NIST Technical Article
"Making Sense of the "Min" marking on Class I and II Scales"

Knowledge Check

After reviewing the technical article, use the following questions to check your knowledge of the principles covered in the article. If a multiple- choice question does not specifically ask for "all correct answers," it may be assumed that only one of the answers listed is correct.

1. What is the purpose of the "Min" marking on a scale?

a) To provide the user with information that will help minimize excessive errors due to rounding, tolerance application, and other variables.

b) To establish a value for the smallest load intended to be weighed on a scale

c) To assist a scale owner in selecting a scale that is suitable for application in which the scale will be used.

d) All of the above

2. How does the minimum capacity criteria specified in OIML Recommendation 76 (R 76) differ from the minimum load criteria in NIST Handbook 44?

a) There is no difference; the requirements are identical.

b) OIML R 76 requires the minimum capacity to be marked on the scale as "Min," or "Minimum Capacity" whereas NIST Handbook 44 requires no such marking.

c) R 76 includes a minimum capacity requirement of 1000 d on a Class I or II scale, whereas NIST Handbook 44 specifies a minimum load requirement of 1 200 d.

d) NIST Handbook 44 requires the minimum load to be marked on the scale as "Min," whereas OIML R 76 requires no such marking.

3. For scales with different values of (d) and (e), what is the key reason for basing a scale's minimum acceptable load on the value of (e) rather than on (d)?

a) It is more convenient for manufacturers to use the value of (e).

b) The size of (e) is easier to read on a Class I or II scale.

c) The application of tolerance would result in a significantly larger relative error if the minimum load is based on (d) because tolerances are based on (e) and the value of (e) is larger than that of (d) on Class I and Class II scales.

d) The value of (e) is more readily understood by users than is the value of (d).

4. If NIST Handbook 44 does not include a requirement for marking a "Min" on a scale, why are scales found in the U.S. commercial marketplace sometimes marked with a "Min" value?

a) U.S. inspectors want to ensure the scales meet both NIST Handbook 44 and OIML R 76 requirements.

b) It is likely more cost effective for manufacturers to build a single scale with a common marking for both international and U.S. markets.

c) Scales are prohibited from being marked with a "Min" value in the U.S., so a scale found with a "Min" marking is to be taken out of service.

d) It is likely that the manufacturers applied the wrong label to these scales.

5. According to NIST OWM's interpretation, a scale's minimum acceptable load should be based on the value of (e) rather than (d) when (e) and (d) are different values.

a) True

b) False

6. **According to NIST Handbook 44, when a scale has different values of (d) and (e), the verification scale division (e) is to be used for:**

   a) Determining the applicable tolerance values

   b) Establishing the parameters for scale accuracy class

   c) Determining the applicable tolerance values and establishing the parameters for scale accuracy class

   d) None of the above

7. **Using which of the following as the basis for the minimum acceptable load helps minimize the effects of tolerance application and digital rounding?**

   a) The verification scale division (e)

   b) The scale division (d)

8. **Which of the following best describes the verification scale division (e)?**

   a) A value, expressed in units of weight (mass) and specified by the manufacturer of a device, by which the tolerance values and accuracy class applicable to the device are determined.

   b) A value, expressed in units of mass and specified by the manufacturer, which is the smallest subdivision of the scale for analog indication or the difference between two consecutively indicated or printed values for digital indication or printing.

   c) The largest interval, expressed in units of mass, into which the scale's measuring range can be divided.

   d) None of the above.

9. **Class I and II scales are required to have a value of the verification scale division (e) that is different than the value of the displayed scale division (d).**

   a) True

   b) False

10. Which of the following best describes the scale division (d)?

a) A value, expressed in units of weight (mass) and specified by the manufacturer of a device, by which the tolerance values and the accuracy class applicable to the device are determined.

b) A value, expressed in units of mass and specified by the manufacturer, which is the smallest subdivision of the scale for analog indication or the difference between two consecutively indicated or printed values for digital indication or printing.

c) The largest interval, expressed in units of mass, into which the scale's measuring range can be divided.

d) None of the above.

11. When considering scale suitability for a particular application, it is generally recommended that most loads weighed on the scale be:

a) As close to nominal capacity as possible

b) Never below one-quarter scale capacity

c) Between one-half and three-quarters of scale capacity.

d) Between one-quarter and three-quarters of scale capacity.

12. Which of the following describes how to determine scale error as a percent of an applied test load?

a) Divide the amount of scale error by the amount of applied test load and multiply by 100

b) Divide the amount of the applied test load by the amount of scale error and multiply by 100

c) Divide the amount of the applied test load by the applicable tolerance and multiply by 100

d) None of the above