

Case Study: Submersible Pump MV Cable, Pavlodar River Port

A customer in Kazakhstan needed a 180 m medium-voltage replacement cable for a submersible pump at Pavlodar River Port, with a 54 mm diameter limit, screened control pairs, data for a VFD supply and agreed factory tests. This case follows the questions and answers that led to the order.

By Jyen • Technical and Operations Engineer, TEBAOFLEX • 2026-10-08 • 5 min read



Pavlodar River Port in Kazakhstan runs submersible pumps in a concrete pump pit. One pump's cable needed replacing, and a customer in Kazakhstan ordered a 180 m replacement from TEBAOFLEX: (N)TSCGEWCUEUS 6/10 kV S3×50+2×25/2+S(4×0.5) mm². The pump's 6,000 V motor is fed from a medium-voltage variable-frequency drive (VFD), and the new cable had to fit the pump's existing cable entry. Before ordering, the customer sent a detailed list of technical and commercial questions.

Case at a glance	Detail
Location	Pavlodar River Port, Kazakhstan
Customer	A project customer in Kazakhstan

Case at a glance	Detail
Application	Replacement supply cable for a 6,000 V submersible pump motor fed from a medium-voltage VFD
Cable type	(N)TSCGEWCUEUS 6/10 kV S3×50+2×25/2+S(4×0.5) mm ²
Length	180 m, one continuous length on one drum
Status	Order placed

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The Application: A New Cable for an Existing Pump

Each pump's supply cable enters at the top, beside the lifting handle.



One of the submersible pumps at Pavlodar River Port. The red cable is its existing supply cable; brand labels are blurred. Photo: taken on site.

Photos of the cable being replaced show its layout: three power cores, two green-yellow earth cores and a separate control element. The new cable had to reproduce that layout, pass through the pump's cable entry and carry a VFD

supply over 180 m. At the customer's request, our documents call it a TEBAOFLEX replacement cable for the pump, not an original pump-maker cable.



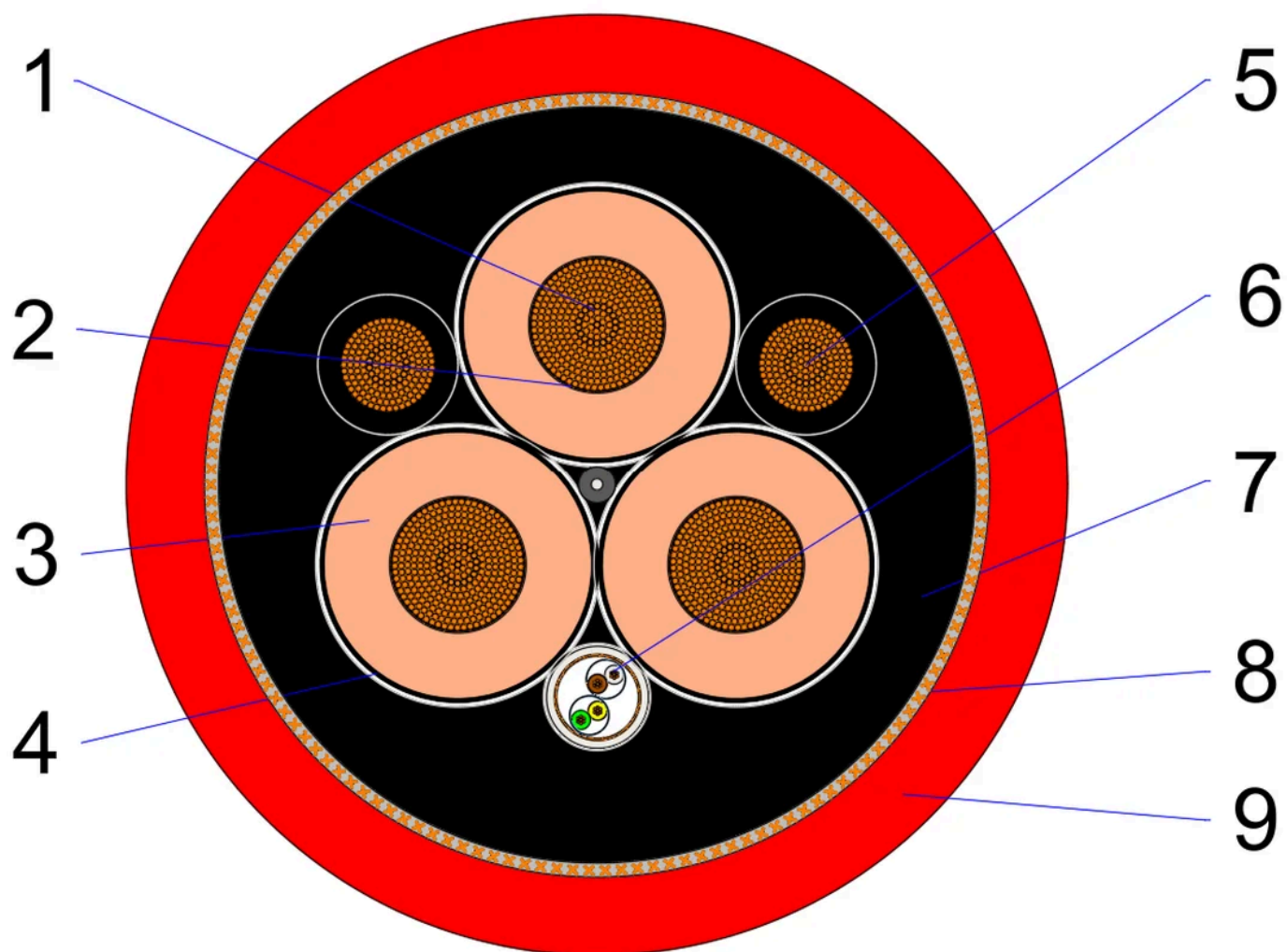
The cable being replaced: its stripped end (left) and its terminated cores (right). Photos: taken on site.

