ENVIRONMENTAL CONTROL DURING CONSTRUCTION

SYSTEMATICALLY MANAGE THE RISK

Date: New York, 23 May 2010
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Regional weather conditions require temporary indoor air quality control equipment!

Based on project details and location a custom plan needs to be created and implemented.

“Good IAQ benefits everyone: Managing indoor air quality (IAQ) systematically during construction is becoming more and more common as contractors gain more experience with LEED. It benefits the health of everyone who works on the site, not just the finished product and eventual occupants of the building.”
BUILDING ENVIRONMENT SHOULDN'T BE MANAGED FROM **DAY 1**

Permanent building systems maintain healthcare facilities at a set temperature, and humidity.

While maintaining ventilation and high air quality.

**TEMPORARY SYSTEMS SHOULD BE DESIGNED TO MATCH THE SPECIFICATION OF THE PERMANENT BUILDING SYSTEM.**
TEMPERATURE AND HUMIDITY MUST BE MANAGED!

WHILE MINIMIZING FLUCTUATIONS IN TEMPERATURE AND HUMIDITY.
SO IF WE MANAGE TEMPERATURE AND HUMIDITY

We minimize schedule impacts.

Produce a higher quality product

Minimize impacts on owner occupied buildings

Provide an ideal curing environment for construction materials

Better worker environment

Produce a lower risk building
REGIONAL CONDITIONS PROVIDE CHALLENGES

Across the country:
Average Relative Humidity - Vancouver, BC

- Average Relative Humidity - 0600LST (%)
- Average Relative Humidity - 1500LST (%)

Average Relative Humidity - 0600LST (%)
- Jan: 87.8%
- Feb: 87%
- Mar: 85.9%
- Apr: 84.7%
- May: 83.9%
- Jun: 83%
- Jul: 83.5%
- Aug: 86.1%
- Sep: 89.4%
- Oct: 89.9%
- Nov: 87.9%
- Dec: 88.1%

Average Relative Humidity - 1500LST (%)
- Jan: 79.8%
- Feb: 75.3%
- Mar: 70.2%
- Apr: 65.4%
- May: 63.9%
- Jun: 63.6%
- Jul: 62.4%
- Aug: 63.1%
- Sep: 67.8%
- Oct: 75.8%
- Nov: 78.9%
- Dec: 80.8%

TUESDAY SEPTEMBER 25, 2012; Bob Bedard - Ellis Don, T.J. Johnson - Cavalier Industries Ltd

Monday, 17 September, 12
Average Relative Humidity - Edmonton, AB

Humidity control recommended, add in winter, remove in summer.
Average Relative Humidity - Toronto, ON

- **Average Relative Humidity - 0600LST (%)**
- **Average Relative Humidity - 1500LST (%)**

**Year Round Control Recommended**

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Average Relative Humidity - Ottawa, ON

- Average Relative Humidity - 0600LST (%)
- Average Relative Humidity - 1500LST (%)

Jan: 74%, 61%
Feb: 73%, 58%
Mar: 73%, 50%
Apr: 73%, 49%
May: 75%, 52%
Jun: 79%, 52%
Jul: 83%, 55%
Aug: 87%, 59%
Sep: 88%, 60%
Oct: 84%, 60%
Nov: 83%, 69%
Dec: 80%, 72%
Average Relative Humidity - Montréal, QB

- Average Relative Humidity - 0600LST (%)
- Average Relative Humidity - 1500LST (%)

Environment Control During Construction

Systemically manage the risk.
Average Relative Humidity - St. John’s, NL

- **Average Relative Humidity - 0600LST (%)**
- **Average Relative Humidity - 1500LST (%)**

Jan: 83.6%, 78.9%
Feb: 83.2%, 76.4%
Mar: 85%, 75.8%
Apr: 87.3%, 75.9%
May: 87%, 72.7%
Jun: 86.8%, 71.1%
Jul: 87.3%, 69.9%
Aug: 88.5%, 70.8%
Sep: 88.9%, 73%
Oct: 87.3%, 76.1%
Nov: 85.1%, 78.9%
Dec: 84.2%, 80.7%

Untitled 1

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Monday, 17 September, 12
Average Temperature - Vancouver

- Daily Average (°C)
- Daily Minimum (°C)
- Extreme Minimum (°C)

Year round daily minimum = year round heat even in summer months

TUESDAY SEPTEMBER 25, 2012; Bob Bedard - Ellis Don, T.J. Johnson - Cavalier Industries Ltd
Average Temperature - Edmonton, AB

- Daily Average (°C)
- Daily Minimum (°C)
- Extreme Minimum (°C)

Year round daily minimum = year round heat
Cold winter averages
Extreme cold possible

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Monday, 17 September, 12
Average Temperature - Toronto, ON

- Daily Average (°C)
- Daily Minimum (°C)
- Extreme Minimum (°C)

Year round daily minimum = year round control
Cold winter averages
Extreme cold possible

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Monday, 17 September, 12
Systemically manage the risk.

