

## 2015 NIST EPO No. 7

# Examination Procedure Outline for Medium-Capacity Scales

It is recommended that this outline be followed as minimum criteria for examining medium-capacity portable platform scales and warehouse scales, including self-contained and built-in types, with the following types of indicating elements: beams, dials, and electronic digital-indicators. Nonretroactive requirements are followed by the applicable date in parentheses.

### SAFETY NOTES

*When excerpting this Examination Procedure Outline for duplication, the NIST EPO Safety Annex (Safety Considerations and Glossary of Safety Key Phrases) should be duplicated and included with this outline.*

*Safety policies and regulations vary among jurisdictions. It is essential that inspectors or servicepersons be aware of all safety regulations and policies in effect at the inspection site and practice their employer's safety policies. The safety reminders included in this EPO contain general guidelines useful in alerting inspectors and servicepersons of the importance in taking adequate precautions to avoid personal injury. These guidelines can only be effective in improving safety when coupled with training in hazard recognition and control.*

Prior to beginning any inspection, the inspector should read and be familiar with the NIST EPO Safety Annex - "Safety Considerations and Glossary of Safety Key Phrases." The terms and key phrases in each safety reminder of this outline are found in the glossary of the EPO Safety Annex. The inspector is reminded of the importance of evaluating potential safety hazards prior to an inspection and taking adequate precautions to avoid personal injury or damage to the device. As a minimum, the following safety precautions should be noted and followed during the inspection.

**Clothing**

**Personal Protection Equipment**  
e.g., Safety Shoes

**Electrical Hazards**

**Support – for Scale and Test Weights**

**First Aid Kit**

**Transportation of Equipment**

**Lifting**

**Also: Wet/Slick Conditions**  
**Chemicals and Hazardous Materials**  
**Obstructions**

**SAFETY FIRST!!!**

- Check the inspection site carefully for safety hazards and take appropriate precautions.
- Learn the nature of hazardous products used at or near the inspection site.
- Use personal protection equipment appropriate for the inspection site.
- Be sure that a first aid kit is available and that the kit is appropriate for the type of inspection activity.

**H 44 General Code  
 and Scales Code Comments<sup>1</sup>  
 References**

**Inspection:**

1.	Zero-load balance		
	Zero indication .....	S.1.1.	
	Digital zero indication.....	S.1.1.1.(a), S.1.1.1.(b)..	E only
	Digital display of zero.....	G-S.5.2.2.(d) (1/1/86)	M & E only
	Normal balance position.....	S.1.5.1.	B only
	Adjustment of zero-load balance.....	S.2.1.1.	
	Manual and semiautomatic zero-setting.....	S.2.1.2.	
	Balance condition as found .....	UR.4.1.	
2.	General considerations		
	Selection of equipment.....	G-UR.1.1., UR.1.1.	
	Installation		
	In accordance with manufacturer’s instructions.....	G-UR.2.1.	
	Indicating and recording elements .....	G-UR.2.2.	
	Foundation, supports, and clearance .....	UR.2.1., UR.2.4. (1/1/73)	

**Check to be sure the scale supports are adequate to support the  
 scale and test weights equal to the capacity of the scale!**

Accessibility for inspection, testing, and sealing.....	G-UR.2.3.
Assistance in testing .....	G-UR.4.4.
Position of equipment.....	G-UR.3.3.
Customer indications.....	S.1.8.3.
Level indicating means.....	S.2.4.
Level condition.....	UR.4.2.

<sup>1</sup> Key to abbreviations in Comments Column:

- |  |                     |
|--|---------------------|
| B = Beam Scales                                | D = Dial Scales     |
| E = Electronic digital scales                  | U = Unmarked scales |
| M = Scales marked with an accuracy designation |                     |

**H 44 General Code  
 and Scales Code Comments<sup>1</sup>  
 References**

Inspection (cont.):

Use		
Facilitation of fraud.....	G-S.2.	
Method of operation.....	G-UR.3.1.	
Special designs or marked for special applications.....	G-UR.3.2.	
Environment	UR.3.5.	
Suitable for the environment in which it is used.....	G-UR.1.2.	
Protection from environmental factors.....	UR.2.3.	
Maintenance requirements.....	G-UR.4.1.	
Scale modification.....	UR.4.3.	
3. Marking.....	S.6.3.	
a. Marking requirements – all devices		
Identification.....	G-S.1.	
Name, initials, or trademark of manufacturer or distributor.....	Retroactive	
Model identifier.....	Retroactive	
Model identifier prefix.....	(1/1/03)	
Acceptable abbreviations for “model” and “number”.....	(1/1/03)	
Nonrepetitive serial number.....	(1/1/68)	
Serial number prefix.....	(1/1/86).....	M only
Acceptable abbreviations for “serial” and “number”.....	(1/1/01)	
Current software version or revision identifier (for not built-for-purpose, software based devices).....	(1/1/04)	
Version or revision identifier preface and acceptable abbreviations for “version,” “revision,” and “number”.....	(1/1/07)	
NTEP CC number or CC addendum number and prefix (for devices that have an NTEP CC).....	(1/1/03)	
Devices or main elements remanufactured after January 1, 2002.....	G-S.1.2. (1/1/02)	
Name, initials, or trademark - last remanufacturer or distributor.....	(1/1/02)	
Model designation if different from original model designation.....	(1/1/02)	
Location of marking information for not built-for-purpose, software-based devices.....	G-S.1.1. (1/1/04) G-S.7.	
Lettering.....	G-S.6. (1/1/77)	
Operational controls, indications, and features.....	G-UR.2.1.1.	
Visibility of identification.....	G-S.4.	
Interchange or reversal of parts.....		
b. Marking requirements – weighing/load-receiving, and indicating element in same housing or covered on the same CC (in addition to marking for all devices).....	S.6.3 (1/1/86).....	M only
Accuracy class.....	Retroactive	
Nominal capacity.....	(1/1/83)	
Value of scale division with nominal capacity, if not apparent ...	(1/1/86)	
Value of "e" (if different from "d").....		
Temperature limits if range on the NTEP CC is narrower than and within – 10 °C to 40 °C (14 °F to 104 °F).....	(1/1/86).....	M only
	(1/1/86).....	M only

H 44 General Code and Scales Code References	Comments <sup>1</sup>
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Scales designed for special purposes .....

Inspection (cont.):

- c. Marking requirements - indicating element not permanently attached to weighing and load-receiving element or covered by a separate CC (in addition to marking for all devices)..... S.6.3.
  - Accuracy class ..... (1/1/86) ..... M only
  - Nominal capacity..... Retroactive
  - Value of scale division with nominal capacity, if not apparent. .... (1/1/83)
  - Value of "e" (if different from "d") ..... (1/1/86)
  - Temperature limits if range on NTEP CC is narrower than and within - 10 °C to 40 °C (14 °F to 104 °F) ..... (1/1/86) ..... M only
  - Scales designed for special purposes..... (1/1/86) ..... M only
  - Maximum number of scale divisions ( $n_{max}$ )..... (1/1/88)
  
- d. Marking requirements – weighing and load-receiving element not permanently attached to indicating element or covered by a separate CC (in addition to marking for all devices)..... S.6.3
  - Accuracy class..... (1/1/86)
  - Nominal capacity..... Retroactive
  - Temperature limits if range on NTEP CC is narrower than and within - 10 °C to 40 °C (14 °F to 104 °F)..... (1/1/86) ..... M only
  - Scales designed for special purposes..... (1/1/86) ..... M only
  - Maximum number of scale divisions ( $n_{max}$ ) ..... (1/1/88) .....
  - Minimum verification scale division for which the device complies with applicable requirements ( $e_{min}$ )..... (1/1/88)
  
- e. Marking requirements - load cell with Certificate of Conformance (in addition to marking for all devices) ..... S.6.3., S.5.4. (1/1/94).... E only
 

**Note:** Requires information on a data plate attached to the load cell or in an accompanying document. If a document is provided, the serial number shall appear on the load cell and in the document. .... (1/1/88)

  - Manufacturer’s name or trademark, model designation, model prefix and serial number and prefix shall also be marked on both the load cell and in any accompanying documents ..... (1/1/91)
  - Accuracy class..... (1/1/88)
  - Temperature limits if range on the NTEP CC is narrower than and within - 10 °C to 40 °C (14 °F to 104 °F) ..... (1/1/86)
  - Maximum number of scale divisions ( $n_{max}$ ) ..... (1/1/88)
  - “S” or “M” for single or multiple cell applications ..... (1/1/88)
  - Direction of loading, if not obvious ..... (1/1/88)
  - Minimum dead load, maximum capacity, safe load limit, and load cell verification interval,  $V_{min}$  ..... (1/1/88)

**H 44 General Code  
 and Scales Code Comments<sup>1</sup>  
 References**

**Inspection (cont.):**

4.	Design of weighing devices.....	S.5.....	M only
	Designation of accuracy class .....	S.5.1. (1/1/86)	
	Parameters of accuracy class .....	S.5.2. (1/1/86)	
	Multi-interval/multiple-range scale division value.....	S.5.3. Retroactive.....	M & E only
	Relationship of load cell verification interval to the value of the scale division.....	S.5.4. (1/1/94).....	M & E only
	Relationship of the minimum verification scale division ( $e_{min}$ ) of a weighing/load-receiving element to the value of the scale division .....	S.1.2.2.2.....	M & E only
5.	Indicating and recording elements		
	Value of scale division .....	S.1.2. (1/1/86).....	M only
	Digital indicating scales .....	S.1.2.1. (1/1/89)	
	Values of graduated intervals or increments .....	G-S.5.3.	
	Recorded representations, General.....	G-S.5.6.	
	Devices that indicate or record in more than one unit.....	G-S.5.3.1.	
	Appropriate abbreviations		
	Equipment manufactured on or after January 1, 2008.....	G-S.5.6.1.(a)	
	Equipment manufactured prior to January 1, 2008 .....	G-S.5.6.1.(b), Table 1	
	Prepackaging scales only.....	S.1.9.1.	
	Tare		
	Value of tare division .....	S.2.3. (1/1/83)	
	Tare mechanism .....	S.2.3.	
	Combined zero-tare (“0/T”) key.....	S.2.1.6.	
	Appropriateness of design		
	Indicating and recording elements.....	G-S.5.	
	Capacity indication, weight ranges, and unit weights .....	S.1.7.	
	Maximum range of initial zero-setting mechanism		
	Complete scales.....	S.2.1.5.(a)	
	Scales with separable components .....	S.2.1.5.(b) (1/1/09).....	E only
	Recommended minimum load.....	UR.3.1	M & E only
	Maximum Load .....	UR.3.2.	
	Weighbeams .....	S.1.5. ex S.1.5.5. ....	B&D only
	Poises.....	S.1.6.....	B&D only
	Dials and balance indicators with graduations having a specific value.		
	Graduations .....	S.1.3.1, S.1.3.2.,	
	Indicators.....	S.1.3.3.....	B&D only
	Clearance.....	S.1.4.1., S.1.4.2.,	
	Parallax.....	S.1.4.3.....	B&D only
	Damping	S.1.4.4.	
	Damping means.....	S.1.4.5	
	Electronic elements .....		
	Adjustable components .....	S.2.5.	
	Provision for sealing.....	S.2.5.1.(b)	
		S.1.10.	
	Multiple weighing elements (common provision for sealing). ....	S.1.11.(a) (1/1/79).....	E only
	Security seal	S.1.11.(b) (1/1/90).....	E only
		G-S.8.1. 1/1/10.....	E only
		G-UR.4.5. ....	E only

H 44 General Code and Scales Code References	Comments <sup>1</sup>
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**Inspection (cont.):**

- 6. Weighing elements
  - Antifriction means ..... S.4.1.
  - Adjustable components ..... S.4.2.
  - Multiple load-receiving elements ..... S.4.3.
  - Drainage, if wet commodities are weighed ..... S.3.2., UR.3.6.

