DESFA
Hellenic Gas Transmission System Operator

HELLENIC GAS TRANSMISSION SYSTEM OPERATOR

357-359, MESSOGION AVE.,
15231 ATHENS, GREECE
Tel.: 210 6501258
Fax : 210 6501551

TECHNICAL JOB SPECIFICATION

499/4

REVISION 0

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HIGH PRESSURE (HP) TRANSMISSION SYSTEMS

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REFERENCE DOCUMENTS

Job Spec. No 199/5
[Corrosion Protection of Field Joints and Uncoated Pipeline Components]

Job Spec. No 199/8
[Crossings]

Job Spec. No 499/3
[Measuring-up and As Built Documentation]

Job Spec. No 499/18
[Application of Erosion Protection Measures]

Job Spec. No 499/21
[Trenching and Backfilling for Pipelines Laid by or under Road Surfaces]

Std Drawing No. STD-1-41-04

Std Drawing No. STD-1-41-05

Std Drawing No. STD-1-41-06

Std Drawing No. STD-1-41-14

Std Drawing No. STD-1-41-16

Standard Technical Specification ΠΤΠ-Ο150 (Ministry of Public Works)

Standard Technical Specification ΠΤΠ-Ο155 (Ministry of Public Works)

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

1.0 SCOPE

This specification covers the requirements for bedding, padding and backfilling of trenches and the installation of HDPE conduits and warning tape in cross country and urban areas for natural gas pipelines, as well as, for pipes, cables, etc.

This specification does not cover the requirements for backfilling for pipelines laid by or under road surfaces which are covered by **the Job Specification No 499/21.**

For backfilling of trenches and location of warning mesh, the requirements of the following, listed in order of precedence, shall be fulfilled:

- Standard Drawings and Typical Details in referenced Documents.
- This specification.
- Other Specifications listed in Reference Documents.
- **ELOT EN 1594**

2.0 CONSTRUCTION

The trench shall not be backfilled until:

- The pipeline has been surveyed as per **Job Specification No. 499/3.**
- The piping has been surveyed in the metering, regulating and compressor stations.
- The survey has been approved by the Owner Representative and a permit for backfilling of the specific section has been obtained from the Owner Representative.

Backfilling shall be carried out in 3 main stages:

a) Bedding.

b) Padding, which consists of two main parts :

- Middle padding.
- Top padding.

c) Filling of trench.

Bedding is the trench bottom preparation in order to provide a continuous and even support to the pipeline to be laid. Middle padding is the backfilling of trench up to the top of pipe level, top padding is the backfilling of the trench up to 200mm above the top of pipe level and filling of trench is the backfilling of trench above the top padding border. Top padding and filling of trench can be carried out after the approval of the permit for backfilling.

The backfilling shall be carried out carefully, so that the pipe insulation is not damaged. Special care must be taken by the Contractor that the backfilling material falls from the lowest possible height. If it is shown (during or after construction) that the insulation has been damaged, this shall be repaired by the Contractor at his own expense.

In case of over-excavation the bottom of the excavation shall be restored to the required level to ensure that the pipes are properly supported and stress-free by backfilling with sand. This material shall be compacted in layers not exceeding 200mm.

Around irregular pipeline components (e.g. valves, insulating couplings, etc), which

cannot be tape wrapped **(Job Specification No. 199/5),** sand shall be used as backfilling material providing the component with a surrounding sand cover of, at least, 100 mm.

On line and scraper stations, sand shall be used as backfilling material to an extent specified by the Owner Representative.

Padding and backfilling shall be carried out in a way that the pipe is not displaced vertically or horizontally. If this is not possible by machine work, padding shall be carried out by hand up to 200mm above the top of the pipe.

Padding shall be carried out with quarry or river sand in all cases, except the case that the excavated material is soil with stones not larger than 25 x 50mm size.

Only suitable excavated material, which will not damage the pipe and/or the coating, shall be used as backfill above padding. Stones larger than 150 mm shall not be used but shall be driven away.

No rubbish, electrode stumps, pipe stumps, wood, vegetation, frozen soil, etc, shall be used as backfill.

Large lumps of soil, clay etc. shall be broken up before used for backfilling.

Backfilling below the Gabion boxes on all major rivers, streams and torrent crossings shall be compacted quarry sand or river sand. Padding and backfilling below the erosion protection measures on ravine crossings shall be quarry sand or river sand except the case that the excavated material is soil with stones not larger than 25 x 50 mm size.

The padding with quarry or river sand from the top of the pipe up to a level of 200 mm above the top of the pipe shall take place where :

a) In rocky areas.

b) Extremely low-resistivity soil prevails (i.e. clay, salty soils, etc.), as will be shown on the longitudinal sections.

c) Chemically polluted soil (particularly organic dissolvent) is struck.

