Volume 29 - Issue 5 - January 2023

BOA

Building Operators Association of Canada

Official Publication of the Building Operators Association (Calgary)

January 2023

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Important Phone Numbers

Emergency	911
Alberta Boiler Association	403 291 7070
Alberta Labour (Emergency)	403 297 2222
Buried Utility Locations	1 800 242 3447
City Of Calgary (All Departments)	311
Dangerous Goods Incidents	1 800 272 9600
Environmental Emergency	1 800 222 6514
Poison Centre	403 670 1414
Weather Information (24hr)	403 299 7878

Front Cover: The Bow River reflects pastel tones cast by the setting sun behind the Calgary skyline—

Christy Caswell

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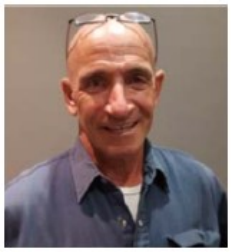
President's Message



BOA
Building Operators Association of Canada
Building Operators Association
Box 22116, Bankers Hall
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I hope this message finds you and yours well and in good health

Happy New Year !!!

The Building Operators Association has worked with BOMA Calgary and World ICU in putting together competencies that Building Operators perform over the course of a year. Some will be done daily others weekly, monthly, quarterly, or annually. Not all facilities are the same so some may or not be included in the tasks. There are two levels that were included in the competencies list. First level is the entry level #3. Those persons are in training but should be able to speak on the tasks required of them. The second level is the person who must be adequately able to perform the functions to satisfy to a validator's satisfaction, that the person is knowledgeable with that competency. I have listed the competencies of each level on our website: www.boacalgary.com They are posted under Articles and under #C Competencies.

If you have any questions, please contact me at president@boacalgary.com.

Wishing you a year of health and prosperity.

Smiles))

With kind regards,

Les Anderson PE, RPA

TEST YOUR OPERATOR IQ!

Are you equally adept at troubleshooting problems in the boardroom and the boiler room? As the resident facility guru, there's a lot riding on whether or not you know the difference between sounds control and a sound investment.
Try our monthly Operator IQ challenge...*answers on page 23*

1. **An operating control switch for an on-off boiler:**
a. uses a differential spring to reduce cycling
b. can only have its cut-in setting adjusted
c. has an un-adjustable span between cut-in and cut-out
d. utilizes a resistance coil
e. operates in conjunction with a modutrol motor

2. **Combustion air safety switches are commonly found:**
a. on natural draft boilers
b. on hot water boilers only
c. on boilers utilizing a forced draft fan
d. on gas fired boilers only
e. as non-interlocking devices and take no part in a startup

3. **In view of heating boilers, a low fire switch:**
a. is a type of manual over-ride
b. takes no part in the start-up of an automatic boiler
c. is a normally closed switch
d. utilizes a thermal element for its operation
e. acts as an interlock to ensure minimum damper setting

4. **Modulating burner controls operate by regulating:**
a. steam flow and fuel flow
b. fuel temperature and air flow
c. fuel flow, air flow, and feedwater pressure
d. fuel flow, and air flow
e. fuel flow, and atomizing steam flow

5. **Modulating combustion controls:**
a. regulate the steam and feedwater supply
b. regulate fuel and air supply
c. control the oil atomizer
d. control the back draft damper
e. control the draft and feedwater temperature

Environmental Auditing

by Shirley Green

Summary of a presentation made by Shirley Green of the Occupational Health, Safety and Environment department of SAIT to the membership of the Building Operators Association (Calgary) at the November 1999 meeting.

What is Environmental Auditing?

By definition, it is a risk management and loss prevention tool for taking inventory of an organization's environmental assets and liabilities through a systematic and objective evaluation of the organization's management systems, compliance with environmental laws and regulations, and compliance with internal environmental policies and standards.

Why conduct an environmental audit?

There are several potential benefits associated with environmental auditing. An audit will:

- verify compliance with environmental legislation, diminishing liability of organizational officers or directors
- assess performance, identifying future problems and remedies for immediate ones
- demonstrate due diligence showing reasonable care and precautions are in place to prevent a possible offense
- verifies environmental management system is working
- educate and ensure employees are informed of environmental regulations and procedures prevent environmental liability in business transactions and may make financing and insurance easier to obtain.

The Historical Review

Prior to a first-time audit, a historical review should be included in the pre-audit activities. The baseline audit may take an extended period of time due to environmental issues that arise during the audit period which may require the auditor's attention and involvement.

Regulatory Review

A list of all pertinent regulations and departmental structures should be compiled before the site visit. The audit may also address additional areas such as corporate and industry standards and guidelines. These are examined from a management standpoint through examinations and evaluations of the permits and licences, environmental policies and standards, communications and training.

The Audit Tool and Protocol

1. A review of company records and files is conducted to:

- evaluate the facility operations with regard to environmental management and performance
- establish and/or measure compliance status with regulations and company policies

ensure the environment is protected

2. Interviews with management and personnel will:

- evaluate management commitment to environmental stewardship
- evaluate facility personnel's awareness of company environmental policy
- ensure staff is effectively trained and aware of their environmental responsibilities

identify checks and procedures that are in place to ensure the standard of practice is achieved

