air and substation connection loops from local traction substations to track feeders.

- **Specifications:** Circular stranded copper conductors, extruded semi-conducting conductor screen, EPR insulation or cross-linked polyethylene (XLPE) insulation, copper tape screen or copper wire screen, and an anti-termite, UV-resistant LSZH protective outer sheath.
- **Core Standards:** ICEA S-93-639, PNS 1207, iEC 60502-2, IEC 60332-3, IEC 61034, IEC 60754, ICEA S-93-639, PNS 1207
- **Conductor & Sizing:** Class 2 stranded annealed copper, native metric sizing (38 mm2 up to 800 mm2) cross-referenced to PNS 1207parameters for grounding configurations.
- **Temperature Rating:** Up to 90°C in normal operation, 105°C for emergency overloads, and 250°C during short-circuit conditions.
- **Voltage Class:** 34.5kV

2.4 High-Voltage for Bulk Supply Sub-station (BSS)

High-voltage 69kV up to 115kV underground cables designed for heavy-duty, high demand power transmission, engineered to withstand extreme conditions, featuring high-purity copper conductors and robust water-blocking tape and are widely used in metropolitan and utility infrastructure grids, vital for connecting major substations and mass transit systems.

- **Specifications:** Compact circular stranded plain aluminum wire/copper, water blocking layer and radial water barrier, cross-linked polyethylene (XLPE), metallic copper wire screens and swelling tapes for moisture protection, Low Smoke Zero Halogen (LSZH) outer sheath.
- **Core Standards:** IEC 60840, IEC 60228 Class 2, IEC 60332-3, IEC 61034, IEC 60754
- **Temperature Rating:** Up to 90°C in normal operation, 105°C for emergency overloads, and 250°C during short-circuit conditions.
- **Voltage Rating:** 69kV up to 115kV

2.5 Signaling & Vital Control Cables

Vital trackside signaling infrastructure links for track circuits, wayside cabinets, and axle counters.

- **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 with Low Smoke Zero Halogen (LSZH) jacket. Designed to meet the vertical tray fire test requirements of **IEC 60332-3-24 (Cat C)** and the more stringent **IEC 60332-3-22 (Cat A)** for densely packed cables installed in cable trays, ensuring maximum fire protection.
- **Core Standards:** IEC 60332-3-24 (Cat C), IEC 60332-3-22 (Cat A), IEC 60331, IEC 60332, IEC 61034, IEC 60754, PNS 1207
- **Conductor & Sizing:** Metric multi-core architecture (1.5 mm2 to 10 mm2) available from 2-core up to 50-core. Color-coded or numbered options.

2.6 Telecommunications Cables

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.
- **Core Standards:** IEC 60794, IEC 60332, IEC 61034, IEC 60754

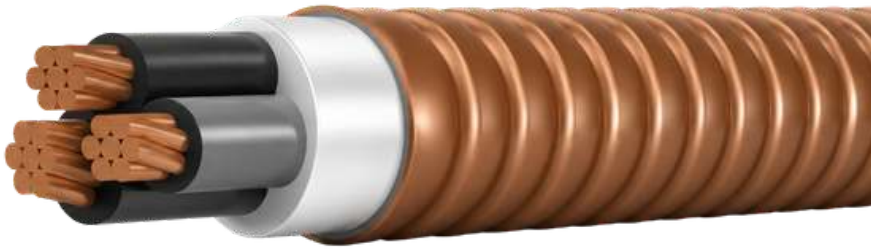
SECTION 3:

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

3.1 Signaling, Communication & Life Safety Pathways

Critical mass notification, telecommunications backbones, and wayside signaling cabinets in enclosed structures.

- **Marmon Firewall® Product Line (Low-Smoke Zero-Halogen Infrastructure):** High-performance, Low-Smoke Zero-Halogen (LSZH) infrastructure cables engineered for underground trainways and enclosed passenger stations to minimize smoke toxicity and visibility hazards in strict compliance with NFPA 130.
- **Marmon HUB-Link® Product Line (Signaling & Communications):** Rugged transit communication, mass notification, and wayside signaling cables built to maintain network and data path survivability across rail corridors under NFPA 72 and NFPA 130 criteria.
- **Core Standards:** NFPA 72, NFPA 130



- **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

General power and control cables specifically engineered with Low-Smoke Zero-Halogen jackets. In the event of a fire, they produce minimal smoke and zero toxic halogen gases, meeting both PEC safety rules and local PNS environmental safety regulations.

