Wire Rope Reference Guide & Measurement Field Manual

CRITICAL MANDATE: Field repairs of wire rope are strictly prohibited. Any wire rope or hardware meeting any discard criteria listed below must be immediately and permanently removed from service.

1. 3-Point Caliper Measurement Method (Diameter Verification)

To accurately verify nominal diameter reduction, measurements must be taken using a properly calibrated dial or digital caliper. Improper technique will yield an inaccurate result.

Step 1: Orient the Caliper Jaws Correctly (Crown-to-Crown)

Always measure the **maximum outer diameter**. The caliper jaws must contact the crowns of two opposite strands (outermost limits). Never allow the jaws to fall into the valleys between strands. Rotate the caliper slightly to ensure you have captured the widest peak dimension.

Step 2: Take 3 Separate Section Measurements

Identify the area showing the highest visible wear, abrasion, or structural necking. Take **three (3) separate measurements** along that specific run, spacing each measurement approximately 6 to 12 inches apart. At each point, rotate the caliper 90 degrees to capture any out-of-round deformation.

Step 3: Average and Compare Against Discard Math

Sum your three measurements and divide by three to determine the **Average Measured Diameter**. Compare this average against the baseline or nominal diameter using the formula below:

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Diameter Reduction % = ((Nominal Diameter - Average Measured Diameter) / Nominal Diameter) * 100
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Diameter Reduction Discard Thresholds (ASME B30.9)

Nominal Rope Diameter	Maximum Allowable Wear / Reduction Limit	Action Required If Measured Below
Up to 5/16"	Max 0.015" reduction (approx 5%)	Remove immediately if reduction exceeds 0.015"
3/8" to 1/2"	Max 0.031" (1/32") reduction	Remove immediately if reduction exceeds 0.031"
9/16" to 3/4"	Max 0.047" (3/64") reduction	Remove immediately if reduction exceeds 0.047"
7/8" to 1-1/8"	Max 0.063" (1/16") reduction	Remove immediately if reduction exceeds 0.063"

2. ASME B30.9 Wire Rope Sling Removal-From-Service Criteria

- **Stranded Slings:** 10 randomly distributed broken wires in one lay, OR 5 broken wires in one strand in one lay.
- **Cable-Laid Slings:** 20 broken wires per cable lay.
- **Braided Slings:** 20 broken wires per braid lay (less than 8 strands), 40 broken wires per lay (8 or more strands).

- **Valley Breaks:** Zero Tolerance. Any broken wire occurring in the valley/depression between strands requires immediate replacement.
- **Structural Deformations:** Immediate removal for kinking, birdcaging, core protrusion, or crushing.
- **Environmental:** Immediate removal for heat damage, electrical arc strikes, or excessive rust pitting.