**Pretest Determinations:**

- 1. Tolerances.
  - Acceptance/maintenance. .... G-T.1., G-T.2.
  - Application. .... G-T.3.
  - Principles..... T.N.1..... M only
  - Tolerance values:

Determine number of scale divisions (n)<sup>2</sup>

$$n = \frac{\text{Scale capacity}}{\text{Value of the verification scale division (e)}}$$

Tolerance application:

Unmarked scales ..... T.1.1.

Unmarked scales with greater than 5000 divisions: ..... Table T.1.1.

Apply the tolerances specified in Table T.1.1.  
 Tolerances for Unmarked Scales and the corresponding  
 T.N. paragraphs referenced in the Table.

Unmarked scales with 5000 or fewer divisions: ..... Table T.1.1.

Apply Class III, T.N.3.1., Table 6 or T.N.3.2. in  
 accordance with the instructions indicated in Table  
 T.1.1. Tolerances for Unmarked Scales. Also apply  
 “Other Applicable Requirements” (T.N. paragraphs  
 referenced in Table 1.1.)

<sup>2</sup> On a multiple range or multi-interval scale the number of divisions for each weighing range or weighing segment independently shall not exceed the maximum specified for the accuracy class. The number of scale divisions, n, for each weighing range or segment is determined by dividing the scale capacity for each range or segment by the verification scale division, e, for each range or segment (i.e., do not add "n" for the ranges or segments together). On a scale system with multiple load receiving elements and multiple indications, each element considered shall not independently exceed the maximum specified for the accuracy class. If the system has a summing indicator, the n<sub>max</sub> for the summed element shall not exceed the maximum specified for the accuracy class. (Table 3, footnote 4 added 1997).

H 44 General Code and Scales Code References	Comments <sup>1</sup>
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**Pretest Determinations (cont.):**

Scales marked with an accuracy class designation.....	T.N.2.1.	
Subsequent verification examinations.....	T.N.2.3.	
Multi-interval and multiple range scales.....	T.N.2.4.	
Ratio tests (scales equipped with commercial weights).....	T.N.2.5.....	B only
Maintenance tolerance values .....	T.N.3.1.[ Table 6 (Class III)]	
Acceptance tolerance values .....	T.N.3.2.	
Tolerances for substitution test.....	T.N.3.11.	
Tolerances for strain-load test.....	T.N.3.12.	
Multiple indicating/recording elements .....	T.N.4.1.	
Single indicating/recording elements.....	T.N.4.2	
Single indicating element/multiple indications.....	T.N.4.3	
Shift or section test.....	T.N.4.4.....	M only
Repeatability .....	T.N.5.	
2. Sensitivity.		
Application.....	T.2.1.....	U&B only
General.....	T.2.2.....	U&B only
Sensitivity requirement, equilibrium change .....	T.3.....	U&B only
Sensitivity .....	T.N.6.....	M&B only
3. Discrimination.		
Analog automatic indicating (includes balance indicators with graduations having specific values).....	T.N.7.1.....	M&D only
Digital automatic indicating.....	T.N.7.2.....	E only
4. Minimum test weights and test loads .....	N.3., Table 4	

**Test Notes:**

1. Error Weights. For scales equipped with nonautomatic (beam) indication, balance small error weights on the platform, the smallest weight being equal to the minimum tolerance value at maximum test load.
2. Check repeatability and agreement between indications throughout the test.
 

Repeatability of indications.....	G-S.5.4., T.N.5.
Digital indication and representation.....	G-S.5.2.2.
3. Recheck zero-load balance each time test load is removed.
 

Zero-load balance change.....	N.1.9.
Abnormal performance.....	G-UR.4.2.

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**Test Notes (cont.):**

4. If scale is equipped with a ticket printer or type-recording beam, print ticket at each test load. Check effectiveness of motion detection.
 

Digital indication and representation.....	G-S.5.2.2.....	E only
Recorded representations		
Also verify that any options for obtaining a recorded representation are appropriate. The customer may be given the option of not receiving the recorded representation. If the system is equipped with the capability, the customer may also be given the option of receiving the recorded representation electronically in lieu of or in addition to a hard copy.....		
Money value, mathematical agreement.....	G-S.5.6.	
Motion detection .....	G-S.5.5.	
Value of the indicated and recorded scale division .....	S.2.5.1.(b)	
	UR.1.3.(1/1/86)	
  
5. If, during the conduct of the test, the performance of the device is questionable with respect to the zone of uncertainty or the width of zero, adequate tests should be conducted to determine compliance; however, they must be conducted under controlled conditions.
 

Digital indicating elements.....	S.1.1.1.(a), S.1.1.1.(b) (1/1/93) .....	E only
Discrimination test .....	N.1.5. (1/1/86) .....	M, D, & E only
Digital device .....	N.1.5.1. ....	E only
  
6. If the device is equipped with operational features such as programmable tare, multiple tare memory, weigh-in/weigh-out, or multiple weighing elements, verify proper operation and appropriateness. .... E only
 

Maintenance of equipment .....	G-UR.4.1.	
Abnormal performance.....	G-UR.4.2.	
Multiple load-receiving elements .....	S.4.3.	
Manual gross weight entry .....	S.1.12. (1/1/93) and (1/1/05), UR.3.9.	

**Test:**



1. Sensitivity test at zero load..... N.1.4. .... B only
2. Discrimination test at zero load, if applicable ..... N.1.5. (1/1/86) ..... M,D,&E only



**H 44 General Code  
 and Scales Code Comments<sup>1</sup>  
 References**

**Test (cont.):**

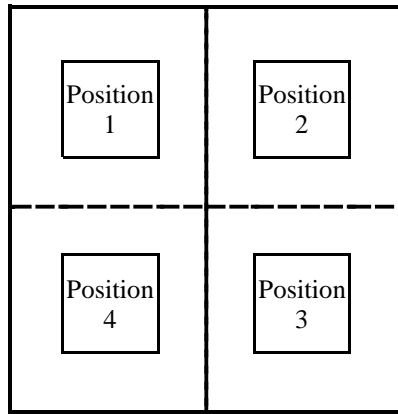
- Digital Device..... N.1.5.1. .... E only
  
- 3. Increasing-load test (with the test load approximately centered) ..... N.1.1.  
 Initial verification – to capacity..... N.3.  
 Subsequent verification
  - a. Small scales - at minimum load (20d), 500d, 2000d, 4000d to capacity
  - b. Larger scales – at minimum load (20d), 500d, 2000d, 4000d to capacity or, at tolerance intervals to Table 4 values.
  - c. Beam scales - at a minimum, test at or near half and full capacity on each weighbeam bar. Scales not equipped with a full capacity beam should be ratio tested by applying field standard weights, specifically designed for this purpose, on the counterpoise hanger. At each test load, test scale counterpoise weights by substituting them for field standard weights. If there is a noticeable change in indication, remove the counterpoise weight from service until it can be determined that it meets the requirements in the Weights Code of NIST Handbook 44..... N.1.7. .... B only
  
- 4. Shift test:
  - Scales with a nominal capacity of 1000 lb or less: ..... N.1.3.7. (a)  
  
 Use one-third capacity test load (defined as test weights in amounts of at least 30 % of scale capacity, but not to exceed 35 % of scale capacity) centered as nearly as possible in each quadrant of the load-receiving element using the prescribed test pattern as shown in Figure 1.
  - Scales with a nominal capacity greater than 1000 lb..... N.1.3.7. (b)  
  
 Use one-third capacity test load (as defined above for Scales with a nominal capacity of 1000 lb or less) centered as nearly as possible in each quadrant of the load-receiving element as shown in figure 1 or one-quarter capacity test load centered as nearly as possible over each corner of the load-receiving element as shown in figure 2.

**H 44 General Code  
 and Scales Code Comments<sup>1</sup>  
 References**

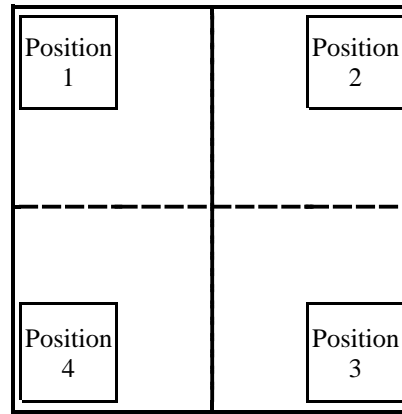
**Test (cont.):**

**Shift-Test Positions  
 Medium-Capacity Platform Scales**

**Figure 1 ..... Figure 2**



The above test pattern indicates the correct positions of a one-third capacity shift-test load and may be applied when performing the shift test on any medium capacity platform scale.



The above alternative test pattern indicates the correct positions of a one-quarter capacity shift-test load and may be applied alternatively to the positions shown and test loads indicated in Figure 1 when performing a shift test on medium capacity platform scales having a nominal capacity greater than 1000 lb.

**Note:** When multiple field standards are used as the prescribed shift-test load, do not concentrate those field standards in a test pattern that would be less than if that same load were comprised of only a single field standard.

- 5. Sensitivity test at maximum test load ..... N.1.4. .... B only
- Discrimination test at maximum test load (if applicable) ..... N.1.5.(1/1/86) ..... M, D, & E only
  
- 6. RFI/EMI tests (if a problem is suspected) (operate each potential source one at a time)..... N.1.6. .... E only
  - Radio Frequency Interference (RFI)
  - Electromagnetic Interference (EMI)
    - Testing with non associated equipment ..... G-N.2.
    - Environment..... G-UR.1.2.
    - Associated and nonassociated equipment ..... G-UR.3.2
    - Abnormal performance ..... G-UR.4.2
    - Tolerance RFI/EMI tests ..... T.N.9..... E only

**H 44 General Code  
 and Scales Code Comments<sup>1</sup>  
 References**

**Test (cont.):**

- 7. Test for over-capacity indication..... S.1.7.
  
