

GOING UNDER GROUND

ISSUE #2
MV JOINTING

THE JOINT IS THE TEST

Branch, transition,
straight and
separable - the
engineering of
the connection.

Bowthorpe[®]

Lucy Electric

NKT

EFEN 

Langmatz 

PFISTERER

POLARIS

insulect
VERSATILITY VIA COLLABORATION

Sieyuan

Tough connection. **Proven solution.**

A cable is manufactured in a factory, tested under controlled conditions, and delivered on a drum with a certificate. A joint is made in the ground, by hand, often on a live network, often at night, often in weather. It is the most worked and the most vulnerable point in any cable system, and it is where reliability is won or lost. When a network records a premature cable failure, the joint is where the investigation usually starts.

Issue 1 took the network underground from the civil structure up; this issue follows the voltage as it climbs, into the joints and connectors that carry it through MV and into HV, from 36 kV to 170 kV. As New Zealand's networks densify, age and add new generation, the variety of joints multiplies: branching a circuit so cable runs direct instead of doubling back, as a wind farm does across a ridgeline; transitioning decades-old gas- and oil-filled cable into new XLPE; the everyday straight joint at 36 kV and again at 72.5 kV; and the pluggable joint that can be separated and remade, at both tiers.. The system table that follows shows how each one fits, and it's written for the people who own the consequences of a joint: asset managers, engineering consultants, project managers and design estimators.

**Underground jointing
isn't new. Getting it
right is.**

Complete Joint Classification. Total System Confidence

Across an MV–HV cable network, almost every joint falls into one of a handful of types. This issue covers them - one supplier relationship, one accountable partner, from 36 kV to 170 kV.

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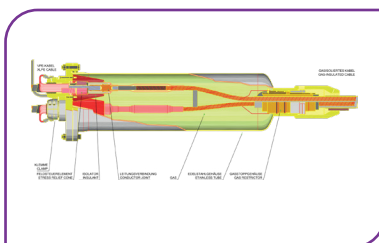
MV JOINTING

01 BRANCH JOINT



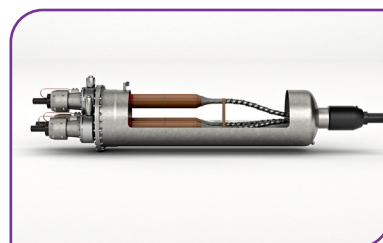
NKT JPI3-4W Branch Joint
Branch up to three strings per phase from one in-line joint - route cable directly instead of doubling back.

02 TRANSITION GAS JOINT



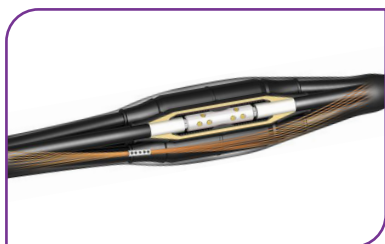
NKT GAS-TJ 36 Joint
Connect three-core gas-pressure cable to three single-core XLPE cables.

03 TRANSITION OIL JOINT



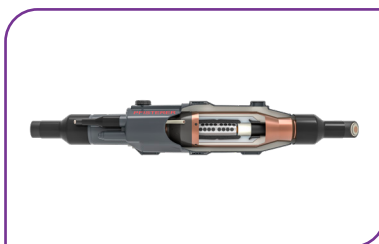
NKT 72.5-170kV Oil joint
Connect single/three-core oil-filled (LPOF) cable to XLPE.

04 STRAIGHT MV JOINT



NKT 36kV Slipover Joint
The routine 36 kV through-joint, slip-on, shear-bolt connectors.

05 STRAIGHT HV JOINT



Pfisterer MSA Joint
The 72.5 kV through-joint, one-piece silicone, individually tested.

06 PLUGGABLE MV JOINT



Pfisterer CONNEX Cable Joint
Single-pole, resistant to outdoor, soil-resistant, offshore proof.



