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TECHNICAL JOB SPECIFICATION
199/2
REVISION 0
DATE 05/04/2011

HIGH PRESSURE (HP) TRANSMISSION SYSTEMS

TRANSPORT AND STRINGING OF PIPES

QUALITY ASSURANCE PAGE

CHANGES LOG

REVISIONS LOG

0	05-04-2011	FIRST ISSUE	PQ DPT	V.G.
Rev. No	Rev. Date	REASON FOR CHANGE	Made By	Approved By

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REFERENCE DOCUMENTS

- Std Drawing STD-1-41-01
  [Stacking of Pipes NPS 10"-36"for Pipelines Plan Elevation and Section]

- API RP 5L1
  [Recommended Practice for Railroad Transportation of Line Pipe]

- API RP 5LW
  [Recommended Practice for Transportation of Line Pipe on Barges and Marine Vessels]

- ELOT EN 1594
  [Gas supply systems - Pipelines for maximum operating pressure over 16 bar - Functional requirements]

- ELOT EN 10208-2
  [Steel pipes for pipelines for combustible fluids - Technical delivery conditions - Part 2: Pipes of requirements class B]

1.0 SCOPE

This specification covers the minimum requirements for all handling, storing, transport and stringing of pipes to be used for the construction of natural gas lines and MR Stations.

For the handling, storing, transport and stringing of pipes, etc. the requirements of the following, listed in order of precedence, shall be fulfilled:

- This specification
- **ELOT EN 1594**
- **ELOT EN 10208-2**
- **API RP5L1** - Recommended Practice for Railroad Transportation of Line Pipe.
- **API RP5LW** - Recommended Practice for Transportation of Line Pipe on Barges and Machine Vessels.

Contractor shall submit detailed procedures for all activities described in paragraphs 2 and 3 herein bellow to Owner for approval.

2.0 HANDLING AND STORAGE

All equipment necessary for handling, loading, and unloading and storage shall be supplied by the Contractor.

2.1 HANDLING AND STORAGE

Handling will be performed by trained personnel.

The use of wire rope and chains for the handling of steel coated pipes is prohibited, in order to avoid any damage to the coating, by handling equipment. Lifting and lowering of the pipe by the crane shall be carried out slowly, without striking against hard objects, in order to prevent the pipe from rolling and the associated damage to the coating.

During crane handling, the pipe coating will not be damaged by striking against stanchions, loading hooks, or any other sharp-edged items.

While handling by means of hoisting belts made of synthetic materials, the bearing surfaces of the hoisting belts must be free from any sharp-edged material (stones, ash, etc.).

- When handling by means of steel wire hoisting slings, only rubber or plastic coated steel wire slings, preferably with coated end loops, may be used. The bearing surfaces of the slings shall be free from any sharp-edged material (stones, ash, etc.).

Only pipes in the same range of length will be handled simultaneously.

Handling by means of pipe-hooks:

- The bearing surfaces of the rope hooks shall be coated with wear-resistant plastic plates. The outer edges of the rope hooks should be rounded- off with a radius of R=10 mm and then plastic coated.

Pipes with a high unit weight are mainly handled individually using rope hooks. Pipes with end protectors shall be handled with special hooks.

- The lifting forks and all other bearing surfaces shall be sufficiently padded, in order to avoid damage to the pipe coating. All pipes whether individual or in bundles and/or have different lengths, shall be picked up separately, at the center.

When lifting or lowering the pipes, the forks must not be allowed to strike other pipes. The pipes must not be rolled into cantline position by the forks.

Damaged pipes or coating shall be repaired by Contractor at no cost for the Owner, in the presence of the supervision representative.

2.2 STORAGE

2.2.1 GENERAL

The pipes shall be stored on even and firm ground.

Wooden bearing strips are to be placed underneath the bottom layer at a distance of about 2 to 4 m (in special cases 1 m) of each other. If the storage yard is concreted, 5 cm thick strips may be sufficient. In the case of unpaved storage areas, the strips must be 10 to 14 cm thick, if the calculated number of layers or to be stacked.

Lateral support will also be necessary in special cases. The outer wooden strips should be 1 m from the pipe ends; with larger nominal widths a distance of 1.5 m is recommended. Short pipe lengths are to be deposited inside the stack.

All timber used (dunnage, intermediate layers, wedges) shall be free from hard, sharp-edged or pointed matter, such as nails, stones, etc. For the dunnage, intermediate strips and lateral welding, use strips or planks, or, if nothing else is available, squared pine timber.