- **Marmon FIREWALL® LSZH Type TC-LS:** Specialized Tray Cable certified with a Low Smoke (-ST1) modifier. The FIREWALL® series is thermoset-insulated for long-term thermal stability, passing severe lame spread and smoke limiting rules mandated under UL 1685 (FT4 Method), IEEE 1202 FT4, and nuclear-grade IEEE 383 tray test procedures.
- **Core Standards:** UL 1277, UL 1685

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.

4.1 Bangkok Cable – Fire Performance Line

Bangkok Cable's railway fire safety ratings are governed by a multi-tiered framework of international standards configured specifically to satisfy the safety mandates of Philippine Railway projects (complying with the PEC and PNS).

- **Specifications:** Class 2 Stranded Circular Copper Conductors, High-Density Dual Layer Fire Barrier Mica Tape, Cross-Linked Polyethylene (XLPE) Core Insulation, Extruded LSZH Bedding + Galvanized Steel Wire Armor, Anti-Termite Flame Retardant LSZH Outer Sheath (Orange)
- **Core Standards:** IEC 60502-1, IEC 60331-1 & IEC 60331-2 (90 to 120 mins at 750°C to 800°C), BS 6387 CWZ
- **Fire Safety Ratings:** BS 6387 Categories C, W, and Z (Tested under direct flame at 950°C for 3 continuous hours, direct flame at 650°C 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 mm²)	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

Marmon IEI's VITALink® series complies with PEC Article 1.4 (Emergency Systems), which mandates a 2-hour fire-rated circuit integrity cables for critical life-safety systems (such as tunnel ventilation fans, emergency lighting, and evacuation public address systems) to ensure power stays on even during an active structural fire.

- **Specifications:** Solid/Stranded Copper Conductors, Fire-Resistive Ceramifiable Insulation Layer, Continuous Armor (Welded & Corrugated Copper/Steel), Sunlight-Resistant LSZH Outer Jacket (Red)
- **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 (mm²)	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

4.3 Critical Equipment Circuit Integrity Selection Matrix

By dividing our high-survivability solutions into **IEC Framework** and **NFPA Framework Cebu Cables** resolves the conflicting engineering demands found across separate contract packages of MMSP and NSCR. Whether your framework requires compliance with IEC or NFPA, our pre-vetted, **PEC 2017** and **PHILIPPINE ELECTRICAL CODE - 2014** compliant portfolio provides the correct, factory-backed solution under one seamless local contract.

Vital Infrastructure Sub-System	Primary Emergency Function	IEC Framework	NFPA Framework	Core Search Standards Matched
Tunnel Jet Fans & Smoke Extraction	Clears toxic smoke from underground /MMSP subway chambers during a fire.	BCC CU/MICA/SWA Series (IEC 60331-21 / BS 6387)	Marmon VITALink® MC Metric (UL 2196 Listed 2-Hour Cable)	UL 2196, NFPA 130, NFPA 502
Station Deluge & Fire Pumps	Powers high-pressure water systems to suppress structural station fires.	BCC Armoured Fire Series (BS 6387 Cat W/ Water Test)	Marmon VITALink® MC-Metric (UL 2196 High-Pressure Hose Blast)	UL 2196, UL 2556, NFPA 70
Emergency Evacuation Lighting	Illuminates escape routes along elevated NSCR viaducts and MMSP walkways.	BCC CU/MICA/LSZH Series (PNS Metric Sizing 2.0/3.5 mm)	Marmon VITALink®-300 Series (1-Hour Fire Rated Option)	NFPA 130, UL 44, PNS 1207
Tunnel Public Address & Mass Notification	Broadcasts critical voice instructions to passengers fleeing enclosed rail sectors.	BCC Shielded Signaling Series (IEC 60332-3-22 Cat A)	Marmon HUB-Link® / VITALink® (NFPA 72 Level 3 Integrity)	NFPA 72, IEEE 1202 FT4, UL 1685

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.

ISO 17025 CERTIFIED

- **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 (CATEGORRY C)

RESISTANCE TO FIRE WITH WATER TEST (CATEGORY W)

RESISTANCE TO FIRE WITH MECHANICAL SHOCK TEST (CATEGORY Z)

THAILAND
NSC-TISI-TIS 17025
TESTING 0164

BANGKOK CABLE CO., LTD.

