

2015 NIST EPO No. 21

Examination Procedure Outline for Retail Motor-Fuel Dispensers Single, Dual, and Multi-Product (Except Blenders)

It is recommended that this outline be followed as minimum criteria for examining conventional, single and dual product, power-operated retail dispensers --"gasoline pumps," analog or digital, and consoles. This outline may also be used for multi-product dispensers that share a single hose, but not including those that dispense blended products, which are addressed in EPO No. 22. 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.

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	Material Safety Data Sheets (MSDS)
Electrical Hazards	Nature of Product
Emergency Procedures	Personal Protection Equipment
Eye Protection	e.g., safety shoes, safety aprons, gloves, barrier cream, etc. if deemed necessary.
Fire Extinguisher	Static Discharge
First Aid Kit	Safety Cones/Warning Signs
Grounding	Switch Loading
Ignition Sources	Traffic
Lifting	Transportation of Equipment
Location	

See Also: Wet/Slick Conditions, Chemicals, Petroleum Products, and Hazardous Materials, Obstructions

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.
- Obtain and read copies of MSDS’s.
- Know the emergency procedures and location and operation of fire extinguishers and emergency shut-offs.
- Post safety cones/warning signs and be aware of vehicular and pedestrian traffic patterns.
- Use caution when moving in wet, slippery areas.
- Open both sides of the dispenser to allow fumes to dissipate before proceeding with the inspection.
- If leaks, spills, or exposed wiring cause hazardous testing conditions, it is recommended that the testing be discontinued until the unsafe conditions are corrected.
- 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.

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 Liquid-Measuring
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 References**

Inspection:

1. Selection

Selection and Suitability	G-S.3., G-UR.1.1., G-UR.1.2. G-UR.1.3., UR.3.3.
Installation.....	G-S.2., G-UR.2.1., G-UR.2.2., UR.2.1., UR.2.2., UR.2.4.
Position of Equipment	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., G-UR.4.2., UR.3.5.
Computing Capability.....	UR.3.3.

2. Indicating and recording elements

Design	S.1.1.
Units.....	S.1.2.1., S.1.2.3.(a), S.1.2.3.(c)
Readability	G-S.5., G-S.6. (1/1/77), G-S.7., S.1.4., S.1.5.
Values of Intervals.....	G-S.5.3., G-S.5.3.1.

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Inspection (cont.):

Indication of delivery	S.1.6.1. (portions NR 1/1/06)
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)
Unit Price and product identity	S.1.6.4.1.(a), S.1.6.4.2., UR.3.2., UR.3.3.
Multiple unit price dispensers	S.1.6.4.1.(b) (1/1/91), S.1.6.4.1. (b)(2), S.1.6.5.(a) (1/1/91), S.1.6.5.4.(a) (1/1/91), S.1.6.5.4.(b), UR.3.3.
Quantity and total price display – except aviation refueling	S.1.6.5.5. (1/1/94)
Quantity and total price display – aviation refueling.....	S.1.6.5.6. (1/1/08)
Advancement and return to zero	S.1.3., S.1.6.3., UR.3.1.
Recorded representations.	
General.....	G-S.5.6.
Point of sale systems.	S.1.6.7. (1/1/86)
Post-delivery discounts.....	S.1.6.8., UR.3.3.
Provision for sealing.....	G-S.8. (1/1/90), G-UR.4.5., S.2.2., Table S.2.2. (1/1/95)
Sealing multiple measuring elements with a common provision for sealing	G-S.8.1. (1/1/10)
3. Marking.....	G-S.1., G-S.1.1.(1/1/04), G-S.1.2. (1/1/02), G-UR.2.1.1., G-UR.3.4., S.4.1., S.4.4.1. (1/1/85), S.4.4.2. (1/1/03)
4. Measuring elements.	
Air eliminator vent, if self-contained dispenser.....	S.2.1.
Security seal on adjusting mechanism	G-UR.4.5.
5. Discharge hose-retail	S.3.1., S.3.2., S.3.3., S.3.5., S.3.6., S.3.7.

Inspection (cont.):

Length – General..... UR.1.1.1.
Length and Protection – Marinas and Airports UR.1.1.2.

6. Totalizers..... S.5. (1/1/95)

Pretest Determinations:

1. Tolerances
 Applicable requirements..... G-T., T.1.
 Basic values T.2., Table T.2
 Repeatability T.3.

2. Product storage identification..... UR.2.5.
3. Test Liquid..... N.1.1.
 Verify that the liquid available for testing is appropriate.
4. Test Draft Size N.3.4.

SAFETY REMINDER!!!

- **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!**
- **Ground the test measure or prover properly and only use a metal funnel when returning product to storage.**

Test Notes:

1. If the test measure or prover is dry, it must be prepared for use by first “wetting” it. To wet the test measure or prover, fill it to capacity and empty it following proper drain procedures.

2. Level the test measure or prover. When the test measure or prover is full of liquid, re-check its level to ensure that the weight of the product has not affected the level condition.

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Pretest Determinations (cont.)

- 3. Take care to minimize changes in volume of the test liquid due to temperature changes and evaporation losses. N.2.

- 4. Hand held test measures require a 30 s (\pm 5 s) pour followed by a 10 s drain, with the measure held at a 10 to 15 degree angle from vertical. N.4.4.1.

- Bottom drain provers require a 30 s drain after the main flow ceases. N.4.4.2.

- See NIST HB 105-3, Specifications and Tolerances for Graduated Neck Type Volumetric Field Standards, 2010, Section 7.

