



Hellenic Gas Transmission System Operator S.A.
357-359 Messogion Av., GR 152 31 Halandri
Tel.: 213 088 4000
Fax: 210 674 9504
Email: desfa@desfa.gr

TECHNICAL SPECIFICATION

Doc No: **DSF-SPC-CIV-003**

Rev. 1

Page 1 of 11

HIGH PRESSURE (HP) TRANSMISSION SYSTEMS

TRENCHING AND EXCAVATION

JUNE 2021

This document is the property of DESFA S.A. and shall not be reproduced, copied or used for any purpose, other than for which it is specially furnished

REV	DESCRIPTION	DATE	PRPD	CHKD	APVD
1	Second Issue	30-06-2021	AP+ EK	KM	TPI
0	First Issue	05-04-2011	PQ DPT.		V.G.



Hellenic Gas Transmission System Operator S.A.
357-359 Messogion Av., GR 152 31 Halandri
Tel.: 213 088 4000
Fax: 210 674 9504
Email: desfa@desfa.gr

TECHNICAL SPECIFICATION

Doc No: DSF-SPC-CIV-003

Rev. 1

Page 3 of 11

Table Of Contents

1	SCOPE	4
2	REFERENCES	4
3	ACRONYMS	5
4	CONSTRUCTION	5
5	CONTRACTOR'S QUALITY SYSTEM.....	11



Hellenic Gas Transmission System Operator S.A.
357-359 Messogion Av., GR 152 31 Halandri
Tel.: 213 088 4000
Fax: 210 674 9504
Email: desfa@desfa.gr

TECHNICAL SPECIFICATION

Doc No: DSF-SPC-CIV-003

Rev. 1

Page 4 of 11

1. SCOPE

This specification specifies trenching and excavation for the construction of natural gas pipelines, as well as for pipes, cables etc.

It covers trenching and excavation in various types of soil, such as soft soil, semi-rock, rock, as well as in various types of terrain, such as flat areas, mountainous areas, or steep slopes in cross country and urban areas.

For trenching and excavation at areas with muddy bottom reference is made to relevant construction specification for muddy bottom replacement.

For trenching and excavation at crossings with roads, railways, watercourses, rivers, channels, etc. reference is made to relevant construction specifications for crossings.

For trenching and backfilling for pipeline laid by or under road surfaces reference is made to a relevant construction specification.

The requirements of the following, listed in order of precedence shall be fulfilled for trenching and excavation:

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

2. REFERENCES

2.1 REFERENCE DOCUMENTS AND DRAWINGS

- Tech Spec. DSF-SPC-PIP - 016[Crossings]
- Tech Spec. DSF-SPC-PIP-019[River Crossings]
- Tech Spec. DSF-SPC-CIV-002[Site Requirements]
- Tech Spec. DSF-SPC-CIV-005[Backfilling]



Hellenic Gas Transmission System Operator S.A.
357-359 Messogion Av., GR 152 31 Halandri
Tel.: 213 088 4000
Fax: 210 674 9504
Email: desfa@desfa.gr

TECHNICAL SPECIFICATION

Doc No: DSF-SPC-CIV-003

Rev. 1

Page 5 of 11

- Tech Spec. DSF-SPC-CIV-010[Installation in Muddy Areas]

2.2 REFERENCE CODES AND STANDARDS

- EN 1594[Gas supply systems - Pipelines for maximum operating pressure over 16 bar - Functional requirement]
- ΠΔ 1073/1981 [Safety measures for construction works in building construction and civil works. (ΦΕΚ 260/A/1981)]
- DIN 4107[Settlement observations during and after construction of buildings]
- DIN 4124[Excavation and trenches, slopes, planking and strutting breadths and working space]
- ΠΔ 305/1996[Health and Safety specifications for temporary or mobile construction sites in compliance with EC directive 92/57 (ΦΕΚ 212/A/1996)]

3. ACRONYMS

HP	High Pressure
DN	Nominal Diameter
ROW	Right of Way

4. CONSTRUCTION

4.1 TRENCH IN CROSS COUNTRY AREAS

After completion of ROW preparation and ROW clearing, Contractor shall re-establish the pipeline axis in accordance with the pipeline route plans and the reference points (benchmarks). The centreline of the trench shall follow the pipeline route, shown in the relevant drawings, while at the horizontal or vertical angles the centreline shall conform to the corresponding type of bends specified at that location.