- 8. Decreasing-load test ..... N.1.2. .... D & E only  
 Scales marked with an accuracy designation..... N.1.2.1. .... M only  
     For scales having 1000 divisions or greater, tests shall be conducted with test loads equal to the maximum test load at each tolerance value. For example, on a Class III scale, at test loads equal to 4000d, 2000d, and 500d. For marked scales with fewer than 1000 divisions, the test load shall be equal to one-half of the maximum load applied in the increasing-load test.
  
- All other scales ..... N.1.2.2.  
     The test load shall be equal to one-half of the maximum load applies in the increasing-load test.
  
- 9. Recheck zero-load balance ..... N.1.9., G-UR.4.2.
  
- 10. Substitution or strain load test ..... Table 4.  
     Scales shall be tested using at least the minimum amount of test weights and to the minimum test loads specified in Table 4. In instances where the amount of test weight available for testing is equal to or greater than the minimum required by Table 4, but less than the amount of test load required, not more than three substitutions are to be performed to achieve a test load that equals at least the minimum required.
  
- Where practical, scales should be tested to capacity on an initial verification and to at least used capacity on subsequent tests. In accordance with Table 4, not more than three substitutions shall be used during substitution testing, after which the tolerances for strain load tests apply.
  
- 11. Recheck zero load balance ..... N.1.9., G-UR.4.2.
  
- 12. Conduct out-of-level test (portable scales without level-indicating means only). ..... S.2.4.

		H 44 General Code and Scales Code References	Comments <sup>1</sup>
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**Test (cont.):**

- |  |  |                      |        |
|--|--|----------------------|--------|
| 13. Test for proper design of automatic zero-tracking mechanism, if scale is so equipped:  |  |                      |        |
|  | Scales manufactured between 1/1/81 and 1/1/07.....   | S.2.1.3.1.(c).....   | E only |
|  | Scales manufactured on or after 1/1/07 .....   | S.2.1.3.2.(b) .....  | E only |
| <p>Under normal operating conditions the maximum load that can be “rezeroed” when placed on or removed from the platform all at once shall be 0.6 scale division for scales manufactured between January 1, 1981, and January 1, 2007, and 0.5 scale division for scales manufactured on or after January 1, 2007.</p> |  |                      |        |
| 14. Check proper design of tare auto-clear, if scale is so equipped.....   |  | S.2.3. (1/1/83)..... | E only |
| 15. If scale is equipped with a semi-automatic zero-setting mechanism, test the effectiveness of motion detection.....   |  | S.2.1.2.....         | E only |
| 16. Establish correct zero-load balance. ....  |  | N.1.9., G-UR.4.2.    |        |
|  | After all equipment at a location has been tested, review results to determine compliance with equipment maintenance and use of adjustments..... | G-UR.4.1., G-UR.4.3. |        |

## 2015 NIST EPO No. 9

### Examination Procedure Outline for

### Part 1 – Monorail Scales – Electronic Digital Indicators

Part 1 – Monorail Scales – Electronic Digital Indicators .....	1
Part 2 – Monorail Scales and Meat Beams – Mechanical .....	11

It is recommended that this outline be followed as minimum criteria for examining monorail scales equipped with electronic digital indicators used to weigh statically or dynamically. See EPO 9, Part 2 for Mechanical Meatbeam and Monorail Scales.

Requirements that apply only to scales marked with an accuracy class are indicated with an asterisk. Nonretroactive requirements are followed by the applicable date in parentheses.

#### SAFETY NOTES

*When excerpting this Examination Procedure Outline for duplication, the EPO Safety Annex (Safety Considerations and Glossary of Safety Key Phrases) should be duplicated and included with this outline.*

*Safety policies and regulations vary among jurisdictions. It is essential that inspectors or servicepersons be aware of all safety regulations and policies in place at the inspection site and practice their employer's safety policies. The safety reminders included in this EPO contain general guidelines useful in alerting inspectors and servicepersons to the importance of taking adequate precautions to avoid personal injury. These guidelines can only be effective in improving safety when coupled with training in hazard recognition and control.*

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**Clothing**

**Personal Protection Equipment**

e.g., Safety Shoes

**Electrical Hazards**

**Support** – for scales, test weights, and load-receiving elements (e.g., meat hooks or test platform)

**First Aid Kit**

**Transportation of Equipment**

**Hardhat** – for protection from overhead (e.g., hanging meat hooks)

**Eye Protection** - for protection from hanging meat hooks

**Lifting**

**Also: Overhead Hazard, Materials or Obstructions**

**H-44 General Code and  
 Scale Code References**

**Inspection:**

**SAFETY REMINDER!!!**

- Check the inspection site carefully for safety hazards and take appropriate precautions.
- Learn the nature of hazardous products used at or near the inspection site.
- Use personal protection equipment appropriate for the inspection site.
- Be sure that a first aid kit is available and that the kit is appropriate for the type of inspection activity.

1. Zero-load balance as found. ....	S.1.1., S.1.1.1., S.2.1.1., S.2.1.2., S.2.1.4., UR.4.1., G-S.5.2.2(d)*
If the device is not in balance, the user should be made aware of paragraph UR.4.1., and warning issued if necessary. If device is set for tare, check accuracy of the tare being taken.	
2. Indicating and recording elements.	
Scale division, value (d) and number (n). ....	S.1.2.*, S.1.2.1. (1/1/89), S.1.2.2., S.5.*, G-UR.1.1., UR.1., UR.1.1.(b), G-S.5.3., UR 1.3.1.(b), UR.3.10.
Tare division value.....	S.2.3. (1/1/83), S.2.3.1.
Tare mechanism. ....	S.2.3.
Appropriateness. ....	G-S.5., S.1.7., S.5.2.*,UR.1.1. (a)*, UR.3.1.*
Recording elements, General .....	G-S.5.6.
Customer readability, if applicable. ....	G-UR.3.3.
Damping means. ....	S.2.5.1.
Adjustable components. ....	S.1.10.
Provision for sealing. ....	S.1.11. (1/1/90), G-UR.4.5., G-S.8. G-S.8.1. (1/1/2010)
Manual Weight Entries. ....	S.1.12. (1/1/93), UR.3.9. S.6.3., S.6.2.

**H-44 General Code and  
 Scale Code References**

**Inspection (cont.):**

3. Marking.....	G-S.1.
a. Marking requirements - all devices	
Identification.....	Retroactive
Name or ID of manufacturer.....	Retroactive
Model identifier.....	(1/1/03)
Model identifier prefix.....	(1/1/68)
Nonrepetitive serial number.....	(1/1/86)
Serial number prefix.....	(1/1/03)
NTEP CC prefix and number (for devices that have an NTEP CC).....	(1/1/04)
Software version or revision identifier.....	G-S.1.2.
Devices or main elements remanufactured after January 1, 2002.....	G-S.1.
name and ID of remanufacturer or distributor.....	(1/1/02)
model number if different from original model number.....	(1/1/02)
b. Marking requirements - weighing and indicating elements in same housing or covered on the same CC (in addition to marking for all devices).....	S.6.3.
Accuracy class.....	(1/1/86)
Nominal capacity.....	Retroactive
Value of scale division with nominal capacity, if not apparent.....	(1/1/83)
Value of "e" (if different from "d").....	(1/1/86)
Temperature limits if narrower than and within - 10 °C to 40 °C (14 °F to 104 °F).....	(1/1/86)
Scales designed for special purposes.....	(1/1/86)
c. Marking requirements - indicating element not permanently attached or covered on separate CC (in addition to marking for all device).....	S.6.3.
Accuracy class.....	(1/1/86)
Nominal capacity.....	Retroactive
Value of scale division with nominal capacity, if not apparent.....	(1/1/83)
Value of "e" (if different from "d").....	(1/1/86)
Temperature limits if narrower than and within -10 °C to 40 °C (14 °F to 104 °F).....	(1/1/86)
Scales designed for special purposes.....	(1/1/86)
Maximum number of scale divisions ( $n_{max}$ ).....	(1/1/88)
d. Marking requirements for weighing and load-receiving element not permanently attached or covered on separate CC (in addition to marking for all devices).....	S.6.3.
Accuracy class.....	(1/1/86)
Nominal capacity.....	Retroactive
Temperature limits if narrower than and within -10 °C to 40 °C (14 °F to 104 °F).....	(1/1/86)
Scales designed for special application.....	(1/1/86)
Maximum number of scale divisions ( $n_{max}$ ).....	(1/1/88)
Minimum verification scale division for which device complies with the requirements ( $e_{min}$ or d).....	(1/1/88)
e. Marking requirements - load cell with Certificate of Conformance (in addition to marking for all devices).....	S.6.3., S.5.4. (1/1/94)

**H-44 General Code and  
Scale Code References**

**Inspection (cont.):**

**G-S.1. (cont.)**

**Note:** Requires information on a data plate attached to the load cell or in accompanying document. If a document is provided, the serial number shall appear on the load cell and in the document. .... (1/1/88)

Manufacturer’s name or trademark, model designation, model prefix, and serial number and prefix shall also be marked on both the load cell and in any accompanying documents. .... (1/1/91)

Accuracy class..... (1/1/86)

Temperature limits if narrower than and within – 10 °C to 40 °C (14 °F to 104 °F). .... (1/1/86)

Maximum number of divisions. .... (1/1/88)

“S” or “M” for single or multiple cell applications. .... (1/1/88)

Direction of loading, if not obvious. .... (1/1/88)

Minimum dead load, maximum capacity, safe load limit, and load cell verification interval,  $V_{min}$ . .... (1/1/88)

f. Marking requirements – current software version or revision identifier for not built-for-purpose, software- based devices. ....G-S.1.(d) (1/1/2004),  
 G-S.1.(d)(1)(2), (1/1/07),  
 G-S.1.1.(1/1/2004)

4. Design of balance, tare, level, damping, and arresting mechanisms. ....S.2.1., S.2.3., S.2.5.1.

5. Design of weighing elements. ....S.4.

6. Installation :

Static monorail scales.....UR.2.3., UR.2.4.,  
 G-UR.2.

Dynamic monorail scale considerations:.....N.1.3.5.1., UR.2.3.,  
 UR.2.4., G-UR.2.

- Space to avoid contact between carcasses,
- Higher resolution checkweigh scales, and
- Carcasses used multiple times.