- 5. To determine proper operation of totalizers, read and record the totalizer indications before and after all test drafts. S.5. (1/1/95)

- 6. After each test draft:
 - a. Print a ticket if the device is so equipped and verify required information is provided on the receipt. G-S.5.6., G-S.5.6.1., UR.3.4.

 - b. 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.

 - c. For transactions conducted with point-of-sale systems or devices activated by debit cards, credit cards, and/or cash, verify that required information is printed on the receipt. S.1.6.7. (1/1/86)

 - d. Verify that required information is on the receipt and that a receipt is provided in applications where post-delivery discounts are offered. S.1.6.8., UR.3.3.

 - e. Check price computations on all indicators (including consoles) and on recorded representations. S.1.6.5.(a) (1/1/91)
 - Digital equipment G-S.5.5.
 - Analog equipment S.1.6.5.(b), Table 1., N.4.3.2.

 - f. Check for agreement of quantity values between indicated and recorded representations. G-S.5.2.2., S.1.6.6.(a)(1), S.1.6.6.(a)(2) (1/1/88), S.1.6.6.(b)

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Test Notes (cont.):

7. Verify, after a delivery is completed, that the quantity and total price are displayed for at least five minutes or until the next transaction is initiated by a customer. S.1.6.5.5. (1/1/94), S.1.6.5.6. (1/1/08) (aviation)

SAFETY REMINDER!!!

- Use proper lifting techniques when lifting a test measure!!!
- 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.
- Avoid switch loading! Test devices dispensing low-vapor pressure products (e.g., diesel fuel and kerosene) before testing devices dispensing high-vapor pressure products (e.g., gasoline and ethanol blends up to E85) with the same test measure or prover. Additional precautions may be necessary with other high-vapor pressure products.

Test:

1. **Normal Test** – full flow, basic tolerance. N.4.1., T.2., Table T.2
- For this and subsequent Normal Tests, verify that the maximum discharge rate of the installation does not exceed the marked maximum. S.4.4.1. (1/1/85), UR.2.2.
- For this and subsequent tests, verify that other conditions of use do not exceed marked or manufacturer-specified limitations. G-UR.3., S.4.1.
- At the beginning of the first delivery, check for suppressed values. S.1.6.1. (1/1/06)
- For this and subsequent tests, re-check the level of the test measure or prover once it is full of liquid and before reading the indication to ensure that the weight of the product has not affected the level condition.
- If the result of the first test is at or near the tolerance limit, repeat this test. N.4.1.2., T.3.
If necessary, conduct a Repeatability Test as outlined in Step 3 below.

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Test (cont.):

2. **Special** – slow flow, basic tolerance. N.4.2., N.4.2.2., T.2.,
Table T.2.

If the result of the first test is at or near the tolerance limit, repeat this test. N.4.1.2., T.3.

If necessary, conduct a Repeatability Test as outlined in Step 3 below.

*Petroleum Product Sampling*¹

3. **Repeatability Test.** N.2., N.3.4., N.4.1.2.,
T.3.

If necessary, conduct a repeatability test. A repeatability test must include at least three consecutive test drafts. Test drafts must be conducted under approximately the same conditions (e.g., flow rate and temperature) and be of approximately the same draft size.

4. **RFI/EMI Test** (electronic equipment only)..... G-N.2., G-UR.1.2.,
G-UR.3.2., G-UR.4.2.

This testing is typically done only if a problem is suspected or during the inspection of a new installation.

Radio Frequency Interference (RFI)

Electromagnetic Interference (EMI)

5. **Anti-Drain Test** - Check the effectiveness of the anti-drain means S.3.7.

6. **Zero-Setback Interlock** - Check the effectiveness of the zero-setback interlock..... S.2.5.

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.

7. **Power Loss Test**..... S.1.6.2.1. (1/1/83),
S.1.6.2.2. (1/1/83)

Before conducting a power loss test, first check with your supervisor to determine your jurisdiction’s policy on the conditions under which this test is to be conducted.

¹ When taking gasoline samples from single hose multi-product dispensers, the samples should be collected either immediately following an observed sale of the particular grade or product to be sampled or after sufficient product has been purged from the hose to ensure the sample is representative of the grade or product being sampled. Guidelines for taking samples for octane verification are found in NIST Handbook 130, “Uniform Laws and Regulations in the Areas of Legal Metrology and Engine Fuel Quality,” Interpretations and Guidelines, Section 2.6.16. Minimum Fuel Flush for Octane Verification, and are stated as follows: **“A minimum of 1.2 L (0.3 gal) of motor fuel shall be flushed from a dispenser before taking a sample for octane verification. The flush shall be returned to the storage tank containing the lowest octane.”**

Post-Test Tasks:

1. Security Means

- a. Check for the presence of security seals on the device. Document missing seals on the official report and apply new ones as needed. G-UR.4.5., S.2.2.
- b. Record audit trail information if the device is equipped with an audit trail. S.2.2. (1/1/95),
Table S.2.2. (1/1/95)

2. Record the total quantity of product dispensed during testing on the official report.

SAFETY REMINDER!!!

– **Avoid switch loading! Test devices dispensing low-vapor pressure products (e.g., diesel fuel and kerosene) before testing devices dispensing high-vapor pressure products (e.g., gasoline and ethanol blends up to E85) with the same test measure or prover. Additional precautions may be necessary with other high-vapor pressure products.**

- 3. 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.
- 4. Record the compliance action and disposition of the device on the report and explain the results to the device owner.

SAFETY REMINDER!!!

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