

Section 1A

Illuminated Mining Cables to AS/NZS 1802:2003

Self-Powered LED | Underground Coal | Shuttle Cars & Pumps

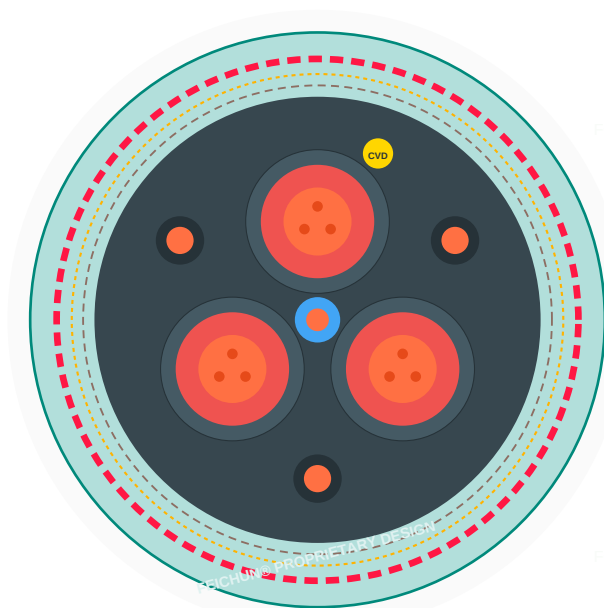
TYPE 275-LED

1.1 kV | AS/NZS 1802

SELF-POWERED LED VISIBILITY
Underground Coal Mining Certified

A flexible reeling cable for shuttle cars, pumps, and similar underground coal mining equipment — designed and certified to AS/NZS 1802:2003 for use in underground coal mines with methane/coal dust hazardous atmospheres — featuring integrated self-powered LED illumination for enhanced roadway visibility and personnel safety.

AS/NZS 1802:2003 CERTIFIED · UNDERGROUND COAL MINING · SELF-POWERED LED · FEICHUN® EXCLUSIVE



- Translucent FR-TPU Sheath (FC-TPU™ S-Series)
- Integrated LED Strip (Warning Red 620–630 nm)
- Aramid Stress-Relief Braid (FC-ASB™)
- Open-Weave Textile Reinforcement
- Semi-Conductive Elastomer Filler
- Semi-Conductive Elastomeric Cradle / Screen
- EPR Insulation (Phase Cores)
- Tinned Copper Conductors (Class 5)
- SC Elastomer Insulated Interstitial Earths
- EPR Insulated Extensible Pilot Core
- FC-CVD™ Shunt Module (1.1 kV)

Cable Construction (Inside → Out)

- Conductors** — Annealed tinned copper, flexible Class 5 stranding per AS/NZS 1125.
- Insulation** — EPR (Ethylene Propylene Rubber) per AS/NZS 1802:2003, Cl. 4.4.
- Core Screening** — Semi-conductive elastomeric cradle/screen around each phase core.
- Earth Cores** — Semi-conductive elastomer insulated interstitial earth conductors.
- Pilot Core** — EPR insulated extensible pilot conductor (0.75 mm² at 16–25 mm²; 1.25 mm² at 35–50 mm²).
- Filler** — Semi-conductive elastomer filler.
- FC-CVD™ Module** — FeiChun® internal solid-state capacitive voltage divider (all variants 1.1 kV).
- LED Strip** — Industrial-grade flexible LED strip, warning red (620–630 nm), silicone encapsulated.
- Stress-Relief** — FeiChun® FC-ASB™ aramid braid surrounding LED FPC circuits.
- Textile Reinforcement** — Open-weave textile reinforcement layer.
- Outer Sheath** — Heavy duty translucent FR-TPU/PUR (FeiChun® FC-TPU™ S-Series for shuttle-car duty).

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FC-TPU™ S-Series | Shuttle-Car Grade | Formula FC-2026-TPU-S2 | FeiChun Exclusive

Note: The TYPE 275-LED is specifically designed and certified to **AS/NZS 1802:2003** — the dedicated Australian/New Zealand standard for underground coal mining reeling and trailing cables. This is distinct from the AS/NZS 2802:2000 standard that governs the Type 409/412/440/441/450/455 series. AS/NZS 1802 imposes additional requirements for flame propagation, earth fault monitoring, pilot circuit integrity, and methane atmosphere compatibility that are mandatory for underground coal mine service.