3. The physical inspection of facilities will:

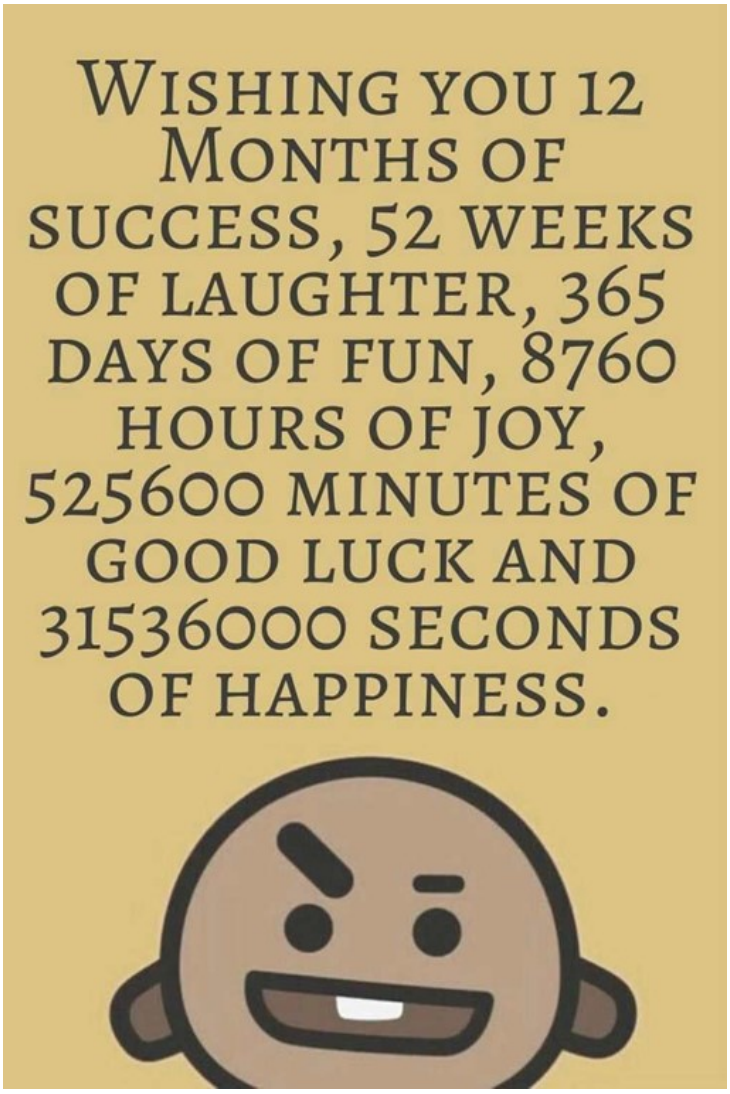
- enable the collection of evidence through visual examination
- provide for observation of critical operations helps in determining where/how any sampling should be conducted facilitate recommendations for immediate corrective action.

Create an Action Plan

After the environmental audit report has been submitted to management, realistic goals and objectives should be set to improve environmental performance. These goals can include, but are not limited to:

- written policies showing management commitment to environmental stewardship
- communication of environmental responsibilities to all employees
- solid and hazardous waste reduction, efficient water and energy use initiatives

continuous monitoring, measuring, and accounting of initiatives to evaluate effectiveness and success.



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Fresh Air: New HVAC Approaches

by Charles A. Rowland, PE, and Martin J. Wendel, Jr., PE,

Building owners are looking closely at a range of innovations as the marketplace demands change.
The entire HVAC industry is re-examining itself. Code compliance, environmental concerns, cost issues, developments in technology and equipment — these are among the key factors driving changes in HVAC designs. In many cases, tried-and-true solutions are falling by the wayside, replaced by innovative approaches to old problems.

One big reason for new strategies is changes in codes. As ASHRAE 90.1 is adopted by building codes, new requirements will ripple through the industry. The latest version of ASHRAE 90.1 adds requirements for equipment efficiencies, building envelope design, daylighting strategies and duct construction. Allowable transport factors dictate duct sizing criteria and control strategies. Many of these new requirements require examination of long-held assumptions about the way buildings are designed and commissioned.

Another big driver of change is the growing demand for "green" buildings that require less energy to construct and operate. Many organizations today are interested in designing their buildings to be LEED (Leadership in Energy and Environmental Design) certified, a designation developed by the U.S. Green Building Council that awards points for energy efficient design and enhanced environmental performance features. Higher levels of distinction are achieved based on the points accrued. These criteria are leading some owners away from the traditional strategies of achieving the lowest cost for design and construction efforts and moving them towards arrangements where owners work with design professionals to optimize energy efficiency and conservation, improve indoor air quality and recycle natural resources wherever possible.

Similarly, owners are more involved than ever with the design of buildings. More and more owners have their own standards and preferences that must be applied and incorporated into the design.

Today's designs must take into account not only first and operating costs, but also the uncertainty of unregulated utility charges, longterm capital spending schemes — even the effects of an energy provider coming on site to provide electricity, heating or cooling. The entire project team must be vigilant to make sure that the right questions are being asked and to avoid costly detours.

As some of the underlying forces shaping HVAC systems have changed, so have practices in HVAC design. Several of these innovations represent a departure from conventional wisdom, while others are simply a result of the current industry environment. Here' a look at nine emerging changes.

1. Reclamation/Conservation
Many organizations are looking at reclamation and conservation as methods of preserving natural resources. For example, organizations are currently recovering condensate from air handling unit cooling coils and using the excess water for cooling towers; this practice significantly reduces the load

for domestic water on a given day. Owners are also reclaiming energy by putting in energy recovery devices to preheat or precool the supply airstream with the energy from the exhaust or relief airstream.

