MALAYSIAN STANDARD
MS 1525 : 2019

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Chapter 9
Energy Management Control System

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CONTENTS

WG members for EMS

- ASHRAE Malaysia Chapter
- Association of Consulting Engineers Malaysia
- Building Automation System Association of Malaysia
- Cofreth (M) Sdn Bhd
- Energy Commission
- Greenbuildingindex Sdn Bhd
- Jabatan Kerja Raya
- Malaysian Air-Conditioning & Refrigeration Association
- Malaysian Association of Energy Service Companies
- SIRIM Berhad (Secretariat)
- The Electrical and Electronics Association of Malaysia
- The Institution of Engineers, Malaysia

Major modifications for Chapter 9

a) Clearer definition as to when EMS should be considered in terms of use of central air-conditioning system rather than merely air-conditioned space $\geq$ 4000 m^2.
b) Expand main functions of EMS to four to include “energy related data collection and analyses”.
c) Elaborate and expand description on Control of equipment, and Monitoring of equipment.
d) Insert new section on “Energy related data collection and analyses”.
e) Renaming “Energy consuming areas” to “Significant Energy Uses (SEUs)”.

Major modifications for Chapter 9 cont'd

f) Simplified write-up on “Lighting system” to account for significant reduction in its energy use due to continuous improvement in lighting technology.

g) Incorporate recommendation for chiller >1 000 kWr to be equipped with flow monitoring device and external water temperature sensors for tracking of its performance by EMS.

h) Expand guidance on control of sub-systems impacting Air handling units and Pumps.

i) Limitation on lighting control wattage is removed in line with technology advancement and use of Card access for controls added.

j) Lighting for common areas is revised.

k) Enhancement to section on Characteristics of EMS.

9. Energy Management Control System

9.1 Energy Management System (EMS)

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9.14 Prerequisites for optimizing EMS operation

9.1 Energy Management System (EMS)

The Energy Management System (EMS) is a subset of the building automation system function. It should be considered for buildings using central air-conditioning system serving an area $\geq$ 4 000 m^2. The EMS is a state-of-the-art system and is microprocessor based. Generally, the EMS has four main functions:

a) control of equipment;

b) monitoring of equipment;

c) integration of equipment and other sub-systems; and

d) energy related data collection and analyses

9.2 Control of equipment

The primary purpose of the control of equipment is to save energy by (preferably real-time) optimization system controls. This is performed by the EMS function of the building automation system through;

a) Scheduling & Manual overriding;

b) Control of set points for key operating parameters;

c) System/equipment optimisation for energy efficient operations;

d) Report & record operational alarms;

e) Ensure correct and safe sequence of operation (including for **Maximum Demand Limiting** programming)

9.5 Energy related data collection and analyses

The main purpose of energy data collection is to enable the building owner/operator to conduct basic energy review of the overall building facilities for the purpose of developing and implementing a sustainable energy management programme.

Among the key energy related data to be collected are the energy load profiles on real time basis for all Significant Energy Uses (SEUs) as elaborated in 9.6

Analysis of these data will provide historical and current trends of energy consumption of the building for enabling energy planning activities to set the objective and target, energy baseline, energy performance indicator(s) and energy baseload to implement sustainable energy management programme.

The data collected and analysed can also be useful for benchmarking purposes when used in conjunction with other information such as floor areas, working hours, etc to establish its Building Energy Intensity (BEI) value.

9.6 Significant Energy Uses (SEUs)

9.6.1 Air conditioning and mechanical ventilation (ACMV) system

The system is typically the largest energy consumer in the building and has the largest energy savings potential. The EMS shall place special emphasis on the ACMV system as specified in 9.7.

9.6.2 Lighting system

Lighting system has substantial energy savings potential. It is therefore to be included in the EMS as specified in 9.8.

9.6.3 Others

9.7 Application of EMS to the ACMV system

9.7.1 Central plant

It is highly recommended that for chiller > 1 000 kWr to be equipped with flow monitoring device and external water temperature sensors for tracking of its performance by EMS.

9.7.2 Air handling units (AHUs)

For Variable Air Volume (VAV) AHU system, the EMS should be capable of adjusting the set point based on (but not restricted to), static pressure reset inside the main supply air duct. Dynamic static pressure reset algorithm should be considered whenever possible. Inverter should have high level interface with EMS and damper position of VAV boxes should have feedback to EMS for control purpose.

9.7.6 Pumps

Chilled water and condenser water pumps larger than 2 kWe and operating for more than 750 hours per year should incorporate digital power meter/s linked to the EMS. Alternatively, if inverter is installed to the pump, high level interface with EMS should be provided for energy consumption monitoring.

9.7.6 Pumps cont'd

For variable volume water distribution pumping system, remote differential pressure sensors at appropriate location most representing the load demand condition should be installed and to be linked to EMS for effective control. Set point for differential pressure sensors should match the piping configuration. Where possible, dynamic reset of differential pressure set point should be considered.

Set point for any other relief device of pumping system should be properly adjusted according to set point of differential pressure to minimize waste of energy but yet maintain system within safe operation.

9.8 Application of EMS to the lighting system

The maximum number of light fittings per circuit should not exceed 10.

For applications where automatic control is feasible, savings in lighting energy may be further realised through (but not limited to) incorporating devices such as motion/presence sensor and photo-sensor which switch-off unnecessary lighting during unoccupied or daylight mode. Use of "Lighting Sweep Logic" is encouraged, where lights that should be turned off at night will remain off by means of the EMS periodically "sweeping" them off.

9.14 Prerequisites for optismising EMS operation

The following items should be examined before attempting further enhancement:

a) EMS documentation - be adequate;

b) sequences of operation - compiled, examined and well understood;

c) current control strategies - compiled & examined;

d) calibration of equipment - calibrate all sensors and actuators;

e) functional testing - ensure equipment is operating as intended;

f) maintenance planning to sustain EMS performance

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Chapter 10
Building Energy Performance

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