SINGAPORE STANDARDS COUNCIL

Overview of SS 553 on Air-Conditioning and Mechanical Ventilation in Buildings

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THINK GLOBAL, THINK STANDARDS

50 YEARS OF STANDARDISATION

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Order of Presentation

- Purpose and Scope
- Main Changes
- Some Highlights of Changes

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Purpose and Scope

A revision of SS 553 : 2009 – 'Code of Practice for Air-Conditioning and Mechanical Ventilation in Buildings'.

The purpose of 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.

The 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.

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Main Changes

The main changes made in this revision are as follows:

* New requirement on outdoor air intake and purging of indoor air for air handling systems.

* New Minimum Efficiency Reporting Value (MERV) and equipment to improve air filtration standards in an air-conditioned space, in accordance with MOH guidelines.

* New requirement on inclusion of equipment accuracy for room temperature controls, modulating control valves and air temperature sensors.

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Main Changes (continued)

* New requirement on of chilled water temperature difference for cooling coils of air handling units.

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

* New requirement on inclusion of location for plants to provide ease of maintenance, replacement and specific functions unique to the plant equipment.

* Raised requirement on motor power for better control demand of pumping system.

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Outdoor Air Intakes

* Location of the air intake shall avoid the possibility of contamination of the intake air due to short circuiting of any exhaust discharges. (Cl 6.1.3)

* During Purging of indoor air Care should be taken to avoid contaminated air from outside from being drawn in. (Cl 7.4)

* Ventilation rate for air-conditioning added for Gym. (Table 1)

Design and Calculations (Note added Cl 7.1.3)

* Air speed and air temperature can be controlled to improve thermal comfort. Low air speed can be compensated by reducing air temperature; and relatively high air temperature can be compensated by increasing air speed.

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Design and Calculations

* Air speed and air temperature can be controlled to improve thermal comfort. Low air speed can be compensated by reducing air temperature; and relatively high air temperature can be compensated by increasing air speed.
(Note added to Cl 7.1.3)

* Reference to dry-bulb temperature instead of operative temperature for conditions for Indoor thermal environment.
(Cl 7.2)

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Air Filtration (Cl 7.5) extensively revised

* The particulate contaminants in the recirculated air and pollutants in the outdoor air introduced into an air-conditioned space shall be continuously removed.

* Screen or louvre for outdoor air intake required.

* The rating for cleaning the air in all AHUs shall be equivalent to MERV 6 or better, and MERV 14 when the outdoor pollution level is in the unhealthy range in accordance with MOH's guidelines.

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Air Filtration (Cl 7.5) extensively revised (continued)

* For cleaning outdoor air supplied to FCUs shall be equivalent to MERV 6 or better, and MERV 14 when the outdoor pollution level is in the unhealthy range.

*Fan motors shall be sized such that the required air flow rate can be maintained.

* Recommended to install a gas-phase filter when there is a high level of gaseous pollutants.

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Controls for Energy Management (Cl 8)

* Room temperature control should be within ± 1 ^{O}C in actual operation. Modulating control valve with good rangeability and valve authority should be used. Air temperature sensors should have the appropriate accuracy for effective control of the space temperature. (Cl 8.3)

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Air Handling Units (Cl 9)

* Air handling units shall be located such that there is good access for proper maintenance. Air handling units of cooling capacity greater than 35 kW shall be floor mounted. (Cl 9.1.1)

* Cooling coils should have chilled water temperature difference of 6.5 ^{o}C or more to reduce chilled water plant energy consumption. The chilled water control valve must shut when the air handling unit is not in operation. (Cl 9.1.3)

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Fan Power Limitations

* The ratio of the fan system power to the supply fan air flow rate (main fan) of each air-conditioning system at design conditions shall not exceed the allowable fan system power shown in Table 2a. Computation of allowable fan power follows either fan system motor nameplate kW (Option 1) or fan system input kW (Option 2). (A/C systems Cl 9.2.1.1)

* The ratio of the fan system power to the supply fan air flow rate (main fan) of each ventilation system at design conditions shall not exceed the allowable fan system power shown in Table 8. Computation of allowable fan power follows either fan system motor nameplate kW (Option 1) or fan system input kW (Option 2). (M/V systems Cl 14.2.1)

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Plants (Cl 10)

* Plants should be designed and located with proper access for maintenance and future replacement works. (Cl 10.3)

* Heat rejection equipment shall be located to reject heat efficiently without impairing the performance of the equipment. The heat rejection equipment shall be spaced apart adequately and shall not be obstructed so as to prevent hot or moist air recirculation. Heat shall be rejected directly outdoors and not into any habitable space. (Cl 10.4)

* Motors exceeding 3.7 kW (*previously 15 kW*) shall have controls and/or devices (such as variable speed control) that will result in pump motor demand of no more than 30% of design wattage at 50% of design water flow. (Cl 10.7.1.1)

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Thank you

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