

69kV – 138kV XLPE Insulated Transmission Cable

Extruded XLPE | Sub-Transmission & Transmission Class | Underground Utility Infrastructure

PRODUCT OVERVIEW

Mirabel Energy USA 69kV–138kV XLPE insulated transmission cable represents the entry point of the high voltage underground cable class — serving sub-transmission and transmission infrastructure for electric utilities, independent power producers, large industrial campuses, and data center hyperscale developments requiring dedicated underground transmission supply. Cross-linked polyethylene (XLPE) dry-cured insulation delivers exceptional dielectric strength, low dielectric loss (tan δ), and superior thermal performance compared to legacy PILC (Paper Insulated Lead Covered) and fluid-filled designs — with no maintenance-intensive oil pressure systems. Extruded semi-conducting conductor and insulation screens provide a smooth, void-free interface that maximizes service life and dielectric integrity under continuous electrical stress. Available in single-conductor constructions with copper or aluminum conductors and copper wire or tape shield, engineered to meet AEIC CS9 and IEC 60840 specifications.

69kV – 138kV Voltage Range	90°C Normal Conductor Temp	250°C Fault Short-Circuit	IEC 60840 Primary Standard
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APPLICATIONS

- Utility sub-transmission underground cable (69kV and 115kV class)
- Transmission-level urban underground infrastructure (138kV)
- Generation interconnect — power plant to grid step-up substation
- Hyperscale data center and AI campus dedicated HV utility feed
- Industrial complex primary service entrance at 69kV–138kV
- Overhead-to-underground transition on transmission corridors

KEY SPECIFICATIONS

- 69kV–138kV rated — IEC 60840, AEIC CS9, and IEEE 404 compliant
- Triple-extruded XLPE insulation: dry cure, void-free conductor/insulation interface
- Conductor temp: 90°C normal / 130°C emergency / 250°C fault
- Copper or aluminum segmental conductors — 500 kcmil to 2500 kcmil
- Copper wire shield or copper tape shield — selectable for system design
- Longitudinal and radial water blocking — moisture barrier metallic laminate
- Polyethylene (PE) or HDPE outer jacket — UV and mechanical protection
- Available with metallic moisture barrier sheath (Al or Cu laminate)

TECHNICAL SPECIFICATIONS

Parameter	69kV Class	138kV Class
Voltage (Um)	69kV (76kV Um)	138kV (145kV Um)
BIL Rating	350kV	650kV
Insulation Type	XLPE (dry cure)	XLPE (dry cure)
Conductor Temp Normal	90°C	90°C
Conductor Temp Emerg.	130°C	130°C
Conductor Sizes	500–2500 kcmil	500–2500 kcmil
Primary Standard	IEC 60840 / AEIC CS9	IEC 60840 / AEIC CS9

CONDUCTOR SIZES & CONFIGS 500 kcmil – 2500 kcmil Cu or Al Single conductor CWS or CTS shield	STOCKING & PROCUREMENT Reno, NV · Houston, TX Long-lead and project-phased delivery supported	APPLICATION ENGINEERING GCP Energy LLC — Salt Lake City, UT Ampacity, thermal, and system design support available
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230kV XLPE Insulated Transmission Cable

EHV Extruded XLPE | Bulk Transmission Class | Urban Underground & Generation Interconnect

PRODUCT OVERVIEW

Mirabel Energy USA 230kV XLPE transmission cable operates at the upper boundary of the IEC 60840 standard — representing bulk transmission-class underground infrastructure for the most demanding utility and generation interconnect applications in North America. At 230kV, underground cable systems are increasingly specified as the preferred alternative to overhead lines in urban and suburban corridors, environmentally sensitive areas, and where aerial right-of-way acquisition is cost-prohibitive or socially opposed. The 230kV XLPE cable system incorporates precision dry-cured triple-extruded insulation, segmental copper or aluminum conductors, longitudinal and radial water blocking, a corrugated aluminum moisture barrier sheath, and an outer HDPE jacket — engineered for 40+ year service life under continuous electrical, thermal, and mechanical stress. Factory acceptance testing per IEC 60840 includes partial discharge, voltage, and tan δ measurements on every cable length delivered.