When storing in pipe boxes, stacking in layers with intermediate strips of sufficient thickness and quantity is recommended. In order to avoid damage to coating, all surfaces of the pipe boxes, which might contact the pipes, shall be provided with boards or other suitable materials.

Wood fibber or straw-filled plastic hoses alone will not suffice. Depending on the box width and pipe diameter, additional blocking shall be used to minimize lateral movement of the pipe. The lateral supporting strips and/or wedging shall be matched to the resulting cavities (spaces between supporting strips, pipe diameter).

Stacking arrangement shall be made in accordance with **Std Drawing STD-1-41-01.**

- The pipes must be if possible perpendicular to the electrical high voltage transmission line.
- On cantline stowage, the lateral supports shall be sufficiently dimensioned, securely anchored and lined with pinewood. The padding of hard contact surfaces alone, without using pine boards is not permitted. The padding material shall not be fixed with nails or wire pins.

3.0 TRANSPORT

All equipment necessary for transportation shall be supplied by the Contractor.
For railroad transportation the requirements of **API RP 5L1** shall be fulfilled. For marine transportation, the requirements of **API RP 5LW** shall be fulfilled.
For truck transportation the requirements of **API RP 5LW** shall be fulfilled.
Prior to start the transport of pipes, the Contractor shall demonstrate his method of loading and securing pipes on vehicles for the client supervision as well as relevant authorities, in order to receive their approval of the method. This is for why the Contractor shall submit relevant procedures for approval.
Transportation shall be carried out using sufficient dunnage, padding, and banding so that adequate protection of the pipe and its coating, where applied, is achieved.
For loading accessories the following cross sections are recommended for supporting timber (underlying, intermediate, and lateral):

- Pipe diameter up to 400 mm
  Weight/meter approx.25 kg : cross section 24 to 30 cm^2
  Weight/meter 25 kg : cross section 40 cm^2
- Pipe diameter 400 to 600 mm : cross section 80 cm^2
- Pipe diameter 600 to 900 mm : cross section 140 cm^2
- Pipe diameter 900 to 1100 mm : cross section 230 cm^2
- Pipe diameter 1100 to 1600 mm : cross section 270 cm^2

Supporting timber shall preferably be in one piece; boards and squared timber shall have more width than height. Boards or strips, which are to be wedged, must be long enough so that the nailed or glued-on wedges contact the boards along their entire length.
Wedges must comply with the following requirements. The effective wedge height depends on the pipe diameter. The min. heights are as follows:

- For truck transportation 1/5 of the pipe diameter.
- For railroad transportation 1/8 of the pipe diameter in long wagon dir.
- For railroad transportation 1/12 of the pipe diameter in transportation wagon dir.

However, the minimum wedge height shall not be less than 12 cm.
The wedge surfaces shall be so dimensioned that the radius extended beyond the contact point remains within the bearing surface of the wedge, otherwise the wedges must be secured against tilting.
The width of the wedge shall be at least 2/3 of its height.
The wedge surface contacting the pipe shall be at an angle of 35° to the horizontal supporting surface.
The wedges shall be so fixed that the forces acting upon the load during transportation are safely absorbed. At least two nails must be used for fastening the wedges. The number of wedges and nails required to prevent lateral pipe movement depends on the weight of the freight. The nails shall be driven at least 5 cm vertically into the wedges, approx. 4 cm into the wagon floor, and to about 2/3 the thickness of the bearing and/or intermediate strips.

When fastening with nails, only wedges made from poplar wood shall be used, wedges made from pinewood shall be used for glued joints only.

3.1 LOAD SECURING

All vehicle loads shall be secured against shifting in longitudinal or transverse directions. The wire binding shall be made up of an even number of annealed and plastic coated, 3 to 5 mm diameter steel wires (370 N/mm^2 min. tensile strength), which shall be tensioned at either side using rack sticks. The coating shall be protected against pressure marks by suitable padding material underneath the wire bindings.
Belts, ropes and chains attached to bracing points are especially suitable, because they permit the load to be pre-tensioned. Damage to the pipe coating caused by lashing-especially by ropes and chains-shall be avoided by suitable padding. Straw or wood fiber filled pads, or felt or foam plastic cushions are particularly suitable.

3.2 RAILROAD TRANSPORTATION

Pipe loading shall be carried out according to the rules established for freight car loading. Especially suitable for the transportation of steel line pipe with protection coating is the four-axle special bogie flat-wagon with high stanchions and holding-down equipment.
Prior to loading, the wagon must be examined for and thoroughly cleared of nails and other foreign matter from previous loads. We recommend padding the stanchions. If nails are used, nail heads and points require special attention; it is prohibited to hammer down protruding parts of the nails. When unloading, supporting timber with nailed-on wedges shall be removed in the upright position.
Pieces of wire from the holding-down equipment shall be removed, if these are likely to damage the coating.
During loading and unloading no crowbars shall be applied to the plastic coating.

