Volume 32 - Issue 4– December 2025

BOA
Building Operators Association of Canada

Official Publication of the Building Operators Association (Calgary)
December 2025

Thorncliffe Greenview

Community Association

5600 Centre Street N at 5pm

What's Inside?

Important Phone Numbers

Emergency	911
Alberta Boiler Safety 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

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Promotions Committee VACANT	promotions@boacalgary.com
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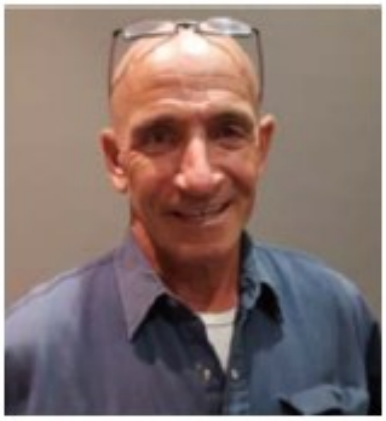
President's Message



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

Our new meeting space is at: **Thorncliffe Greenview Community Association 5600 Centre Street North**

The year is coming to a close and I would like to take this opportunity to wish you all the best for 2026.

Over the last few months of 2025 there have been some challenges and opportunities for Building Operators in general as well as our association.

The closing of PanGlobal Publishing has left a gap in training Building Operators but when that gap is closed, the replacement of learning material will be more relevant to our needs. A shake up in the learning material for 5th Class was desperately needed anyway. It is an opportunity to improve the learning material for the students.

The closing of the Danish Canadian Club gave us an opportunity to see what else was out there for us. Mark Arton found for us the present venue at the Thorncliffe Greenview Community Association 5600 Centre Street N: Nicer chairs bigger rooms and lower costs. There is also a 'great room' that will allow us to put on a better trade show. We will do our best to make that happen in the spring or early summer of 2026.

We have also realigned our association to BOMA Calgary. We have always had a great relationship with BOMA. BOA and BOMA had signed a MOU back in 1995. The support that comes with them in our corner will enhance how we will move forward in the new year.

2026 will be a great year! We have shaken off the dust and are prepared for a good year.

HAPPY HOLIDAYS! HAPPY NEW YEAR!

