SLOVENSKI STANDARD
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Kovinski industrijski cevovodi - 6. del: Dodatne zahteve za vkopane cevovode

Metallic industrial piping - Part 6: Additional requirements for buried piping

Metallische industrielle Rohrleitungen - Teil 6: Zusätzliche Anforderungen an erdgedeckte Rohrleitungen

Tuyauteries industrielles métalliques - Partie 6: Exigences complémentaires pour les tuyauteries enterrées

Ta slovenski standard je istoveten z: **EN 13480-6:2024**

ICS:

23.040.10	Železne in jeklene cevi	Iron and steel pipes
77.140.75	Jeklene cevi in cevni profili za posebne namene	Steel pipes and tubes for specific use

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EUROPEAN STANDARD

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English Version

Metallic industrial piping - Part 6: Additional requirements for buried piping

Tuyauteries industrielles métalliques - Partie 6: Exigences complémentaires pour les tuyauteries enterrées

Metallische industrielle Rohrleitungen - Teil 6: Zusätzliche Anforderungen an erdgedeckte Rohrleitungen

This European Standard was approved by CEN on 9 July 2024.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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European foreword

This document (EN 13480-6:2024) has been prepared by Technical Committee CEN/TC 267 “Industrial piping and pipelines”, the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by December 2024, and conflicting national standards shall be withdrawn at the latest by December 2024.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 13480-6:2017.

This new edition incorporates the Amendments which have been approved previously by CEN members, and the corrected pages up to Issue 2 without any further technical change. Annex Y provides details of significant technical changes between this European Standard and the previous edition.

This document has been prepared under a standardization request addressed to CEN by the European Commission. The Standing Committee of the EFTA States subsequently approves these requests for its Member States.

For the relationship with EU Legislation, see informative Annex ZA, which is an integral part of this document.

This European Standard EN 13480 for metallic industrial piping consists of eight interdependent and not dissociable Parts which are:

— *Part 1: General;*

— *Part 2: Materials;*

— *Part 3: Design and calculation;*

— *Part 4: Fabrication and installation;*

— *Part 5: Inspection and testing;*

— *Part 6: Additional requirements for buried piping;*

— *CEN/TR 13480-7, Guidance on the use of conformity assessment procedures;*

— *Part 8: Additional requirements for aluminium and aluminium alloy piping.*

Although these Parts may be obtained separately, it should be recognized that the Parts are inter-dependant. As such the manufacture of metallic industrial piping requires the application of all the relevant Parts in order for the requirements of the Standard to be satisfactorily fulfilled.

This European Standard will be maintained by a Maintenance MHD working group whose scope of working is limited to corrections and interpretations related to EN 13480. The contact to submit queries can be found at https://unm.fr/en/maintenance-agencies/maintenance-agency-en-13480/.
A form for submitting questions can be downloaded from the link to the MHD website. After subject experts have agreed an answer, the answer will be communicated to the questioner. Interpretation sheets will be posted on the website of the MHD.

Amendments to this new edition may be issued from time to time and then used immediately as alternatives to rules contained herein. These amendments will be consolidated within EN 13480:2024 in accordance with the maintenance system of EN 13480 series approved by CEN/BT Decision C172/2021.

Any feedback and questions on this document should be directed to the users' national standards body. A complete listing of these bodies can be found on the CEN website.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.

1 Scope

This document specifies requirements for industrial piping either totally buried or partly buried and partly run in sleeves or similar protection. It is used in conjunction with the other six parts of EN 13480:2024 series.

Where buried piping subject to this standard connects to piping installed under other jurisdiction such as pipelines, the transition can be made at a closing element e.g. an isolating or regulating valve separating the two sections. This can be close to the boundary of the industrial site, but can be inside or outside the boundary.

Operating temperature up to 75 °C.

NOTE For higher temperatures reference can be made to EN 13941-1:2019+A1:2021 and EN 13941-1:2019+A1:2021, but it is kept in mind, that CEN/TC 107 only deals with pre-insulated piping with temperatures up to 140 °C and diameters up to 800 mm, which is state of the art for these products.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 13480-1:2024, *Metallic industrial piping — Part 1: General*

EN 13480-2:2024, *Metallic industrial piping — Part 2: Materials*

EN 13480-3:2024, *Metallic industrial piping — Part 3: Design and calculation*

EN 13480-5:2024, *Metallic industrial piping — Part 5: Inspection and testing*

3 Terms and definitions

No terms and definitions are listed in this document.

4 General

4.1 Safety

a) Buried piping within an industrial site presents a potential hazard to site personal, equipment and environment. The sections set out in this document provide guidance as to how the hazard presented by the piping can be assessed, and the integrity of the piping system maintained.

