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TECHNICAL SPECIFICATION

Doc No: DSF-SPC-CIV-012

Rev. 1

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HIGH PRESSURE (HP) TRANSMISSION SYSTEMS

FENCING

JUNE 2021

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1. SCOPE

The Scope of this project is to define the minimum requirements for all materials, labor, equipment and execution for a complete installation of the chain link fencing at the perimeter of pipelines and above ground installations.

2. REFERENCES

2.1 REFERENCE DOCUMENTS AND DRAWINGS

- Tech Spec No DSF-SPC-CIV-006[Concrete Works]
- Standard Drawing STD-1-47[Fence and Gate/Elevations, Sections and Details].

2.2 REFERENCE CODES AND STANDARDS

The latest issue of the following standards shall be considered for the backfilling works of this project:

- EN 1670 [Building hardware. Corrosion resistance. Requirements and Test Methods].
- EN 10025 [Hot Rolled products of structural steels]
- EN 10080 [Steel for reinforcement of concrete-Weldable reinforcing steel-General.]
- EN 10218.01 [Steel wire and wire Products. General. Test methods].
- EN 10218.02 [Steel wire and wire Products. General. Wire dimensions and tolerances].
- EN 10219.01 [Cold formed welded structural hollow sections of non alloy and fine grain steels
- EN 10223.01 [Steel wire and wire products for fences. Part 1: Zinc and Zinc alloy coated steel barbed wire.]
- EN 10223.06 [Steel wire and wire products for fences – Part 6: Steel wire chain link fencing.]
- EN 10244.01 [Steel wire and wire products. Non-ferrous metallic coatings on steel wire. General Principals.]
- EN 10244.02 [Steel wire and wire products. Non-ferrous metallic coatings on steel wire. Zinc or zinc alloy coatings.]
- EN 12320 [Building Hardware.Padlocks and padlock fittings. Requirements and Test Methods.]
- EN ISO 1461 [Hot dip galvanised coatings on fabricated iron and steel articles-Specifications and test methods].

3. ACRONYMS

DN Nominal Diameter

4. FENCING

4.1 GENERAL

Requirements for the safety fencing are taken into account for the needs of:

- Perimeter fencing of all pipeline stations and above ground installations,
- fencing of controlled access areas

All fencing materials shall be new and unused and shall follow the requirements of the referring latest version of Codes and Standards.

5. INSTALLATION

5.1 FENCING TYPE

Chain link security fencing consisting of galvanised steel posts with a 45° welded extension arms, holding three rows of barbed wire which shall be provided at the perimeter of all pipeline stations and above ground installations. The chain link fabric shall be 50mm continuously diamond woven complying to EN 10223.06 with height approximately 2,00m. Chain link fabric shall be heavily galvanised wire. Line wire shall be high tensile heavily galvanised 3,15mm with a minimum tensile strength of 1000 N/mm².

Line wire is used for tensioning and tying fencing and shall be heavily galvanised according to EN 10244.02 Class A requirements. Tension wire shall be 4 mm hot dip galvanized wire as per ELOT EN ISO 1461. Line wire shall be placed between tension posts, corner and gate posts. Line wire shall be strained with stainless steel turnbuckles attached to tension posts. Three rows of line wire shall be provided along the height of the fabric equal spacing. Top row of line wire shall be no lower than 50mm from the top of chain link fabric.

Barbed wire shall be installed on fence post extension arms and on the top of vehicle and personnel gates. Barbed wire shall be conventional type consisting of two wire strands that shall be twisted together with an approximate lay of 50mm.

Barbed wire shall be tightly wrapped around the line wires by a method that prevents slipping exposing 4 point barbs spaced not more than 75 mm apart.

6. FENCE POSTS



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All Fence posts including line posts, corner posts and gate posts shall be manufactured from cold formed welded pipe sections. Also, two bracings shall be provided to the corner posts and personnel exit, one brace on each side of the fence. In the main entrance gate posts shall be provided with out of plane bracings and in the emergency personnel exit gate posts shall be provided with both in-plane and out of plane bracing.

Steel fence posts, with steel grade S235JRG2 due to EN 10025, shall be hot dip galvanised after fabrication and welded in compliance to the provisions of EN ISO 1461.