Warm regards,
Les Anderson,

BOA Calgary President

BOA
Building Operators Association of Canada

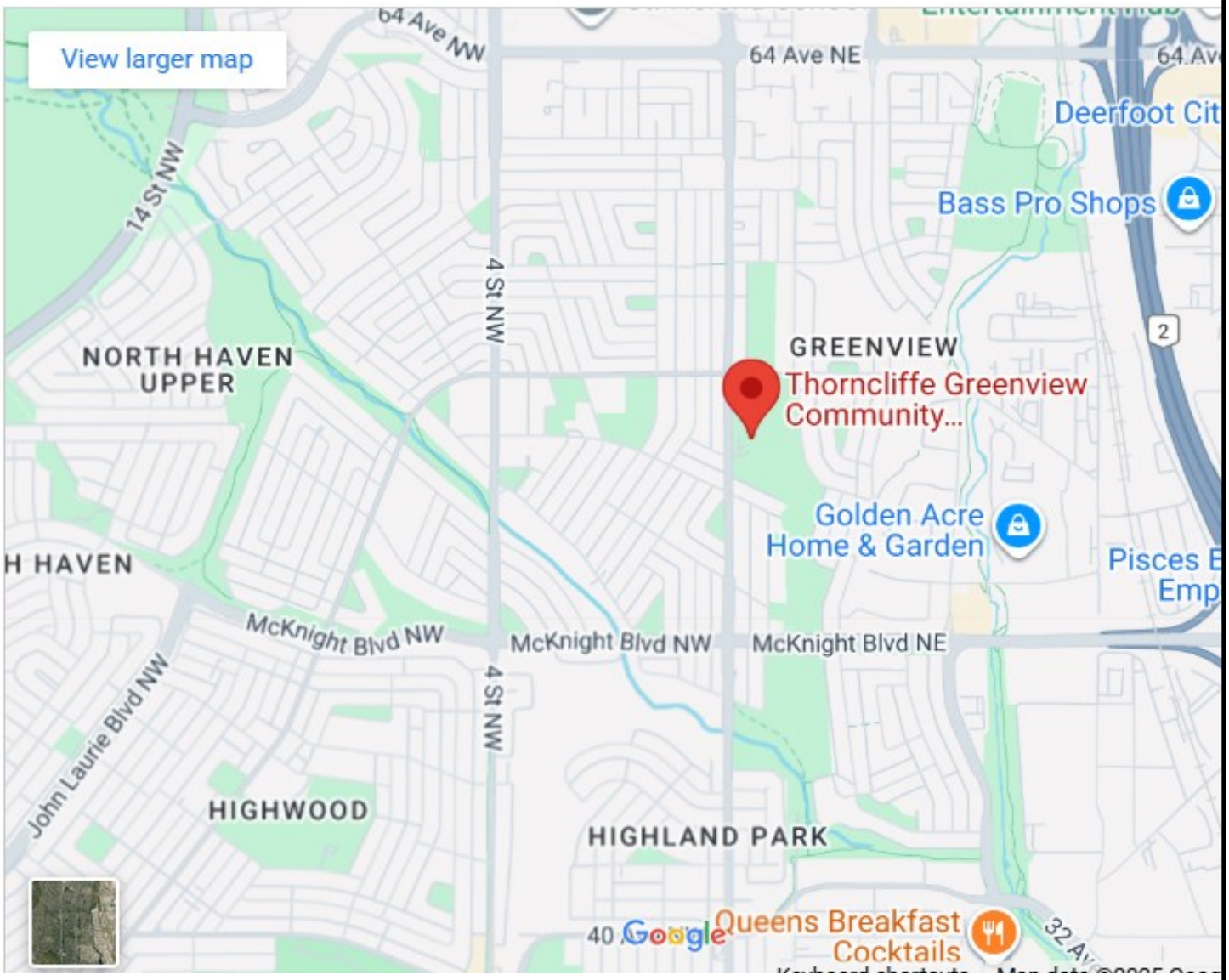
Join us at our Monthly Meeting on

Tuesday December 9th, 2025

at our new location:

Thorncliffe Greenview Community

5600 Centre St N, Calgary, AB T2K 0T3



Meeting starts at 5pm to 7pm
Free Parking

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 34*

1. A thermostat, which is sometimes installed in the return air duct, serves primarily to:

a. limit temperature of the heated outside air
b. control the throttle of the steam in the tubes
c. sense the temperature of the steam in the coils
d. minimize temperature fluctuations in discharge air
e. heat recirculated air

2. Air vents are:

a. not required when an inverted bucket steam trap is used
b. not required on the steam mains if an inverted bucket steam trap is used at the steam coil
c. not required at the steam coil if a float and thermostatic trap is used at the steam coil with an atmospheric return and the steam main is adequately vented
d. not required anywhere if a float and thermostatic trap is used at the steam coil
e. required only with hot water coils

3. Ethylene glycol used in glycol coils:

a. has a higher heat transfer efficiency than hot water
b. has less friction losses in the coil and piping than hot water
c. requires a smaller pump and less horsepower than hot water
d. has much lower pressure drops through the coil and piping
e. have a lower heat transfer efficiency than hot water

4. In a hot water coil which of the following is not included for providing a good guideline for the correct application of the system with minimal possibility of freeze-up?

a. positive air venting of the coil is essential
b. the air velocity should exceed 10 m/s
c. a constant flow of water should be fed to the coil
d. the water velocity should exceed 0.8 m/s
e. the water temperature should be maintained at a reasonable preset temperature

5. The flow arrangement best suited for hot water coils is:

a. the counter flow arrangement because it is more efficient
b. the parallel flow arrangement because it gives better protection against freezing
c. one in which the cold air enters the coil where the coldest water is flowing
d. the half serpentine
e. the triple bypass flow arrangement

How to Give Your Machine a Physical

by Jim Fitch

Doctors have perfected the skills of conducting physical exams. They know what questions to ask and how to examine the body for clues that signify health, injury or disease. The same is true of pilots. They are taught how to perform critical preflight checks or inspections that reveal mechanical condition and safety. By walking around the plane with checklist in hand, pilots survey the aircraft for signs of tire damage, maintenance errors, material defects, and even sabotage.

Mechanics, lubrication technicians and even equipment operators must be skilled at giving physicals as well. Like the doctor or pilot, they need to be alert to subtle changes or symptoms that might be an early sign of machine malfunction or accelerated wear. One of the obvious problems with conducting such inspections is that for most machines, the critical operating components are shielded from view by panels, casings, guards and housings, including the lubricant in most cases. It's like asking your doctor to give you a physical while wearing body armor.

Still, the machine and the lubricant can telegraph hints and signals to us in a variety of

ways, but only if we are both tuned in and literate to their message. Tuned in means being vigilant and ubiquitous, like a detective, always looking for clues even when camouflaged from view. Literate means not only recognizing the presence of the clue but also being wise to the meaning of its message and the corrective response.

As in nearly all cases, the selection of machine inspections should be tailored to the machine design, criticality and operating environment. This means optimize the inspection process, not maximize. This is done by using good judgment in selecting which inspections are needed and how frequently they should be carried out. Following is a list of problem-revealing tests and inspections relating to oil lubrication. They require limited technical proficiency and most involve no special tools or instrumentation.

1. Oil Color Change. Monitor changes in lubricant color through sight glasses and oil samples. Lubricants experiencing thermal and oxidative distress will exhibit marked changes (darkening) in color and opacity. Many types of contaminants will alter color as well. Additionally, a wrong lubricant can often be recognized by a shift in darkness or color.

