



Designation: D6881/D6881M – 03 (Reapproved 2020)

Standard Classification for Standard Plastics Industry Bulk Box/Pallet Unit Size Classified By Bulk Density¹

This standard is issued under the fixed designation D6881/D6881M; 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 (ϵ) indicates an editorial change since the last revision or reapproval.

INTRODUCTION

An ad-hoc survey in 2000 showed about 40 different box sizes in use by the plastic resin industry; the purpose for this classification is to quantify a box/pallet unit size acceptable for this industry within the limits of the scope.

1. Scope

1.1 This classification covers containers used to hold plastic resins with bulk density (Test Methods **D1895**) of 27 to 39 lb/ft³ (0.432 to 0.625 g/cm³).

1.2 This classification does not apply to any plastic resins with bulk density below 27 lb/ft³ (0.432 g/cm³) or above 39 lb/ft³ (0.625 g/cm³).

1.3 This classification does not apply to bulk boxes containing hazardous materials.

1.4 This classification does not address box/pallet unitization requirements.

1.5 This classification does not address requirements of plastic bag liners normally placed inside the corrugated bulk box before filling with plastic resin.

1.6 This classification does not address tamping, shaking, or other compression methods of the resin filled bulk box to condense entrained air and increase headspace in the bulk box.

1.7 This classification does not address blocking and bracing or other shipping requirements normally associated with bulk box unit deliveries.

1.8 This classification does not address filled bulk box/pallet unit stack height.

1.9 This classification does not address international shipping regulations of bulk box/pallet units.

¹ This classification is under the jurisdiction of ASTM Committee **D10** on Packaging and is the direct responsibility of Subcommittee **D10.12** on Shipping Containers, Crates, Pallets, Skids and Related Structures.

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1.10 This classification does not address pallet opening sizes for pallet trucks.

1.11 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard.

1.12 *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.13 *This classification offers an organized collection of information or a series of options and does not recommend a specific course of action. This document cannot replace education or experience and should be used in conjunction with professional judgement. Not all aspects of this classification may be applicable in all circumstances. This ASTM standard is not intended to represent or replace the standard of care by which the adequacy of a given professional service must be judged, nor should this document be applied without consideration of a project's many unique aspects. The word "standard" in the title of this document means only that the document has been approved through the ASTM consensus process.*

1.14 *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:²

D1895 Test Methods for Apparent Density, Bulk Factor, and Pourability of Plastic Materials

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 *bulk box, plastic resin, n*—a container used to enclose, protect, hold, and transport plastic resin, with net weights of about 1000 to 1600 lb (453.6 to 725.7 kg); it will have semi-rigid sidewalls that resist bulging of the sidewall when loaded, retain the approximate size of the empty assembled box, and prevent collapse of the container during removal of the product.

3.1.1.1 *Discussion*—Normally, the box is placed on a pallet or skid, filled, and stacked one pallet load on the other for a stack height selected by the user.

3.1.2 *freeboard, n*—amount of bulk box set back from pallet edge on all sides to offset the bulge of the container when filled with resin (typically 7 to 8 % of pallet dimension).

3.1.3 *pinwheeling, v*—when lengthwise loading vans or containers, the turning of a bulk box 90° and loading widthwise.

3.1.4 *plastic resin, n*—organic compounds produced by polymerization that are flowable forms of filled or unfilled powder, flake, chips, pellets, or granules originating from either virgin, compounded, regrind, or reclaim polymer.

4. Significance and Use

4.1 This standard classification will be used to:

4.1.1 Standardize the package size increasing availability, versatility, and acceptability of bulk box/pallet units.

4.1.2 Lower transport package manufacturing costs.

4.1.3 Lower cost/lb of packaged resin because of higher net weight/package.

4.1.4 Reduce environmental impact of pallets and bulk boxes by reducing waste.

4.1.5 Support reuse of bulk boxes and pallets throughout the supply chain.

4.1.6 Optimize lifecycle package cost.

4.1.7 Improve both inbound and outbound freight cost in comparison to non-optimal packaging.

4.1.8 Lower inventory/storage cost of raw materials (need less on hand).

4.1.9 Reduce warehouse space for resin storage.

4.1.10 Reduce forklift trips (carrying higher weight).

4.1.11 Promote multi-industry usage of common footprint boxes and pallets (examples are the automotive and chemical drum industry).

