November 2014

DVS – DEUTSCHER VERBAND FÜR SCHWEISSEN UND VERWANDTE VERFAHREN E.V.

Industrial pipelines made of thermoplastics – Planning and installation – Underground pipe systems

Technical Code DVS 2210-3

Contents:

Note: Explanations of the symbols, abbreviations and indexes used in this guideline can be found in the notes contained in Guideline DVS 2210-1 and Guideline DVS 2210-2.

1 Scope

This guideline provides the basis for the planning and construction of underground pipe systems made of thermoplastic materials. The application of this guideline requires experience in plastics processing, general pipeline construction and knowledge of the materials referred to in section 1.3.

The pipeline systems covered in this guideline are for the transportation of liquid and gaseous substances. The guideline should be generally considered when a risk to persons and/or the environment cannot be ruled out.

Regulations, construction, inspection and approval principles, or official requirements, which demand, extend or restrict the application of this guideline must be taken into account separately. Information on this can be found in section 2.

DVS, Technical Committee, Working Group "Joining of Plastics"

Orders to: DVS Media GmbH, P. O. Box 10 19 65, 40010 Düsseldorf, Germany, Phone: +49(0)211/1591-0, Telefax: +49(0)211/1591-150

1.1 Purpose of the guideline

The guideline predominantly aims or harmonise existing standards for the planning and construction of underground plastic pipelines. For this reason, the system-related rules for gas, water and drain pipes should be considered from perspectives compliant with plastics and, if possible, standardised. Similarly, where system-specific stipulations or quality-reducing influences counteract the proper use of plastics, suggestions for improvement should be put forward.

The importance of the proper use of plastics is illustrated in a study by the "Institut für unterirdische Infrastruktur" (IKT – Institute for Underground Infrastructure), Gelsenkirchen, which was carried out on plastic sewage pipes on behalf of the Ministry for Environment and Nature Conservation in North Rhine-Westfalia.

During extensive inspections of existing sewers made of large pipes with a monolithic (homogenous) and sectioned (profiled) pipe wall structure, widely varying deformation shapes were discovered. In addition to standard deformation of the plastic pipe (elliptical shape in the horizontal axis), there was evidence of three to four waved stages until ovalisation in the vertical axis.

It is assumed that the majority of the deformations, as well as the vertical and horizontal changes in position, emerged during pipe installation. In addition to the global deformations, localised occurrences were also recorded, which were primarily located in the area of the pipe bottom.

The imperfections encountered point to inadequacies in the implementation of the plastic-specific procedures during the underground engineering work, which was compounded by insufficient compaction of the soil in the embedment zone.

1.2 Areas of application

Example areas of application include:

– wastewater treatment plants
– industrial-water supply facilities
– industrial and chemical plants

The scope can also be extended to include other areas of application. Extensions to the application of the guideline must be agreed separately between the contracting parties.

1.3 Materials

When choosing the materials, the following influences must be considered in particular:

– operating conditions
– installation conditions and environmental influences
– chemical resistance to the transported media
– type of joint connections

If applicable, the material suitability must be proven when adhesives, sealants and similar substances are incorporated.

The scope includes the following pipe materials[1]:

– Polyethylene PE, PE-X
– Polypropylene PPH, PP[illegible] PP[illegible]
– Polyvinyl chloride PVC[illegible] PVC[illegible]

Taking into consideration the material properties, the guideline can also be applied to modifications of the materials referred to and other thermoplastics.

A prerequisite for the use of the aforementioned materials is that the characteristic values required for dimensioning exist to a reliable extent and that the manufacturing parameters required for proper processing are recognised state of the art.

1.4 Installation method

Despite the extensive range of installation methods for plastic pipelines (e.g. trenchless installation, relining, etc.), this guideline will only refer to the open construction method with the production of a pipe trench. The reason being that this installation method is a particularly good way of demonstrating how important the correct execution of underground engineering work is for the operational safety of a plastic pipeline.

2 Regulations and rules

Manufacturers of pipes, moulded components, items of equipment, etc. and installers of underground pipeline systems must check which rules apply to the respective application and whether any related regulations must also be taken into account. An overview of the standards, guidelines and such that apply to this guideline can be found in section 11.

2.1 Regulations

Underground pipelines used to supply gas and water are subject to a range of specific regulations. The DVGW regulation is of particular importance, especially worksheets W 400-1 (Planning, Section 15) and W 400-2 (Construction and inspection), as well as DIN EN 805. The installation of gas pipes made of PE up to an operating pressure of 10 bar is described in detail in worksheet G 472.

The construction of underground sewage and drainage pipes made of various materials is covered in DIN EN 1610 (installation and testing).

Where applications compliant with plastics are concerned, supplementary stipulations must also be met in addition to generally applicable rules. The relevant recommendations form part of this guideline.

Underground double-pipe systems, which are used to transport water-polluting liquids, may be subject to special construction regulations or require an additional suitability check by a recognised, independent examining authority. Further details can be found in Guideline DVS 2210-2.

2.2 Rules

The directive of the Product Safety Act (Pressure Equipment Directive – 14th ProdSV (Product Safety Directive)) must be observed. This applies when bringing new pressure equipment and assemblies with a permissible operating pressure of p > 0.5 bar to market.

In accordance with the 14th ProdSV, the manufacturer of pressure equipment of this kind is obliged to submit the equipment or assembly to a conformity assessment procedure (Pressure Equipment Directive 97/23/EC, Art. 10). Performance of the conformity assessment procedure is sometimes incumbent on a notified body (Pressure Equipment Directive 97/23/EC, Art. 12 to 14).

Tanks, pipelines and items of equipment with a safety function are included in the 14th ProdSV. Pipes, moulded components, items of equipment, expansion joints and other pressure-bearing components in particular are covered by pipelines. Items of equipment are fittings, measuring and control devices, and other equipment that influences the safety of the pipeline.

The extent to which other regulations, such as the Federal Water Act (WHG) or the Drinking Water Ordinance (TrinkwV), must be considered depends on the application.

---

[1] The material designations should be understood as a generic term for a respective group of thermoplastics. Thermoplastics with abbreviations in accordance with DIN, EN and ISO standards are assigned to the respective material group on the basis of their properties (e.g. PE includes types PE 63, PE 80, PE 100).