1A.1 TYPE 275-LED — Dimensional & Electrical Data

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Type	Part No.	Voltage	Cond. Size mm ²	Cond. Dia. mm	Screen Area (each) mm ²	Dia. Over Screen mm	Pilot Size mm ²	LED Power	Sheath Thk. mm	Cable O.D. mm	Weight kg/100 m
275-LED.1	MCU-275L.1-016	1.1kV	16	9.5	2.76	4.2	0.75	FC-CVD™	4.4	35.5	198
	MCU-275L.1-025	1.1kV	25	10.8	4.45	4.8	0.75	FC-CVD™	4.7	39.0	259
	MCU-275L.1-035	1.1kV	35	12.0	6.15	5.2	1.25	FC-CVD™	5.0	42.5	325
	MCU-275L.1-050	1.1kV	50	13.8	8.06	5.7	1.25	FC-CVD™	5.4	47.0	420

Dimensions and weights are nominal ± manufacturing tolerances. Cable O.D. includes FeiChun® LED strip, FC-ASB™ aramid braid, and FC-SPM™ circuits. Weights approx. 10–14 % greater than standard Type 275. Part numbers use **MCU-** prefix (underground coal series) per FeiChun convention. All variants use FC-CVD™ capacitive voltage divider as the Type 275 operates exclusively at 1.1 kV.

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1A.2 FeiChun® FC-CVD™ Self-Powered LED Technology

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FC-CVD™ Capacitive Voltage Divider | 1.1 kV Shuttle-Car Optimised | FeiChun Exclusive

The TYPE 275-LED operates exclusively at 1.1 kV, where FeiChun's **FC-CVD™ capacitive voltage divider** provides the most reliable energy harvesting. Shuttle car cables experience extreme dynamic bending cycles (reel-in/reel-out up to 300 m per panel) with highly variable load currents — the FC-CVD™ delivers stable LED power regardless of load fluctuations:

- FC-CVD™ Module:** FeiChun's ultra-compact flexible capacitive voltage divider integrated within the cable lay-up. High-impedance tap draws only tens of milliamps from the phase conductor — a negligible fraction of shuttle-car rated current.
- Shuttle-Car Load Tracking:** Unlike dragline or continuous-miner cables that carry relatively steady loads, shuttle-car feeders experience rapid load cycling (acceleration, loaded haul, braking, empty return). FeiChun's FC-CVD™ S-variant includes enhanced capacitor bank sizing to bridge momentary zero-load intervals, ensuring flicker-free LED illumination throughout the shuttle cycle.
- Onboard Regulation:** Flexible-substrate rectifier + LDO produces clean 12 V DC.
- Zero Infrastructure Change:** No external DC supply. No gate end box modification. Existing plugs and couplers unchanged. True plug-and-play.

1A.3 FeiChun® FC-SPM™ Surge Protection

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Layer	Component	Function
1	TVS Diodes	Picosecond clamping of transient spikes from shuttle-car motor switching.
2	Zener / LDO	Locks LED rail to 12 V DC. Eliminates flicker during load cycling.
3	PTC Resettable	Auto-resets after overcurrent. No replacement required.

1A.4 FeiChun® FC-TPU™ S-Series Shuttle-Car Grade Sheath

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❑ FEICHUN PROPRIETARYFC-TPU™ S-Series | Formula FC-2026-TPU-S2 | Extreme Flex-Cycle Rated | FeiChun Exclusive

Shuttle-car reeling cables endure the most punishing dynamic bending regime in underground coal mining — hundreds of reel-in/reel-out cycles per shift, often over broken stone and through tight roof-bolt patterns. FeiChun's **FC-TPU™ S-Series** (Shuttle-Car Grade, Formula FC-2026-TPU-S2) is specifically developed for this extreme duty:

- **Extreme Flex-Cycle Life** — FC-TPU™ S2 formulation includes enhanced elasticity and fatigue resistance. Tested to exceed 50,000 bending cycles at the minimum bending radius specified in AS/NZS 1802:2003 Cl. 4.10 without loss of light transmittance or mechanical integrity.
- **High Light Transmittance** — Clear 620–630 nm transmission even after prolonged service. LED glow remains visible after thousands of reeling cycles.
- **Flame Retardancy** — Meets AS/NZS 1802:2003 Cl. 4.12 flame propagation requirements (more stringent than AS/NZS 2802). Halogen-free; self-extinguishing; no toxic fumes.
- **Abrasion Resistance** — 3–5× conventional elastomer. Resists gouging from broken stone, roof bolts, and conveyor structures during cable trailing on the mine floor.
- **Low-Temperature Flexibility** — Maintains translucency and flexibility at underground ambient temperatures (typically 20–35 °C, but critical for surface pre-commissioning at sub-zero conditions in southern Australian winters).
- **Chemical Resistance** — Resistant to stone-dust slurry, hydraulic fluids, and shuttle-car grease.

1A.5 AS/NZS 1802:2003 & Additional Standards Compliance

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The TYPE 275-LED is certified to **AS/NZS 1802:2003** — the primary standard governing electric cables for underground coal mining in Australia and New Zealand. This standard imposes requirements beyond AS/NZS 2802, including mandatory flame-propagation testing, earth-fault loop impedance limits, and pilot-circuit continuity monitoring:

Standard	Title / Scope	Applicability
AS/NZS 1802:2003	Electric cables — Reeling and trailing — For underground coal mining	PRIMARY STANDARD. All construction, electrical, mechanical, flame-propagation, earth-fault and pilot-circuit requirements fully maintained.
AS/NZS 60079.11	Explosive atmospheres — Intrinsic safety 'i'	LED circuit: Ex ia IIC Ga/Gb. FC-CVD™ capacitively limited below IS energy thresholds.
AS/NZS 3808:2000	Electrical equipment for coal mines — Intrinsic safety	LED circuit meets Group I (methane) IS requirements. Mandatory for underground coal.
AS/NZS 62208	Empty enclosures — Low-voltage switchgear	Compatible with existing gate end boxes and shuttle-car coupler hardware.
AS/NZS 1125	Conductors in insulated electric cables	Conductor material, stranding, resistivity.
IEC 60079.0	Explosive atmospheres — General	General construction for hazardous zones.
Coal Mining Safety Regulations (State)	QLD CSMH Act 1999 / NSW WHS (Mines) Reg 2014	Compliant with state-level coal mining safety legislation requiring AS/NZS 1802 certified cables for underground coal reeling applications.

1A.6 Key Advantages & Operational Benefits

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1 Underground Coal Certified (AS/NZS 1802)

The TYPE 275-LED is the world's first LED-illuminated cable certified to AS/NZS 1802:2003 — the mandatory standard for underground coal mining reeling cables in Australia. All flame-propagation, earth-fault, and pilot-circuit requirements are fully satisfied.

2 Shuttle-Car Visibility

Continuous red glow delineates the trailing cable path behind operating shuttle cars. Personnel can visually trace the cable through roadway intersections and around blind corners — dramatically reducing trip-over and run-over incidents in the #1 hazard zone of underground coal production panels.

3 Plug-and-Play for Existing Shuttle Cars

No external DC supplies. No gate end box modifications. No coupler changes. Direct drop-in replacement for standard Type 275. Disconnect → connect → energise → glow.

4 Intrinsically Safe for Methane Atmospheres

LED strips generate negligible heat (cold light). FC-CVD™ capacitive current limiting restricts energy below Ex ia IIC ignition thresholds. AS/NZS 3808 and AS/NZS 60079.11 compliant for Group I (methane/coal dust) atmospheres.

5 FeiChun® FC-TPU™ S-Series Extreme Flex Durability

Shuttle-car grade translucent sheath rated for 50,000+ bending cycles. 3–5× abrasion resistance vs conventional elastomer. Maintains light output after years of service.

6 Live Cable Indication in Production Panels

Immediate visual confirmation that the shuttle-car cable is energised — critical during panel changeovers, cable splicing, and lock-out/tag-out procedures where multiple cables may be present in confined spaces.

7 Maintenance-Free FC-SPM™

Autonomous surge protection with PTC auto-reset. Designed for full cable service life with zero maintenance on the illumination circuit.

8 State Mining Regulation Compliance

Satisfies QLD CSMH Act 1999 and NSW WHS (Mines) Regulation 2014 requirements for AS/NZS 1802-certified underground coal reeling cables.

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