4.1.12 Guide the first-time resin packager as to a successful bulk box/pallet unit now in use in the resin industry.

4.1.13 Optimize net product weight in truckload trailer vans and oversea containers.

4.2 This standard classification will be used by:

4.2.1 Resin producers/converters/compounders/customers to compare with their current practice.

4.2.2 Bulk box manufacturers to recommend a proven cost-effective package for plastic resins in the targeted bulk density range.

4.2.3 Pallet manufacturers as a common bulk box footprint pallet for the targeted bulk density ranges used by the plastic resin industry.

4.2.4 Box liner manufacturers to size their liners to a specified volume dimension.

4.2.5 Warehouses to provide space layout plans based on dimensions of the standard box/pallet unit.

5. Basis of Classification

5.1 The bulk box will contain about 1000 to 1600 lb (453.6 to 725.7 kg) of plastic resins with typical bulk densities of 27 to 39 lb/ft³ (0.432 to 0.625 g/cm³).

5.2 Minimum performance of the bulk box pallet unit during pack out, storage, and transit will be specified by the user.

5.3 Total height of box, cap, and pallet (container height) equals 44 ± ¾-in. (1118 ± 19 mm).

5.4 Total width of pallet (container footprint width) equals 45 ± ¼-in. (1143 ± 6.35 mm).

5.5 Total length of pallet (container footprint length) equals 48 ± ¼-in. (1219 ± 6.35 mm).

5.6 Bulk box “freeboard” on all sides of the pallet will be specified by the user.

5.7 Corrugated fiberboard bulk boxes are normally used in this application; the octagon-shaped box is preferred because of the superior strength/capacity weight over rectangular corrugated boxes.

5.8 Wooden pallets are typically used in this application but may be of other materials of construction; the required footprint will allow the user an option to choose either four- or two-way entry.

5.9 The eight corners of the octagon bulk box must be supported on top and on the bottom by the pallet; box corners must align top and bottom on deck boards of wooden pallets.

6. Test Method and Retest

6.1 The bulk density performance properties enumerated in this classification may be estimated with Test Methods **D1895**.

7. Ordering Information

7.1 The purchaser should select the preferred permitted options and include the following information in procurement documents:

7.1.1 Standard title, number, and date.

7.1.2 Bulk density of the plastic resin to be packaged.

7.1.3 Expected gross weight of packed out box and pallet.

7.1.4 Form for delivery—assembled or knocked down.

7.1.5 Unitization requirements.

7.1.6 Liner or bag requirements.

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

- 7.1.7 Stacking, environmental, and shelf life requirements.
- 7.1.8 Graphic requirements.
- 7.1.9 Transport package requirements.

8. Keywords

8.1 bulk box; bulk package; containers by bulk density; paperboard containers; plastic resin ; resin package; returnable box system; transport package

ANNEX

(Mandatory Information)

A1. BULK BOX STANDARD CLASSIFICATION SUMMARY

A1.1 Criteria in setting dimension limits include:

A1.1.1 The height requirement is to insure that the double stack container (normal fork truck load) will enter the ocean container that has an opening of 90 in. (2286 mm) at the container entrance door.

A1.1.2 The width requirement is to insure two containers will fit side by side in truck vans and ocean containers with adequate space for fork truck loading. Inside ocean container width equals 92 in. (2337 mm).

A1.1.3 The width requirement is to insure the bulk box or pallet/skid may be suitable for use in multi-industry applications (for example, the automotive and chemical drum industries).

A1.1.4 The length requirement is to insure the bulk box or pallet/skid may be suitable for use in multi-industry applications (for example, the automotive and chemical drum industries).

A1.1.5 The weight requirement is based on the volume of the bulk box and bulk density of the plastic resin.

[ASTM D6881/D6881M-03\(2020\)](https://standards.iteh.ai/catalog/standards/sist/fb7ceadc-e2e2-4500-8c69-c212133acbd3/astm-d6881-d6881m-032020)

APPENDIX

(Nonmandatory Information)

X1. GENERAL USE AND GUIDANCE

X1.1 The size requirements are based on being able to load ocean freight containers as well as truck load vans using pallets with a two-way entry (no “pinwheeling” of the load is necessary). User may specify pallets with four-way entry.

X1.2 Since the box will be used by a wide variety of users with different storage and transit requirements, each user may utilize their own performance standards and specifications.

X1.3 Organizations that may be interested in this standard include:

X1.3.1 Society of Plastic Engineers.

X1.3.2 National Wooden Pallet and Container Association.

X1.3.3 Technical Association of the Pulp and Paper Industry.

X1.3.4 American Plastics Council—American Chemical Council.

X1.3.5 Society of Plastics Industries.