07 PLUGGABLE HV JOINT

Pfisterer SEANEX Connection Joint
Plugable connection between two cable lines.



The smarter way to branch.

Onshore wind farms are usually wired turbine-to-turbine in strings - a daisy-chain. Because turbines are sited along the hills and ridges that catch the best wind, the MV cables between them have to follow the terrain. In practice that means a cable runs down from one turbine and back up to the next, creating long double-runs. Every extra metre of cable is extra material, extra trenching, and extra installation effort - cost that lands squarely on the project budget and the programme.

A more direct approach

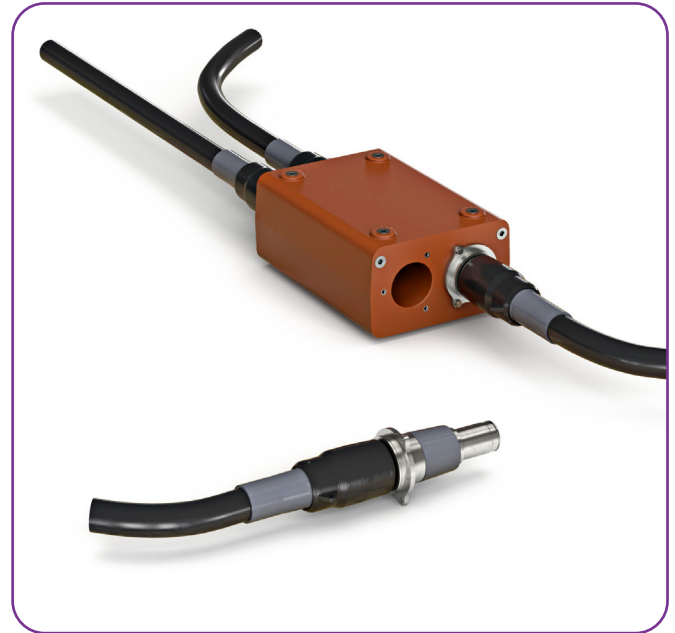
The NKT JPI3-4W is a branch joint that lets you lay cables in a spider-web configuration instead of a daisy-chain. Circuits can be collected at the foot of the terrain rather than carried back up to each turbine, so the routing is more direct and the network needs less cable.

Less cable means lower procurement, trenching and installation costs - and more freedom in how you lay the system out across difficult ground.

WHEN TO SPECIFY

For design estimators

Pre-engineered for spider-web layouts and compatible with NKT CPI 3 and CPI 3XL inner-cone connectors (CWS and CTS screens), so it drops into a branched MV design without bespoke engineering. The envelope is defined - 450 × 370 × 200 mm, 30 kg, 1250 A, 40 kA / 5 s thermal short-circuit withstand - and a documented type-test package is available on request for specification review. Type-tested to recognised IEC/HD requirements.



NKT JPI3-4W Branch Joint

Why the solid design matters

The JPI3-4W is a fully solid, vacuum-cast epoxy joint - every unit X-rayed to 100% in production. That construction is the source of its practical advantages:

No internal cavity. There are no hollow voids inside the body, so there is nothing to collapse under burial load.

Sealed against water. With no air pockets for water to occupy, the cast body resists ingress in the trench. (IP / immersion rating to be confirmed with NKT.)

Direct heat path. Heat transfers straight through the resin rather than across air gaps, supporting the joint's 1250 A continuous rating.

Compact footprint. At 450 × 370 × 200 mm the body is smaller than typical metal-box branch enclosures, so less excavation is required.

Lays the way cables do. A straight, in-line plug connection follows the natural geometry of cables sitting flat in the trench - no separable elbows to accommodate.

Compared with hollow or metal-box branch designs, the solid approach is what gives the JPI3-4W its reliability, compactness and ease of installation.

Connecting yesterday's cable to tomorrow's network.