2. Impaired Air-handling Ability. Most healthy lubricants will rapidly release entrained air. However, distressed and contaminated lubricants may fail to release air from the body of the oil and may also form sustained surface foam. Aeration and foam problems are not always a problem with the condition of the oil but may point to entrained air sources and mechanical conditions. Sight glasses and inspection hatches may provide the first sign of a problem.

3. Impaired Water-handling Ability. Water and oil don't usually mix. However, in the event that they become conjoined in an emulsion, the problem is usually associated with a change in the oil properties (many causes) or contamination. Observing oil/water separation after violently mixing quantities of each in a sample bottle or laboratory glassware is an easy check for this property.

4. Blotter Spot Structure. This inspection has been discussed before in Noria publications. It involves placing a couple drops of oil on blotter paper or card stock, then observe for radial structure to form (rings, starburst, etc.). Healthy, uncontaminated oils don't produce structure. Instead, the oil will wick up into the paper leaving only a uniform gradient of oil color behind.

5. **Patch Test Inspection of Debris Field.** This test has also been discussed extensively in Noria publications. Sometimes called the poor boy's particle counter, it provides information not only about particle size and count but, to the trained eye, can also provide information about particle composition and shape. Even a $20,000 particle counter can't do that!

6. Bottom Sediment and Water (BS&W). It is often said that what is bad for the oil, or has degraded from the oil, or has been liberated from the surfaces of your machine is also heavier than the oil. We know that substances heavier than the oil will settle when mixed with the oil. There is great wisdom to routinely inspecting for BS&W using special sight glasses or drain port sampling. After all, if nothing has settled, much could be said for what aberrant conditions are not happening to your machine.

7. The Voice in Noise. Few machines are quiet

during operation. Even completely healthy machines have something to say. You've heard the adage, "a singing gear is a happy gear". This is often true, but not always. Machine sounds change for specific reasons. Try to locate the point of generation. Some maintenance technicians play doctor by using crude stethoscopes in the form of a garden hose of a steel rod held to their ear, with the other end touching potential noise-generation sources.

8. Checking Your Machine's Temperature. Doctors use thermometers, but maintenance technicians employ a variety of tools including online temperature probes (thermocouples or resistance temperature detectors (RTDs)), thermal imaging cameras or handheld heat guns. A few common causes of temperature excursions include wrong lubricants, degraded lubricants, contaminated lubricants, abnormal friction/wear, and the list goes on.

9. **Pressure Drop.** In the same way oil temperature can change in response to an assortment of problems, oil pressure can increase or decrease as well. Anything that can change viscosity (don't make me compile another list…) or form surface deposits can change system pressure. For similar reasons, it is no surprise that doctors pay special attention to blood pressure during an exam.

10. **Filter Life.** When filters plug prematurely, there is usually good reason. What's plugging the filters and why they're plugged are considerations worthy of our attention. Areas of particular concern are soft contaminants (such as sludge, organic material, dead additive residue, biomass, etc.), terrain dust and wear debris. The filter is the final resting place for a variety of machine and lubricant operational waste products. I'm sure you've already noted the interesting human health analogies here as well.

The above list of ten inspections is just a start. There are far too many field tests and inspections to describe in one column. For those who make a living caring for the health of lubricants and machinery, the value of being proficient in performing machinery physicals is immense. Flanked by laboratory analysis and other predictive maintenance technologies, the modern-day lubrication and condition-monitoring professional is indeed fortunate to have such an increasingly vivid view of the internal state and operational health of his machinery.

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Winter Driving Tips

Do your part to keep our highways safe and to help maintenance crews clear the roads as safely and efficiently as possible. Plan ahead and drive according to the conditions.

- **Unless travel is absolutely necessary, stay off the roads during major storms.**
- Winterize your vehicles. This should include an examination of the spare tire, battery, belts, hoses, anti-freeze, tires, brakes, heater, defroster and windshield wipers.
- Carry an emergency road kit.
- Clear all snow and ice completely off windows, side view mirrors, headlights, taillights and licence plates.
- Buckle up and adjust head restraints. The centre of your head restraint should be even with the top of your ears.
- Keep your vehicles more than half full of fuel. The extra volume can help reduce moisture in your fuel system, which adds extra weight to your vehicle. A topped-up gas tank will also help if you become stranded.
- Slow down. The posted speed limit is intended for ideal road conditions. Road signs may indicate 110 km/h, but icy or snow-covered roads warrant slower speeds.
- Drivers are legally required to drive according to road conditions. You can be charged with a traffic offence you aren't driving to the conditions.
- Stay back from snowplows. They will let you pass when it's safe to do so.
- Plan your destination ahead of time.
- Keep your headlights on so drivers behind you can see your taillights - don't rely on daytime running lights.
- Never use cruise control in winter conditions.
- On snowy roads, try driving outside of the previous tire tracks for extra traction.
- Signal early to let other drivers anticipate and react. Check your rear view and side mirrors, and always shoulder check before changing lanes.
- Avoid sudden moves. Abrupt changes in direction or slamming on the brakes could cause you to spin out of control.
- On wet /slick surfaces, allow at least three times the normal following distance.
- Remember; bridge decks are often slicker than other parts of the highway are, due to greater temperature fluctuations.
- Know your braking system and how it reacts on ice. Be gentle with braking pressure on slick roads.
- Avoid braking on curves; rive through a safe, steady speed.
- Accelerate slightly when approaching hills and then maintain a steady speed going up.
- Gear down for both uphill climbs and downhill grades. This will avoid brake

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wear and chances of sliding. Be careful of abrupt downshifting which can cause skidding, particularly when turning.

