

Examination Procedure Outline for Electronic Computing Scales

It is recommended that this outline be followed for electronic digital indicating computing and prepackaging 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 *****

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Many policies and regulations will vary from jurisdiction to jurisdiction. It is essential that the inspector or serviceperson be aware of all safety regulations and policies in place at the inspection site and to practice the safety policies established by the inspector's or serviceperson's employer. The safety reminders included in this EPO contain general guidelines for safety. These guidelines are useful in alerting inspectors and servicepersons to the importance of taking adequate precautions to avoid personal injuries. These guidelines can only be effective in mitigating safety hazards if inspectors and servicepersons receive training in hazard recognition and controls.

- * **Electrical Hazards**
- * **First Aid Kit**
- * **Lifting**
- * **Location**
 - also: **Wet/Slick Conditions**
 - Chemicals, Petroleum Products, and Hazardous Materials**
 - Obstructions**
- * **Personal Protection Equipment**
 - e.g. **Safety Shoes**
- * **Support** -- for Scale and Test Weights
- * **Transportation of Equipment**

EPO No. 1-E

Inspection:

- *****

- 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 References

1. Zero-load balance as found. Do not adjust. For pre-pack scale, check to determine if tare is being taken. S.1.1., UR.4.1., S.2.1.1., S.2.1.2., G-S.5.2.2.(d) (1/1/86)
2. Support for scale G-UR.2.1., UR.2.1.
- *****

- Check to be sure the scale supports are adequate to support the scale and test weights equal to the capacity of the scale !**
- *****
3. Level condition S.2.4., UR.4.2.
If the device is out of level and/or not in a zero-balance condition (except pre-packaging scales), the user should be made aware of paragraphs UR.4.1. and UR.4.2. and a warning issued if necessary. Before proceeding with the test, these conditions must be corrected.
4. Indicating and recording elements.
Value of Scale Division S.1.2. (1/1/86), S.1.2.1 (1/1/89), UR.1., UR.1.1.(b), G-S.5.3.
Prepackaging scales only S.1.9.1.
Value of Tare Division S.2.3. (1/1/83)
Tare Mechanism S.2.3.
Appropriateness G-S.5., S.5.2.* (1/1/86), UR.1.1.(a)*, UR.3.1.*, UR.3.2.
Customer Readability S.1.8.3., G-UR.3.3.
Damping Means S.2.5.
Marking G-S.7., G-S.1., G-S.6. (1/1/77), G-UR.2.1.1., S.6. (Tables a & b)

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Inspection: (cont)

Adjustable Components	S.1.10.
Provisions for Sealing	S.1.11. (1/1/90), G-UR.4.5.
5. Weighing elements	S.4.1., S.4.2., S.4.3.
Drainage, if wet commodities are weighed	S.3.2., UR.3.6.
Marking	S.6.2., S.6.3. (Tables A & B)
6. Maintenance, use, and environmental factors (cleanliness, obstructions, modifications, etc.).	G-S.2., G-UR.1.2., G-UR.3.1., G-UR.3.2., UR.3.5., G-UR.4., UR.2.3., UR.4.3.

Pretest Determinations:

Tolerances.

1. Acceptance/maintenance	G-T.1., G-T.2.
2. Application/intermediate values	G-T.3., G-T.4.
3. Tolerance values:	
Determine number of scale divisions	<u>Scale Capacity</u> (n)
	n = Value of scale division
If scale is marked with an Accuracy Designation	T.N.2.1., T.N.2.3., T.N.2.4., T.N.3.1., Table 6 (Class III column), T.N.3.2., T.N.4.4., T.N.5.
If scale is unmarked but n equals 5,000 or less	T.1.1., T.N.2.1., T.N.2.3., T.N.2.4., T.N.3.1./Table 6, (Class III column) T.N.3.2., T.N.5.
Discrimination	T.N.7.2.

Test Notes:

1. Check repeatability of, and agreement between, indications throughout test.	G-S.5.2.2.(a), T.N.5.
2. Recheck zero-load balance each time test load is removed.	N.1.9., G-UR.4.2.

