2.8 Measuring and Test Equipment

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Quick Review of changes to 2.8

2.8.1 to include the addition of “verify” in addition to edits for redundant text better addressed elsewhere.

2.8.1 Establish and maintain documented procedures to control, *calibrate/verify*, and maintain all measuring and testing equipment and devices used to validate conformity.

2.8.5.2 Removed

2.8.5.2 Access to the status should be at or near the work area.

Quick Review of changes to 2.8

2.8.6 added “process monitoring equipment”

2.8.6 Assess and document the validity of previous inspection and test results when measuring and testing equipment and process monitoring equipment are found to be out of *calibration*.

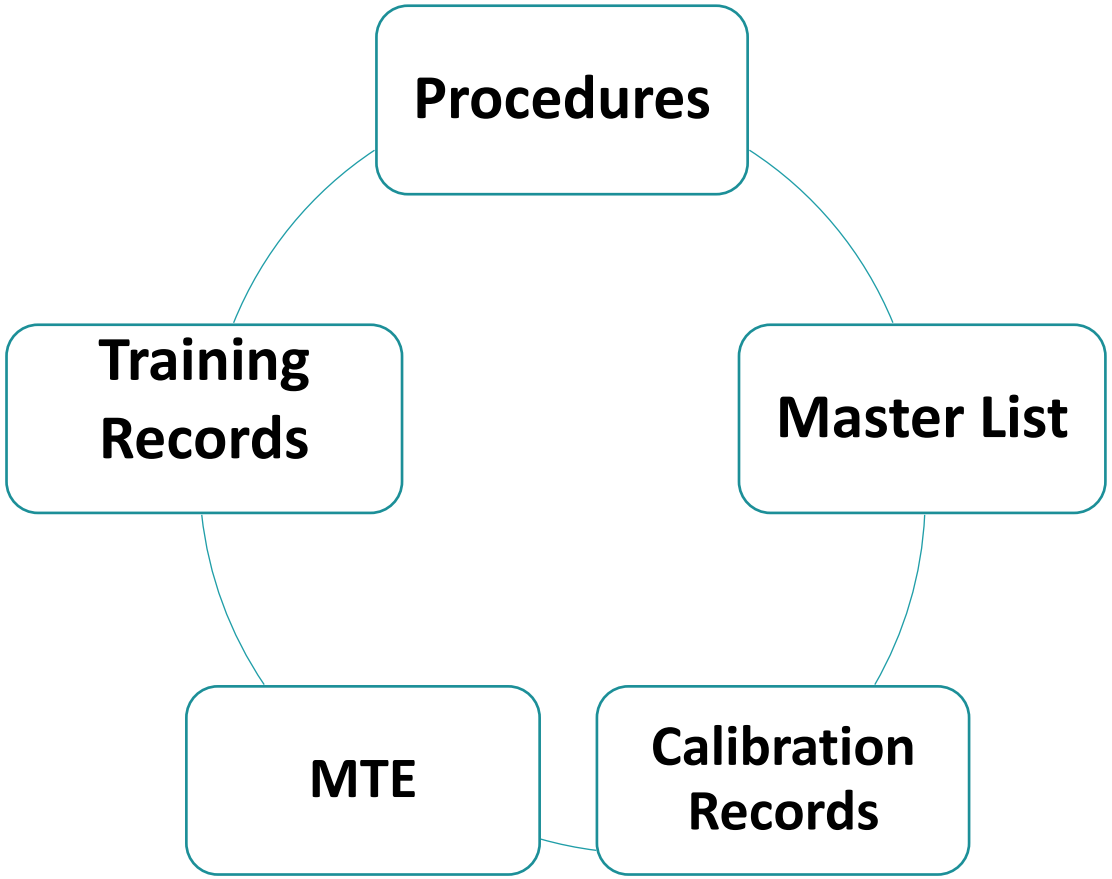
2.8.8 added “shelf life”

2.8.8 Ensure that the handling, storage, shelf life, and preservation of measuring and testing equipment is such that the accuracy and fitness for use are maintained.