2. Fast Track Projects

In industry sectors such as pharmaceutical facilities, data centers, and corporate office buildings, the traditional sequence of design, bid and build for constructing buildings is becoming a thing of the past. For these segments of the industry, fast-track construction is no longer an anomaly; it is the model. Projects routinely have early packages, pre-purchase packages and multiple bid packages issued in conjunction with the development of the design. Designing for flexibility and anticipating evolution of the project design are key in minimizing costly changes during construction.

3. Ventilation Control

One method of reducing first costs and energy costs for an HVAC system is to reduce the amount of outdoor air that must be conditioned. In facilities such as laboratories, where hazardous elements are present, the challenge is reducing the volume of outside air while still maintaining code compliance, indoor air quality and safe conditions for occupants.

The installation of carbon dioxide monitoring in HVAC systems as a means of safely reducing occupant ventilation rates is gaining popularity. In this arrangement, the level of CO2 is continuously monitored on the return side of the HVAC system. Outdoor air is introduced as needed to maintain the CO2 below preset limits. This application has particular value when applied to conference areas that typically experience great shifts in the number of occupants. A big energy user in laboratories is typically the fume hood, where all of the air that flows through the hood is exhausted outdoors. Traditionally, the common method of reducing this flow is to apply variable air volume (VAV) controls to the hood so that the amount of airflow drawn through the hood is regulated in proportion to the amount of open “sash” area. To enhance energy savings, occupancy sensor controls have been added to the hoods to further reduce flows when the sashes are left open and the hood is left unoccupied. A recent development is “low flow” fume hoods, which claim to provide safe operating conditions for the user while requiring less airflow through the open sash areas.

4. Trending Building Performance

Today’s building automation systems (BAS) provide more flexibility than ever to manage building performance. By monitoring system performance and utility use, the BAS can automatically optimize the performance of various building systems. This can take the form of simple tasks, like the resetting of discharge air temperature or static pressure setpoints when it would save energy, to optimal on-off staging of chillers and other prime movers, to providing demand-limiting capability when the electrical peak demand is approached. All of these functions help an owner operate the building more efficiently.

These methods of management will grow more important as utilities continue to modify their billing structures towards time-of-day rates, even to the point of having the BAS polling utilities for rates and making automatic operational decisions based on optimization programs.

5. Primary-Only Chilled Water Distribution

In the not-too-distant past, chiller manufacturers would recommend that the water flowing through their chillers be kept at a constant flow rate to safely operate the equipment. In central plants with more than one chiller, this often resulted in pumping schemes involving primary and secondary pumping so that the flow could be kept constant through the chiller, while flow through the distribution piping could be varied to meet the load. Most chiller plants with multiple chillers have pumping schemes based on this concept. As chiller controls and sensors have improved, manufacturers

have realized that chillers will operate properly with varying flows. The result is systems that can operate as variable-volume, primary-only pumping systems. This change has meant energy savings and first-cost savings because there are fewer pumps, controls and electrical connections. While there are circumstances that lead to primary and secondary pumping systems, more and more plants are being designed with primary-only pumping.

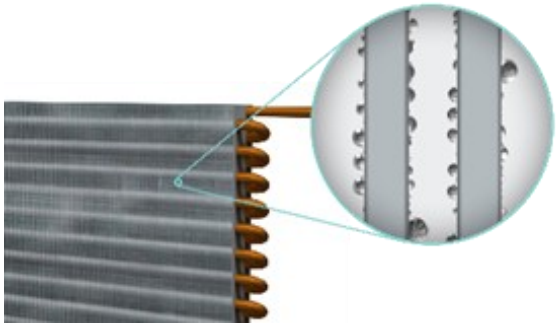
6. Water-Cooled Data Center Equipment

Potential equipment loads have skyrocketed for data centers, server farms and similar spaces. Spaces that may have previously been designed at 40 watts per square foot for equipment load are being designed for increasingly higher equipment densities. For example, 100 watts per square foot is not uncommon. In one instance, an organization was looking to design space for 150 watts per square foot.

These high loads are pushing the equipment manufacturers to consider providing water cooling to the racks to offset the high loads and prevent hot spots from occurring where air distribution might be restricted. This cooling method would put the cooling at the heat source where it needs to be and could be expanded to match the number of equipment racks. Interestingly enough, this would bring data center cooling full circle: Early mainframe computers were directly cooled with chilled water before computer manufacturers moved away from water-cooled to air-cooled systems.

7. Low-Temperature Air

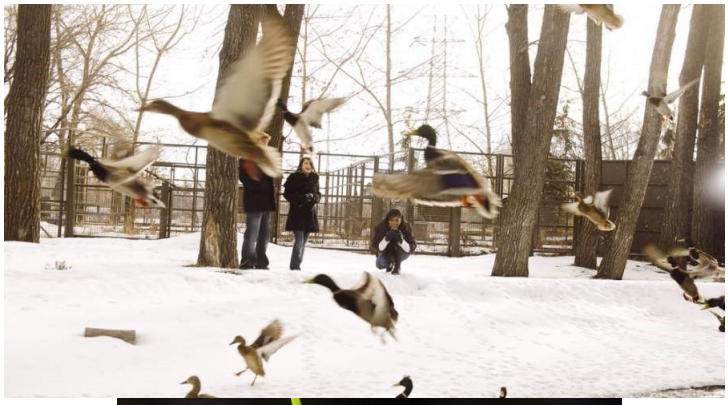
Low-temperature air systems are becoming more popular. Supplying air at 40 to 45 degrees instead of the more conventional 55 to 57 degrees helps keep

