



# SLOVENSKI STANDARD

## SIST-TS CEN/TS 14541:2007

01-julij-2007

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Plastics pipes and fittings for non-pressure applications - Utilisation of non-virgin PVC-U, PP and PE materials

Kunststoff-Rohrleitungen und Formstücke für drucklose Anwendungen - Verwendung von Umlauf-, Rücklaufmaterial und Rezyklat aus PVC-U-, PP- und PE-Materialien

Tubes et raccords en plastique pour applications sans pression - Utilisation de matieres non vierges en PVC-U, PP et PE

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### **ICS:**

23.040.20	Cevi iz polimernih materialov	Plastics pipes
23.040.45	Fitingi iz polimernih materialov	Plastics fittings

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ICS 23.040.20; 23.040.45

English Version

**Plastics pipes and fittings for non-pressure applications -  
Utilisation of non-virgin PVC-U, PP and PE materials**

Tubes et raccords en plastique pour applications sans  
pression - Utilisation de matières non vierges en PVC-U,  
PP et PE

Kunststoff-Rohrleitungen und Formstücke für drucklose  
Anwendungen - Verwendung von Umlauf-,  
Rücklaufmaterial und Rezyklat aus PVC-U-, PP- und PE-  
Materialien

This Technical Specification (CEN/TS) was approved by CEN on 4 December 2006 for provisional application.

The period of validity of this CEN/TS is limited initially to three years. After two years the members of CEN will be requested to submit their comments, particularly on the question whether the CEN/TS can be converted into a European Standard.

CEN members are required to announce the existence of this CEN/TS in the same way as for an EN and to make the CEN/TS available promptly at national level in an appropriate form. It is permissible to keep conflicting national standards in force (in parallel to the CEN/TS) until the final decision about the possible conversion of the CEN/TS into an EN is reached.

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

**Management Centre: rue de Stassart, 36 B-1050 Brussels**

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## Foreword

This document (CEN/TS 14541:2007) has been prepared by Technical Committee CEN /TC 155 "Plastics piping systems and ducting systems", the secretariat of which is held by NEN.

Recycling and processing technology has developed in such a way that utilisation of non-virgin plastic materials is now possible under certain conditions, in spite of the lack of experience in the field of recycling plastics into life-long products.

Environmental considerations by users, manufacturers and others have stimulated manufacturers to start collecting experience in this area.

This document is based on the experience obtained at this time.

CEN/TC 155 decided to prepare this Technical Specification in order to have all relevant definitions and general rules regarding utilisation of PVC-U, PP and PE non-virgin materials in one standard, which may serve as a reference document and reduce unnecessary repetition in the product standards concerned.

For PVC-U this Technical Specification is based on the work undertaken in ISO TC 138 "Plastic pipes, fittings and valves for the transport of fluids".

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

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## 1 Scope

This document specifies definitions and recommended specifications and test methods for the utilisation of PVC-U, PP and PE non-virgin materials in components for non-pressure piping systems.

This document specifies the use of material with agreed specifications in the event that large quantities are to be used.

This document gives information concerning the relationship between relevant characteristics and their influence on processing/performance on pipes and/or fittings.

NOTE 1 For the purpose of this specification, the term pipes refers to extruded pipes and any parts of a fabricated fitting which is made from an extruded pipe. The term fitting means injection moulded fittings and injection moulded parts of a fabricated fitting.

NOTE 2 The product standard should specify the requirements and permitted deviations of the characteristics specified in Table 1, Table 2 and Table 3, as well as permitted dosage levels.

NOTE 3 The WG responsible for the product standard should consider those recommendations and only permit dosage levels which comply with the safety requirements of the product standard. Further, the WG should consider whether extra or more frequent product testing is relevant when using such material in the production of pipes and fittings in accordance with the relevant product standard.

NOTE 4 For the recycling process, for the testing and the use of the material National and/or European regulations may apply.