NOTE 1 Attention is drawn to appropriate National or Local regulations.

b) The main factors to be considered are:

— Design including Routing, Layout, Interaction with connecting systems;

— Materials and Construction Specification and Quality Control;

— Operating Procedures and Control;

— Corrosion protection;

— External Impact Protection and Mitigation.

All of these factors interact.

NOTE 2 It is recommended that all buried piping be subjected to a formal hazard analysis procedure.

NOTE 3 Attention is drawn to appropriate National or Local regulations.

c) Additional safety requirements can be specified for group 1 fluids according to EN 13480-1:2024, including automated means of isolating buried sections of piping.

4.2 Routes

All routes for buried piping shall be agreed with the owner and operator of the site. The site owner shall be required to furnish details of all other actual or planned buried services (including cables) and all roadways or other surface loads within the construction working width or zone of the proposed pipe.

Piping in category III according to EN 13480-1:2024 shall be separated from any other pipe or service by a minimum distance of 0,25 m unless it can be demonstrated that a smaller distance is acceptable.

4.3 Depth of installation

In the absence of special protection (e.g. concrete slabs) buried piping shall be provided with a minimum cover of 0,8 m.

The designer shall consider increasing the extent of cover above the minimum where penetrating cold or frost heave of the ground is likely, or where damage from excavation activities is a possibility.

4.4 Pipes marking and recording

Buried pipes shall be marked by a continuous tape or other agreed means placed directly above the pipe and no closer than 0,3 m.

All buried pipes shall be identified on as-installed drawings which accurately locate the route relative to structures or other permanent features. The site owner can require the route to be physically marked by the use of identification posts or cover slabs at appropriate intervals.

4.5 Internal inspection provisions

Where periodic internal inspection of buried piping is anticipated, and the specification identifies the method proposed, the designer shall incorporate appropriate means of introducing and removing the inspection devices. Such closures, and openings for inspection shall be designed in accordance with EN 13480-3:2024.

4.6 Contents removal

The design of the piping system shall make allowance for the safe filling and removal of the contents. This shall include vent and drain points or falls as required, and the selection of appropriate bends and fittings.

4.7 Trench drainage

The designer shall recognize that pipe trenches for buried piping can act as channels for ground water. Appropriate means shall be employed to ensure that the bottom of the trench has sufficient slope to soak-aways or sumps to prevent accumulation of water around the piping. Where such measures are not possible, the designer shall include the possibility of flotation in the design calculations.

In addition, the drainage arrangements shall dispose of the hydrostatic test water. Care shall be exercised during this operation to ensure that washout of bedding material does not occur.

5 Materials

Materials shall conform to the requirements of EN 13480-2:2024 except that the value for the specified minimum elongation after fracture for the longitudinal direction (see EN 13480-2:2024, 4.1.4.) shall be 20 %.

Materials with elongation values less than 20 % shall be avoided, and shall only be used subject to agreement between the purchaser and the designer.

6 Design and calculation

6.1 Minimum wall thickness for buried piping

Unless the pressure design calculations lead to a greater thickness, the wall thickness of the pipe shall not be lower than the value given in Table 1.

Table 1 — Minimum wall thickness for buried piping

Nominal size (DN)	Minimum thickness mm
DN ≤ 80	3,2
80 < DN ≤ 150	4,7
150 < DN ≤ 450	6,35
450 < DN ≤ 600	7,9
600 < DN ≤ 950	9,5
950 < DN	1 % DN

6.2 Design

6.2.1 A simple single dimensional model linking buried pipes and the surrounding ground can be sufficient for piping designed in accordance with EN 13480-3:2024. More complex analysis of pipe to soil interaction can be used where sufficient accurate geo-mechanical data is available, or where the conditions of this annex cannot be met.

NOTE It is assumed that the loads imposed by the piping on the soil do not exceed its load bearing capacity.

6.2.2 The designer shall include in the calculations the weight of soil or backfill above the pipe and the maximum predicted value of traffic or other static and dynamic loads imposed on the ground above the pipe. With a minimum immediate (first) cover to the pipe of 150 mm of sand, or similar free-flowing material, the forces can be considered as acting over the entire 180° of the upper pipe surface.

6.2.3 In addition to calculations at the design pressure, the loadings on the unpressurized system shall be calculated.

6.2.4 Pipe movement will be significantly restrained by the frictional force at the interface with the surrounding soil, and can be effectively prevented at buried bends and large branches. Unless specific measures are incorporated to permit relative movement, buried pipes shall be considered as fully restrained axially for calculation purposes.

