EPO No. 12

Examination Procedure Outline for

Livestock and Animal Scales
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

When excerpting this Examination Procedure Outline for duplication, the "Safety Considerations" section and the "Glossary of Safety Key Phrases" should be duplicated and included with the outline.

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. The inspector should read and be familiar with the introductory section on safety found at the beginning of this publication. As a minimum, the following safety precautions should be noted and followed during the inspection. Definitions of each reminder are found in the "Glossary of Safety Key Phrases" at the back of this publication.

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 to 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.

Clothing

Electrical Hazards

First Aid Kit

Lifting

Location

also: **Wet/Slick Conditions**
Overhead Hazards, Obstructions

Personal Protection Equipment
e.g., Safety Shoes
Hard Hat

Safety Cones/Warning Signs

Support – for Scale and Test Weights

Transportation of Equipment

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Inspection:

Safety First!!!

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.

Position safety cones and warning signs if necessary.

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 References

1. Zero-load balance as found ..... S.1.1., S.2.1.1., S.2.1.2., S.1.5.1., 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.

Check to be sure the scale supports are adequate to support the scale <u>and</u> test weights equal to the capacity of the scale !

   - Accessibility for inspection, testing, and sealing ..... G-UR.2.3.
   - Assistance ..... G-UR.4.4.
   - Position, customer readability ..... G-UR.3.3.
   - 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.

3. Marking S.6.3., S.6.2
   - Nominal capacity ..... S.6.1. (1/1/86) (livestock only)
     Nominal capacity must satisfy the relationship of:
     nominal capacity ≤ CLC x (N - 0.5), where N = the number of sections in the scale

Inspection (cont.):

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a. Marking requirements - all devices
- Identification ..... G-S.1.
  - Name or ID of manufacturer ..... Retroactive
  - Model 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 ..... (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 other than -10 ^{0}C to 40 ^{0}C (14 ^{0}F to 104 ^{0}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 other than -10 ^{0}C to 40 ^{0}C (14 ^{0}F to 104 ^{0}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 - 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) on the load-receiving element (for scales manufactured prior to 1989, the Section Capacity may be used as the CLC; except that, the CLC marking must be added at the time of modification to any scale not previously marked) ..... (1/1/89) (livestock only)

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Inspection (cont.):

Marking requirements (cont.) - weighing and load receiving element not permanently attached or covered on separate CC (in addition to marking for all devices) ..... S.6.3.
- Temperature limits if other than –10 ^{0}C to 40 ^{0}C (14 ^{0}F to 104 ^{0}F) ..... (1/1/86)
- Scales designed for special purposes ..... (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. 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. except S.2.5.1. and S.2.5.2.

   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.3.1.*
   - 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.

   Tolerance values: Scale capacity
   - Determine number of scale divisions (n) ..... n = Value of scale division if scale is marked with an accuracy designation.
     - Maintenance tolerance T.N.3.1./Table 6
     - 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.*

Pretest Determinations (cont.):

[1] A balance indicator with graduations having specific values shall be considered a dial.

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Tolerances (cont).
Sensitivity:
Marked scales ..... T.N.6.1.(a), T.N.6.2.
Unmarked scales ..... T.2.1., T.2.7., T.3.1.(a) or (c)

2. Determine "used capacity."
For calculation in metric units:
Multiply area of platform in square meters (length x width = area) by: 540 kilograms for cattle, 340 kilograms for calves and hogs, and 240 kilograms for sheep.

For calculation in inch pound units:
Multiply area of platform in square feet (length x width = area) by: 110 pounds for cattle, 70 pounds for calves and hogs, and 50 pounds for sheep.

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

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:

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:

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)

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Test (cont.):

2. Increasing-load test.
   Test to used capacity with the test load distributed ..... N.1.1.
   a. Beam scales. At a minimum, test at half and full capacity on fractional beam, 100-pound increments to 1000 pounds, 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.

      When ratio testing, test poise and beam by the removal of standard weights from the counterpoise hanger ..... N.1.7.

   b. Dial scales. Test at 100-pound increments to 1000 pounds and at each quarter of dial capacity. Test all unit or drop weights normally used.

3. Shift test. Can be conducted during increasing-load test.
   Livestock scale with more than two sections ..... N.1.3.4.

   For Livestock scales with more than two sections, conduct at least one shift test with a Minimum test load of 12.5 percent of scale capacity anywhere on the load-receiving element using the prescribed test patterns and maximum test loads specified below

   Prescribe test pattern: An area of 1.2 meters (4 feet) in length and 3.0 meters (10 feet) in width or the width of the scale platform, whichever is less, shall be loaded to no more than half of the concentrated load capacity before loading the other side.

   For test patterns less than 1.2 meters (4 feet) in length, determine the maximum loading by the formula [(wheel base of test cart or length of test load divided by 48 in) x 0.9 x CLC].

   For test patterns that exceeds 1.2 meters (4 feet), the maximum test load applied shall not exceed CLC x the largest r factor in table UR.3.2.1.

   For weighing elements installed prior to January 1, 1989, the rated section capacity may be substituted for concentrated load capacity to determine maximum loading.

   Multiple pattern loading: To test to the nominal capacity, multiple patterns may be simultaneously loaded in a manner consistent with the method of use.

   Other designs: Special design scales and those that are wider than 3.7 meters (12 feet) shall be tested in a manner consistent with the method of use, but following the principles described above.

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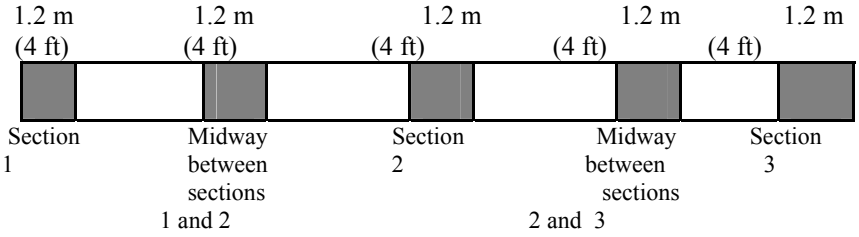
Test (cont.):



Test load: The maximum test load applied to the prescribed test pattern shall not exceed the concentrated load capacity (or for scales manufactured prior to January 1, 1989, the rated section capacity).

Note: When testing scales manufactured prior to January 1, 1989, caution should be exercised when loading test weights equivalent to the rated section capacity onto areas between sections.

Note: When loading the first section to be tested, it is recommended that observations be made at each increment of test weight application.

Note: 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.

Two-section livestock scales and animal scales ..... N.1.3.8.

4. 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.

5. Decreasing-load test (dials only) at one-half of maximum test load (at no less than one-half dial face capacity)..... N.1.2.

6. Remove all test weights and determine any zero-load balance change ..... N.1.9., G-UR.4.2.

7. Remove error weights and establish correct zero-load balance.