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SINGAPORE STANDARD

Code of practice for air-conditioning and mechanical ventilation in buildings

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		Mr K Ramanathan	*Individual Capacity*
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The Working Group, 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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		Prof Wong Yew Wah
Members	:	Er. Ang Kok Wee
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Members	:	Mr Michael Seow Mr Toh Eng Shyan Mr Vijayaratnam Karuppaiah Mr Wee Kai Siong Mr Yong Siew Hwa

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

American Society of Heating, Refrigerating and Air-conditioning Engineers, Singapore Chapter
Association of Consulting Engineers Singapore
Building and Construction Authority
Institution of Engineers Singapore
International Facility Management Association, Singapore Chapter
Land Transport Authority
Measurement and Verification Pte Ltd
Nanyang Technological University
National Environment Agency
National University of Singapore
Singapore Civil Defence Force
Sustainable Energy Association of Singapore

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Foreword

This Singapore Standard was prepared by a Working Group appointed by the Technical Committee on Building Maintenance and Management which is under the direction of the Building and Construction Standards Committee. It is a revision of SS 553 : 2009 – 'Code of practice for air-conditioning and mechanical ventilation in buildings'.

The purpose of this revision is to keep abreast of international standards in the design, construction, installation, testing and commissioning, operation and maintenance of air-conditioning and mechanical ventilation systems (ACMV) in all commercial, office and institutional buildings except hospitals.

This code represents a standard of good practice for air-conditioning and mechanical ventilation systems with particular emphasis on indoor air quality, energy efficiency, fire safety and maintainability.

The main changes made in this revision are as follows:

1) New outdoor air intake and purging of indoor air requirement for air handling systems.

2) New efficiency reporting method and equipment to improve air filtration standards in an air-conditioned space, in accordance with MOH guidelines.

3) Addition of equipment accuracy requirement for room temperature controls, modulating control valves and air temperature sensors.

4) Addition of chilled water temperature difference requirement for cooling coils of air handling units.

5) Raising full and part load fan power limitations for air handling units and car park fan systems, in accordance with ASHRAE Standard 90.1 : 2013.

6) Addition of location requirement for plants to provide ease of maintenance, replacement and specific functions unique to the plant equipment.

7) Raising motor power requirement for better control demand of pumping system.

This code is intended to complement Singapore Standard 'Code of practice for indoor air quality for air-conditioned buildings (SS 554)'.

The values in Tables 2a and 2b, and 6.2.1 of this Singapore Standard are based on the following ASHRAE standards respectively:

a) ANSI/ASHRAE/IES Standard 90.1 : 2013 'Energy standard for buildings except low-rise residential buildings (SI Edition)'

b) ANSI/ASHRAE Standard 62.1 : 2013 'Ventilation for acceptable indoor air quality'

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.*

2. *An SS or TR is voluntary in nature except when it is made mandatory by a regulatory authority. It can also be cited in contracts making its application a business necessity. Users are advised to assess and determine whether the SS or TR is suitable for their intended use or purpose. If required, they should refer to the relevant professionals or experts for advice on the use of the document. Enterprise Singapore shall not be liable for any damages whether directly or indirectly suffered by anyone or any organisation as a result of the use of any SS or TR.*

3. *Compliance with a SS or TR does not exempt users from any legal obligations.*

Code of practice for air-conditioning and mechanical ventilation in buildings

Section One – General

1 Scope

1.1 This code of practice provides general guidance in the design, construction, installation, testing and commissioning, operation and maintenance of air-conditioning and mechanical ventilation systems in all commercial, office, and institutional buildings except health care facilities. The purpose of this code is to establish minimum requirements in mechanical ventilation and air-conditioning engineering practice such that an acceptable indoor thermal environment can be attained in an energy efficient manner with general consideration for the indoor air quality (IAQ), and maintainability of the equipment.

1.2 This code does not address specific indoor air quality concerns for minimising potential health hazards. Users should refer to SS 554 for specific / more complete IAQ requirement guidelines.

1.3 This code does not address the design requirements of fire protection. Users should refer to the Code of Practice for Fire Precautions in Buildings for the purpose of design requirements of fire protection, including smoke purging system.

1.4 This code does not address heating installations as the majority of mechanical ventilation and air-conditioning systems in Singapore do not require any form of heating.

1.5 This code does not apply to industrial ventilation in control of specific air contaminants inside the workplace as such requirements are separately covered by a different set of regulations.

NOTE 1 – It is not intended that this code should impose unnecessary restrictions on design and installations of systems, nor on the development and use of new improved or unusual materials, design or methods of constructions or installation not covered by this code. However, in the event that this code is applied as a requirement by regulations of regulatory authorities, any departure from this code will require the specific approval of the regulatory authority. It is good practice that all parties involved in a project are informed through a process of exchange of information. The recommended procedure can be found in Annex A.

NOTE 2 – Neither this code nor SS 554 prescribes specific ventilation rate requirements for zones that include smoking. ASHRAE Standard 62.1 may be referred to if smoking zones are present or if there are zones that do not meet the requirements for separation from zones that include smoking.

2 Normative references

The following documents are referenced 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.

AHRI 1060	Performance rating of air-to-air exchangers for energy recovery ventilation equipment
ASHRAE Standard 62.1	Ventilation for acceptable indoor air quality
ASHRAE Standard 111	Measurement, testing, adjusting, and balancing of building HVAC systems

ASHRAE Standard 15	Safety standard for refrigeration systems
ASHRAE Guideline 0	The commissioning process
ASHRAE Guideline 1.1	HVAC & R technical requirements for the commissioning process
BS 476-12	Fire tests on building materials and structures, Part 12: Method of test for ignitability of products by direct flame impingement
SS CP 5	Code of practice for electrical installations
SS CP 83-2	Code of practice for construction computer-aided design (CAD), Part 2 : CAD symbols
SS 212	Specification for aluminium alloy windows
SS 299-1	Specification for fire resistant cables, Part 1 : Performance requirements for cables required to maintain circuit integrity under fire conditions
SS 530	Code of practice for energy efficiency standard for building services and equipment
SS 554	Code of practice for indoor air quality for air-conditioned buildings
SS 591	Code of practice for long term measurement of central chilled water system energy efficiency

ASHRAE Handbook of Fundamentals

Code of Practice for the Control of Legionella Bacteria in Cooling Towers

Code of Practice for Fire Precautions in Buildings

Guide to Setting up a Child Care Centre

Code of Practice on Environmental Health

(See also Clause 4)