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MAINTENANCE TIPS

Crusher Liner Backing Compound: Proper Application for Maximum Liner Life

Apply crusher backing compound correctly. Material selection, mixing, pouring, and curing procedures for cone and gyratory crusher liners.

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Backing compound is a critical yet frequently overlooked component in crusher liner installation. Properly applied backing compound ensures complete contact between the liner and crusher frame, distributing crushing forces evenly, preventing premature liner failure, and extending both liner and frame life. Understanding backing compound types, application procedures, and common mistakes enables maintenance teams to maximize liner performance.

Understanding the Role of Backing Compound

Why Backing Compound Is Essential

Crushing forces create enormous stress concentrations where liners contact the crusher frame. Without proper backing:

PROBLEM	CAUSE	CONSEQUENCE
Point loading	Voids between liner and frame	Liner cracking and premature failure
Liner movement	Incomplete support	Accelerated wear, loose fasteners
Frame damage	Concentrated stress at contact points	Frame erosion, expensive repairs
Heat buildup	Air gaps prevent heat transfer	Thermal stress, material property changes
Vibration	Liner movement against frame	Noise, accelerated component wear

Force Distribution Analysis

Crushing forces in a cone crusher can exceed 2,000 kN. Distribution matters significantly:

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Without backing compound:
Contact area: 20% of liner back surface
Stress concentration: 5× average stress
Risk: Liner cracking, frame damage

With proper backing:
Contact area: 95%+ of liner back surface
Stress distribution: Near-uniform
Result: Full liner life, protected frame
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Types of Backing Compound

Epoxy-Based Backing Compounds

Most common type for crusher liner backing:

PROPERTY	STANDARD EPOXY	HIGH-TEMPERATURE EPOXY
Compressive strength	80-100 MPa	70-90 MPa
Temperature limit	80-100°C	150-180°C
Working time (pot life)	20-45 minutes	30-60 minutes
Cure time (full strength)	24-48 hours	48-72 hours

PROPERTY	STANDARD EPOXY	HIGH-TEMPERATURE EPOXY
Mix ratio	Varies by product	Varies by product

Advantages of epoxy backing:

- Excellent compressive strength
- Good adhesion to steel and manganese
- Self-leveling properties fill voids effectively
- Chemical resistance to crusher environment
- Reasonable working time for installation

Zinc-Based Backing Compounds

Traditional option still used in some applications:

PROPERTY	ZINC ALLOY	NOTES
Compressive strength	200-250 MPa	Higher than epoxy
Temperature limit	Melting point ~400°C	Excellent heat resistance
Application method	Molten pour	Requires melting equipment
Working time	Minutes	Fast solidification

Zinc backing considerations:

- Requires specialized melting equipment (450-500°C)
- Safety concerns with molten metal handling
- Faster installation once melted
- Difficult removal for liner changeouts
- Higher material density adds weight

Polyurethane-Based Backing

Alternative for specific applications:

PROPERTY	POLYURETHANE	NOTES
Compressive strength	40-60 MPa	Lower than epoxy
Flexibility	Some deflection allowed	Absorbs impact better
Temperature limit	70-90°C	Lower than epoxy
Removal	Easier than epoxy	Beneficial for frequent changes

Surface Preparation Requirements

Frame Surface Preparation

Proper frame preparation is critical for backing compound adhesion and performance:

Step-by-step frame preparation:

1. **Remove old backing completely:**
   - Chisel out bulk material
   - Grind remaining residue to bare metal
   - Check for frame damage or wear
2. **Clean surface thoroughly:**
   - Wire brush to remove rust and scale
   - Degrease with solvent cleaner
   - Allow complete drying
3. **Repair any frame damage:**
   - Build up worn areas with weld metal
   - Grind smooth to proper profile
   - Document significant wear for future reference
4. **Apply release agent to overflow areas:**
   - Wax or grease on areas where compound overflow is not wanted
   - Protects threads and mating surfaces

Liner Preparation

New liners require preparation for optimal backing adhesion:

1. **Remove mill scale and rust:**
   - Wire brush or sandblast back surface
   - Remove casting flash and high spots
2. **Clean thoroughly:**
   - Degrease with appropriate solvent
   - Remove all oil and cutting fluid residue
3. **Check liner fit:**
   - Trial fit liner before backing application
   - Verify adequate gap for backing compound (typically 3-6mm)
   - Identify any interference points

Backing Compound Application Procedure

Mixing Procedure

Proper mixing is critical for backing compound performance:

Pre-mixing checks:

- Verify product is within shelf life
- Check storage temperature requirements met
- Ensure sufficient quantity for application
- Confirm ambient temperature within recommended range

Mixing steps:

1. Use clean mixing containers and tools
2. Measure components accurately per manufacturer ratio
3. Mix resin component thoroughly before adding hardener
4. Combine components and mix for specified time (typically 3-5 minutes)
5. Scrape container sides and bottom during mixing

6. Avoid entraining air during mixing

Critical mixing parameters:

PARAMETER	CONSEQUENCE IF INCORRECT
Wrong mix ratio	Incomplete cure, soft compound
Insufficient mixing	Soft spots, poor adhesion
Contamination	Cure inhibition, weak bond
Air entrapment	Voids, reduced strength
Temperature too low	Extended cure, incomplete crosslink

Pouring Technique

Proper pouring ensures complete void filling without trapped air:

1. **Position liner correctly:**
   - Center liner in frame with proper gap all around
   - Support liner at correct height for gap
   - Seal bottom gap to contain compound
2. **Pour from lowest point:**
   - Start pouring at lowest point of gap
   - Allow compound to flow and fill upward
   - Pour slowly to avoid trapping air
3. **Continue until full:**
   - Fill until compound appears at vent holes
   - Slight overfill ensures complete filling
   - Watch for air bubbles indicating incomplete fill
4. **Allow proper cure time:**
   - Do not disturb during initial cure (2-4 hours minimum)
   - Full cure typically 24-48 hours at 20°C
   - Cold temperatures extend cure time significantly

Gap Requirements

Proper backing gap ensures adequate compound volume:

CRUSHER TYPE	COMPONENT	RECOMMENDED GAP
Cone crusher	Mantle	6-10mm uniform
Cone crusher	Bowl liner	6-12mm uniform
Jaw crusher	Jaw plates	3-6mm behind plate
Gyratory	Mantle	8-15mm uniform

Common Application Mistakes

Mistake 1: Inadequate Surface Preparation

Symptoms:

- Backing compound separates from frame during operation
- Liner movement despite proper backing quantity
- Early liner cracking from stress concentration

Prevention:

- Always remove ALL old backing material
- Clean to bright metal on frame surfaces
- Degrease thoroughly and allow to dry

Mistake 2: Improper Mix Ratio

Symptoms:

- Backing remains soft after cure time
- Sticky or tacky surface
- Compound crumbles under load

Prevention:

- Use manufacturer's measuring containers
- Verify ratio before each application
- Train personnel on proper procedures

Mistake 3: Air Entrapment

Symptoms:

- Voids visible when liner removed
- Localized liner wear or cracking
- Hollow sound when tapping liner

Prevention:

- Pour slowly from lowest point
- Provide adequate vent holes
- Use proper gap dimension for flow

Mistake 4: Cold Temperature Application

Symptoms:

- Extended cure time
- Incomplete cure
- Reduced final strength

Prevention:

- Check minimum application temperature (typically 10-15°C)
- Pre-warm components and crusher if needed
- Use cold-weather formulations when available

Mistake 5: Insufficient Gap

Symptoms:

- Incomplete backing fill
- Compound squeeze-out leaves voids

- Metal-to-metal contact points

Prevention:

- Trial fit liner before backing
- Grind high spots on liner back
- Use proper shims or spacers

Backing Compound for Different Crusher Types

Cone Crusher Mantle Backing

Cone crusher mantles require full backing support:

- **Gap requirement:** 6-10mm uniform around mantle
- **Pour sequence:** Bottom to top, multiple pour points if needed
- **Vent requirements:** Top vent holes to release air
- **Cure before operation:** Minimum 24 hours at 20°C

Cone Crusher Bowl Liner Backing

Bowl liners require careful installation due to inverted position:

- **Gap requirement:** 6-12mm uniform
- **Sealing:** Bottom seal critical to contain compound
- **Pour method:** Multiple points around circumference
- **Air release:** Work compound to release trapped air

Jaw Crusher Backing

Jaw plates typically use thinner backing layer:

- **Gap requirement:** 3-6mm behind plate
- **Challenges:** Large flat area, tendency for air entrapment
- **Technique:** Tilt frame slightly, pour from low point
- **Alternative:** Some applications use shim plates instead of compound

Backing Removal Techniques

Mechanical Removal

Standard method for backing removal during liner change:

1. **Chisel bulk material:** Air chisel removes major portions
2. **Grind remaining residue:** Angle grinder with cup wheel
3. **Inspect frame condition:** Document any wear or damage
4. **Clean for new backing:** Wire brush, degrease

Heat-Assisted Removal

For stubborn backing or large volumes:

- Moderate heating (150-200°C) softens epoxy backing
- Reduces effort required for mechanical removal
- Avoid excessive heat that could affect frame metallurgy

Quality Verification

Post-Installation Checks

CHECK	METHOD	ACCEPTANCE CRITERIA
Complete fill	Visual inspection of vent holes	Compound visible at all vents
Cure verification	Shore D hardness test	Per manufacturer specification
Void detection	Tap test with hammer	Solid sound, no hollow areas
Adhesion check	Visual inspection of edges	No separation from frame or liner

Documentation Requirements

Record the following for each backing application:

- Product used (manufacturer, lot number)

- Mix ratio verified
- Ambient temperature at application
- Cure time provided
- Technician performing work
- Any deviations or issues noted

Proper backing compound application is essential for maximizing crusher liner life and protecting the crusher frame. The investment in proper surface preparation, quality materials, and correct application procedures delivers significant returns through extended liner life, reduced unplanned downtime, and avoided frame damage.

Topics: #Backing Compound #Cone Crusher #Liner Installation #Maintenance

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