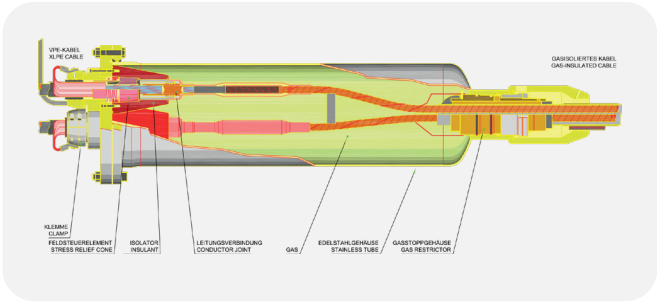
The transition joint reshapes the newest networks - the generation coming online. This one reconciles an old network with a new one.

Across New Zealand, sections of older gas-pressure cable are still in service - assets with decades of life behind them and a finite span ahead. When a section reaches end of life, or a network extends past it, the practical question is rarely "rip it all out" - it's "how do we connect what's there to the XLPE we're installing now, safely and cleanly."

The NKT GAS-TJ 36 is built for exactly that join: a transition joint that takes a three-core gas-pressure cable to three single-core XLPE cables, at operating voltage up to 36 kV. An integrated trifurcating box handles the three-core-to-single-core split inside the one assembly.

Each side of the joint is treated on its own terms. The XLPE side uses a pre-moulded silicone-rubber stress cone for field control. The gas side uses special heat-shrink tubes acting as oil barrier and stress control, with a gas restrictor to hold back gas loss during the work. The two are bridged by a pressure-tight epoxy-resin insulator with an embedded electrode, and conductors are joined by compression connector. A GRP housing protects the XLPE side, and screen separation is available.

It carries conductors up to 500 mm² (Cu or Al) on the XLPE side, and up to 500 mm² Cu / 400 mm² Al on the gas side, with larger sections on request.



NKT GAS-TJ 36 Gas Transition Joint

TECHNICAL DATA

Item	Rating / Detail
Type	GAS-TJ 36 transition joint (gas-pressure cable → XLPE)
Operating voltage (Um)	Up to 36 kV
Configuration	Three-core GAS cable to three single-core XLPE cables; integrated trifurcating box
Conductor - XLPE side	Up to 500 mm ² Cu / 500 mm ² Al
Conductor - GAS side	Up to 500 mm ² Cu / 400 mm ² Al (larger on request)
XLPE stress control	Pre-moulded silicone-rubber stress cone
GAS-side stress control	Special heat-shrink tubes (oil barrier + stress control)
Insulator	Pressure-tight epoxy resin with embedded electrode
Conductor connection	Compression type
Outer protection (XLPE)	GRP housing
Other	Gas restrictor limits gas loss; screen separation possible

WHEN TO SPECIFY

For asset managers

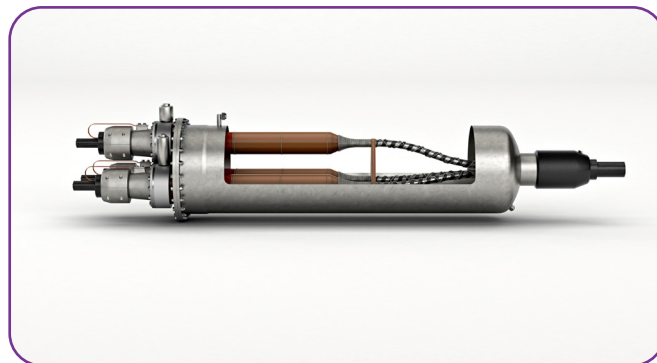
This is a lifecycle product, not a new-build one. It lets you stage the retirement of gas-pressure cable against your replacement budget instead of committing to wholesale renewal - bringing existing assets into new XLPE runs as the programme allows. The conductor range (to 500 mm²) and the gas restrictor that limits loss during the join both matter when you're working on a pressurised legacy circuit.

