SS 667 : 2020
(ICS 13.100; 13.220; 13.230)

SINGAPORE STANDARD

Code of practice for handling, storage and processing of combustible dust

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The Technical Committee set up the Working Group on Handling and Storage of Combustible Dust to prepare this standard. The Working Group consists of the following experts who contribute in their *individual capacity*:

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		Mr Wee Hooi Leong
		Mr Zaw Hlwan Moe
		Dr Zhang Danqing

The organisations in which the experts of the Working Group are involved are:

Advanced Remanufacturing and Technology Centre
Glaxo Wellcome Manufacturing Pte Ltd
Evonik Methionine SEA Pte Ltd
Institute of Chemical and Engineering Sciences
Ministry of Manpower
Nanyang Polytechnic
Singapore Civil Defence Force
SIS'88 Pte Ltd
The Polyolefin Company (Singapore) Pte Ltd
TUV SUD Asia Pacific Pte Ltd
UL International Singapore

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Foreword

This Singapore Standard was prepared by the Working Group on Handling and Storage of Combustible Dust set up by the Technical Committee on Chemicals and Processes under the purview of CSC.

This code sets out requirements and recommendations to help in the prevention of fires and explosions that could result from the ignition of suspended, fine solid particulates within an enclosure or building. Its development was aimed to support the creation of new business opportunities by creating a safe operating environment, in particular, the early adoption of new advanced manufacturing technologies such as additive manufacturing or otherwise commonly known as “3-D printing”. This code also serves as a best practice reference for users including small and medium-sized enterprises, on the handling and storage of various types of combustible dust.

In drawing up this code, attention was paid to the hazards posed by both primary and secondary dust explosions so that manufacturers, industry users and institutes of higher learning (IHL) handling combustible dust (e.g. food processing, woodworking factories, pharmaceutical, petrochemical, specialty chemicals, additive manufacturing, and logistics industry) could be aided in their assessment of dust hazards (safety, health, environment) and mitigation of those hazards through control measures, elimination of ignition sources and minimising damage. In addition to operational measures, this code also provided information that will advise developers and builders of new industrial buildings (especially high-rises) that could potentially be used for activities that involve combustible dust.

In order to achieve these aims, the code provides provisions in the areas of dust hazard identification, characterisation and analysis, hazard management via mitigation and prevention, process equipment safety specifications, storage requirements, facility and system design including performance-based design options as well as safety management system implementation.

In the contextualisation of this code, significant effort has been placed to align the requirements from various local regulatory agencies with regards to fire, explosion and other hazards related to combustible dusts. The provisions in this code also considered general space constraints, high-rise, multi-storied, multi-tenanted and below ground facilities that are typically found in land scarce Singapore. The varied nature of combustible dust types, manufacturing scale and handling activities were also taken into account.

As a general principle when applying this code, workplaces that use, handle or store combustible dust are strongly recommended to update their practices accordingly as far as reasonably practicable.

Permission has been sought from the National Fire Protection Association (NFPA) to reproduce materials from the following NFPA standards:

- NFPA 61, Standard for the Prevention of Fires and Dust Explosions in Agricultural and Food Processing Facilities, 2017 edition. Copyright© 2016, National Fire Protection Association.
- NFPA 484, Standard for Combustible Metals, 2015 edition. Copyright© 2014, National Fire Protection Association.
- NFPA 652, Standard on the Fundamentals of Combustible Dust, 2016 edition. Copyright© 2015, National Fire Protection Association.
- NFPA 654, Standard for the Prevention of Fire and Dust Explosions from the Manufacturing, Processing, and Handling of Combustible Particulate Solids, 2017 edition. Copyright© 2016, National Fire Protection Association.
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Code of practice on handling, storage and processing of combustible dust

1 Scope

This code aims to provide a comprehensive procedure on the handling, storage and processing of combustible dust to prevent and mitigate fires and dust explosions in facilities handling such materials.

It is designed to aid users in the assessment of dust fire and explosion hazards and the mitigation of those hazards through facility design, equipment/process control measures, elimination of ignition sources and minimising damage.

The code is applicable to industries (e.g. food processing, woodworking factories, pharmaceutical, petrochemical, specialty chemicals, additive manufacturing, and logistics), research institutions and institutes of higher learning (IHL) that manufacture, process, blend, convey, repackage, generate or handle combustible dusts or combustible particulate solids. This code is not applicable for warehousing of sealed containers of such materials when not associated with an operation that handles or generates combustible dust.

2 Normative references

The following referenced documents are indispensable for the application of this code. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

AMCA 99-0401-86	Classification for spark resistant construction
ASTM E1226	Standard test method for explosibility of dust clouds
ASTM E1515	Standard test method for minimum explosible concentration of combustible dusts
BS EN 14491	Dust explosion venting protective systems
IEC 60079-10	Classification of hazardous areas
IEC 61340-4-4	Electrostatics – Part 4-4: Standard test methods for specific applications – Electrostatic classification of flexible intermediate bulk containers (FIBC)
ISO 80079:20-2	Explosive atmospheres — Part 20-2: Material characteristics — Combustible dusts test methods
NFPA 68	Standard on explosion protection by deflagration venting
NFPA 69	Standard on explosion prevention systems
NFPA 70	National electrical code
NFPA 652:2016	Standard on the fundamentals of combustible dust

SS 555-3:2018	Protection against lightning – Part 3: Physical damage to structures and life hazard
SS 645	Code of practice for installation and servicing of electrical fire alarm systems
SS CP 52	Code of practice for automatic fire sprinkler system