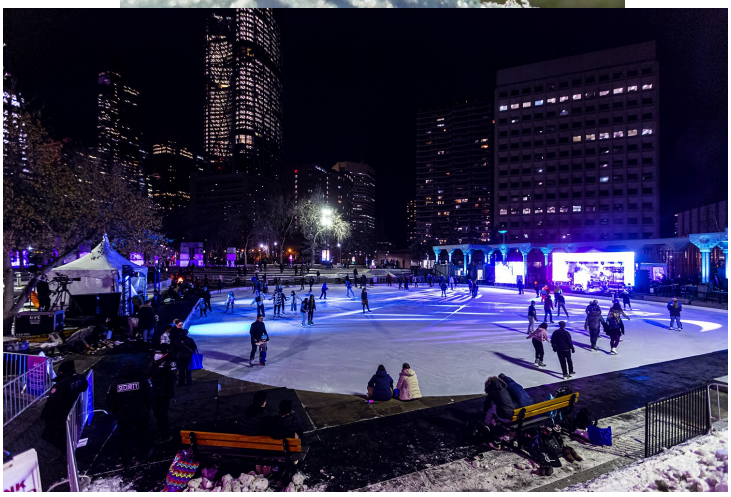


duct costs down by providing more cooling per cfm. This scheme does have some drawbacks, including avoiding “dumping” of the air out of the diffuser in some spaces. In addition, the lower temperature can cause drafts and produce low relative humidity in the space.

8. Commissioning

Commissioning is an organized, planned, and





KenKen Puzzle

How to solve the Kenken puzzle:

(Answers on page 23)

- Fill in the numbers from 1 –6
- Do not repeat the number in any row or column
- The numbers in each heavily outlined set of squares, called cages, must combine (in any order) to produce the target number in the top corner using the mathematical operation indicated
- Cages with just one square should be filled in with the target number in the top corner
- A number can be repeated within a cage as long as it in the same or column

2÷		4	3–	1–	
8+		5–		20×	
3+			3	3–	10×
	600×				
1–		6+	5–		3
	2			10+	

documented approach to verify that the installation and performance of equipment and systems conform to the design intent. A well-executed commissioning plan verifies installations, confirms testing, executes startup and verifies system operations. Commissioning, once a rare occurrence, is evolving into a construction standard, as evidenced by the new ASHRAE energy requirements that require a level of commissioning. Some owners have embraced commissioning because they realize that a successfully executed, sound commissioning plan is key to receiving a building that is truly "ready for turnover," with all systems started up and adjusted in compliance with the design.

9. Alliance Agreements

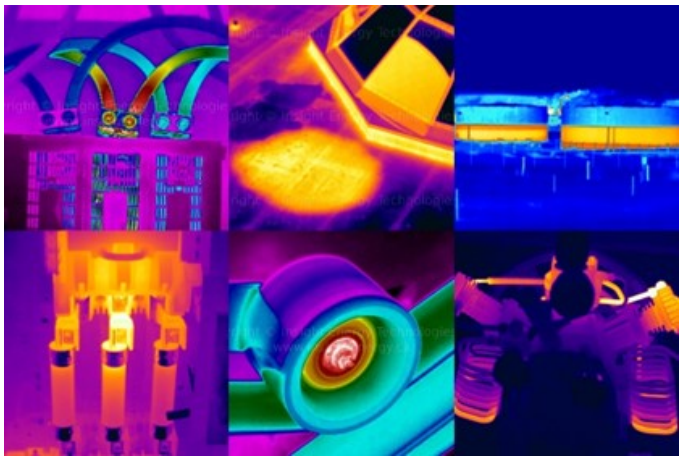
Some owners are moving toward establishing alliance partnerships with equipment vendors, design professionals and construction managers. These alliances produce long-term relationships and improve the design and construction process: They engender a strong team environment where all groups work toward continuous improvement by sharing information, knowledge and lessons learned.

Charles A. Rowland, PE, is director of mechanical services for Kling Lindquist, an integrated architecture, engineering, interiors and planning firm. Martin J. Wendel, Jr., PE, is an engineering design principal for Kling Lindquist. *Article reprinted with permission*

Making Infrared Pay

by Infraspection Institute

Education can help managers make the most of investments in infrared technology



Infrared thermography is a non-contact, non-destructive test method that uses a thermal imager to detect, display and record thermal patterns and temperatures across a surface. Engineering and maintenance departments more often are using the technology in situations where knowing thermal profiles and temperatures will provide meaningful data about a system, object or process.

The technology can help engineering and maintenance technicians carry out predictive maintenance, condition assessment, quality assurance, and forensic investigations of electrical, mechanical and structural systems.

Exploring applications

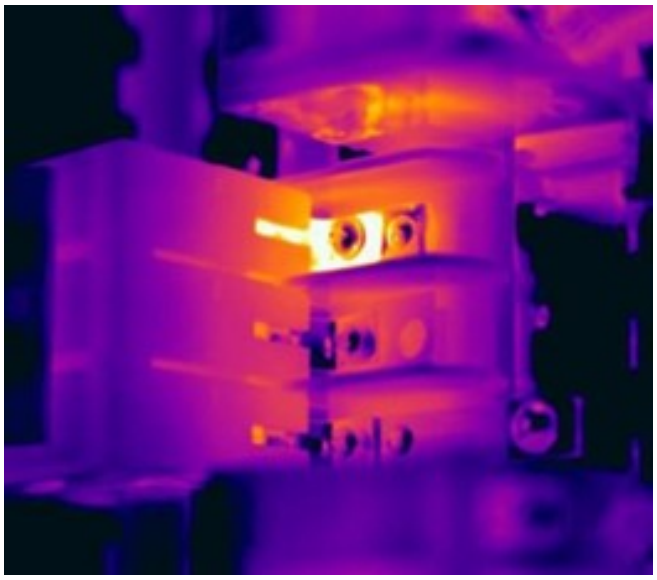
Managers first should explore the most common applications of the technology before making decisions on infrared training for front-line technicians.

