



# Standard Specification for Molded Drain, Waste, and Vent (DWV) Short-Pattern Plastic Fittings<sup>1</sup>

This standard is issued under the fixed designation F2135; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

<sup>ε1</sup> NOTE—Fig. X1.1 was editorially corrected in April 2017.

## 1. Scope

1.1 This specification covers standard fitting geometries for molded short-pattern plastic fittings intended for use in drain, waste, and vent applications.

1.2 Fittings meeting the requirements of this specification are designed for use with outside-diameter controlled pipe. The body inside diameter can vary significantly as the wall thickness and outside diameter varies, and therefore, is not suitable for use as a fitting socket.

1.3 Fittings meeting the requirements of this specification shall be tested in accordance with the applicable requirements of Specifications [D2661](#) or [D2665](#).

1.4 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units which are provided for information only and are not considered standard.

1.5 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory requirements prior to use.*

1.6 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

## 2. Referenced Documents

### 2.1 ASTM Standards:<sup>2</sup>

<sup>1</sup> This specification is under the jurisdiction of ASTM Committee [F17](#) on Plastic Piping Systems and is the direct responsibility of Subcommittee [F17.63](#) on DWV.

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<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

- [D2122](#) Test Method for Determining Dimensions of Thermoplastic Pipe and Fittings
- [D2661](#) Specification for Acrylonitrile-Butadiene-Styrene (ABS) Schedule 40 Plastic Drain, Waste, and Vent Pipe and Fittings
- [D2665](#) Specification for Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings
- [D2749](#) Symbols for Dimensions of Plastic Pipe Fittings
- [F1498](#) Specification for Taper Pipe Threads 60° for Thermoplastic Pipe and Fittings

## 3. Requirements

3.1 Short-pattern fittings shall conform to the geometries as specified in this specification.

3.2 All other dimensions shall be determined in accordance with Test Method [D2122](#).

3.3 The exact outside shape of a short-pattern fitting is determined by the socket dimensions, wall thickness requirements, waterway, and any other critical dimensions that may be specified.

3.4 Configurations designed as short as possible are acceptable providing that the minimum wall thickness requirements for the particular nominal size being made is followed.

3.5 All short-pattern fittings used for drainage and having a 90° directional change (except vent fittings) shall have a pitch of ¼ in./ft or 1°12'.

3.6 All short-pattern fittings having tapered threads shall conform and be gaged in accordance with Specification [F1498](#).

### 3.7 45° Y-Branches:

3.7.1 Short-pattern 45° Y-branches shall not be pitched.

3.7.1.1 When the branch of a short-pattern 45° Y is of a smaller diameter than the main body of the fitting, the internal diameters of the fitting shall remain constant until they intercept one another.

### 3.8 One-Quarter Bends:

3.8.1 Short-pattern one-quarter bends shall have a centerline radius of curvature of not less than the nominal pipe size, with

the exception of traps. The centerline radius of curvature shall be measured in accordance with Section 4.

3.9 Sanitary Tees:

3.9.1 Short-pattern sanitary tees and reducing tees shall have a centerline radius of curvature on the side branch of not less than its nominal size, when measured in accordance with Section 4. The alignment of the side branch shall be so located that the smallest inside radius of the side branch of the sanitary tee shall meet tangentially with, or within 5 % of, the main bore (see Fig. 1), when measured in accordance with 4.4.5.

NOTE 1—Refer to Appendix XI for geometric configurations of some of the fittings being produced. Consult the individual manufacturer for laying lengths.

4. Test Method for Determining Compliance of Short-Pattern ¼ Bends and Sanitary Tees

4.1 Scope:

4.1.1 This test method covers the determination of the centerline radius of short-pattern ¼ bends and of the side branch of short-pattern sanitary tees. A method of determining the alignment of the side branch of short-pattern sanitary tees is also included.

