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Code of practice for fire safety for laboratories using chemicals

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The Working Group on Fire Safety in Laboratories, appointed by the Technical Committee to assist in the preparation of this standard, comprises the following experts who contribute in their *individual capacity*:

		Name
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		Dr Shaik Salim
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		Mr Watt Kwong Mun
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*Served till March 2017

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

Air Liquide Singapore Private Limited
AmSpec Testing Services Pte Ltd
Analytical Laboratories Testing (S) Pte Ltd (ANALABS)
ExxonMobil Asia Pacific Pte Ltd
GlaxoSmithKline Singapore
Institute of Chemical and Engineering Sciences
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National University of Singapore
Republic Polytechnic
SGS Testing & Control Services Singapore Pte Ltd
Shell Bukom Manufacturing Site
Singapore Civil Defence Force
Singapore Health Services Private Limited
TÜV SÜD PSB Pte Ltd

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Foreword

This Singapore Standard was prepared by the Working Group on Fire Safety in Laboratories appointed by the Technical Committee on Petroleum and its Products under the purview of the Chemical Standards Committee.

The development of this standard resulted from the review of SS 532, “Code of practice for storage of flammable liquids”. The review highlighted the difficulty among laboratories in general to comply with SS 532 as laboratories (especially in the area of research and development) handle small quantities of a variety of substances. It is different from factories and chemical plants where the quantity stored is generally fixed to cater to specific manufacturing processes. Therefore, the overall risk profile and hazard control strategies of laboratories are significantly different compared to factories and warehouses that are typically covered by SS 532.

In addition to adopting international best practices as described in overseas standards, careful consideration was given to the operation of laboratories within the Singapore context. This contextualisation is in areas such as local government regulations, high-rise and below ground laboratories and general space constraints in land scarce Singapore. The varied nature of laboratories that are engaged in tertiary education, research and development, healthcare, commercial analytical services, and industrial support services was also taken into account.

As a general principle, laboratories are strongly encouraged to update their practices accordingly as far as reasonably practicable.

In preparing this standard, reference was made to the following publications:

1. NFPA 45:2015 Standard on fire protection for laboratories using chemicals
2. NFPA 55:2013 Compressed gases and cryogenic fluids code
3. SS 532 Code of practice for the storage of flammable liquids
4. SS 586 series: Specification for hazard communication for hazardous chemicals and dangerous goods
5. ANSI/ASSE Z9.5-2012 American National Standard for laboratory ventilation
6. AS/NZS 2243 SET:2006 Safety in laboratories set
7. AS/NZS 2982:2010 Laboratory design and construction
8. Directive 2014/34/EU of the European Parliament and of the Council Article 2 (4) http://eur-lex.europa.eu, © European Union, 1998-2017 for Clause 3.6
9. SCIC Guidebook on the Globally Harmonised System of Classification and Labelling of Chemicals
10. Workplace Safety and Health Act (Chapter 354A)
11. Workplace Safety and Health (Confined Spaces) Regulations 2009 Part 1 Preliminary
12. Workplace Safety and Health Act (Chapter 354A) Revised Edition 2009 14A – (5)

Permission has also been sought from the following organisations for the reproduction of materials into this standard:

1) National Fire Protection Association – NFPA 45:2015 and NFPA 55:2013 (further information is available from (http://www.nfpa.org/).
2) Attorney-General’s Chambers – Workplace Safety and Health (Risk Management) Regulations (Rg 8) and Workplace Safety and Health (Confined Spaces) Regulations 2009 (S462/2009).
3) Standards Australia Limited – AS/NZS 2982:2010.
4) European Union – Directive 2014/34/EU (http://eur-lex.europe.eu) © European Union, 1998-2017

5) Singapore Chemical Industry Council – SCIC Guidebook on the Globally Harmonised System of Classification and Labelling of Chemicals

Acknowledgement is made for the use of information from the above publications.

Attention is drawn to the possibility that some of the elements of this Singapore Standard may be the subject of patent rights. Enterprise Singapore shall not be held responsible for identifying any or all of such patent rights.

NOTE

1. *Singapore Standards (SSs) and Technical References (TRs) are reviewed periodically to keep abreast of technical changes, technological developments and industry practices. The changes are documented through the issue of either amendments or revisions.*

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Code of practice for fire safety for laboratories using chemicals

1 Scope

This Singapore Standard sets out requirements and recommendations for the fire safety of laboratories using chemicals. The standard covers the safe use, handling, storage and disposal of flammable liquids, compressed and liquefied gases. The standard also covers fire safety requirement in terms of laboratory unit design and construction, fire protection, explosion hazard protection, ventilating system requirements as well as the storage, handling and disposal of flammable chemicals. Toxic and hazardous chemicals are also included due to their potential impact on fires.

This standard is applicable to laboratories located within manufacturing facilities (e.g. petrochemical, pharmaceutical, gas manufacturing), Institutes of Higher Learning (IHL), research entities, commercial entities and healthcare sector. Other potential users are laboratory equipment suppliers, fire safety managers, health and safety professionals, facility managers and consultants (e.g. QP, M&E engineers, fire safety engineers).

2 Normative references

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

AS/NZS 2243 SET	Safety in laboratories set
BS 476-4	Fire tests on building materials and structures. Non-combustibility test for materials
IEC 60529	Degrees of protection provided by enclosures (IP Code)
NFPA 11	Standard for low, medium and high-expansion foam
NFPA 12	Standard on carbon dioxide extinguishing systems
NFPA 17	Standard for dry chemical extinguishing systems
NFPA 45	Standard on fire protection for laboratories using chemicals
NFPA 51	Standard for the design and installation of oxygen-fuel gas systems for welding, cutting, and allied processes
NFPA 54	National fuel gas code
NFPA 55	Compressed gases and cryogenic fluids code
NFPA 58	Liquefied petroleum gas code
NFPA 2001	Standard on clean agent fire extinguishing systems

SS CP 10	Code of practice for installation and servicing of electrical fire alarm systems
SS CP 52	Code of practice for automatic fire sprinkler system
SS 332	Specification for fire doors
SS 532	Code of practice for the storage of flammable liquids
SS 508 series	Graphical symbols – Safety colours and safety signs
SS 575	Code of practice for fire hydrant, rising mains and hose reel systems
SS 563 : Part 2	Code of practice for the design, installation and maintenance of emergency lighting and power supply systems in buildings
SS 578	Code of practice for use and maintenance of portable fire extinguishers
SS 586 series	Specification for hazard communication for hazardous chemicals and dangerous goods
SS 603	Code of practice for hazardous waste management