



A Division of Transnet SOC Limited

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**INFRASTRUCTURE ENGINEERING**

**ELECTRICAL DEPARTMENT  
SPECIFICATION**

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**HYDRAULIC CABLE TENSIONER**

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Two handwritten signatures are shown, each on a horizontal dashed line. The top signature is in black ink and appears to be 'Rotondwa Ludzulu'. The bottom signature is in black ink and appears to be 'Molefi Moeketsane'.

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Transnet Freight Rail - Infrastructure

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## 1. Scope

This specification covers the design, manufacture, supply, and delivery of a hydraulic cable tensioner intended for use during the installation, tensioning, and maintenance of Overhead Track Equipment (OHE) conductors on railway electrification systems.

The equipment shall be suitable for controlled tension stringing of contact wire, catenary wire, earth wire, Optical Fibre Composite Overhead Ground Wire (OPGW), and All-Dielectric Self-Supporting (ADSS) optical fibre cables.

The hydraulic tensioner shall be capable of maintaining stable and adjustable conductor tension during stringing operations and shall be suitable for use in railway maintenance and construction environments.

## 2. Applicable Standards

The equipment shall comply with applicable international standards or equivalent, including but not limited to:

- IEC 60794 – Optical fibre cables
- IEC 60826 – Design criteria of overhead transmission lines
- ISO 12100 – Safety of machinery
- ISO 13849 – Safety-related parts of control systems
- ISO 4413 – Hydraulic fluid power systems
- ISO 4309 – Wire ropes – Care and maintenance
- International Electrotechnical Commission (IEC) 60913 – Railway applications: Fixed installations – Electric traction overhead contact lines.
- IEC 62486 – Railway applications: Current collection systems – Technical criteria for the interaction between pantograph and overhead line.
- IEC 60850 – Railway applications: Supply voltages of traction systems.

## 3. Functional Requirements

- 3.1. The hydraulic tensioner shall provide smooth and continuously adjustable conductor tension during stringing operations.
- 3.2. The machine shall incorporate a hydraulic control system capable of maintaining constant conductor tension during pay-off operations.
- 3.3. The equipment shall be suitable for use in the installation and maintenance of:
  - Overhead contact wire
  - Feeder and catenary wire
  - Earth wires
  - Optical fibre cables (OPGW and ADSS)
- 3.4. The tensioner shall allow controlled pay-off and pull-back operations during conductor installation.
- 3.5. The system shall ensure safe conductor handling without mechanical damage to the conductor surface.

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## 4. Mechanical Design Requirements

- 4.1. The tensioner shall be equipped with a multi-groove bull-wheel designed to guide and support conductors during stringing operations.
- 4.2. The bull-wheel shall be fitted with wear-resistant MC nylon or equivalent non-metallic lining segments to prevent damage to the conductor.
- 4.3. The bull-wheel shall have a minimum groove bottom diameter of 1200 mm.
- 4.4. The bull-wheel shall have not less than five grooves suitable for various conductor sizes.
- 4.5. The machine frame shall be fabricated from structural steel suitable for heavy-duty outdoor service and designed to withstand transportation, vibration, and operational loads.

## 5. Hydraulic System Requirements

- 5.1. The hydraulic system shall provide infinitely variable tension control to allow constant tension conductor stringing.
- 5.2. The system shall incorporate high-efficiency hydraulic pumps and motors from reputable manufacturers.
- 5.3. Hydraulic components shall comply with ISO 4413 requirements for hydraulic safety and reliability.
- 5.4. The system shall be designed for continuous operation under field conditions.

## 6. Performance Requirements

The hydraulic cable tensioner shall meet or exceed the following minimum performance parameters

- 6.1. The equipment shall be capable of providing a maximum tension force of not less than 28 kN.
- 6.2. The tensioner shall be capable of maintaining a continuous operating tension of not less than 22 kN during conductor stringing operations.
- 6.3. The equipment shall allow a maximum conductor stringing speed of not less than 5 km/h.
- 6.4. The tensioner shall be capable of providing a maximum pull-back force of not less than 20 kN.
- 6.5. The equipment shall be suitable for handling conductors with a maximum diameter of not less than 32 mm.
- 6.6. The bull-wheel shall have a minimum groove bottom diameter of 1200 mm.
- 6.7. The bull-wheel shall incorporate not less than five grooves to accommodate different conductor configurations.

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## 7. Power Unit

- 7.1. The tensioner shall be powered by a diesel engine suitable for industrial and construction environments.
- 7.2. The engine shall be water-cooled and rated for continuous duty operation.
- 7.3. The minimum engine power rating shall be 11 kW at approximately 2200 rpm or higher.
- 7.4. The engine shall comply with applicable emission and operational safety standards.

## 8. Safety Requirements

- 8.1. The tensioner shall be equipped with a spring-applied, hydraulically released multi-plate braking system.
- 8.2. The braking system shall automatically engage in the event of hydraulic system failure to prevent uncontrolled movement of the conductor.
- 8.3. All rotating and moving components shall be adequately guarded to protect operators.
- 8.4. The machine shall include emergency stop controls accessible to the operator.

## 9. Environmental and Operating Conditions

The equipment shall be designed for operation under the following conditions:

- Outdoor railway construction environments
- Ambient temperature range: –10 °C to +50 °C
- Dusty and humid conditions typical of railway infrastructure worksites
- Operation on uneven ground surfaces.

## 10. Physical Characteristics

- 10.1. The equipment shall be suitable for transport by road or mounting on railway maintenance vehicles where required.
- 10.2. The hydraulic tensioner weight shall not exceed 1.8 tons.
- 10.3. The overall dimensions of the hydraulic tensioner, including any mounted accessories, shall comply with applicable railway structure gauge and clearance requirements as well as road transport clearance limits to ensure safe operation within railway infrastructure and lawful transportation on public roads.

## **11. Documentation**

The supplier shall provide the following documentation:

- Technical datasheets
- General arrangement drawings
- Hydraulic system schematics
- Operation and maintenance manuals
- Spare parts catalogue