SCL-20.12 Sections Throughout the Code to Include Provisions for Commercial Single Draft Weigh-in-Motion Vehicle Scales

Source:
Mettler Toledo, LLC

Purpose:
Recognize commercial single draft Weigh-in-Motion vehicle scale systems.

Item Under Consideration:
Amend NIST Handbook 44 Scales Code as follows:

S.1. Design of Indicating and Recording Elements and of Recorded Representations.

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S.1.14 Weigh-In-Motion (WIM) Vehicle Scales - Values to be Recorded – At a minimum, the following values shall be printed and/or stored electronically for each vehicle weighment:

(a) gross vehicle weight;
(b) scale identification (required if more than one lane at the site has the ability to weigh a vehicle in motion); and
(c) vehicle direction (required if the WIM vehicle scale is bi-directional).

(Added 20XX)

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S.1.15. Weigh-in-Motion Vehicle Scales Operational Limitations.

S.1.15.1. Identification of a Fault. – Fault conditions shall be presented to the operator in a clear and unambiguous means. No weight value shall be indicated or recorded when a fault condition is detected. The following fault conditions shall be identified if applicable:

(a) Vehicle speed was below the minimum or above the maximum speed as specified.
(b) Direction of vehicle was not valid for this installation.
(c) A change in vehicle speed greater than that specified was detected.
(d) The period of time all vehicle axles were simultaneously on the scale was below the minimum Data Acquisition Time.
(e) Vehicle's path of travel was outside the lateral side edges of the load-receiving element

(Added 20XX)

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S.6. Marking Requirements

Table S.6.3.a.
Marking Requirements

To Be Marked With ⇓	Weighing Equipment				
	Weighing, Load-Receiving, and Indicating Element in Same Housing or Covered on the Same CC[1]	Indicating Element not Permanently Attached to Weighing and Load-Receiving Element or Covered by a Separate CC	Weighing and Load-Receiving Element Not Permanently Attached to Indicating Element or Covered by a Separate CC	Load Cell with CC (11)	Other Equipment or Device (10)
Manufacturer's ID (1)	X	X	X	X	X
Model Designation and Prefix (1)	X	X	X	X	X
Serial Number and Prefix (2)	X	X	X	X	X (16)
Certificate of Conformance Number (CC) (23)	X	X	X	X	X (23)
Accuracy Class (17)	X	X (8)	X (19)	X	
Nominal Capacity (3)(18)(20)	X	X	X		
Value of Scale Division, "d" (3)	X	X			
Value of "e" (4)	X	X			
Temperature Limits (5)	X	X	X	X	
Concentrated Load Capacity (CLC) (12)(20)(22)		X	X (9)		
Special Application (13)	X	X	X		
Maximum Number of Scale Divisions (n_{max}) (6)		X (8)	X (19)	X	
Minimum Verification Scale Division (e_{min})			X (19)		
"S" or "M" (7)				X	
Direction of Loading (15)				X	
Minimum Dead Load				X	
Maximum Capacity				X	
<u>Minimum and Maximum Speed (25)</u>			<u>X</u>		
<u>Vehicle Direction Capability (26)</u>			<u>X</u>		
Safe Load Limit				X	
Load Cell Verification Interval (v_{min}) (21)				X	

Table S.6.3.a. Marking Requirements					
Section Capacity and Prefix (14)(20)(22)(24)		X	X		

(Added 1990) (Amended 1992, 1999, 2000, 2001, 2002, 2004 and 20XX)

Table S.6.3.b. Notes for Table S.6.3.a. Marking Requirements
25. Weigh-in-Motion Vehicle Scales must be marked with minimum and maximum speed limitations. (Added 20XX)
26. Weigh-in-Motion Vehicle Scales must be marked with direction capability if bi-directional. (Added 20XX)

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N.1. Test Procedures.

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N.7. Weigh-in-Motion Vehicle Scale.

N.7.1. Reference Scale – a certified, static scale shall be used to establish all vehicle weights used in this procedure.

N.7.1.1. The Reference Scale shall be of such dimension and spacing as to facilitate the single-draft static weighing of all Reference Vehicle weights.

N.7.1.2. The Reference Scale should be located near the Weigh-in-Motion vehicle scale to minimize the effect of vehicle fuel consumption. The Reference Scale and the Weigh-in-Motion vehicle scale may be the same scale.

N.7.1.3. The Reference Scale shall be verified immediately prior to using it to establish Reference Vehicle weights. To ensure the reliability of the reference scale's performance when establishing the weight values for reference vehicles, a subsequent test of the reference scale may be performed immediately following the test of the WIM vehicle scale. To qualify for use as a suitable Reference Scale, it must meet NIST Handbook 44, Class III L acceptance tolerances. It shall also be capable of displaying in a higher resolution that permits loads to be weighed in 1/10 of the increment size of the WIM Scale.