• Take your foot off the brake if you start to skid, and steer in the direction you want to go. When the wheels regain their grip, brake firmly and smoothly.

• When driving a rear-wheel drive, prepare to steer just enough in the opposite direction to prevent a counter skid.

CARRY AN EMERGENCY ROAD KIT INCLUDING:

- First Aid Kit
- Fire Extinguisher
- Blanket
- Road Map and Compass
- Extra Clothing and Footwear
- Paper Towel or Rags
- Sand, Road Salt or non-clumping Kitty Litter
- Flashlight with Extra Batteries
- Emergency Food – anything that won't spoil like granola bars, nuts or chocolate
- Ice Scraper and Snowbrush
- Cell Phone
- Candle in a deep tin
- Waterproof Matches
- Shovel
- Booster Cables

www.transportation.alberta.ca

Dial 5-1-1

www.511.Alberta.ca

@511Alberta

The tradition of hanging stockings is linked to the story of St. Nicholas, who dropped gold coins into a poor family's stockings to help them.

"Home Alone" is one of the highest-grossing Christmas films of all time, earning over $476 million worldwide since its release in 1990.

Boiler Shut Down

by Harry de Jong

General

When a routine shutdown is scheduled, it should be planned so there is time to perform certain operations in the shutdown procedure.

If the boiler is equipped with soot blowers, and any other fuel other than natural gas has been fired, the soot blowers should all be operated before taking the boiler off the line.

All the recommended rules for operating the soot blowers should be followed. One of the most important rules is that the steam load on the boiler is 70% of boiler rating or greater. Operation at low load, with its resulting colder furnace may result in some unburned combustibles escaping from the furnace and redepositing on the tubes or collecting in pockets. Agitation of the combustibles during soot blowing at low load may result in an occurrence. Therefore, It Is Important to have all of the areas of the gas passes thoroughly swept with flue gas, thus purging any combustible gas from pockets where it may collect.

2. After the soot blowing operation is complete, the steam flow from the boiler should be gradually reduced and the burner run to the low fire position.

3. With the burner in low fire position, blow down the boiler along with the water column, gauge glass, and feedwater regulator. Turn the burner off in accordance with the burner manufacturer's instructions. If the boiler is equipped with a flue gas outlet damper, it should be fully closed to allow the unit to cool slowly.

4. Remove and clean the burner oil gun. Place the fuel supply equipment in standby condition (for gas, shut main supply cock). Throw the main electrical switch, and take the feedwater regulator out of service. Hand operate the feedwater valves to keep the water level above one-half (1/2) gauge glass.

5. When the boiler pressure falls below line pressure, the boiler stop valve should be closed if the setting has cooled enough to prevent any pressure buildup. If the boiler is equipped with a non-return valve, the valve should close automatically when the boiler pressure drops below line pressure. This, of course, isolates the boiler from other units remaining in service. As the drum pressure falls below 15 to 25 psi, the manual closing device (handwheel) of the non-return (if equipped) should be closed and the vent valve on the boiler opened. This will prevent a vacuum on the boiler waterside, which will loosen well set gaskets and cause future problems. While there is still a small amount of steam pressure available, the boiler should be blown down and filled back to a safe level with freshly treated hot water in preparation for the next Startup.

If the boiler is being shut down just for overnight or for the weekend, the foregoing procedure is generally all that is required. The primary concern is to make sure there is sufficient water in the boiler. If the boiler is only going to be shut down overnight, the boiler can be secured and will have pressure still showing the next morning. When the boiler is insulated well enough to permit steam pressure to remain overnight, there is no danger of pressures dropping low enough to start pulling a vacuum. Then the boiler vent valve can be left closed.

In those instances where the boiler may be left unattended long enough that the boiler cools down and does start to pull a vacuum, the piping can be equipped with a vacuum breaker valve. The valve can be installed close to the top of the steam drum or shell, preferably above the water line. As the

boiler cools down and the condensing of the steam starts to form a vacuum, the valve permits air to enter the drum and atmospheric pressure will exist in the drum. One precaution must be taken in such an installation. When starting up the boiler each time, be sure the boiler vent valve is opened to evacuate all of the air that has been trapped in the boiler and boiler water.

Up to this point, we have been talking about shutting down the boiler for just a few hours or a few days. If the boiler is going to be taken out of service for several weeks or several months, then a different procedure must be followed.

