

Anhui Feichun Special Cable Co., Ltd.

安徽飞纯特种电缆有限公司

Advanced Solutions for High-Voltage Mining Applications



TECHNICAL SPECIFICATION

High-Voltage Round Portable Power Cable for Heavy Mining Equipment

25 kV CLASS

Mining Cable, 3/C 2 AWG + 2 AWG G + 8 AWG Earth-Check, 90°C SHD-GC, 25 kV, EPR/CPE, TPU (RCI) Jacket

Cable Type:	SHD-GC (Shielded Heavy Duty – Ground Check)	Rated Voltage:	25 kV (Neutral to Ground)
Phase Conductors:	3 × 33.6 mm ² (2 AWG)	Ground Conductor:	33.6 mm ² (2 AWG)
Earth-Check Conductor:	8.37 mm ² (8 AWG)	Maximum Withstand Voltage:	>36 kV (5 min test)
Conductor Operating Temp:	90°C Maximum Continuous	Ambient Temperature Range:	–25°C to +80°C
Insulation System:	EPR (Ethylene Propylene Rubber)	Outer Jacket:	TPU (RCI) Double Layer
Jacket Thickness:	7.1 mm (0.280 in)	Feichun Product Code:	FC-SHD-GC-25K-2AWG-TPU

1. APPLICABLE STANDARDS & CERTIFICATIONS

FC-STD-001

This Feichun high-voltage mining cable is engineered and manufactured in strict accordance with internationally recognized standards for portable mining power cables operating at elevated voltage levels. The 25 kV rating places this product in the high-voltage category, requiring enhanced insulation systems and rigorous testing protocols to ensure safe and reliable operation in demanding mining environments.

ICEA S-75-381

NEMA WC-58

ASTM B 172

ASTM B 33

MSHA APPROVED

25 kV CLASS

Reference Standard	Scope & Application
ICEA S-75-381 / NEMA WC-58	Primary specification for portable and power feeder cables for mines; defines construction, testing, and performance requirements for high-voltage mining cables

ASTM B 172	Specification for rope-lay-stranded copper conductors with bunch-stranded members, ensuring maximum flexibility for mobile equipment applications
ASTM B 33	Specification for tinned soft or annealed copper wire, defining tin coating requirements for corrosion protection and solderability
ICEA S-75-381, Tab. 3-22	Detailed conductor construction requirements including strand configuration, lay lengths, and dimensional tolerances
ICEA S-75-381, Tab. 3-25	Grounding conductor specifications ensuring adequate fault current carrying capacity
ICEA S-75-381, Sec. 3.21	Outer jacket construction and performance requirements for TPU thermoplastic materials
MSHA P-07-KA030001	U.S. Mine Safety and Health Administration approval for TPU-jacketed cables in mining operations

 **HIGH VOLTAGE CABLE – 25 kV CLASS – SPECIAL HANDLING REQUIRED**

2. CABLE CONSTRUCTION

FC-CON-002

This Feichun 25 kV SHD-GC cable represents an advanced design optimized for powering large mobile mining equipment such as shovels and draglines. The cable features **three power conductors** manufactured from grouped, stranded annealed copper wires per ASTM B172, providing excellent flexibility while maintaining low electrical resistance. Each phase conductor is surrounded by an **extruded semi-conductive strand shield** that creates an almost perfect electrode surface, eliminating air gaps and preventing corona discharge at high operating voltages. The **EPR (ethylene-propylene rubber) insulation** provides superior dielectric strength and resistance to electrical stress, humidity, vapor, oil, and corona effects. The insulation is protected by an **extruded conductive layer combined with textile braid** for mechanical protection. The cable incorporates a **2 AWG grounding conductor** and an **8 AWG earth-check conductor** for ground continuity monitoring. The entire assembly is protected by a **double-layer TPU (RCI) outer sheath** providing exceptional mechanical protection against abrasion, impacts, and environmental exposure.

