



**Summary of Substantive Changes
between the 2014 and the 2017 editions of
ASTM D4101 “Standard Classification System and Basis for Specification for
Polypropylene Injection and Extrusion Materials”**

Presented to the IAPMO Standards Review Committee on November 9, 2018

General: The changes to this standard should not have an impact on currently listed products. The significant changes are:

- Incorporated former notes 13, 14, 15 and 16 into the body of the standard (See Sections 11 and 12)
- Removed the allowance for retesting of materials that fail to meet the requirements of the standard (see Section 15)
- Added a footnote to Table PP which replaces groups 2 and 3 with group 5 for new materials to be called out (see Table PP).

The title of the standard was changed as follows: ***Standard Classification System and Basis for Specification for Polypropylene Injection and Extrusion Materials***

Section 2, Referenced Documents: The following referenced standards were added or deleted as follows:

~~*D635 Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position*~~

~~*D2863 Test Method for Measuring the Minimum Oxygen Concentration to Support Candle-Like Combustion of Plastics (Oxygen Index)*~~

~~*D5740 Guide for Writing Material Standards in the Classification Format*~~

~~*2.3 DOT Standard:*~~

~~*MVSS-302 Federal Motor Vehicle Safety Standard 302 Flammability of Interior Materials⁵*~~

~~*2.4 UL Standard:*~~

~~*UL 94 Standard for Tests for Flammability of Plastic Materials for Parts in Devices and Appliances⁶*~~

2.4 ISO Standards:

ISO 19069-1 Plastics—Polypropylene (PP) moulding and extrusion materials—Part 1: Designation system and basis for specifications

ISO 19069-2 Plastics—Polypropylene (PP) moulding and extrusion materials—Part 2: Preparation of test specimens and determination of properties

Section 11, Specimen Preparation: Incorporated notes 13, 14 and 15 as part of section 11 as follows:

~~*NOTE 13—11.1.4.2*~~ For materials with melt flows less than 1 g/10 min, the temperature of the melt should be raised in 5°C increments from 250°C until the part weight of the entire shot is equivalent to the part weight of a 1 to 5-g/10 min material.

NOTE 14 Due to degradation and thermal expansion of the material do not exceed 270°C. If unable to obtain the weight at 270°C, make slight adjustments in the injection pressure to achieve the proper weight.



11.1.4.3 The melt temperature shall be 190°C for materials with melt flows greater than 30 g/10 min.

11.1.4.4 Since the needle-type pyrometer technique is somewhat tedious, a second technique using an infrared pyrometer may be used. The infrared pyrometer used must have an accuracy of 1 % of reading or 61°F or 61°C, a response time of at least 0.5 s, and a distance to target ratio of at least 30:1. It is recommended that the infrared pyrometer have a laser beam to establish the position being measured on the molten mass of polymer. This second technique shall only be used after a correlation between the needle-type pyrometer and the infrared pyrometer has been established. This correlation shall be verified at least every six months. The correlation shall be re-established each time either pyrometer is recalibrated.

11.1.6 Injection Pressure and Speed—All materials less than 30-g/10 min melt flow shall be molded using a single stage pressure. For a given machine and a given mold, the injection pressure and the injection speed controls shall be set to produce equal part weights, including sprue and runners (± 2 %) regardless of material flow rates. The injection speed and injection pressure shall be set to minimize sink and flash. The maximum amount of flash shall not exceed 1 mm and will only be acceptable in the nontesting area. Once the injection speed and pressure are determined for a given machine and mold they shall not be varied by more than ± 2 %. ~~NOTE 14—A~~ single stage pressure can be obtained in two different ways: (1) Injection pressure may be set to reach

11.1.6.1 Set the injection pressure to a specified pressure then allowed to shift over to a hold pressure; the hold pressure maintains the pressure at the maximum pressure generated by the injection pressure, and (2) The cavity may be filled using hold pressure only fill the cavity using hold pressure only.

11.1.6.1.1 Discussion—The first method is the preferred method. For materials with melt flow rates above 30 g/10 min the injection and hold pressures may be set to different pressures. Normally the hold pressure is set lower than the injection pressure, but must be high enough to finish filling out the molded part. It is recommended that, for these high melt flow rate materials, the manufacturer be contacted for guidance in establishing the injection and hold pressures ~~manufacturer.~~ ~~NOTE 15—It~~ is recommended that screw rotation speed be set to a minimum to allow the screw to rotate for 17 to 19 s of the 20-s cooling time. This slower screw speed will provide greater uniformity of the melt with respect to viscosity and temperature. It may be necessary to adjust the screw rotation speed for the various material types in order to achieve the 17 to 19-s time frame. The rate of screw movement backwards away from the mold is dependent on the back pressure, frictional effects, various additive types, and melt viscosity.

Section 12, Conditioning: Incorporated note 16 as part of section 12 as follows:

~~NOTE 16—12.1.2~~ When the temperature in the molding area exceeds 28°C or the humidity level exceeds 60 % (applies only to filled materials) specimens shall be moved as quickly as possible to the standard laboratory atmosphere.

Section 15, Rejection and Rehearing: Removed the allowance for retesting of materials that fail to meet the requirements of the standard as follows:

~~15. Rejection and Rehearing~~

~~15.1 Material that fails to conform to the requirements of this specification may be rejected. If any failure occurs, the materials may be retested to establish conformity. Rejection shall be reported to the supplier promptly and in writing. In case of dissatisfaction with the results of the test, a claim for a rehearing may be made.~~



Table PP, Requirements for Unreinforced Polypropylene (Natural Color Only): Added footnote "J" which replaces groups 2 and 3 with group 5 for new materials to be called out as follows:

Both of these groups have been replaced by Group 05. Appendix X2 contains the cell classification values for these two groups from the old Table PP and can be used for materials previously classified with these groupings. All new materials shall be called out using the Group 05 classification above.