Wet Storage

There are two (2) basic methods of laying up a boiler for extended periods of time. They are wet and dry storage.

If the unit is to be stored for no longer than a month and emergency service is required, wet storage is satisfactory. Wet storage is not generally employed for boilers that may be subjected to freezing temperatures. Several alternative methods may be employed.

1. The boiler to be stored should be closed and filled to the top with chemically treated feedwater or condensate, to minimize corrosion during standby storage. Water pressure greater than atmospheric pressure should be maintained within the boiler during the storage period. A head tank may be connected to the highest vent of the boiler to maintain pressure above that of atmospheric pressure.

For short periods of wet storage, the water or condensate in the boiler should contain approximately 450 PPM of caustic soda and 200 PPM of sodium sulfite. If the boiler is equipped with a superheater of the drainable type, it can also be filled with the above-described treated water by overflowing from the boiler.

If the superheater is non-drainable, it should be filled with condensate or demineralized water containing no more than 1 PPM of dissolved solids. Before introducing the water into the superheater, sufficient hydrazine should be added to achieve a concentration of about 200 PPM. Sufficient volatile alkali should also be added to produce a pH of 10. The treated water may be introduced into the superheater through an outlet header drain until the water flows into the boiler. When the superheater is filled, close the vents and drains.

This quality of water may also be used in the boiler. If the storage period should extend beyond a month, the concentration of hydrazine should be doubled.

2. As an alternative, the boiler may be stored with water at normal operating level in the drum and nitrogen maintained at greater than atmospheric pressure in all vapor spaces. To prevent in leakage of air, it is necessary to supply nitrogen at the vents before the boiler pressure falls to zero as the boiler is coming off the line. If boiler pressure falls to zero, the boiler should be fired to re-establish pressure and drums and superheaters thoroughly vented to remove air before nitrogen is admitted. All partly filled steam drums and superheater headers should be connected in parallel to the nitrogen supply. If nitrogen is supplied only to the steam drum, nitrogen pressure should be greater than the hydrostatic head of the longest vertical column of condensate that could be produced in the superheater, or a minimum of 5 psi.

3. Rather than maintain the water in the boiler at normal operating level with a nitrogen cap, it is sometimes preferred to drain the boiler completely, applying nitrogen continuously during the draining operation and maintaining a pressure of nitrogen greater than atmospheric throughout the draining and subsequent storage.

Dry Storage

Dry storage is preferable for boilers out of service for extended periods of time or in locations where freezing temperatures may be expected during standby. The cleaned boiler should be thoroughly dried, since any moisture left on the metal surface would cause corrosion. After drying, precautions should be taken to preclude entry of moisture in any form from steam lines, feed lines, or air.

A moisture absorbing material should be used, such as quicklime, at the rate of two (2) pounds or silica gel at the rate of five (5) pounds for 30 cubic feet of boiler volume. It may be placed on desiccant trays inside the drums or inside the shell to absorb moisture from the air. The manholes should then be closed and all connections on the boiler should be tightly blanked. The effectiveness of the materials for such purposes and the need for their renewal may be determined through regular internal boiler inspections.

We would strongly recommend that large signs be placed in conspicuous places around the boiler to indicate the presence of moisture absorbing materials. The message to be conveyed can be as follows:

Note: Moisture absorbing material has been placed in both the fireside and waterside of this boiler. These materials must be removed before any water is introduced into the boiler and before the boiler is fired.

For long periods of storage, internal inspections should be performed to assess the condition of the moisture absorbing materials. Such inspections should be initiated monthly, unless experience dictates otherwise. The moisture absorbing material increases in volume as moisture is absorbed, making it necessary to use deep pans. Fresh material should be substituted as needed at the time of the inspection.

Alternatively, air dried externally to the boiler may be circulated through it. The distribution should be carefully checked to be sure the air Rows over all areas.

If the boilers are going to be stored in any place other than a dry, warm protected atmosphere, then steps should be taken to protect the exterior components also. Burner components that are subject to rust, such as jackshaft, linkage, valve stems, moving parts, etc., should be coated with a rust inhibitor and covered to protect them from moisture and condensation. Electrical equipment, electronic controls, relays, switches, etc., should be similarly protected.

Pneumatic controls, regulators, diaphragm or piston operated equipment should be drained or unloaded and protected so that moisture, condensation, rust, etc. will not damage the equipment during a long period of storage. Feedwater lines, as well as blowdown, sootblowers, drain lines, etc., should all be drained and dried out. Valve stems, solenoid valves and diaphragms should all be protected by lubricant, rust inhibitors, plastic coverings or sealants.

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IAQ Culprits:
Hiding in Plain Sight

Ted Fitzmeyer

Unlikely suspects boilers, chillers and cooling towers can jeopardize indoor environments without proper maintenance.