**H-44 General Code and Scale Code References**

**Inspection (cont.):**

<p style="text-align: center;"><b>SAFETY REMINDER</b></p> <ul style="list-style-type: none"><li>– Check the inspection site carefully for safety hazards and take appropriate precautions.</li><li>– Use caution in moving in wet, slippery areas.</li><li>– Use personal protection equipment appropriate for the inspection site.</li><li>– Be sure that a first aid kit is available and that the kit is appropriate for the type of inspection activity.</li><li>– Check to be sure the scale supports are adequate to support the scale, test weights equal to the capacity of the scale, and test platforms or chains to suspend test weights</li></ul>
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- 7. Maintenance, use, and environmental factors (cleanliness, obstructions, modifications, etc.).....G-S.2., G-UR.1.2., G-UR.3.1., G-UR.3.2., G-UR.4., UR.4.3.
- 8. Assistance.....G-UR.4.4.
- 9. Provisions for testing and accessibility.....UR.2.9., G-UR.2.3.
- 10. Determination of Load Cell Suitability (applicable to load cells with an NTEP Certificate of Conformance):
  - a. The number of scale divisions (n) of the scale is less than or equal to the  $n_{max}$  of the indicator or the load cells, whichever is less; for example, if the indicator has an  $n_{max}$  of 10 000 and the load cells have an  $n_{max}$  of 5000, then the scale may use up to 5000 divisions.
  - b. The load cell is approved for the required accuracy class. Note: A Class II load cell may be used in a Class III application; however the opposite is not true.
  - c. The load cell is rated Single (S) or Multiple (M) use as appropriate to the application.  
**Note:** A load cell rated for single use may be used in a single or multiple load cell application; however, a load cell rated for multiple uses cannot be used in a single load cell application.
  - d. The load cell complies with the requirements for  $V_{min}$  and temperature effect on zero-load balance. ....S.5.4., T.N.8.1.3.

**Inspection (cont.):**

For scales with mechanical lever systems:

$$v_{\min} \leq \frac{d^*}{\sqrt{N} \times (\text{scale multiple})}$$

$$v_{\min} \leq \frac{d^*}{\sqrt{N}} = \frac{1 \text{ lb}}{\sqrt{2}} = \frac{1 \text{ lb}}{1.414} = 0.71 \text{ lb}$$

\*When the value of the scale division, d, is different from the verification scale division, e, for the scale, the value of e must be used in the formulae above.

**Pretest Determinations:**

1. Tolerances.
  - Acceptance/Maintenance.....G-T.1., G-T.2.
  - Application.....T.N.2.1., T.N.2.3.,  
T.N.2.4.
  - Tolerance values:
    - Scales marked with an accuracy class.....T.N.3.1., T.N.3.2.,  
Table 6 (Class III),
    - Scales not marked.....T.N.3.8., T.N.4.1.,  
T.N.4.4., T.N.4.5., T.N.5.
    - Discrimination.....T.N.7.2.
2. Select trolleys, trees, chains, or other auxiliary gear necessary to suspend test weights on rail or meat hook. If two or more trolley-and-tree combinations are used; they should be uniform in weight (within plus or minus two ounces).

**SAFETY REMINDER!!!**

- **Wear appropriate personal protection equipment such as hard hats and eye protection to prevent injury from overhead meat hooks, hanging carcasses, falling weights, and slipping on slick surfaces.**
- **Wear safety shoes to prevent possible injury from falling weights and slipping on slick surfaces.**

**Pretest Determinations (cont.):**

- 3. Minimum test weights and test loads. .... N.3.

**Test Notes:**

- 1. Suspend auxiliary gear (trolleys, trees, chains) from live rail.
- 2. Balance in auxiliary gear.
- 3. Check repeatability and agreement between indications and between indications and recorded representations throughout test. ....T.N.4.1., T.N.5., G-S.5.2.2.(a)
- 4. Verify that any options for obtaining a recorded representation are appropriate. The customer may be given the option of not receiving the recorded representation. If the system is equipped with the capability, the customer may also be given the option of receiving the recorded representation electronically in lieu of or in addition to a hard copy. ....G-S.5.6.
- 5. Check zero-load balance each time test load is removed. ....N.1.9., G-UR.4.2
- 6. If the scale is equipped with a printer, print a ticket at each test load; check effectiveness of motion detection. ....G S.5.6., S.2.5.1., UR.1.3. (1/1/86)
- 7. If, during the conduct of the test, the performance of the device is questionable with respect to the zone of uncertainty or the width of zero, adequate tests should be conducted to determine compliance. ....N.1.5., N.1.5.1., S.1.1.1.
- 8. If the device is equipped with operational features such as automatic zero-setting mechanism, programmable tare,\*manual weight entries, or two scales with one printer, check proper operation and appropriateness.

\*Note: See UR.3.9. The use of manual gross weight entries, are not allowed on monorail scales.

**H-44 General Code and Scale Code References**

**Test:**

**Static Test:**

**SAFETY REMINDER!!!**

- **Wear safety shoes!**
- **Use proper lifting techniques!**

- 3. RFI/EMI test (if a problem is suspected).....G-N.2., G-UR.3.2.,  
Radio Frequency Interference (RFI) G-UR.4.2., G-UR.1.2.,  
Electromagnetic Interference (EMI) N.1.6., T.4., T.N.9.\*
- 4. Over capacity test, if deemed necessary. ....S.1.7., S.2.1.5., S.2.1.5.(b)  
(1/1/2009)
- 5. Decreasing load test. Test at one half of maximum test load. ....N.1.2.
- 6. Remove all test weights and determine any zero load balance change. ....N.1.9., G-UR.4.2.
- 7. Test for proper design of automatic zero-setting mechanism, if device is so equipped.S.2.1.3.1.(c), S.2.1.3.2.8.
- 8. If device is equipped with a semi-automatic zero-setting mechanism (push button),  
test effectiveness of motion detection.....S.2.1.2.(b)
- 9. Establish correct zero load balance.

**Dynamic Test** .....N.1.3.5.1.

On a dynamic test with 20 or more test drafts, 10 % of the individual test drafts may be two times the basic tolerances, if the error on the total of all test load drafts does not exceed 0.2 %.

- 1. Conduct dynamic test with livestock carcasses
- 2. Test no less than 20 test loads using carcasses or portions of carcasses of the type normally weighed (two additional test loads may be included in the test run in the event that one or two of the test load are rendered unusable).
- 3. Position the test carcasses far enough ahead of the scale so the swaying motion settles to duplicate the normal sway of a continuously running plant chain.

**H-44 General Code and Scale Code References**

**Dynamic Test (cont.)**.....N.1.3.5.1.

- 4. If the plant conveyor chain does not space or prevent the carcasses from touching one another, the dynamic test should not be conducted until this condition is corrected.
  
- 5. Individually weigh (statistically) the carcasses on the same scale being tested or another monorail scale in close proximity with the same or smaller divisions.
  - a. The scale selected for weighing the carcasses must be tested statically with test weights.
  
- 6. If the scale being tested is used for weighing freshly slaughtered animals, a static weighment of the carcasses must be taken as quickly as possible before or following the Dynamic weighment to avoid loss due to shrinkage.
  
- 67. If multiple dynamic tests are conducted using the same carcasses, obtain static weights before and after multiple dynamic tests.
  
- 8. If the carcass changes weight between static tests, the amount of weight change should be taken into account, or the carcass should be discarded for tolerance purposes.

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## 2015 NIST EPO No. 9

### Examination Procedure Outline for

## Part 2 – Monorail Scales and Meat Beams – Mechanical

It is recommended that this outline be followed for monorail scales equipped with equipped with weigh-beams or mechanical dials. Requirements that apply only to scales marked with an accuracy class are indicated with an asterisk. Nonretroactive requirements are followed by the applicable date in parentheses.

### Safety Notes – See EPO 9, Part 1

**H-44 General Code  
 and Scale Code  
 References**

### Inspection:

<p><b>SAFETY REMINDER!!!</b></p> <ul style="list-style-type: none"> <li>– Check the inspection site carefully for safety hazards and take appropriate precautions.</li> <li>– Learn the nature of hazardous products used at or near the inspection site.</li> <li>– Use personal protection equipment appropriate for the inspection site.</li> <li>– Be sure that a first aid kit is available and that the kit is appropriate for the type of inspection activity.</li> </ul>
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- |   |  |
|---|--|
| <p>1. Zero-load balance as found.....</p> <p style="padding-left: 40px;">If the device is not in balance, the user should be made aware of paragraph UR.4.1., and warning issued if necessary. If device is set for tare, check accuracy of the tare being taken.</p>   | <p>S.1.1., S.2.1.1., S.2.1.2.,<br/>UR.4.1</p>  |
| <p>2. Indicating and recording elements.</p> <p style="padding-left: 40px;">Scale division, value (d) and number (n).....</p> <p style="padding-left: 80px;">Tare division value. ....</p> <p style="padding-left: 80px;">Tare mechanism. ....</p> <p style="padding-left: 80px;">Weighbeams. ....</p> <p style="padding-left: 80px;">Poises.....</p> <p style="padding-left: 80px;">Dials and balance indicators. ....</p> <p style="padding-left: 120px;">Appropriateness.....</p> <p style="padding-left: 120px;">Damping means.....</p> <p style="padding-left: 120px;">Customer readability. ....</p> <p style="padding-left: 120px;">Adjustable appropriateness. ....</p> | <p>S.1.2.*, G-UR.1.1.,<br/>UR.1., UR.1.1.(b),<br/>G-S.5.3.</p> <p>S.2.3. (1/1/83), S.2.3.1.</p> <p>S.2.3.</p> <p>S.1.5. except S.1.5.5.</p> <p>S.1.6.</p> <p>S.1.3., S.1.4., S.2.2.</p> <p>G-S.5., S.1.7.,</p> <p>UR.1.1.(a),* UR.3.1.,*</p> <p>S.5.,*UR.3.2.,</p> <p>S.2.5.</p> |

**H-44 General Code  
and Scale Code  
References**

**Inspection (cont.):**

3. Marking .....	S.6.3., S.6.2.
a. Marking requirements - all devices	
Identification .....	G-S.1.
Name or ID of manufacturer .....	Retroactive
Model identifier .....	Retroactive
Model identifier prefix. ....	(1/1/03)
Nonrepetitive serial number. ....	(1/1/68)
Serial number prefix. ....	(1/1/86)
NTEP CC prefix and number (for devices that have an NTEP CC).....	(1/1/03)
Devices or main elements remanufactured after January 1, 2002. ....	G-S.1.2.
name and ID of remanufacturer or distributor.....	(1/1/02)
Model number if different from original model number. ....	(1/1/02)
b. Marking requirements - weighing and indicating elements in same housing or covered on the same CC (in addition to marking for all devices).....	S.6.3.
Accuracy class. ....	(1/1/86)
Nominal capacity.....	Retroactive
Value of scale division with nominal capacity, if not apparent. ....	(1/1/83)
Value of "e" (if different from "d"). ....	(1/1/86)
Scales designed for special purposes.....	(1/1/86)
c. Marking requirements - indicating element not permanently attached or covered on separate CC (in addition to marking for all device).....	S.6.3.
Accuracy class. ....	(1/1/86)
Nominal capacity.....	Retroactive
Value of scale division with nominal capacity, if not apparent. ....	(1/1/83)
Scales designed for special purposes.....	(1/1/86)
Maximum number of scale divisions ( $n_{max}$ ).....	(1/1/88)
d. Marking requirements for weighing and load-receiving element not permanently attached or covered on separate CC (in addition to marking for all devices). ....	S.6.3.
Accuracy class. ....	(1/1/86)
Nominal capacity.....	Retroactive
Scales designed for special application. ....	(1/1/86)
Maximum number of scale divisions ( $n_{max}$ ). ....	(1/1/88)
Minimum verification scale division for which device complies with the requirements ( $e_{min}$ or d). ....	(1/1/88)
4. Installation.....	UR.2.3., UR.2.4., G-UR.2.
5. Design of balance, tare, level, damping, and arresting mechanisms. ....	S.2.1., S.2.3., S.2.5.1.
6. Design of weighing elements. ....	S.4.