The excavation shall be carried out without mixing topsoil and subsoil, as shown in Technical Specification No. DSF-SPC-CIV-002. Cover after backfilling of the trench varies in relation to certain parameters (such as: road crossings, roads in urban areas,



Hellenic Gas Transmission System Operator S.A.
357-359 Messogion Av., GR 152 31 Halandri
Tel.: 213 088 4000
Fax: 210 674 9504
Email: desfa@desfa.gr

TECHNICAL SPECIFICATION

Doc No: DSF-SPC-CIV-003

Rev. 1

Page 6 of 11

river crossings, crossing requirements imposed by Authorities, etc.) and shall be greater than 1m and up to a maximum height of 2.5 m.

The depth of the trench shall be such that everywhere there will be a minimum cover of 1.00 m from the top of the pipeline up to the upper edge of the trench after backfilling and reinstatement. The trench excavation depth shall be as the defined depth in the relevant pipeline route longitudinal sections. However special care shall be taken in order the pipeline cover after backfilling and reinstatement not to exceed 2.50 m.

Without reducing the requirements for minimum cover given above, a trench bottom bedding of quarry sand, at least 20 cm thick, shall be provided below the pipe where either:

- the trench bottom is rocky or semi-rocky
- The excavated material mainly consists of stony material, including semi-rock materials,
- extremely low-resistivity soil prevails (e.g. clay, salty soils, etc), as will be shown on the longitudinal sections,
- chemically polluted soil (particularly organic dissolvent) is struck, or on all rivers, streams, torrents and ravine crossings.

The trench walls shall be constructed with the proper inclination in order to avoid any collapse and comply with all applicable safety regulations.

At steep slopes (slopes with inclination greater than 36%) an over-excavation is required at the locations where ditch breakers are placed, in accordance with the relevant typical drawings for ditch breakers construction.

Sandbags by linen material (linatsa) are acceptable as bedding, particularly on sloping ground, and they shall provide a distance between pipeline bottom and bottom of trench at least 20cm. The distance between sandbags shall not exceed 5m. After lowering in the pipe string, bedding shall be completed (filling of the area between the sandbags), according to the above mentioned restrictions i.e. using quarry sand.

In such a case it has to be assured that bedding material has been evenly placed under the pipeline between the sandbags, providing an even and continuous support to the pipe. After filling of the intermediate distance area between sandbags with



Hellenic Gas Transmission System Operator S.A.
357-359 Messogion Av., GR 152 31 Halandri
Tel.: 213 088 4000
Fax: 210 674 9504
Email: desfa@desfa.gr

TECHNICAL SPECIFICATION

Doc No: DSF-SPC-CIV-003

Rev. 1

Page 7 of 11

bedding material, as described above, the sandbags shall be certainly cut out by knife.

The minimum bottom width of the trench shall be the pipe diameter plus 0,4 m, except of pipe with DN 250 where the minimum bottom width of the trench shall be the pipe diameter plus 0,6m.

The trench shall be such that:

1. The pipe may be laid at the bottom of the trench, free of axial compression or tension and without being elastically deformed with a radius less than the one specified on the longitudinal sections. In rocky areas where sand bedding is required, field bends are recommended instead of using elastic bending.
2. The pipe shall be placed on a firm and even bottom where settlements are excluded, i.e. and the soft soil as well as the organic deposits and similar conditions shall be removed and replaced by suitable materials below the pipe.
3. In case of underground installations, the trench shall be widened and/or over-excavated, in order to assure that the minimum distance between the pipeline and any other installation is min. 0.30 m, except for field drains with a diameter $D \leq 150$ mm. where a clearance of 0.15 m is allowed.