Component	Material	Detailed Specification
Phase Conductors (×3)	Annealed flexible stranded tinned copper	2 AWG (33.6 mm ²), 259 strands in 7×37 rope-lay construction per ASTM B 172; grouped stranded configuration for maximum flexibility
Strand Shield	Extruded semi-conductive compound	Simultaneously extruded with insulation using vulcanization process; creates uniform electrode surface eliminating air voids and preventing corona at 25 kV operation
Insulation	EPR (Ethylene Propylene Rubber)	Nominal wall thickness: 0.295 in (7.49 mm) per ICEA S-75-381 for 25 kV class; black color; high dielectric strength with electrical stability under interruptions and voltage transients
Insulation Shield	Extruded conductive layer + textile braid	Extruded semi-conductive layer bonded to insulation surface; textile braid overlay provides mechanical protection; minimum 60% optical braid coverage

Phase Identification	Colored polyamide filaments	Black, White, Red color coding integrated into shield braid per ICEA S-75-381
Ground Conductor	Annealed stranded tinned copper	2 AWG (33.6 mm ²), stranded per ASTM B 33 and ICEA S-75-381, Tab. 3-25; non-insulated for direct earth bonding
Earth-Check Conductor	Insulated tinned copper	8 AWG (8.37 mm ²), yellow polypropylene insulation per ICEA S-75-381, Tab. 3-22; monitors ground circuit continuity
Filler & Binder	Elastomeric compound / textile	Non-hygroscopic filler material with binding tape and textile braid to maintain round cable profile
Core Separator	Rubber-filled binder tape	Single-faced tape applied helically over assembled core prior to jacketing process
Outer Jacket	TPU (RCI) – Thermoplastic Polyurethane	Double-layer construction with lead reinforcement for enhanced mechanical protection; thickness: 7.1 mm (0.280 in); excellent resistance to shocks, abrasion, flames, sunlight, and wide temperature range

Feichun Advanced Manufacturing Process:

The simultaneous extrusion and vulcanization process employed in Feichun manufacturing creates an almost perfect electrode interface between the conductor shield and EPR insulation. This eliminates air inclusions that could lead to partial discharge and premature insulation failure at 25 kV operating voltages. The process ensures exceptional protection against electrical stress, humidity penetration, vapor ingress, oil contamination, and corona effects throughout the cable's service life.

3. DIMENSIONAL SPECIFICATIONS

FC-DIM-003

The dimensional parameters for this Feichun 25 kV cable reflect the enhanced insulation thickness required for high-voltage operation. The 0.295-inch (7.49 mm) insulation wall thickness provides adequate dielectric strength for the 25 kV rating with appropriate safety margins, while the 7.1 mm TPU double-layer jacket ensures mechanical durability in demanding mining applications.

Parameter	Metric Value	Imperial Value
Phase Conductor Cross-Section (each)	33.6 mm ²	2 AWG
Phase Conductor Diameter	6.6 mm	0.260 in
Phase Conductor Strand Configuration	259 strands (7×37 rope-lay construction)	
Ground Conductor Cross-Section	33.6 mm ²	2 AWG
Ground Conductor Strand Configuration	259 strands (7×37 rope-lay construction)	
Earth-Check Conductor Cross-Section	8.37 mm ²	8 AWG
Insulation Thickness (25 kV Class)	7.49 mm	0.295 in
Outer Jacket Thickness (Double Layer)	7.1 mm	0.280 in
Approximate Cable Weight	6,016 kg/km	4,042 lbs/1000 ft

Minimum Bending Radius	8 × Overall Diameter	Per ICEA S-75-381
Maximum Permissible Tensile Force	1,500 N	337 lbf

4. ELECTRICAL CHARACTERISTICS

FC-ELEC-004

The electrical performance parameters presented below have been verified through comprehensive testing in Feichun's accredited laboratory facilities. The 25 kV voltage rating requires enhanced insulation with superior dielectric properties to withstand continuous operation as well as transient overvoltages that may occur in mining power distribution systems. The cable is designed to withstand voltages exceeding 36 kV for a minimum of 5 minutes during factory acceptance testing.

