



# Cable Solutions for the Petrochemical Refining Industry



Marmon Electrical  
A Berkshire Hathaway Company

Marmon Industrial Energy & Infrastructure is one of the most reputable industrial cable manufacturers in the world. Manufactured in the United States of America with rigorous attention to detail and quality standards, Marmon IEI's products are specified by many industry leaders for some of the most challenging projects. As part of the Marmon Group and Berkshire Hathaway, Marmon IEI has the financial backing, technical support, and resource sharing of other Marmon Wire & Cable companies, giving Marmon IEI an advantage when dealing with even the most complex requirements. Marmon IEI's core strengths include the ability to design cables to meet the stringent requirements of our customers, fast delivery to meet on-site needs, and the capability to meet various regulatory standards.

## INSTRUMENTATION

Instrumentation cables monitor process parameters such as pressure, flow rate, and temperature by transmitting high-quality, low voltage signals to the instrumentation and process control room. These cables are typically multiple twisted-pair configurations with each pair gathering one set of process data. Shielding, a Marmon IEI innovation, prevents noise and interference and helps to maintain signal quality.

## CONTROL

Control cables carry power to change process parameters from the control room to the remote equipment. Control cables are typically comprised of 14 AWG and larger conductors, with additional grounding conductors and shielding included as needed.

## CIRCUIT INTEGRITY

Circuit Integrity cables are meant to perform in the event of a fire emergency. These specialty cables are typically installed in critical circuits, allowing for extended control and monitoring times, even in an emergency situation.

## DIGITAL DATA

Digital Data cables, such as Fieldbus and Category cables, are serial, two-way, digital communication cables specifically designed for process monitoring. Communication is provided via twisted-pairs of conductors with specific electrical characteristics and construction features depending upon the certification.

## THERMOCOUPLE EXTENSION

Thermocouple Extension cables allow for the remote monitoring of thermocouples from a central location. These cables are available in several common thermocouple types.

## COMPOSITE CABLES

Composite cables combine the above types into one convenient package, providing for an all-in-one solution. These cables are especially helpful when space or ease of installation is a concern.

# Instrumentation and Control Cables, configurations and options:

## CONDUCTORS

Bare, tinned, or nickel-plated annealed copper and most thermocouple alloys, in solid, 7-strand, or 19-strand configurations from 20 AWG to 8 AWG are common in Marmon IEI's products. Additional sizes, metric conductors, and alternative stranding options are available upon request.

## INSULATIONS

Marmon IEI offers both thermoset and thermoplastic insulation compounds including PVC, PVC/Nylon, XLPE, HDPE, and Silicone. Specialty compounds are available upon request.

## JACKET (SHEATH)

PVC, LDPE, HDPE, CPE, TPN(LSZH) or high temperature compounds. We use the term "jacket" for the inner jacket (covering the cable bundle) and the outer jacket (covering the armor). Typically, the same type of material is used for inner and outer jacket.

## PAIRS

Individually shielded or unshielded, up to 100 pairs.

## SHIELDING

Marmon IEI provides a variety of options in shielding to prevent EMI (electro-magnetic interference) over the twisted pairs and for the overall cable.

**Taped shield** – Aluminum/polyester backed tapes for individual and overall shields with drain wires. Drain wires are placed under the shield to facilitate grounding and are in contact with the conductive aluminum or copper side of the shield and allow for easy termination to ground.

**Braided shield** for improved EMI and mechanical protection - Bare copper, tinned copper or stainless steel braid.



## Circuit Integrity Cable, configurations and options:

### APPROVALS AND RATING

Marmon IEI can offer a variety of ratings and standards for instrumentation products. Please discuss the specific rating and approvals with your customer service representative. Depending on the cable design and selection of armor types, the following approvals are available:

- **Design Standards:**  
UL 13 (PLTC and PLTC-ER), UL 2225 (MC-HL), UL 2250 (ITC and ITC-ER), ICEA S-73-532, BS 5308, EN 50288-7, AS/NZS 5000
- **Flame Retardancy:**  
IEEE 1202, UL 1685, VW-I, FT4, IEC 60332
- **Temperature Rating:**  
-50 °C to 105 °C, and up to 260 °C with fluoropolymers
- **Low Smoke Zero Halogen Constructions:**  
(IEC 61034 and IEC 60754)
- **Conductors**  
Marmon IEI's conductors are certified to ASTM B3, B33, & B8, when applicable. Compliance with IEC 60228 and AS/NZS 1125 is also available.