BCC BANGKOK CABLES CERTIFICATES

ZERTIFIKAT ◆ CERTIFICATE ◆ 認證證書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

CERTIFICATE
No. B 081496 0020 Rev. 00

Holder of Certificate: Bangkok Cable Co., Ltd.
93 Moo 11 Suksawat Rd.
Nai Khlong Bang Pla Kot, Phra Samut Chedi
Samut Prakan 10290
THAILAND

Certification Mark:

Product: Flame retardant cables

The product was tested on a voluntary basis and complies with the essential requirements. The certification mark shown above can be affixed on the product. It is not permitted to alter the certification mark in any way. In addition, the certification holder must not transfer the certificate to third parties. This certificate is valid until the listed date, unless it is cancelled earlier. All applicable requirements of the testing and certification regulations of TÜV SÜD Group have to be complied. For details see: www.tuvsud.com/ps-cert

Test report no.: 7191248706-EEC20/09-TR

Valid until: 2026-02-23

Date, 2021-02-25

(WEI LIANG TAN)

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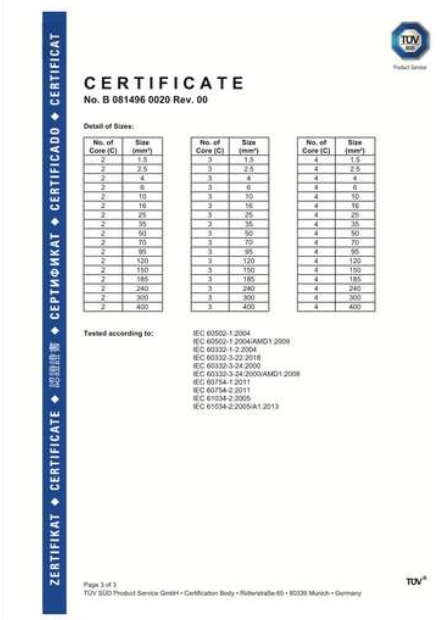

ZERTIFIKAT ◆ CERTIFICATE ◆ 認證證書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

CERTIFICATE
No. B 081496 0020 Rev. 00

Detail of Sizes:

No. of Core (C)	Size (mm²)
2	1.5
2	2.5
2	4
2	6
2	10
2	16
2	25
2	35
2	50
2	70
2	95
2	120
2	150
2	185
2	240
2	300
2	400

No. of Core (C)	Size (mm²)
3	1.5
3	2.5
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3	10
3	16
3	25
3	35
3	50
3	70
3	95
3	120
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3	185
3	240
3	300
3	400

No. of Core (C)	Size (mm²)
4	1.5
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4	6
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4	16
4	25
4	35
4	50
4	70
4	95
4	120
4	150
4	185
4	240
4	300
4	400

Tested according to:
IEC 60502-1:2004
IEC 60502-1:2004/AMD1:2009
IEC 60332-1-2:2004
IEC 60332-3-22:2018
IEC 60332-3-24:2000
IEC 60332-3-24:2000/AMD1:2008
IEC 60754-1:2011
IEC 60754-2:2011
IEC 61034-2:2005
IEC 61034-2:2005/A1:2013

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ZERTIFIKAT ◆ CERTIFICATE ◆ 認證證書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

CERTIFICATE
No. B 081496 0020 Rev. 00

Model(s): XLPE/LSHF

Brand Name: BANGKOK CABLE

Parameters:
Type : CU/XLPE/LSHF Cable
Size : 2C x 1.5 mm² to 4C x 400 mm²
Voltage : 0.6/1 kV
Conductor : Stranded circular plain copper wires (class 2)
Insulation : XLPE
Filler : FR-PP yarn (2C x 1.5 mm²)
: LSHF rod and FR-PP yarn (4C x 400 mm²)
Binder : Polyester tape
Oversheath : LSHF

Test report number(s)	Test Standard(s)
7191082418-EEC14/09-01	IEC 60502-1:2004/AMD1:2009
7191082418-EEC14/09-02	IEC 60332-1-2:2004 IEC 60332-3-24:2000/AMD1:2008 IEC 61034-2:2005/AMD1:2013
7191082418-EEC14/10	IEC 60502-1:2004/AMD1:2009
7191082418-EEC14/11	IEC 60502-1:2004/AMD1:2009
7191082418-EEC14/12-01	IEC 60502-1:2004/AMD1:2009
7191082418-EEC14/12-02	IEC 60332-1-2:2004 IEC 60332-3-24:2000/AMD1:2008 IEC 60754-1:2011 IEC 60754-2:2011 IEC 61034-2:2005/AMD1:2013
7191248706-EEC20/01	IEC 60332-3-22:2018
7191248706-EEC20/02	IEC 60332-3-22:2018

