

30 July 2025

Legislative Requirements on the Safe use of Combustible Dust

Kee Zhi Yong

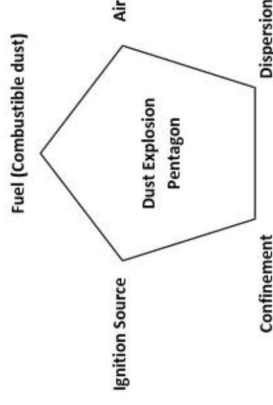
OSHD, Major Hazards Department



*Empowered Workforce,
Thriving Workplaces*

Learning from the catastrophic incident

- The 24 Feb 2021 accident resulted in three deaths, five major injuries, two minor injuries, and severe property damage
- The explosion of the mixer machine ignited combustible potato starch powders in the workshop, leading to secondary flash fires



Source: CNA



Source: The Straits Times



10 people suffer burns after 'loud explosion' at Tuas industrial building



Source: CNA



Tuas Inquiry Committee recommendations



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About us

Government Accepts Recommendations by the Tuas Explosion Inquiry Committee

25 March 2022 | Workplace safety and health

1. The Inquiry Committee (IC) appointed to look into the fatal explosion and fire at 32E Tuas Avenue 11 on 24 February 2021 has submitted its report to the Minister for Manpower. After carefully reviewing the IC's recommendations, the Government has accepted all of them.

Background

2. On 24 February 2021, eight workers at manufacturing company Stars Engrg Pte Ltd ("Stars Engrg") were preparing a mixer machine to mix potato starch powder with heated water, in order to produce a compound to manufacture fire retardant sheets. An explosion occurred in the process, killing three workers, injuring seven others, and causing severe damage to the building structure.

Revised legislation to effect these recommendations

Annex

Recommendations by the IC


- a) Encourage buyers of industrial equipment to certify their equipment to the machinery safety standard SS 537-1¹;
- b) Review and expand the Fifth Schedule of the Workplace Safety and Health Act² to include higher-risk machineries, such as those powered by mechanical, electrical, hydraulic or pneumatic energy;
- c) Require suppliers of materials that pose a defined level of combustible dust hazard to include a label explicitly informing others of the hazard before selling or redistributing those materials;
- d) Require companies that handle prescribed amounts of specified combustible powders to register or notify the authorities;
- e) Require occupiers to inform building owners or landlords about the use of combustible powders; and
- f) Put in place more outreach and guidance efforts for Small and Medium Enterprises, as well as workers who may be at risk.



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SINGAPORE

Combustible dust, high-risk machinery: MOM introduces more measures to strengthen workplace safety in manufacturing



A worker handles a drum used to store combustible dust, which must be labelled to state associated hazards from January 2025.
PHOTO: AsoOne/Ong Chin Wee

THE STRAITS TIMES SINGAPORE

New rules in place to protect workers handling higher-risk machinery, combustible dust

Sharon Salim

UPDATED NOV 29, 2024, 08:02 PM -



SINGAPORE – From Jan 1, 2025, companies must follow new rules to ensure safer use of higher-risk machinery and combustible dust.

Following a 2021 Tuas explosion that killed three workers, suppliers and manufacturers dealing with combustible dust must label related packages or containers to communicate its dangers and how to use it safely, said the Ministry of Manpower (MOM) on Nov 29.

From 1 January 2025, the list of hazardous substances in the Fifth Schedule of the WSH Act is expanded to include combustible dust. Duties of manufacturers and suppliers will also be extended to include combustible dust.

- **Labelling for combustible dust:** Statement "**Warning: May form explosible dust-air mixture if dispersed**" needs to be explicitly stated on the label.
- **Notification on use of combustible dust:** Factories that handle, sort, pack, store, process, manufacture or use combustible dust specified in the Fourth Schedule of the WSH (General Provisions) Regulations at or above the prescribed threshold quantity will be required to notify MOM and the owner of the factory such as the building owner or landlord.