4.2 Significance and Use

4.2.1 Determination of the centerline radius of curvature of short-pattern ¼ bends.

4.2.2 Determination of the centerline radius of curvature of the side branch of short-pattern sanitary tees.

4.2.3 Determination of the alignment of the side branch of short-pattern sanitary tees.

4.3 Apparatus

4.3.1 For accuracy, the following equipment shall be used:

4.3.1.1 Lead pencil—3H or harder lead 0.020 in. (0.5 mm), sharp.

4.3.1.2 Set square, suitable size.

4.3.1.3 Metal rule—accurate to 0.020 in. (0.5 mm).

4.3.1.4 Solid blade saw—capable of cutting a fitting in half squarely along the mold parting line.

4.3.1.5 Photocopy machine—capable of reproducing the cut surface of the fitting to be tested.

4.4 Procedure

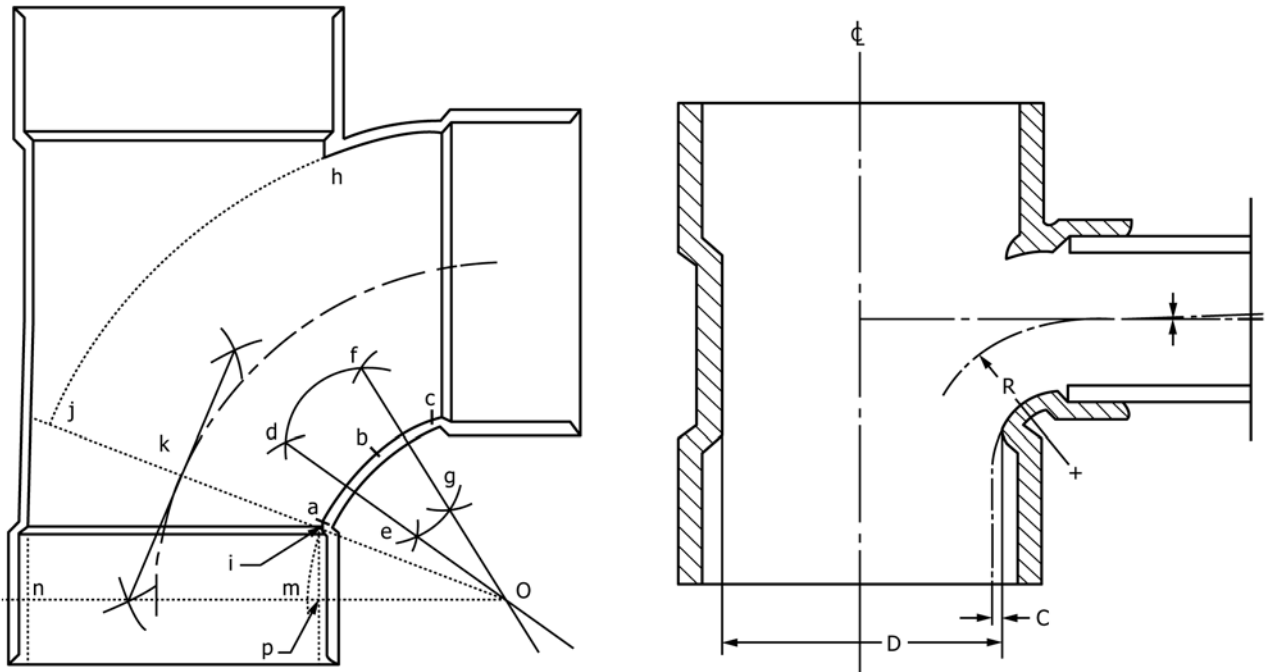
4.4.1 Cut a fitting in half squarely along the mold parting line using a solid blade saw.

4.4.2 Place the metal rule next to the specimen to be photocopied. Make a photocopy of each half of the specimen. (Ensure that the outline is clearly defined. White correction fluid or equivalent may be used.)

4.4.3 Compare the metal rule to its photocopy. The photocopy shall not be enlarged or reduced.

4.4.4 Find the centerline radius of curvature for each half of the fitting as follows (see Fig. 1).

4.4.4.1 Locate points *a*, *b*, and *c* on the curved line forming the inside of the fitting, as shown in Fig. 1. Points *a* and *c* are placed at the extremities of the curve, while point *b* is placed approximately midway between *a* and *c*.



R = greater than branch nominal size

$$\frac{C}{D} \times 100 = \text{less than } 5\%$$

FIG. 1 Measurement for Centerline Radius of Curvature and Branch Alignment

4.4.4.2 Using a compass with a radius greater than  $\frac{1}{2}$  the length of line  $ab$ , draw two intersecting arcs with their center at  $a$  and  $b$ , locating points  $d$  and  $e$ .

4.4.4.3 Draw the bisector by passing a line through the two intersecting points of the arcs (points  $d$  and  $e$ ).

4.4.4.4 Using  $c$  as center, in a similar manner, bisect the line  $bc$  with a line passing through the two intersecting points of the arcs (points  $f$  and  $g$ ).

4.4.4.5 The point where the two bisectors intersect, at point  $O$ , is the center point of the inner arc of the side branch.

4.4.4.6 Extend the inner arc at point  $h$  and the inner arc at point  $i$ , using point  $O$  as center.

4.4.4.7 Draw a line through point  $O$  and point  $i$  crossing the two arcs at points  $i$  and  $j$ .

4.4.4.8 Bisect the line  $ij$  in the manner described in 4.4.4.2 and 4.4.4.3, finding point  $k$ . Line  $Ok$  is the centerline radius of curvature.