**H-44 General Code  
and Scale Code  
References**

**Inspection (cont.):**

7. Maintenance, use, and environmental factors (cleanliness, obstructions, modifications, etc.) ..... G-S.2., G-UR.1.2., G-UR.3.1., G-UR.4., UR.4.3.

**SAFETY REMINDER!!!**

- Check the inspection site carefully for safety hazards and take appropriate precautions.
- Use caution in moving in wet, slippery areas.
- Use personal protection equipment appropriate for the inspection site.
- Be sure that a first aid kit is available and that the kit is appropriate for the type of inspection activity.
- Check to be sure the scale supports are adequate to support the scale, test weights equal to the capacity of the scale, and test platforms or chains used to suspend test weights.

8. Assistance ..... G-UR.4.4.
9. Provisions for testing and accessibility ..... UR.2.9., G-UR.2.3.

**Pretest Determinations:**

1. Tolerances.
- Acceptance/Maintenance ..... G-T.1., G-T.2.
- Application ..... T.N.2.1., T.N.2.3., T.N.2.4.
- Tolerance values:
- Scales marked with an accuracy class. .... T.N.3.1., T.N.3.2., Table 6 (Class III), T.N.4., T.N.5.
- Scales not marked ..... T.1.1., T.N.3.1., Table 6 (Class III), T.N.3.2. T.N.4.1., T.N.4.2., T.N.5.
- Discrimination ..... T.N.7.1.\*

**Pretest Determinations (cont.):**

2. Select trolleys, trees, chains, or other auxiliary gear necessary to suspend test weights on rail or meat hook. If two or more trolley-and-tree combinations are used; they should be uniform in weight  $\pm 52$  grams ( $\pm 2$  ounces).

<p><b>SAFETY REMINDER!!!</b></p> <ul style="list-style-type: none"><li>– <b>Wear appropriate personal protection equipment such as hard hats and eye protection to prevent injury from overhead meat hooks, hanging carcasses, falling weights, and slipping on slick surfaces.</b></li><li>– <b>Wear safety shoes to prevent possible injury from falling weights and slipping on slick surfaces.</b></li></ul>
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3. Minimum test weights and test loads. .... N.3.

**Test Notes:**

1. Suspend auxiliary gear (trolleys, trees, chains) from live rail.
2. If beam scale, place small error weights on or suspend from the live rail or hook. The value of the smallest weight should be equal to the minimum tolerance value and the total of all the weights should be equal to the tolerance at maximum test load.
3. Balance in auxiliary gear and test weights.
4. Check repeatability and agreement between indications and between indications and recorded representations throughout test. .... T.N.4.1., T.N.5., G-S.5.2.2.(a)
5. Check zero-load balance each time test load is removed. .... N.1.9., G-UR.4.2
6. If scale is equipped with a type-recording beam or printer, print a ticket at each test load..... G S.5.6., UR.1.3.(1/1/86)

**Static Test:**

<p><b>SAFETY REMINDER!!!</b></p> <ul style="list-style-type: none"><li>– <b>Wear safety shoes!</b></li><li>– <b>Use proper lifting techniques!</b></li></ul>
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**H-44    General    Code  
and    Scale    Code  
References**

**Static Test (cont.):**

- |  |                                      |
|--|--------------------------------------|
| 1. Sensitivity test at zero load (weighbeams only).....  | N.1.4.                               |
| Discrimination test at zero only (dial indicators only).....   | N.1.5.                               |
| 2. Increasing load test .....  | N.1.1.                               |
| a. Beam scales. Test at not less than three points or notches on weigh-beam. Scales not equipped with a full capacity beam should be ratio tested using standard weights on counterpoise hanger.   |                                      |
| When ratio testing, test poise and beam by substituting poise position with the removal of standard weights from counterpoise hanger.....  | N.1.7.                               |
| b. Dial scales. Test at not less than three points on reading face, including all possible quarters of capacity. Test all unit weights possible. If equipped with tare bars, test at one half and full capacity of each bar.   |                                      |
| 3. Shift test. Use test load equal to the largest load that can be anticipated to be weighed at the installation, but never less than one-half capacity. Apply load successively on the right end, the left end, and the center of the live rail. This can be conducted during the increasing load test..... | N.1.3.5.                             |
| 4. Beams and balance indicators only, test for SR at the maximum test load. ....   | N.1.4.                               |
| Dials only. Conduct the discrimination test at maximum test load. ....   | N.1.5.                               |
| 5. Dials only. Conduct the decreasing-load test at one-half of the maximum test load (at no less than one-half of the dial face capacity).....   | *N.1.2.1., N.1.2.2.                  |
| 6. Beams only. Conduct a counterpoise weight accuracy test (see <i>HB 44 Section 2.23. Weights</i> paragraph T.1. and appropriate Table 1. Maintenance Tolerance for Avoirdupois Weights or Table 1. Maintenance Tolerance for Metric Weights). ....   | HB 44 Section 2.23<br>paragraph T.1. |
| 7. Remove all test weights and determine any zero-balance change.....  | N.1.9., G-UR.4.2.                    |

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## 2015 NIST EPO No. 12

### Examination Procedure Outline for

### Part 1 – Livestock and Animal Scales – Electronic Digital Indicating

Part 1 – Electronic Digital Indicating .....	1
Part 2– Mechanical – Analog Indicating .....	11

It is recommended that this outline be followed as minimum criteria for examining livestock and animal scales equipped with electronic digital indicators. See Part 2 for livestock and animal scales equipped with weighbeams or dials.

Requirements that apply only to scales marked with an accuracy class are indicated with an asterisk. Nonretroactive requirements are followed by the applicable date in parentheses.

#### SAFETY NOTES

*When excerpting this Examination Procedure Outline for duplication, the EPO Safety Annex (Safety Considerations and Glossary of Safety Key Phrases) should be duplicated and included with this outline.*

*Safety policies and regulations vary among jurisdictions. It is essential that inspectors or servicepersons be aware of all safety regulations and policies in place at the inspection site and practice their employer's safety policies. The safety reminders included in this EPO contain general guidelines useful in alerting inspectors and servicepersons to the importance of taking adequate precautions to avoid personal injury. These guidelines can only be effective in improving safety when coupled with training in hazard recognition and control.*

Prior to beginning any inspection, the inspector should read and be familiar with the EPO Safety Annex - "Safety Considerations and Glossary of Safety Key Phrases." The terms and key phrases in each safety reminder of this outline are found in the glossary of the EPO Safety Annex. The inspector is reminded of the importance of evaluating potential safety hazards prior to an inspection and taking adequate precautions to avoid personal injury or damage to the device. As a minimum, the following safety precautions should be noted and followed during the inspection.

**Clothing**

**Personal Protection Equipment**  
e.g., Safety Shoes

**Electrical Hazards**

**Safety Cones/Warning Signs**

**First Aid Kit**

**Support – for scales and test weights**

**Location**

**Transportation of Equipment**

**Lifting**

**Also:**

**Wet/Slick Conditions**

**Overhead Hazard, Materials, or Obstructions**

**H-44 General Code and Scale Code References**

**Inspection:**

**SAFETY REMINDER!!!**

- **Check the inspection site carefully for safety hazards and take appropriate precautions.**
- **Use caution while moving in wet, slippery areas.**
- **Use personal protection equipment appropriate for the inspection site.**
- **Be sure that a first aid kit is available and that the kit is appropriate for the type of inspection activity.**
- **Be sure that a first aid kit is available and that the kit is appropriate for the type of inspection activity.**

1. Zero-load balance as found. If the device is not in balance, the user should be made aware of paragraph UR.4.1. and a warning issued if necessary. If at a ring scale and a tare has been taken for a ring man, check accuracy of the tare taken..... S.1.1., S.2.1.1., S.2.1.2., UR.4.1., G-S.5.2.2.(d) (1/1/86)\*
2. General Considerations
  - Selection ..... G.S.3., G-UR.1.1, UR.1.
  - Installation ..... G-UR.2.
  - Supports for portable scale ..... UR.2.1.
  - Protection from environment ..... UR.2.3.
  - Foundation, supports, and clearance ..... UR.2.4.
  - Access to weighing elements ..... UR.2.5.
  - Stock racks ..... UR.2.7.

**SAFETY REMINDER!!!**

- **Check to be sure the scale supports are adequate to support the scale and test loads equal to the capacity of the scale!**

- Maintenance, use, and environmental factors.
- Facilitation of fraud ..... G-S.2.
  - Environment ..... G-UR.1.2.
  - Operation ..... G-UR.3.1.
  - Maintenance ..... G-UR.4.
  - Maximum load ..... UR.3.2.
  - Minimum load for livestock ..... UR.3.8.
  - Manual gross weights ..... UR.3.9., S.1.12.
  - Scale modification ..... UR.4.3
  - Accessibility for inspection, testing, and sealing ..... G-UR.2.3.
  - Assistance ..... G-UR.4.4.
  - Position, customer readability ..... G-UR.3.3.

