

الهيئة السعودية للمواصفات والمقاييس والجودة

Saudi Standards, Metrology and Quality Org. (SASO)



SASO DS 33564 :2025

Doors Made of Polyvinyl Chloride (PVC)

ICS:

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Foreword

Saudi Standards, Metrology and Quality Organization (SASO) has prepared the Saudi Standard “**Doors Made of Polyvinyl Chloride (PVC)** ” based on relevant ADMO, International and National foreign Standards and references.

DRAFT

Doors Made of Polyvinyl Chloride (PVC)

1. SCOPE

This Saudi standard specifies the criteria, properties, and test methods of PVC interior doors. The requirements presented herein are specific to PVC, which is predominantly utilized as a building material, particularly for interior doors.

2. Normative Reference

- 2.1 SASO ISO 306: Plastics — Thermoplastic materials — Determination of Vicat softening temperature (VST)
- 2.2 SASO GSO EN 479: Plastics – Poly (vinyl chloride) (PVC) based profiles - Determination of heat reversion
- 2.3 SASO GSO EN 478: Plastics. Poly(vinyl chloride) (PVC) based profiles. Determination of the appearance after exposure at 150° C
- 2.4 SASO ISO 472, Plastics — Vocabulary
- 2.5 SASO ISO 11925-2: Reaction to fire tests — Ignitability of products subjected to direct impingement of flame, Part 2: Single-flame source test
- 2.6 BS 6920-1: Suitability of non-metallic materials and products for use in contact with water intended for human consumption with regard to their effect on the quality of the water
- 2.7 SASO 2052: Rigid Poly vinyl chloride (PVC) Extruded Hollow Profiles for Windows and Doors
- 2.8 IS 15931: Solid Panel Foam UPVC Door Shutters - Specification
- 2.9 (ASTM D4726) Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Exterior-Profile Extrusions Used for Assembled Windows and Doors
- 2.10 (ASTM) D543 Practices for Evaluating the Resistance of Plastics to Chemical Reagents
- 2.11 (ASTM) F1057 – 21 Standard Practice for Estimating the Quality of Extruded Poly (Vinyl Chloride)(PVC) Pipe by the Heat Reversion Technique
- 2.12 (ASTM) E831 – 12 Standard Test Method for Linear Thermal Expansion of Solid Materials by Thermomechanical Analysis.
- 2.13 (ASTM) D 635 – 98 Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position.

3. Terms and definitions

This section elaborates on terms and definitions used in this standard and those used as references to it. The purpose is to clarify all the standards details and avoid ambiguities.

- 3.1. **PVC compound:** Unplasticized Polyvinyl Chloride with required additives.
- 3.2. **Material:** PVC compound in a form of granules or powder to produce PVC profiles intended to be used for doors fabrication covered by this standard.
- 3.3. **Virgin material:** PVC compound of defined formulation, which has not been used or processed other than required for its compounding and to which no reprocessed or recycled material has been added.

- 3.4. **Own processed material:** Own grinded PVC profiles that is devoted of visible signs of degradation.
- 3.5. **Recycled material:** Material prepared from post-consumer PVC products, regardless of where they were originally manufactured, but compatible with PVC doors' requirements.
- 3.6. **Extruded profile:** A form of a hollow plastic part made by extrusion technic in which thickness (T) is very small in proportion to length (L) and width (W) (Aspect ratio $W/T > 10$).
- 3.7. **Main profile:** Single profile part used to make door after lamination and other needed assemblies.
- 3.8. **Secondary profile:** Profile parts that are adhered to main single profile to design for special sizes doors.
- 3.10 Door:** A moving barrier at the entrance of a building or a room. It is made mainly from PVC, but other materials as well.
- 3.11 Door Frame:** The rectangular frame that Surrounds an opening into which a door fits.
- 3.12 Laminate:** A thin polymeric made sheet (PVC or other polymers that are compatible with PVC profile) used to cover doors and door frames for different purposes.
- 3.13 Adhesion:** Action of connecting two surfaces together using compatible chemical adhesives.

4 Requirements

4.1. Raw material

4.1.1 PVC compound

The PVC compound composition recommended for PVC doors' profiles can be as listed in table 1 but not limited to it. Any additives that can improve the main properties of the profile and hence the door performance, such as processing aid or impact modifier can be added.