N.7.2. One or more Reference Vehicles shall be used to provide varying weight conditions for testing. Reference vehicles shall be representative of vehicles that are customarily weighed on the WIM vehicle scale during normal operation. Reference Vehicle length and axle spacing must comply with the minimum Data Acquisition Time allowed for the WIM vehicle scale.

N.7.2.1. Loads shall be positioned to present as close as possible, an equal side-to-side load.

N.7.2.2. Reference Vehicle(s) shall be selected to provide:

a) **A weight value above 2/3 the capacity of the Weigh-in-Motion vehicle scale,**
b) **A weight value below 1/3 the capacity of the Weigh-in-Motion vehicle scale or the empty weight of a Reference Vehicle, and**
c) **At least one weight value between the above weight values.**

N.7.2.3. Reference Vehicle(s) shall have their gross vehicle weight established on a Reference Scale as defined in N.7.1. immediately before being used to conduct the Weigh-in-Motion vehicle scale tests.

N.7.2.3.1. If the weight of the Reference Vehicle changes during the test (e.g. due to fuel consumption, change of driver, etc.), a new, revised gross vehicle weight shall be established.

N.7.2.4. Reference vehicles shall be weighed on a reference scale that provides the gross vehicle weight in a value that is 1/10 of an increment of the WIM scale.

N.7.3. Test speeds - a constant speed of the Reference Vehicle shall be maintained during each test (See also S.1.15.c).

N.7.3.1 Various speeds of the Reference Vehicle shall be used between the minimum and maximum operating speed specified for the Weigh-in-Motion vehicle scale. The minimum speed capability of the Reference Vehicle may be used as the minimum speed.

N.7.4. WIM Vehicle Scale Test Procedures - shall simulate the normal intended use as closely as possible (i.e. test as used).

N.7.4.1. The WIM vehicle scale must comply with all applicable static vehicle scale tests as described in N.1. using certified weights.

N.7.4.2. The tests shall be performed using the Reference Vehicle(s) defined in N.7.2.

N.7.4.3. Each Reference Vehicle shall have a minimum of 10 weighments at the speeds as defined in N.7.3.

N.7.4.4. Reference Vehicles must stay within the defined roadway along the load receiving element. (See also S.1.15.1.e).

N.7.4.5. Direction Test. – The tests shall be performed in both directions, if applicable.

N.7.4.6. At the conclusion of the WIM vehicle scale tests, there will be a minimum of 30 total weight readings for the Reference Vehicle(s) for each direction if applicable. The tolerance for each weight reading shall be based on the gross vehicle weights and the acceptance tolerance values per Table 6 for Accuracy Class III L.

(Added 20XX)

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Table 7a. **Typical Class or Type of Device for Weighing Applications**	
Class	**Weighing Application or Scale Type**
I	**Precision laboratory weighing**
II	**Laboratory weighing, precious metals and gem weighing, grain test scales**
III	**All commercial weighing not otherwise specified, grain test scales, retail precious metals and semi-precious gem weighing, grain-hopper scales, animal scales, postal scales, vehicle on-board weighing systems with a capacity less than or equal to 30 000 lb, and scales used to determine laundry charges**
III L	**Vehicle scales (including weigh-in-motion vehicle scales), vehicle on-board weighing systems with a capacity greater than 30 000 lb, axle-load scales, livestock scales, railway track scales, crane scales, and hopper (other than grain hopper) scales**
IIII	**Wheel-load weighers and portable axle-load weighers used for highway weight enforcement**
Note: A scale with a higher accuracy class than that specified as "typical" may be used.	

(Amended 1985, 1986, 1987, 1988, 1992, 1995, ~~and~~ 2012, and 20XX)

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Appendix D. Definitions

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reference vehicle. – A test vehicle with an associated load, including the driver, that has been statically weighed for temporary use as a mass standard for a short period of time, typically the time required to test one Weigh-in-Motion vehicle scale. [2.20]

(Added 20XX)

vehicle scale. – A scale (including weigh-in-motion vehicle scales) adapted to weighing highway, farm, or other large industrial vehicles (except railroad freight cars), loaded or unloaded. [2.20]

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weigh-in-motion (WIM) vehicle scale. – A vehicle scale adapted to weighing highway, farm, or other large industrial vehicles (except railroad freight cars), loaded or unloaded, in a single draft while these vehicles travel across the scale. [2.20]
(Added 20XX)