230 kV Voltage Class	90°C Normal Conductor Temp	1050kV BIL Lightning Impulse	IEC 60840 Primary Standard
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APPLICATIONS

- Urban underground bulk transmission — replacing overhead 230kV lines
- Generation step-up interconnect — large power plant to 230kV substation
- Inter-substation cable in metropolitan transmission networks
- Offshore wind farm HVAC export cable (230kV class)
- Utility transmission cable in environmentally sensitive corridors
- Large data center hyperscale 230kV dedicated transmission infrastructure

KEY SPECIFICATIONS

- 230kV (245kV Um) rated — IEC 60840, AEIC CS9, CIGRÉ TB 823 compliant
- Triple-extruded dry-cure XLPE: precise insulation wall uniformity
- 1050kV BIL / 1050kV switching impulse withstand voltage
- Segmental stranded copper or aluminum conductors — 1000–3000 kcmil
- Corrugated aluminum sheath — longitudinal and radial moisture barrier
- Copper wire shield for fault current and capacitive charging current return
- HDPE outer jacket with factory-applied strippable oversheath for testing
- FAT per IEC 60840: PD, tan δ , voltage withstand on 100% of cable lengths

TECHNICAL SPECIFICATIONS

Parameter	230kV XLPE	Unit / Reference
System Voltage (Um)	245kV	IEC 60840
BIL (1.2/50 μ s)	1050kV	IEC 60060
Insulation Type	Dry-cure XLPE	Triple extruded
Conductor Temp Normal	90°C	IEC 60840
Conductor Temp Emerg.	105°C	IEC 60840
Conductor Sizes	1000–3000 kcmil	Cu or Al
Moisture Barrier	Corrugated Al sheath	Radial + longitudinal

CONDUCTOR SIZES & CONFIGS 1000–3000 kcmil Cu or Al segmental Corrugated Al sheath HDPE jacket FAT included	STOCKING & PROCUREMENT Reno, NV · Houston, TX Long-lead and project-phased delivery supported	APPLICATION ENGINEERING GCP Energy LLC — Salt Lake City, UT Ampacity, thermal, and system design support available
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345kV – 500kV XLPE Insulated EHV Transmission Cable

Extra High Voltage | IEC 62067 · IEEE P1 | Bulk Grid Transmission & HVAC Backbone

PRODUCT OVERVIEW

Mirabel Energy USA 345kV–500kV XLPE extra-high voltage (EHV) cable represents the pinnacle of underground transmission technology — operating at voltage levels that carry the majority of bulk electrical energy across the North American grid. EHV underground cable systems at 345kV and 500kV are deployed for the most critical transmission corridors: urban underground where overhead lines are not feasible, offshore wind farm HVAC export cables, long submarine crossings, and strategic reinforcement of bulk transmission networks. Governed by IEC 62067 (the EHV counterpart to IEC 60840), these cable systems demand the highest levels of manufacturing precision, quality assurance, and installation engineering available in the cable industry. Factory acceptance testing is mandatory on 100% of cable lengths, and type testing includes electrical, thermal, and mechanical qualification at full system voltage. Mirabel EHV cable is supported by comprehensive application engineering services including thermal rating studies, installation design, joint bay layout, and FAT/SAT test protocol development.

345–500 kV EHV Range	90°C Normal Conductor Temp	1550kV BIL Max Impulse (500kV)	IEC 62067 Primary Standard
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APPLICATIONS

- Bulk transmission underground cable — 345kV and 500kV utility backbone
- Urban bypass of overhead 345kV/500kV transmission infrastructure
- Offshore wind HVAC export cable — wind farm to onshore substation
- Long submarine crossings — bays, rivers, and straits up to 500kV
- Generation interconnect — large nuclear, hydro, or pumped storage plants
- Strategic transmission grid reinforcement in congested load areas

KEY SPECIFICATIONS

- 345kV–500kV (362kV–550kV Um) — governed by IEC 62067
- Dry-cure triple-extruded XLPE: highest insulation quality class available
- 1175kV BIL (345kV) / 1550kV BIL (500kV) impulse withstand
- Milliken or segmental Cu/Al conductors — 1500–5000 kcmil
- Corrugated welded aluminum or lead alloy moisture barrier sheath
- 100% FAT per IEC 62067: PD < 5pC, tan δ, HVAC voltage withstand
- System design support: thermal rating, installation, and joint bay engineering
- Accessory package: factory-made joints, GIS terminations, sealing ends