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Test Notes: (cont.)

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|----|---|--|
| 3. | If scale is equipped with a printer, print ticket or label at each test load. Check effectiveness of motion detection, and check labels and weight and money value agreement. | Type Evaluation Handbook
References: G-S.5.6.,
Tests, Motion Detection

G-S.5.5., G-S.5.6., S.2.5.1.(b),
S.1.8.4., S.1.9.2. (prepackaging
scales only) |
| 4. | 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. | Type Evaluation Handbook
References: Guidelines -
Use of Error Weights

N.1.5., N.1.5.1., S.1.1.1. |
| 5. | If the device is equipped with operational features such as programmable tare and/or unit prices, multiplier keys, sales latin, manual weight entries, price retention, or two scales with one printer, check proper operation and appropriateness. | Type Evaluation Handbook |

Test:

WEAR SAFETY SHOES !
USE PROPER LIFTING TECHNIQUES !

- | | | |
|----|--|--|
| 1. | Increasing-load test ¹ (with the load centered) at minimum load (20 d), .50 pounds; then at each pound to 5 pounds; at 5-pound intervals thereafter to one-half scale capacity (include 500 d, 2000 d, and 4000 d). | N.1.1., Table 6/T.N.3.2.
or Table 5 |
| 2. | Shift test--one-half capacity load. | N.1.3.1., Table 6/T.N.3.2.,
T.N.4.4.* |
| 3. | Continue increasing-load test--at 5-pound intervals to capacity. | |

¹For scales that are not marked with an accuracy classification and have less than 1000 scale divisions, use the following procedure: begin test at 20 d then test at 0.50 pound and at each pound to capacity, including 1/4, 1/2, and 3/4 capacity.

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Test: (cont.)

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|-----|---|---|
| 4. | RFI/EMI tests (if a problem is suspected)
--at capacity. | Type Evaluation Handbook
G-UR.1.2., G-N.2., G-UR.3.2.,
G-UR.4.2., N.1.6., T.4., T.N.9.* |
| 5. | Test for over-capacity indication. | S.1.7., S.2.1.5. |
| 6. | Decreasing-load test--for scales marked
with an accuracy class and having 1000
or more scale divisions, test at 4000 d,
2000 d, and 500 d. If n is less than
1000, or if scale is not marked, test at
one-half scale capacity. | N.1.2., N.1.2.1., or N.1.2.2.,
Table 6/T.N.3.2. |
| 7. | Test for discrimination (if a problem
is suspected) at capacity. | N.1.5., N.1.5.1., T.N.7.2. |
| 8. | Recheck zero-load balance. | |
| 9. | Test for proper design of automatic zero-
setting mechanism, if scale is so equipped. | S.2.1.3.(a) (1/1/81) |
| 10. | Check proper design of tare auto-clear,
if scale is so equipped. | S.2.3. including note (1/1/83) |
| 11. | If scale is equipped with a semi-
automatic zero-setting mechanism, test
effectiveness of motion detection. | S.2.1.2.(b) |
| 12. | Establish correct zero-load balance. | |

EPO No. 13
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Examination Procedure Outline for

Vehicle and Axle-Load Scales
Mechanical - Analog Indicating
(Weighbeams and Dials)

It is recommended that this outline be followed for vehicle and axle-load scales equipped with weighbeams and/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.

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Many policies and regulations will vary from jurisdiction to jurisdiction. It is essential that the inspector or serviceperson be aware of all safety regulations and policies in place at the inspection site and to practice the safety policies established by the inspector's or serviceperson's employer. The safety reminders included in this EPO contain general guidelines for safety. These guidelines are useful in alerting inspectors and servicepersons to the importance of taking adequate precautions to avoid personal injuries. These guidelines can only be effective in mitigating safety hazards if inspectors and servicepersons receive training in hazard recognition and controls.