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## 2 Normative references

The following referenced documents are indispensable for the application 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 727, *Plastics piping and ducting systems — Thermoplastics pipes and fittings — Determination of Vicat softening temperature (VST)*

EN 728, *Plastics piping and ducting systems — Polyolefin pipes and fittings — Determination of oxidation induction time*

EN 922, *Plastics piping and ducting systems — Pipes and fittings of unplasticized poly(vinyl chloride) (PVC-U) — Specimen preparation for determination of the viscosity number and calculation of the K-value*

EN 12099, *Plastics piping systems — Polyethylene piping materials and components — Determination of volatile content*

EN 10204:2004, *Metallic products — Types of inspection documents*

prEN 15344, *Plastics — Recycled Plastics — Characterisation of Polyethylene (PE) recyclates*

prEN 15345, *Plastics — Recycled Plastics — Plastics recyclate characterisation of PP recyclates*

prEN 15346:2006, *Plastics — Recycled Plastics — Characterisation of poly(vinyl chloride) (PVC) recyclates*

EN ISO 1133, *Plastics — Determination of the melt mass-flow rate (MFR) and the melt volume-flow rate (MVR) of thermoplastics (ISO 1133:2005)*

EN ISO 1183-2, *Plastics — Methods for determining the density of non-cellular plastics — Part 2: Density gradient column method (ISO 1183-2:2004)*

EN ISO 3451-1, *Plastics — Determination of ash — Part 1: General method (ISO 3451-1:1997)*

EN ISO 3451-5, *Plastics — Determination of ash — Part 5: Poly(vinyl chloride) (ISO 3451-5:2002)*

EN ISO 6259-1, *Thermoplastics pipes — Determination of tensile properties — Part 1: General test method (ISO 6259-1:1997)*

ISO 6259-3, *Thermoplastics pipes — Determination of tensile properties — Part 3: Polyolefin pipes*

ASTM D 1693, *Standard test method for environmental stress-cracking of ethylene plastics*

### 3 Terms, definitions and abbreviations

#### 3.1 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

##### 3.1.1

##### **virgin material**

material in the form of granules or powder that have not been subjected to use or processing other than that required for their manufacture and to which no reprocessable or recyclable material has been added

##### 3.1.2

##### **own reprocessable material**

material prepared from rejected unused pipes and fittings including trimmings from pipe and fittings production that will be reprocessed in a manufacturer's plant after having been previously processed by the same manufacturer, by a process such as moulding or extrusion and for which the complete formulation is known

##### 3.1.3

##### **external reprocessable material**

material comprising one of the following:

- material from rejected unused pipes or fittings, or trimmings there from, that will be reprocessed and that are originally processed by another manufacturer;
- material from the production of unused thermoplastic products other than pipes and fittings, regardless of where they are manufactured

##### 3.1.4

##### **recyclable material**

material comprising one of the following:

- material from used pipes or fittings which have been cleaned and crushed or ground;
- material from used thermoplastic products other than pipes or fittings which have been cleaned and crushed or ground

##### 3.1.5

##### **reformulated material**

recyclable/reprocessable material that has been reformulated, by additives and processing techniques, to meet an agreed specification. Typically the additives used would be stabilizers, pigments, etc.; the reformulated material: homogeneous pellets, granules, powder etc., with the produced batch having consistent physical properties

##### 3.1.6

##### **agreed specification**

specification of the relevant material characteristics agreed between the supplier of the non-virgin material, the pipe and/or fitting manufacturer and in case of third party certification, the certification body

### 3.2 Abbreviations

- PE polyethylene  
PP polypropylene  
PVC-U unplasticized poly(vinyl chloride)  
MFR melt mass-flow rate

## 4 Utilization of non-virgin material

### 4.1 Own reprocessable material

The use of own clean reprocessable material for producing pipes and fittings shall be permitted without limitations unless otherwise specified in the referring standard. If fitting material is used for producing pipes, it shall be considered as recyclable material unless it is the same formulation.

### 4.2 External reprocessable and recyclable materials with agreed specification

External reprocessable and recyclable materials with an agreed specification that are available in relevant quantities and time intervals shall be permitted to be added to virgin or own reprocessable material or a mixture of those two materials for the production of pipes, provided all the following conditions are met:

- specification for each material shall be agreed between the supplier of external reprocessable or recyclable material and the product manufacturer. It shall at least cover the characteristics given in Table 1, Table 2 and Table 3 for PVC-U, PP and PE. Other characteristics are specified in prEN 15346 for PVC, prEN 15345 for PP and prEN 15344 for PE.