TECHNICAL SPECIFICATIONS

Parameter	345kV EHV	500kV EHV
System Voltage (Um)	362kV	550kV
BIL (1.2/50µs)	1175kV	1550kV
Insulation Type	Dry-cure XLPE	Dry-cure XLPE
Conductor Temp Normal	90°C	90°C
Conductor Temp Emerg.	105°C	105°C
Conductor Sizes	1500–5000 kcmil	2000–5000 kcmil
Standard	IEC 62067	IEC 62067

CONDUCTOR SIZES & CONFIGS 1500–5000 kcmil Milliken Cu/Al Corrugated Al or Pb sheath FAT on all lengths	STOCKING & PROCUREMENT Reno, NV · Houston, TX Long-lead and project-phased delivery supported	APPLICATION ENGINEERING GCP Energy LLC — Salt Lake City, UT Ampacity, thermal, and system design support available
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EPR Insulated High Voltage Cable — 69kV to 138kV

Ethylene Propylene Rubber | Maximum Flexibility & Water-Tree Resistance | HV Submarine & Dynamic

PRODUCT OVERVIEW

Mirabel Energy USA EPR (Ethylene Propylene Rubber) insulated high voltage cable provides the industry's preferred solution for applications demanding maximum flexibility, proven water-tree resistance, and long-term reliability in dynamically stressed or continuously wet environments at transmission voltage levels. While XLPE dominates static underground land cable applications, EPR maintains a strong position in submarine cables, offshore platform power cables, and dynamic cable applications where continuous flexing and movement would rapidly fatigue a rigid XLPE insulation system. EPR's inherently flexible elastomeric structure absorbs cyclic mechanical stress without cracking or delamination at the semi-conducting screen interface — a critical advantage for floating platform risers, wave energy converters, and tidal energy applications. EPR also demonstrates superior resistance to water treeing at HV stress levels, making it the conservative choice for installations in continuously saturated environments where long maintenance intervals are required.

69kV – 138kV Voltage Range	90°C / 105°C Conductor Temp	EPR Rubber Insulation System	Dynamic Rated Flex Capability
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APPLICATIONS

- Submarine HV cable — river and bay crossings at 69kV–138kV
- Offshore platform power supply cable — fixed and semi-submersible
- Dynamic riser cable — floating production storage and offloading (FPSO)
- Tidal and wave energy converter power export cable
- Industrial facility HV cable in continuously flooded cable tunnels
- Nuclear plant safety-related HV cable requiring long qualified life

KEY SPECIFICATIONS

- EPR insulation: elastomeric — superior flexibility vs. XLPE at HV stress levels
- Proven water-tree resistance — preferred for continuously wet and submerged service
- Dynamic rated constructions available for floating platform and riser applications
- 90°C normal / 105°C emergency conductor temperature
- Available 69kV–138kV voltage class (IEC 60840 / IEEE 404)
- Armored constructions: SWA (single wire armor) or DWA (double wire armor)
- Lead or aluminum alloy sheath for radial moisture barrier in submarine designs
- Factory qualification per CIGRÉ TB 623 for submarine and dynamic service

TECHNICAL SPECIFICATIONS

Parameter	EPR HV (Land)	EPR HV (Submarine/Dynamic)
Voltage Range	69kV – 138kV	69kV – 138kV
Insulation Type	EPR	EPR (dynamic grade)
Conductor Temp Normal	90°C	90°C
Conductor Temp Emerg.	105°C	105°C
Armor	Optional SWA	SWA or DWA (standard)
Moisture Barrier	Al tape or Pb sheath	Pb alloy sheath
Standard	IEC 60840 / IEEE 404	CIGRÉ TB 623

CONDUCTOR SIZES & CONFIGS 500 kcmil – 2000 kcmil Cu or Al SWA / DWA armor Pb sheath for submarine	STOCKING & PROCUREMENT Reno, NV · Houston, TX Long-lead and project-phased delivery supported	APPLICATION ENGINEERING GCP Energy LLC — Salt Lake City, UT Ampacity, thermal, and system design support available
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Submarine & Subsea Power Cable — HVAC & HVDC

HVAC to 500kV · HVDC to ±600kV | Armored | Offshore Wind · Interconnects · Island Links

