

# STATE OF COLORADO

## Colorado Department of Agriculture

Inspection & Consumer Services Division  
Measurement Standards Section  
3125 Wyandot Street  
Denver, CO 80211-3824  
(303) 477-4220  
(303) 477-4248 FAX  
[www.ag.state.co.us/ics/Measurement/Index.html](http://www.ag.state.co.us/ics/Measurement/Index.html)



Bill Owens, Governor  
Don Ament, Commissioner  
Sheldon R. Jones, Deputy Commissioner

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To: Whom It May Concern

From: Jonathan Handy, Measurement Standards Program Senior

Re: Tolerances Applied to Commercial and Law Enforcement Weighing & Measuring Devices

As per the Colorado Measurement Standards Act Section 35-14-105, the tolerances to be applied to commercial and law enforcement weighing and measuring devices are those in the most current edition of the National Institute of Standards and Technology (NIST) Handbook 44. This Handbook is available free on line at <http://ts.nist.gov/ts/htdocs/230/235/owmhome.htm>.

Acceptance tolerances are applied to new and recently repaired equipment if tested within 30 days of being placed into commercial service, as described in the General Code of Handbook 44, Section G-T.1. Otherwise, maintenance tolerances are applied.

For scales marked with a Class Designation (I, II, III, III L, or IV), tolerances are as set forth in Section T.N of the Scale Code of Handbook 44. Maintenance tolerances are listed in Table 6 of the Scale Code (see below). Acceptance tolerances are one half of the maintenance tolerance values.

<b>Table 6.</b>				
<b>Maintenance Tolerances</b>				
<b>(All values in this table are in scale divisions)</b>				
<b>Tolerance in scale divisions</b>				
	<b>1</b>	<b>2</b>	<b>3</b>	<b>5</b>
<b>Class</b>	<b>Test Load</b>			
I	0 - 50 000	50 001 - 200 000	200 001 +	
II	0 - 5 000	5 001 - 20 000	20 001 +	
III	0 - 500	501 - 2 000	2 001 - 4 000	4 001 +
IIII	0 - 50	51 - 200	201 - 400	401 +
III L	0 - 500	501 - 1 000	(Add 1d for each additional 500 d or fraction thereof)	

For unmarked devices, tolerances are specified in Section T and Table T.1.1 of the Handbook 44 Scale Code:

Table T.1.1. Tolerances for Unmarked Scales						
Type of Device	Subcategory	Min. Tol.	Accept. Tol.	Maint. Tol.	Decreasing-Load Multiplier <sup>1</sup>	Other Applicable Requirements
Vehicle, axle-load, livestock, railway track (weighing statically), crane, and hopper (other than grain hopper)		Class III L, T.N.3.1 (Table 6) and T.N.3.2.			1.0	T.N.2., T.N.3., T.N.4.1., T.N.4.2., T.N.4.3., T.N.4.4., T.N.5., T.N.7.2.
Grain test scales	n # 10 000 n > 10 000	Class III, T.N.3.1. (Table 6) and T.N.3.2. Class II, T.N.3.1. (Table 6) and T.N.3.2.			1.0	
Railway track scales weighing in motion		T.N.3.6. except that for T.N.3.6.2. (a), no single error shall exceed four times the maintenance tolerance.			1.0	
Monorail Scales, In-Motion		T.N.3.8.			1.0	
Customer-Operated Bulk-Weighing Systems for Recycled Materials		± 5 % of applied material test load. Average error on 10 or more test loads # 2.5 %.			1.0	
Wheel-load weighers and portable axle-load scales	Tested individually or in pairs <sup>2</sup>	0.5 d or 50 lb, whichever is greater	1 % of test load	2 % of test load	1.5 <sup>3</sup>	
Prescription scales		0.1 grain (6 mg)	0.1 % of test load load	0.1 % of test load	1.5	
Jewelers' scales	Graduated	0.5 d	0.05 % of test load	0.05 % of test load	1.5	
	Ungraduated	Sensitivity or smallest weight, whichever is less				
Dairy-product-test scale	Loads < 18 g 18 g load	0.2 grain 0.2 grain	0.2 grain 0.3 grain	0.2 grain 0.5 grain	1.5	
Postal and parcel post scales Designed/used to weigh loads < 2 lb	Loads < 2 lb	15 grain, 1 g, 1/32 oz, 0.03 oz, or 0.002 lb	15 grain, 1 g, 1/32 oz, 0.03 oz, or 0.002 lb	15 grain, 1 g, 1/32 oz, 0.03 oz, or 0.002 lb	1.5	
	Loads ≥ 2 lb	Table 5	Table 5	Table 5		
Other postal and parcel post scales		Table 5	Table 5	Table 5	1.5	
All other scales	n > 5000	0.5d or 0.05 % of scale capacity, whichever is less	0.05 % of test load	0.1 % of test load	1.5	T.N.2.5., T.N.4.1., T.N.4.2., T.N.4.3., T.N.5., T.N.7.2.
	n # 5000	Class III, T.N.3.1., Table 6 and T.N.3.2.			1.0	T.N.2., T.N.3., T.N.4.1., T.N.4.2., T.N.4.3., T.N.5., T.N.7.2.