### SPECIALTY RATINGS

- **ER (EXPOSED RUN)**  
These cables provide additional impact and crush resistance, allowing the cable to be run outside of a cable tray or conduit. ER ratings are available for many constructions.
- **HL (HAZARDOUS LOCATIONS)**  
Marmon IEI offers many cables which are suitable for use in Class I, Division 1, Division 2, Zone 1 and Zone 2. These cables meet very stringent construction and performance standards, ensuring safe operation in the most dangerous environments.
- **FIELD BUS**  
Fieldbus cables can be certified to meet FieldComm FF-844 H1 and/or IEC 61158 standards.

### ARMOR

- Served Wire Armor (SWA), Galvanized Steel
- Interlock Galvanized Steel (ILGS) Armor
- Interlock Aluminum (ILA) Armor
- Gardex® Continuously Corrugated Welded Aluminum Armor, Class I Division 1 rated.
- Dekabon® Chemical and Moisture Barrier

### CONDUCTORS

Tinned or Nickel plated (27% Ni) annealed copper, in solid, 7-strand, or 19-strand configurations from 20 AWG (0.5mm<sup>2</sup>) to 10 AWG (6.0mm<sup>2</sup>).

### INSULATIONS

Silicone alloy

### SHIELDING

Aluminum or Copper/polyester backed tapes for individual and overall shields with drain wires. Drain wires are placed under the shield to facilitate grounding.

### ARMOR

- Served Wire Armor (SWA), Galvanized Steel
- Interlock Galvanized Steel (ILGS) Armor
- Gardex® Continuously Corrugated Welded Aluminum Armor, Class I Division 1 rated

### JACKET (SHEATH)

TPN (LSZH)

### APPROVALS AND RATING

- Design Standards:  
UL 13 (PLTC), UL 2250 (ITC), ICEA S-73-532, EN 50288-7
- Fire Resistance Standards: IEC 60331 and BS 6387
- Temperature Rating: -20 °C to 90 °C
- Hazardous Zone Classifications:  
Class I Division 1, Division 2, Zone 1 and Zone 2
- Low Smoke Zero Halogen (IEC 61034 and IEC 60754)
- Conductors as ASTM B3, B33, B8, and IEC 60228, AS/NZS 1125



## Packaging & Documentation

If requested prior to ordering, Marmon IEI can provide Certificates & Test Reports (Certificates of Conformance) for every item on an order shipment.

Custom reel tags can be printed to meet customer requirements if they are requested prior to placing an order.

Unless otherwise specified, cables are delivered on wooden reels from 16 up to 96 inches in diameter. On most reels, there is an option to add lagging (wooden planks nailed to the reels flanges) to prevent damage to the cable while in transit. Marmon IEI's wooden reels are heat-treated and comply with international phytosanitary requirements.

Cable ends (known as "pig tails") are left exposed on the outside of the reel to allow for final testing. They are sealed with heat-shrink caps during shipment.

## CHEMICAL RESISTANCE GUIDE

CHEMICAL	Perfluoro Alkoxy (PFA)	Fluorinated Ethylene Propylene (FEP)	Chlorinated Polyethylene (CPE)	High Density Polyethylene (HDPE)	Low Density Polyethylene (LDPE)	Polyvinylchloride (PVC)
Sodium Chloride 10%	E	E	E	E	E	E
Ammonium Hydroxide 10%	E	E	E	E	E	E
Hydrochloric Acid 10%	E	E	E	E	E	E
Sodium Hydroxide 10%	E	E	E	E	E	E
Acetic Acid 5%	E	E	E	E	E	E
Sulfuric Acid 30%	E	E	E	E	E	G
Nitric Acid 10%	E	E	E	E	E	G
Naphtha	E	E	E	G	G	G
Methanol	E	E	E	G	P	G
Diesel / Gasoline	E	E	E	G	P	P
Acetone	E	E	E	G	P	D
Kerosene	E	E	E	G	P	E
Cyclohexane	E	E	G	G	P	P
Benzene	E	E	G	P	P	P
Toluene	E	E	G	P	P	P
Carbon Tetrachloride	E	E	G	P	P	P

E	Excellent	Retains >80% original ultimate tensils and >80% original elongation and has <50% volume swell.
G	Good	Retains 60-80% original ultimate tensils or 60-80% original elongation or has 50-100% volume swell.
P	Poor	Retains <60% original ultimate tensile or <60% original elongation or has >100% volume swell.
D	Deteriorated	No properties could be recorded, compound deteriorated.

*Actual performance may vary based on compound, environmental conditions, exposure, concentration, and/or other variables. Testing is recommended.*

Gardex® is a registered trade mark of Marmon Specialty Cable  
 Dekabon® is a registered trade mark of Marmon Industrial Energy & Infrastructure



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