The key to maintenance and engineering managers' success is staying ahead of maintenance requirements critical in ensuring a safe, efficient and healthy building. System operators and managers play key roles in determining whether indoor air quality (IAQ) problems will or won't occur, since they oversee preventative maintenance of heating, ventilation and air conditioning (HVAC) systems.

But oversights often occur, despite the best efforts of the maintenance manager. These IAQ problems typically result from improperly functioning key mechanical systems that are not generally associated with IAQ issues, such as cooling towers, chillers, humidifiers and boilers.

To eliminate the likelihood of these HVAC components creating IAQ problems, they must be regularly inspected, tested, cleaned and repaired. Although there is no substitute for a qualified technician, a series of specific maintenance tips can help identify the most common IAQ problems associated with these HVAC components.

Cooling towers

Cooling towers use water to remove heat from cooling processes and equipment such as chillers. Cooling towers can be the cause of a variety of IAQ problems.

First, the cooling tower can be a breeding ground for bacteria. In addition to ensuring proper heat rejection, cooling towers require careful and thorough maintenance to ensure that pathogens such as Legionella do not occur. Pathogenic growths can be prevented by proper biocide chemical treatment and preventive maintenance.

Managers should schedule periodic water testing conducted by a qualified chemical treatment specialist, as well as oversee the installation and

maintenance of a system to deliver appropriate chemicals to the water. Technicians should monitor these systems continuously.

Cooling tower inspection is critical in verifying that the chemical treatment system is doing its job.

Managers should schedule a quarterly inspection to look for bacteria growth, tower overflow and effluent drift or carryover. Signs of bacteria growth include slimes and algae in the cooling tower sump and within the spray area.

If such growth occurs, properly protected and qualified technicians should perform the cleaning. Any leaks or overflow problems should be repaired. If effluent drift occurs, a drift eliminator can be installed. Managers must make sure that effluent from a cooling tower is never drawn into outdoor air intakes or openings.

A cooling tower that does not permit the associated cooling equipment to properly control

building humidity levels also may be an indirect cause of IAQ problems.

Chillers

Water chillers provide cold water — typically 45 degrees or colder — to air handlers and terminal equipment to control space temperature and relative humidity. If a chiller is not providing cold enough chilled water, adequate dehumidification may not occur, which can lead to mold growth within the HVAC ductwork, air handlers or the building itself.

Refrigerant leaks from chillers also can cause IAQ problems. Weekly visual inspections and checks of refrigerant levels will verify any possibility of leaks. Continual monitoring of the refrigerant leak monitor which is now required by many of today's codes, warn of leakage as measured in parts per million.

Technicians should repair any leaks immediately. As with most HVAC equipment, only properly protected and qualified technicians should perform refrigerant repairs. Managers must make sure that waste oils and spent refrigerants are stored and disposed of properly.

Technicians also should repair insulation on piping in and around the chiller to prevent the formation of condensation. Many systems use glycol in the chilled water system to prevent freeze problems. Toxic glycol, such as ethylene, however, should never be used, because a leak within an air handler could cause a catastrophic IAQ problem and jeopardize the health of building residents.

Boilers

Boilers also can contribute to IAQ problems if they do not provide proper heat or reheat. Increased ventilation rates require that many systems use reheat to ensure spaces will not overcool, while still delivering the proper amount of outdoor air. This situation may require the boiler system to operate year round.

Boilers also contribute to IAQ problems by permitting the products of combustion and carbon monoxide to inadvertently enter the building because of leaking boiler flues or stacks positioned too close to air intakes. Managers should schedule monthly inspections during the heating season to ensure proper flue drafting and that the flue system and fuel systems are not leaking.

Older boilers can contribute to IAQ problems, especially if they have inadequate ventilation for combustion. In general, a minimum of 1 square inch of free area per 2,000 Btu is acceptable. Check local

codes. Often, combustion air openings are bearded up to reduce freeze problems which further contributes to ventilation problems.

Gas or oil leaks at the boiler are not only fire hazards, but they can cause odor and health problems elsewhere the building. Qualified and properly protected technicians should repair all such leaks immediately.

Properly maintained HVAC components can eliminate or reduce the likelihood of IAQ problems and permit quick repair of problems that do occur. Proactive facilities engineers who have documented preventive maintenance procedures and repair follow- up are protecting building's occupants, as well as themselves, if IAQ problems arise.

Too much of a Good Thing?

Humidifiers typically are installed for areas such as computer rooms, libraries and museums. In colder climates, they are used to increase space humidity levels to within acceptable ranges, usually 20-30 percent relative humidity. ASHRAE 55-1981 provides guidelines on acceptable temperature and humidity levels.

Problems linked to low relative humidity include dry irritated eyes, nose and throat, as well as high static electricity. Ironically, humidifiers installed to

help control these problems can cause IAQ problems. Humidifiers generally deliver humidity to a space by adding steam vapor to the air stream. Although this is accomplished by different methods, each system has the same IAQ problem potential.