ELECTRICAL DISTRIBUTION SYSTEMS.

As electrical current flows through a conductor, it generates heat. Many common electrical defects are accompanied by a rise in temperature for up to several weeks before failure, but some defects initially show up as cool components.

Among the problems infrared technology can detect are loose or deteriorated connections, overloads, imbalanced loads, open circuits, inductive heating, harmonics, and defective equipment.

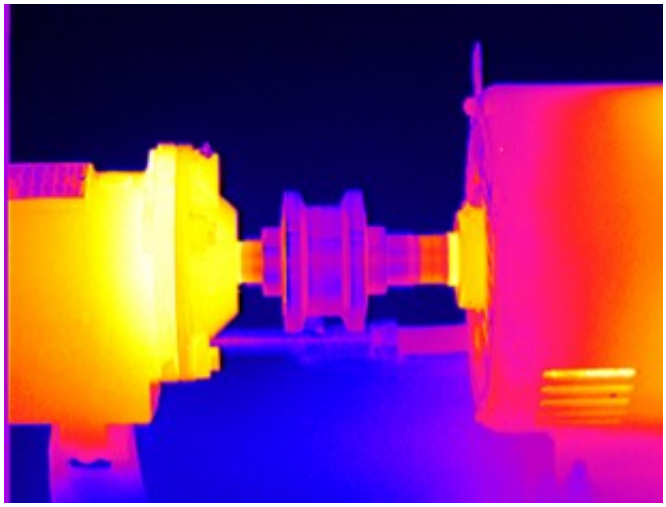
Training can help technicians: locate problems quickly, without interrupting service; reduce costly and unscheduled power outages; minimize preventive maintenance time; maximize troubleshooting effectiveness; prevent premature failure; extend equipment life; identify potentially dangerous equipment; and reduce insurance premiums and deductible payments.



MECHANICAL SYSTEMS.

These devices generate heat as they operate. Resulting forces such as friction, misalignment, and improper belt tension cause excessive heating.

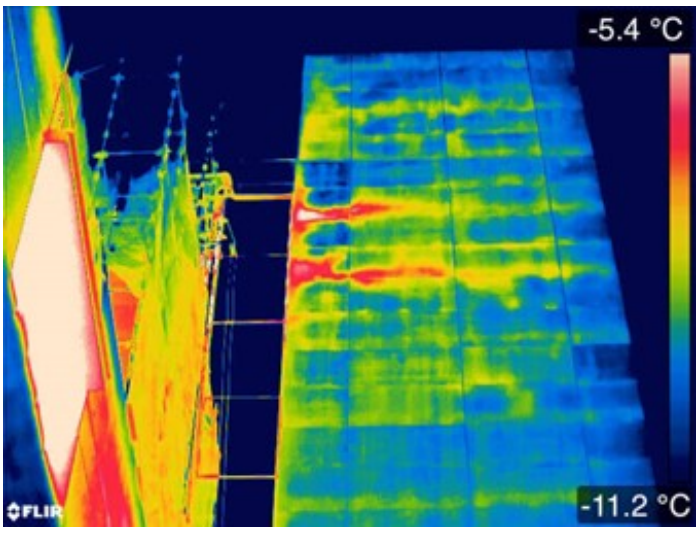
Among the problems infrared technology can detect are misalignment of coupled equipment, over- and under-lubrication of bearings, over- and under-tension of belted systems, excessive friction, and defective equipment.



STRUCTURAL COMPONENTS.

Missing or damaged insulation or water infiltration into insulated systems results in excess energy loss. Thermal imaging can detect evidence of latent moisture or physical defects due to changes in either the thermal conductivity or thermal capacitance of the insulation system.

Problems that infrared imaging can detect are: missing, damaged, or improperly installed insulation; energy losses caused by air infiltration; and water infiltration. Applying infrared imaging to structures can reduce heating and cooling costs, evaluate thermal performance of retrofits, identify latent moisture, detect conditions conducive to mold or insect problems, and provide hard-copy proof of problems.



ROOFING SYSTEMS.

Water infiltration into low-slope roofing systems causes changes in their thermal properties. Usually conducted at night, thermal imaging can help technicians identify latent moisture, as well as missing, damaged, or improperly installed insulation.

It also can pinpoint water-damaged roof areas quickly and accurately, help technicians perform quality assurance inspections of new or retrofitted systems, eliminate unnecessary replacement of good roofs, identify problems before they become large, help extend the life of the existing roof, document problems before the warranty expires, and provide facts for planning accurate budgets.

Targeting training

Aside from test equipment, training is the most important investment a company will make in infrared inspection. Advances in technology have resulted in infrared equipment that is user friendly. But it is not point-and-shoot technology.

Besides understanding the object or system being inspected, thermographers must understand common error sources that can influence observed thermal data. Training should teach infrared theory, heat-transfer concepts, equipment selection and operation, eliminating or overcoming common error sources, and specific applications. Courses should allow technicians to quickly master the technology, enabling a company to see a return on the investment.

All training is not equal. Consequently, course content often varies widely between training providers. In some cases, courses offered by

equipment manufacturers might be biased toward their own brand and ignore limitations of equipment they manufacture or sell.

The most desirable training courses are presented without marketing information and are applicable to all infrared imagers, regardless of brand or age. They also should be taught by experienced thermographers who have extensive field experience in providing infrared inspections for a range of organizations.