- * **Clothing**
- * **First Aid Kit**
- * **Electrical Hazards**
- * **Lifting**
- * **Location**
. also: **Wet/Slick Conditions**
. **Chemicals, Petroleum Products, and Hazardous Materials**
- **Overhead Hazards**
. **Obstructions**
- * **Personal Protection Equipment**
. e.g. **Safety Shoes**
. **Hard Hat --** for protection from overhead hazards
- * **Safety Cones/Warning Signs**
- * **Support --** for scale, test weights, and test equipment

EPO No. 13

Safety Notes: (cont.)

* **Transportation of Equipment**

Inspection:

***** **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 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.
If the device is not in balance, the user should be made aware of paragraph UR.4.1. and a warning issued if necessary. S.1.1., S.2.1.1., S.2.1.2., S.1.5.1., UR.4.1.
- 2. Marking
 - Indicating and recording elements. G-S.1., G.S.6(1/1/77), G.S.7., G-UR.2.1.1., S.6.1.(1/1/89), S.6.3.
 - Weighing and load-receiving elements S.6.1.(1/1/89), S.6.2., S.6.3.
- 3. Indicating and recording elements.
 - Scale division, value (d) and number(n) S.1.2.*,S.5.*,UR.1.,UR.1.1.(b)
 - Tare division value S.2.3. (1/1/83)
 - Tare mechanism S.2.3.
 - Appropriateness of design
 - General G-S.5.

EPO No. 13

Inspection: (cont.)

3. Indicating and recording elements (cont.)

Weighbeams	S.1.5. except S.1.5.5.
Poises	S.1.6.
Dials and balance indicators ¹	S.1.3., S.1.4., S.1.7.
Damping means	S.2.5.
Suitability	S.5.2. (1/1/86)*, UR.1.1.(a)*, UR.3.1.*, UR.3.2., UR.3.3.
Customer readability, if applicable	G-UR.3.3.
Adjustable components	S.1.10.

4. Weighing and load-receiving elements

Access	UR.2.5.
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5. Installation

G-UR.2., UR.2.3., UR.2.4.

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

6. Approaches

Vehicle scales	UR.2.6.1. (1/1/76)
Axle-load scales	UR.2.6.2.

6. Maintenance, use, and environmental factors.

G-S.2., G-UR.1.2., G-UR.3.1., G-UR.4.,
UR.3.2., UR.3.3., UR.3.7.,
UR.3.8., UR.4.3.

7. Assistance

G-UR.4.4.

Pretest Determinations:

1. Tolerances.

Acceptance/maintenance	G-T.1., G-T.2.
Application	T.N.2.1., T.N.2.3.
Tolerances values:	
Scales marked with an accuracy class	T.N.3.1./Table 6 (Class III L), T.N.3.2., T.N.4. (except T.N.4.5.), T.N.5.
Scales not marked with an accuracy class	T.1.1., T.N.3.1./Table 6 (Class III L), T.N.3.2., T.N.4. (except T.N.4.5.), T.N.5.
Discrimination	T.N.7.1.*
Sensitivity:	
Scales marked	T.N.6.1.(a), T.N.6.2.
Scales not marked	T.2.1., T.2.7., T.3.1.(a) or (c)

¹A balance indicator with graduations having a specific value shall be considered a dial.

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Pre-Test Determinations: (cont.)

- 2. Determine maximum test load to be applied during test: a test load not to exceed marked Concentrated Load Capacity (or for scales manufactured prior to January 1, 1989, the marked Section Capacity) may be applied to any section or between any two sections. A test load of 100 percent of capacity may be distributed over the entire platform.
- 3. Minimum test weights and test loads N.3.
(Note: The term "recommended" to be deleted 1/1/94.)

