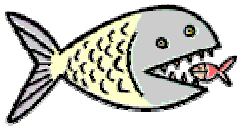


**JUNE 2007**

## Are There Scales on a Gas Pump? That Sounds Fishy to Me!

*By Steven Cook*

The NIST Weights and Measures Division occasionally receives inquiries about the use of the word "scale" in General Code paragraph G-S.5.2.2. (d) Digital Indication and Representation. Some liquid-measuring device owners, service agents, and manufacturers incorrectly believe this paragraph specifying specific "zero display" requirements does not apply to their devices since they are not weighing devices. This article will review some of the most common definitions of the word "scale" and how the word is used with other types of measuring equipment in Handbook 44.



The following are some of the many common definitions for the word "scale" when used as a noun:

- The epidermis of a fish.
- An ordered reference standard; "judging on a scale of 1 to 10."
- An indicator having a graduated sequence of marks.
- A measuring instrument for weighing; shows amount of mass.
- A series of musical notes differing in pitch according to a specific scheme (usually within an octave).
- Relative magnitude; "Richter Scale."
- Standard wage levels for a given type of job (e.g., a pay scale).

From an international perspective, the word "scale" is typically used when referring to an indicator or the value of an indication. For example, the International Vocabulary of Basic and General Terms in Metrology (VIM) defines a "scale" as part of a displaying device consisting of an ordered set of marks, together with any associated numbers or quantity values.

OIML R 76, International Recommendation for "Non-automatic Weighing Instruments" further defined the following terms when used in the recommendation:

### **Scale mark (T.2.4.2)**

- A line or other mark on an indicating component corresponding to a specified value of mass.

### **Scale base (T.2.4.3)**

- An imaginary line through the "centres" of all the shortest scale marks.

### **Actual scale interval (d) (T.3.2.2)**

- Value expressed in units of mass of:
  - the difference between the values corresponding to two consecutive scale marks, for analogue indication, or
  - the difference between two consecutive indicated values, for digital indication.

**Verification scale interval (e) (T.3.2.3)**

- Value, expressed in units of mass, used for the classification and verification of an instrument.

**Scale interval of numbering (T.3.2.4)**

- Value of the difference between two consecutive numbered scale marks.

OIML R 117, International Recommendation for "Measuring systems for liquids other than water" uses the word "scale" in the following definition when describing the first element of an indicating device:

First element of an indicating device (T.3.17)

- Element which, in an indicating device comprising several elements, carries the graduated scale with the smallest scale interval.

As you can see, the word "scale" when used by itself or as a type of weighing device (e.g., vehicle scale) in Handbook 44 Section 2 is considered a "weighing instrument" in international documents. The word "scale" can also be part of an indicator on a weighing or measuring device when it is used with the words division, interval, indication, or increment. Fortunately, "scale" is most frequently used in the weighing device codes in Handbook 44 Section 2 where it does not matter if the word refers to a weighing or indicating device. However, the word "scale" is used in the General Code Section 1 paragraph G-S.5.2.2. as mentioned earlier and applies to both weighing and measuring devices. The word is also used in the Section 4.42. Farm Milk Tanks. describing specifications for sight gauges in paragraphs S.3.6.3. and S.3.6.4., and in Section 4.44. paragraphs describing the markings of intervals on graduates (e.g., Single- and Double-scale graduates).

In summary, the word "scale" can be used in conjunction with both weighing and measuring devices. Thus, the term "scale" as used in General Code sub-paragraph G-S.5.2.2. (d) can apply to any weighing or measuring device in Handbook 44 when it is associated with either a digital indication or with marks on a graduated indication.

For questions about the use of the word "scale" in Handbook 44, contact Steve Cook by telephone at 301-975-4003 or by e-mail at [steven.cook@nist.gov](mailto:steven.cook@nist.gov).