Infrared certification is written proof that a person has completed formal training and possesses a certain skill set. Certification has long been one measure of thermographer competence within the infrared community, in much the same way a diploma or degree is used among educational institutions.

Some providers offer customized, on-site training. With on-site classes, instructors travel to a facility and customize training to meet a company's specific needs. When possible, trainers should work with technicians to conduct field trips and address a company's particular applications. On-site courses provide a cost-effective alternative to open-enrollment classes.

Finally, some providers use web servers and multimedia resources to provide a distance learning alternative that can better meet a department's training needs.

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Infrared Technology Heats Up

by Michael Newbury

As infrared diagnostic systems have advanced in recent years, many engineering and maintenance managers have begun rolling this technology into their technician training programs. The cost of many imaging tools has dropped, and their reliability has increased, making infrared technology a viable component of a facility's program to ensure power quality.

Infrared thermography cameras produce images of invisible infrared, or heat, radiation, and they enable technicians to produce precise, non-contact temperature measurements. This technology allows maintenance and engineering technicians to gauge potential heat-related issues, such as loose electrical connections, they cannot detect through visual inspection of the equipment. If not addressed, these issues could cause facility downtime or endanger the safety of building occupants and technicians.

Current camera technologies and infrared software programs also offer built-in digital visual cameras, handheld devices, and guided reporting. For example, one software provider offers a program that replicates a predictive maintenance inspection database from the server to a personal digital assistant or tablet computer in the field. Using this software, technicians can enter information about problems they observe and report the test status of each piece of equipment directly into the database.

After the inspection, they can upload that information and immediately share it over the company's intranet using dynamic web technology. Users they can print and distribute hard-copy reports. The database also can share information with department's computerized maintenance management systems and other predictive maintenance programs.

Of course, managers first need to understand their departments' needs. All of these bells and whistles come at a cost and would not benefit every facility.
— *Michael Newbury*

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5th Class Power Engineering Course

The Online BOMA 5th Class Power Engineering Course:

- **Will begin on Feb 2, 2023 and will take place every Tuesday and Thursday evenings from 5-8pm.**
- **The course will be held online only using Zoom.**
- **The fee for enrollment will cover the cost of the 150 hour course, textbooks, and BOMA certificate upon completion**
  please note this does not include the ABSA exam*
- ***No prerequisites are required for the course***

New to the industry? If you are looking to become a building operator, then we recommend taking the Building Operator Level 3 online course. Visit our website for more info: https://boma.ca/courses-list/building-operator-program/

If you need further information please contact info@boma.ca

Change of Date:

February's Meeting will take place on Tuesday February 21, 2023 (*not February 14th*).

We look forward to seeing you on February 21, 2023 at the Danish Canadian Club

Identifying the Reasons for Joint Sealant Restoration

by Howard Kowalchuk and Pete Reynolds

Before starting any joint sealant restoration work, one should have a clear understanding of the reasons for proceeding with the project.

Joint sealants are typically restored for one or more of the following reasons:
1. A seal breach that has manifested itself as water and/or air leakage.
2. As preventative maintenance to avoid the costs and inconvenience of future seal failures.
3. For sealant that is close to the end of its service life.

As part of a general building maintenance package. Regardless of the motivation for the restoration work, the existing condition of the building joint seals and the overall wall system should be documented. A visual inspection or survey of the building joints should be undertaken. This may require the use of a swing stage, man lifts, boatswain chairs or other similar types of equipment. The extent of the survey needs to be decided upon before starting the project. It may be decided that a partial survey such as one drop per elevation will provide enough information to proceed.

The survey should document the following information:
1) The joint substrate types. Appendix A gives a description of common building materials that sealants must adhere to. The substrate type is required input for joint movement calculations. It is also a consideration when selecting replacement sealant products.

2) The joint locations, spacing, approximate linear footage and joint configuration (width and depth). Record the expected temperature range for that region. Typical and nontypical details should be sketched. Note location of non- typical areas.
The joint configuration, sealant width and depth, should be determined by cutting out samples in representative areas and measuring the sealant profile. There are four basic types of joint configurations
- Butt joint.
- Fillet or angle joint
- Lap joint.
- Bridge joint.

In the cut-out areas, the condition of the joint backing should be noted, including type and size. Check joint backing for moisture retention. Does it appear dry or wet? Is there staining on the backer rod? Include any observations made on any abnormal conditions of the wall interior, and/or traces of water. Note if the substrates are in need of repair. 3) The joint sealant general condition as well as substrate condition should be documented. This includes noting the location and the amount of linear footage.

Joint sealants are required to accommodate normal building movement while still maintaining a seal. This movement combined with weathering effects can cause a gradual reduction in the sealant performance properties. The samples cut to determine joint configuration should be examined.