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. If beam scale, balance small error weights on the platform, the smallest weight equal to the minimum tolerance value and the total value of the weights being equal to the tolerance value at maximum test load.
- 2. Check repeatability of, and agreement between, indications throughout the test. T.N.5., G-S.5.2.2.(b)
- 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 (T.R.) beam or a printer, print ticket at each test load. G-S.5.6., UR.1.3. (1/1/86)*, G-S.5.2.2.(b)

EPO No. 13

Test:

***** WEAR SAFETY SHOES ! *****

***** USE PROPER LIFTING TECHNIQUES ! *****

- 1. Sensitivity test at zero load (for weighbeams and balance indicators only) N.1.4.
Discrimination (dials and balance indicators with graduations having a specific value only). N.1.5. (1/1/86)*
- 2. Increasing-load and shift (section) test. N.1.1.
 - a. If beam scale, test at not less than two points on each weighbeam.
 - b. If automatic-indicating scale, test at not less than three points on reading face, including all possible quarters of the reading-face capacity. Test all unit weights possible.
 - c. Use not less than two different loads successively distributed anywhere on the load-receiving element using the prescribed test patterns and maximum test loads specified below. N.1.3.4.

Test pattern: An area at least 4 feet long and a width equal to the width of one side of the test pattern shall be loaded to no more than one quarter of the concentrated load capacity before loading the other side.

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 12 feet shall be tested in a manner consistent with the method of use, but following the principles described above.

EPO No. 13

Test: (cont.)

2. Increasing-load and shift (section) 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 observations be made at each increment of test weight application.

3. Decreasing-load test (dials only), at one-half of maximum test load (at no less than one-half dial-face capacity). N.1.2., N.1.2.2.

4. Strain-load test on at least two sections N.1.1.

Position loaded vehicle on one end of scale; bring scale to balance by addition or removal of weights. Note this as reference point. Distribute test weights on other end of scale. Determine error using the reference point noted above. The tolerances are selected based upon the value of the test-weight load only.

5. Sensitivity test at maximum test load (weighbeams and balance indicators only). N.1.4.

Discrimination (dials and balance indicators with graduations having a specific value only). N.1.5. (1/1/86)*

6. Counterpoise-weight test, if device is so equipped. H-44 Weights Code

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

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

Examination Procedure Outline for

Retail Motor-Fuel Dispensers
Single Product

It is recommended that this outline be followed for conventional, single-product, power-operated retail dispensers-- "gasoline pumps," analog or digital, and consoles.

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- * Clothing
* Electrical Hazards -- Loose or exposed wiring
* Emergency Procedures
* Eye Protection
* Fire Extinguisher
* First Aid Kit
* Grounding
* Ignition Sources
* Lifting
* Location

..... also: Wet/Slick Conditions
..... Chemicals, Petroleum Products, and Hazardous
Materials
..... Obstructions

EPO No. 21

Safety Notes: (cont.)

* **Material Safety Data Sheets (MSDS)**

* **Nature of Product**

* **Personal Protection Equipment**

. e.g.

Safety Shoes

. Safety Aprons, Respirators, Gloves, Barrier

Cream, etc. if deemed necessary

* **Safety Cones/Warning Signs**

* **Static Discharge**

* **Switch Loading**

* **Traffic**

* **Transportation of Equipment**

Inspection:

***** **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 -- obtain and read copies of MSDS's** *****

***** **Know emergency procedures and location and operation of fire extinguisher and emergency shut-offs** *****

***** **Post safety cones/warning signs and be aware of vehicular and pedestrian traffic patterns** *****

***** **Use caution in moving in wet, slippery areas** *****

***** **Use personal protection equipment and clothing appropriate for the inspection site** *****

***** **Open both sides of dispenser to allow fumes to dissipate before proceeding with the inspection of the dispenser** *****

***** **If leaks, spills, or exposed wiring cause hazardous testing conditions it is recommended that the testing be discontinued until the unsafe conditions are corrected** *****

EPO No. 21

Inspection: (cont.)