2.8 MTE and Audits

- **One of the common areas for audit findings along with document control**
- **Why?**
- **Target Rich Environment**
  - Large population
  - # of opportunities
  - Auditor’s luck ☺

2.8 MTE and Audit Finding Sources



2.8 MTE and Audit Finding Sources

- **Procedures and common issues**
  - Address all the requirements of M-1003
  - MSRP technical, regulatory and MTE OEM requirements
    - Calibration intervals
    - Shelf life / storage requirements / Protected when not in use
    - Operation of MTE
  - Failure to follow your procedures
  - Required reviews of your procedures

2.8 MTE and Audit Finding Sources

- **Master List**
  - Missing MTE
  - Out of date items
  - Locations not correct
  - Calibration intervals incorrect

2.8 MTE and Audit Finding Sources

- **Calibration Records**
  - Missing known valid relationship to nationally recognized standards
  - Incorrect calibration method / device
  - Incorrect calibration tolerances / attributes
  - Incorrect calibration intervals
  - Calibration results outside of limits and not detected
  - Measurements at Min / Max points and need to adjust intervals
  - Assessment not conducted when required
  - Record retention and preservation
  - Inadequate review – pass / fail error

2.8 MTE and Audit Finding Sources

- **Training Records**
  - Personnel performing calibrations internally
    - Training records / checklist
    - Authorization letter
  - Employees using / verifying MTE
    - Qualification records
    - Trainer Checklist for work cell / process

2.8 MTE and Audit Finding Sources

- **MTE Related Items**
  - Calibration status not known
  - Calibration status illegible
  - Calibration status incorrect
  - MTE not maintained / handling issues
  - MTE storage and preservation issues
  - Safeguards missing or compromised
  - Incorrect item in use (measurement increments)
  - No unique ID
  - Requires AAR technical approval

Auditing 2.8

- **Use an audit collection sheet for MTE sampled**

INTERNAL AUDIT – GAUGE CALIBRATION REVIEW SHEET						
Gauge ID	Description	Due Date (Sticker)	Matches Gauge System?	Cal. Cert Rec'd & Reviewed?	Cal Traceable to Nat. Std.	Comments / Master used for Internal Calibrations
			☐ Yes ☐ No	☐ Yes ☐ No ☐ N/A ☐ DNR	☐ Yes ☐ No ☐ N/A ☐ DNR	
			☐ Yes ☐ No	☐ Yes ☐ No ☐ N/A ☐ DNR	☐ Yes ☐ No ☐ N/A ☐ DNR	
			☐ Yes ☐ No	☐ Yes ☐ No ☐ N/A ☐ DNR	☐ Yes ☐ No ☐ N/A ☐ DNR	
			☐ Yes ☐ No	☐ Yes ☐ No ☐ N/A ☐ DNR	☐ Yes ☐ No ☐ N/A ☐ DNR	
			☐ Yes ☐ No	☐ Yes ☐ No ☐ N/A ☐ DNR	☐ Yes ☐ No ☐ N/A ☐ DNR	

Auditing 2.8

- **Use Master List to ID the MTE checked and verification of status**
  - Printed lists can be effectively utilized when sorted by
    - Location / Work Cell to be audited / MTE type
    - Benefits:
      - Allows the opportunity to detect missing MTE
      - Permits sample size selection
      - Auditor can check unique #, status legibility / accuracy to master
      - Mark MTE checked and any comments / observations for items checked
      - Improves speed and accuracy of checks

Auditing 2.8

- **Compare Master List sample checked items**
  - Calibration Records for any errors
    - Calibration / In Service Date / Next Calibration Due Date / Location
  - Calibration Record Review (Slide 10)
    - Missing known valid relationship to nationally recognized standards
    - Incorrect calibration method / device
    - Incorrect calibration tolerances
    - Incorrect calibration intervals
    - Calibration results outside of limits and not detected
    - Measurements at Min / Max points
    - Assessment not conducted when required
    - Record retention and preservation

Lessons Learned / Improvements

- **Gauge Calibration Software Applications**
  - Status indicator printing from MTE calibration record to avoid written legibility and errors
    - You can still put the wrong label on an item
  - Provides Master List view and print options
  - Can see what is Due or Due within a selected # of days / Email alerts
  - Allows inclusion of internal calibration procedure, MTE prints, Photos, Purchase info, Gauge R&R, etc.
  - Allows internal calibration results and record retention
    - Traceability to MTE used in calibration
  - Permits attaching external calibration records
  - Email alerts

Lessons Learned / Improvements

- **Internal Calibrations / Verifications**
  - The use of Master Gauges where applicable is more efficient
  - Reference use of standards / specifications / MTE calibrations
  - Required increment / accuracy level of MTE used to calibrate
  - Maintaining traceability to national standards
  - Calibrating through the entire range of a device as opposed to a single point

Lessons Learned / Improvements

- **Calibration Status in the shop environment**
  - Labels on MTE
    - Place them for line-of-sight access when possible
    - Place them near the unique ID when possible
    - Place them to avoid excess contact / wear
    - Use cover tape / clear nail polish or other means to preserve them
      - Have a safe tool to remove them
  - Labels on MTE storage point, fixtures, etc.
    - When MTE size, shape and use makes maintain the status problematic the calibration status labels can be applied to the storage point
  - Printed or Electronic list for work area with current MTE status

