



INTERNATIONAL ORGANIZATION FOR STANDARDIZATION

ISO RECOMMENDATION
R 1060

PLASTICS

DESIGNATION OF POLYVINYL CHLORIDE RESINS

1st EDITION

April 1969

COPYRIGHT RESERVED

The copyright of ISO Recommendations and ISO Standards belongs to ISO Member Bodies. Reproduction of these documents, in any country, may be authorized therefore only by the national standards organization of that country, being a member of ISO.

For each individual country the only valid standard is the national standard of that country.

Printed in Switzerland

Also issued in French and Russian. Copies to be obtained through the national standards organizations.

BRIEF HISTORY

The ISO Recommendation R 1060, *Plastics – Designation of polyvinyl chloride resins*, was drawn up by Technical Committee ISO/TC 61, *Plastics*, the Secretariat of which is held by the United States of America Standards Institute (USASI).

Work on this question led to the adoption of a Draft ISO Recommendation.

In April 1967, this Draft ISO Recommendation (No. 1217) was circulated to all the ISO Member Bodies for enquiry. It was approved, subject to a few modifications of an editorial nature, by the following Member Bodies :

Australia	India	South Africa, Rep. of
Austria	Iran	Spain
Belgium	Israel	Sweden
Brazil	Italy	Switzerland
Bulgaria	Japan	Turkey
Canada	Korea, Dem. P. Rep. of	U.A.R.
Czechoslovakia	Korea, Rep. of	United Kingdom
France	Netherlands	U.S.A.
Germany	Poland	Yugoslavia
Greece	Portugal	
Hungary	Romania	

No Member Body opposed the approval of the Draft.

The Draft ISO Recommendation was then submitted by correspondence to the ISO Council, which decided, in April 1969, to accept it as an ISO RECOMMENDATION.

PLASTICS

DESIGNATION OF POLYVINYL CHLORIDE RESINS

INTRODUCTION

This ISO Recommendation describes a *method of designation* for polyvinyl chloride resins which permits its use as the basis of a *specification*.

It is necessary to emphasise that some of the combinations of properties obtainable from the various classes in the Table (see page 5) cannot be realised in practice.

1. SCOPE

1.1 This ISO Recommendation provides a means of designating polyvinyl chloride resins as a function of their uses (in general), the polymerization process, and their principal and possible secondary properties. It also provides for designating grades having properties important for particular end uses.

1.2 Types and grades

Two *types* are defined :

- resins for general uses : “G” for General purposes;
- resins for plastisol : “P” for Plastisol.

Each of the combinations of properties shown in the Table on page 5, *which can be realised in practice*, constitutes a *grade*.

2. DEFINITION

For the purposes of this ISO Recommendation, the term *polyvinyl chloride resin* means a homopolymer of vinyl chloride ($H_2C = CHCl$ monomer) in the form of a powder. This powder is intended for use, together with the necessary additives, to form a compound used in the fabrication of thermoplastic products.

It may also contain, *in small quantities*, non-polymerizable substances used during the polymerization process (emulsifiers or suspending agents, catalyst residues, etc.) or added deliberately in the course of polymerization with a view to stabilising the resin (pre-stabilisers).

3. METHODS OF MANUFACTURE

There are a number of methods of polymerizing vinyl chloride. The most widely used are the emulsion (e), suspension (s), mass (m), and solution (sl) methods. However, there exist other methods intermediary between these and certain new methods which are referred to as “special” (sp).

4. GENERAL REQUIREMENTS

The polyvinyl chloride resins referred to in this ISO Recommendation are designated as follows :

- (a) by a general indication of their end use "G" or "P" and the process of polymerization : e, s, m, sl or sp;
- (b) as a function of the values which they have for the principal and possibly the secondary properties in the classes in the Table on page 5. Each property of the resin listed in the table is allocated a number corresponding to the class in which the resin falls. If any property is not taken into consideration, the number 0 is placed in the appropriate place in the designation;
- (c) possibly by an indication of the particle structure.

NOTES

1. Because of the normal variations which occur in the manufacture of resins, a product supposedly belonging to a given class for one property may fall, in some cases, in the class immediately above or below that designated.
2. An example of the designation of a resin is shown in Annex A.

