Volume 29 - Issue 7 - March 2023

BOA
Building Operators Association of Canada

Official Publication of the Building Operators Association (Calgary)
March 2023

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Front cover photo:
Calgary skyline (hdphotography25/Instagram)

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

Executive & Committees

President Les Anderson	president@boacalgary.com C: 403 921 0648
Vice President Mark Arton	chairman@boacalgary.com (c) 403-305-7029
Associate VP Vacant	associate.vice.president@boacalgary.com
Chairman Mark Arton	chairman@boacalgary.com (c) 403-305-7029
Treasurer Carrissa Speager	treasurer@boacalgary.com (c) 403-969-0329
Secretary Monika Bhandari	secretary@boacalgary.com (c) 403-470-4169
Education Committee Vacant	education@boacalgary.com
Membership Committee VACANT	membership@boacalgary.com
Promotions Committee VACANT	promotions@boacalgary.com
Activities Committee Samson Isowode	403-874-0850
Technical Concerns Kyle D'Agostino	chairman@boacalgary.com
Webmaster Les Anderson	webmaster@boacalgary.com

President's Message

BOA
Building Operators Association of Canada
Building Operators Association
Box 22116, Bankers Hall
Calgary, AB T2P 4J5
www.boacanada.ca

I hope this message finds you and yours well and in good health

The Covid isolations are over, and people are retuning back to the work force. There is a need to bring in new people to work in the facilities and the people we need most to look after are the young workers. The onus is on management to educate and train these people in the safe work practices required of them to work safely in our facilities. The youth have no idea of all that they don't know. It is up to us to instill to them safe work practices that they can carry with them for the rest of their lives. Young workers need answers to basic health and safety questions. Lack of practical experience, a carefree "it won't happen to me" attitude, and fear for their jobs are all reasons why young workers may not ask questions about safety.

As an employer or supervisor of young workers, you should be prepared to cover a wide range of health and safety topics as components of your orientation training program. Young workers need to be made aware of job hazards, including training and protective equipment, and the rights and responsibilities of both workers and employers. Some studies found 80 percent of young workers don't receive proper training in occupational health and safety.

If you are a supervisor, it's up to you to make sure workers follow the OH&S Act and your company's policies and rules, to work safely, and use protective equipment. Inform workers about known hazards and demonstrate to workers how to work safely. To learn that the worker has the right to refuse to perform unsafe work either because of lack of training or unsafe conditions and that management must respond to the workers concerns immediately.

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 24*

1. Boiler sections are held together with:

a. cap bolts
b. torque tubes
c. pipe unions
d. tie rods
e. Stays

2. Cast-iron boiler capacity:

a. is very large compared to steel boilers
b. can be increased by simply adding sections
c. cannot be increased once assembly is completed
d. is not a function of section numbers
e. can be increased by increasing section size

3. Cast-iron boiler sections maximize heat transfer by:

a. utilizing as few passes as possible
b. vertical firing
c. exposing as large a surface as possible to the hot gases
d. utilizing an external furnace
e. using four push nipples per section

4. Modular cast-iron boiler water flow is:

a. continuous through all modules
b. connected in series
c. intermittent, occurring only while the unit is firing
d. always vertically upwards
e. done without the use of headers or manifolds

5. Cast iron boilers can only be used for:

a. process steam
b. low-pressure plants
c. high-pressure plants
d. high or low-pressure plants
e. all of the above

Plant safety - Employers must protect their young workers

by Maureen Shaw

Injury statistics for young workers are startling. StatsCan reports that every day 189 young workers between the ages of 15 and 24 are injured on the job. That grim toll adds up to 69,000 injuries each year. Some studies found 80 percent of young workers don't receive training in occupational health and safety.

These numbers are brought to life when you consider a real-life tragedy. In late 2004, Sean Kells was only 19 years old when on the third day of his part-time job. The chemical fluid that he was pouring ignited, and Sean was engulfed in a burst of flames. He received third-degree burns to 95 percent of his body and died the following day. With proper safety and emergency training, Sean's death could have been prevented.

The Industrial Accident Prevention Association (IAPA), Canada's largest health and safety organization, strongly believes workplace injuries and deaths, such as the death of Sean Kells, can be prevented. In 1995, we worked closely with the Workers Health and Safety Centre (WHSC) to develop the Young Worker Awareness Program (YWAP).

In 1996, volunteers and staff of both organizations delivered the program to more than 50,000 Ontario students. YWAP provides young workers with basic knowledge of workplace health and safety hazards, their rights and their responsibilities.

The program is available at no cost to Ontario schools, and combines a general assembly with classroom instruction to provide basic health and safety information.

The responsibility for health and safety in the workplace must be shared by the employer and the worker. This summer, the IAPA and the WHSC launched a joint media campaign aimed at reaching young people during the peak summer employment period.

The goal of the campaign was to try to raise awareness of their rights and responsibilities under the Occupational Health and Safety Act. Studies show that 35 percent of those asked feel they regularly encounter harmful situations at work, and 24 percent say they have felt obligated

to do dangerous work.
As president and chief executive officer of IAPA, I personally understand the message. My son was injured on the job three years ago in a workplace incident that almost claimed his life.

It is important that we use this program as a vehicle to reach young workers to reduce the number of needless injuries, illnesses and deaths. In the manufacturing sector alone, the injury rate for young workers is 35 percent higher than for other workers.

What should I review with my employees?
Young workers need answers to basic health and safety questions. Lack of practical experience, a carefree "it won't happen to me" attitude, and fear for their jobs are all reasons why young workers may not ask questions about safety.

As an employer or supervisor of young workers, you should be prepared to cover a wide range of health and safety topics as components of your orientation training program. Young workers need to be made aware of job hazards, including training and protective equipment, and the rights and responsibilities of both workers and employers.

If you are a supervisor, it's up to you to make sure workers follow the OH&S Act and your company's policies and rules, to work safely, and use protective equipment.

Inform workers about known hazards and demonstrate to workers how to work safely. What can you do?