Where the oil-filled network meets XLPE.

Oil-filled cable has carried high-voltage underground links, sub-transmission and transmission alike, for decades. As those circuits are extended or partially renewed, the joint between the original low-pressure oil-filled (LPOF) cable and new XLPE has to hold at high voltage and prove it against more than one standard.

The NKT TJ transition joint connects single- or three-core LPOF cable to single-core XLPE cable, with aluminium or copper conductors. The family is rated to a minimum system voltage (U_m) of 72.5 kV and runs up to 170 kV, supplied as three defined builds - TJ 84-1, TJ 84-3 and TJ 170-3 - so the right one is specified to the cable rather than adapted on site. It is designed to IEC 60141-1, SS 424 14 17 and IEC 60840.

The two cable technologies are handled distinctly. The XLPE side uses a pre-moulded silicone stress cone for field control, with a metal cable gland, expansion vessels and insulating oil. The oil-cable side uses a stress cone built from oil-impregnated insulation paper, carbon paper, copper mesh and a stress-relief ring. Between them sits an epoxy-resin insulator, with a compression-type conductor bolt and compression connectors making the through-connection. The assembly is carried in a stainless-steel housing with an oil feed-in; an oil-stop housing reduces oil loss during installation, and a glass-fibre outer housing with filling compound provides outer protection.



NKT 72.5-170kV Oil Transition Joint

WHEN TO SPECIFY

For engineering consultants

A multi-standard transition designed to IEC 60141-1, SS 424 14 17 and IEC 60840 - the standard that governs the type-test regime for the XLPE side (partial discharge, AC withstand, impulse and heating cycles). The datasheet is specific about what each side is made of and what each of the three builds covers, which is the level of detail an insulation-system and conductor-joint interface review actually needs; type-test certificates are available from NKT on request. The honest trade-off to state up front: this is a transition between two fundamentally different insulation systems - oil-impregnated paper versus XLPE - so the oil-stop housing, oil feed-in and expansion-vessel detail are not optional extras. They are the join.

VARIANT DATA - NKT TJ 84-170 KV

Type	Voltage	LPOF core	Max. XLPE / LPOF cross-section	Max. XLPE insul. Ø	Max. oil-side Ø	Max. dimensions (L x Ø)
TJ 84-1	84 kV	Single-cable	1000 / 800 mm ²	66.0 mm	78.0 mm	1800 × 250 mm
TJ 84-3	84 kV	Three-cable	1000 / 800 mm ²	66.0 mm	114.0 mm	2500 × 480 mm
TJ 170-3	170 kV	Three-cable	1000 / 630 mm ²	83.5 mm	114.0 mm	3400 × 700 mm

NKT SOJ HSTS 36 kV Slip-Over Joint

STRAIGHT JOINTING - MV

Slip it on. Pull the insert. Sealed under its own pressure.

After the branches and transitions comes the most common joint on a 36 kV run - the straight through-joint. It's routine, and routine punishes inconsistency: strip quality, conductor cleanliness and connector torque are exactly the variables a busy crew has least time to get right when the programme is tight.

The NKT SOJ HSTS takes those variables off the table. It's a pre-moulded joint with a heat-shrink outer jacket, for 36 kV XLPE- and EPR-insulated cable, 1- or 3-core, in aluminium or copper. The EPDM body is built in three layers - conductive, insulating, conductive - and pre-expanded on plastic inserts. Once the conductors are connected and the body centred, the inserts pull out and it grips the insulation under its own active pressure, following the cable under load. No flame to seat it.

The kit is complete and restores every layer: heat-shrink jacket, vulcanising tape, and shear-off-bolt connectors for conductor and screen - so torque is set by the bolt, not the installer. You select on one number, insulation diameter (19–46.5 mm), covering 50–630 mm² - down to 16 mm² with the ADAPTER - with kit weights of 3.3–10.9 kg.