**H-44 General Code and Scale Code References**

**Inspection (cont.):**

3. Marking .....	S.6.3., S.6.2., S.6.5., G-S.1.1.
a. Marking requirements - all devices	
Identification. ....	G-S.1.
Name, initials or trademark of manufacturer or distributor. ....	Retroactive
Model identifier designation. ....	Retroactive
Model prefix. ....	(1/1/03)
Nonrepetitive serial number. ....	(1/1/68)
Serial number prefix. ....	(1/1/86)
Software version or revision number. ....	(1/1/04)
NTEP CC prefix and number (for devices that have an NTEP CC). ....	(1/1/03)
Remanufacturer information, as appropriate:	
name and ID of remanufacturer or distributor. ....	(1/1/02)
model number if different from original model number. ....	(1/1/02)
Lettering. ....	G-S.7.
Operational controls, indications, and features. ....	G-S.6. (1/1/77)
Visibility of identification. ....	G-UR.2.1.1.
Interchange or reversal of parts. ....	G-S.4.
b. Marking requirements - weighing and indicating elements in same housing or covered on the same CC (in addition to marking for all devices). ....	S.6.3.
Accuracy class. ....	(1/1/86)
Nominal capacity. ....	Retroactive
Value of scale division with nominal capacity, if not apparent. ....	(1/1/83)
Value of "e" (if different from "d"). ....	(1/1/86)
Temperature limits if narrower than and within – 10 °C to 40 °C (14 °F to 104 °F) ....	(1/1/86)
Scales designed for special application. ....	(1/1/86)
c. Marking requirements - indicating element not permanently attached or covered on separate CC (in addition to marking for all device). ....	S.6.3.
Accuracy class. ....	(1/1/86)
Nominal capacity. ....	Retroactive
Value of scale division with nominal capacity, if not apparent. ....	(1/1/83)
Value of "e" (if different from "d") ....	(1/1/86)
Temperature limits if narrower than and within – 10 °C to 40 °C (14 °F to 104 °F) ....	(1/1/86)
Scales designed for special application. ....	(1/1/86)
Maximum number of scale divisions ( $n_{max}$ ). ....	(1/1/88)
Concentrated Load Capacity (CLC) or Section Capacity. ....	S.6.5. (1/1/03) Table S.6.3.(a)(b)
d. Marking requirements - weighing and load-receiving element not permanently attached or covered on separate CC (in addition to marking for all devices). ....	S.6.3.
Accuracy class. ....	(1/1/86)
Nominal capacity. ....	Retroactive
Nominal capacity on load-receiving element. ....	(1/1/89) (livestock only)
Concentrated Load Capacity (CLC) or Section Capacity. ....	S.6.5. (1/1/03) Table S.6.3.(a)(b)

**H-44 General Code and Scale Code References**

**Inspection (cont.):**

**Marking (cont.)**

<b>Temperature limits if narrower than and within –10 °C to 40 °C (14 °F to 104 °F)</b> .....	(1/1/86)
Scales designed for special application.....	(1/1/86)
Maximum number of scale divisions ( $n_{max}$ ).....	(1/1/88)
<b>Minimum verification scale division for which device complies with the requirements (<math>e_{min}</math> or <math>d</math>)</b> .....	(1/1/88)

- e. Marking requirements - load cell with Certificate of Conformance (in addition to marking for all devices)..... S.6.3., S.5.4. (1/1/94)

**Note:** Requires information on a data plate attached to the load cell or in accompanying document. If a document is provided, the serial number shall appear on the load cell and in the document..... S.6.3., (1/1/88)

Manufacturer’s name or trademark, model designation, model prefix and serial number and prefix shall also be marked on both the load cell and in any accompanying documents. ....	(1/1/91)
Accuracy class.....	(1/1/88)
Temperature limits if narrower than and within – 10 °C to 40 °C (14 °F to 104 °F) ...	(1/1/86)
Maximum number of divisions.....	(1/1/88)
“S” or “M” for single or multiple cell applications. ....	(1/1/88)
Direction of loading, if not obvious.....	(1/1/88)
Minimum dead load, maximum capacity, safe load limit, and load cell verification interval, $V_{min}$ .....	(1/1/88)

4. Determination of Load Cell Suitability (applicable to load cells with an NTEP Certificate of Conformance):

- a. The number of scale divisions ( $n$ ) of the scale is less than or equal to the  $n_{max}$  of the indicator or the load cells, whichever is less; for example, if the indicator has an  $n_{max}$  of 10 000 and the load cells have an  $n_{max}$  of 5000, then the scale may use up to 5000 divisions.
- b. The load cell is approved for the required accuracy class. **Note:** A Class III load cell may be used in a Class III L application; however, the opposite is not true.
- c. The load cell is rated Single (S) or Multiple (M) use as appropriate to the application. **Note:** A load cell rated for single use may be used in a single or multiple load cell application; however, a load cell rated for multiple uses cannot be used in a single load cell application.
- d. The load cell complies with the requirements for temperature effect on zero-load balance..... S.5.4. (1/1/94), T.N.8.1 Appendix to EPO 12-E



**H-44 General Code and Scale Code References**

**Inspection (cont):**

**Marking (cont.)**

Note: Testing to determine the effect of temperature on zero-load balance cannot be performed in the field; however, for purposes of field inspection, a load cell is considered to comply with T.N.8.1.3. if the  $V_{min}$  value marked on the load cell is less than or equal to the  $V_{min}$  value as calculated below based upon the  $d$  and  $N$  for the scale; if it is not, the scale does not comply with T.N.8.1.3.

Full electronic scale with more than one load cell: The verification scale division  $V_{min}$ , for the load cells must be less than or equal to the scale division,  $d$ , divided by the square root of the number of load cells,  $N$ , used in the scale:

$$v_{min} \leq \frac{d^*}{\sqrt{N}}$$

Note: Maximum values of  $v_{min}$  for commonly encountered multiple load cell scales are listed in the Appendix to EPO 12-E.

For scales with mechanical lever systems:

$$v_{min} \leq \frac{d^*}{\sqrt{N} \times (\text{scale multiple})}$$

*\*When the value of the scale division,  $d$ , is different from the verification scale division,  $e$ , for the scale, the value of  $e$  must be used in the formulae above.*

5. Indicating and Recording Elements

Value of scale division. ....	S.1.2.* (1/1/86)
Weight units. ....	S.1.2.1. (1/1/89)
Designation of accuracy class.....	S.5.*
Value of graduated interval. ....	G-S.5.3.
Marked devices.....	UR.1.1.(a)
Unmarked devices. ....	UR.1.1.(b)(animal only)
Recording elements, General.....	G-S.5.6.
Recorded scale division. ....	UR.1.3. (1/1/86)
Tare division value, if equipped with a keyboard <sup>1</sup> . ....	S.2.3.(1/1/83)
Tare mechanism .....	S.2.3.(1/1/83)
Appropriateness.	
Indicating and recording elements. ....	G-S.5.
Parameters for Accuracy Class. ....	S.5.2.(1/1/86)
Selection.....	UR.1.
Initial zero-setting mechanism. ....	S.2.1.5.
Recommended minimum load. ....	UR.3.1.
Minimum load for weighing livestock .....	UR.3.8.

<sup>1</sup> Generally, tare is not considered appropriate on these scales. If the device is located in an auction market and is a ring scale, a tare capability may be considered appropriate.

**H-44 General Code and Scale Code References**

**Inspection (cont):**

**Marking (cont.)**

Maximum load.....	UR.3.2.
Manual gross weight entries.....	S.1.12.(1/1/05), G-S.8. (1/1/90), UR.3.9.(e)
Damping means.....	S.2.5., S.2.5.1.
Adjustable components.....	S.1.10.
Provisions for sealing.....	G-UR.4.5. S.1.11., (1/1/93)
 6. Design of weighing elements.....	 S.4.

**Pretest Determinations:**

1. Tolerances.	
Acceptance/maintenance.....	G-T.1., G-T.2.
Application.....	G-T.3., G-T.4., T.N.2.1., T.N.2.3.

Tolerance values:

Determine number of scale divisions (n) e division if scale is marked with an accuracy designation.

$$n = \frac{\text{scale capacity}}{\text{value of scale division}}$$

Maintenance tolerance.....	T.N.3.1./Table 6 (Class III L - Livestock) (Class III - Animal)
Acceptance tolerance.....	T.N.3.2.
Agreement of indications.....	T.N.4.
Repeatability.....	T.N.5.
Unmarked scales.....	T.1.1.
Discrimination.....	T.N.7.1.*
Substitution or Strain Tests (if necessary).....	T.N.3.11., T.N.3.12.
 2. Determine “used capacity.”	
For calculation in metric units:	
Multiply area of platform in square meters (length x width = area) by:	
540 kg for cattle, 340 kg for calves and hogs, and 240 kg for sheep.	
For calculation in U.S. customary units:	
Multiply area of platform in square feet (length x width = area) by: 110 lb	
for cattle, 70 lb for calves and hogs, and 50 lb for sheep.	
 3. Minimum test weights and test loads.....	 N.3./Table4

**Pretest Determinations (cont.)**

**SAFETY REMINDER**

- **Carefully inspect electrical supply lines for test equipment for wear or damage; correct potentially hazardous conditions before use; protect lines from damage during use.**

**Test Notes:**

**SAFETY REMINDER**

- **Wear appropriate personal protection equipment such as safety shoes to prevent possible injury from falling weights and slipping on slick surfaces and a hard hat to prevent injury from overhead hazards.**

1. Check repeatability of, and agreement between, indications throughout test..... G-S.5.2.2.(b), T.N.5.
2. Recheck zero-load balance each time test load is removed..... N.1.9., G-UR.4.2.
3. If the scale is equipped with printer, print ticket at each test load..... G-S.5.6., UR.1.3.  
(1/1/86)

Also verify that any options for obtaining a recorded representation are appropriate. The customer may be given the option of not receiving the recorded representation. If the system is equipped with the capability, the customer may also be given the option of receiving the recorded representation electronically in lieu of or in addition to a hard copy. .... G-S.5.6.

**Test:**

**SAFETY REMINDER**

- **WEAR SAFETY SHOES!**
- **USE PROPER LIFTING TECHNIQUES!**

1. Discrimination test at zero load (dials and balance indicators only). .... N.1.5.(1/1/86)
2. Increasing-load test.  
Test to used capacity with the test load distributed. .... N.1.1.

**Test (cont.):**

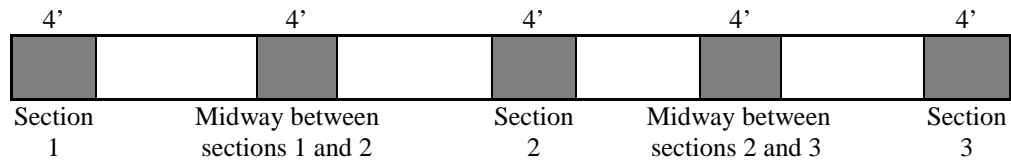
- 3. Shift test. (May be conducted during increasing-load test).  
Vehicle Scales, Axle-Load Scales, and Livestock Scales..... N.1.3.3.

Vehicle Scales, Axle-Load Scales, and Combination Vehicle/Livestock Scales..... N.1.3.3.1.

Minimum Shift Test. At least one shift test shall be conducted with a minimum test load of 12.5 % of scale capacity, which may be performed anywhere on the load-receiving element using the prescribed test patterns and maximum test loads specified below.

Combination Vehicle/Livestock Scales shall also be tested consistent with N.1.3.3.2. Prescribed Test Pattern and Test Loads for Livestock Scales with More Than Two Sections and Combination Vehicle/Livestock Scales.)

Prescribed Test Pattern and Loading for Vehicle Scales, Axle-Load Scales, and Combination Vehicle/Livestock Scales. – The normal prescribed test pattern shall be an area of 1.2 m (4 ft) in length and 3.0 m (10 ft) in width or the width of the scale platform, whichever is less. Multiple test patterns may be utilized when loaded in accordance with Paragraph (c), (d), or (e) as applicable. An example of a possible test pattern is shown in the following diagram.