All posts shall be placed every 2m and shall be fabricated from 2.1/2" dia. (DN 65) and 3.6mm wall thickness. They shall be provided with welded 45° extension arms of the same cross section. The total length shall be 3,00 m, 2.50 the steel circular posts and 0.50 cm the welded extension arms.

Main entrance gate posts (for vehicular and personnel gates) shall be fabricated from 4½"(DN115) with wall thickness 5.0mm. Gate posts shall be provided with welded 45° extension arms of the same cross section.

Post extension arms of 45° shall be extended upwards and outwards from the safety area. Exposed ends of circular fence posts including extension arms shall be sealed against the inflow of moisture and water with 5mm welded plates or steel caps. Anchor plate 5mm thick also shall be provided at ends o tubular fence posts embedded in concrete in the concrete foundations.

Bracings shall be fabricated from 2 ½ " steel galvanized bar, wall thickness 3,60mm pipe. They shall be attached to tension, corner or gate posts at a point not less than 2.0m above ground level and shall extend downwards 60° (degrees) angle measured from the horizontal plane. Bracings shall be shop welded to posts.

7. GATES

The minimum width of personnel gate shall be 1 metre (single leaf) and for vehicular gates 6 metres (double leaf).

Gates will swing open towards the inside of the station. Gates frames shall consist of a perimeters circular frame and an additional horizontal member at the mid height of the gate. Vehicle gates shall be adequately braced to prevent sagging.

The gate frame shall be infilled with chain link fabric fixed with the tie wire complying with the requirements mentioned above. Inset frame shall be 50*50mm mesh grille of 3mm round section light metal wire, mounted on a stringer frame galvanised 10mm round section bar welded to the gate frame by means of spacers.



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The two leaves of double gates shall be flushed by a steel strip (stopper), when closed. They shall be equipped with a flush bolt, which prevents the one leaf of the gate to open when the other leaf is closed.

Double gates shall close by means of a hasp made from 50 x 10 x 1200 mm flat bar. The hasp shall be equipped with a handle of 12 mm round section bar and 18 mm holes for a padlock, which shall be operated from the interior of the station only. The hasp shall be lockable at both open and closed positions.

Gates shall be secured against lifting-off their hinges when are at closed position.

Padlocks shall be delivered for the gates. These shall have cadmium treated loop and 5 keys, and shall form part of the Owner central locking system. The Contractor shall submit to the Owner Representative various types of padlock for approval.

Pedestrian door shall be equipped internally and externally with steel fittings for a padlock with the same key code as of the gate. The holes shall be 18 mm.

Furthermore, there shall be a latch lock with a brass latch bolt. The lock shall be equipped with a handle of stainless steel.

All steel for gates etc. shall be delivered hot dip galvanized.

8. FOUNDATION AND CONCRETE CURB

All posts shall be set in unreinforced concrete pile foundations cast in a drilled ground pocket. Where soft foundation soil is encountered it will be compacted with vibratory roller before boring of the fence post foundation. Where soft soil conditions are encountered, compaction shall involve a continuous strip 2.0m wide about the fence centreline for the entire length along the fence line.

Foundations for line posts, tension posts, corner posts, bracing posts and emergency personnel gate posts shall be 30cm in diameter and 50cm deep. Foundations for main entrance gate posts shall be 40cm in diameter and 80cm deep.

At ground level a 30cm deep by 20cm wide continuous concrete strip shall be provided along the entire fence length, except gate locations. The concrete curb is provided to prevent unauthorised entry by digging under the fence, or by lifting of the chain link fabric.



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Concrete strip beam concreting shall be the last fencing construction activity and shall commence only after fence erection is completed, inspected and approved over its entire length.

Bottom of concrete curb shall be 10cm below ground level. Top of concrete curb will normally be 20cm above ground level. Bottom of chain link fabric shall be embedded to the concrete strip beam by 10cm.

The height of the strip beam at the base of fencing shall be increased when required up to 30cm above ground level to inhibit stormwater runoff from neighbouring property. At low points along property limits the strip beam shall be constructed flush with ground level to allow rainwater runoff to drain outside property limits.

9. QUALITY ASSURANCE

It is CONTRACTOR's responsibility to properly complete quality forms, which are applicable for the execution of the works, in accordance with the specifications and codes. Also, it is Contactor's responsibility to remove old fencing and install the new one where necessary. After completion of works, the relevant quality forms and product certificates shall be submitted to the COMPANY's Representative for approval and acceptance of the works