

Dust hazard analysis: sample excerpt

Fictional flour mill · desk analysis to NFPA 660 (2025), Chapters 7 and 21, prepared for a US consultancy's qualified person

FICTIONAL EXAMPLE. Invented facility, invented documents and photographs; material values are literature values for illustration only. This is not a dust hazard analysis of any real facility and it has not been reviewed by a qualified person.

This excerpt shows the format and depth of our desk analysis: one process system worked through, one building compartment check, and part of the recommendations and assumptions. The full fictional example covers four process systems and two compartments in 31 pages.

Document	AX-EXAMPLE-2610 · Rev. A · 2026-10-23
Facility	Example Flour Mill (fictional): wheat flour mill, about 8,000 cwt/day ($\approx$ 363 t/day)
DHA type	5-year review and update (NFPA 660 7.1.4)
Standards	NFPA 660 (2025) Chapters 1–10 and 21; OSHA 29 CFR 1910.272 (a)–(n)
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Reviewed and approved by	The consultancy's qualified person (not reviewed: fictional)

Summary of findings

4 process systems and 2 compartments reviewed; 14 DHA entries, 9 with a hazard present; 19 recommendations (priority 1: 3, priority 2: 12, priority 3: 4). 12 essential documents were still missing and 8 assumptions are open for verification on site.

Act now (priority 1): deflagration protection for the receiving leg L-1 (R-01); housekeeping on the sifter floor, where accumulation exceeds the threshold (R-15); and no compressed-air blowdown while machinery runs (R-16).

Accumulation check: BC-02 sifter floor (NFPA 660 7.3.4.2.1)

Floor area	Layer	Area covered	Threshold (21.8.4.2.1.1)	Result
900 m ²	4.0 mm (0.157 in.)	60 m ² = 6.7% of the footprint	3.2 mm (1/8 in.) over 5%	Exceeds threshold

Process system PS-01: receiving bucket elevator L-1

Lifts raw wheat from the receiving pit to the cleaning-house scale; rated 8,000 bu/h (≈ 218 t/h). Inside leg, boot in a below-grade tunnel, head in the head house. Speed switch and head bearing sensors; no deflagration protection.

Material	Basis	Kst / St	Pmax	MEC	MIE	MIT cloud / layer	Note
M-02 Grain dust (wheat) from aspiration and DC-1	Literature, indicative	131 / St 1	9.2	125	not reported	510 / 300	Fines may be St 2 (A-02). Source: GESTIS no. 103.
M-03 Wheat, bulk raw grain	Assumed	—	—	—	—	—	Bulk grain; its dust is M-02.

DHA-01 · PS-01 Receiving bucket elevator L-1 · Head section and casing (inside leg)			
Hazard: Deflagration in equipment Present: Yes Risk: S4 × L2 = 8 (medium) Priority: 1 – Act now			
Location	BC-01 head house; casing through floors	Material	M-02, M-03
Suspension mechanism / dust source	Bucket discharge at the head and loading at the boot suspend grain dust inside the casing in normal operation.		
Credible ignition sources	MF: choked leg, belt slip on the head pulley, belt rubbing the casing, buckets striking the casing. HS: overheated head bearing. TM: tramp metal. HW: work on the leg.		
Credible scenario	Choke or misalignment → belt slips → friction heats belt or lagging → dust cloud in the head ignites → deflagration. The casing is not vented, so it can rupture and release flame and pressure into the head house.		
Safe operating range (7.3.1(2)(a))	Belt speed ≥ 80% of normal (speed switch). Feed ≤ rated 8,000 bu/h. Bearing alarm setpoint not provided (DR-17).		
Safeguards: prevention	Speed switch stops the drive and alarms at 80% of normal speed (feed-stop interlock not confirmed). Head bearing temperature sensors. Lagged head pulley. Grate and magnet at the receiving pit.	Safeguards: protection	None: no venting, suppression or isolation on the leg.
Gaps (clause)	21.9.4.14.2.1: inside leg handling bulk raw grain without venting to NFPA 68 or protection to NFPA 69. 21.9.4.14.1.12(A),(B): no boot bearing monitor, no belt or pulley alignment monitors. 21.9.4.14.1.10: belt and lagging resistivity not documented.		
Recommendations	R-01, R-02, R-03	Assumptions, data refs	A-03; D-04; P-01 to P-04

Recommendations (excerpt)

Rec.	Recommendation, reasoning and plan	Basis	Priority · type	Owner · target
R-01 DHA-01	Provide deflagration protection for leg L-1: venting to NFPA 68 where the casing can vent to the outside, or an explosion protection system to NFPA 69 (for example suppression with isolation). Start with an engineering study. Why: Inside leg handling bulk raw grain with no protection; a casing rupture would release flame and pressure into the occupied head house and could start a secondary explosion (DHA-12). Plan: Study by the target date, installation at the next planned shutdown. Interim: confirm the speed-switch feed-stop interlock and add a daily belt and bearing check.	NFPA 660 21.9.4.14.2.1; NFPA 68; NFPA 69	1 – Act now Engineering Open	Plant engineering 2027-01-31
R-16 DHA-13	Stop compressed-air blowdown while machinery runs; allow it only after shutdown and ignition source control, and only where the conditions of 21.8.4.2.6.2 are met. Why: Blowdown during operation creates the cloud that the flash fire scenario needs. Plan: Immediate instruction to all shifts.	NFPA 660 21.8.4.2.6; OSHA 1910.272(j)(3)	1 – Act now Administrative Open	Production 2026-11-15

Assumptions (excerpt)

ID	Assumption (used in)	Why it was made	Effect if wrong	How to verify
A-01 Open	Material properties of M-01, M-02 and M-04 are taken from GESTIS-DUST-EX literature records. Used in: All DHA rows; R-05	No client test reports (DR-09).	Actual dust may be finer or drier and more reactive; vent and isolation design could be undersized.	Test representative samples (R-05).
A-06 Open	Dust layer thickness and covered areas are estimated from photos with a scale. Used in: Compartments; DHA-12, DHA-13; R-15	No measurements on site.	BC-01 could also exceed the threshold.	Measure on site with a depth gauge; record in the housekeeping log.

This assessment is based on the documents provided; on-site verification is the client's responsibility. Every report lists the documents it relies on and the assumptions made where information was missing. The consultancy's qualified person leads the analysis, visits the facility, reviews this work and signs.