Legislation relevant to combustible dust hazard at the workplace

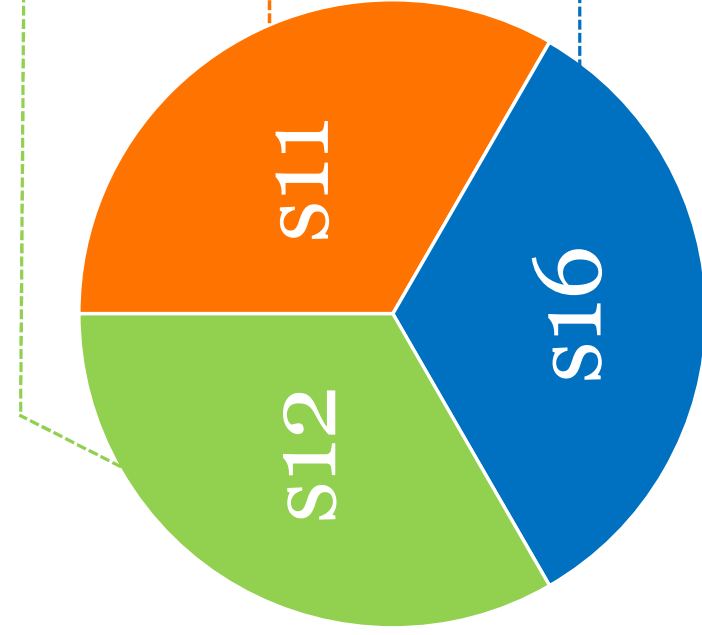
Workplace Safety and Health Act (WSH Act)

WSH (Risk Management) Regulations

WSH (General Provisions) Regulations

WSH (Incident Reporting) Regulations

WSH Act - dutyholders at workplaces



Duties of employer

- Ensure the safety and health of his employees at work

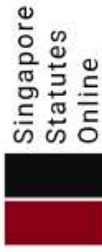
Duties of occupier

- Ensure workplace is safe and without risks to health to every person within the premises

Duties of manufacturers and suppliers of machinery, equipment or hazardous substances used at work

- Provide information about the safe use of the hazardous substance to whom the hazardous substance is supplied for use at work. Combustible dust – New addition to 5th Schedule





		Sections 16(9), 17(7) and 64(1)
FIFTH SCHEDULE		
MACHINERY, EQUIPMENT OR HAZARDOUS SUBSTANCES		
⋮		
PART 2		
HAZARDOUS SUBSTANCES		
⋮		
1. Corrosive substances		
2. Flammable substances		
18. Combustible dust	↓	
		<i>[S 929/2024 wef 01/01/2025]</i>

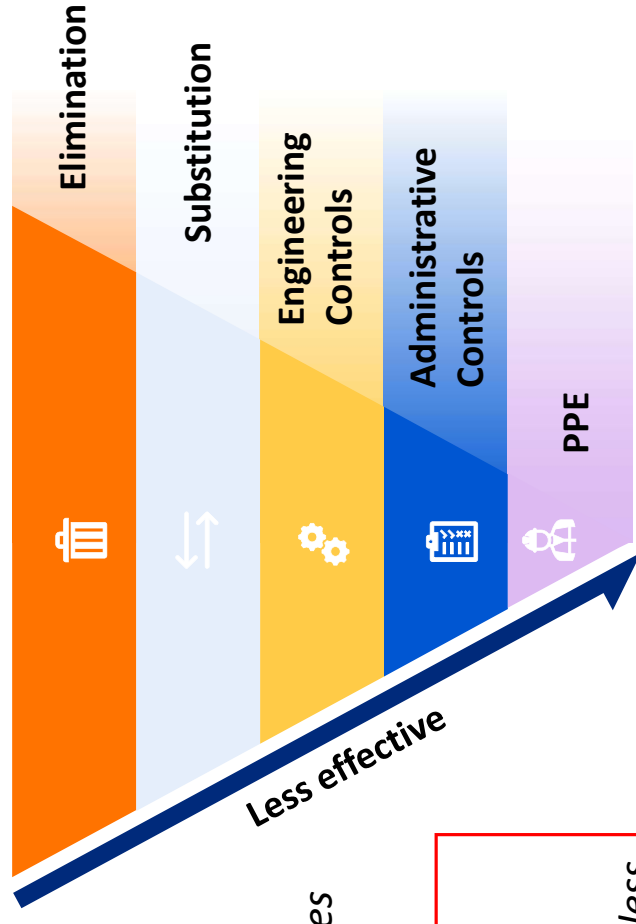
Combustible dust is added to the list of **hazardous substances** in the Fifth Schedule of the WSH Act