Electrical Parameter	Metric Units	Imperial Units	Conditions
Rated Voltage	25 kV (Neutral to Ground)		Continuous operation
Maximum Withstand Voltage	>36 kV		5-minute test duration
Power Conductor DC Resistance	0.564 Ω/km	0.172 Ω/1000 ft	@ 25°C
Ground Conductor DC Resistance	0.564 Ω/km	0.172 Ω/1000 ft	@ 25°C (2 AWG)
Earth-Check Conductor DC Resistance	2.228 Ω/km	0.679 Ω/1000 ft	@ 25°C (8 AWG)
Inductance per Unit Length	0.466 mH/km	0.142 mH/1000 ft	Per phase
Operating Capacitance per Unit Length	0.164 µF/km	0.05 µF/1000 ft	Per phase
Ampacity (Continuous Duty)	178 A		90°C conductor / 40°C ambient
Permissible Short-Circuit Current	4.80 kA		90°C → 250°C transition

Feichun High-Voltage Testing Protocol:

Each Feichun 25 kV cable undergoes rigorous high-voltage acceptance testing including AC withstand at greater than 36 kV for 5 minutes, partial discharge testing to verify the integrity of the extruded shield/insulation interface, and insulation resistance measurements at elevated test voltages. The simultaneous extrusion and vulcanization manufacturing process ensures electrical stability under voltage interruptions, switching transients, and lightning impulse conditions.

5. PERFORMANCE CHARACTERISTICS & SPECIAL FEATURES

FC-PERF-005

The Feichun 25 kV SHD-GC mining cable incorporates numerous advanced features that provide exceptional performance in the demanding environment of surface mining operations. The combination of EPR insulation with simultaneous extrusion technology and the double-layer TPU (RCI) jacket delivers outstanding resistance to the full range of mechanical, electrical, and environmental stresses encountered in powering heavy mobile equipment.

Corona Protection: Extruded strand shield creates perfect electrode surface, eliminating partial discharge at 25 kV

Moisture Resistance: EPR insulation and sealed construction provide protection against humidity and vapor ingress

Oil Resistance: TPU jacket and EPR insulation resist petroleum-based fluids common in mining environments

Electrical Stability: Maintains dielectric properties through voltage interruptions, switching transients, and impulse events

Impact Resistance: Double-layer TPU jacket with lead reinforcement absorbs mechanical shocks

Abrasion Resistance: Extra heavy duty jacket withstands dragging over rough terrain

Flame Resistance: Self-extinguishing materials meet FT1 and FT5 flame test requirements

UV/Sunlight Resistance: Formulated for extended outdoor exposure without degradation

Environmental Performance

Conductor Operating Temperature	90°C Maximum
Ambient Temperature Range	−25°C to +80°C
Cold Flexibility (TPU Jacket)	−50°C Rated
Ozone Resistance	Excellent
Weather Resistance	Excellent
Chemical Resistance	Good (mining fluids)
Flame Performance	FT1, FT5 Compliant

Mechanical Performance

Flexibility Rating	Excellent (mining grade)
Jacket Construction	Double layer with lead
Impact Resistance	Excellent (reinforced)
Abrasion Resistance	Extra heavy duty
Torsion Resistance	High
Minimum Bending Radius	8 × OD
Flex Life	Exceeds ICEA requirements

6. APPLICATIONS

FC-APP-006

This Feichun 25 kV SHD-GC mining cable is specifically engineered for delivering high-voltage power to the largest mobile mining equipment operating in surface mining applications. The 25 kV rating enables efficient power transmission over longer trailing cable lengths while minimizing voltage drop and power losses, making it ideal for equipment with high power demands located at significant distances from substation facilities.

