ANHUI FEICHUN SPECIAL CABLE CO., LTD.

安徽飞纯特种电缆有限公司

ARMOURED POWER CABLE - TECHNICAL SPECIFICATION

4C × 35 MM²

4 Core Armoured Power Cable with Steel Wire Armour - 1.1kV Insulation

HEAVY DUTY | SWA ARMOURED | HIGH CURRENT | DIRECT BURIAL

⚡ HEAVY DUTY ARMOURED POWER CABLE

High Current Capacity | Superior Mechanical Protection | Industrial Grade Construction

Number of Cores	Conductor Size	Rated Voltage	Armour Type	Current Rating
4C	35 mm²	1.1 kV	SWA	~145 A

Power Capacity
~100 kW

⚡ CURRENT CARRYING CAPACITY

Direct Burial	Clipped to Wall	On Cable Tray	In Conduit
140 A	155 A	150 A	135 A

1. GENERAL DESCRIPTION

This heavy-duty 4 core armoured power cable features large 35mm² copper conductors with galvanized steel wire armour (SWA), providing exceptional current carrying capacity and superior mechanical protection. Rated at 1.1kV with Class 5 flexible copper conductors, this cable is engineered for demanding industrial power distribution applications requiring high current delivery (approximately 140-155A) and robust protection against mechanical damage, impact, and environmental hazards. The steel wire armour makes it ideal for direct burial installations, industrial plants, main power feeders, large motor connections, and any application where both high power transmission (up to 100kW) and mechanical durability are essential. This cable represents the optimal solution for heavy industrial power requirements.

Parameter	Specification
Cable Designation	**4 Core × 35 MM² Armoured Power Cable**
Number of Cores	**4 Cores**
Conductor Cross-Section	**35 mm² per core**
Rated Voltage U_0/U	**0.6/1.1 kV**
Conductor Material	Annealed Bare Copper (Cu) - Class 5 Stranded
Conductor Type	Flexible Multi-Wire Stranded
Insulation Material	Cross-Linked Polyethylene (XLPE) or PVC
Inner Sheath	Polyvinyl Chloride (PVC) Bedding Layer
Armour Type	**Galvanized Steel Wire Armour (SWA)**
Outer Sheath	Heavy-Duty PVC - Black Standard
Flexibility Grade	Class 5 - High Flexibility
Application Class	Heavy Duty Industrial Power Distribution

2. CABLE CONSTRUCTION & ARMOUR DETAILS

ARMOURED CABLE STRUCTURE (Core to Outer Layer)

1. Conductor Core: Fine stranded annealed copper wires (Class 5), 35mm² nominal per core

2. Conductor Insulation: XLPE or PVC insulation with standard color identification

3. Core Assembly: Four insulated cores twisted in optimal configuration

4. Filler Material: Non-hygroscopic polypropylene filler to maintain roundness

5. Binding Tape: Non-woven separator tape

6. Bedding/Inner Sheath: PVC bedding layer for core protection

⚙ **7. STEEL WIRE ARMOUR (SWA): Heavy-duty galvanized steel wire armour for maximum protection**

8. Outer Sheath: Heavy-duty PVC compound (Black, UV resistant)

Component	Material/Description	Technical Details
Conductor	Class 5 flexible stranded copper	Per IEC 60228, wire diameter ≤0.41mm
Number of Strands	Multiple fine copper wires	Approximately 494+ strands per conductor
Copper Purity	Annealed copper	≥99.9% purity, maximum conductivity
DC Resistance	Maximum at 20°C	≤0.565 Ω/km per conductor
Conductor Diameter	Nominal	Approximately 7.5 - 8.0 mm per core
Insulation Thickness	XLPE or PVC Type	1.0 - 1.4 mm nominal
Core Colors	Standard identification	Brown, Black, Grey, Blue (or as specified)
Inner Sheath Thickness	PVC bedding layer	1.2 - 1.6 mm nominal
Steel Wire Armour	**Heavy-duty galvanized steel wires**	Wire diameter: 1.25 - 1.60 mm (typically 1.25mm)
Armour Application	Helically laid steel wires	Close pitch, single layer, continuous
Galvanization	Hot-dip galvanized	Minimum 50 microns zinc coating
Outer Sheath Thickness	Heavy-duty PVC layer	2.0 - 2.4 mm nominal
Overall Diameter	Approximate	30 - 34 mm (including armour)
Approximate Weight	Per kilometer	1,850 - 2,100 kg/km
Copper Content	Pure copper weight	Approximately 1,245 kg/km (4 × 35mm²)