The axial stress due to combined pressure and temperature change effects shall be calculated as follows:

$$S_L = \nu\ S_p - E\alpha\ (\Delta T) \quad (1)$$

where

S_L is the axial stress ≤ 0,90 × yield strength at design temperature;

S_p is the circumferential stress due to pressure alone;

ΔT is the maximum temperature range;

ν is Poisson's ratio;

α is the thermal expansion factor;

E is the Young modulus.

6.2.5 Where no detailed analysis is undertaken, the maximum temperature range (including the installation temperature) shall not exceed 35 °C, and restraining features such as buried bends and tees shall have a separation of not less than 5 DN. Where detailed analysis is undertaken, it shall be in accordance with EN 13480-3:2024 supplemented by Annex A (normative).

6.2.6 Where seismic events are to be considered, the pipe shall be treated as if rigidly connected to the ground and following the imposed displacements. Dynamic amplification can be ignored.

NOTE The surrounding soil can be considered to effectively dampen all harmonic excitations of the pipe.

6.2.7 The designer shall consider the interface between buried and above ground sections of the piping for all design conditions.

For the static analysis, the buried part shall be considered as clamped for thermal expansion, and it shall be ensured that the flexibility of the above ground part is sufficient in order to limit the loads at the connection of the two parts to acceptable values.

The designer shall analyse the effects of any anticipated settlement of the buried piping relative to the connected piping overground or in ducts, and shall ensure compliance with the requirements of this document.

NOTE When gaseous fluids are carried by the piping, the designer can note the likely rise in temperature in the discharge lines of a compressor and corresponding reduction at the outflow from pressure reducing equipment.

Where such in-line items are close to a buried section, the designer shall consider the effects of the temperature change.

7 Installation

7.1 Trenches

7.1.1 The normal method of installation shall be by the excavation of trenches. Alternatively, sections of underground pipe installed by thrust boring or similar trenchless methods shall be set in casings.

7.1.2 The bottom of the trench shall be consolidated and free from sharp objects, rocks or stones. The trench shall be made with sufficient slope to provide drainage for the pipe to minimise flotation and corrosion. Where necessary, soak-aways or sumps shall be provided.

The piping shall be laid on an even bed of sand or similar material and consequently the longitudinal bending stress due to weight can be discounted.

7.1.3 A bedding base of free-flowing material such as rounded sand or fine gravel shall be provided with sufficient depth to support the pipe and assist drainage.

7.2 Pipe laying

7.2.1 The trench shall be substantially free of water before the pipe is placed in position.

7.2.2 Provision shall be made for sufficient access to joints to permit proper examination during hydrostatic or other testing operations, and to wrap or otherwise protect pipe joints in the trench. Adequate means shall be provided for removing the hydrostatic test water from the pipe and trench.

7.2.3 The bore of the piping shall be clean to the required standard before laying in the trench.

7.2.4 All practical means shall be taken to prevent damage to the pipe and its coatings in storage and during pipe laying. Wire ropes and chains shall not be used for lifting. Protective pipe coatings shall be visual examined or high voltage tested after the pipe is laid and prior to back filling the excavation.

7.3 Back filling

7.3.1 All tie and examination operations shall be completed before backfilling.

7.3.2 The first cover of the piping shall be made using free-flowing materials to a minimum depth of 150 mm, ensuring that the whole circumference of the pipe is in contact with the filling.

7.3.3 The remaining backfilling shall be the same material that was excavated to form the trench or of similar characteristics. No vegetable or waste matter shall be incorporated. Compacting shall not commence before a cover of 0,3 m has been achieved.

8 Sleeves or casings

Where buried piping is subjected to frequent overhead traffic or occasional heavy loads, consideration shall be given to providing the pipe with an external protective sleeve or casing. These shall also be employed for sections installed by thrust boring or similar means.

Casings shall be of steel, concrete or plastic composition with a diameter providing a minimum of 100 mm clearance from the carrier pipe.

They shall be constructed to carry all likely external loads, without consideration of the carrier pipe and any internal supports. The thicknesses of steel tubing shall not be less than the values required by EN 13480-3:2024 according to the loads applied (with a minimum of 9,5 mm).

Not less than 3 supporting centralising spacers shall be installed around the pipe at intervals not exceeding the span requirements with a maximum of 4 m.

Casings shall be sealed at their ends to prevent the ingress of water or other foreign matter. If the annulus between carrier and sleeve pipes is to be filled with a fluid, the seal need only be sufficient to withstand the pressure of the filler unless, otherwise specified by the purchaser.

9 Corrosion protection

9.1 General

Buried piping shall be protected from external corrosion which can arise from water and ground contaminants, and the effects of stray earth electrical currents. Protection shall be provided by a combination of coating the pipe surface and cathodic electrical protection.