Supported in New Zealand by Hiko, NKT's local partner - technical support, installation guidance and manufacturer-backed warranty.

RANGE DATA - NKT SOJ HSTS 36 KV

Insulation Ø (mm)	Conductor cross section (mm ²)	1-core kit (kg/kit)	3-core kit (kg/kit)
19–23.5	50–70	SOJ 361-1 70 HSTS · 3.3	SOJ 361-3 70 HSTS · 5.8
22.5–28	50–70	SOJ 362-1 70 HSTS · 3.6	SOJ 362-3 70 HSTS · 6.9
22.5–28	95	SOJ 362-1 95 HSTS · 3.6	SOJ 362-3 95 HSTS · 6.9
27–35	95–150	SOJ 363-1 150 HSTS · 4.3	SOJ 363-3 150 HSTS · 8.8
27–35	185–240	SOJ 363-1 240 HSTS · 4.3	SOJ 363-3 240 HSTS · 8.8
33.5–46.5	185–240	SOJ 364-1 240 HSTS · 5.2	SOJ 364-3 240 HSTS · 10.6
33.5–46.5	300–400	SOJ 364-1 400 HSTS · 5.3	SOJ 364-3 400 HSTS · 10.7
33.5–46.5	500–630*	SOJ 365-1 500 HSTS · 5.5	SOJ 365-3 500 HSTS · 10.9

WHEN TO SPECIFY

For project managers

A programme product. One kit per joint, no open-flame seating step, and shear-off bolts that give every crew the same connection every time. Select by insulation diameter and you know the kit weight before you leave the depot - fewer site variables, fewer call-backs. Delivery certainty too: across 2024–2025, over 99% of Hiko deliveries arrived on time.



SOJ HSTS 3-Core Kit

One piece. Individually tested. Built for the cable's lifetime.

The straight join again - this time at 72.5 kV, where there is no room for field variables or a part that needs revisiting. The Pfisterer MSA 72 answers that with a one-piece, pre-assembled silicone joint body: geometrical field control, slipped over the prepared cable as a single body, and individually tested before it leaves the factory.

TECHNICAL DATA

Item	Rating / Detail
Type / standard	One-piece silicone-rubber slip-on joint (MSA 72-XKG); IEC 60840 type-tested
Voltage (Um / Un)	72.5 kV / 60–69 kV
Test levels	BIL 325 kV · AC withstand 90 kV (15 min type / 30 min routine) · PD < 5 pC at 1.5 Uo · thermal s/c 63 kA (1 s)
Conductor & range	150–2000 mm² Cu/Al (family); XKG bolted to 1600 mm² (A1–A4 ≤1200, A5–A6 800–1600); bonding ≤ 630 mm²; Ø over insulation 37–87 mm
Dimensions / weight	L1 2300 mm · Ø 400 mm · 125–130 kg

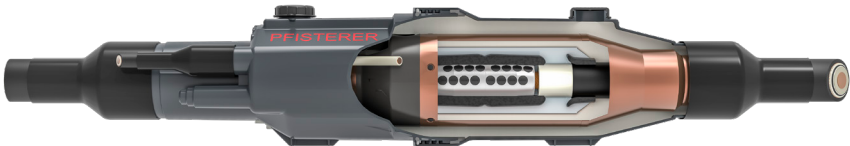
It joins copper or aluminium conductor cables and is finished with a choice of outer and inner housings and screen versions for the specific installation. It is rated Um 72.5 kV (Un 60–69 kV), with a 325 kV lightning impulse (BIL) withstand and partial discharge under 5 pC. Across the MSA 72 family it accepts conductor cross-sections from 150 to 2000 mm² over prepared-insulation diameters of 37–87 mm, with bonding connections up to 630 mm².