Trench excavations shall be usually performed by mechanical means (excavators, etc.) or by hand in cases of existence of underground installations, where there is a risk of damaging them. Contractor may use trencher for performing the excavation, as long as the trench dimensions set out the specifications and Standard Drawings will be fulfilled.

The location of cables, pipes etc. indicated on the drawings, shall be regarded as approximate. It is Contractor's responsibility to locate them accurately and to dig them free by hand. Contractor is responsible for any damage to existing services and for any compensation arising there from.

If it is advantageous to the Contractor, he may use after the Owner's Representative approval, field bends to reduce excavation work. He may also omit bends, after Owner's



Hellenic Gas Transmission System Operator S.A.
357-359 Messogion Av., GR 152 31 Halandri
Tel.: 213 088 4000
Fax: 210 674 9504
Email: desfa@desfa.gr

TECHNICAL SPECIFICATION

Doc No: DSF-SPC-CIV-003

Rev. 1

Page 8 of 11

Representative approval, if the Contractor finds the extra excavation more beneficial to him. However, the resulting cover should never exceed 2,5 m.

Over excavation below the specified level shall be rectified by backfilling with selected excavation compacted material, according to Client's Representative instructions and the Backfilling Technical specification DSF-SPC-CIV-005.

This material shall be compacted in layers not exceeding 0.2 m. and if the Contractor find soft soil or organic deposits in the trench bottom, then the Contractor shall immediately bring this to the attention of the Owner's Representative.

All trenches shall be kept free from water during excavation, fine grading, pipe laying, jointing and embedment operations. Where the trench bottom is mucky or otherwise unstable because of the presence of water and in cases where the static ground water elevation is above the bottom of any trench or bell holed excavation, such groundwater shall be lowered to the extend necessary to keep the trench free from water and the trench bottom stable when the work within the trench is in progress. Surface water shall be prevented from entering trenches.

Where de-watering is required during excavation, Contractor shall perform this by any means, such as use of wells, well point equipment, drainage pipes, open sump pumping, etc.

All water pumped from the trenches shall be conveyed to existing drainage channels. Any conflicts and costs incurred by the improper disposal of the water shall be borne by the Contractor.

The Contractor shall make all necessary arrangements with the authorities and/or landowners and will be liable for any claim raised by landowners for any caused damage to their property due to dewatering activities.

If any structures or pipes or other utilities, which do not appear in the tender documents, are discovered during excavation, the Supervision shall be informed immediately.

The Contractor shall clean the trench immediately before the lowering in of the pipe. All stumps, roots, etc. shall be removed at no extra cost or cut back sufficiently to ensure that they are not in contact with the pipe.



Hellenic Gas Transmission System Operator S.A.
357-359 Messogion Av., GR 152 31 Halandri
Tel.: 213 088 4000
Fax: 210 674 9504
Email: desfa@desfa.gr

TECHNICAL SPECIFICATION

Doc No: DSF-SPC-CIV-003

Rev. 1

Page 9 of 11

If boulders or rocks with size exceeding 150 mm are encountered during excavation, these shall be removed by the contractor at no extra cost.

However, no lowering-in shall take place before Supervision has inspected the trench and authorization to commence lowering-in has been given. Such authorization shall not constitute any waiver on requirements specified herein or in any other Specifications or drawings.

At rocky areas, stringing and welding activities shall be performed after trench blasting in order to avoid damages to the pipeline. For the procurement, transportation, use and disposal of unused blasting material, all the relevant state regulations shall be strictly applied. Wherever blasting is not allowed, (e.g. urban areas, nearby fuel pipes, sensitive areas etc.) the trenching shall be performed with the use of proper equipment (hammers, trenchers, etc.) and other mechanical means (bulldozers, excavators, etc.) Any boulders and rocks shall be removed from site. After excavating of blasted rock from the trench, any boulders and rock existing at the bottom shall be mechanically broken in order to form a levelled bottom.