WSH (General Provisions) Regulations

Provisions relating to combustible dust hazard:

- *r26: Precautions with regard to explosive or flammable dust, gas, vapour or substance*
- *r38: Safety provisions in case of fire*
- *r39: Toxic dust, fumes or other contaminants*
- *r40: Permissible exposure levels of toxic substances*
- *r41: Hazardous substances*
- *r42: Warning labels*
- *r43: Safety data sheet*
- *r44(1A): Exclusion on label for containers storing less than 25kg of organic combustible dust*
- *r44AA: Notify MOM and owner of factory*



Fourth Schedule of the WSH (General Provisions) Regulations

FOURTH SCHEDULE

Regulation 2

THRESHOLD QUANTITY OF COMBUSTIBLE DUST

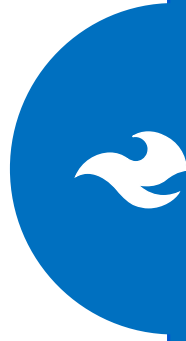
PART 1

ORGANIC SUBSTANCES

<i>First column</i> Substance	<i>Second column</i> Threshold quantity of combustible dust derived from substance
1. Alfalfa	100 kilograms
2. Apple	
3. Beetroot	
4. Carbon black	
5. Carrageenan	
6. Carrot	
7. Cereals (for example, barley, corn, oat, rice, rye and wheat) and their derivatives	
8. Charcoal	
9. Coal	

List of [combustible dust and respective threshold quantities](#) for notification

Relevant clauses under WSH (General Provisions) Regulations grouped into three main categories



Explosive or flammable dust,
gas, vapour or substance and
fire safety

r26

r38



Measures to ensure exposures
are within Permissible
Exposure Levels + workplace
monitoring

r39

r40



Management of hazardous
substances and hazard
communication

r41

r42, r44(1A)

r43

r44AA



WSH (General Provisions) Regulations

r26 - Precautions with regard to explosive or flammable dust, gas, vapour or substance

- Enclosure of the plant used in the process
- Removal or prevention of accumulation of the dust, gas, vapour or substance
- Exclusion or effective enclosure of possible sources of ignition
- Use of suitable flame-proof equipment
- Restrict the spread and effects of explosion by the provision of chokes, baffles and vents, or other equally effective appliances in the plant

r38 - Safety provisions in case of fire

- Ensure good house-keeping
- Escape paths are free from obstruction



SS 667 - Code of Practice for handling, storage and processing of combustible dust

WSH (General Provisions) Regulations



MENU

Hygiene monitoring >

r39 - Toxic dust, fumes or other contaminants

- Take measures to control (e.g., upstream risk controls) and protect persons against inhalation of toxic airborne contaminants
- Clean dust, fibre or waste accumulated on surfaces using suitable means which will not make the dust airborne
- Regular workplace monitoring of toxic dust and fumes generated/present in the atmosphere

r40 - Permissible exposure levels of toxic substances

- Ensure persons at work are not exposed to toxic substances exceeding respective Permissible Exposure Level (PEL)

Toxic substances monitoring report

Companies that use or generate toxic substances at their workplace should regularly monitor and report these hazards.

At a glance

Who can submit	<ul style="list-style-type: none"> • Company representatives • Toxic substances monitoring officers
When to submit	Within 2 weeks after monitoring is completed
Related eService	<ul style="list-style-type: none"> ② Submit and manage toxic substances monitoring reports
Related documents	<ul style="list-style-type: none"> • Guidelines on sampling strategy and submission of toxic substances monitoring report (2) • Toxic substances monitoring report template (2)