Should stony backfilling only consist of round shaped stones not larger than 150 mm, then wrapping of the pipe with one layer of protective fabric (rock-shield) can substitute (after Owner's Representative approval), for padding with sand. Wrapping shall ensure an overlap of at least 5cm. Wrapping material shall be approved by the Owner's Representative.

The Contractor shall ensure that all dewatering and well point equipment has been removed before starting backfilling. Backfilling shall commence immediately after removal of well point equipment, in order to ensure that satisfactory compaction can be achieved.

The backfilling shall be compacted in such a way that the pipe insulation is not damaged and the pipe is not displaced vertically or horizontally or overstressed, considering the type of backfilling material and the strength of the pipe.

Furthermore, it shall be secured that settlements shall not occur later, either in the backfilling material or in the material beneath the pipe.

The soil displaced by the pipeline will not be considered as excess material but shall be spread evenly over the working width, only if not detrimental to agricultural activities or land use of private owner. The thickness of the topsoil after reinstatement shall

be as before the start of work i.e. approximately 300mm.

Any excess material after backfilling shall be removed by the Contractor, at no extra cost to the Owner.

Any propping or shoring used to hold the trench open shall be removed as soon as the trench is sufficiently backfilled and compacted, so as to prevent any falls of earth which may damage the pipe or the insulation.

Where the trench crosses drainage installations, these shall be re-instated during backfilling according to **Job Specification No. 199/8.**

Horizontal drains used for dewatering during construction shall be cut and sealed, at a level below the normal ground water level.

Where concrete protecting slabs are to be laid above the pipe, these shall be separated from the pipe by a layer of at least 200mm compacted sand.

3.0 BACKFILLING AND PROTECTION OF PIPE TRENCH IN STEEP SLOPES

In steep slopes, i.e. slopes with inclination ≥36%, the backfilling of pipe trench has to proceed from the bottom to the top of the slope. The entire length of the pipe located on steep slopes shall be wrapped with one layer of protective fabric, while the part of the pipe embedded in erosion protection beams shall be wrapped with two layers of protective fabric.

In steep slopes over 36%, the pipe shall be bedded on sandbags. The distance between sandbags shall not exceed 4 m and the space under the pipeline and between the sandbags will be filled with sand.

Sand shall be used for backfilling material surrounding the pipe up to a level of 200mm above the top of the pipe.

Backfilling works shall be executed in steps, each step consisting of the length between two successive erosion protection beams. In case of beams made of concrete the procedure may be changed, subject to Owner Representative's agreement, so that a number of beams may be cast before backfilling works between them are executed.

Where it is necessary and where it is indicated on the longitudinal profiles, anchoring of the pipelines shall be carried out according to Owner relevant drawings.

Erosion protection beams may consist of sand bags or cement-sand bags or concrete or Natural Bentonite. Reference is made to **Standard Drawings No. STD-1-41-04, STD-1-41-05, STD-1-41-06, STD-1-41-16 and STD-1-41-14** accordingly.

If any water exists in the slopes, drainpipes wrapped with filter cloth shall be installed, according to Owner Standard drawings mentioned above and for the whole length of the slope. At the bottom of the slope, the drain pipes shall be driven outside the trench in order to release their water to the surrounding area.

During and after backfilling of the pipe trench, the top soil shall be secured against creeping and erosion as specified on **Job Spec. No. 499/18.**

4.0 WARNING MESH

After installation of the HDPE conduit and the completion of the padding, a warning tape shall be laid.

Warning mesh shall be placed over the entire length of the pipeline (urban and non

urban areas). The mesh shall be approx. 600mm wide and shall be made of yellow PVC or PE. Warning mesh shall also be used where isolated cables are laid away from the pipe. Mesh shall be laid by the Contractor without extra charge to the Owner.

Special care shall be taken to ensure that the warning tape is placed at the centre of the trench over the laid pipeline.

5.0 BACKFILLING IN URBAN AREAS

Backfilling of the trenches in asphalt roads of urban areas shall be carried out as follows:

Quarry sand must be used as side fill and initial backfill above the crown of the pipe. The initial backfill layer shall be 200 mm as shown on the relevant standard drawing.

Compaction of the initial backfill shall be carried out with light equipment such as hand tampers or light vibrators.

The main backfill for the trench above the initial backfill and up to the bottom level the concrete slab used for the construction of the asphalt road must be in accordance with the **Standard Technical Specifications ΠΤΠ-Ο150** and **ΠΤΠ-Ο155** material only, as shown on the relevant standard drawing.

The material as per **Standard Technical Specification ΠΤΠ-Ο155** shall be used only for the top backfill layer of 200 mm thickness.