There are a number of precautions you can take to ensure a safe workplace for young workers, including:

- Develop an effective health and safety training program for all new employees;
- Provide and maintain a safe workplace, including equipment and protective devices;
- Provide training so workers can work safely with materials used in your workplace, including equipment and protective devices;Inform new workers of any known hazards in your workplace, and provide training to work safely with the hazard

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Filters: Underrated and Overlooked

by David Kozlowski

Failing to pay attention to the role of air filters is one way to undercut the performance of HVAC systems

Given all the cost, design and technology that goes into sophisticated HVAC systems, it is a bit unnerving that a system can be very easily compromised by a cheap, throw-away filter. But it happens all the time.

As important as filters are, they often are given the least amount of attention of all components in an HVAC system. Aside from hospitals, which fall under a strict code covering air filtration, too few maintenance and engineering managers could say exactly what kinds of particulates their filters can remove from the air.

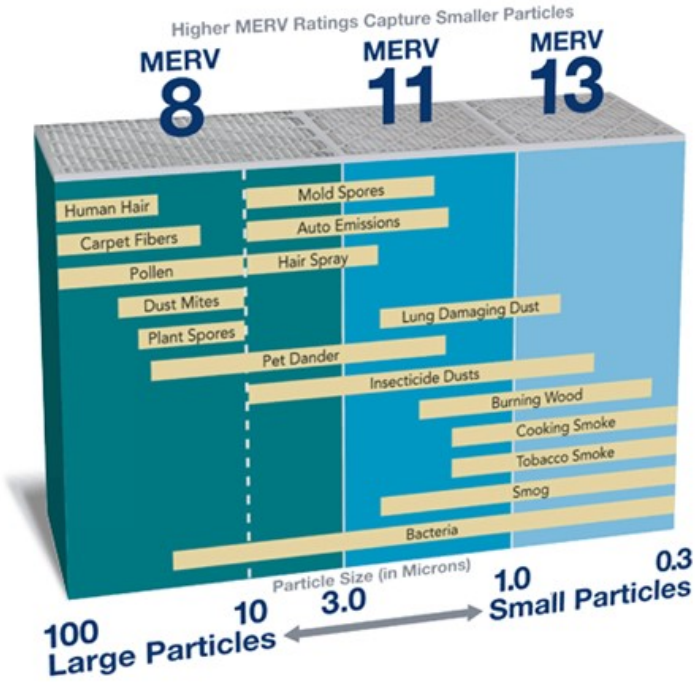
Recent changes to American Society of Heating, Refrigeration and Air-conditioning Engineers (ASHRAE) standard for indoor air quality could turn this around. The standards arm managers with the knowledge of their filters' capabilities. This knowledge, along with a closer look at filter design and maintenance, can help managers improve the air quality of their facilities and save money.

Move to MERV

Earlier this year, ASHRAE released Standard 52.2, Method of Testing General Ventilation Air Cleaning Devices for Removal Efficiencies by Particle Size. The standard changes the way filters are tested and rated. Gradually, manufacturers will begin labeling air filters with a value based on the filter's minimum efficiency in removing a range of particles, rather than its average efficiency. This means managers now will know with some certainty what their filter systems are capable of removing from the air stream.

For instance, ASHRAE Standard 62 on indoor air q Quality recently was amended to require a ***minimum efficiency reporting value (MERV)*** of 6 or greater for many applications, says Andrew Persily, chairman of Standard 62 committee. This minimum requirement is designed to keep dirt and moisture from mixing on the cooling coils, Persily says.

A MERV 6 rating corresponds roughly to a filter that is 20 percent efficient or less and removes 85-90 percent of particles measuring 3-10 microns. These



particles include mold spores, hair spray and cement dust. A human hair is about 100 microns thick.

"Right now, I have MERV 6-7 circled as a recommendation, but I am not sure that that is going to be enough," says Al Abend, chief of school

facilities for Maryland's Department of Education. "There is still a lot of educating we need to do before we can really start talking about what is best for our schools."

Research indicates that particles from about I micron to 5 microns are the most troublesome and can enter deep into the lungs.

But MERV 6 might not be enough filtration, says H.E. Barney Burroughs, president of Building Wellness Consultancy Inc. and chairman of 52.2 committee. Burroughs is conducting a 50-site, five-city filtration project to determine a sufficient level of filtration by measuring downstream particles.

Embracing the MERV rating system is important, however, because it means managers will have a better handle not only on the quality of the air their systems provide but on the cost of providing it. Managers understand the energy and labor costs, but they don't really know how the good the air is, he says.

Understanding the relation between air quality and cost means understanding the operating costs of filters, says Norm Nelson, senior project manager and forensic engineer for CH2M Hill.

The cost of air quality

Not many managers consider life-cycle cost when it comes to filters. And what they might learn when they do so is that better filters cost less.

"Labor and energy decide the cost of filtration more than the cost of filters do," Nelson says.

One premise of life-cycle cost is that a larger filter media surface area means less pressure drop and more dirt holding capacity, resulting in cleaner air, fewer filter changes and greater energy efficiency.

"The first thing to know is that filters that look dirty are probably just beginning to do their job," Burroughs says. The dirt that builds up in a filter is actually increasing the filter's efficiency, but only up to a point, he says.

To improve life-cycle costs, managers should try to improve a filter's dirt-holding capacity. Typical tactics to achieve this goal is using pleated filters or increasing the depth of the filters.

The labor savings that result from using filters with increased dirt-holding capacity are obvious. A standard 2-inch, throw- away filter in bulk quantities might cost $1.50. A good-quality, 2-inch pleated filter with the same efficiency might cost $4-6. But the pleated filter will last four to six times longer than the standard filter, thus requiring fewer changes.

Burroughs is conducting a direct comparison at an Atlanta-area hospital using several different types of filters. So far, he has found that a 1 -inch, blanket-type filter, though it offered a lower first cost, needed to be changed after just one month. In contrast, the more expensive pleated MERV 5 and MERV 7 filters have remained in place and are performing well seven months later.