FIRST SCHEDULE

Regulation 2 and 40

PERMISSIBLE EXPOSURE LEVELS OF TOXIC SUBSTANCES

Toxic Substance	Permissible Exposure Level (PEL)		
	PEL (Long Term) ppm ^a	PEL (Long Term) mg/m ³	PEL (Short Term) ppm ^b
Acetaldehyde	—	—	25
Acetic acid	10	25	15
Acetic anhydride	5	21	—
Acetone	750	1780	1000
Acetone cyanohydrin	—	—	4.7
Acetonitrile	40	67	60
Acetophenone	10	49	—
Acrylonitrile	1	14	—
Acrylonitrile butadiene styrene	0.1	0.23	0.3
Acrylamide	—	0.03	—
Acrylic acid	2	5.9	—
Acrylonitrile-Vinyl cyanide	2	4.3	—
Adipic acid	—	5	—
Adiponitrile	2	8.8	—

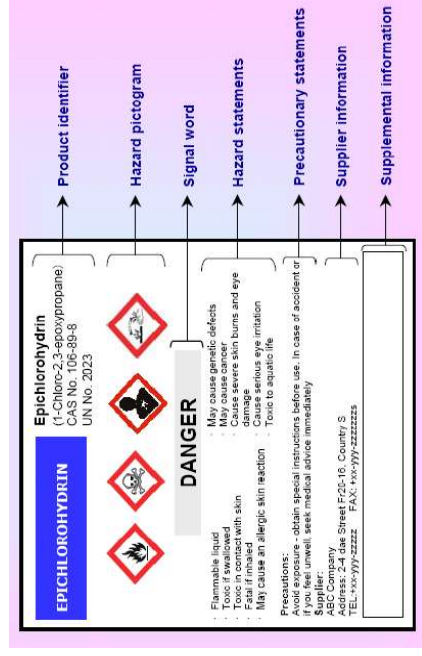


WSH (General Provisions) Regulations

- r41 – Hazardous substances**
 - Hazardous substances (*Combustible Dust – new*) shall be under the charge of a competent person
 - Hazardous substances shall be properly kept, stored, used and disposed
- r42, r44(1A) – Warning labels**
 - Containers of hazardous substances, including combustible dust, shall be labelled in accordance with SS 586 Part 2
 - Labelling is excluded for containers storing less than 25kg of organic combustible dust
- r43 – Safety data sheet**
 - Supplier shall provide SDS with accurate and adequate information
 - Occupier shall obtain the SDS, assess it and make it available to persons at work
- r44AA – Notify MOM and owner of factory**
 - Notify combustible dusts (4th Schedule) that meet or exceed the respective threshold quantities
 - 1 month before use and within 1 month after cessation of use*

*all 4th schedule dusts

Sample GHS Label



Storage
Store in a well-ventilated place. Keep container tightly closed. Store locked up.

Disposal
Dispose of contents/container in accordance with Singapore regulations.

Other hazards which do not result in classification:
May form explosive dust-air mixture if dispersed.

Inclusion of warning statement on combustible dust in Globally Harmonised System (GHS) label and SDS



1. NEW – Provision of information for hazard communication

A label is required on all containers of combustible dusts in any workplace, to:

- Warn of combustible dust hazard
- Communicate precautionary measures to be taken

A. For organic[^] (in packages of 25kg or more), non-hazardous[#] chemical or plastic combustible dusts

[^] Examples of organic dust include potato starch, flour, cocoa powder etc.

[#] Non-hazardous refers to substances not classified as hazardous under GHS e.g. lactose, polyethylene

Labels to warn of combustible dust hazard to include:

“Warning: May form explosive dust-air mixture if dispersed”

B. For metal, other chemical or plastic combustible dusts

A warning statement is required on the GHS* label and in the Safety Data Sheet* (SDS).

e.g. A GHS **label** for combustible dust
MAGNESIUM STEARATE

WARNING

- Causes skin irritation.
- Causes serious eye irritation.
- May cause respiratory irritation.
- Use only outdoors or in a well-ventilated area.
- Avoid breathing dust/fumes.
- Wear protective gloves, protective clothing, eye protection and face protection.
- Wash all exposed external body areas thoroughly after handling.
- Store in a well-ventilated place. Keep container tightly closed.

Warning: May form explosive dust-air mixture if dispersed.

