STRATEGIC GUIDELINES FOR SELECTION OF BEST ENERGY EFFICIENT AIR CONDITIONING SYSTEM/EQUIPMENT FOR COMMERCIAL BUILDINGS IN SRI LANKA.

Kukulege Aruna Kelum Perera

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Master of Science in Building Services Engineering

Department of Mechanical Engineering

University of Moratuwa

Sri Lanka

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By

K.A.K. Perera

Supervised by

Prof.R.A.Attalage

This Dissertation was submitted to the Department of Mechanical Engineering of the University of Moratuwa in partial fulfillment of the requirement for the Degree of MSc in Building Services Engineering.

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Prof. R.A.Attalage

Department of Mechanical Engineering

University of Moratuwa

Abstract

Air conditioning was considered a luxury in earlier days and now it becomes a general requirement due to urbanization, new constructions, modern architecture, regulations and standards etc. In early days there were no limitations on space and also there were lot of greenery which supports concepts such as natural ventilation.

Therefore importance of establishing proper procedure for AC system development is great and this study aims at developing a systematic procedure for selection of efficient AC system/equipment for different type of commercial buildings.

Literature review discuss broadly on technologies, standards and regulations, energy efficiency, Calculation techniques and tools, Building envelope improvements which is the flat form for development of a methodology to achieve research objective. Methodology developed consist of three phases namely Design, Testing and Commissioning, Operation and Maintenance. In Sri Lanka focus is mainly given for design phase and neglect T & C, O & M phases which is so critical for success of the project.

Once methodology established guidelines have been developed for easy reference so that even layman can understand approach required for development of efficient AC system for his new building. Real time case study presented for better understanding of proposed methodology and further improvement on the study can be done by monitoring applications.

Finally recommendations were given based on research study outcome for real time applications.

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LIST OF ABBREVIATION

Abbreviation		Description
AABC	:	Associated Air Balance Council
AC	:	Air Conditioning
ACMV	:	Air Conditioning & Mechanical Ventilation
AHU	:	Air Handling Unit
ANSI	:	American National Standards Institute
ARI	:	Air Conditioning & Refrigeration Institute
ASHRAE	:	American Society of Heating, Refrigeration and Air Conditioning Engineers
BAS	:	Building Automation System
BCHP	:	Building Cooling Heat and Power
BMS	:	Building Management System
BOQ	:	Bill Of Quantities
BREEAM	:	Building Research Establishment Environmental Assessment Methodology
BSRIA	:	Building Services Research and Information Association (UK)
BTU	:	British Thermal Units
CCHP	:	Combined Cooling, Heat and Power
CCTV	:	Closed Circuit Television
CEB	:	Ceylon Electricity Board
CHPDH	:	Combined Heat and Power District Heating
COP	:	Coefficient Of Performance
DC	:	Direct Current
DOE	:	Department Of Energy
EER	:	Energy Efficiency Ratio

FCU	:	Fan Coil Unit
FLA	:	Full Load Amperage
FPT	:	Functional Performance Test
HCFC	:	Hydro Chloro Fluoro Carbons
HPHX	:	Heat Pipe Heat Exchanger
HVAC	:	Heating Ventilation and Air Conditioning
IAQ	:	Indoor Air Quality
IEQ	:	Indoor Environmental Quality
IPLV	:	Integrated Part Load Value
ISO	:	International Organization for Standardization
LCA	:	Life Cycle Assessment
LEED	:	Leadership in Energy & Environmental Design
LPD	:	Lighting Power Densities
MERV	:	Minimum Efficiency Reporting Value
MJ	:	Million Joules
NEBB	:	National Environmental Balancing Bureau
NGO	:	Non Governmental Organization
NPLV	:	Non Standard Part Load Value
NPV	:	Net Present Value
O & M	:	Operation & Maintenance
OTTV	:	Overall Thermal Transmittance Value
PMV	:	Predicted Mean Vote
PPB	:	Parts Per Billion
PPD	:	Predicted Percentage Dissatisfied
RH	:	Relative Humidity
SC	:	Shading Coefficient
STP	:	Standard Temperature and Pressure

T & C	:	Testing & Commissioning
TAB	:	Test, Adjust, Balance
TDS	:	Total Dissolved Solids
TMY	:	Typical Meteorological Year
TR	:	Tones of Refrigeration
VAV	:	Variable Air Volume
VOC	:	Volatile Organic Compound
VRV	:	Variable Refrigerant Volume
VSD	:	Variable Speed Drive
WPU	:	Water Cooled Package Units
WWR	:	Window to Wall Ratio