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## TECHNICAL SPECIFICATION

**Doc No : DSF-SPC-CIV-007**

**Rev. 1**

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### HIGH PRESSURE (HP) TRANSMISSION SYSTEMS

# CONSTRUCTIONS OF DRAINS

**JUNE 2021**

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## **1 SCOPE AND OBJECTIVES**

The scope of this Technical Specification is to describe the minimum requirements of the construction process for the Drains at Line Valve Scraper Station for the NG transmission lines.. This specification covers materials and works.

## **2 REFERENCES**

### **2.1 Reference Documents**

- Std Drawing No. STD-1-43-01 [Drainage and Sewer Pit]
- Hellenic Regulation for Concrete Sewer Pipes (ΦΕΚ 253Β/24.4.84).
- ΠΕΤΕΠ 08-06-01-00 (ΥΠΕΧΩΔΕ) «Δίκτυα Βαρύτητας από Τσιμεντοσωλήνες» [Ministry of Public Works- Concrete drainage pipes]

### **2.2 Reference Codes and Standards**

- EN124:1 [Gully tops and manhole tops for vehicular and pedestrian areas. Definitions, classification, general principles of design, performance requirements and test methods].
- EN 124-2 [Gully tops and manhole tops for vehicular and pedestrian areas. Gully tops and manhole tops made cast iron.
- EN 476 [General requirements for components used in discharge pipes, drains and sewers]
- EN 1610 [Construction and testing of drains and sewers]
- EN 12201-2+A1 [Plastics piping systems for water supply – for drainage and sewerage under pressure Polyethylene (PE)]
- ISO 4435 [Plastics piping systems for non-pressure underground drainage and sewerage - Unplasticized poly (vinyl chloride) (PVC-U)]
- EN 13242:2002+a1 [Aggregates for unbound and hydraulically bound materials for use in Civil Engineering work and Road construction].



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### **3 ACRONYMS**

DN	Nominal Diameter
PN	Nominal Pressure Rating
NG	Natural Gas
PED	Pressure Equipment Directive

### **4 MATERIALS**

#### **4.1 Concrete Pipes for Drains and Clean Sewer**

Pipes of mass concrete shall be as per ΠΕΤΕΠ 08-06-01-00

(ΥΠΕΧΩΔΕ) «Δίκτυα Βαρύτητας από Τσιμεντοσωλήνες» Ministry of Public Works- Concrete drainage pipes.

#### **4.2 Plastic Pipes**

Plastic pipes shall be unplasticized polyvinyl chloride (PVC-U) pipes for underground drainage networks manufactured according to **EN 476 or ISO 4435**.

#### **4.3 Manholes and Gullies**

Manholes shall be made of reinforced concrete.

Manhole dimensions, concrete grade, reinforcement, etc. shall be according to Std Dwg. No. STD-1-43-01.

Manholes shall be watertight.

Gullies shall be tight and shall have connecting branch, 100 mm water trap, and 400 mm sediment collector.

#### **4.4 Material for Joints**

Ring seals in accordance with Manufacturer standards shall be used for PVC pipes. Concrete pipe joints shall be sealed with rubber gaskets as per **ΠΕΤΕΠ 08-06-01-00**.



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### **4.5 Covers and Grids**

According to ELOT EN 124:1. Cover and frame of 1.2 m manholes shall be cast iron.

Grid bearing on 0.3 m gully: City-gutter grid with safety lock, heavy duty. Gully cover to be heavy duty grating.

## **5 CONSTRUCTION**

### **5.1 Excavation**

Before commencing excavation, Contractor must take into consideration the drainage system of the station and where this is required, the ground inclinations and submit for review and approval a relevant study with an application drawing. Surface materials and humus etc. shall be stored in separate piles for later reinstatement. To avoid trench instability, excavation material approved as suitable backfill material in accordance with the relevant project shall be deposited not closer than 2,0m from trench.

Pipelines and cables which are exposed during the excavation shall be secured against damage and frost by means of adequate support and insulation.

No conduits or drains may be disconnected without the Supervisor's permission.

The Contractor shall take measures to remove any surface or ground water entering the excavation. Water shall be removed by pumping or gravity and shall be discharged to natural drainage courses.