XYZ CHEMICAL PTE LTD
123 Peace Road
Singapore 123456

Contact number: 65 612345678
Emergency contact number: 65 6000 789



e.g. SDS excerpt, from the Hazard Identification section

Storage
Store in a well-ventilated place. Keep container tightly closed. Store locked up.

Disposal
Dispose of contents/container in accordance with Singapore regulations.

Other hazards which do not result in classification:

May form explosive dust-air mixture if dispersed.

* For more info, refer to:

Singapore Standard 586 on Specification for hazard communication for hazardous chemicals and dangerous goods

– Part 2: Globally harmonised system of classification and labelling of chemicals – Singapore’s adaptations

– Part 3: Preparation of Safety Data Sheets (SDSs)



2. **NEW** – Notify MOM and building owners on use of combustible dusts (1/2)

Factories[#] handling the prescribed list of combustible dusts[^] that meet or exceed the respective threshold quantities, are required to notify MOM and building owners:

- a) At least one month before the use of combustible dusts in the premises
- b) Not later than 1 month after ceasing the use of all combustible dust in the premises

Details of combustible dust notification to MOM

Combustible dust info to include:

- 1) The types of combustible dust and
- 2) The respective quantities used within the premises

The workplace **combustible dust notification** is

- Via MOM's eService portal;
- A part of factory notification / registration; and
- Applicable to both new and existing factories
 - ✓ Existing factories – add combustible dust info to their factory licence details.
 - ✓ New factories – include combustible dust info when applying for factory notification/registration.
- Changes to combustible dust info: Factories to provide updates in their factory details, via the eService portal.

User guide



Refer to user [guide](#) to assist company on how to submit combustible dust notification using the [eService portal](#)

2. **NEW** – Notify MOM and building owners on use of combustible dusts (2/2)

Common queries from the Chemical and Process Industry on notification:

Q: Is notification required for transient handling of Fourth Schedule dusts (e.g. warehouses with short-duration product turnover)?

A: Yes, notification is required based on the maximum expected inventory at any given time.

Q: For metal substances, should I notify for the metallic dust (e.g. titanium, zinc), as well as the metallic compound in powder form (e.g. titanium dioxide, zinc sulphate)?

A: No, companies are only required to notify substances specifically named in the Fourth Schedule of the WSH (General Provisions) Regulations. In the case of metallic dusts, manganese dusts, aluminum dusts etc, require notifications as they are highly combustible in nature. Related compounds of the metallic dusts are not required to be notified.

Q: How should we calculate the total quantity of a Fourth Schedule dust when it is part of a mixture (e.g. polyethylene mixed with other compounds)?

A: For mixtures, companies should:

- Calculate and report the quantity of the pure prescribed dust based on composition;
- If the composition cannot be determined, report the total quantity of the mixture and include this information in the remarks section

Other FAQs



NEW – Threshold quantity of combustible dust that requires notification

Organic Combustible Dusts		Threshold quantity per substance
<ol style="list-style-type: none"> Alfalfa Apple Beetroot Carbon black Carrageenan Carrot Cereals (for example, barley, corn, oat, rice, rye and wheat) and their derivatives Charcoal Coal Cocoa Coconut and its derivatives Coffee Coke Cotton and its derivatives 	<ol style="list-style-type: none"> 15. Egg white 16. Garlic 17. Grains (malted) 18. Grains (spent) 19. Grass 20. Hops 21. Lemon peel or pulp 22. Linseed 23. Locust bean gum 24. Milk and its derivatives 25. Olive pellet 26. Onion 27. Parsley 28. Peach 	<ol style="list-style-type: none"> 29. Peanut 30. Peat 31. Potato and its derivatives 32. Soot 33. Soybean and its derivatives 34. Spice 35. Sugar 36. Sunflower seeds 37. Tapioca 38. Tea 39. Tobacco 40. Walnut 41. Xanthan gum 42. Yucca seeds
43. Cellulose	44. Cork	45. Wood
		100 kg
		25kg

Plastic Combustible Dusts		Threshold quantity per substance
<ol style="list-style-type: none"> Epoxy resin Ethylene-vinyl acetate copolymer Melamine Polyacrylamide Polyacrylonitrile Polyethylene Polypropylene Polyvinyl acetate Polyvinyl alcohol Polyvinyl butyral Polyvinyl chloride Terpene-phenol resin Urea-formaldehyde-cellulose 		100 kg
14. Phenolic resin	15. Polymethyl acrylate	25kg