Table 1. — General PVC compound for PVC doors 'profile

PVC
Heat stabilizer(s)
Lubricants (External & Internal)
Fillers (Mainly Calcium carbonate)
Pigment (If required)
Blowing Agent (for Foaming if required)

4.1.2: Virgin material use: Virgin rigid PVC compound as dry blend, pellets or other solid particles forms that has not been processed other than that required for its initial manufacturing, to provide high doors and door frames performance i.e. Fulfilling all CTQs listed in (coming sections).

4.1.3: Own processed material use: Material from OWN recycled PVC profile or similar in formulation PVC products, free of degradation and fulfilling all CTQs list in coming section.

4.1.4: Recycled material use: Rigid PVC compound from recycled door profiles or similar in formulation products (regardless of where they were manufactured) if they are devoted of degradation and compatible with PVC doors' requirements.

4.1.5: Laminate: The laminations must be able to adhere easily to PVC doors through common adhesives used for PVC.

4.1.6: Adhesives: The adhesives used in PVC doors should be good adhesives or tie layers of laminates and PVC profiles.

4.2 Profile shape design: The profiles are in general manufactured according to the designs given in figure1, but can be modified in both design and dimensions based on mutual agreement between the manufacturer and the consumer.



Figure1: Example of PVC profile cross-section

4.3 : Profile appearance:

4.3.1: Surface finish: Profiles shall be free of foreign matters, voids, cracks, scratches and other visual defects.

4.3.2: Color: Uniformity of the color should be considered just for good quality of the profile since lamination is mandatory in most cases of doors manufacturing.

4.4 : Profile dimensions:

4.4.1: Dimensions: The profile dimensions (length, width, and thicknesses) and tolerances shall be as agreed upon between the supplier and the purchaser in the purchase order.

4.4.2: Dimensions stability: The dimensions ((length, width, and thicknesses) of the profile should not vary more than what is inherent to normal PVC profile extrusion processing conditions (See values limits in properties).

4.5 : Profile straightness: The profile shall be straight such that the longitudinal and cross direction axes (Extrusion direction and perpendicular axes) of the profile shall not deviate from the straight line by more than 1 mm/m.

4.6 : Profile surface flatness: The surface of the profile shall be flat such that difference between maximum and minimum readings (Concavity vs convexity) across the face shall not exceed 0.3 mm as shown in figure (2).

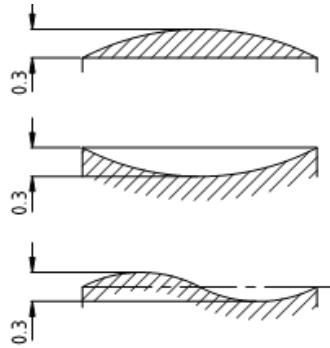


Figure 2: Surface flatness

4.7 : Profile mass per unit length: The profile mass per unit length should not exceed more than 5 % from the nominal value declared by the profile manufacturer.

4.8: Profile mechanical properties:

Tensile properties such as tensile strength, Modulus of elasticity and elongation at break are good indicators of the profile performance.

Values of properties that are good indicators of good quality doors' profiles are listed in table2 and are recommended for auditing PVC doors' profiles manufacturers for their end products quality.

Table2: PVC profile recommended tensile & flexural properties.

Property	Compact Profile	Foamed Profile	Test Method
Density	>1.4 g/cc	1 or 0.8 g/cc	ASTM D792-98
Tensile at Yield (MPa)	25.0 – 27.0	15.0 – 20.0	ASTM D638-99
Tensile at Break (MPa)	24.0 – 25.0	13.0 – 18.0	ASTM D638-99
Tensile Modulus (MPa)	2500 – 3100	1700 – 2200	ASTM D638-99
Elongation at Break (MPa)	10.0 – 15.0	5.0 - 10.0	ASTM D638-99
Flexural Strength (MPa)	47.0 – 56.0	20.0 – 26.0	ASTM D790-99
Flexural Modulus (MPa)	4000 – 4800	2000 – 2500	ASTM D790-99

Doors' impact resistance: Doors' profiles impact resistance should be classified as good if a profile like the one observed in figure3 is passing strikes (one strike for each sample) of falling weight mass of 2 Kg falling from 0.7 m height on the it. Three samples should pass the test at least for each profile as mentioned in table 4. ASTM D5420-98a

Table4: Profile impact requirements

Door's profile name	Strike 1	Strike 2	Strike 3	Remark
1	Pass	Pass	Pass	Good impact resistance
2	Pass	Pass	Fail	Bad impact resistance

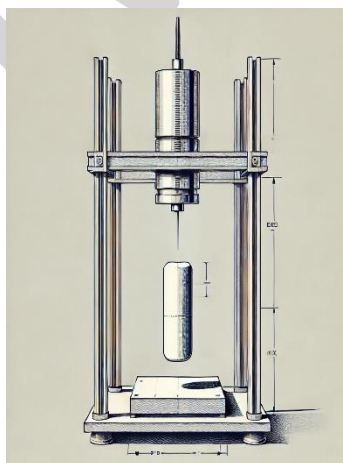


Figure3: Falling weight impact test

4.9: Profile thermal properties:**4.9.1: Heat distortion temperature:**

The heat distortion temperature shall not be less than 72 °C. The test shall be conducted according to ASTM D648-01.

