# Alkali Attack in Cement Kilns: What to Check Before Changing Your Refractory Specification

Reviewed version: 28 September 2026. Companion reading copy, not a product datasheet or compliance certificate.

Web article and current requirements

Suspected alkali damage is a reason to investigate the lining and process together-not a reason to order a higher-alumina material on the strength of a brochure. Start with the installation location, operating history and a traceable specification.

This guide helps maintenance and purchasing teams prepare a material review. It does not prescribe a universal formulation, predict campaign life, or report a Vuulcan field trial.

## Why the equipment location matters

Refractory selection for cement equipment must consider chemical exposure alongside abrasion, temperature and operating conditions. Alkalis, chlorine and sulphur are relevant to corrosion assessment; the inlet chamber, calciner and cooler do not share one uniform duty. Calderys' cement application guidance describes these location-dependent requirements.

Identify the actual damaged component and lining construction before describing it as a "transition-zone problem." Do not use one feed-analysis value or one assumed temperature to select material across the kiln system.

## Collect evidence before assigning a failure cause

Record the failure location, its progression and the conditions that changed. Photographs help locate damage but cannot, on their own, prove its chemistry.

| Input | What to provide | What it helps establish |
|---|---|---|
| Equipment and location | Component name, marked drawing and lining type | Which duty and specification are being reviewed |
| Operating history | Temperature records, starts/stops and recent fuel or process changes | Whether changed conditions coincide with damage |
| Process materials | Available feed, fuel and deposit analyses with sample dates | Evidence of exposure, rather than an assumed universal threshold |
| Existing lining | Grade, controlled datasheet, batch records, thickness and installation records | What was specified and what was actually installed |
| Failure evidence | Location-tagged photographs and available laboratory findings | A basis for specialist assessment, not a diagnosis from colour alone |

Where testing is needed, agree the question, sampling procedure and interpretation with a competent laboratory or responsible engineer. A measurement without a representative sample or relevant acceptance criterion should not become a purchasing rule.

## Why alumina percentage is not a complete specification

Two products with similar headline chemistry need not have the same behaviour in service. HWI's castable engineering guidance explains that formulation, bonding, application conditions and installation all contribute to performance. A higher value for one property is not a universal upgrade.

For a proposed substitution, request a controlled datasheet and a written comparison against the actual purchase specification. Separate typical data from guaranteed acceptance limits and compare results at the same test conditions.

## Questions to resolve with the material supplier

1. Is the proposed grade intended for the stated equipment location and exposure?

2. Which specification clauses are met, which are different, and which require confirmation?

3. What relevant test evidence is available, and does it cover the proposed grade?

4. Are the installation method and approved curing/dryout instructions compatible with the project?

5. Who approves the change: the plant, its designer, its contractor, or another responsible party?

A supplier recommendation is not the project owner's acceptance of a deviation. Keep the comparison and approval with the quotation record. Where the operating input is incomplete, request clarification or an explicitly conditional proposal.

## Field evidence: what can support a comparison

This article does not offer a verified Vuulcan campaign-life case study. If a supplier cites a reference installation, ask for the material grade, location, service conditions, installation method, comparison basis and permission to use the reference.

A result from another plant is context, not a guaranteed outcome for the current project. Where the evidence cannot be shared or checked, leave the claimed benefit unconfirmed.

## Compare cost with project data, not a generic savings claim

Use current quotations and the plant's own records. Document whether each figure is measured, quoted or assumed. A practical comparison can include material and freight, removal and installation, inspection, planned outage time and subsequent repairs.

| Comparison item | Evidence needed |
|---|---|
| Delivered material cost | Same quantity, commercial basis, currency and scope |
| Installation and outage | Contractor quotation and the plant's agreed costing basis |
| Expected service period | Relevant documented history or a clearly labelled scenario |
| Uncertainty | Alternative scenarios showing how the decision changes |

If service life is unknown, do not convert an optimistic estimate into a guaranteed saving. The minimum improvement needed to justify a premium can be assessed as a scenario; it is not evidence that the improvement will occur.

## Prepare a quotation request

Send the material grade or specification, equipment location, dimensions or lining thickness, quantity and unit, drawing revision, required documentation, destination and required delivery date. For an engineering substitution, include operating and failure information.

Ask the supplier to identify compliance, deviations, document availability and the scope of supply before confirming an order. Material supply, lining design, installation supervision and dryout services are separate responsibilities.

## Sources and limits

- Calderys: cement refractory applications - industry context, not Vuulcan capability evidence.

- HWI: What Makes a Great Castable? (September 17, 2026) - formulation/application context, not a transferable service-life guarantee.

This is general procurement guidance. Plant-specific diagnosis, material selection and installation changes require review by the parties responsible for the equipment and project.

Submit a material specification or list for review · Availability, compliance, documents and quotation timing remain subject to confirmation.

General procurement guidance. Source scope is stated above. Product availability, compliance, documentation and quotation timing require confirmation against the current project.

## Frequently asked questions

### Does a higher alumina percentage prevent alkali damage?

It is not sufficient evidence by itself. Review the complete grade, exposure, applicable test data and installation requirements before approving a substitution.

### Can the damaged brick's colour confirm alkali attack?

No. Treat photographs and appearance as observations. A responsible technical assessment should consider process history and relevant testing before assigning the cause.

### Is there one feed-alkali threshold that selects the right grade?

This guide does not establish a universal threshold. The equipment location and actual operating conditions must be assessed with the proposed material's evidence.

### Can an alkali-resistant grade guarantee a longer campaign?

Not on the basis of the product label alone. A performance commitment requires an agreed scope, relevant evidence and defined operating and installation conditions.

### Can standard and alkali-resistant materials be used in one lining?

Do not adopt a generic zoning percentage. Submit the proposed layout, material interfaces and installation requirements to the responsible designer for review.

### What should the purchasing team ask first?

Confirm the duty and specification, the supplier's deviations and evidence, and the commercial and delivery scope. Leave unverified performance benefits explicitly unconfirmed.