Page 2 of 3
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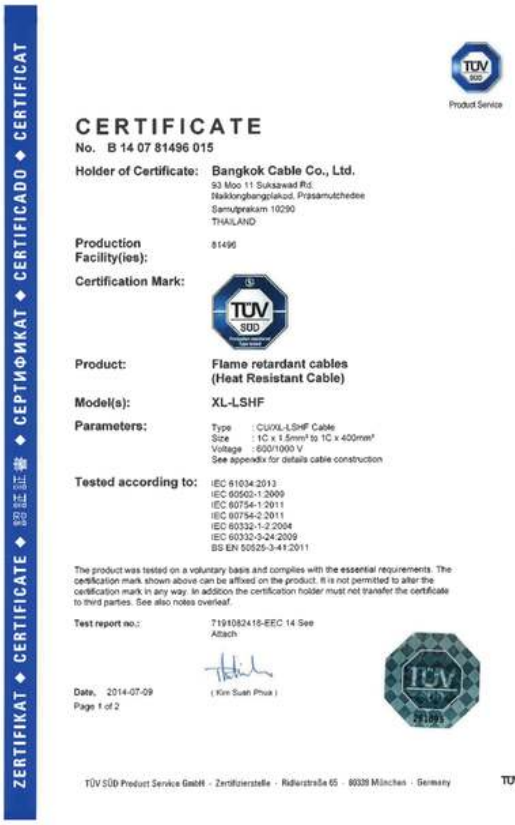

ZERTIFIKAT ◆ CERTIFICATE ◆ 認證證書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

Product Service

CERTIFICATE
No. B 14 07 81496 015

Holder of Certificate: Bangkok Cable Co., Ltd.
93 Moo 11 Suksawad Rd.
Nakklongbangplakod, Prasamutchedee
Samutprakarn 10290
THAILAND

Production Facility(ies): 81496

Certification Mark:

Product: Flame retardant cables
(Heat Resistant Cable)

Model(s): XL-LSHF

Parameters:
Type : CU/XL-LSHF Cable
Size : 1C x 1.5mm² to 1C x 400mm²
Voltage : 600/1000 V
See appendix for details cable construction

Tested according to:
IEC 61034:2013
IEC 60502-1:2009
IEC 60754-1:2011
IEC 60754-2:2011
IEC 60332-1-2:2004
IEC 60332-3-24:2009
BS EN 50525-3-41:2011

The product was tested on a voluntary basis and complies with the essential requirements. The certification mark shown above can be affixed on the product. It is not permitted to alter the certification mark in any way. In addition the certification holder must not transfer the certificate to third parties. See also notes overleaf.

Test report no.: 7191082418-EEC 14 See Attach

Date, 2014-07-09
Page 1 of 2

(Kim Suah Phua)

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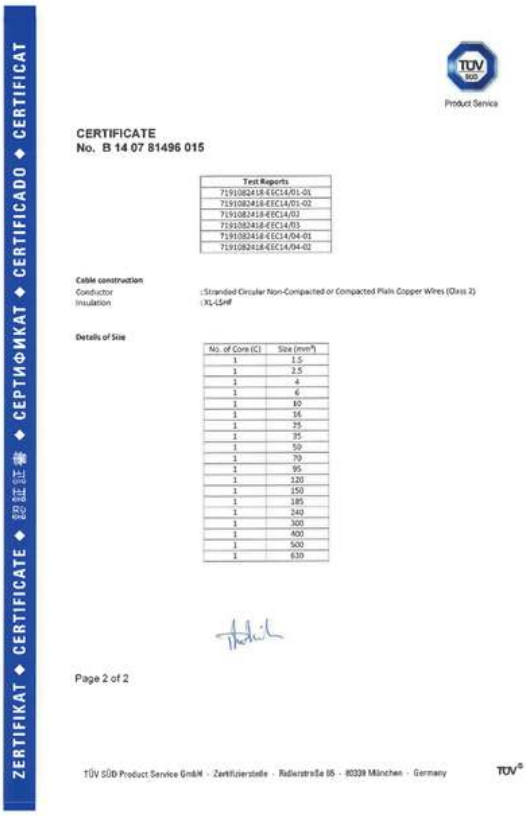

ZERTIFIKAT ◆ CERTIFICATE ◆ 認證證書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

Product Service

CERTIFICATE
No. B 14 07 81496 015

Test Reports
7191082418-EEC14/01-01
7191082418-EEC14/01-02
7191082418-EEC14/03
7191082418-EEC14/04-01
7191082418-EEC14/04-02

