

## **Understanding the Handle Strength Test**

*The “Understanding the Product Safety Tests” Series*

The *Handle Strength Test* is conducted on products that have one or more handles for lifting or moving the product. The test involves holding the product securely while overloading the handle to determine if the handle and its securement means are damaged or completely fail.

**Test Objective:** The objective is to verify that product handles and their securement hardware are not damaged allowing the product to fall and cause injury to the user or others in the vicinity of the product. A 3X or 4X safety factor is required depending on the standard (able to withstand 3 or 4 times the rated strength without damage).

**Test Purpose:** Beyond consideration for the strength of handles over time, the test is also seeking to insure that the handle system will not fail in unintended overload conditions – for example, if the user stacks extra materials (weight) on top of the product when moving or carrying the product by the handles.

**Test Method:** In general, the requirement is for the handle system to withstand 3X – 4X the weight that the handle supports during intended use. The specific test load and test load application method depends on several variables that can include the product weight and portability, the number of handles, and how the handles are intended to be used per the user instruction manual.

### 1) **Test Load:**

- a) **One Handle:** For most standards, a test load equal to 4X the weight of the product is applied to the handle.
- b) **Two Handles:** Are two handles provided for convenience or necessity?
  1. The test load for each handle is determined by the % of the product weight supported by each handle = each handle is tested with 4X the load it supports.
  2. Lighter products with two handles (i.e. <25Kg) are tested assuming the product can be carried by one handle = each handle is tested with 4X the overall weight of the product. This also applies to heavier products that are obviously intended to be carried by a single handle.
- c) **Stacked Products:** Products that are designed to be stacked, must have the stacked weight included in the test load calculations.
- d) **Stationary & Fixed products** in some standards are only tested at 2X the normal load.

### 2) **Test Load Application:**

- a) In all cases, the weight should be hung from the handle without clamping (i.e. wrap a strap around the handle).
- b) The weight should be evenly distributed and centered on the handle, with some standards specifying that the weight is to be applied across 70 or 75 mm of the center width of the handle (i.e. using a 70 or 75 mm wide strap).
- c) **Do Not** drop the load onto the handle. Most standards specify that the test load should be gradually applied, over a period of 5 - 10 seconds.

### 3) **Test Time:** After gradually applying the load, 1 minute with the full test load in place.

**Pass/Fail Criteria:** Most standards indicate the following pass fail criteria:

- A) **During Testing:** The handle cannot break allowing the product to fall.
- B) **After Testing:** The handle, its securement hardware, and the portion of the enclosure to which the handle is connected are to be inspected to insure that no damage or distortion was sustained.



Other Considerations: Manufacturers have ultimate liability which means that even if the product is certified to the safety standards, the manufacturer can still be found liable if someone is injured using their product. For this reason, it behooves the manufacturer to think beyond the requirements in the standard.

- a) Handles Required: Some standards require portable products weighing 20Kg or more be provided with at least one handle for carrying. In addition, stationary and fixed equipment are usually required to have handles or clearly defined lifting points.
- b) Handle Securement Screws: It is a good idea to use handle securement hardware that is protected against loosening. Some standards such as 61010-1 specify that for products with a single handle, the test is performed with one of the securement screws removed unless they are the type that are protected against loosening.
- c) Handle Width & Diameter: Think about your typical user. Women and children have smaller hand sizes than men. Is your handle width and diameter adequate for your typical user?
- d) Handle Gap from Enclosure: Some handle gaps are too narrow, and consequently the handle opens so close to the enclosure that people with bigger hands can hit their knuckles on the enclosure or handle mounting hardware. Make sure you have people with various hand sizes test the handles.
- e) Handle Grip: The safety standards generally do not have requirements that relate to the user's ability to retain grip on the handle. However, the designer should consider grip surface, especially for situations where the user may have moist hands that could reduce grip. Remember that prolonged gripping will induce hand sweat that can reduce grip. There are many materials that can be used to maximize grip with handle surfaces. Do not take it for granted that the handle you specify has adequate grip.
- f) One or Two Handles: You should consider the lifting ability of your typical user combined with the length of time that the user may be asked to hold the product.
  1. Two handles reduce the weight that must be supported by each hand. However, two handles also provide for level carrying of the product which makes it easier for the user to stack items on top of the product while carrying (increasing the load on the handles).
  2. Also consider that, even if you provide two handles, the user may try to lift or move the product by one handle. Make sure your handles are sufficient for this purpose as it is clearly a "foreseeable misuse" that the design engineer must consider.
- g) One or Two Person Lifting: Be clear in your instructions if you provide multiple handles. Do you intend the product to be carried by one or two people? Keep in mind that specifying two person movement for heavy products can help prevent injuries from users attempting to lift too much weight. For this reason, you should also include proper lifting instructions in your user manual.

Conclusion: As you can see, we don't simply perform the tests because they are in the standard. Each test in the standard has a set of objectives that relate to the 6 Hazards of Product Safety. The Handle Strength Test is performed as part of the review for Injury hazards. Protecting the user from handles that are inadequate is crucial to insuring the product continues to provide protection from a Risk of Injury, or from subsequent hazards presented by a product that falls and is damaged but remains operational. It is therefore an extremely important test – another test that directly saves toes, feet, and in some extreme cases, lives.

**Compliance Assistance Services to help you get it right the 1<sup>st</sup> time**  
**Preliminary Design Reviews, Design Guidance, Training**  
**US, Canadian, CE, & International Certifications**