Module: 8.4

Retail Motor Fuel Dispensers (Registered Service Agents)

Overview and Scope

This module outlines the learning objectives registered servicepersons must understand and apply to successfully perform their duties in placing in service, testing, repairing, and calibrating Retail Motor Fuel Dispensers. The module focuses on specific concepts related to device technology, operations, specific inspection requirements, and test procedures for these devices found in NIST Handbook 44 General Code and Liquid Measuring Devices, NIST EPO 21, and NIST EPO 22.

Prerequisites

Module 8.1 - NIST Handbook 44 and NIST Handbook 130 – Basic (Registered Service Agents)

Learning Objectives

1 Technologies Used in Retail Motor Fuel Devices

A registered serviceperson should understand the technologies used in a typical Retail Motor Fuel Device (RMFD). To demonstrate this the serviceperson can:

1.1 Define common RMFD terms such as motor fuel, motor fuel device, retail device, etc.

1.2 Describe the various technologies used to deliver liquid product to the measuring element, including the functions of manifolds, pumps, check valves, temperature compensation, and air elimination systems.

1.3 Describe the different types of RMFD systems (dispensers vs pumps, above ground vs below ground storage, blenders, vs single product systems, etc.).

1.4 Describe the major components of an RMFD.

1.5 Recognize typical measurement technologies used in RMFD systems, such as positive displacement and turbine meters.

1.6 Recognize typical registration technologies used in these systems, such as mechanical registers and electronic registers.

1.7 Identify the metrological components of a measuring system (measuring element, pulser or signal generator, register, operator controls and printer).

1.8 Describe the function and types of vapor recovery systems.

1.9 Describe built-in safety components in an RMFD.

1.10 Restate that these systems may be made up of measuring elements/modules and indicator elements/modules.

1.11 Select the appropriate Handbook 44 Code for each device examined based on the application section of the code.

1.12 Recognize that system performance will vary with the rate of flow (linearity), product composition and properties, influences such as temperature, supply voltage, etc., and disturbances such as entrapped vapor or air, EMI/RFI, etc.

2 System Markings and Operations

A registered serviceperson should understand the various marking requirements applicable to a measuring system and demonstrate the ability to operate a measuring system. To demonstrate this the registered serviceperson can:

2.1 Recognize and interpret required identification markings on an RMFD system or element.

2.2 Recognize and interpret required markings on the controls, indications and features of an RMFD.

2.3 Recognize the following functions/operations on a measuring system.

2.3.1 Zero reset.

2.3.2 Activation controls to start flow.

2.3.3 Flow control valves.

2.4 Recognize and interpret the measurement information displayed on a mechanical register.

2.5 Recognize and interpret the measurement information displayed on an electronic register.

2.6 Demonstrate ability to estimate the actual flow rate of a system using the system indications.

3 Technical Requirements

A registered serviceperson should understand the various technical requirements applicable to an RMFD. To demonstrate this the serviceperson can:

3.1 Apply the rules regarding the following measuring system features/indications and identify where to find the rule in Handbook 44.

3.1.1 Marking Requirements

3.1.2 Size of minimum increment of volume and price indications.

3.1.3 Return to proper zero indication on reset.

3.1.4 Maximum and minimum flow rates for the system

3.1.5 Flow control and check valves for wet hose systems with both above ground and below ground storage.

3.1.6 Discharge lines and valves.

3.1.7 Maximum and minimum indications of delivery or price.

3.1.8 Agreement of indications within a system, both mechanical and electronic.

3.1.9 Mathematical agreement on computing devices – mechanical and electronic.

3.1.10 Unit price display and changes to unit price.

3.1.11 Air elimination devices for dispensers and pumps.

3.1.12 Categories of sealing, appropriate seals and audit trails.

4 User Requirements

A registered serviceperson should understand the various user requirements applicable to an RMFD system. To demonstrate this the serviceperson can:

4.1 Assess whether device is installed correctly.

4.2 Assess suitability of the discharge hose and nozzle.

4.3 Assess whether a device is being used correctly.

4.4 Assess if a Liquid Measuring Device is being used in conformance with the requirements of UR.3.1., UR.3.2., UR.3.3., UR.3.4., and UR.3.5.

4.5 Assess whether the device is properly maintained in accordance with requirements of UR.4.

5 Basic Test Procedures

A registered serviceperson should be able to use Handbook 44, NIST Examination Procedure Outline (EPO) 21, NIST EPO 22, and National Type Evaluation Program (NTEP) Certificates of Conformance to conduct the appropriate performance tests and evaluate compliance of RMFDs with applicable tolerances and performance standards. To demonstrate this the serviceperson can:

5.1 Determine the appropriate Accuracy Class for the RMFD.

5.2 Determine minimum test drafts required for testing a given RMFD system.

5.3 Select appropriate test measures to conduct tests, use them correctly, and care for them when not in use.

5.4 Apply the rules for reading indications and rounding of numerical values.

5.5 Understand the difference between normal and special tests and apply the appropriate tolerance for each test.

5.6 Describe the different NIST EPOs used for single, dual and multi-product dispensers, including safety considerations and return of product to storage.

5.7 Select appropriate test drafts for normal tests of a given measuring system, perform the appropriate normal tests, and evaluate the test results for compliance with applicable tolerances.

5.8 Select appropriate test drafts and flow rates for a (normal) repeatability test for a given measuring system, perform the test, and evaluate the test results for compliance with applicable tolerances and agreement requirements.

5.9 Select appropriate test drafts for special tests for a given measuring system, perform the appropriate special tests, and evaluate the test results for compliance with applicable tolerances.

5.10 Conduct appropriate examinations and tests to evaluate that required devices within the system are working correctly and are functioning within tolerance (air elimination, check valves, prepay purchases, zero reset, mathematical agreement, etc.), comply with safety requirements, and properly return product to storage.

5.11 Apply the information found in an NTEP Certificate of Conformance.

Contributors:

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