3. ELECTRICAL CHARACTERISTICS

Parameter	Value	Test Condition / Standard

Rated Voltage (U_0/U)	**0.6/1.1 kV**	AC 50/60 Hz
Maximum Conductor DC Resistance	0.565 Ω/km	At 20°C per IEC 60228
Current Carrying Capacity (Direct Burial)	**135 - 145 A**	Underground, 25°C soil temperature
Current Carrying Capacity (Clipped to Wall)	**150 - 160 A**	Free air, 30°C ambient
Current Carrying Capacity (Cable Tray)	**145 - 155 A**	Perforated tray, 30°C ambient
Current Carrying Capacity (In Conduit)	130 - 140 A	Enclosed conduit, 30°C ambient
AC Voltage Test	3.5 kV for 5 minutes	Between conductors and armour/earth
Insulation Resistance	≥50 MΩ·km	At 20°C
Maximum Operating Temperature	70°C (PVC) / 90°C (XLPE)	Continuous operation
Short Circuit Temperature	160°C (PVC) / 250°C (XLPE)	Maximum 5 seconds duration
Voltage Drop	Approx. 1.25 mV/A/m	At power factor 0.8, 90°C
Power Transmission (3-Phase, 400V)	**Approximately 96-105 kW**	At 145A, 400V, 3-phase, 0.8 PF
Power Transmission (Single-Phase, 230V)	Approximately 33 kW	At 145A, 230V, single-phase
Inductance	Approx. 0.08 mH/km	AC frequency 50 Hz
Capacitance	Approx. 0.30 µF/km	Core to core
Armour Earthing	**MANDATORY at both ends**	Steel wire armour provides earth path

4. MECHANICAL PROPERTIES & ARMOUR PERFORMANCE

Parameter	Specification	Notes
Flexibility Class	**Class 5 - High Flexibility**	Per IEC 60228, despite large size
Mechanical Protection Level	**Heavy Duty - Armoured**	Maximum impact and crush resistance

Minimum Bending Radius (Installation)	12 × Overall Diameter (≥384 mm)	Due to large size and steel wire armour
Minimum Bending Radius (Fixed)	10 × Overall Diameter (≥320 mm)	After installation
Radial Crushing Strength	**Excellent - Heavy armour**	Steel wire armour provides maximum protection
Impact Resistance	**Excellent - Maximum protection**	Suitable for severe mechanical hazards
Rodent Protection	**Excellent - Steel barrier**	Heavy steel wire prevents all gnawing damage
Installation Temperature	≥0°C	Preheating required below 0°C
Operating Temperature Range	-15°C to +70°C (PVC) -20°C to +90°C (XLPE)	Ambient conditions
Maximum Pulling Tension	50 N/mm² of conductor area	During installation (~7,000N total)
Direct Burial	**Excellent - Primary Application**	Armour provides full mechanical protection
Flame Retardant	IEC 60332-1-2	Single vertical wire flame test
Cable Weight (Handling)	Heavy - Requires Equipment	Approximately 1.9 - 2.1 kg per meter

5. TYPICAL APPLICATIONS

Main Power Distribution

Primary power feeders for industrial facilities, commercial complexes, and large buildings

Underground Power Supply

Direct burial installations for permanent underground power distribution networks

Large Motor Connections

Power supply to large motors (55-90 kW), heavy pumps, large compressors, and industrial machinery

Transformer Feeders

Secondary distribution from large transformers to main distribution boards and switchgear

Industrial Plants

Heavy industrial environments - refineries, chemical plants, steel mills, manufacturing facilities

Mining Operations

Surface and underground mining power distribution requiring maximum mechanical protection

Petrochemical Facilities

Power distribution in oil & gas facilities, refineries, and processing plants

Marine & Offshore

Shore power installations, offshore platform feeders, and marine facility power supplies

Data Center Infrastructure

Main power feeds to large UPS systems and high-capacity power distribution units

Building Services

Main incoming cables for large commercial buildings, hospitals, and institutional facilities

Key Advantages: Very high current carrying capacity (140-160A) | Exceptional mechanical protection | Suitable for direct burial without conduit | Low electrical resistance (0.565 Ω/km) | Minimal voltage drop for long runs | Armour provides earthing path | Maximum durability and service life | Cost-effective for high power applications | Rodent and pest proof | UV resistant outer sheath

