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Plastics — Unplasticized poly(vinyl chloride) (PVC-U) moulding and extrusion materials —

Part 1: Designation system and basis for specifications

Plastiques — Matériaux à base de poly(chlorure de vinyle) non plastifié (PVC-U) pour moulage et extrusion —

Partie 1: Système de désignation et base de spécification

Reference number
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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 9, *Thermoplastic materials*.

This first edition of ISO 21306-1 cancels and replaces ISO 1163-1:1995, which has been technically revised. The main changes compared to the previous edition are as follows:

— the positions of Data block 2 and Data block 4 of the old designation system has been changed.

A list of all parts in the ISO 21306 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Plastics — Unplasticized poly(vinyl chloride) (PVC-U) moulding and extrusion materials —

Part 1: Designation system and basis for specifications

1 Scope

This document establishes a system of designation for unplasticized PVC thermoplastic material which may be used as the basis for specifications.

The types of PVC-U plastics are differentiated from each other by a classification system based on appropriate levels of the designatory properties

a) Vicat softening temperature,

b) impact strength (Charpy notched),

c) modulus of elasticity

and on information about basic polymer parameters, intended application and/or method of processing, important properties, additives, colorants, fillers and reinforcing materials.

This document is applicable to all unplasticized compositions of homopolymers and copolymers that contain at least a mass fraction of 50 % of vinyl chloride. It is also applicable to compositions containing chlorinated poly(vinyl chloride) and to compositions containing blends of one or more of the above-mentioned polymers, provided that the total amount of these polymers represents at least a mass fraction of 50 % of the polymer content of the composition.

It applies to materials ready for normal use in the form of powder, granules or pellets and to materials unmodified or modified by colorants, additives, fillers, etc.

This document does not apply to cellular plastics.

It is not intended to imply that materials having the same designation give necessarily the same performance. This document does not provide engineering data, performance data or data on processing conditions which can be required to specify a material for a particular application and/or method of processing.

If such additional properties are required, they can be determined in accordance with the test methods specified in ISO 21306-2, if suitable.

In order to specify a thermoplastic material for a particular application or to ensure reproducible processing, additional requirements may be given in data block 5 (see 4.1).

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.

ISO 1043-1, *Plastics — Symbols and abbreviated terms — Part 1: Basic polymers and their special characteristics*

ISO 21306-2, *Plastics — Unplasticized poly (vinyl chloride) (PVC-U) moulding and extrusion materials — Part 2: Preparation of test specimens and determination of properties*

3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

4 Designation and specification system

4.1 General

The designation and specification system for thermoplastics is based on the following standardized pattern.

Designation						
Description block (optional)	Identity block					
	International Standard Number block	Individual-item block				
		Data block 1	Data block 2	Data block 3	Data block 4	Data block 5

The designation consists of an optional description block, reading “Thermoplastics”, and an identity block comprising the International Standard number and an individual-item block. For unambiguous coding, the individual-item block is subdivided into 5 data blocks comprising the following information:

Data block 1: Identification of the plastic by its symbol PVC-U in accordance with ISO 1043-1 (see 4.2).

Data block 2: Fillers or reinforcing materials and their nominal content (not included in this document, see 4.3).

Data block 3: Position 1: Intended application or method of processing (see 4.4).

Positions 2 to 8: Important properties, additives and supplementary information (see 4.4).

Data block 4: Designatory properties (see 4.5).

Data block 5: For the purpose of specifications, a fifth data block may be added containing additional information.

The first character of the individual-item block shall be a hyphen. The data blocks shall be separated from each other by commas.

If a data block is not used, this shall be indicated by doubling the separation sign, i.e. by two commas (,,).

4.2 Data block 1

In this data block, after the hyphen, unplasticized poly (vinyl chloride) plastics are identified by the symbol “PVC-U”, in accordance with ISO 1043-1.

4.3 Data block 2

Not included in this document.

4.4 Data block 3

In this data block, information about intended application and/or method of processing is given in position 1 and information about important properties, additives and colour in positions 2 to 8. The code-letters used are specified in Table 1.