Matching Construction to Duty: Inside the Replacement Cable

In $S3 \times 50 + 2 \times 25/2 + S(4 \times 0.5)$, the three power cores are 50 mm^2 each. The two earth cores are 12.5 mm^2 each, 25 mm^2 in total. The $S(4 \times 0.5)$ control element holds two twisted pairs of 0.5 mm^2 cores under their own tinned copper screen.

In the drawing's numbering, the braid (8) carries earth-fault current and the PCP sheath (9) faces the water:

1. Flexible, finely stranded tinned copper conductor.
2. Semiconductive conductor screen.
3. Ethylene propylene rubber (EPR) insulation.
4. Semiconductive insulation screen with semiconductive tape.
5. Tinned copper earth cores with semiconductive rubber insulation.
6. Control element: tinned copper cores with EPR insulation in a screened group.
7. GM1b inner sheath.
8. Overall tinned copper wire braid.
9. Polychloroprene (PCP) outer sheath, compound type 5GM5, for water, abrasion, impact and mechanical protection.



Cross-section of the (N)TSCGEWCUEUS 6/10 kV replacement cable. Numbers match the list above. Drawing: TEBAOFLEX.

What the Customer Needed Before Ordering

The customer's list ran from cable data to payment terms. These were the technical points.

One Continuous Length

The cable had to come in one length on one drum, without joints, factory splices or repaired sections. We confirmed 180 m of new cable in one length on one drum. Because a video cannot show every metre of a drum, we also offered a guarantee letter that the 180 m contains no joints.

Fit at the Pump's Cable Entry

The customer asked whether we could keep the overall diameter at or below 54 mm, or else name the cable-entry grommet a 54–58 mm cable would need. We confirmed an overall diameter of 54 mm or less.

Data for the VFD Supply

The motor's [VFD supply](#) runs through a du/dt filter over 180 m of cable, so the customer asked for the cable's capacitance and inductance. The data we supplied:

Item	Value
Capacitance	0.345 µF/km
Inductance	0.371 mH/km
Current rating	About 200 A per phase core at 30 °C in free air, before installation, grouping and water corrections
Voltage rating	6/10 kV (U ₀ /U), maximum system voltage 12 kV
Temperature	–40 to +90 °C; 90 °C maximum continuous conductor temperature; 250 °C during short-duration faults

Braid Coverage and Screen Checks

Both screens are [tinned copper wire braids](#). For the control pairs we confirmed coverage of at least 80 %. For the overall braid we confirmed at least 80 %, typically 84 %, with an earth-fault rating of 8.37 kA for one second. To check screen continuity, both ends are stripped and the continuity and resistance of the overall and control screens are measured. The report gives the measured values, and we supply the braid's wire count and wire diameter.

Factory Tests Tied to Payment

The customer made the final payment conditional on accepting the factory test documents for the actual drum:

- the test report, with photos and video of the finished cable and drum;
- the sheath and metre markings;
- confirmation of the joint-free length and the measured overall diameter;
- the AC withstand, partial discharge (PD), conductor resistance, screen continuity and water immersion results.

We agreed and invited the customer to visit the factory. The acceptance criteria we set out:

- PD of 10 pC or less at 1.73 U₀ (about 10.4 kV).
- A 2 kV AC, 5-minute voltage test on the control element.
- The power-core AC voltage test given in the final approved datasheet.
- 24 hours in water, then 17 kV at power frequency for 5 minutes, with no breakdown or flashover.

[IEC 60270](#) is the standard for charge-based PD measurement, which is why the limit is given in picocoulombs (pC). We also offered a cross-section sample of the finished cable so the customer could check the construction.

Where Things Stand

The customer placed the order on these terms. The factory acceptance test (FAT) on the finished 180 m drum is to follow the criteria above, and its documents go to the customer before the balance is paid.

The Takeaway

Replacing a submersible pump's cable takes more than matching voltage and cross-section. This order turned on the pump's cable entry, the earth and control-pair layout, data for the VFD and a joint-free length. Each point, acceptance criteria included, was settled in writing before the order.

If you need a replacement cable for a submersible pump or another medium-voltage machine, [talk it through with us](#) before you choose a supplier. Our [project case archive](#) has other project cases.

Sources

This case draws on the customer's questions and our answers in the order file, site photos from the port, our cross-section drawing and an IEC standards record. The IEC link describes that standard's scope; it is not certification or approval of our products.

Cover photo: one of the submersible pumps at Pavlodar River Port, with its existing supply cable. Photo: taken on site.