PRODUCT OVERVIEW

Mirabel Energy USA submarine and subsea power cables deliver the critical energy transport infrastructure for offshore wind farm export systems, island-to-mainland grid interconnects, cross-strait and cross-bay links, and offshore platform power supply. Both HVAC (up to 500kV) and HVDC (up to ±600kV) voltage designs are available — with HVDC mass-impregnated (MI) and extruded XLPE insulation options for long-distance DC transmission where reactive power compensation for AC cable becomes impractical beyond approximately 50–80km. The submarine cable construction incorporates a pressure-resistant insulation system, lead or aluminum alloy moisture barrier sheath, armor wire layers for tensile strength during installation and in-service mechanical protection, and a polypropylene yarn or HDPE outer serving. Cable lay installation, burial depth, and cathodic protection system design support is available through the GCP Energy application engineering team.

Up to 500kV HVAC AC Voltage	±600kV HVDC DC Voltage	SWA / DWA Armor Mechanical Protection	CIGRÉ TB 623 Qualification Standard
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APPLICATIONS

- Offshore wind farm inter-array and export cable (HVAC 66kV–220kV)
- Island-to-mainland grid interconnect (HVAC or HVDC)
- Cross-bay and cross-strait long-distance HVDC transmission links
- Offshore oil and gas platform power supply (HVAC 33kV–132kV)
- Tidal and wave energy array export cable systems
- River crossing and harbor transit for underground transmission circuits

KEY SPECIFICATIONS

- HVAC designs: 33kV–500kV per IEC 60840 / IEC 62067
- HVDC designs: ±150kV–±600kV (MI-PPL or extruded XLPE) per IEC 62895
- Single wire armor (SWA) or double wire armor (DWA) for deep-water deployment
- Lead alloy (E-alloy) or corrugated aluminum moisture barrier sheath
- Dynamic cable constructions available for floating platforms and risers
- Qualified per CIGRÉ TB 623 (HVAC) and CIGRÉ TB 852 (HVDC) protocols
- Factory and shore-end testing: 100% FAT, TDR, and insulation resistance
- Installation engineering support: lay vessel coordination, burial assessment

TECHNICAL SPECIFICATIONS

Parameter	HVAC Submarine	HVDC Submarine (XLPE)
Voltage Range	33kV – 500kV	±150kV – ±600kV
Insulation	XLPE or EPR	XLPE (extruded)
Armor	SWA or DWA	SWA or DWA
Moisture Barrier	Pb alloy or Al sheath	Pb alloy sheath
Qualification	CIGRÉ TB 623	CIGRÉ TB 852 / IEC 62895
Conductor	Cu or Al (round/seg)	Cu (Milliken)
Typical Max Depth	Up to 1,000m	Up to 3,000m

CONDUCTOR SIZES & CONFIGS 33kV–500kV HVAC ±150kV–±600kV HVDC SWA/DWA Custom cable lay engineering	STOCKING & PROCUREMENT Reno, NV · Houston, TX Long-lead and project-phased delivery supported	APPLICATION ENGINEERING GCP Energy LLC — Salt Lake City, UT Ampacity, thermal, and system design support available
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Self-Contained Fluid-Filled (SCFF) & Pipe-Type Cable

Legacy Infrastructure Support | 69kV–345kV | HPOF Pipe-Type · SCFF Maintenance & Replacement

PRODUCT OVERVIEW

Mirabel Energy USA supplies Self-Contained Fluid-Filled (SCFF) and High-Pressure Oil-Filled (HPOF) pipe-type cable for the maintenance, repair, and selective replacement of the large installed base of fluid-filled transmission cable that continues to operate across North American utility networks. SCFF cable uses an oil-impregnated paper insulation system with a pressurized fluid channel in the hollow conductor — maintaining positive oil pressure to suppress void formation and sustain dielectric integrity across the cable's service life. HPOF pipe-type cable encases three single-conductor cables in a pressurized steel pipe filled with high-pressure dielectric oil, providing the highest mechanical protection available for underground transmission. While new XLPE extruded designs are specified for new construction, the extensive installed base of fluid-filled cable in service at 69kV–345kV across the US creates an ongoing need for exact-match replacement sections, maintenance fluid, and transition joint accessories to interface legacy fluid-filled systems with modern extruded XLPE cable.