Application Category	Equipment Examples
Primary Application: Draglines	Large walking draglines, dragline excavators for overburden removal, coal mining draglines requiring 25 kV power supply
Primary Application: Electric Shovels	Large electric rope shovels, mining shovels with high-voltage motors, P&H and Bucyrus class equipment
Surface Mining Equipment	Bucket wheel excavators, spreaders, large mobile crushers, in-pit conveyors
Dredging Operations	Large cutter suction dredges, mining dredges requiring high-voltage power supply
Material Handling	Large stacker-reclaimers, ship loaders, mobile transfer conveyors
Drilling Equipment	Large rotary blast hole drills, high-power drilling platforms

⚠ **High-Voltage Safety Notice:**

This cable operates at 25,000 volts and presents serious electrical hazards. Installation, maintenance, and repair must only be performed by qualified personnel trained in high-voltage cable handling procedures. Always follow applicable electrical safety

codes and mine safety regulations. De-energize and ground the cable before any work is performed.

7. MARKING, PACKAGING & DELIVERY

FC-PKG-007

Each Feichun cable is permanently marked with indent printing that remains legible throughout the cable's service life, even after exposure to oils, chemicals, and mechanical abrasion. The marking clearly identifies the cable as a 25 kV rated product to ensure proper handling and installation procedures are followed.

Item	Specification
Surface Marking (Indent Print)	FEICHUN CABLE 25KV 3/C 2AWG TYPE SHD-GC FT1 FT5 (-50°C) +90°C P-07-KA030001-MSHA TPU-RCI
Standard Jacket Color	Black (alternative colors available: Red, Yellow, Green, Orange, Blue)
Standard Packaging	1,000 ft (305 m) on heavy-duty non-returnable wooden shipping drums
Alternative Packaging	Custom lengths, returnable steel reels – available on request with minimum order quantities
Documentation	Feichun Quality Test Certificate with complete electrical test data including high-voltage withstand results

8. REGULATORY APPROVALS

FC-REG-008

Feichun SHD-GC 25 kV cables are approved by the U.S. Mine Safety and Health Administration (MSHA) for use in mining operations. The TPU (RCI) jacket version carries its own specific approval number recognizing the enhanced mechanical properties of this jacket material.

Regulatory Authority	Approval Number	Jacket Material
MSHA (Mine Safety and Health Administration)	P-07-KA060012	PCP (Polychloroprene) – Standard
MSHA (Mine Safety and Health Administration)	P-7K268101	CPE (Chlorinated Polyethylene)
MSHA (Mine Safety and Health Administration)	P-07-KA030001	TPU (Thermoplastic Polyurethane) – This Product

9. FEICHUN QUALITY ASSURANCE

FC-QA-009

The Feichun quality management system ensures that every 25 kV mining cable meets the stringent requirements for high-voltage operation. The enhanced testing protocol for 25 kV class cables includes additional electrical tests beyond those required for lower voltage products, verifying the integrity of the insulation system and its ability to withstand the electrical stresses encountered in service.

Test Category	Test Parameters & Methods
Conductor Verification	DC resistance measurement, strand count, tinning quality, lay length confirmation per ASTM B 172
High-Voltage Insulation Tests	AC withstand at >36 kV for 5 minutes; partial discharge testing; insulation resistance at 5000V DC; dielectric strength verification
Shield Integrity	Extruded shield continuity, shield resistance, braid coverage measurement (≥60%)

Jacket Testing	Thickness verification (7.1 mm), tensile strength, elongation, cold bend at -50°C, heat aging, abrasion resistance
Flame Testing	FT1 vertical flame test, FT5 horizontal flame test per ICEA S-75-381
Completed Cable Tests	100% spark test at elevated voltage, dimensional verification, flexibility test, corona extinction verification

Feichun Quality Commitment:

Each 25 kV cable shipment includes a comprehensive Feichun Quality Test Certificate documenting all high-voltage test results with full traceability. Feichun maintains ISO 9001:2015 certification and operates an ISO/IEC 17025 accredited high-voltage testing laboratory. Manufacturing records are retained for a minimum of 15 years for high-voltage products to support long-term warranty coverage and provide technical assistance throughout the extended service life of these critical mining infrastructure components.



FEICHUN SPECIAL CABLES

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