Lessons Learned / Improvements

- **MSRP / Regulatory Compliance for MTE**
  - Shelf Life – Examples: SCABT (FRA) and Pressure gauges (MSRP G-II)
  - Required increment discernment and wear tolerances examples
    - Wheel mounting pressure gauges MSRP G-II
    - MTE calibration wear limits MSRP S - M214
  - Processing or environmental requirements
    - Checking hardness with MTE requires removal of decarburized surface metal (MSRP S M-212)
    - Checking tight tolerance dimensions and temperature requirements for MTE (MSRP G-II)

Examples of MSRP guidance affecting MTE

RULE 1.4 Wheels—Mounting Press Practices
(Reference Figs. 4.17, 4.18, 4.19, and 4.21 through 4.34)

1.4.1 Wheel mounting presses must be equipped with a pressure recording gauge and a secondary pressure gauge. These gauges must be used for every mounting operation and must agree within ±2%. The secondary gauge must be checked by means of a dead weight tester or accurate master gauge at least once in each 6 months of service. Records must be attached to or kept in close proximity to the gauge, showing the date last tested and the date actually put into service. The recording gauge must have a minimum resolution of 100 tons per inch with graduations superimposed on the chart in no larger than 5-ton increments. It must make a complete wheel fit pressure diagram of each wheel mounted as shown in Figs. 4.21 through 4.28

What about the calibration requirements?

In accordance with § 232.409(d), both the front and rear units have to be calibrated for accuracy according to the manufacturer's specifications and procedures at least once every 368 days. The test shall include testing radio frequencies and modulation. The 368 days does not include up to 92 days of shelf-life prior to placing the unit in service. The date of the calibration, the location

Table D.2 M-214 New gauge tolerances (where tolerances are not specified)

Critical gauged dimensions (underlined or listed as important).

Flatness tolerance as specified on the drawing.

Maximum tolerance of ±0.02 in. is allowed for all gauges under any and all conditions.

Noncritical gauged dimensions.

Flatness—All Gauges	–0.000 in. to 0.010 in.
Size of Gauge (in.)	Tolerance (in.)
0.000 to 4.000	±0.031 (1/32)
4.001 to 12.000	±0.047
12.001 to 48.000	±0.062 (1/16)
48.001 to 96.000	±0.125 (1/8)
96.001 and Greater	±0.188

Notes:

1. To provide for wear, gauge dimensions may vary from those on the gauge drawing in the direction and be more restrictive on casting tolerances as provided in Fig. D.4 of this specification.
2. Worn gauges must be within the dimensions on the gauge drawing and the tolerances listed in Table D.2.

Lessons Learned / Improvements

- External cert. review examples

PRECISION GAGE & TOOL CO.

Craig Warren 2-11-15

375 GARGRAVE ROAD
DAYTON, OHIO 45449
PHONE: 937-866-9666
FAX: 937-866-9661
www.pgtgage.com

Cert#:150492

Certificate Of Calibration

WOSB CERTIFIED

Customer:
PROGRESS RAIL
1185 INDUSTRIAL BLVD.
BOAZ, AL 35957

Cal. Date: 1/28/2015
Cal. Due Date: 1/28/2016

Gage Description: TYPE "F" COUPLER GAGE

Custodian / Department:
Manufacturer: WINCHESTER
Shop Order: RB0119-2D
Temp./RH: 68 F / 48 %
Cal. Interval: 12 MONTHS
Calibration Procedure Used: QI4.11-35

Gage I.D.: 19 (W747)
Received Condition: IN TOLERANCE
Model Number: 44248-1
Unit Of Measure: INCH
Performed By : COX
Calibration Result: Passed

(Tol.- = Minimum Allowable Limit Tol.+ = Maximum Allowable Limit)

Description	Standard	Tol. -	Tol. +	As Found	Unit
RADIUS	1.000	0.985	1.015	1.001	INCH
	3.000	2.985	3.015	3.001	INCH
	2.000	1.985	2.015	2.000	INCH
	3.875	3.860	3.890	3.874	INCH
RADIUS	1.750	1.735	1.765	1.756	INCH
	16.000	15.985	16.015	16.007	INCH
	3.563	3.548	3.578	3.566	INCH
RADIUS	1.000	0.985	1.015	0.998	INCH