ENVIRONMENT CONTROL DURING CONSTRUCTION

Average Temperature - Ottawa, ON

- Daily Average (°C)
- Daily Minimum (°C)
- Extreme Minimum (°C)

Year round daily minimum = year round control

Cold winter averages
Extreme cold possible

Monday, 17 September, 12
Average Temperature - Montréal, QB

- Daily Average (°C)
- Daily Minimum (°C)
- Extreme Minimum (°C)

Year round daily minimum = year round control
Cold winter averages
Extreme cold possible

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Monday, 17 September, 12
Average Temperature - Halifax, NS

- Daily Average (°C)
- Daily Minimum (°C)
- Extreme Minimum (°C)

Year round daily minimum = year round control
Cold winter averages
HUMIDITY MAY HAVE EVEN MORE IMPORTANCE THAN TEMPERATURE

Hospitals are designed with humidity as a key control factor.

• INFECTION CONTROL
• PATIENT/DOCTOR COMFORT
• MEET CODES
• EFFICIENCY

How do we manage temperature during construction?
How do we manage humidity during construction?
How do we meet LEED and infection control guidelines?
Why do we want to pressurize the building?

- Provide uniform interior and surface temperatures
- Reduce risk of condensations
- Provides mechanical ventilation of enclosed areas for drying and curing of installed materials, to disperse humidity and to prevent hazardous accumulations of dust, fumes and gas vapors from construction processes.
- Prevents air infiltration - reduce entry of containment's (pollen, dust, particulates, etc)
- Better air distribution
- Excellent worker environment - maximum productivity
SITE EXAMPLE:

- Strathcona Hospital - Phase 1
SITE EQUIPMENT LAYOUT - HEATING (3-4 Seasons):

- Exhaust System - 40,000CFM
- MERV11 Filtration
- In-Direct Fired Heaters
- High Efficiency Indirect Fired Heaters, 42,000 CFM
SITE EQUIPMENT LAYOUT - DEHUMIDIFICATION (SUMMER):

- Powered Air Exhaust
- Refrigerant Dehumidifiers
- Small Desiccant Dehumidifier
- Large Desiccant Dehumidifier
SITE EQUIPMENT LAYOUT - COOLING (SUMMER):

- 24,000 CFM Pre-Filtered Conditioned Air
- Industrial 20 Ton AC
- 20,000 CFM Exhaust Air
- Powered Air Exhaust
SITE EQUIPMENT LAYOUT - HUMIDIFICATION (WINTER):

- Powered Air Exhaust
- Humidification Equipment
- MERV8 Filtration
- In-Direct Fired Heaters

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Monday, 17 September, 12
AIR MOVEMENT IN A HOSPITAL FACILITY:

How we manage the installation of duct work with HEPA filtered air.

As we assemble duct work we force HEPA filtered air through the duct work, the advantages are:

• Reducing end cleaning cost
• Ensuring no mould growth in stagnant duct work
• Utilize existing duct work to distribute air in the building

Build duct work in the direction of workflow from source of conditioned air. Maintain .75 PA and distribute air.
Temporary Heating Systems:

In-Direct Systems:

- HIGHLY EFFICIENT
- MODULAR
- ADDITION OF HIGH CFM / STATIC PRESSURE SYSTEMS CREATES APPLICATION
  FLEXIBILITY
Temporary Heating Systems:

In-Direct Systems:

What’s important?

- Backwards incline fans
- VFD Drives to control fan speeds
- VFD Reduces inrush current, reliable on temporary power systems

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Temporary Heating Systems:

Glycol Systems:

- HIGHLY EFFICIENT
- MODULAR
- GREAT FOR MULTI-LEVEL APPLICATIONS
- DISTRIBUTE HEAT IN HIGHLY PARTITIONED AREAS
Temporary Heating Systems:

Glycol Systems:

Heat Exchangers should be utilized pulling a portion of outside air.
Temporary Heating Systems:

Glycol Systems:
Temporary Dehumidification Systems:

Refrigerant Based Systems

- Re-purposed air conditioner
- Easy to operate, typically 120v 15amp circuit
- Water is condensed and pumped out via water line
  (just need access to drain system)
Temporary Dehumidification Systems:

Refrigerant Based Systems
Temporary Dehumidification Systems:

Desiccant Based Systems

- Performs exceptionally well in cooler climates (West/East Coast)
- As there is no actual water produced during the process, these units can work effectively at sub-zero temperatures.
- The rotor, is manufactured from alternate layers of flat and corrugated sheets, impregnated with an active component (desiccant). As air passes through these channels, moisture is transferred between the air and the desiccant in its vapour form.
- Adds heat to air stream as well
Temporary Dehumidification Systems:

Desiccant Based Systems
Temporary Humidification Systems:

Humidistat Controlled Misting Fans:

- Simple easy to install solution to add humidity during construction
- Simple 120v power connection
- Simple hose water connection
- High Pressure pump to atomize water for rapid evaporation
- No complicated steam generators or water treatment required.
- Run automatically via humidistat operation to targeted RH%
Temporary Filtration Systems:

HEPA Filtration:

- HIGH CFM / STATIC CENTRIFUGAL BLOWERS
- Optional activated carbon and potassium permanganate for VOC removal
- Neg air barriers, HVAC duct work protection
Temporary Filtration Systems:

HEPA Filtration:
Thanks!

That’s all for today

Date: September 25, 2012

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