

## Chapter 5 Objectives

Describe:

- the procedures for testing repeatability and agreement of indications.
- the procedure for verifying return to zero-load balance each time all test loads are removed.
- the procedure for inspecting printed tickets during tests and checking the effectiveness of motion detect, in the case of electronic systems.
- the procedures for checking the operation and appropriateness of special operating features on electronic digital indicating scales.

**Note: Before introducing the slide presentation for each chapter, it is recommended that the presenter read the course material for the chapter in its entirety and refer to the written material as needed while using the slide presentation to illustrate and explain the text.**




## Indications and Recorded Values

- ◆ **G-S.5.2.2 Digital Indication and Representation.**
  - All values agree and round correctly.
- ◆ **G-S.5.6. Recorded Representations.**
  - Must be printed digitally.

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G-S.5.2.2 is a four part requirement. Read and explain each of the four individual parts (a)-(d). Provide an example of how each part of the requirement applies and summarize how the device must operate to enable compliance to each one. Read and explain the purpose of G-S.5.6.



## T.N.5. Repeatability

- ◆ Results from several weighings of the same load under reasonably static test conditions shall agree within the absolute value of maintenance tolerance and be within applicable tolerance.
  - Doesn't change with applicable tolerance.
  - Accurate repositioning of the test weights is crucial.
  - See G-S.5.4 for Specification.

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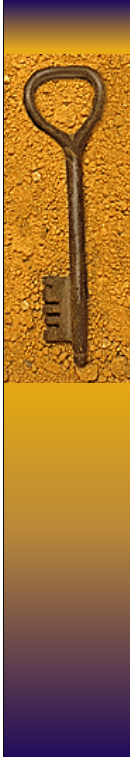
Define repeatability and explain its importance. Explain how the test is performed and the importance of reapplying the weights in the same location on the load-receiving element. Explain why there is a tolerance applied individually to the test load and a separate tolerance applied to the variation in repeatability results.



## **T.N.4. Agreement of Indications**

- ◆ **T.N.4.1. Multiple/Recording Elements**
  - apply tolerances independently.
  
- ◆ **T.N.4.2. Single Indicating/Recording Element (full capacity weighbeam)**
  - differences must not exceed the absolute value of the applicable tolerance and must be in tolerance

Explain the requirements T.N.4.1. and T.N.4.2. Provide specific examples of the scale components affected by these requirements. Explain how to test for compliance.



## T.N.4. Agreement of Indications

- ◆ **T.N.4.3. Single Indicator with Multiple Elements (analog indicators)**
  - differences not greater than  $\frac{1}{2} d$  and each must be within tolerances.
  
- ◆ **T.N.4.4. Shift or Section Test**
  - differences must not exceed the absolute value of the maintenance tolerance and must be in tolerance (e.g., not + or – 1 d but 1 d)

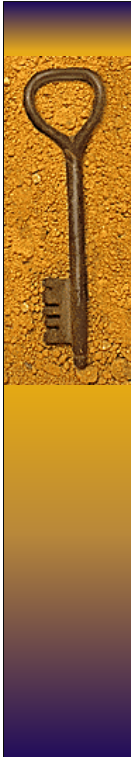
Explain both requirements. Provide examples and demonstrate how to test for compliance.



## N.1.9. Zero Load Balance Change

- ◆ A zero load balance change test shall be conducted on all scales after the removal of any test load.
- ◆ The zero load balance should not change by more than the minimum tolerance applicable.
- ◆ See also G-UR.4.2. Abnormal Performance

Explain how and why the test is conducted. Explain the application of this requirement when acceptance tolerance is being applied.

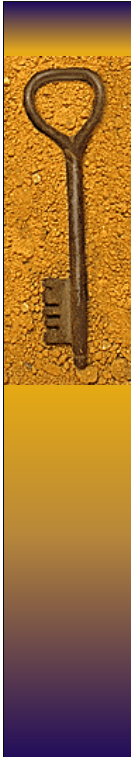


# Examination Procedure

- ◆ Inspection
- ◆ Pretest Determinations
- ◆ Test
- ◆ Evaluation of Results

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These are the main categories contained in the EPO's.



## Digital Tests

- ◆ Zone of Uncertainty
- ◆ Discrimination
- ◆ Width of Zero

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Different types of indicators require differing and unique tests. These are indicator specific tests for digital indicators. Explain each of the terms and define their importance.

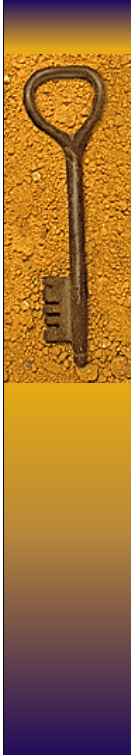




## Operational Features and Controls

- ◆ During the test you should determine if operational features work as intended and if they comply with appropriate handbook requirements.
  - *zero controls, tare, indicators, recorders, remote indicators, motion detection (S.2.1.2.) for printing, zeroing functions (S.2.1.3.), wireless connections, hidden functions, ticket printers, etc.*
- ◆ These features vary widely among devices and new ones are constantly emerging.

Explain the importance of obtaining an understanding of the purpose of each operational control and how it functions for each device inspected. Provide several examples of how operational controls can be used or manipulated to provide both intentional and unintentional false weights.



## Summary

- ◆ Inspection must include a comprehensive evaluation of the indicating and recording elements and accessories.
- ◆ Digital indications are required to function within specific limits and your observations may indicate that additional testing is needed.
- ◆ Checking zero is one of the most important steps of the test.

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Slide summarizes the contents of chapter 5.