If everything else is equal between a 2-inch and 4-inch filter, the 4-inch filter has an average lower pressure drop, which means less energy used.

Taking into account labor and energy savings, if there is room to increase the size of a filter rack, it could be cost effective to do so, Nelson says.

Managers could do the same thing by lowering the air velocity, but that is a more expensive option, he says.

The Maryland State Department of Education has done its own energy analysis. The department compared the performance of a disposable, 2-inch coarse-fiber filter for unit ventilators to that of a 2-inch, extended pleated filter.

The results show significant energy savings when using the latter filter. The former cost $3.80 per 1,000 cubic feet per minute, and the latter cost $3. The savings resulted from cleaner, more efficient coils.

A 4-inch pleated filter still saved more than the disposable filter but less than the 2-inch filter because of the increased cost of the filter. At 6 inches, Abend says, the pleated filter costs significantly more.

"As you improve your filtering and increase the sizes, you save more, but only up until a certain point," Abend says. "After that, you have to make a judgment," he says. "That's when it becomes a question of how much more do I want to pay for better air quality."

Burroughs encourages managers to start thinking of filters as an investment. Says Burroughs, "If managers buy the right filter and maintain it properly, then the payback is in clean coils, clean ducts, less housekeeping and less energy."

Filter Options

Managers have a range of options in using filters to help meet facilities' indoor air quality needs. Among the filter types are these:

HEPA filters. High-efficiency particulate arrestance (HEPA) filters can remove more than 95 percent of most particulate matter, including particles as small as 0.100.20 microns.

Gaseous phase filters. These filters use a carbon or charcoal pad to remove gases and are most effective in removing odors. But recharging the carbon can be messy.

Electric static filters. These filters can be added to I - inch unit ventilator filters to improve filter efficiency. The electric pad uses activated charcoal and draws low voltage when wired to the fan.

Ultraviolet light filters. These filters can destroy many biological and chemical contaminates, but effectiveness drops off quickly. While it is 100 percent effective next to the bulb, it is only 20 percent efficient 2 inches away.

The amount of filter surface area not only is critical to efficient filtration and dirt-holding capacity. It also can have an effect on energy.

What MERV Means

ASHRAE Standard 62 on indoor air quality recently was amended to require a minimum efficiency reporting value (MERV) of 6 or greater for many air filter applications.

MERV Rating Chart

MERV Rating	Dust Spot Efficiency*	Typical Controlled Containment
MERV 1	<20%	**>10.0 micron Particle Size** Pollen, Dust Mites, Sanding Dust, Spray Paint Dust, Textile Fibers, Carpet Fibers
MERV 2	<20%	
MERV 3	<20%	
MERV 4	<20%	
MERV 5	<20%	**3.0 - 10.0 micron Particle Size** Mold Spores, Hair Spray, Fabric Protector, Dusting Aids, Cement Dust, Pudding Mix
MERV 6	<20%	
MERV 7	25% - 30%	
MERV 8	30% - 35%	
MERV 9	40% - 45%	**1.0 - 3.0 micron Particle Size** Legionella, Humidifier Dust, Lead Dust, Milled Flour, Auto Emissions, Welding Fumes
MERV 10	50% - 55%	
MERV 11	60% - 65%	
MERV 12	70% - 75%	
MERV 13	<90%	**.30 - 1.0 micron Particle Size** All Bacteria, Most Tobacco Smoke, Sneeze Droplets
MERV 14	90% - 95%	
MERV 15	>95%	
MERV 16	>95%	

A human hair is approximately 20-40 microns in size. Viruses, the smallest airborne particles, range in size from .01 to 0.3 micron.

**Dust Spot Efficiency is the measurement of a filter's ability to remove airborne particles.*

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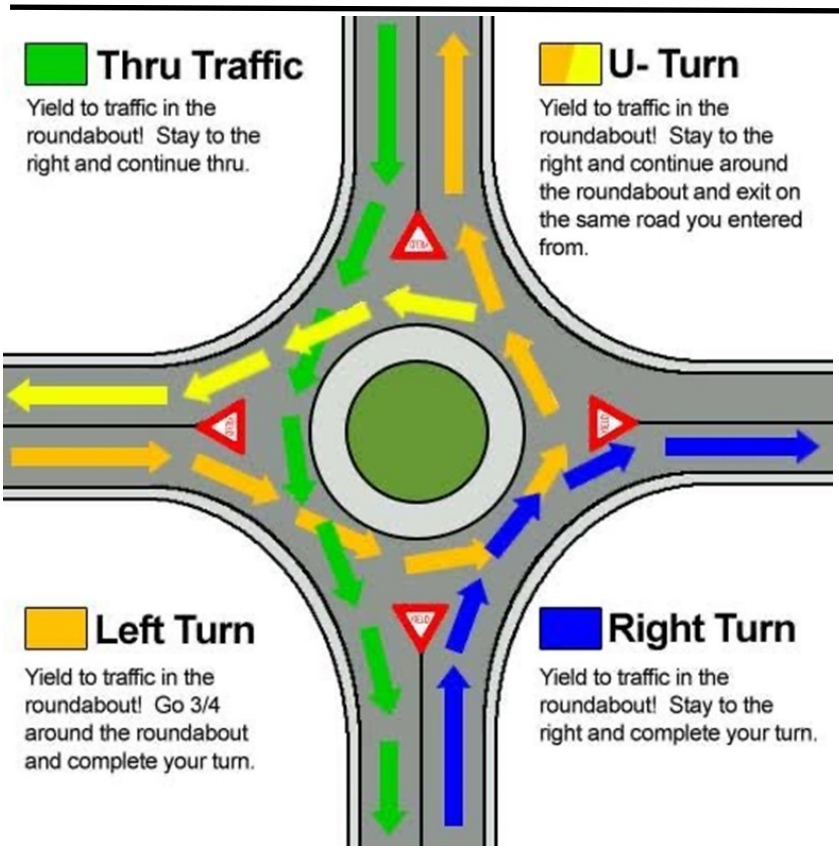
KenKen Puzzle

How to solve the Kenken puzzle:

(Answers on page 24)

- 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

		6	9	1			3	
9			2		6		8	7
2		8				1	6	
		4	6	8	2	9		1
	5	1		7				
	2				5	7		6
	6	7	5			8		
	9				1	4		5
4			3	9			1	



ROUNDABOUTS

ROUNDABOUTS may seem confusing but just remember to YIELD to the traffic on your left.