Care shall be taken during excavation near trees, so that the roots will be cut to the least extent necessary.

If by Contractor's mistake, the excavation is too deep, the bottom shall be filled with sand up to the correct elevation and shall be thoroughly compacted without any extra cost to the Owner. Tolerances shall be kept to a maximum of 100 mm over-excavated and zero mm under-excavation.

### **5.2 Laying and Assembling**

The pipe shall be inspected for defects and cracking before being carefully lowering in the trench. Any defective pipe shall be rejected and replaced without any extra cost to the OWNER.

Pipelines shall be laid on a leveling layer of 150-200 mm thick sand. Normal laying and support conditions are to be anticipated, in accordance with contractual codes & documents.



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Drain pipes shall be surrounded by a filter material or suitable drainage gravel of the following composition:

- no more than 15% shall pass the 0.125 mm sieve.
- more than 15% shall be withheld by 2 mm sieve.

This material shall be at least 100 mm thick and it shall be subject to approval by the Supervisor.

Assembling of concrete and PVC pipes shall be made with ring seal joints, using rings supplied by the pipe supplier for the pipe type and size in question.

Before the joint is made, care shall be taken that both the spigot (tongue) end and the socket (groove, bell) end are clean and undamaged. The rubber ring shall be positioned in accordance with the Supplier's instructions and may not be twisted or set askew on the pipe.

In order to achieve the tightness prescribed, care shall be taken during the assembly of pipes so that the insertion takes place when the pipe is in the correct position and parallel to the pipe axis. The pipe may never be wriggled into place.

The rings shall be kept free of frost and protected against sunshine.

### **5.3 Backfilling**

Backfilling of the trench shall take place immediately after the pipe laying has been approved.

Backfilling material shall be fine quarry sand according to EN 13242. The padding shall be placed on the sides in balanced way such as to avoid movement of the bedded pipe.

Minimum pipe cover, measured from top of pipe or top concrete encasement when provided, shall be 800mm.

For concrete pipes, the backfill shall be spread successively on both sides of the pipes and shall be compacted in maximum 0,20m thick loose layers and shall, all along the trench, be carefully compacted so that there is friction against the sides of the trench. Compaction shall therefore be continued after the shoring, if any, has been removed.

For PVC pipes, a protective layer of 100 mm sand shall be laid over the top of the pipe.

After backfilling and laying of the protective layer, further backfilling shall be executed in sequent layers with approximately 200mm compacted thickness each, which should be moisture conditioned in order to achieve the required degree of compaction.

Compaction of all backfill layers shall be carried out by light compaction equipment, such as vibrating plates and small rollers.



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At roads, the backfill shall be compacted so that it attains the same carrying capacity as the ground beside the trench.

During compaction of the material above the pipe, such a method shall be chosen that in consideration of the strength of the pipe and the immediate earth cover, no overloading of the pipe shall take place.

Furthermore, in case of traffic with heavy equipment in or above the trench, security shall be provided so that the pipe shall not be overloaded.

### **5.4 Supplementary Works**

Before completion the drainage system shall be rinsed thoroughly with water. Covers and grids shall be cleaned from earth, concrete, etc. and shall be adjusted to the height of the surrounding ground or pavement surface. Settlement within the guarantee period shall be repaired and necessary reinstatement shall be made by Contractor, without any extra cost to the Owner.

## **6 INSPECTION**

All drainage works shall be supervised by qualified Civil Engineer. The setting out of all structures and alignment inspection shall be performed by a qualified surveyor.

## **7 QUALITY ASSURANCE**

It is Contractor's responsibility to properly complete quality forms, which are applicable for the execution of works, in accordance with specifications and codes.

Each shipment of pipe (plastic or reinforced concrete) arriving on the site shall be accompanied by delivery notes and manufacturer certificates demonstrating conformance to the relevant standards and specifications.

The relevant quality forms and material – laboratory certificates shall be submitted once available to the Client's Representative for approval and acceptance of the works.

After completion of the works, the Contractor shall produce as built drawings and submit them to the Owner for approval.

Client's representatives shall have the right to review all the relevant documentation and audit the relevant quality procedures, as considered necessary, in order to ensure that the quality system is actually functioning satisfactory.