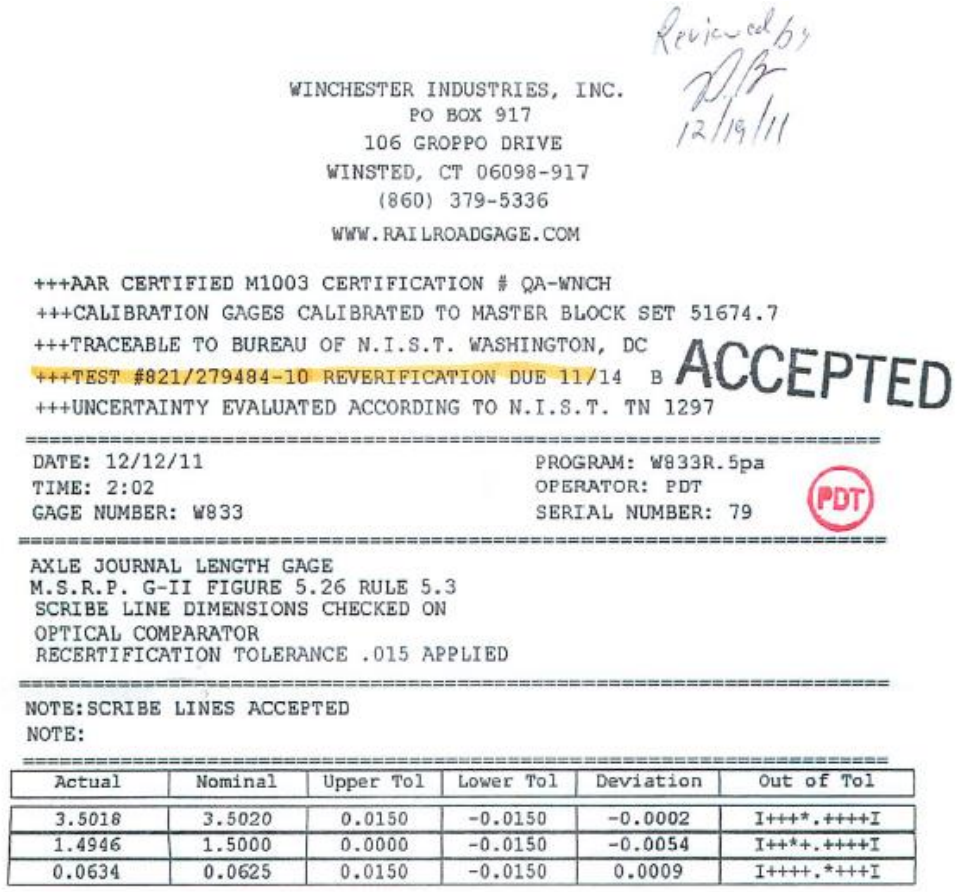
Equipment Used To Calibrate Gage:

Company	Serial Number	Description	Last Calibration	Due For Calibration
PG&T	PGT00003	OPTICAL COMPARATOR 12 IN	8/16/2013	8/16/2015
PG&T	PGT00022	MICRO-HITE, BROWNE & SHARPE	11/6/2014	11/6/2015
PG&T	PGT00166	RADIUS GAGE SET, 9/16 TO 1 INCH	3/19/2013	3/19/2015

SOURCE OF INSPECTION:WINCHESTER DWG. W747
Nist traceability through Master Gage blocks file no. PGT00264. Reference NIST Master Blocks test no 821/279484-10

Uncertainty of test: +/- 0.000050 in. PG&T is held harmless for damages resulting from the use of this gage.

Inspector: Debbie Cox



Reviewed by DB 12/19/11

WINCHESTER INDUSTRIES, INC.
PO BOX 917
106 GROPPO DRIVE
WINSTED, CT 06098-917
(860) 379-5336
WWW.RAILROADGAGE.COM

+++AAR CERTIFIED M1003 CERTIFICATION # QA-WNCH
+++CALIBRATION GAGES CALIBRATED TO MASTER BLOCK SET 51674.7
+++TRACEABLE TO BUREAU OF N.I.S.T. WASHINGTON, DC
+++TEST #821/279484-10 REVERIFICATION DUE 11/14 B ACCEPTED
+++UNCERTAINTY EVALUATED ACCORDING TO N.I.S.T. TN 1297

DATE: 12/12/11
TIME: 2:02
GAGE NUMBER: W833
PROGRAM: W833R.5pa
OPERATOR: PDT
SERIAL NUMBER: 79

PDT

AXLE JOURNAL LENGTH GAGE
M.S.R.P. G-II FIGURE 5.26 RULE 5.3
SCRIBE LINE DIMENSIONS CHECKED ON
OPTICAL COMPARATOR
RECERTIFICATION TOLERANCE .015 APPLIED

NOTE:SCRIBE LINES ACCEPTED
NOTE:

Actual	Nominal	Upper Tol	Lower Tol	Deviation	Out of Tol
3.5018	3.5020	0.0150	-0.0150	-0.0002	I+++*.++++I
1.4946	1.5000	0.0000	-0.0150	-0.0054	I++*+.++++I
0.0634	0.0625	0.0150	-0.0150	0.0009	I++++.*+++I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THANK YOU