4.9.2: Heat reversion:

The relative change in length for the profile after exposure to heat shall not exceed 2 - 3% for any of the tested pieces and should be uniform on all the profile faces. The test shall be conducted according to reference that referred in clause 2.11.

4.9.3: Profile behavior after heating at 150 °C:

The profile shall not show any bubbles, cracks, breakages, blisters and delamination after heating at 150 °C. The test shall be conducted according to reference mentioned in clause 2.11

4.9.4: Profile thermal expansion:

PVC thermal expansion coefficient is 4.5×10^{-5} m/m°C when the material is compact and 3.7×10^{-5} m/m°C when the material is foamed indicating that a standard door of two-meter height might expand up to 2 mm at a temperature reaching 40 °C. Doors should then be designed based on the mentioned values to avoid thermal expansion problem. Thermal Expansion Coefficient is measured according to standard that mentioned in clause 2.12.

4.10: Profile flammability:**4.10.1: Rate or Extent of burning**

The profile shall be self-extinguishing type. The average extent of burning shall be less than 3 mm and average time of burning (before self-extinguishing) shall be less than 5 seconds. Test shall be conducted according to reference in clause 2.13.

4.10.2: Oxygen Index:

Oxygen index measured according based on below formula according to ASTM D2863-97 should be as mentioned in table 3.

Table3: Low Oxygen Index of PVC

Polymer Name	Min value (%)	Max Value (%)
PVC, Plasticized Filled	20.0	40.0
PVC, Rigid	40.0	45.0

4.11: Doors' lamination

4.11.1: Lamination adhesion performance:

Lamination adhesion to door's profile should be tested at least two to three times a year to avoid delivering bad laminated doors. Bubbles, scratch or any defects should not exist to consider good lamination.

4.12: Chemical Resistance

To determine the chemical resistance of PVC doors, samples should be immersed in the specified chemicals (Deionized Water, Sodium Hydroxide, Sulfuric Acid, Nitric Acid, Hydrofluoric Acid, Ethanol, Isopropyl Alcohol, Methylene Chloride) for 24 hours at room temperature and visually examined in accordance with Test method (That referred in clause 2/10). The samples' surface should be clear and undissolved.

4.13: Health and safety requirements for materials

Comply with health, safety, and environmental rules, regulations, and other organizational requirements.

5. Sampling

Choose samples using a statistically acceptable approach. Samples should be indicative of the substance utilized. When using commercial parts, cut them into sections to create flat test specimens at least 1.5 in. (38 mm) wide. The back surface of the specimen should be as flat as possible on the specimen support anvil, with no ridges or raised areas that could make contact with the anvil. The specimens should also be free of visible imperfections such as grooves, ribs, and so on.

6. Marking

It is required that products or packaging shall be labeled as in Arabic or Arabic and English with the following information:

- a) Symbol of classification by molding method
- b) Symbols of use area and major use
- c) Year and month, or abbreviation, of manufacture
- d) Manufacturer's name or abbreviation
- e) Type of raw material, indicated
- f) Country of origin

g) Dimensions

References

1. IS 15931 : 2012: Solid Panel Foam UPVC Door Shutters - Specification"
2. ISO 1043-1, Plastics — Symbols and abbreviated terms — Part 1: Basic polymers and their special characteristics
3. BS 6920-1:2014 Suitability of non-metallic materials and products for use in contact with water intended for human consumption with regard to their effect on the quality of the water
4. SASO 2052/2022 Rigid Poly vinyl chloride (PVC) Extruded Hollow Profiles For Windows and Doors
5. D4726 – 18 Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Exterior-Profile Extrusions Used for Assembled Windows and Doors
6. Burning Tests on Plastic Materials; ASTM D5207.
7. F2817 – 13 An American National Standard Specification for Poly (Vinyl Chloride) (PVC) Gas Pressure Pipe and Fittings for Maintenance or Repair