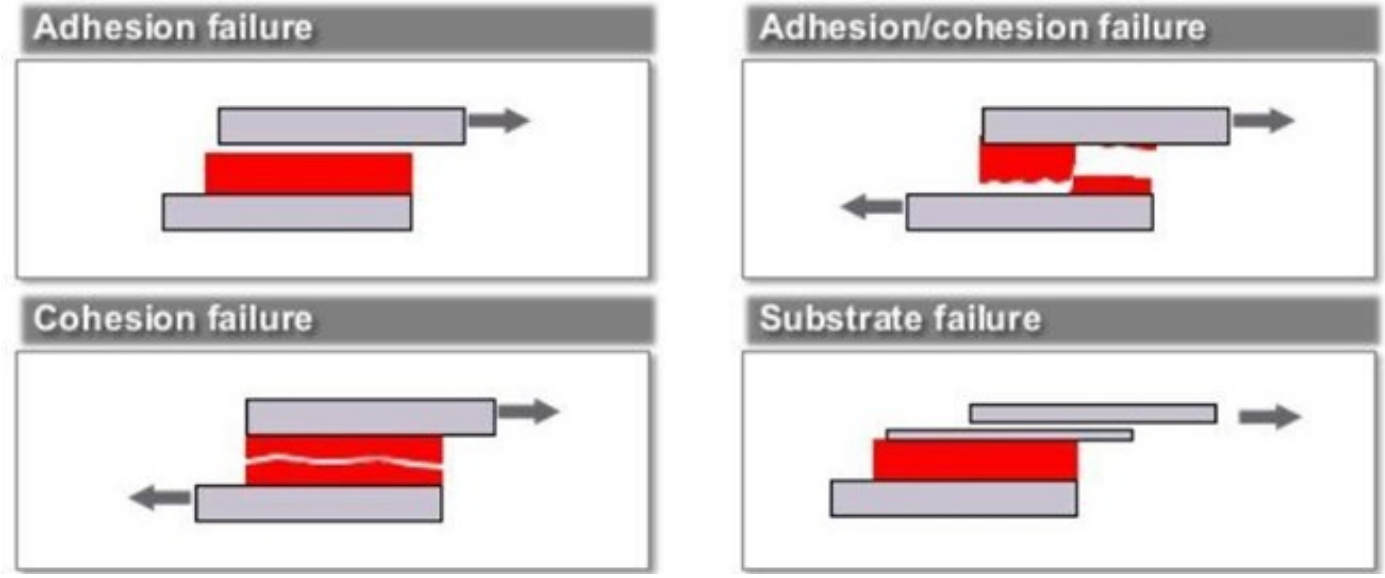
Comments on the sealant appearance (both on the surface and within the bead), brittleness and elastic properties should be noted. Determine the age of the sealant if possible, from construction or maintenance records.

Document the type of joint seal failures. A description of the three types is as follows.

a) *Sealant Adhesive Bond Loss*
Sealant adhesive bond loss is when the sealant has separated cleanly from the sur- face of the substrate. A gap may appear between the sealant and the substrate.

b) *Sealant Cohesive Tearing*
Sealant cohesive tearing is when a split or tear occurs within the body of the sealant bead. The split may go all the way through or just a portion of the bead. Generally, the split is parallel to the length of the joint. This type of failure is due to excessive or restrictive movement.

c) *Substrate Cohesive Failure*
Substrate cohesive failure is when the substrate ruptures or degrades at or near the sealant bond line. The sealant remains adhered to the substrate but the substrate separates within itself.



Joint seal failures are not necessarily readily apparent by visual inspection alone. A common technique for evaluating joint seal problems is to probe the joint seal during the inspection. Probing is simply applying a localized force at the center of the joint sealant using a blunt instrument. This will simulate extension of the joint, care should be taken not to overextend the joint by use of excessive force.

Probing may uncover sealant adhesive bond loss that was not apparent using visual inspection. Probing should be done during the inspection on a defined, repetitive basis. A typical approach is to probe every 3 to 5 linear feet of seal if no failures are observed. Failure areas are probed on a continuous basis until no failure is observed.

4) General observations. An important part of the survey is to document the general state of the building exterior and to note specific areas of concern.
Take particular note of:
- Evidence of water leakage or efflorescence.
- Wall cracking patterns and locations.
- Wall panel relative positions. Are they plumb and in line?
- Evidence of previous maintenance or repairs.
- Existing deficiencies in the wall system.

Assessing the Existing Conditions
With the survey completed, a general picture of the existing conditions can be visualized. If a partial survey was undertaken the first assessment is to decide if further inspection is required. Are the majority of the observed problems occurring on one elevation or are they concentrated in one general area? It might be useful to per- form an extensive inspection if the problems are not isolated.

Assessing failures
Making a sketch of the building elevations may be very helpful in assessing the existing conditions. The sketch should identify the joint seal failure locations along with the other areas of concern such as substrate cracking patterns.

The drawings and sketches should be reviewed to identify any patterns. Are all joint failures of one type? Do they occur only in one repetitive area such as at the window corners? Has one time building movement caused a problem? Are there cracking patterns that show this?

It is here that the assessor uses his building envelope knowledge and experience to truly understand the root cause of problems.

Potential Failure, Root Causes

Some potential root causes of failures attributed to sealants are:

a) *Sealant Adhesive Bond Loss*

Sealant adhesive bond loss can be caused by improper substrate preparation, substrate contamination or improper sealant installation. Sealant performance is very dependent on substrate preparation. Upon inspection, is there evidence that dirt, oil, form release agents, or other contaminants are within the areas of bond loss? If a primer was used, was it applied properly? Is there evidence of excessive amounts of primer, insufficient or no primer, use of the wrong primer or primer contamination?

Was the sealant installed properly? Is the bead width to depth ratio correct? Does it have the desired hourglass shape? Is three-sided adhesion occurring?

Sealant-substrate incompatibility may show itself as sealant adhesive bond loss. Sealants do not necessarily bond to all materials equally well. For example, a sealant that bonds well to glass may not bond well to granite. If all sealant bond loss is occurring on one substrate it may be caused by an inherently weak bond.

b) *Sealant Cohesive Tearing*

Sealant cohesive tearing usually results from joint movement being greater than the movement capability of the sealant or from improperly installed sealant.

