

KILN CHAIN MAINTENANCE AND INSPECTION

Wear measurement techniques, elongation limits, and chain replacement criteria for kiln chain systems.

KILN CHAIN MAINTENANCE & INSPECTION PROCEDURE

1. Inspection Schedule

FREQUENCY	INSPECTION TYPE	SCOPE
During kiln shutdowns	Full inspection	All chains, hangers, shackles
Monthly (operating)	Visual / external	Unusual sounds, vibration, shell temp anomalies
Quarterly	Sampling inspection	Accessible chains – measure elongation on 10% of chains
Annually	Comprehensive	Full chain map, life prediction, replacement planning

2. Wear Measurement Techniques

Chain Elongation Measurement

1. Identify a chain section that can be safely accessed during shutdown
2. Measure the distance between 10 hanger points (or 10 chain links)
3. Compare to the original installation measurement
4. Calculate elongation percentage: $((\text{Current} - \text{Original}) / \text{Original}) \times 100$
5. Record on the chain inspection map

ELONGATION	ACTION REQUIRED
0% – 2%	Normal wear – no action needed
2% – 5%	Monitor – increase inspection frequency
5% – 8%	Plan replacement at next shutdown
8%+	Replace immediately – failure risk is high

Link Cross-Section Measurement

1. Use calipers to measure wire diameter at the thinnest point of 5 random links
2. Compare to original diameter specification
3. Calculate section loss percentage

SECTION LOSS	ACTION REQUIRED
0% – 10%	Normal wear
10% – 20%	Monitor closely

20%+

Replace chain section

3. Hanger & Shackle Inspection

- ☐ Inspect all hanger welds for cracking or heat damage
- ☐ Check hanger pin holes for elongation (wear)
- ☐ Inspect shackles for cracking, especially at the pin hole
- ☐ Verify all cotter pins are intact — replace any missing
- ☐ Check for hanger bracket erosion or material loss
- ☐ Measure hanger wear — replace at 25% section loss

4. Common Failure Modes

FAILURE	CAUSE	PREVENTION
Chain breakage	Excessive wear, thermal fatigue, overstress	Regular measurement, correct grade selection
Hanger failure	Weld cracking, thermal stress, vibration	Weld inspection, hanger replacement program
Shackle failure	PIN wear, cracking at stress concentration	Shackle replacement during shutdowns
Excessive stretching	High temperature exceeding grade limit	Verify grade matches zone temp, upgrade if needed
Chain tangle	Improper installation, broken hanger	Correct installation, hanger inspection
Shell contact	Chain too long, hanger wear, elongation	Clearance check, chain length adjustment

5. Shutdown Inspection Checklist

- ☐ Kiln cooled to safe access temperature
- ☐ Confined space entry permit obtained
- ☐ All chains visually inspected for breakage
- ☐ Elongation measured on 10% of chains per zone
- ☐ Link cross-section measured on 5 random links per zone
- ☐ All hangers inspected for weld integrity
- ☐ All shackles inspected for cracking
- ☐ Clearance between chain and shell verified (150mm min)
- ☐ Chain map updated with measurements and observations
- ☐ Replacement chains ordered for sections exceeding wear limits
- ☐ Photos taken of any anomalies for engineering review

MAINTENANCE PLANNING SUPPORT

Uniking Canada provides kiln chain inspection support and replacement planning.

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