The MSA 72-XKG slip-on variant is type-tested to IEC 60840, the XKG carries a 90 kV AC withstand (15-minute type test, 30-minute routine test) and a 63 kA thermal short-circuit withstand for 1 second. It is built around a bolted connector rated up to 1600 mm² - joint sizes A1–A4 to 1200 mm², A5–A6 from 800 to 1600 mm² - in an injection-moulded, clean-room silicone body with a PP outer housing and cold filling compound. Assembled, it measures 2300 mm long at 400 mm diameter and weighs 125–130 kg depending on size, with a Pfisterer-stated 40-year expected service life after installation by certified fitters.

WHEN TO SPECIFY

For asset managers

A 40-year part by design, backed by test data rather than adjectives: 325 kV BIL, partial discharge under 5 pC, and individual testing of every body before delivery. The Hiko datasheet states the connection is made for the cable's lifetime; Pfisterer's XKG variant data puts a 40-year expected service life and a 63 kA/1 s thermal short-circuit withstand on it, type-tested to IEC 60840. For a buried HV joint, that combination - tested individually, certified on install, then left alone - is a genuine lifecycle input, and the local technical support behind it means the 40-year decision isn't made on a datasheet alone.



Pfisterer MSA Joint

For flexible situations - the joint you can pull apart.

The joints so far have been permanent - made once, and made to stay. The last two are built to come apart. The Pfisterer CONNEX cable joint is a plug-in connection between two 36 kV cable lines: a factory-built joint body with the contact bushings moulded into a soil-resistant insulating body, closed by inserting a CONNEX separable connector. Because the connection plugs together rather than being cast or moulded in place, it can be separated and remade without rebuilding the joint.

That makes it suited where a permanent joint isn't. It is rated for outdoor, offshore and underground use, single-pole, and built to sit in soil directly. For underground or offshore duty the bell flanges of the separable connectors must be bronze, because the soil sensitivity comes from the bell flange's contact with the soil. It is a straight, Size 1 joint rated U_m 36 kV and 630 A, weighing 5.8 kg in a compact body 143 mm in diameter and 263 mm long — supplied factory-built and supported in New Zealand by Hiko.



CONNEX Cable Joint

TECHNICAL DATA

Item	Rating / Detail
Type	CONNEX cable joint, Size 1, single-pole, plug-in (straight)
Application	Outdoor, offshore and underground; soil-resistant body
Max. system voltage (U_m)	36 kV
Nominal current (I_N)	630 A
Size 1	Design Straight
Dimensions	Diameter 143 mm · length 263 mm · weight 5.8 kg
Note	For underground/offshore use, the separable-connector bell flanges must be bronze

WHEN TO SPECIFY

For engineering consultants

This is an environmental-suitability decision as much as an electrical one. The joint is soil-resistant and rated for direct burial and offshore duty at 36 kV / 630 A - but the soil sensitivity sits at the bell-flange/soil interface, so the bronze bell-flange requirement for buried or offshore use isn't optional, it's the spec. The plug-in construction is the other half of the case: a connection that can be separated and remade is a maintenance and reconfiguration argument, not just a first-fit one.

Plug in and out wherever and whenever you need.

Where CONNEX makes a pluggable join at 36 kV, the Pfisterer SEANEX connection joint does it at 72.5 kV. It is a pluggable connection between two cable lines, designed to be made, broken and remade — for temporary use during testing, as an interim solution while a line is under construction, or as a permanent connection.

TECHNICAL DATA

Item	827 235 001
Type	SEANEX connection joint, Size 3A, pluggable (straight)
Application	Pluggable connection between two cable lines; temporary/testing, interim, or permanent
Voltage ($U_m / U_n / U_o$)	72.5 / 60–69 / 36 kV
Applicable standards	IEC 60840, IEC 63026
Insulation medium	Epoxy resin
Routine test - AC withstand (1 min)	140 kV
Capacitive voltage tap	Included



Pfisterer SEANEX Connection Joint

Its value is flexibility without compromise. The cable connectors are pre-assembled, so installation is fast, and the joint closes voltage-proof without any gas-work or monitoring device.