3.3 TRUCK TRANSPORTATION

The equipment and facilities used to secure the freight must match the following transport loads :

- 0.8 times the force of weight opposite to the direction of travel.
- 0.5 times the force of weight in the direction of travel.
- 0.5 times the force of weight to prevent lateral movement.

Particularly suitable are vehicles with lashing facilities firmly connected to the vehicle itself, which permit the load to be sufficiently pretension. In order to prevent damage to the coating as a result of the load shifting in the longitudinal truck direction, the lashings shall be retightened after a short traveling time.
Prior to loading, the truck must be examined for and thoroughly cleared of nails and other foreign matter from previous loads. If nails are used, nail heads and points require special attention; it is prohibited to hammer down protruding parts of the nails. When unloading, supporting timber with nailed-on wedges shall be removed in the upright position. Pieces of wire from the holding-down equipment shall be removed, if these are likely to damage the coating. During loading and unloading no crowbars shall be applied to the plastic coating.

3.4 TRANSPORTATION ON INLAND WATERWAYS

The cargo compartment should be free from any foreign objects or materials likely to cause either physical damage to the pipe, contamination of the pipe, or chemical reaction with the pipe. When stowing the pipes, they must not be permitted to strike the edges of hatches or against other solid objects.

The pipes shall be positioned below the loading decks by slowly rolling them over intermediate wooden layers. The pipes shall not be pulled over other pipes in a longitudinal direction, as this may cause damage to protection coating.

Cantline stowage is recommended for straight pipes. Here, very close stowage- especially of the bottom pipe layer- is of great importance, No crowbars shall be applied to the plastic coating. Dunnage shall have a min. thickness of 4 cm, timber on the sidewalls of the ships hold at least 2.4 cm.

3.5 CONTAINER TRANSPORTATION

For shipping steel line pipe with corrosion protection coating, only open top containers are suitable which can be used for overseas, continental, and inland transport.

In order to avoid damage to the pipe coating, the cargo securing devices must be designed to withstand the following:

- Twice the force of weight for transportation on long- stroke shock absorber wagons (in the longitudinal direction).

- Once the force of weight in the vertical direction (in addition to the static force of weight).

- 0.4 times the force of weight to counteract transverse acceleration during road transport.

- 0.6 times the force of weight to counteract transverse acceleration during sea transport.

Prior to loading, it shall be checked that the container is in perfect order and that all moving parts are fully functional.

The load shall be secured in compliance with these recommendations. Prior to loading, the container floor shall be checked. The load shall be stowed so that the container doors and hatches can be opened without any risk.

The Contractor will be informed about the maximum length of pipe and shall thereafter obtain the necessary approval by the police, road authorities etc., for transporting this pipe. Wherever possible, the contractor shall ensure that any weight restrictions on public roads are not exceeded. If these restrictions are exceeded, the Contractor is responsible for compensating any damages caused to these roads.

When pipes are collected from a storage site, the Contractor shall secure the remaining pipes against slippage.

The storage sites shall be emptied according to the advancement of construction. Any extra pipes at a storage site shall be transported forward along the route.

When a storage site is emptied of materials the Contractor shall clean the site and any access road and reinstate both to their original condition. Hereafter the site shall be handed over to the landowner in question.

4.0 STRINGING OF PIPE

The pipes shall be strung consecutively along the working width on timbers or similar, suitably cushioned packing so that they are not in direct contract with the ground surface with at least two per pipe, to avoid damaging or fouling the pipes and to make sure that these is a distance of at least 10 cm between pipe and ground level for brushing the bevels just before welding. The pipes shall be strung in such a way that the normal use of the surrounding areas is disturbed as little as possible. For this reason, passages or crossings for animals, machinery as well as normal site traffic shall be kept free. Pipes shall be secured against rolling.

Pipes with different wall thickness shall be strung in accordance with the information given on the longitudinal sections. When stringing pipes with diameter tolerance marks (+, 0, -), ends with the mark + shall never abut on ends with the mark -.

Where crossings and other restricted areas require several pipes to be strung together, they may not be stacked (i.e. pipes shall be laid alongside of each other).

Appropriate mats or straw brakes should be used to protect pipe during blasting operations.