4.4.4.9 Measure and record the length of line  $Ok$ .

4.4.5 Determine the side branch misalignment (C/D Ratio) of a sanitary tee as follows (see Fig. 1).

4.4.5.1 After finding point  $O$  using the method in 4.4.4.4 using a set square, draw a line through point  $O$  at  $90^\circ$  to the main bore of the body, forming line  $On$ .

4.4.5.2 Extend the arc  $Oi$  from point  $i$  until it crosses line  $On$  at point  $m$ .

4.4.5.3 Extend the inside waterway of the main bore from point  $i$  until it crosses line  $On$  at point  $p$ .

4.4.5.4 Measure and record the length of line  $mp$ , which is factor C of the ratio.

4.4.5.5 Measure and record the length of line  $np$ , which is factor D of the ratio.

#### 4.5 Calculation and Interpretation of Results

4.5.1 Calculate the centerline radius of curvature (the length of line  $Ok$ ) for the short-pattern  $\frac{1}{4}$  bend, sanitary tee or reducing sanitary tee by averaging the centerline radius of curvature for each half of the fitting.

4.5.2 Calculate the percent of misalignment of the side branch of a short-pattern sanitary tee by dividing the misalignment C (the length of line  $mp$ ) by the diameter of the main bore D (the length of line  $np$ ). Multiply by 100, then average the results of both halves of the fitting.

4.5.3 If the result in 4.5.2 exceeds 5%, the measuring procedure shall be repeated four additional times using the same fitting sample. If any of these four results exceed 7%, the fitting shall not be acceptable.

#### 4.6 Precision and Bias<sup>3</sup>

4.6.1 The percent of misalignment of the side branch (C/D ratio) of a short-pattern sanitary tee is a measurement consisting of the average of the two values determined for the halves of one fitting and has been found to have a potential error of  $\pm 2\%$  when using the method described in Section 4.

### 5. Keywords

5.1 DWV; fittings; plastic; Schedule 40; thermoplastic

<sup>3</sup> Supporting data have been filed at ASTM International Headquarters and may be obtained by requesting Research Report RR:F17-1047.

## APPENDIX

### (Nonmandatory Information)

#### X1. CONFIGURATIONS

X1.1 The following fittings, descriptions, and terms are commonly used in the plastic Drain, Waste, and Vent piping industry. However, these illustrations may not exhibit all the configurations produced. Therefore, consult the individual

manufacturer as to sizes and laying-length dimensions (see Symbols D2749).

NOTE X1.1—Some fitting configurations may be made with threaded hubs or spigot connections.