<sup>1</sup> The decreasing load test applies only to automatic indicating scales.

<sup>2</sup> If marked and tested as a pair, the tolerance shall be applied to the sum of the indications.

<sup>3</sup> The decreasing load test does not apply to portable wheel load weighers.

## **TAGS AND TOLERANCES**

**Blue Tags:** A blue (work order) tag is placed on a device when it is found out of tolerance or not operating properly (ex: won't return to zero). When the inspector tags a scale, he should tell the device owner that they must call a licensed scale company within two days and that the device must be repaired within 30 days. The scale company fixes the device, sends the tag and a placing-in-service report (ISR) to the M/S office within 10 days after the work is done. The office then puts this report in the inspector's mailbox so he can re-check the device. The inspector attaches the ISR to his FAR after re-checking the device.

Note: Apply acceptance tolerance if checking the device within 30 days from the date it was installed, repaired or reconditioned. Use maintenance tolerance if the test is done after 30 days.

**Red Tags:** A red (condemned) tag is placed on a device when the scale is inoperable or way out of tolerance. A red tag (vs. a blue tag) is appropriate when the customer is being shorted because of the inaccurate weight. With this tag, the device may not be used again until repaired. If the business removes the tag and uses the device, issue a violation and fine [CRS 35-14-131(d)].

**Yellow Tags:** A yellow tag is placed on a device when the annual license fee has not been paid. If the business removes the tag and uses the device, issue a violation and fine [CRS 35-14-127(1)].

**Purple Tags:** A purple tag is placed on a device that is licensed and tested but is not approved for commercial purposes. Example: WIC scales that are used for weighing people.

**Orange Tags:** An orange tag is placed on a device that is found in a business but is not licensed and not approved for commercial purposes. Example: A hardware store with two scales: an old nail scale in the back and one at the register in front. The register scale is the "official" scale; the nail scale is for estimating purposes.

**Maintenance Tolerance:** The official limit of inaccuracy permissible in a commercial measuring device. Maintenance tolerance should be applied during routine annual inspections.

**Acceptance Tolerance:** Acceptance tolerance is applied to devices inspected within 30 days after installation, repair or reconditioning. The scale company is expected to adjust equipment to as close to zero error as possible; that is why acceptance tolerance is one half of maintenance tolerance. For Class III grocery scales, 30 lb capacity where d (the scale division) is 0.01 lb:

0 - 500d	(0 - 5.00 lb)	tolerance is	+ or - .01 lb
501 - 2000d	(5.01 - 20.00 lb)	tolerance is	+ or - .01 lb
2001 - 4000d	(20.01 - 40.00 lb)	tolerance is	+ or - .02 lb