69kV – 345kV Voltage Range	SCFF / HPOF Cable Type	Fluid-Filled Insulation System	Legacy Support Primary Market
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APPLICATIONS

- Replacement sections for in-service SCFF cable circuits (69kV–345kV)
- HPOF pipe-type cable repair and length replacement in existing pipe systems
- Transition joints — fluid-filled to extruded XLPE interface assemblies
- Maintenance supply: dielectric fluid, pressure monitoring equipment
- Urban legacy transmission network asset life extension programs
- Capacity uprating of existing fluid-filled cable circuits

KEY SPECIFICATIONS

- SCFF: oil-impregnated paper insulation with pressurized fluid conductor channel
- HPOF pipe-type: three-phase in pressurized steel pipe, 69kV–345kV
- Available as exact-match replacement for existing installed cable types
- Transition joint accessories for SCFF/HPOF to XLPE interface
- Compliant with AEIC CG7, ICEA S-108-720, and IEEE 1696
- Lead sheath (SCFF) and steel pipe (HPOF) mechanical protection
- Dielectric fluid supply, pressurization system components, and monitoring
- Engineering support: fault location, circuit rating, and life assessment

TECHNICAL SPECIFICATIONS

Parameter	SCFF Cable	HPOF Pipe-Type
Voltage Range	69kV – 230kV	69kV – 345kV
Insulation	Oil-impregnated paper	Oil-impregnated paper
Fluid Channel	Hollow conductor	Pressurized steel pipe
Operating Pressure	15–45 psi	200 psi nominal
Sheath / Pipe	Lead alloy sheath	Steel pipe
Application	New or replacement	Replacement sections
Standard	ICEA S-108-720	IEEE 1696 / AEIC CG7

CONDUCTOR SIZES & CONFIGS Exact-match replacement sections Transition joints Dielectric fluid supply	STOCKING & PROCUREMENT Reno, NV · Houston, TX Long-lead and project-phased delivery supported	APPLICATION ENGINEERING GCP Energy LLC — Salt Lake City, UT Ampacity, thermal, and system design support available
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HV Cable Accessories — Joints, Terminations & GIS Interfaces

69kV – 500kV | Factory-Made Prefabricated | Dry-Type & Fluid-Filled · GIS · Overhead Transition

PRODUCT OVERVIEW

A high voltage cable system is only as reliable as its accessories — joints, terminations, and transition interfaces that represent the highest concentration of electrical stress and the most frequent source of in-service failure in underground transmission systems. Mirabel Energy USA HV cable accessories are factory-made, prefabricated dry-type assemblies designed to match the electrical and mechanical performance of the cable system they connect. Pre-molded stress-control elements, proprietary interface materials, and precision-dimensioned components eliminate field workmanship variables that are the primary cause of accessory failures. The accessories portfolio covers straight joints for cable-to-cable connections, outdoor sealing ends for overhead line transitions, GIS (Gas Insulated Switchgear) plug-in terminations for substation interfaces, and transformer direct-connection bushings. Transition accessories for fluid-filled to extruded XLPE interfaces are available for legacy network modernization projects.

69kV – 500kV Voltage Range	Prefabricated Joint Type	GIS / OHL / Xfmr Termination Types	IEEE 404 Qualified Standard
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APPLICATIONS

- Straight joints — cable-to-cable connection at drum length intervals
- Outdoor sealing ends — underground to overhead line transition
- GIS plug-in terminations — cable to gas-insulated switchgear interface
- Transformer terminations — direct connection to transformer bushings
- Transition joints — XLPE to SCFF or HPOF fluid-filled cable interface
- Repair joints — emergency fault restoration for in-service cable circuits

KEY SPECIFICATIONS

- Factory-made prefabricated design — eliminates field workmanship variables
- Pre-molded stress-control cone — precision-engineered for cable screen cutback
- Dry-type design (no field-applied oil or resin for most joint types)
- Covers 69kV–500kV voltage class — XLPE and EPR cable systems
- GIS plug-in terminations: IEC 62271-209 compliant, SF6 interface sealed
- Outdoor sealing ends: RTV silicone sheds, UV and pollution-resistant
- Transformer terminations: oil-to-XLPE interface, compatible with major OEM bushings
- Type tested per IEC 60840 / IEC 62067 / IEEE 404 — test certificates available