5. PARTICULAR REQUIREMENTS

The values and methods of test to be included for these properties should be agreed between purchaser and supplier.

6. METHODS OF TEST

The test methods are indicated in column 3 of the Table on page 5.

TABLE

Number	Property	Method of test (1).	Unit	Classes															
				0	1	2	3	4	5	6	7	8	9						
	(a) Principal																		
I	Viscosity number ⁽²⁾	ISO/R 174	ml/g	NS ⁽⁴⁾	<70	70 to 80	> 80 to 90	> 80 to 90	> 90 to 105	> 105 to 120	> 120 to 135	> 135 to 155	> 155 to 175	> 175					
II	Apparent bulk density ⁽³⁾ (not cup)	ISO/R 60	g/ml	NS	<0.25	0.25 to 0.35	> 0.35 to 0.45	> 0.35 to 0.45	> 0.45 to 0.55	> 0.55 to 0.65	> 0.65	...	...	...		
III	Sieve analysis -- Retained on 0.063 mm sieve	ISO DR No. 1624	%	NS	<0.5	0.5 to 5	> 5 to 20	> 5 to 20	> 20 to 50	> 50 to 90	> 90	...	...	...		
IV	-- Retained on 0.250 mm sieve			NS	<0.5	0.5 to 5	> 5 to 20	> 5 to 20	> 20 to 50	> 50 to 90	> 90	> 90				
V	Ash as sulphates	ISO DR No. 1270 Method B	%	NS	<0.20	0.20 to 0.40	> 0.40 to 0.80	> 0.40 to 0.80	> 0.80 to 1.60	> 1.60	...	...	...	...	
	(b) Secondary																		
VI	Volatile matters (including water)	ISO DR No. 1269	%	NS	<0.30	0.30 to 1	> 1 to 3	> 1 to 3	> 3	...	...	...	...	...
VII	pH of aqueous extract	ISO DR No. 1264	%	NS	<6.5	6.5 to 8.5	> 8.5 to 10.5	> 8.5 to 10.5	> 10.5	...	...	...	...	...
	(c) Particular																		
	1. Impurities and foreign particles 2. Behaviour in the presence of plasticizer 3. Ability to form dry blends 4. Properties of plastisol 5. Electrical properties 6. Thermal stability	For agreement between purchaser and supplier																	

Values to be agreed between purchaser and supplier

(1) See Annex C.

(2) K - values corresponding to these values can be found from the literature.

(3) This property is of no interest for paste resins. An "0" must be placed in position Number II in the designation.

(4) NS = Not specified.

ANNEX A

As an example of the use of the Table, a general purposes resin, prepared by the suspension process and giving the following values for the various properties :

Number	Property	Value	Class
	(a) Principal		
I	Viscosity number	95 ml/g	4
II	Apparent bulk density (not cup)	0.50 g/ml	4
	Sieve analysis		
III	– Retained on 0.063 mm sieve	80 %	5
IV	– Retained on 0.250 mm sieve	0 %	1
V	Ash as sulphates	0.05 %	1
	(b) Secondary		
VI	Volatile matters (including water)	0.45 %	2
VII	pH of aqueous extract	NS	0

would be given the grade designation Gs 44511
or Gs 44511 20

ANNEX B

Where possible, it is recommended that in national standards a list of the combinations of properties obtainable from the various classes available in practice be given.

ANNEX C

APPLICABLE PUBLICATIONS

1. ISO Recommendation R 174, *Determination of viscosity numbers of polyvinyl chloride resin in solution.*
2. ISO Recommendation R 60, *Determination of apparent density of moulding material that can be poured from a specified funnel.*
3. ISO Recommendation R . . . , *Plastics – Polyvinyl chloride resins – Sieve analysis in water* (at present Draft ISO Recommendation No. 1624).
4. ISO Recommendation R . . . , *Plastics – PVC resins – Determination of pH of aqueous extract* (at present Draft ISO Recommendation No. 1264).
5. ISO Recommendation R . . . , *Plastics – PVC resins – Determination of ash and sulphated ash* (at present Draft ISO Recommendation No. 1270).
6. ISO Recommendation R . . . , *Plastics – PVC resins – Determination of volatile matter (including water)* (at present Draft ISO Recommendation No. 1269).