Roundabout Benefits:

- Crashes are reduced by 39%
- Crashes resulting in injuries dropped by 76% and fatalities by 90%
- Traffic delays cut by as much as 75%

The Daily One-Minute Inspection

by Jim Fitch

The other day while waiting at an airport, I noticed a couple of teenagers playing speed chess, also known as lightning chess. According to the rules, a game of 40 moves or less must be played in fewer than six minutes (three minutes per side). Their hands and pieces were in constant motion. It seemed to be more a foot race than a game of wit, intellect and strategy. Yet these kids couldn't seem to get enough of it, as they were playing one game after another.

How does this relate to lubrication and maintenance? In my view, the most important maintenance function doesn't require anything from the tool box. It doesn't require an instrument or an oil sample. It may not be on your PM schedule or lube route. What it requires instead are skillful inspections that are rapid, comprehensive and frequent. Taking a pointer from speed chess, we need to pick up both inspection tempo and quality by deploying sensory -based (versus instrument-based) condition monitoring techniques. Let's call them daily OMIs, or one-minute inspections.

Learning Machine "Sign Language"

Begin by learning how lubricants and machines reveal problems. Unlike people who have verbal skills, machines use "sign language" to communicate what hurts or what has invaded their system. Recognizing the "signs" or symptoms that the machine conveys is a required skill for those who work with machines and are responsible for their care and feeding. This involves training, practice and motivation.

Many PMs are inspections; however, they are often performed without the required skills, motivation and frequency. In contrast, daily OMIs are critical, high-resolution snapshots of machine and lubricant condition. Such inspections need to be conducted by trained operators, technicians, millwrights or others who have frequent access to machines. As is often said for safety, quality and total productive maintenance (TPM) - machine reliability is everyone's responsibility.

Checklists are helpful when completing tasks. These can be incorporated into scheduling software, maintenance PDAs and even posted on or near the machine itself. The range of inspections will vary considerably depending on the machine type and how it has been accessorized for inspection activities. Below is a basic list of common lubrication -related inspection tasks, many of which have been discussed previously in Noria publications:

- **Temperature.** Use touch, gauges and/or heat guns to inspect for general or localized hot running conditions. Besides a host of mechanical explanations, temperature excursions can also be caused by wrong lubricant, degraded lubricant, contaminated lubricant, aeration, varnish, etc.

- **Oil Volume.** Use level gauges, sight glasses, dip sticks or inspection ports/hatches. A slight drift in oil level (up or down) can be a critical alarm.

- **Pressure.** Use gauges or pressure transducers at

multiple points as needed. Temperature, viscosity, flow restrictions and aeration are among the many causes of pressure changes

- **Filter.** Examine delta-P gauges and bypass indicators to confirm filter is serviceable. When filters plug prematurely, there's usually an important reason why.

- **BS&W.** Take bottom samples or examine bottom, sediment and water (BS&W) bowls for abnormal accumulations such as sludge, wear debris, free water, biomass and other contaminants.

- **Ventilation.** Confirm serviceable condition of breathers and inspect for abnormal fumes, vapor and smoke.

- **7. Clear and Bright.** Pull samples or inspect sight glasses, BS&W bowls and bottle oilers for oil color, clarity, insolubles, suspensions, aeration/ foam, emulsions, fouling, etc.

- **8. Leakage.** Use a powerful flashlight to inspect shaft seals, gaskets, actuators seals, fittings, unions, ports, hoses, etc. Sudden leakage at multiple points is often caused by a change in lubricant quality.

- **9. Fluid Surface and Headspace.** Through inspection hatches and ports look for foam, varnish, sludge, bathtub rings, corrosion and churning.

- **Points of Entry.** Inspect for potential ingression sites such as unsealed or unprotected vents, breathers, hatches, inspection ports, clean-out covers, etc.

- **Dirty Exterior.** Machines that are dirty on the outside are usually dirty on the inside as well. Keeping machines wiped down and clean is a precursor to contamination control.

- **Spits and Sputters.** Machines emit an assortment of audible signals; some are normal but other are not. Report abnormal whines, rattles, rumbles, pops, etc. Use a rod, garden hose or stethoscope as needed to localize the generating source.

- **Grease Condition/Color.** Inspect grease extruding from seals and along shafts for abnormal color, consistency and condition.

The central theme of the daily OMI is the need for inspection vigilance, quality and scope. With oil analysis, we often say "you can't catch a fish unless your hook's in the water". This refers to the need to frequently sample oil if you expect to catch nonconforming conditions or machine faults. We've also learned that having your hook in the water is not enough either. We need to have it baited correctly and know how and where to fish. The same wise advice applies to machine inspections.

By getting into the habit of doing daily OMIs with a sharp and skillful eye, you can probably catch more problems than oil analysis, vibration analysis and thermography combined. *By Jim Fitch, "The Daily One-minute Inspection". Machinery Lubrication Magazine.*

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Canada to Phase Out Fluorescent Lamps

Proposal cites manufacture end date in 2023, retail end date in 2026

Canada's Department of the Environment and Department of Health have proposed amendments to the 1999 Canadian Environmental Protection Act that would effectively phase out the manufacture of most fluorescent lamps by the end of 2023 and ban the sale of most fluorescent lamps by the end of 2026. The proposal centers around the environmental risks of lamps containing mercury – and not energy efficiency or meeting specific lumens per watt targets.

The proposed Amendments would affect numerous categories of lamp products including linear and compact fluorescent lamps. The majority of affected lamps would be prohibited in December 2023, with a three-year interim period where replacement lamps would be permitted before the full prohibition takes place in December 2026.