Cable construction
Conductor : Stranded Circular Non-Compacted or Compacted Plain Copper Wires (Class 2)
Insulation : XL-LSHF

Details of Size

No. of Core (C)	Size (mm²)
1	1.5
1	2.5
1	4
1	6
1	10
1	16
1	25
1	35
1	50
1	70
1	95
1	120
1	150
1	185
1	240
1	300
1	400
1	500
1	630

Page 2 of 2

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CEBU CABLES
INTERNATIONAL

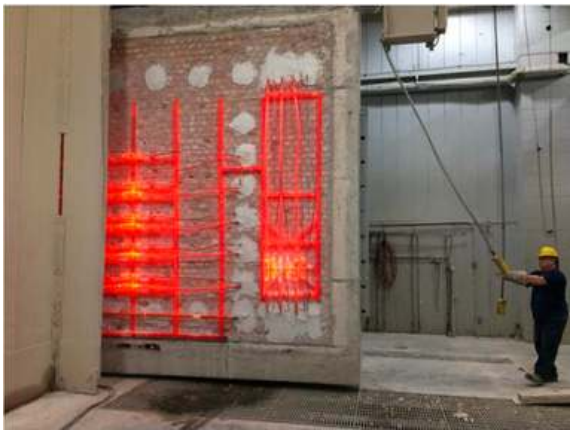
Marmon Industrial Energy & Infrustructure Advanced Fire Testing

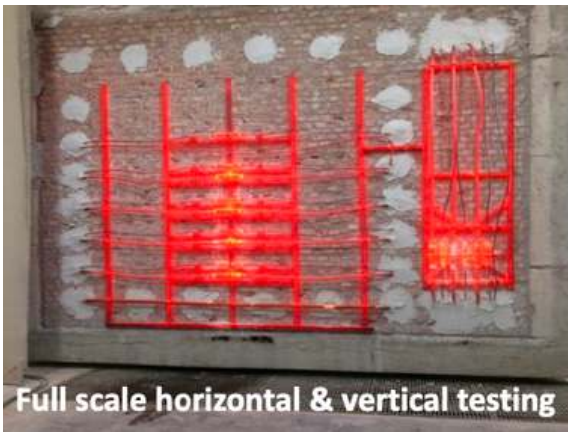
Marmom IEI Flame and Fire Testing includes:

- 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





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 | FHJR

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

The appearance of a company's name or a specific product/component designation in the UL Product iQ platform does not in itself mean that the product or component so specified or identified is subject to the UL Solutions' Surveillance Program.

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, tradename, trademark and product designation shall be considered as being covered by the UL Solutions' Listing, Classification, or Recognition Service.

If you have questions regarding this letter, please contact the UL Solutions customer care team at https://www.ul.com/contact-us.

UL Solutions

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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

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

The appearance of a company's name or a specific product/component designation in the UL Product iQ platform does not in itself mean that the product or component so specified or identified is subject to the UL Solutions' Surveillance Program.

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, tradename, trademark and product designation shall be considered as being covered by the UL Solutions' Listing, Classification, or Recognition Service.

If you have questions regarding this letter, please contact the UL Solutions customer care team at https://www.ul.com/contact-us.

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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 | FHJR

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. FHIT.120, 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; FHIT.120A, FRR 2h, Maximum 480 VAC (line-to-line) when installed in accordance with manufacturer's installation instructions IM-120-2 dated Feb 2021; FHIT.60, FRR 1h, Maximum 600 VAC (line-to-line) when installed in accordance with manufacturer's installation instructions IM-60-3 dated Feb 2021. FHIT.60A, 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
7	14, 12, 10, 8, 6
6	14, 12, 10, 8, 6, 4
5	14, 12, 10, 8, 6, 4, 3, 2, 1, 1/0, 2/0, 3/0, 4/0
4	14, 12, 10, 8, 6, 4, 3, 2, 1,1/0, 2/0, 3/0, 4/0, 250, 350,400, 500
3	14, 12, 10, 8, 6, 4, 3, 2, 1,1/0, 2/0, 3/0, 4/0, 250, 350,400, 500, 600
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

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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.).

CEBU CABLES
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Your Trusted Local Cable Supplier

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

Contact Us :

Tel: (032) 402 0546
Mobile: +63 917 550 2387 or +63 925 504 4289

Unit 312 Krizia Building Gorordo Avenue Lahug Business Park, Cebu City 6000 Philippines

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