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 Liquid-Measuring Devices Code References

- 1. Indicating and recording elements.
 - Design S.1.1.
 - Units S.1.2.1., S.1.2.3.
 - Readability G-S.5., G-S.6., G-S.7., S.1.4., S.1.5.
 - Values of intervals G-S.5.3.
 - Indication of delivery S.1.6.1.
 - Money-value divisions
 - Analog S.1.6.5.1.
 - Digital S.1.6.5.2.
 - Auxiliary indications S.1.6.5.3. (1/1/85)
 - Selection of unit price S.1.6.5.4. (1/1/91)
 - Money-value computations S.1.6.5.(a) (1/1/91)
 - Unit price and product identity S.1.6.4.1.(a), S.1.6.4.1.(b) (1/1/91),
 - Advancement and return to zero S.1.3., S.1.6.3., UR.3.1.
 - Provision for sealing G-S.8. (1/1/90), G-UR.4.5.

- 2. Measuring elements.
 - Air eliminator vent, if self-contained pump S.2.1.
 - Security seal on adjusting mechanism G-UR.4.5., S.2.2.

- 3. Discharge hose S.3.1., S.3.2., S.3.3., S.3.5., S.3.7., S.3.8., UR.1.1.

- 4. Marking G-S.1., S.4.1., G-UR.3.4., G-UR.2.1.1.

- 5. General considerations.
 - Selection G-UR.1.1.
 - Installation G-UR.2.1., G-UR.2.2., UR.2.1., UR.2.4.
 - Position G-UR.3.3.
 - Accessibility G-UR.2.3.
 - Assistance G-UR.4.4.
 - Use and maintenance G-UR.3.1., G-UR.4.1., UR.3.3.(1/1/90)

EPO No. 21

Pretest Determinations:

1. Tolerances.
 - Applicable requirements G-T., T.1.
 - Basic values T.2.1.
2. Product storage identification UR.2.5.

Test Notes:

Wear appropriate personal protection equipment such as petroleum-resistant, nonskid safety shoes (to prevent possible injury from spills or slipping on slick surfaces), protective clothing, and eye protection to prevent injury from splashed product

Do not leave an activated dispenser unattended !

1. If test measure is dry, add one cubic inch to gauge reading to allow for amount of liquid required to "wet" measure.
2. Allow 10-second drain period each time test measure is emptied.

Ground prover properly and only use a metal funnel when returning product to storage

3. To determine proper operation of totalizers, observe and record the totalizer indications before and after all test drafts.
4. After each test draft:
 - a. print ticket if device is so equipped G-S.5.6., UR.3.4.
 - b. check price computations on all indicators (including consoles) and on recorded representations.
 - digital equipment G-S.5.5.
 - analog equipment S.1.6.5.(b), N.4.3.2.
 - c. check all indicated and recorded values for proper comparability G-S.5.2.2., S.1.6.6.(a), S.1.6.6.(b) (1/1/88)

EPO No. 21

Test:

- ***** **Use proper lifting techniques when lifting prover !** *****
- ***** **Be aware of and attempt to eliminate potential ignition sources in or near the inspection site** *****
- ***** **Be aware of vehicular and pedestrian traffic when moving between dispenser and storage tanks** *****

1. Normal test--full flow, basic tolerance N.1., N.2., N.3.4., N.4.1., T.2.1.

At the beginning of the first delivery,
check for suppressed values. S.1.6.1.

If first test result is at or near the
tolerance limit, repeat this test.
2. Special test--slow flow, basic tolerance N.4.2., N.4.2.2., T.2.1.
3. RFI/EMI test (electronic equipment only) G-N.2., G-UR.3.2., G-UR.4.2.,
G-UR.1.2.
4. Check effectiveness of anti-drain valve S.3.9.
5. Check effectiveness of zero-setback
interlock. S.2.5., UR.3.5.

On equipment with remote pumping systems,
activate one dispenser and check all others
operated by the same pump to make certain
they will not operate without activating the
individual starting levers.
6. Power loss test S.1.6.2.1., S.1.6.2.2. (1/1/83)

Security seal--apply lead-and-wire seal to
secure adjusting mechanism G-UR.4.5.

Note on the official report the number of
gallons of product dispensed during test.

- ***** **Use extreme caution when switch-loading product !** *****
- 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.

- ***** **Take precautions to isolate equipment when transporting it to avoid exposure to hazardous fumes** *****