Excessive movement can be the result of poor joint design, improper sealant selection or as-built joint widths that did not meet the design specifications.
To determine whether or not the joint movement exceeds the capability of the sealant, the following information is required:

a) The existing sealant's joint design ratio. Sealant

movement capability (a :i: percent- age) alone is not the joint design ratio, other factors such as construction tolerances and installation inconsistencies are included. This mayor may not be readily available. Joint design ratio is normally stated on manufacturers' product literature. The typical industry standard for joint design is 4 to 1 .

b) The actual joint movement. It is possible to measure actual joint movement with the use of scratch gauges or other methods. (See figure 2.10) This approach can produce valid movement dimensions provided the gauges are allowed to record movement over an annual cycle. Another approach is to calculate the theoretical joint thermal movement using the method described in Section 10, Appendix B.

If the actual joint movement exceeds the joint design ratio, cohesive tearing may occur. Another common cause of cohesive tearing is improper sealant application. Bead profiles that are too thin have a tendency to easily tear or split. Bead profiles that are too thick increase bond line stress, decreasing movement capability, resulting in tears and splits.

c) *Substrate Cohesive Failure*
In order for the substrate to fail, the adhesive and cohesive strength of the sealant must be greater than the cohesive strength of the substrate. Joint failures of this type usually appear at first glance to be sealant adhesive bond loss. Close examination of the bond line shows that the substrate is embedded in the sealant surface. Prolonged water exposure and/or freeze thaw can often be the cause of this condition.

Indirect Failure Root Causes
Not all joint seal failures are directly related to poor sealant application or performance. Quite often poor design, poor performance, or failures within the wall or roof components lead to building joint failures.

Poor quality windows that leak infiltrated water into a wall system may appear to be sealant problems. Building settlement or other one-time movements such as seismic racking often cause joints to move much more than anticipated.

Joint seal failures resulting from indirect root causes in most cases will not be corrected by replacing the joint sealant alone. Any problem-solving process must identify the root cause and correct it to truly solve the problem. If leaky windows are causing sealant adhesive bond loss in joints below them, the window leaks need to be stopped first.

Any seat failures identified during the survey should be repaired. The result of the survey assessment is an understanding of the extent of the repair required.

The Survey Summary
The results of the survey should be summarized to aid in choosing the appropriate joint seal restoration option.

The summary should include the following information:
The approximate linear feet, type and age of the current joint sealant. The type, location, number and approximate linear feet of detected joint seal failures. A description of the root cause(s) of the detected seal failures including indirect causes.

Doing a systematic existing condition survey along with a thorough assessment of the observations make choosing the restoration approach much easier.

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The 'call for abstracts' is live for the National Conference on Building and Facility Operations' June 2023 building conference. building owners and operators are being targeted as well as consultants who are involved in making buildings more energy efficient. A list of anticipated topics to have presented at the conference is included and speakers are being sought.

Please click on the link for further information:

https://ncbfo.ca/western/events/ncbfo-2023/

Kenken Puzzle Answer

2÷ 6	3	4 4	3− 5	1− 2	1
8+ 3	1	5− 6	2	20× 5	4
3+ 2	4	1	3 3	3− 6	10× 5
1	600× 6	5	4	3	2
1− 4	5	6+ 2	5− 6	1	3 3
5	2 2	3	1	10+ 4	6

TEST YOUR OPERATOR IQ ANSWERS

Answers: 1) a 2) c 3) e 4) d 5) b

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TUESDAY JANUARY 10, 2023 AT 5PM FOR OUR IN-PERSON MONTHLY MEETING

Presenter: **Javier Landaeta**

Title: **Sales Manager for Western Canada at ABB E-Mobility Canada.**

Brief: **Javier has been with ABB E-Mobility since May 2022. He is responsible for developing business and partnerships in the transit, fleet, public and destination market segments. Javier graduated from UBC Vancouver 2011 with a Bachelor of Arts in Human Geography. In his capstone project he developed a framework for sitting Level 2 EV charging stations for City of Vancouver.**

Topics:

1. **ABB in Canada Overview**
2. **EV Charging - AC Level 2 vs DC Level 3**
3. **Elements of an EVSE Project (vehicles, chargers, electrical distribution, digital solutions and maintenance)**
4. **EV Charger ownership models**
5. **Load Management (Static, vs dynamic, local vs cloud)**
6. **Financials; charge session monetization, grants & incentives, carbon credits**
7. **ABB E-Mobility product portfolio**
8. **Looking ahead: V2G/V2X, virtual power plants, distributed energy, full binding energy management, battery storage, onsite generation.**

We look forward to seeing you in-person for our January 10, 2023 meeting at 5pm at the Danish Canadian Club (727 11 Ave SW) on Tuesday January 10, 2023.

Please note: February meeting will take place on February 21, 2023 (instead of February 14, 2023)

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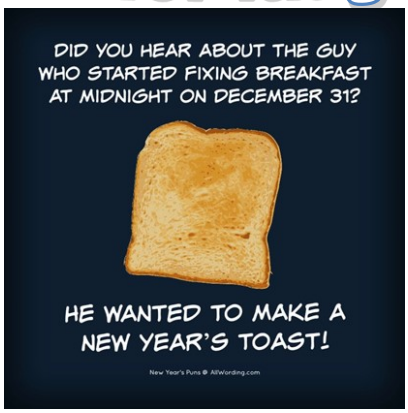

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We look forward to seeing you in-person for our meeting at the Danish Canadian Club (727 11 Ave SW) on Tuesday January 10, 2023 @ 5pm

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