Loading Precautions for Vehicle Scales, Axle-Load Scales, and Combination Vehicle/Livestock Scales. – When loading the scale for testing, one side of the test pattern shall be loaded to no more than half of the concentrated load capacity or test load before loading the other side.

- To test to the nominal capacity, multiple patterns may be simultaneously loaded in a manner consistent with the method of use. .... N.1.3.3.2.

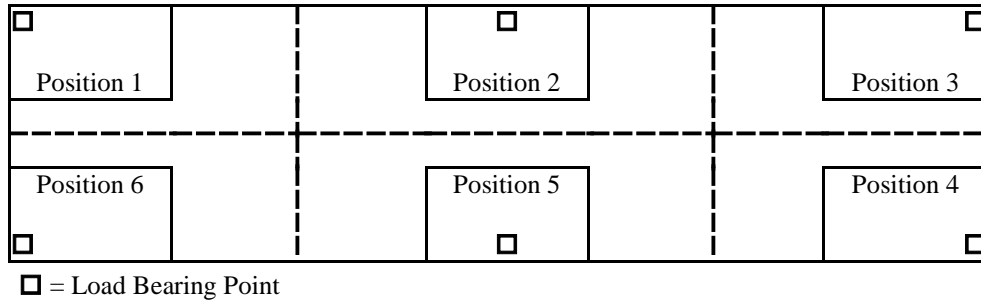
Special design scales and those that are wider than 3.7 m (12 ft) shall be tested in a manner consistent with the method of use but following the principles described above.

Prescribed Test Pattern and Test Loads for Livestock Scales with More Than Two Sections and Combination Vehicle/Livestock Scales..... N.1.3.3.1.

A minimum test load of 5000 kg (10 000 lb) or one-half of the rated section capacity, whichever is less, shall be placed, as nearly as possible, successively over each main load support as shown in the diagram below.

**H-44 General Code and Scale Code References**

**Test (cont.)**

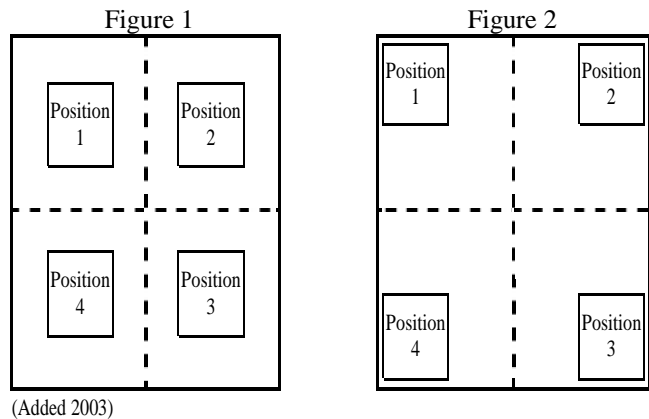


Two-section livestock scales. .... N.1.3.3.3., N.1.3.7.

A shift test shall be conducted using the following prescribed test loads and test patterns, provided the shift test load does not exceed one-half the rated section capacity or one-half the rated concentrated load capacity whichever is applicable, using either:

A one-half nominal capacity test load centered as nearly as possible, successively at the center of each quarter of the load-receiving element as shown in N.1.3.7. All Other Scales Except Crane Scales, Hanging Scales, Hopper Scales, Wheel-Load Weighers, and Portable Axle-Load Weighers Figure 1 (below); or

A one-quarter nominal capacity test load centered as nearly as possible, successively over each main load support as shown in N.1.3.7. All Other Scales Except Crane Scales, Hanging Scales, Hopper Scales, Wheel-Load Weighers, and Portable Axle-Load Weighers Figure 2 as shown in the following diagram:



**H-44 General Code and  
Scale Code References**

**Test (cont.)**

Animal Scales..... N.1.3.7.

For scales with a nominal capacity of 500 kg (1000 lb) or less, a shift test shall be conducted using a one-third nominal capacity test load (defined as test weights in amounts of at least 30 % of scale capacity, but not to exceed 35 % of scale capacity) centered as nearly as possible at the center of each quadrant of the load-receiving element using the prescribed test pattern as shown in Figure 1 (as shown above under Two-section livestock scales).

For scales with a nominal capacity greater than 500 kg (1000 lb), a shift test may be conducted by either using a one-third nominal capacity test load (defined as test weights in amounts of at least 30 % of scale capacity, but not to exceed 35 % of scale capacity) centered as nearly as possible at the center of each quadrant of the load-receiving element using the prescribed test pattern as shown in Figure 1, or by using a one-quarter nominal capacity test load centered as nearly as possible, successively, over each corner of the load-receiving element using the prescribed test pattern as shown in Figure 2 (as shown above under Two-section livestock scales).

- 4. Time Dependence Test..... T.N.4.5.Class III  
(Animal Scales)  
T.N.4.5.1.Class III L  
(Livestock scales)
- 5. Discrimination test at maximum test load. .... T.N.4.5.2.
- 6. Decreasing-load test at one-half of maximum test load..... N.1.5.
- 7. Remove all test weights and determine any zero-load balance change. .... N.1.2.
- 8. Remove error weights and establish correct zero-load balance..... N.1.9., G-UR.4.2.

**2015 NIST EPO No. 12**  
**Examination Procedure Outline for**  
**Livestock and Animal Scales**  
**Part 2 – Mechanical/Analog Indicating**

It is recommended that this outline be followed for livestock and animal scales equipped with weighbeams or dials. Requirements that apply only to scales marked with an accuracy class are indicated with an asterisk. Nonretroactive requirements are followed by the applicable date in parentheses.

**Safety Notes: See EPO 12, Part 1**

**H-44 General Code and  
Scale Code References**

**Inspection:**

**SAFETY REMINDER!!!**

- Check the inspection site carefully for safety hazards and take appropriate precautions.
- Use caution while moving in wet, slippery areas.
- Use personal protection equipment appropriate for the inspection site.
- Be sure that a first aid kit is available and that the kit is appropriate for the type of inspection activity.
- Be sure that a first aid kit is available and that the kit is appropriate for the type of inspection activity.

- |   |  |
|---|--|
| 1. Zero-load balance as found.....        | S.1.1., S.2.1.1., S.2.1.2.,<br>S.1.5.1., S.2.2., UR.4.1. |
| 2. General Considerations                 |  |
| Selection .....                           | G.S.3., G-UR.1.1, UR.1.                                  |
| Installation .....                        | G-UR.2.  |
| Supports for portable scale.....          | UR.2.1.  |
| Protection from environment.....          | UR.2.3.  |
| Foundation, supports, and clearance ..... | UR.2.4.  |
| Access to weighing elements. ....         | UR.2.5.  |
| Stock racks .....                         | UR.2.7.  |

**SAFETY REMINDER!!!**

- Check to be sure the scale supports are adequate to support the scale and test loads equal to the capacity of the scale!

**H-44 General Code and  
Scale Code References**

**Inspection (cont.):**

Maintenance, use, and environmental factors.	
Facilitation of fraud.....	G-S.2.
Environment.....	G-UR.1.2.
Operation.....	G-UR.3.1.
Maintenance.....	G-UR.4.
Maximum load.....	UR.3.2.
Minimum load for livestock.....	UR.3.8.
Scale modification.....	UR.4.3
Accessibility for inspection, testing, and sealing.....	G-UR.2.3.
Assistance.....	G-UR.4.4.
Position, customer readability.....	G-UR.3.3.
3. Marking.....	S.6.3., S.6.2., S.6.5., G-S.1.1.
a. Marking requirements - all devices	
Identification.....	G-S.1.
Name, initials, or trademark of manufacturer or distributor.....	Retroactive
Model identifier designation.....	Retroactive
Model prefix.....	(1/1/03)
Nonrepetitive serial number.....	(1/1/68)
Serial number prefix.....	(1/1/86)
NTEP CC prefix and number (for devices that have an NTEP CC).....	(1/1/03)
Remanufacturer information, as appropriate:	
name and ID of remanufacturer or distributor.....	(1/1/02)
model number if different from original model number.....	(1/1/02)
Lettering.....	G-S.7.
Operational controls, indications, and features.....	G-S.6. (1/1/77)
Visibility of identification.....	G-UR.2.1.1.
Interchange or reversal of parts.....	G-S.4.
b. Marking requirements - weighing and indicating elements in same housing or covered on the same CC (in addition to marking for all devices).....	S.6.3.
Accuracy class.....	(1/1/86)
Nominal capacity.....	(1/1/83)
Value of scale division with nominal capacity, if not apparent.....	(1/1/86)
Value of "e" (if different from "d").....	(1/1/86)
Temperature limits if narrower than and within – 10 °C to 40 °C (14 °F to 104 °F).....	(1/1/86)
Scales designed for special application.....	Retroactive
c. Marking requirements - indicating element not permanently attached or covered on separate CC (in addition to marking for all device).....	S.6.3.
Accuracy class.....	(1/1/86)
Nominal capacity.....	Retroactive
Value of scale division with nominal capacity, if not apparent.....	(1/1/83)
Value of "e" (if different from "d").....	(1/1/86)
Temperature limits if narrower than and within –10 °C to 40 °C (14 °F to 104 °F).....	(1/1/86)



**H-44 General Code and Scale Code References**

**Inspection (cont.):**

Scales designed for special application.....	(1/1/86)
Maximum number of scale divisions ( $n_{max}$ ).....	(1/1/88)
Concentrated Load Capacity (CLC) or Section Capacity. ....	S.6.5. (1/1/03) Table S.6.3.(a)(b)
d. Marking requirements - weighing and load-receiving element not permanently attached or covered on separate CC (in addition to marking for all devices).....	S.6.3.
Accuracy class. ....	(1/1/86)
Nominal capacity. ....	Retroactive
Nominal capacity on load-receiving element.....	(1/1/89) (livestock only)
Concentrated Load Capacity (CLC) or Section Capacity. ....	S.6.5. (1/1/03)
Temperature limits if narrower than and within $-10\text{ }^{\circ}\text{C}$ to $40\text{ }^{\circ}\text{C}$ ( $14\text{ }^{\circ}\text{F}$ to $104\text{ }^{\circ}\text{F}$ ).	Table S.6.3.(a)(b)
Scales designed for special application.....	(1/1/86)
Maximum number of scale divisions ( $n_{max}$ ).....	(1/1/86)
Minimum verification scale division for which device complies with the requirements ( $e_{min}$ or d).....	(1/1/88)
4. Indicating and Recording Elements	
Value of Scale Division.....	S.1.2.* (1/1/86)
Designation of accuracy class.....	S.5.*; UR.1.1.
Weighbeams.....	S.1.5. except S.1.5.5.
Poises.....	S.1.6.
Dials and balance indicators. <sup>1</sup> .....	S.1.3., S.1.4.
Damping means.....	S.2.5.
Appropriateness.	
Indicating and recording elements.....	G.S.5. except G-S.5.2.2.
Parameters for Accuracy Class.....	S.5.2.(1/1/86)*
Selection.....	UR.1.1.
Suitability.....	G-UR.1.1.
Recommended minimum load.....	UR.3.8
Maximum load.....	UR.3.2.
Adjustable components.....	S.1.10.
5. Design of weighing elements.....	S.4.