Additionally, all other mercury-containing lamp manufacturing and imports, except those used for air and water treatment as well as fluorescent and discharge lamps under the catch-all category, would be prohibited by December 2031.

The lamp types cited below have proposed manufacture/import end dates of **December 31, 2023** and sales end date of **December 31, 2026**.

- Pin-base compact fluorescent lamp for general lighting purposes
- Straight fluorescent lamp for general lighting purposes
- Non-linear fluorescent lamp for general lighting purposes, including a circular or square fluorescent lamp
- Induction fluorescent lamp for general lighting purposes
- Metal halide lamp for general lighting purposes
- Cold cathode fluorescent lamp
- External electrode fluorescent lamp
- The categories below have longer proposed sunsets with manufacture and import to cease by the end of **2028**, and a sales end date of **2031**.
- High pressure sodium vapor lamp for general lighting purposes
- Fluorescent and discharge lamps used for growing plants

Manufacture or import of lamps that contain mercury.

The proposed Amendments would decrease the maximum quantity of mercury contained in some lamps manufactured or imported into Canada and would enforce a prohibition date for the manufacture and importation of mercury-containing lamps.

The proposed Amendments would end the exemption for most mercury-containing lamps under Canada's current regulations, as there are now widely available mercury-free alternatives for these products. Most lamps for general lighting purposes would be prohibited by January 1, 2024, while high-pressure sodium vapor lamps for general lighting purposes would be prohibited by January 1, 2029.

Sales of replacement lamps that contain mercury.

For transition purposes, specified replacement lamps would be allowed for a 3-year period under the proposed Amendments to replace lamps that were already in use. The sale of these replacement lamps would be prohibited two years after their exemption expires, in order to avoid issues of stockpiling while allowing retailers to sell their stock. In addition, replacement bulbs for existing automobile headlamps would be allowed with no end date.

Canadian authorities are currently seeking comments from the public during a 75-day consultation period that ends March 9, 2023.

Predictive Maintenance
Simple Recognition Techniques for Operators

by Kenneth E. Bannister

In the hustle and bustle of our daily working lives many of us neglect the simple diagnostic solutions in favour of more complex strategies and expensive diagnostic equipment. In some cases the use of expensive instrumentation is mandated, but more often than not a simple approach to performance monitoring can be employed.

Effective performance monitoring indicators not only convey instantly recognizable information, but are simultaneously interactive with the operator. Simple solutions to performance monitoring employ the use of what I call Auto Recognition Techniques or ARTs to assist the operator in rapidly assessing the machine's running condition or changes to running conditions.

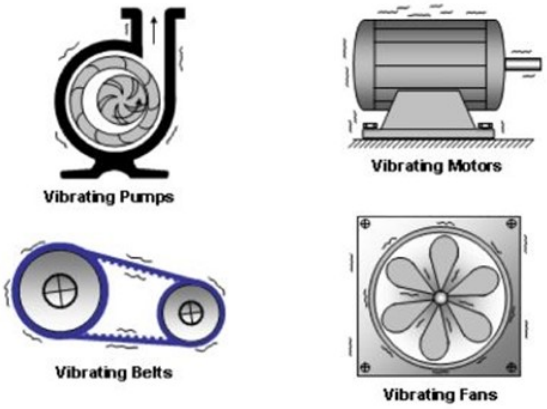
ARTs addressed in this article are passive in nature; no intervention or articulation is required by the operator to assess performance condition. This article presents some simple ART solutions and cites examples for machine vibration, air exchange, filtration, fill levels and temperature.

Machine vibration.

It is a fact that excessive vibration is a machine "killer". Combating excessive vibration often requires 'vibration analysis' to be performed (using vibration analysing instrumentation). The machine is torqued down and aligned to within acceptable limits of vibration. A predictive maintenance program can then be set up which regularly analyses, on a calendar or run time basis, the machine's vibration signature.

Providing the machine is set up correctly, and no external factors change that set up, the machine's signature will stay within specification. However, if a condition occurs to change a set up (for example, machine overload), excessive vibration may be initiated and could occur in between PdM checks, placing the machine in a potential failure condition. The operator could reduce a potential problem from the machine's pitch (sound) change, but it is difficult to differentiate conclusively actual versus previous conditions without a visual indication of change. A simple ART used for this type of situation is the Vibration Line Marker technique. When the machine

is initially set up, all critical torqued bolts (see figure) and positioned parts are marked with a painted yellow line. If excessive vibration occurs causing the parts to misalign or move, this



movement and its severity will be immediately visually displayed to the operator.

Air exchange.

Controlled environments within buildings are often placed under the care of the maintenance department. These controlled environments (e.g., hospital laboratories, computer rooms, etc.) require constant air exchange. A simple ART that can be employed in these instances is an air streamer. A yellow or red ribbon is tied to the air-out vent and the constant air flow will cause the ribbon to 'dance,' allowing rapid visual checks of air flow existence.

Filtration.

Use of air filters to filter external air into a machine usually employ a filter placed inside the machine next to a louvered window. Checking filter effectiveness requires the machine or cabinet to be physically opened. Using the simple ART methodology, the air filter is removed from the inside and placed on the outside of the louvered window. It is a simple operation to perform and all personnel can become 'filter checkers.'

