Strengthening Combustible Dust Safety in Workplaces

Responsible Care® Approach to Combustible Dust Safety

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Presentation Outline

- Policy
- Hierarchy of Risk Control
- Process Safety
- Provision of Information
- Management of Risk
- Training
- Stakeholder Engagement
- Review, Continuous Improvement

PROCESS SAFETY CULTURE

Values, attitudes, behaviours and norms shared by individuals and groups within an organisation that collectively shape how Process Safety is managed.

Key characteristics/requirements:

- leadership commitment, visibility and accountability
- employee involvement and empowerment
- trust and mutual respect

Safety culture is how the organisation behaves when no one is watching

Policy

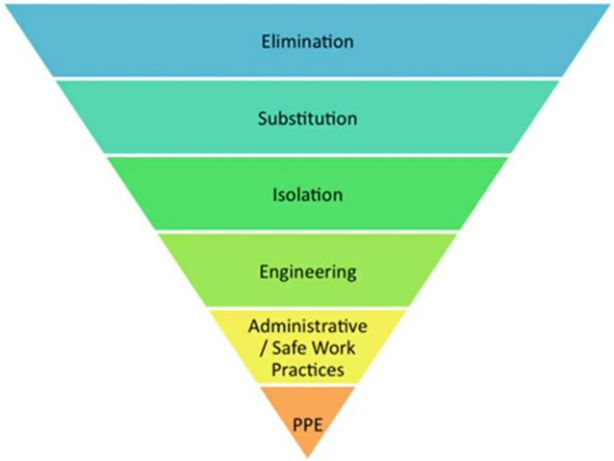
- clear, written policy and documented HSE Management System that includes all aspects of combustible dust safety
- detailed procedures for handling, storing and processing of combustible dust
- *compliance with international and local standards and industry good practices (SS667:2020 – Code of Practice for Handling, Storage and Processing of Combustible Dust)*

Dust Explosion Pentagon

Hierarchy of Risk Control

- Elimination
  - avoid or eliminate dust-producing processes
- Substitution
  - explore alternative processes or products that generate less or non-combustible dust
- Isolation
  - install physical barriers / segregation
  - e.g. blast walls, sealed enclosure
- Engineering Control
  - appropriate design and maintenance of dust collection systems
  - effective ventilation to prevent dust clouds
  - work area that minimise dust accumulation

Hierarchy of Risk Control



- Administrative Control
  - ✓ Permit-to-Work system
  - ✓ implement a combustible dust inspection and control programme
  - ✓ implement an ignition control programme
  - ✓ manage static electricity through bonding and earthing (grounding)
- Personal Protective Equipment
  - ✓ provide and ensure correct use of appropriate PPE
  - ✓ e.g. respirators, flame-resistant/retardant uniform, anti-static safety shoes

Process Safety

- assess and manage risks associated with processes to minimise major accident hazard
- strategies based on Dust Explosion Pentagon
- control ignition sources
  - eliminate or control potential ignition sources
  - including proper electrical equipment and bonding/earthing
- control dust accumulation and dispersion
  - implement engineering controls, e.g. dust collection system, ventilation
  - implement administrative controls, e.g. housekeeping practices
- containment and explosion protection
  - design equipment and facilities to minimise dust clouds
  - explosion protection systems

Process Safety

- Process and Facility Design
  - Design for Safety, Inherently-safer design/processes
- Process Safety Information
- Hazard Identification and Risk Assessment – Dust Hazard Analysis
- Prevention Strategies (eliminate / control)
  - dust control / collection system, control of ignition source
- Mitigation Strategies
  - explosion / deflagration venting, suppression, isolation
- Administrative Controls
  - Permit-to-Work, Safe Work Procedures
- Training / Culture
  - education, awareness, culture of reporting (incl. near misses)
- Management of Change
- Emergency Response
- Incident Investigation / Learning from Incidents
  - share lessons learnt, learn from others

Provision of Information

- provide relevant health, safety and environmental information on products and activities to stakeholders
- proper labelling of combustible dusts with hazard warnings and precautionary measures

  - ✓ Physical and Chemical Properties
  - ✓ Explosion Characteristics
  - ✓ Process and Equipment Information
  - ✓ Safety Systems and Controls
  - ✓ Operating Limits and Conditions
  - ✓ Storage and Handling Data

Management of Risk

- managing the risk of dust explosions is a critical aspect of Process Safety
  - systematic approach to identify, assess, control and monitor dust explosion hazards
- Dust Hazard Analysis
  - systematic evaluation to identify and assess combustible dust risks
- Risk Assessment and Management
  - identifying potential hazards, assessing their severity and likelihood
  - implementing control measures

Training

- ✓*Dust Explosion Basics*
- ✓*Hazard Identification*
- ✓*Prevention and Protection Systems*
- ✓*Safe Work Practices*
- ✓*Equipment Integrity*
- ✓*Emergency Response*
- ✓*Regulatory Requirements*

- Safe Work Practices
  - safe methods for cleaning, handling spills and reporting unsafe conditions
- Awareness and Education
  - ensuring awareness of combustible dust, its hazards and how to reduce risks
- Empowerment
  - encouraging employees to report concerns and actively participate in safety efforts

Stakeholder Engagement

- crucial to successfully manage dust explosion risks
  - ✓ everyone on the same page
- shared understanding of dust explosion risks
- buy-in for safety measures and investments
- ensure cross-functional collaboration (Operations, Maintenance, HSE, business/commercial)
- Key Stakeholders
  - ✓ Operations, Maintenance, Engineering
  - ✓ HSE
  - ✓ Contractors
  - ✓ regulatory agencies, trade associations, community groups/leaders

Review, Continuous Improvement

GO beyond compliance

- Performance Indicators
  - setting, maintaining and regularly reviewing performance indicators
  - **“You can't manage what you don't measure”**
- Learning from Incidents
  - investigating dust-related incidents or near-misses to identify root causes and implement corrective actions
- Risk Assessments and Audits
- Review of Safety Systems (Ventilation, Suppression, Isolation)
- Training and Competency Development
- Management of Change (Normalisation of Deviation)
- Management Review

Continuous improvement is essential for managing dust explosion hazards, ensuring that safety systems remain effective and evolve in response to new risks and regulatory changes

Responsible Care® is the global chemical industry's voluntary initiative to drive continuous improvement in safe chemicals management