6. LOAD CAPACITY & APPLICATION EXAMPLES

Application Example	Typical Load	Configuration
Large Industrial Motor	55-75 kW (75-100 HP)	400V, 3-phase
Main Building Distribution	Up to 100 kW	400V, 3-phase feeder
Large Pump Station	75-90 kW	400V, 3-phase
Industrial Compressor	55-75 kW	400V, 3-phase motor
Transformer Secondary	100-200 kVA	400V, 3-phase distribution
Manufacturing Line Power	80-100 kW	400V, 3-phase main feed
HVAC Chiller Unit	55-90 kW	400V, 3-phase
Commercial Building Main	Up to 100 kW	400V, 3-phase incoming supply
Data Center UPS Feed	80-100 kW	400V, 3-phase to UPS system
Mining Equipment	75-90 kW	400V, 3-phase heavy machinery

7. TECHNICAL STANDARDS & COMPLIANCE

Standard	Description
IEC 60502-1	Power cables with extruded insulation for rated voltages from 1 kV to 30 kV
IEC 60228	Conductors of insulated cables - Class 5 flexible conductors
IEC 60332-1-2	Tests on electric cables under fire conditions - Single vertical wire flame test
IEC 60364-5-52	Electrical installations of buildings - Selection and erection of electrical equipment
BS 5467	Electric cables - Armoured cables with thermosetting insulation (Reference standard)
BS 6346	Electric cables - PVC insulated armoured cables (Reference standard)

GB/T 12706	Chinese National Standard for power cables (0.6/1kV to 26/35kV)
IEC 60364	Low-voltage electrical installations - Earthing and protective conductors
RoHS Compliant	Restriction of Hazardous Substances - Environmental compliance
CE Marking	European Conformity (where applicable)

8. INSTALLATION GUIDELINES FOR ARMOURED POWER CABLES

Installation Parameter	Requirement
Cable Handling	**Heavy cable - Mechanical equipment REQUIRED**
Minimum Installation Crew	4-5 persons with proper equipment
Burial Depth (General Areas)	Minimum 600mm below ground level
Burial Depth (Under Roads)	Minimum 900mm - 1000mm below surface
Trench Bottom Preparation	100-150mm sand bedding layer, smooth and level
Cable Laying Method	Lay on sand bed, cover with 150mm sand, install warning tape
Warning Tape	Install 300mm above cable - high visibility "ELECTRIC CABLE BELOW"
Armour Earthing	**CRITICAL - Earth armour at BOTH ends using SWA glands**
Cable Glands	Heavy-duty SWA glands (BW type) size M50 or M63 with earthing tag
Pulling Force	Maximum 7,000N - Use cable pulling winch and lubricant
Maximum Pulling Length	40-60 meters (use intermediate pull boxes for longer runs)
Cable Rollers	Required every 3-5 meters during installation
Support Spacing (Vertical)	Maximum 0.3 - 0.4 meters due to cable weight
Support Spacing (Horizontal)	Maximum 0.8 - 1.2 meters on heavy-duty cable tray
Cable Tray Width	Minimum 200mm width to accommodate cable diameter
Termination	Heavy-duty cable lugs rated for 35mm² (M12 or M16 stud)
Crimping Tools	Hydraulic crimping tools MANDATORY for 35mm² lugs
Torque Specifications	Follow manufacturer specifications for terminal connections

CRITICAL INSTALLATION WARNINGS:

- **VERY HEAVY CABLE:** Approximately 2 kg per meter - mechanical equipment MANDATORY
- **ARMOUR EARTHING IS CRITICAL:** Failure to earth steel wire armour creates lethal shock hazards
- Never use standard cable glands - ONLY use SWA-specific glands with proper earthing
- Do NOT exceed minimum bending radius (384mm) - armour wires will break causing safety hazards
- Use cable pulling winch - manual pulling is dangerous and inadequate
- Install warning tape 300mm above cable to prevent future excavation damage
- Test armour earthing continuity with low-resistance ohmmeter before energizing
- Use hydraulic crimping tools - manual tools cannot achieve proper compression
- Verify all connections are tight - loose connections at high current cause fires
- Follow manufacturer torque specifications precisely
- PROFESSIONAL INSTALLATION BY QUALIFIED, EXPERIENCED ELECTRICIANS MANDATORY
- Comply with all local electrical codes, safety regulations, and standards

9. VOLTAGE DROP CALCULATIONS

Voltage drop examples for typical high-power installations:

Application	Current	Distance	Voltage Drop	% Drop
75kW Motor (400V, 3-phase)	135 A	50 m	8.4 V	2.1%
100kW Load (400V, 3-phase)	180 A	30 m	6.8 V	1.7%
Main Distribution (400V)	145 A	60 m	10.9 V	2.7%
Transformer Secondary (400V)	150 A	40 m	7.5 V	1.9%
Building Main Supply (400V)	140 A	80 m	14.0 V	3.5%

Voltage Drop Performance: This 4×35mm² cable provides excellent voltage drop characteristics for high-power applications. Suitable for cable runs up to 100 meters at full rated current while maintaining voltage drop under 5%. For longer distances or higher currents, consider 50mm² or 70mm² conductors. Low resistance (0.565 Ω/km) ensures efficient power delivery.