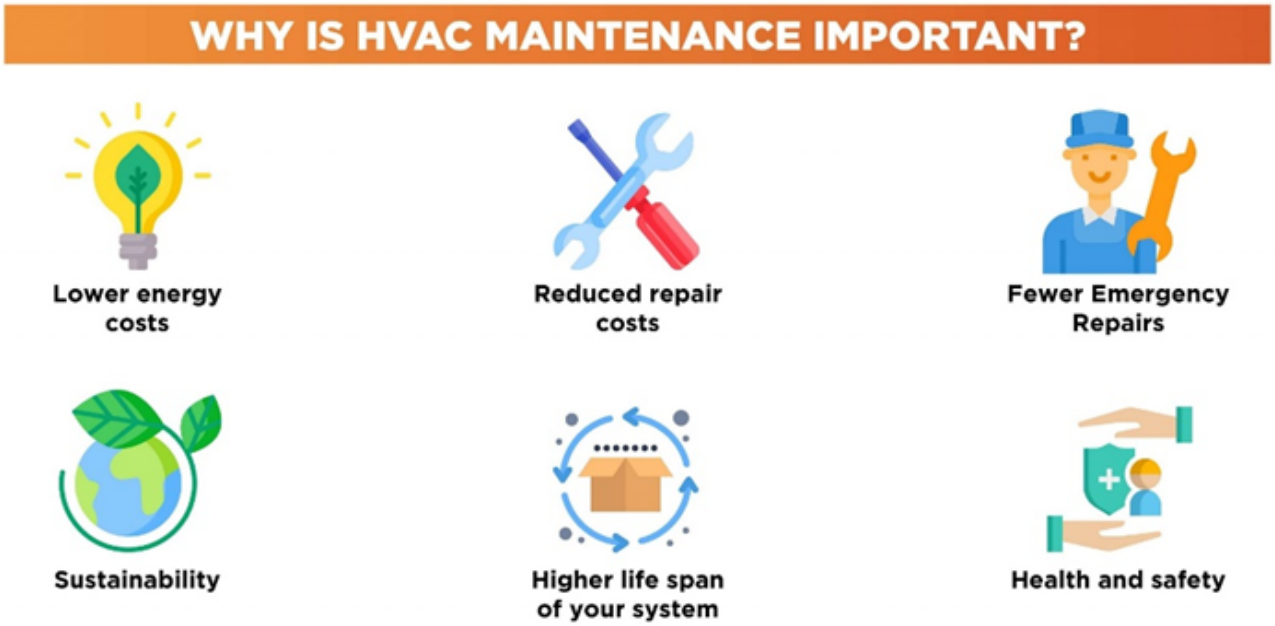
Fill levels.

Reservoirs require filling. A reservoir is always engineered to have a 'lo' level and a 'hi' level position. The difference between the two levels is what I refer to as the Safe Operating Window. An ART solution dictates that both hi and lo levels be clearly marked with large position markers physically and permanently attached to the reservoir.

Temperature.

My previous column on performance monitoring talked about a temperature performance indicator. There are instances where it is not practical to use a gauge. In these cases a simple ART would employ a temperature crayon marker. For example, a constantly lubricated bearing is not to exceed 150F in temperature; in this case the bearing housing is marked with a 150F temperature crayon. (The words 'help' or 'fail' can also be written on the housing.) Up to 150F the crayon is not visible, however, if it exceeds 150F the written words appear, prompting the operator to take action

Above article appeared previously in Plant Engineering and Maintenance. Kenneth E. Bannister is a principle management consultant for the Cambridge-based firm of Engtech Industries



Kickstart your career as a Building Operator

BOMA Calgary's Building Operator Training Course is designed for those wanting to gain more knowledge on commercial building operations and taught by industry veterans.

If you are looking to begin your career in building operations or are currently employed in the industry but want to further your own professional development, this course is for you.

It teaches to the 5th Class Power Engineering standard, allowing you to take the ABSA exam when the course is complete.

Click Here to Register

The 5th Class power Engineering Course will begin on Thursday February 23, 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
The total cost including GST is $2,199.75
Questions? Email Lloyd Suchet at lloyd.suchet@boma.ca for more details.

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Routine Maintenance Assures Satisfactory Valve Performance

Don't overlook leaks...big or small

A leak in a valve often can be remedied simply and, in a hurry, if caught in time. Stem leaks normally can be fixed by slightly tightening the packing nut or gland. Bonnet and flange leaks can be caused by bolts loosening under service strain. If tightening the joint doesn't stop the leak, then inserting a new gasket probably will.

Don't spare the oil can

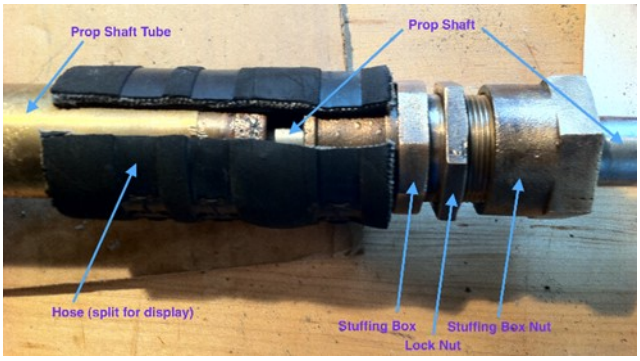
Wear on stem packing is due mainly to the rising and turning motion of the valve stem, combined with deteriorating effects of service conditions. A few drops of oil on the stem, now and then, help to reduce friction—and wear. Don't forget to lubricate exposed stem threads.

Periodic inspection...The best preventive maintenance

Most valves are designed to permit periodic inspection without seriously interrupting service. Without removing the valve body from the line, the complete bonnet and disc assembly can be removed for cleaning and inspection. Seating surfaces in the body can be checked at the same time.

"Pull up" evenly on packing gland...Repack when it's necessary

Stuffing box leaks usually can be stopped by merely "pulling" up the packing nut. On bolted glands, care must be taken to tighten bolts evenly ... as severely cocking the gland will bind the stem. If the stuffing box must be repacked, it usually can be done while the valve is in service.



Don't get caught with your pipe hangers down

Merely having your system equipped with pipe hangers is not enough. Pipe hangers must function not only before, but after, a system is put into service. It is good piping practice to check hangers as well as valves. If a line seems to be settling, or sagging in spots, a few turns on the hanger adjustment will restore the pipe to proper position.

