



- Torque values/ranges are specified in SARP
- SARP typically does not specify torque wrench type
- **Choose** wrench to ensure staying within specified range
- Set wrench to midrange of torque specification
- Account for wrench uncertainty
- Bottom Line:
 - A package with incorrect torques is noncompliant

TORQUE VALUES



Torque value nomenclature

- 25 (+/-5) ft-lb
– Range = 20 – 30 ft-lb Midrange 25 ft-lb
- 50 (+5/-0) ft-lb
– Range = 50 – 55 ft-lb Midrange 52.5 ft-lb
- 50 (+10/-5) ft-lb
– Range = 45 – 60 ft-lb Midrange 52.5 ft-lb
- 75 (+0/-5) ft-lb
– Range = 70 – 75 ft-lb Midrange 72.5 ft-lb
- 75 (+10/-10) ft-lb
– Range = 65 – 85 ft-lb Midrange 75 ft-lb

“FB-LINE” 9975 TORQUE METHODOLOGY



Five 9975 SARP torque specifications:

- 50 (+5/-0) ft-lb Range = 50 – 55 ft-lb
- 100 (+5/-0) ft-lb Range = 100 – 105 ft-lb
- 30 (+5/-0) ft-lb Range = 30 – 35 ft-lb
- 10 (+/-2) in-lb Range = 8 – 12 in-lb
- 30 (+/-2) ft-lb Range = 28 – 32 ft-lb



- Typical M&TE torque wrench with +/- 4% is acceptable
 - May not be good enough to meet all the 9975 SARP range requirement
 - 4% wrench on 100 ft-lb torque ranges 96 - 104 ft-lb. This does not meet the 100-ft-lb minimum torque requirement
 - The requirement is 100 to 105 ft-lb
- FB-Line used 1% wrenches for all torques
 - 1% was not really necessary – but it works for all torque values
 - 4% wrenches are acceptable for lower 9975 torque values (50 ft-lb or less)
 - 2% wrenches are acceptable for the high torque value (100 ft-lb)

ACHIEVING THE CORRECT TORQUE



- Torque specification of 100 (+5/-0) ft-lb
 - Range = 100 - 105 ft-lb
 - Torque to midrange 102.5 ft-lb
 - +/- 4% Wrench yields a torque of **98.4 – 106.6 ft-lb**
 - +/- 2% Wrench yields a torque of **100.5 – 104.6 ft-lb**
 - +/- 1% Wrench yields torque of **101.5 – 103.5 ft-lb**
- Torque specification of 30 (+/-2) ft-lb
 - Range = 28 - 32 ft-lb
 - Torque to midrange 30 ft-lb
 - +/- 4% Wrench yields a torque of **28.8 – 31.2 ft-lb**
 - +/- 2% Wrench yields a torque of **29.4 – 30.6 ft-lb**
 - +/- 1% Wrench yields a torque of **29.7 – 30.3 ft-lb**

“FB-LINE” TORQUE WRENCH ACCURACY INSURANCE



- Frequent wrench calibrations
 - 3-month intervals (typically 6 or 12 months)
 - Multiple torque wrench sets
- Protect wrenches from being “knocked” out of calibration
 - Wrench storage cases
 - Dedicated storage cabinets
- Installed calibrated torque testers
- Perform calibration checks before and after Package Loading
 - Confirm wrench calibration before and after use
 - Pre-Load check failure → do not use wrench
 - Post-Load check failure → may invalidate package compliance
 - Document these checks, best place is in procedure
 - Use to justify wrench out-of-calibration, if needed

PRE-AND POST-LOAD TORQUE TESTING



Wrench test range based on:

- SARP torque range
- Torque wrench uncertainty (1%)
- Torque tester uncertainty (0.5%)

Torque Specification	Torque Range	Test Range
50 (+5/-0) ft-lb	50 – 55 ft-lb	50.8 – 54.2 ft-lb
100 (+5/-0) ft-lb	100 – 105 ft-lb	101.5 – 103.4 ft-lb
30 (+5/-0) ft-lb	30 – 35 ft-lb	30.4 – 34.5 ft-lb
10 (+/-2) in-lb	8 – 12 in-lb	8.12 – 11.8 ft-lb
30 (+/-2) ft-lb	28 – 32 ft-lb	28.4 – 31.5 ft-lb

TYPES OF TORQUE WRENCHES

- Beam & Deflecting Beam
- Clicker
- Dial
- Electronic (indicating)
- Programmable electronic



EM Environmental Management

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TORQUE WRENCHES



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