It combines different conductor materials and connects a wide range of cable cross-sections, is touch-proof, floodable and maintenance-free, and is certified for offshore use. An integrated capacitive voltage tap lets crews confirm the state of the circuit. On delivery the connection sockets are sealed dust- and waterproof with plastic covers; voltage-proof dummy plugs are ordered separately.

It is a straight, Size 3A joint rated U_m 72.5 kV (U_n 60–69 kV, U_o 36 kV), insulated in epoxy resin, to IEC 60840 and IEC 63026.

FEATURES

- For temporary or permanent use
- Fast installation thanks to pre-assembly of the cable connectors
- Combination of different conductor materials
- Connects a vast range of cable cross-sections
- Voltage proof closing without any gas-work or monitoring device
- Touch-proof, floodable and maintenance-free
- Certified for offshore use

WHEN TO SPECIFY

For asset managers

A programme-flexible product. A pluggable HV connection you can install fast on pre-assembled connectors, use temporarily to test a section or bridge an interim stage of a line build, then remake or leave permanent - without gas-work or a monitoring device to close it. For staged HV construction and commissioning, a joint you can re-enter is one less constraint on the sequence.

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Can't make it to EEA 2026?

Get in touch with the Hiko team today, and our account managers will reach out to assist with your project needs.



Seven joints. One discipline.

Branch, transition, straight and pluggable; epoxy resin, silicone and heat-shrink; 36 kV to 170 kV. On the surface these are seven different products from two manufacturers. Underneath, they are one discipline, the engineering of the connection, and that is the thing a network actually has to get right, because the joint is where cable systems fail and where crews are most exposed making them.

The NKT JPI3-4W branch joint reshapes the run, letting cable lay out in a spider-web instead of doubling back, in a fully solid epoxy body with no cavity to collapse under burial load.

Two transition joints reconcile old cable with new. The NKT GAS-TJ 36 brings three-core gas-pressure cable into three core XLPE at up to 36 kV; the NKT TJ family carries oil-filled (LPOF) cable across to XLPE from 72.5 kV up to 170 kV, in three defined builds specified to the cable rather than adapted on site.

The everyday straight joint is covered at both tiers, the NKT SOJ HSTS slip-over joint at 36 kV, seated under its own pressure with no flame and shear-off bolts that set the torque, and the Pfisterer MSA 72 one-piece silicone joint at 72.5 kV, individually tested before it ships.

And two pluggable joints make a connection you can open again. The Pfisterer CONNEX cable joint plugs two 36 kV cable lines together in a soil-resistant body built for outdoor, buried and offshore ground; the Pfisterer SEANEX takes the same pluggable principle to 72.5 kV — touch-proof and floodable — as a permanent link, an interim connection during construction, or a test point

The safety case runs through every one.

A joint with built-in torque control can't be over- or under-tightened by a tired crew at 2am. A one-piece body individually tested before it leaves the factory removes a failure mode before it reaches the trench. A touch-proof, floodable pluggable joint lets two cable lines be connected, and opened again, without cutting the cable, even buried or offshore. A proper transition keeps two incompatible cable technologies safely married for decades. None of it is a specification column to tick - it's the reason these products were engineered the way they were, and the reason they belong in the same issue.

Talk to us about your next jointing project.

Built for New Zealand. 85+ years in the making.

Hiko has supplied electrical network infrastructure in New Zealand for 85+ years. We manufacture our own range - the U-Pillar, UDP, LV frames and distribution pillars in Christchurch, and distribute the global partner products that complete the system.

Every product earns its place by one test: does it perform in New Zealand conditions - coastal salt, high UV, seismic activity, flooding, temperature cycling.

Hiko lives by safely connecting communities to power the future, from our Auckland and Christchurch locations, and going underground is how we're doing more of it.

Hiko is proud to be certified to the following ISO standards:



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