If information is presented in positions 2 to 8 and no specific information is given in position 1, the letter X shall be inserted in position 1.

Table 1 — Code-letters used in data block 3

Code-letter	Position 1	Code-letter	Positions 2 to 8
B	Blow moulding	**B**	Antiblocking
C	Calendering	**C**	Coloured
D	Disc manufacture	**D**	Powder dry blend
E	Extrusion	**E**	Expandable
F	Extrusion of films	**F**	Special burning characteristics
G	General use	**G**	Granules
H	Coating	**H**	Heat ageing stabilized
L	Monofilament extrusion	**L**	Light or weather stabilized
M	Injection moulding		
		N	Natural (no colour added)
		P	Impact modified
Q	Compression moulding		
R	Rotational moulding	**R**	Mould release agent
S	Sintering	**S**	Lubricated
T	Tape manufacture	**T**	Transparent
V	Thermoforming		
X	No indication		
		Y	Increased electrical conductivity
		Z	Antistatic

4.5 Data block 4

4.5.1 General

In this data block, the range of the Vicat softening temperature is represented by a 3-figure code-number (see 4.5.2), the range of the impact strength by a 2-figure code-number (see 4.5.3) and the range of the modulus of elasticity by a letter and a 2-figure code-number (see 4.5.4). The code-numbers are separated from each other by hyphens.

If a property value falls on or near a range limit, the manufacturer shall state which range will designate the material. If subsequent individual test values lie on, or on either side of, the limit because of manufacturing tolerances, the designation is not affected.

NOTE Not all combinations of the values of designatory properties are provided in currently available polymers.

Table 2 — Code-numbers used for designatory properties in data block 4

Vicat softening temperature		Impact strength		Modulus of elasticity	
Code-number	Range °C	Code-number	Range kJ/m²	Code-number	Range MPa
058	≤60	**05**	≤10	**18**	≤2 000
062	>60 but ≤64	**25**	>10 but ≤40	**23**	>2 000 but ≤2 500
066	>64 but ≤68	**50**	>40	**28**	>2 500 but ≤3000
070	>68 but ≤72			**33**	>3 000
074	>72 but ≤76				
078	>76 but ≤80				
082	>80 but ≤84				
086	>84 but ≤88				
090	>88 but ≤92				
094	>92 but ≤96				
098	>96 but ≤100				
102	>100 but ≤104				
106	>104 but ≤108				
110	>108 but ≤112				
114	>112 but ≤116				
118	>116 but ≤120				
122	>120				

4.5.2 Vicat softening temperature

The Vicat softening temperature shall be determined in accordance with ISO 21306-2.

The possible values of Vicat softening temperature are represented by a 3-figure code-number as specified in Table 2.

4.5.3 Impact strength

The impact strength (Charpy notched) shall be determined in accordance with ISO 21306-2.

The possible values of impact strength are divided into 3 ranges, each represented by a 2-figure code-number as specified in Table 2.

4.5.4 Modulus of elasticity

The modulus of elasticity shall be determined in accordance with ISO 21306-2.

