1.0 GENERAL

1.1 Related UBC Guidelines

.1 Building Operations Energy Management Policy

1.2 Coordination Requirements

.1 Coordinate UBC Okanagan Campus Operations and Risk Management (CORM) – Facilities Management and Energy Team.

1.3 Description

.1 Guidance for the design and operation of HVAC systems in order to provide a suitable thermal environment for sedentary work (e.g. in office, classroom, library, laboratory).

.2 The basis for design and operation are the applicable ASHRAE standards, however guidance is required for interpreting them in the context of UBC Okanagan campus.

2.0 MATERIALS AND DESIGN REQUIREMENTS

2.1 Applicable Codes, Standards and Guidelines

.1 Referenced standards refer to the same edition referenced by the BC Building Code.

.2 ASHRAE 55 Thermal Environmental Conditions for Human Occupancy.

The purpose of this standard is to specify the combinations of indoor thermal environmental factors and personal factors that will produce thermal environmental conditions acceptable to a majority of occupants within the space.

.3 ASHRAE 10 Interaction Affecting the Achievement of Acceptable Indoor Environments.

This guideline raises awareness of interactions affecting the achievement of acceptable indoor environments

.4 ASHRAE 62.1 - Ventilation for Acceptable Indoor Air Quality

Natural ventilation design guidance (Section 5)

2.2 Principles

.1 Passive design: designers shall adopt passive design approaches that use the building architecture to improve indoor thermal comfort and minimize energy use and equipment sizing.

.2 Adaptive thermal comfort: where occupants are free to adapt their clothing to the indoor temperature, mechanical cooling is not necessary. Where design conditions in such spaces have been shown to need mechanical cooling, submissions for variance are to be made as part of the initial design philosophy submission.

.3 Humidity control: Okanagan’s temperature climate, with moderate temperatures and low humidity levels year round, allows the humidity in a space to be uncontrolled and the space still be considered comfortable, unless there is a particular reason for humidity control e.g. rare book storage, laboratory operations.

.4 Adaptation: Where possible space for future cooling coils shall be provided to mitigate risk of increased cooling degree days. Provide thermal comfort modelling in support of design.

.5 Thermal modeling simulation shall be used to verify mechanical cooling requirements.

.6 Mechanical cooling shall be provided where process or code requirements dictate e.g. high heat loads in laboratories, IT server rooms, control rooms, AV rooms, electrical rooms, etc.

.7 Large classrooms (>50 students) may require 100% fresh air supply for air quality and/or provision of mechanical cooling, due to high heat load.

2.3 Selection of Ventilation Strategy

.1 Select a ventilation strategy which is most suitable for the building design. Passive or natural ventilation should be used wherever appropriate. For buildings where passive ventilation is unable to meet either the thermal comfort requirements given in this guideline or the program requirements of the building, a mixed-mode ventilation strategy should be considered that uses a combination of natural ventilation and mechanical HVAC where necessary.

.2 Refer to CIBSE – Natural Ventilation in Non-Domestic Building – Chapter 2 “Selecting a natural ventilation concept” as a source of reference.

2.4 Design of Naturally Conditioned Space (i.e. no mechanical cooling)

.1 Naturally conditioned space shall be designed to satisfy the following criteria through passive design practices and shall be verified using thermal modeling simulation:

.1 Internal Temperature (Ti) >=24°C shall not exceed 150 occupied hours.

.2 Internal Temperature (Ti) >=27°C shall not exceed 50 occupied hours.

.3 Internal Temperature (Ti) >=30°C shall not exceed 20 occupied hours.

.2 Where operable windows are provided sensors shall interlock to space heating and cooling. See ASHRAE Handbook Fundamentals, Natural Ventilation and Infiltration, Chapter 22.

2.5 Design of Active Systems

.1 Active systems shall be designed to achieve the following minimum conditions during occupied hours:

.1 Heating systems shall be designed to maintain an indoor temperature of 21°C for an external temperature of -20°C (BC Building Code 1% value for January).

.2 Cooling systems shall be designed to maintain an indoor temperature of 25°C for an external temperature of **38°C** ***DB and 24°C WB***.

2.6 Operation of Active Systems

.1 Space Heating Systems: Set point 21°C +/- 1°C

.2 Space Cooling Systems: Set point 25°C +/- 1°C

.3 Night Time Setback conditions:

.1 Buildings will be maintained between 15°C to 17°C during winter, depending on building recovery time.

.2 No ventilation, unless nighttime cooling control strategy is required.

.3 Pre-conditioning time of 1 hour prior to occupancy, depending on building recovery time.

.4 Research laboratories that require continuous ventilation: During unoccupied conditions reduced ventilation and temperature conditions are expected.

*****END OF SECTION*****