

**Announcements**

## 1. Reading:

- (a) Read and sign the Electrical and Computer Engineering Laboratories Safety and Access agreement
- (b) In Measurement and Instrumentation - Theory and Application
  - i. Chapter 2, *Instrument Types and Performance Characteristics*, read carefully sections 2.3.1 through 2.3.8
- (c) In NIST Pub 811 Guide to SI Units
  - i. Chapter 4, *The Two Classes of SI Units and the SI Prefixes*, note the **names** and **symbols** for the standard units and prefixes

## 2. To Hand In:

- (a) Homework 1 is due on Wednesday, 2020-01-22

**Tumbler, Drinking (Plastic)**

[ INCH-POUND ]  
A-A-457A  
November 4, 1993  
SUPERSEDING  
A-A-457  
July 26, 1982

**COMMERCIAL ITEM DESCRIPTION****TUMBLER, DRINKING (Plastic)**

The General Services Administration has authorized the use of this commercial item description (CID) as a replacement for Federal Specification L-T-800 which has been canceled.

**1. SCOPE**

**1.1 Scope.** This commercial item description covers a plastic 8-ounce (236.6 ml) drinking tumbler.

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## 2. SALIENT CHARACTERISTICS

2.1 Material. The tumbler shall be constructed from polycarbonate or styrene-acrylonitrile (SAN) molding materials. The material shall be clear, colorless and transparent.

2.2 Design and construction. The tumblers shall have a rated capacity of 8.0 ounces (236.6 ml). The measured capacity shall be no less than 7.5 ounces (221.8 ml) and no greater than 9.0 ounces (266.1 ml). The tumblers shall have a minimum of three stacking ribs to aid in separation from stacks. The tumbler may have a pebbled exterior at the manufacturer's option. The dimensions shall be as shown in Table I.

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Table I - Dimensions

Top outside diameter (minimum)	Bottom outside diameter (minimum)	Height (maximum)	Thickness	
			Wall (minimum)	Bottom
2-1/2 (63.5 mm)	2-1/16 (52.4 mm)	3-13/16 (96.8 mm)	0.055 (1.4 mm)	0.075 (1.9 mm)

Note: Unless otherwise stated, all dimensions are in inches.

2.3 Performance characteristics. The tumblers shall not emit any objectionable odors when tested as specified (see 4.8.1). When subjected to the dishwashing test, the tumblers shall exhibit no cracks, scratches, distortions, or other defects (see 4.8.2).

2.4 Workmanship. The finished tumblers shall be clean and free from any defects which may impair serviceability, durability or appearance including bubbles, flow marks, scratches, cracks, and rough edges.

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3.1 FDA requirements. The plastic material used in the tumbler shall meet the applicable requirements of 21 CFR 121, Federal Food, Drug, and Cosmetic Act.

3.2 Recovered materials. The offeror/contractor is encouraged to use recovered materials to the maximum extent practicable, in accordance with paragraph 23.403 of the Federal Acquisition Regulation (FAR).

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TABLE II - Examination for defects

<u>Examine</u>	<u>Defect</u>
Finish	Material not clear, colorless and transparent.
Construction and Workmanship	Stacking ribs missing. Plastic material not as specified (3.1). Capacity not as specified. Dimensions not as specified. Presence of bubbles, flow marks, scratches, cracks, or rough edges.

4.7 Sampling for tests. A random sample of tumblers shall be selected from each lot in accordance with inspection level S-2. Failure of any test shall be cause for rejection of the entire lot. The sample unit shall be one finished tumbler.

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#### 4.8 Tests:

4.8.1 Odor. The sample tumblers shall be half filled with boiling distilled water. A plate of glass shall be immediately placed over the top of the tumbler. After 5 minutes, the plate of glass shall be removed and the presence or absence of odor shall be determined immediately.

4.8.2 Dishwashing. The sample tumblers shall be washed in a commercial spray-type dishwashing machine with the recommended detergent amount. The wash cycle shall be 40 seconds (minimum) at 140-160 degrees Fahrenheit (60-71 degrees Celsius) and the rinse cycle 10 seconds (minimum) at 180 degrees Fahrenheit (82 degrees Celsius). The washed tumblers shall show no signs of cracks, scratches, distortions, or other defects.

#### Specifications

When writing requirements, *don't say "...as small as possible..."*  
*say "...no larger than..."*

*Don't say "...as long as possible..."*  
*say "...no shorter than..."*

The phrase "as possible" should never be used when providing a requirement for some characteristic of something you will design. You might say that you want a phone with a battery that lasts "as long as possible" but that implies that you are willing to spend as much money as necessary to get that phone. Just doing the research to determine **which phone** has the longest battery life would be very expensive, and the chosen phone would be some state-of-art, just-released, one-of-a-kind marvel that would set you back as much as a semester's tuition. Throw in another requirement such as "weigh as little as possible" and there is not likely to be any phone that will meet your requirements (except possibly a flip-phone).

Using phrases like "as...as possible" is a sign of laziness. It shows that the author didn't want to go to the effort to determine what they really need.

Don't say "Shall be 10 m long..."  
and don't say "Shall be  $10\text{ m} \pm 1\%$  long..."  
say "Shall be  $(10.0 \pm 0.1)\text{ m}$  long..."  
or "Shall be no shorter than 9.9 m and no longer than 10.1 m ..."

Specifications must be **specific** and **measurable**.

Your requirements should describe measurable characteristics of the thing being specified. You should be able to visualize a step-by-step procedure for determining whether each requirement was met.

In particular, avoid vague requirements such as "must be reliable" or "must be inexpensive". If you start with a requirement that can't be tested then you won't be able to prove to the customer that you met the requirement, and you won't get paid.

## Language of Requirements

The word **shall**...

- expresses a provision that is **binding**. (MIL-STD-962)
- identifies **mandatory** requirements. (IEEE Std 1012)
- indicates requirements...from which **no deviation** is permitted. (JEDEC Standard No. 88F)

Equivalent language might be "must", "is required", or "is necessary".

Requirements described in this way are deal-breakers: if you don't meet these then the project is a failure and you don't get paid.

The word **will**...

- expresses a **declaration of purpose**. (MIL-STD-962)
- is used for statements of **expectation** or **commitment**. (JEDEC Standard No. 88F)

The words **should** and **may**...

- express **non-mandatory** provisions. (MIL-STD-962)
- indicate optional tasks that are **not required** (IEEE Std 1012)
- indicates that among several possibilities **one is recommended** as particularly suitable (JEDEC Standard No. 88F)