**Pretest Determinations:**

1. Tolerances.	
Acceptance/maintenance.....	G-T.1., G-T.2.
Application.....	G-T.3., G-T.4., T.N.2.1., T.N.2.3.
Ratio tests.....	T.N.2.5.

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<sup>1</sup> A balance indicator with graduations having specific values shall be considered a dial.

**H-44 General Code and Scale Code References**

**Pretest Determinations (cont.):**

Tolerance values:

Determine number of scale divisions (n) e division if scale is marked with an accuracy designation.

$$n = \frac{\text{scale capacity}}{\text{value of scale division}}$$

Maintenance tolerance.....	N.3.1./Table 6 (Class III L - Livestock) (Class III - Animal)
Acceptance tolerance.....	T.N.3.2.
Agreement of indications.....	T.N.4.
Repeatability.....	T.N.5.
Unmarked scales.....	T.1.1.
Repeatability.....	T.N.5.
Discrimination.....	T.N.7.1.*
 Sensitivity:	
Marked scales.....	T.N.6.1.(a), T.N.6.2.
Unmarked scales.....	T.2.1.,T.2.7., T.3.(a) or (c)
Substitution or Strain Tests (if necessary).....	T.N.3.11., T.N.3.12.

2. Determine “used capacity.”

For calculation in metric units:

Multiply area of platform in square meters (length x width = area) by: 540 kg for cattle, 340 kg for calves and hogs, and 240 kg for sheep.

For calculation in inch pound units:

Multiply area of platform in square feet (length × width = area) by: 110 lb for cattle, 70 lb for calves and hogs, and 50 lb for sheep.

3. Minimum test weights and test loads. .... N.3./Table 4

**SAFETY REMINDER!!!**

– **Carefully inspect electrical supply lines for test equipment for wear or damage; correct potentially hazardous conditions before use; protect lines from damage during use.**

**Test Notes:**

**SAFETY REMINDER!!!**

– **Wear appropriate personal protection equipment such as safety shoes to prevent possible injury from falling weights and slipping on slick surfaces and a hard hat to prevent injury from overhead hazards.**

1. For beam scales, balance small error weights on platform, the smallest weight equal to the minimum tolerance applicable, and the total value of the weights equal to the tolerance at maximum test load.
2. Check repeatability of, and agreement between, indications throughout test..... G-S.5.2.2.(b), T.N.5.
3. Recheck zero-load balance each time test load is removed..... N.1.9., G-UR.4.2.
4. If the scale is equipped with a type-registering (TR) beam or printer, print ticket at each test load. .... G-S.5.6., UR.1.3.(1/1/86)

**Test:**

**SAFETY REMINDER!!!**

– **WEAR SAFETY SHOES!**

– **USE PROPER LIFTING TECHNIQUES!**

1. Sensitivity test at zero load (for weighbeams only)..... N.1.4.  
Discrimination test at zero load (dials and balance indicators only). .... N.1.5.(1/1/86)
2. Increasing-load test.  
Test to used capacity with the test load distributed. .... N.1.1.
  - a. For beam scales, the minimum test includes testing at half and full capacity on fractional beam, 100 lb increments to 1000 lb, and three other points on main weighbeam, including used capacity.  
  
Scales not equipped with a full capacity beam should be ratio tested using standard weights on counterpoise hanger. At each test load, test scale counterpoise weights by substituting them for standard counterpoise weights. If there is any noticeable change in the indication, remove the scale weight from service until it can be determined that it meets requirements in the Weight Code of NIST Handbook 44.  
  
Ratio Test ..... N.1.7.

**H-44 General Code and  
Scale Code References**

**Test (cont.)**

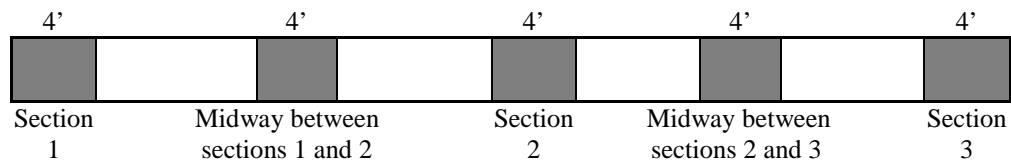
When ratio testing, test poise and beam by the removal of standard weights from the counterpoise hanger

- b. Dial scales. Test at 100 lb increments to 1000 lb and at each quarter of dial capacity. Test all unit or drop weights normally used.
3. Shift test. (May be conducted during increasing-load test).
- Vehicle Scales, Axle-Load Scales, and Livestock Scales..... N.1.3.3.
  - Vehicle Scales, Axle-Load Scales, and Combination Vehicle/Livestock Scales. .... N.1.3.3.1.

Minimum Shift Test. At least one shift test shall be conducted with a minimum test load of 12.5 % of scale capacity, which may be performed anywhere on the load-receiving element using the prescribed test patterns and maximum test loads specified below.

Combination Vehicle/Livestock Scales shall also be tested consistent with N.1.3.3.2. Prescribed Test Pattern and Test Loads for Livestock Scales with More Than Two Sections and Combination Vehicle/Livestock Scales.

Prescribed Test Pattern and Loading for Vehicle Scales, Axle-Load Scales, and Combination Vehicle/Livestock Scales. - The normal prescribed test pattern shall be an area of 1.2 m (4 ft) in length and 3.0 m (10 ft) in width or the width of the scale platform, whichever is less. Multiple test patterns may be utilized when loaded in accordance with Paragraph (c), (d), or (e) as applicable. An example of a possible test pattern is shown in the following diagram.



Loading Precautions for Vehicle Scales, Axle-Load Scales, and Combination Vehicle/Livestock Scales. When loading the scale for testing, one side of the test pattern shall be loaded to no more than half of the concentrated load capacity or test load before loading the other side.

To test to the nominal capacity, multiple patterns may be simultaneously loaded in a manner consistent with the method of use. .... N.1.3.3.2.

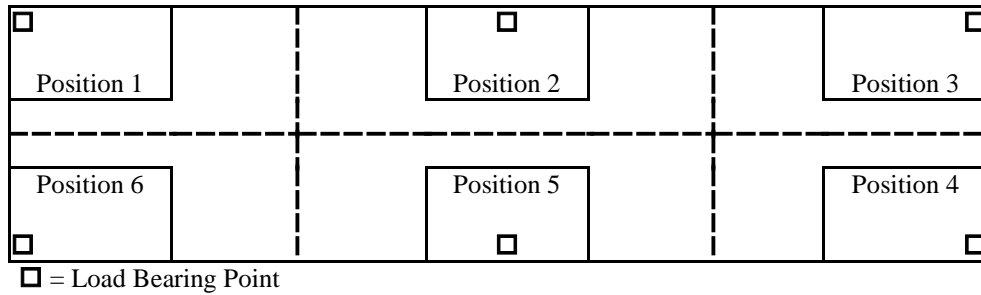
Special design scales and those that are wider than 3.7 m (12 ft) shall be tested in a manner consistent with the method of use but following the principles described above.

Prescribed Test Pattern and Test Loads for Livestock Scales with More Than Two Sections and Combination Vehicle/Livestock Scales..... N.1.3.3.1.

**H-44 General Code and Scale Code References**

**Test (cont.)**

A minimum test load of 5000 kg (10 000 lb) or one-half of the rated section capacity, whichever is less, shall be placed, as nearly as possible, successively over each main load support as shown in the diagram below.

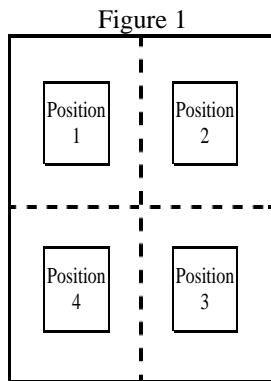


Two-section livestock scales. .... N.1.3.3.3., N.1.3.7.

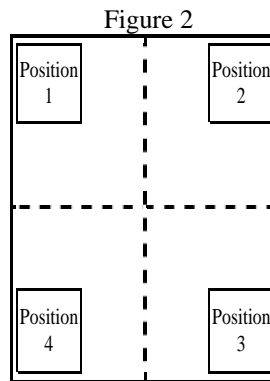
A shift test shall be conducted using the following prescribed test loads and test patterns, provided the shift test load does not exceed one-half the rated section capacity or one-half the rated concentrated load capacity whichever is applicable, using either:

A one-half nominal capacity test load centered as nearly as possible, successively at the center of each quarter of the load-receiving element as shown in N.1.3.7. All Other Scales Except Crane Scales, Hanging Scales, Hopper Scales, Wheel-Load Weighers, and Portable Axle-Load Weighers Figure 1 (below); or

A one-quarter nominal capacity test load centered as nearly as possible, successively over each main load support as shown in N.1.3.7. All Other Scales Except Crane Scales, Hanging Scales, Hopper Scales, Wheel-Load Weighers, and Portable Axle-Load Weighers Figure 2 as follows:



(Added 2003)



**H-44 General Code and  
Scale Code References**

**Tests (cont.)**

Animal Scales..... N.1.3.7.

For scales with a nominal capacity of 500 kg (1000 lb) or less, a shift test shall be conducted using a one-third nominal capacity test load (defined as test weights in amounts of at least 30 % of scale capacity, but not to exceed 35 % of scale capacity) centered as nearly as possible at the center of each quadrant of the load-receiving element using the prescribed test pattern as shown in Figure 1 (as shown above under Two-section livestock scales).

For scales with a nominal capacity greater than 500 kg (1000 lb), a shift test may be conducted by either using a one-third nominal capacity test load (defined as test weights in amounts of at least 30 % of scale capacity, but not to exceed 35 % of scale capacity) centered as nearly as possible at the center of each quadrant of the load-receiving element using the prescribed test pattern as shown in Figure 1, or by using a one-quarter nominal capacity test load centered as nearly as possible, successively, over each corner of the load-receiving element using the prescribed test pattern as shown in Figure 2 (as shown above under Two-section livestock scales).

- 4. Time Dependence Test (Non-Automatic Weighing Instruments) ..... T.N.4.5.Class III  
 (Animal Scales)  
 T.N.4.5.1.Class III L  
 (Livestock scales)  
 T.N.4.5.2.
  
- 5. Sensitivity test at maximum test load (weighbeams and balance indicators only) ..... N.1.4.  
 Discrimination test at maximum test load (dials and balance indicators only) ..... N.1.5.
  
- 6. Decreasing-load test (dials only) at one-half of maximum test load (at no less than  
 one-half dial face capacity) ..... N.1.2.
  
- 7. Remove all test weights and determine any zero-load balance change. .... N.1.9., G-UR.4.2.
  
- 8. Remove error weights and establish correct zero-load balance.