If a humidifier is oversized or not controlled properly, the humidifier can increase the humidity level in the duct stream to a level that supports biological growth. When humidity levels in an air distribution system are above 70 percent, bacteria growth can occur. This risk can increase dramatically when the air system is dirty, or a duct liner is used in the air stream.

Usually, humidifiers have a control that shuts down the humidifier when the air stream in the duct becomes too moist. Technicians should test this monthly in the heating season to ensure it is calibrated properly.

Many humidifiers have a condensate drain system that can become a breeding ground for bacteria if not regularly monitored. System leaks also can provide warm moist areas that bacteria need to grow.

If the space humidistat is set at levels above 45 percent relative humidity, humidifiers can cause mold growth within the occupied space itself. In cold climates, a high humidifier set point can cause condensation on glass.

Generally, occupants do not understand the importance of proper humidistat settings and tend to turn the humidity levels up too high. If this is a recurring problem, locking the humidistat cover may be a good idea.

Steam humidifiers should use clean steam that is provided by a boiler or generator that uses non-toxic EPA approved chemicals or no chemicals at all. A steam-to-steam heat exchanger humidifier is an excellent choice where only unclean steam is a available.

Ted Fitzmeyer, PE is president/principal at Fitzmeyer & Tocci Associates, Inc., a mechanical /electrical engineering firm specializing in educational engineering, design and construction management services for heating, ventilation and air conditioning (HVAC), plumbing, fire protection and electrical systems for both new building construction and renovation programs.

YOUR CHRISTMAS ELF NAME =

First Letter Of Your Name + Your Birthday Month

A. Holly
B. Festive
C. Chilly
D. Sparkling
E. Twinkling
F. Evergreen
G. Glitzy
H. Buddy
I. Frosty
J. Cheerful
K. Dashing
L. Icy
M. Merry
N. Jolly
O. Noelle
P. Polar
Q. Queen
R. Glimmer
S. Snowy
T. Pixie
U. Sunny
V. Cookie
W. Bell
X. Ginger
Y. Tiny
Z. Cocoa

January: Sugar Plum
February: Twinkle Toes
March: SparkleDust
April: Candy Cane
May: McJingles
June: Gingersnap
July: McTinsel
August: Snowball
September: Peppermint
October: McSprinkles
November: Mistletoe
December: Christmas

Wearing a Hard Hat is Only Half the Job

by Michael Lloyd

Inspections are essential to ensure this vital type of PPE can do its intended job.

Millions of hard hats are worn every day. In fact, the hard hat is one of the most recognizable pieces of safety equipment in the industrial workplace. It's also one of the most important pieces of safety equipment because it protects the brain. Unfortunately, this ubiquitous piece of personal protective equipment (PPE) is rarely part of an inspection, maintenance, or replacement program.

The durable exterior of the rugged-looking hard hat can disguise the need for replacement. Hard hats must be replaced when they can no longer provide the protection intended, and sometimes this can be difficult to detect. Workers who use gloves on a work site can obviously see (and feel) the need for new gloves; the wear and tear is readily apparent. On the other hand, many workers may be wearing a hard hat well past its useful life without even knowing it. In every organization where workers wear head protection on the job, a regular hard hat replacement program should be clearly defined and implemented. This type of hard hat replacement program can be implemented and managed with a few considerations.

Many workers may be wearing a hard hat well past its useful life without even knowing it. OSHA, ironically, does not specify the service life of a hard hat, and there is no standard expiration time frame for hard hats. The hard hat manufacturer can recommend a replacement guideline for its products, but hard hat life span may vary significantly based upon the conditions at each work site. Ultimately, an employer is responsible for defining a responsive and appropriate solution for hard hat service life issues.

Useful Life of a Hard Hat

Determining a specific time frame for hard hat replacement at your site will take some research. As a general guideline, most manufacturers recommend replacing hard hats every five years regardless of outward appearance. If work conditions include exposure to higher temperature extremes, sunlight, or chemicals, hard hats should be replaced after two years of use. Some manufacturers recommend the replacement of the hard hat suspension every 12 months, regardless of appearance. Careful review of each work site is critical to ensure that degradation of PPE is not being accelerated due to extreme work conditions.

Inspection and Maintenance

The typical ANSI Type I-compliant hard hat, which provides protection from objects striking the top of the head, consists of two components: shell and suspension. These components work together as a system. It is important for both the shell and suspension to be inspected on a regular basis.

Shell Inspection

Throughout history, many materials have been used to manufacture hard hat shells. Today, thermoplastics (polyethylene, polycarbonate, and others) and thermoset materials (fiberglass -reinforced polyesters and phenolic-impregnated textiles) are commonly used to mold shells of industrial hard hats. These materials have proven to be durable, reliable, and lightweight while providing effective protection. Given proper care, these materials will provide a reasonable service life under normal workplace conditions. But remember, these hard hats do not have an indefinite useful life, nor are they resistant to all physical and chemical exposures.