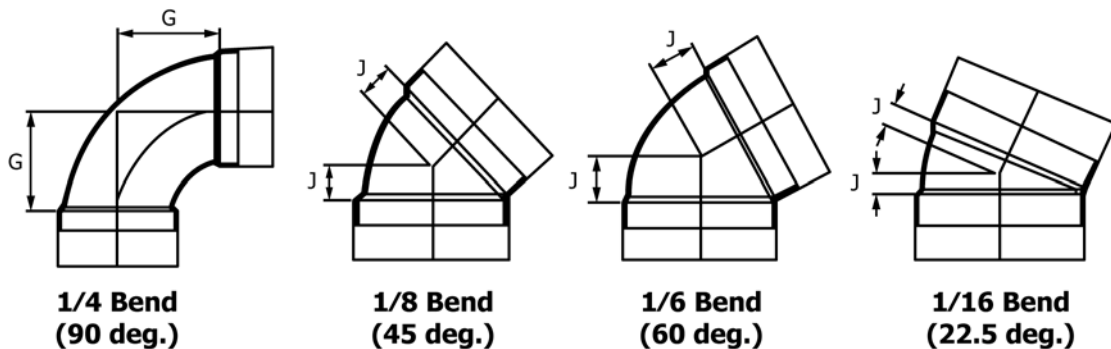


FIG. X1.1 Bends

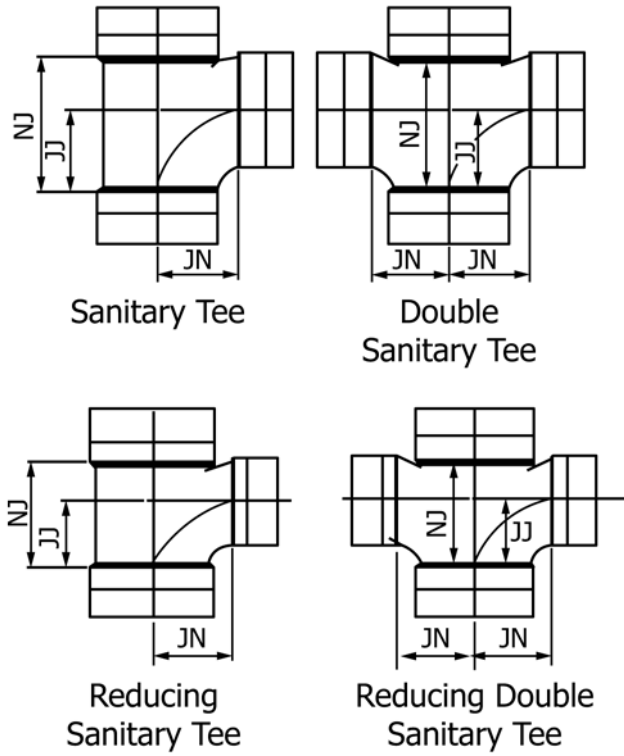


FIG. X1.2 Single & Double Sanitary Tees

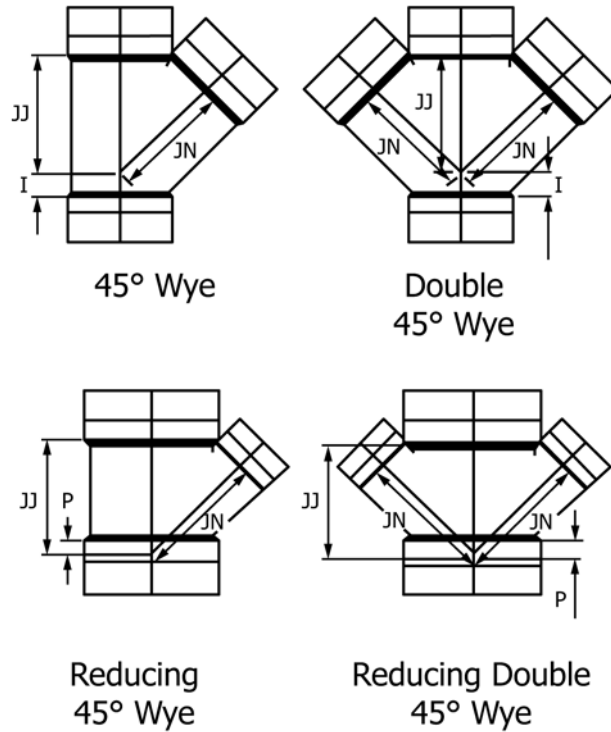
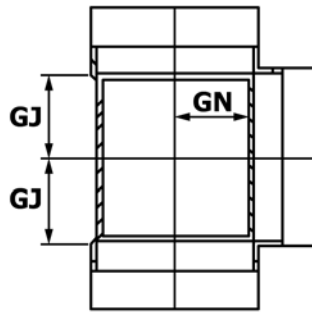
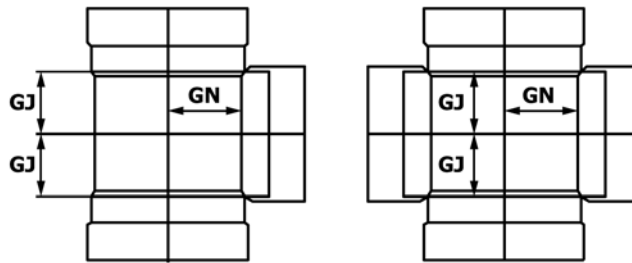


FIG. X1.3 Single & Double 45° Wyes



**Vent Tee**

FIG. X1.4 Vent Tee



**Reducing Vent Tee**

**Reducing Double Vent Tee**

FIG. X1.5 Reducing Vent Tee

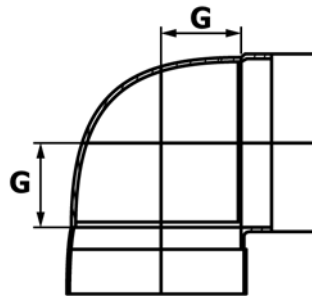
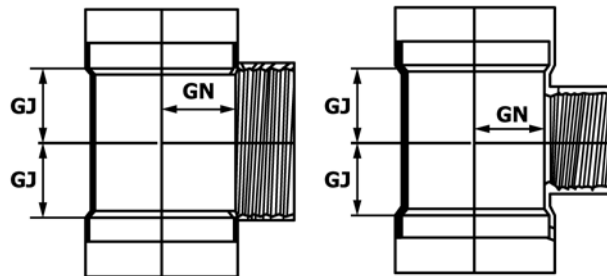


FIG. X1.6 1/4 Bend Vent



**Reducing Cleanout Tee**

FIG. X1.7 Cleanout Tee

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