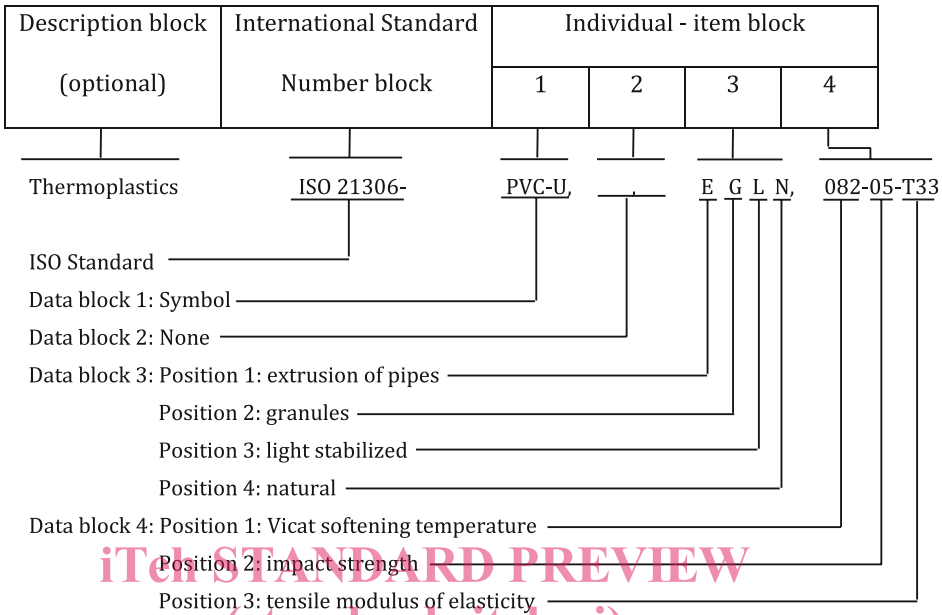
The possible values of modulus of elasticity are divided into 4 ranges, each represented by a 2-figure code-number as specified in Table 2. The fact that it is a tensile modulus shall be indicated by the code-letter T (tension) immediately preceding the code-number indicating the range.

4.6 Data block 5

Indication of additional requirements in this optional data block is a way of transforming the designation of a material into a specification for a particular application. This may be done for example by reference to a suitable national standard or to a standard-like, generally established specification.

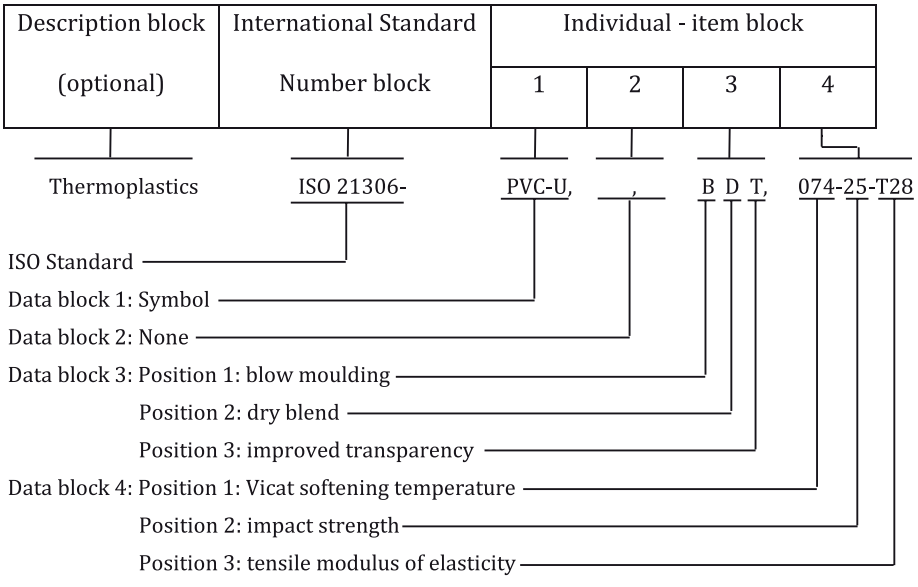
5 Examples of designations

5.1 An unplasticized-PVC thermoplastic material (PVC-U), intended for the extrusion of pipes (E), in the form of a granular material (G), light stabilized (L), natural (N), with a Vicat softening temperature of 83 °C (082), an impact strength of 8 kJ/m2(05) and a tensile modulus of elasticity of 3 700 MPa (T33), shall be designated:



Designation: (Thermoplastics) ISO 21306-PVC-U, , EGLN, 082-05-T33

5.2 An unplasticized-PVC thermoplastic material (PVC-U), intended for blow moulding (B), in the form of a dry blend (D) with improved transparency (T), a Vicat softening temperature of 75 °C (074), an impact strength of 30 kJ/m2(25) and a tensile modulus of elasticity of 2 670 MPa (T28), shall be designated:



Designation: (Thermoplastics) ISO 21306-PVC-U, , BDT, 074-25-T28