

2015 NIST EPO No. 12

Examination Procedure Outline for

Part 1 – Livestock and Animal Scales – Electronic Digital Indicating

Part 1 – Electronic Digital Indicating1
Part 2– Mechanical – Analog Indicating11

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)

Inspection (cont.):

Marking (cont.)

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)

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 ¹	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.

¹ 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.

H-44 General Code and Scale Code References

Test (cont.):

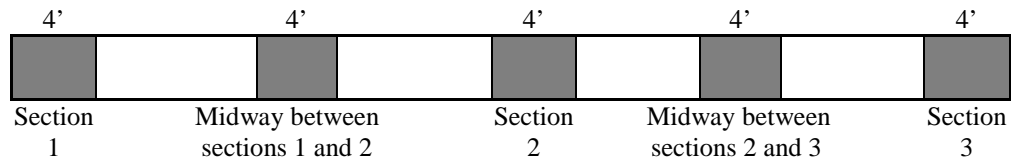
3. Shift test. (May be conducted during increasing-load test).
 Vehicle Scales, Axle-Load Scales, and Livestock Scales..... N.1.3.3.

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.

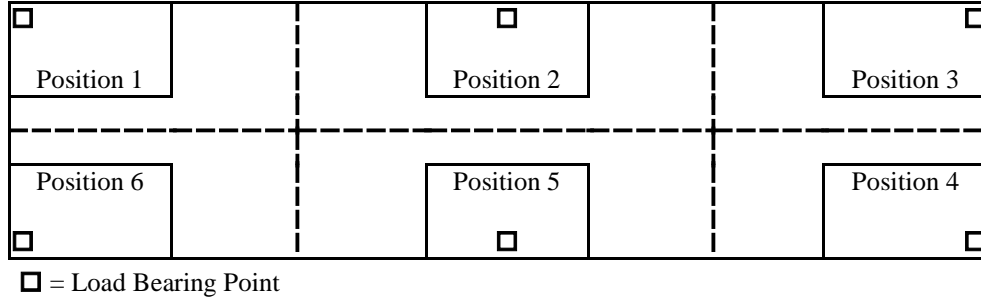
Special design scales and those that are wider than 3.7 m (12 ft) shall be tested in a manner consistent with the method of use but following the principles described above.

- 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.)

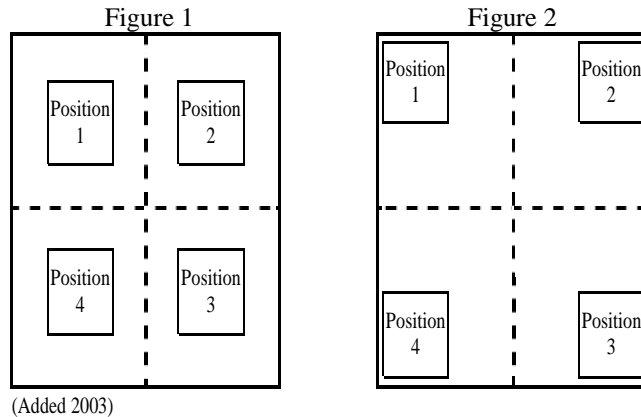


Two-section livestock scales. N.1.3.3.3., N.1.3.7.

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:



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.

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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.,
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. ¹	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.

¹ 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.)

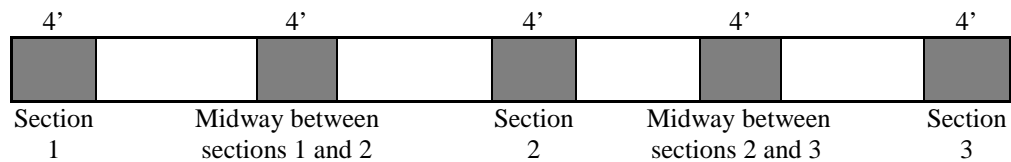
When ratio testing, test poise and beam by the removal of standard weights from the counterpoise hanger

- 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.

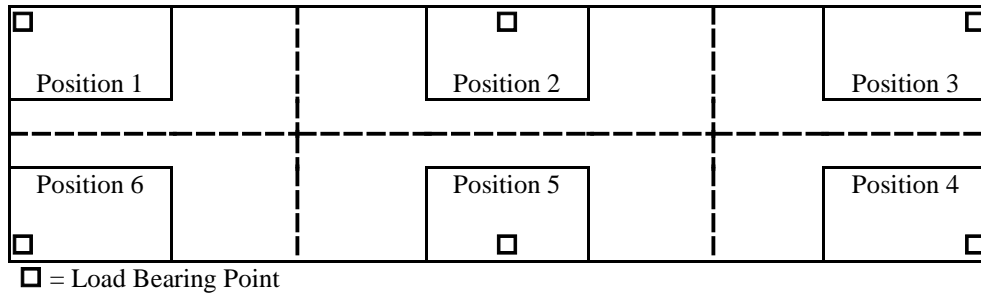
Special design scales and those that are wider than 3.7 m (12 ft) shall be tested in a manner consistent with the method of use but following the principles described above.

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.

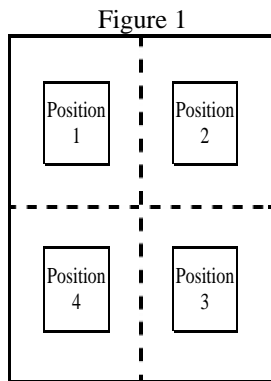


Two-section livestock scales. N.1.3.3.3., N.1.3.7.

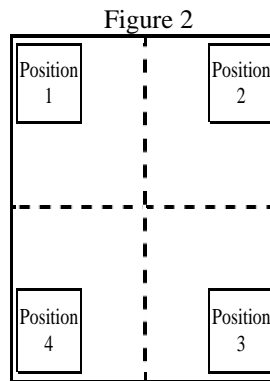
A shift test shall be conducted using the following prescribed test loads and test patterns, provided the shift test load does not exceed one-half the rated section capacity or one-half the rated concentrated load capacity whichever is applicable, using either:

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.