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Water Treatment for Today's HVAC Systems

by William F. Harfst

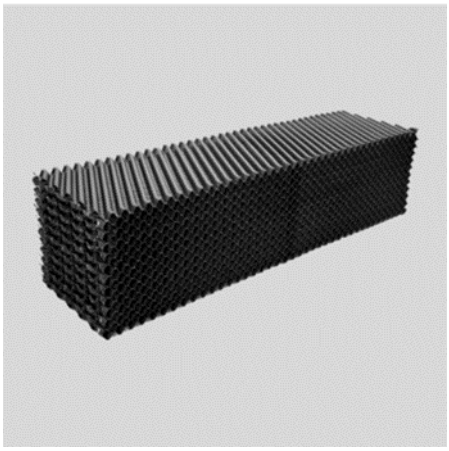
Advances in technology mean changes in chemicals

HVAC SYSTEM ENGINEERS are making steady progress in their efforts to design cooling towers, chillers and steam boilers that operate at higher efficiency and lower cost. Recent innovations - film-type cooling tower fill, enhanced chiller condenser tubes, high-efficiency packaged boilers, and programmable logic controlled (PLC) systems - have made accomplishing these goals a reality. These improvements in equipment design and operation have forced a change in chemical treatment programs used to condition water that flows through cooling towers, chillers and boilers of today's HVAC systems.

In years past, maintenance engineers reported many failures caused by mineral scale deposit, fouling, corrosion and micro biological growths. Recent advances in water treatment technology have made continuous, reliable and safe operation of this equipment possible.

Equipment evolution

A major shift in cooling tower design has been toward the use of film-type cooling tower fill instead of older, more conventional splash-type fill. Film-type fill is made of corrugated plastic layers that break the water flow into thin sheets. Water flows down the fill's surface, where it comes into contact with air flowing through the tower.



This design change improves the heat -rejection rate of die cooling tower over that achievable with splash-type fin. The honeycomb design of film-type fill makes it an ideal substrate for the growth of slime-forming bacteria and algae. It also is a filter trap for airborne debris. These foulants interfere with the flow of water through the cooling tower, and the result is a loss of operating efficiency.

Newer chiller designs include the use of enhanced condenser tubes. Also, older chillers are often retrofitted with newer condenser tube design. Enhanced tubes have spiral grooves cut into the waterside of the tube surface. This produces a rifling effect much like that inside a gun barrel.

Grooves cause water to spiral through the condenser tube, resulting in improved heat transfer, which translates into overall increases in chiller operating efficiency. Spiral grooves present many challenges for maintaining the integrity of the tube surface. The grooves create a nucleation site for the formation of mineral scale deposits. Severe scale deposits can fill in the grooves, resulting in a complete loss of benefit from the rifling.

Residual stresses in the grooves tend to promote corrosion and microscopic cracking of the tube wall.

Likewise, any micro biological growths tend to promote active corrosion in the grooves by micro biologically induced corrosion.

Older low-pressure steam boilers are being replaced with smaller package units featuring high heat-transfer rates. These units are more susceptible to mineral scale deposits, such as calcium carbonate, that form in areas of high heat transfer.

Controller technology

Cooling towers, chillers and boilers are increasingly being controlled by PLCS. These systems were promoted as a way to reduce maintenance manpower. Now, smart control systems regulate the operation of plant equipment to enhance energy

efficiency.

As a result, heating and cooling systems are operated intermittently or under constantly changing loads. They are turned down at off-peak hours or when electric power costs are higher. Cooling towers are operated at higher cycles of concentration to conserve water, and boilers are run with reduced blowdown to save energy. Maintaining water treatment programs during intermittent or cyclical operation of plant equipment is a real challenge for maintenance engineers.

Chemical treatment programs

Traditional water treatment programs for chiller condenser cooling tower systems relied on sulfuric acid for scale control and sodium chromate for corrosion protection. Although sulfuric acid is still used for this purpose, as of May 1990, chromates may no longer be used treating cooling water used

in comfort air condition systems.

Because of the corrosive nature and hazards associated with the handling and storage of concentrated sulfuric acid, the trend is toward the use of non-acid treatment alternatives.

Phosphonates - organic phosphates - are used control scaling without the need for pH control with sulfuric acid. New phosphonates, such as phosphor butane- tricarboxylate (PBTC), are chemically stable against chlorine. They also prevent scale deposits under extreme operating conditions, such as high cycles of concentration in the cooling tower, or elevated pH levels above 8.5 to 9.0.

Phosphonates often are supplemented with polymers enhanced scale protection. Older polymers, such polyacrylates, are still effective in many systems but being replaced or augmented with co-polymers - made from two different chemical monomers - and terpolymers - made from three different chemical monomers.

These polymers work to solubilize, disperse or modify crystalline structure of scale deposits. Used alone or with phosphonates, they are a powerful weapon against foulants on heat-transfer surfaces. Their use often eliminates the need for sulphuric acid for pH control.

Removing suspended solids

Suspended solids that enter cooling water systems airborne debris often lodge in the honeycombs of

film type fill. Removing these suspended solids from the cooling water is best accomplished by side stream filtration of 1-5 percent of the total flow.

These filters are either cartridge-type spiral-wound elements or multimedia depth filters, which can remove solids down to 5 microns. Solids removal can be enhanced by using high-molecular-weight polymers or non-foaming wetting agents.

Micro biological growths such as algae, slime-forming bacteria and mold find suitable habitats on the surface of film-type fill and in the spiral grooves of enhanced condenser tubes. Traditional biocides, such as gaseous liquid chlorine, are still effective in many systems, but for added protection, they may be supplemented with bromide or non-oxidizing biocides, such as glutaraldehyde dibromonitrilopopionarnide (DBNPA), or isothiazolinc Bromine is available in convenient dry tablets or granules for easy application through a brominator feeder. Non-oxidizing biocides are effective against a broad spectrum of micro organisms, but they have the added advantage of rapidly breaking down into non-hazardous components that do not stay in the environment.

These are just some of the innovations in water treatment technology that are available to better protect new cooling towers, chillers and boilers from scale, corrosion and fouling.

Future trends will target finding low-dosage treatments that offer superior performance without being hazardous to the environment. Advances in computer technology also will help automate chemical feeding and testing tasks. The result will be heating and cooling systems that operate at higher efficiency and lower cost.