Chemical Combustible Dusts		Threshold quantity per substance
<ol style="list-style-type: none"> Adipic acid Ascorbic acid Calcium acetate Calcium stearate Carboxy methyl cellulose Dextrin Lactose 	<ol style="list-style-type: none"> 8. Lead stearate 9. Methyl-cellulose 10. Paraformaldehyde 11. Sodium ascorbate 12. Sodium stearate 13. Sulphur 	100 kg
14. Anthraquinone		Any quantity

Metal Combustible Dusts		Threshold quantity per substance
<ol style="list-style-type: none"> Bronze Copper Iron 	<ol style="list-style-type: none"> 4. Iron carbonyl 5. Manganese 6. Silicon 	100 kg
10. Aluminium	11. Magnesium	Any quantity
	12. Niobium	Any quantity
	7. Tantalum	
	8. Titanium	
	9. Zinc	

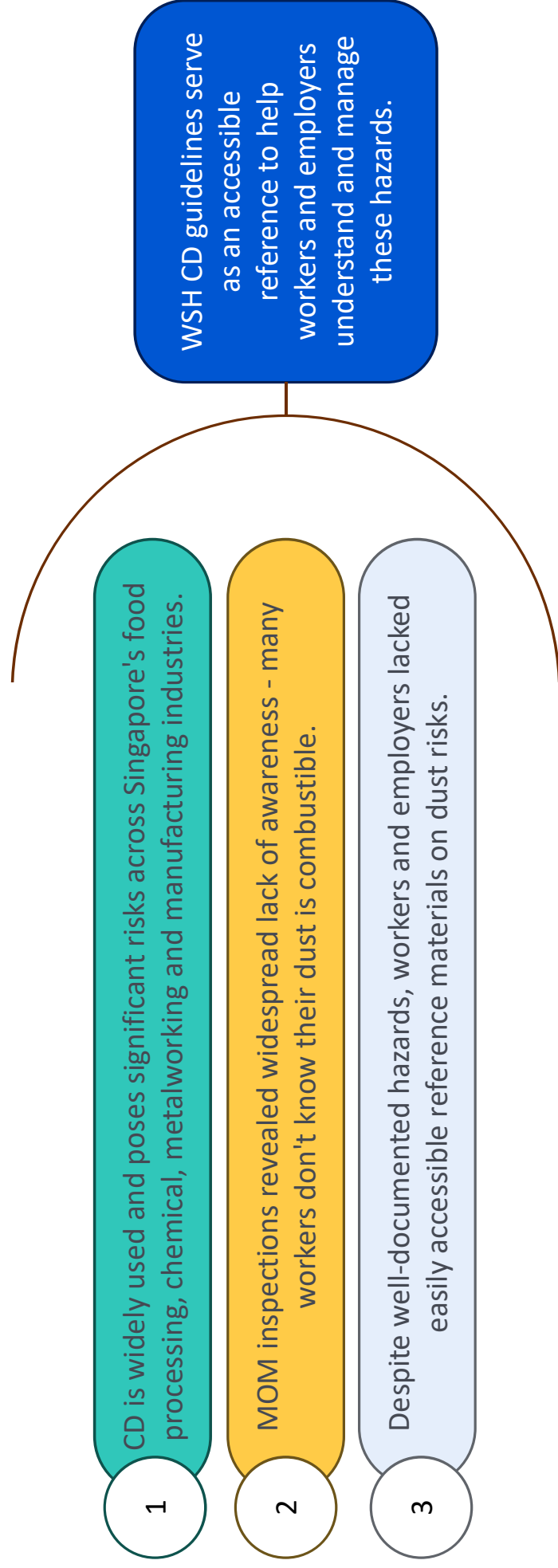
WSH (Incident Reporting) Regulations

- Deaths
- Dangerous Occurrence, WSHA Fifth Schedule Part 2
 - *Reporting of incidents such as flash fire/explosion involving combustible dust*
- Work-related accident
 - *Outpatient / hospitalisation leave*
 - *Light duty*
- Occupational disease, WSHA Second Schedule
 - *e.g., occupational asthma*