At places, where the welding will be performed inside the trench, the trench shall be excavated wider (bell hole) in order to facilitate the welding operation. At locations where tie-ins are foreseen within the trench, over-excavation shall be performed creating thus suitable bell holes. These bell holes shall assure a clearance of at least 0.60 m around the pipeline for a length of approx. 1.50 m, in order to provide the necessary space for welding, coating and inspection operators. Bell holes shall be kept dry by any means (such as wells etc.) throughout the whole welding operation and shall be secured against collapse. Bellholes shall be constructed at no extra cost to the Owner.

Wherever the pipeline crosses active or potentially active faults, which are clearly defined in the corresponding drawings, the requirements set forth in the relevant detailed design drawings shall be applied.



Hellenic Gas Transmission System Operator S.A.
357-359 Messogion Av., GR 152 31 Halandri
Tel.: 213 088 4000
Fax: 210 674 9504
Email: desfa@desfa.gr

TECHNICAL SPECIFICATION

Doc No: DSF-SPC-CIV-003

Rev. 1

Page 10 of 11

4.2 TRENCH EXCAVATION IN URBAN AREAS

The requirements set forth in previous paragraph shall be also applied in case of trench excavation in urban areas, but special care shall be taken by Contractor to avoid damages to existing underground installations, as well as to avoid creating nuisance.

For parts of pipeline, which are laid under or by road or paved surfaces, prior to commencing trench excavation, Contractor shall proceed to preparatory works, such as trials cut for underground installations discovery setting out of trench edges, traffic arrangements, special safety measures, etc.

Contractor shall define the exact number and location of the trial cuts in accordance with local Conditions and in Co-operation with Client's Representative.

For the cutting of the asphalt course, an asphalt cutter shall be used. In all cases the edges of the trench shall be straight of a continuously curved line and the edges cut planes shall be vertical.

In case of demolition walkway concrete slabs, the demolition of entire slabs shall be effected.

The disposal of excavated and demolished material shall be collected in such a way not to cause any problems, nuisance and danger to pedestrians and traffic, as well as obstructions to smooth execution of the construction activities. In case of lack, Contractor shall load them on trucks and remove them to appropriate places specifically designated for this purpose by authorities.

Special care shall be taken by Contractor for the removal of the spilled, debris etc. on roads during their transportation.

Marking and Signing of the working area, as well as use of all necessary safety means, such as protective barriers, fencing, traffic signs and lights are Contractor's primary duty and care, in order to ensure proper and safe execution of construction activities and avoidance of public annoyance.

Removal plants shall be done only if is necessary for the smooth execution works and a relevant permit should be obtained by the competent authorities.



Hellenic Gas Transmission System Operator S.A.
357-359 Messogion Av., GR 152 31 Halandri
Tel.: 213 088 4000
Fax: 210 674 9504
Email: desfa@desfa.gr

TECHNICAL SPECIFICATION

Doc No: DSF-SPC-CIV-003

Rev. 1

Page 11 of 11

For dewatering of the trench the drained or pumped water shall be discharged to a place permitted by the relevant authorities or the landowner. Contractor is responsible to obtain any necessary permit, if required.

Special care shall be taken by Contractor in the supporting of the underground installations, which may be uncovered during excavation works. Contractor shall restore at his own care and cost any damage to underground installations at their owner's satisfaction.

In case of depth reduction shall be applied special pipeline protection measures, as defined in standard drawings, typical details, construction drawings and specifications, by the Contractor. Indicatively, these protection measures may include protective concrete saddles, protective concrete slabs, concrete coating of pipe, etc.

5. CONTRACTOR'S QUALITY SYSTEM

The Contractor (or subcontractor), responsible for the execution of trenching and excavation works of this project, shall be featured by a quality control and assurance system.

All works shall be recorded by Contractor's engineers in the relevant Quality Assurance Forms and shall be submitted to Client Representative for signing.