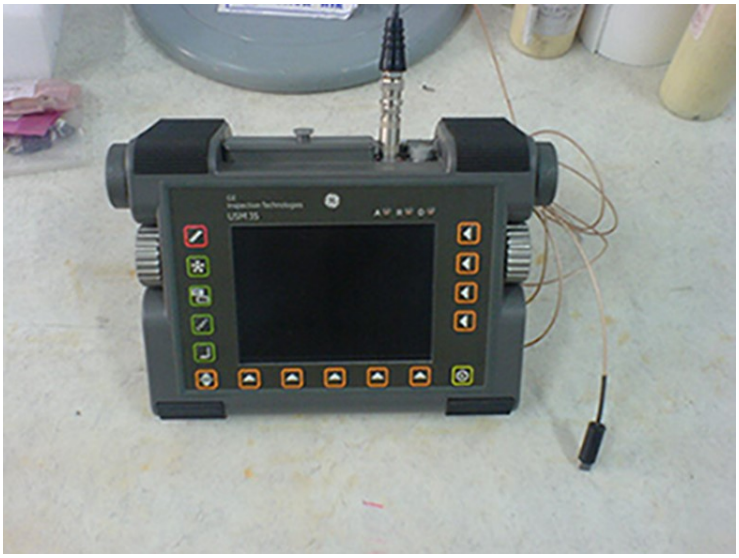
Safe Storage, Effective Application

OSHA AND ENVIRONMENTAL regulations require changes in the traditional procedures for chemical storage and handling. Suppliers are responding by offering products in returnable containers or by delivering directly into 250-500 gallon storage tanks, which include spill containment dikes and level warning signals.

Chemical feed and control systems have benefited from advances in computer technology. PLC-based controllers and data loggers feed chemicals in proportion to the amount of makeup water added to the system. This keeps chemical residuals within recommended guidelines and reduces dependence on the results of chemical tests and manual adjustment of chemical feed pump outputs. Alternatively, suppliers offer products blended with a tracer additive. Its concentration is measured directly by the controller. Adjustments to the chemical pump output are made automatically based on the strength of the tracer signal.

Several devices can measure the performance of water treatment programs and give early warnings of potential trouble. Corrosion coupons remain the easiest and most common method of quantifying results, but more sophisticated devices - such as simulated heat exchangers, heat- transfer monitors and linear polarization resistance probes - are available.

Equipment inspection with fiber optic video cameras or eddy current tests are also helpful in determining the integrity of boiler and condenser tubes. Additionally, computer programs and simulation models are now available that help analyze system data to predict future results.



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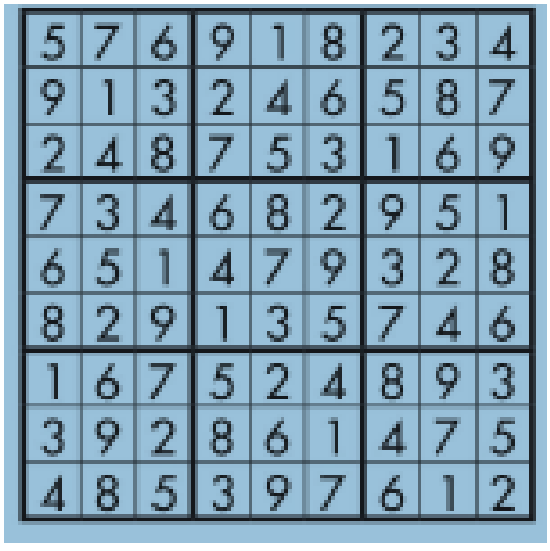
The 'call for abstracts' is live for the National Conference on Building and Facility Operations' June 2023 building conference. building owners and operators are being targeted as well as consultants who are involved in making buildings more energy efficient. A list of anticipated topics to have presented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



5	7	6	9	1	8	2	3	4
9	1	3	2	4	6	5	8	7
2	4	8	7	5	3	1	6	9
7	3	4	6	8	2	9	5	1
6	5	1	4	7	9	3	2	8
8	2	9	1	3	5	7	4	6
1	6	7	5	2	4	8	9	3
3	9	2	8	6	1	4	7	5
4	8	5	3	9	7	6	1	2

TEST YOUR OPERATOR IQ ANSWERS

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

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TUESDAY MARCH 14, 2023 AT 5PM FOR OUR IN-PERSON MONTHLY MEETING

Presenters:

Jeffrey Pooranalingam Electrical Asset Monitoring, Diagnostics & Management

- **Owner of Leading Edge Sales**
- **Past Vice President at Magna IV Engineering**
- **Past Global Product Manager GE/MULTILIN**

Drew Mitchell-Sawchuk Field Service Manager

- **Field Service Manager Sabre +**
- **Past owner Westcan Power Services**
- **Self-employed**

Brief:

Drew will review electrical power system maintenance techniques. An explanation of traditional time based maintenance vs condition based testing will be afforded. An introduction to standard tests, what they are, how we do them and what the results mean. Examples of in-situ failures and how they can upset your operations.

Jeffrey will talk about some exciting new testing developments which are less invasive to running the building but are very effective in establishing condition… *on line diagnostics*.

BOA Building Operators Association of Canada

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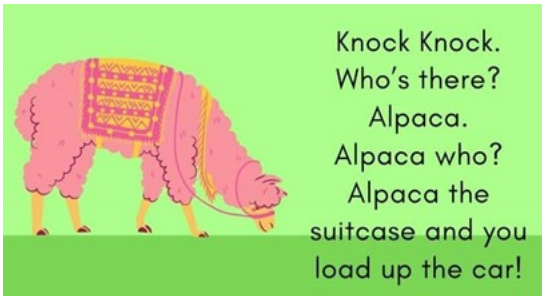

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We look forward to seeing you in-person for our meeting at the Danish Canadian Club (727 11 Ave SW) on Tuesday February 21, 2023 @ 5pm

Please visit the Building Operators Association of Canada YouTube Channel to watch the Speakers and Presentations from the Tradeshow 2022 & Previous Guest Speakers.

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