DANGEROUS OCCURRENCES

1. Bursting of a revolving vessel, wheel, grindstone or grinding wheel moved by mechanical power.
2. Collapse or failure of a crane, derrick, winch, hoist, piling frame or other appliance used in raising or lowering persons or goods, or any load bearing part thereof (except breakage of chain or rope slings), or the overturning of a crane.
3. Explosion or fire damage to the structure of any room or place in which persons are at work, or to any machinery or plant contained therein, and resulting in the complete suspension of ordinary work in the room or place or stoppage of machinery or plant for 5 hours or more, where the explosion or fire is due to the ignition of dust, gas or vapour, or the ignition of celluloid or substance composed wholly or in part of celluloid.
4. Electrical short circuit or failure of electrical machinery, plant or apparatus, attended by explosion or fire or causing structural damage thereto, and involving its stoppage or disuse for 5 hours or more.
5. Explosion or fire affecting any room in which persons are at work and causing complete suspension of ordinary work therein for 24 hours or more.
6. Explosion or failure of structure of a steam boiler or of a receiver or container used for the storage at a pressure greater than atmospheric pressure of any gas or gasses (including air) or any liquid or solid resulting from the compression of gas.
7. Failure or collapse of formwork or its supports.
8. Collapse, in part or in whole, of a scaffold exceeding 15 metres in height or of a suspended scaffold or a hanging scaffold from which any person may fall more than 2 metres.
9. Accidental seepage or entry of seawater into a dry dock or floating dock causing flooding of the dry dock or floating dock.

Introduction to Combustible Dust Guidelines



Objectives and Scope of this Guidelines



Objectives

- Introduce and explain hazards of combustible dust
- Provide guidance on identifying, evaluating, and controlling risks of fires and explosions.
- Support regulatory compliance under the WSH framework.
- Complement SS 667:2020 – Singapore’s Code of Practice for handling combustible dust.

Scope

- Applies to all workplaces under the WSH Act that handle, sort, pack, store, process, manufacture, or use combustible dust.



Outline of the Guidelines

S2

Understanding Combustible Dust

Definition of combustible dust

Types of combustible dust

Inherent properties of combustible dusts

Flash fire and explosion causes and consequences

S3 & S5

WSH Legislation & Hazard Communication

WSH Act (2025 Update):
Combustible dust added to list of hazardous substances.

WSH Regulations:
Mandate risk assessments, safe management, hazard communication.

Employer Duties:
Identify hazards, implement controls, and communicate risks effectively.

Warning Labels

S4

Risk Assessment

Dust Hazard Analysis (DHA):
Systematic review of combustible dust risks

Hierarchy of Controls:

- i. Elimination or substitution of hazardous dust.
- ii. Engineering (ventilation, explosion suppression systems).
- iii. Administrative (training, safe work procedures).
- iv. PPE (fire-retardant clothing, respirators).

Explosion Prevention:
Isolation, suppression, dust collection, ignition control

S6

Case Studies

Case Studies:

1. Potato starch explosion
2. Flour fire in food plant
3. Grain dryer explosion

Key Takeaways:

1. Conduct regular risk assessments (DHA)
2. Effective housekeeping and dust controls
3. Training and communication on risks
4. Always prepare for emergency response



Other Resources

- MOM webpage on safe use of machineries and combustible dust



- List of FAQs on machinery safety and combustible dust



Other Resources

- Approved Codes of Practice
 - *SS 667 - Code of Practice for handling, storage and processing of combustible dust*
 - *SS 658 - Code of Practice for design, operation, testing, and maintenance of local exhaust ventilation systems*
 - *SS 537 - Code of Practice for safe use of machinery*
 - *SS 586 – Specification for Hazard Communication for hazardous chemicals and dangerous goods*
 - *Code of practice on Workplace Safety and Health (WSH) Risk Management*
- WSH Guidelines on Management of Hazardous Chemicals Programme
- MOM Circular on Hazards and Controls of Combustible Dusts
- WSH Council Publication on 6 Basic WSH Rules for Handling Combustible Dust



Thank you