When determined in accordance with the test methods given in Table 1, Table 2 and Table 3 for PVC-U, PP and PE, the actual values from these characteristics shall conform to the agreed value.

- each delivery shall be covered by a certificate according to 3.1 of EN 10204:2004 showing conformity to the agreed specification made by either the material supplier or the product manufacturer as agreed between the parties.

NOTE The quality plan of the supplier of external reprocessable or recyclable material should conform to EN ISO 9001:2000 [1].

- maximum quantity of external reprocessable and recyclable material that is intended to be added shall be specified by the product manufacturer.
- quantity of external reprocessable and recyclable material that is actually added in each production series shall be recorded by the product manufacturer.
- material characteristics of the end product shall conform to the requirements specified in the relevant product standard.
- type testing shall be carried out on the end product with the maximum specified amount and with each form of external reprocessable or recyclable material with an agreed specification. Approved results shall be taken as also proving conformity for components containing lower levels of external or recyclable material.



**Table 1 — Characteristics of recycled PVC-U material that should be considered to be included in the specification related to their influence on process/performance on pipes/fittings**

Characteristic	Unit	Test method <sup>a</sup>	Remark
Filler content by ash rest and/or density <sup>b</sup>	% by mass	EN ISO 3451-5 EN ISO 1183-2	Linked to PVC content
K-value <sup>b</sup>		EN 922	
Vicat softening temperature <sup>b</sup>	°C	EN 727	
Particle size	mm	Sieve analysis	
Type of pigments and stabiliser		By analysis	
Impurities: content and particle size distribution Extraneous polymers		Annex C of prEN 15346:2006 or evaluation of sheets or evaluation of micronised material	
<p><sup>a</sup> Samples shall be taken from the compounded and palletised or from each individual material batch source. The frequency of sampling shall be agreed between supplier and product manufacturer and where relevant, the certification body.</p> <p><sup>b</sup> If the source of the material is consistent e.g. pipes and fittings or other products produced under a quality mark. It is not required to test those material characteristics covered by the quality mark.</p> <p>NOTE When deciding the amount of characteristics to be tested, the frequency with which they have to be tested and the related requirements at least the following should be considered:</p> <p>a) recycling process and sources of the material because of risk of impurities;</p> <p>b) processing of the material into the end product;</p> <p>c) wanted characteristics of the end product;</p> <p>d) possible limitations of sources for the recyclable material;</p> <p>e) intended dosage level of the material.</p>			

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**Table 2 — Characteristics of recycled PP material that should be considered to be in the specification**

Characteristic	Unit	Test method <sup>a</sup>	Remark
Density <sup>b</sup>	kg/m <sup>3</sup>	EN ISO 1183-2	
Tensile strength at yield and elongation at break	%	EN ISO 6259-1 and ISO 6259-3	
MFR <sup>b</sup>	g/10 min	EN ISO 1133 230/2,16	
Ash residue	%	EN ISO 3451-1	
Extraneous polymers		IR analyses or DSC	Presence
Impurities		Mesh filtering	Use agreed mesh size
Type of pigments and/or additives		By analysis	Optional; to be agreed between purchaser and supplier
Volatile matter/moisture content	%	EN 12099	
Thermal stability OIT	min	EN 728 Temperature 200 °C	
<p><sup>a</sup> Samples shall be taken from the compounded and palletised or from each individual material batch source. The frequency of sampling shall be agreed between supplier and product manufacturer and where relevant, the certification body.</p> <p><sup>b</sup> If the source of the material is consistent, e.g. pipes and fittings or other products produced under a quality mark. It is not required to test those material characteristics covered by the quality mark.</p> <p>NOTE When deciding the amount of characteristics to be tested, the frequency with which they have to be tested and the related requirements at least the following should be considered:</p> <p>a) recycling process and sources of the material because of risk of extraneous polymers and impurities;</p> <p>b) processing of the material into the end product;</p> <p>c) wanted characteristics of the end product;</p> <p>d) possible limitations of sources for the recyclable material;</p> <p>e) intended dosage level of the material.</p>			