TECHNICAL SPECIFICATIONS

Accessory Type	Voltage Range	Standard / Interface
Straight Joint	69kV – 500kV	IEC 60840 / 62067
Outdoor Sealing End	69kV – 500kV	IEC 60840 / 62067
GIS Plug-In Term.	69kV – 245kV	IEC 62271-209
Transformer Term.	69kV – 245kV	IEC 60840 / OEM spec
Transition Joint	69kV – 345kV	IEEE 404 / CIGRÉ
Repair Joint	69kV – 345kV	IEC 60840
FAT Included	All types	PD + HVAC voltage test

CONDUCTOR SIZES & CONFIGS 69kV–500kV All accessory types FAT included Engineering support available	STOCKING & PROCUREMENT Reno, NV · Houston, TX Long-lead and project-phased delivery supported	APPLICATION ENGINEERING GCP Energy LLC — Salt Lake City, UT Ampacity, thermal, and system design support available
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HVDC Extruded XLPE Transmission Cable — ±150kV to ±600kV

High Voltage Direct Current | IEC 62895 | Long-Distance Bulk Transmission & Offshore Wind

PRODUCT OVERVIEW

Mirabel Energy USA HVDC extruded XLPE cable represents the most advanced underground and submarine transmission technology available — enabling bulk energy transport over distances of hundreds to thousands of kilometers with minimal reactive power losses and full controllability of power flow. The transition from traditional Mass-Impregnated Non-Draining (MIND) paper cable to extruded XLPE for HVDC applications is the most significant advancement in HV cable technology in decades, governed by IEC 62895 (2017) and supported by extensive CIGRÉ qualification protocols. HVDC XLPE cable design must address the space charge accumulation phenomenon unique to DC insulation stress — requiring specialized XLPE compounds with controlled additive chemistry and manufacturing processes that differ fundamentally from AC XLPE cable production. Applications include long-distance underground transmission corridors connecting renewable energy zones to load centers, offshore wind farm HVDC export systems, asynchronous grid interconnects (back-to-back), and voltage source converter (VSC-HVDC) transmission projects.

±150kV – ±600kV DC Voltage Range	70°C Normal Conductor Temp	Space Charge Free Critical Design Req.	IEC 62895 Primary Standard
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APPLICATIONS

- Long-distance underground HVDC bulk transmission corridors
- Offshore wind farm HVDC export cable (VSC-HVDC)
- Asynchronous grid interconnects and frequency isolation links
- Submarine HVDC interconnections between island grids and mainland
- Multi-terminal HVDC grid (MTDC) cable infrastructure
- Renewable energy zone-to-load center underground HVDC links

KEY SPECIFICATIONS

- ±150kV–±600kV HVDC rated — IEC 62895 qualified extruded XLPE
- Specialized HVDC XLPE compound — controlled space charge suppression
- 70°C nominal conductor temperature (vs. 90°C for AC XLPE)
- Conductor sizes: 1200–3200 kcmil Milliken copper or aluminum
- Lead alloy or corrugated aluminum moisture barrier sheath
- Qualified per CIGRÉ TB 852 and IEC 62895 test protocols
- VSC-HVDC compatible — bipolar and monopolar system designs
- HVDC joint and termination accessories available as complete system

TECHNICAL SPECIFICATIONS

Parameter	±320kV HVDC	±525kV HVDC
System Voltage	±320kV	±525kV
Insulation	HVDC XLPE compound	HVDC XLPE compound
Conductor Temp Normal	70°C	70°C
Conductor Temp Emerg.	85°C	85°C
Conductor Sizes	1200–3200 kcmil	2000–3200 kcmil
Moisture Barrier	Pb alloy or Al sheath	Pb alloy sheath
Standard	IEC 62895 / CIGRÉ 852	IEC 62895 / CIGRÉ 852

CONDUCTOR SIZES & CONFIGS ±150kV–±600kV 1200–3200 kcmil Milliken Cu/Al Complete VSC-HVDC system supply	STOCKING & PROCUREMENT Reno, NV · Houston, TX Long-lead and project-phased delivery supported	APPLICATION ENGINEERING GCP Energy LLC — Salt Lake City, UT Ampacity, thermal, and system design support available
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