10. QUALITY ASSURANCE & TESTING

Rigorous quality control for every production batch:

- **Conductor DC resistance test:** Verified ≤0.565 Ω/km at 20°C per IEC 60228
- **High voltage test:** 3.5 kV AC for 5 minutes between conductors and armour
- **Insulation resistance test:** Minimum 50 MΩ·km at 20°C
- **Comprehensive dimensional verification:** Conductor diameter, insulation thickness, armour wire diameter, overall diameter
- **Armour wire quality test:** Tensile strength minimum 1,200 N/mm²
- **Galvanization quality check:** Zinc coating thickness and adhesion test

- **Flexibility test:** Bending test per IEC 60228 Class 5 requirements for large conductors
- **Mechanical strength testing:** Tensile and elongation testing of insulation and sheath
- **Thermal aging test:** Accelerated aging to verify long-term reliability
- **Fire performance test:** Flame propagation per IEC 60332-1-2
- **Armour continuity test:** Electrical continuity and low-resistance verification
- **Copper purity test:** Conductivity measurement (≥99.9% IACS)
- **Complete visual inspection:** Construction, marking, and finish quality

Quality Certification: Manufactured under ISO 9001:2015 quality management system with full traceability. Complete type test reports per IEC 60502-1, routine test certificates for every drum, and certificates of conformity provided. Third-party testing by accredited laboratories available. Factory acceptance testing (FAT) can be arranged for major projects. All test data recorded and archived for 10+ years.

11. PACKAGING, STORAGE & DELIVERY

Item	Details
Standard Length	100m, 200m, 300m, or customized (weight/transport limits apply)
Maximum Length per Drum	Typically 250-400m depending on drum size and transport limits
Packaging Type	Heavy-duty steel drums (large diameter) - reinforced construction
Typical Drum Weight	500-850 kg depending on length (cable alone: ~2 kg/m)
Cable Marking	Sequential meter marking every 1 meter on outer sheath
Marking Information	Manufacturer, 4C×35MM² SWA, 0.6/1.1kV, date code, sequential footage
Documentation	Type test report, routine test certificate, certificate of conformity, material declaration, installation guide, drum data sheet
Storage Conditions	Store drums upright on firm, level ground in covered, dry area
Storage Temperature	-5°C to +35°C - protect from extreme temperatures
Shelf Life	24 months under proper storage conditions
Handling Equipment	Forklift or crane REQUIRED - drums are very heavy
Transportation	Secure drums properly - use heavy-duty transport equipment
Lead Time	30-45 working days after order confirmation (subject to quantity)

Minimum Order Quantity	500 meters (negotiable for major projects)

12. TECHNICAL CALCULATIONS & DESIGN DATA

Parameter	Value	Notes
Impedance (Z)	Approx. 0.575 Ω/km	At 50 Hz, 90°C operating temperature
Reactance (X)	Approx. 0.080 Ω/km	At 50 Hz frequency
Power Factor	cos φ = 0.8 (typical industrial)	For load calculations
Short Circuit Current (1 sec)	Approx. 8.5 kA (PVC)	Final temperature 160°C
Short Circuit Current (1 sec)	Approx. 13.3 kA (XLPE)	Final temperature 250°C
Maximum Cable Run (2% drop)	Approx. 110 meters	At 145A, 400V, 3-phase, 0.8 PF
Maximum Cable Run (5% drop)	Approx. 275 meters	At 145A, 400V, 3-phase, 0.8 PF
Thermal Time Constant	Approx. 35-45 minutes	Time to reach 63% of final temperature

Important Technical Information:

- This specification is for reference and subject to technical modifications
- Custom options: LSZH (Low Smoke Zero Halogen) sheath, XLPE insulation (90°C operation), special colors, double armour
- For very high current applications (>160A continuous), consider parallel cables or larger conductor sizes
- Installation MUST comply with IEC 60364, NEC, or applicable local electrical codes
- Professional engineering design and installation by experienced contractors MANDATORY
- Load calculations, fault current analysis, voltage drop studies must be performed by qualified engineers
- Circuit protection devices (MCCB) must be properly rated and coordinated
- Armour earthing must be tested and verified - this is a life-safety requirement
- For hazardous areas (ATEX/IECEx), use certified glands and proper installation procedures
- For specialized environments (high temperature, chemical exposure, marine, nuclear), consult technical department
- System earthing and grounding must meet all applicable standards and regulations

飞纯电缆

FEICHUN SPECIAL CABLES

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