Careful review of each work site is critical to ensure that degradation of PPE is not being accelerated due to extreme work conditions.

Regardless of the material, shells should be inspected routinely for dents, cracks, gouges, and any damage due to impact, penetration, abrasions, rough treatments, or wear that might reduce the degree of protection originally provided. Degradation of thermoplastic material may be apparent when the shell becomes stiff, brittle, faded, dull in color, or exhibits a chalky appearance. A hard hat should be replaced at first sign of any of these conditions.

Exposure to direct sunlight will affect the life of the shell.

Although most manufacturers add an ultraviolet inhibitor to the shell material of hard hats to protect against degradation caused by sunlight, all hard hats are susceptible to ultraviolet light damage. Workers should never store their hard hats in the rear window or dash of a vehicle or in direct sunlight. This is the quickest way to degrade the shell material and

reduce the life of the product.

Suspension Inspection

The hard hat suspension is just as important to worker safety as the shell. The suspension actually helps to absorb the shock of a blow, so it must be in good condition at all times. Like the shell, the suspension must be inspected regularly and replaced from time to time. Suspensions should be inspected closely for cracks, frayed or cut crown straps, torn headband or size adjustment slots, loss of pliability, missing components, or other signs of wear. These conditions can be caused by perspiration, hair oils, or normal wear.

Maintenance

As with everything on the work site, hard hats will get dirty. The hat and suspension should be cleaned with mild soap and lukewarm water. Strong detergents, solvent chemicals, gasoline, and other like substances could affect the resistance and other such properties of the hat over time. Contact the manufacturer if you have concerns.

General Guidelines

All new employees should be provided with a new, unused, and unexposed hard hat. The practice of reissuing cleaned hard hats must be avoided. The cost of a hard hat is negligible when the potential for injury, lost time, health care costs, and liability are considered.

Hard hats are designed to protect you only once. If the hard hat has been struck by a forcible blow of any magnitude, both the hard hat shell and the suspension should be replaced immediately, even if no damage is visible. Hard hats also should be replaced if dropped accidentally by the worker from the height of a two story building or higher. Damage to the hat and suspension from the drop could seriously degrade the effectiveness of the product.

Check and log the date code (usually located on the underside of the shell) prior to sending the hard hat into service to help track the age of the product.

Assuming the hard hat has been stored in proper packaging--free from exposure to sunlight, chemicals, and extreme temperatures--the product

service life would begin at the time the hard hat is put into service, not from the date of manufacture. Be sure to check with the manufacturer about product

warranty because it may not allow for storage time. All hard hats have a molded-in date code (date of manufacture) per ANSI Z89.1-2003 industrial head protection requirements. These date codes are usually located on the underside of the shell. Check and log this date prior to sending the hard hat into service to help track the age of the product.

Supplying and enforcing the use of hard hats is only half the job. Safety officials must implement and maintain a hard hat replacement program to ensure that hard hats are providing the level of protection intended. This is not only necessary, but well worth the effort when considering the implications of providing a hard hat that has outlived its usefulness. Check with the hard hat manufacturer for additional tips, guidelines, and warnings.

This article appeared in the March 2007 issue of Occupational Health & Safety.

A Field Test for Your Hard Hat

The following is a simple field test that can be performed by an employee or supervisor to determine possible degradation of polyethylene shells:

Compress the shell inward from the sides about 1 inch (2.5 cm) with both hands and then release the pressure without dropping the shell. The shell should quickly return to its original shape, exhibiting elasticity. Compare the elasticity of the sample with that of a new shell. If the sample does not exhibit elasticity similar to that of a new shell or if it cracks due to brittleness, it should be replaced immediately.

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Sealing the HVAC System

by Thomas A Westerkamp

Insulation application help facilities close the door on heating and cooling system leaks.

Heating, ventilating and air conditioning systems demand costly energy 24 hours a day, 365 days a year for most commercial and institutional buildings. The task for engineering and maintenance managers is to hold the line on energy costs while continually increasing the functional capability and reliability of these systems.

They are aware that any losses are money, energy and repair time down the drain that could be better spent in more productive ways.

HVAC system insulation is a one-time investment that continues to generate savings year after year. Better to make the right investment once and reap the savings than to take shortcuts and pay additional, possibly unnecessary costs down the road.

Insulation and efficiency

Insulation allows boilers, piping and ducts to deliver heat or cooling to the intended space with minimal losses along the way. In addition to added occupant comfort, insulation can reduce noise levels, and installed properly according to the architect's specifications, insulation systems can last for many years. Periodic checks and minor repairs, scheduled as a part of a preventive maintenance program, can extend the insulation life substantially.

The passage of time may cause system deterioration as equipment and insulation age. Periodic reassessment, as well as comparisons with original building specifications, often reveal opportunities to upgrade and improve the system.

New, improved materials can be introduced into the system as they become available, increasing energy efficiency and occupant comfort, and ensuring a healthy IAQ environment.

Looking for savings

For energy-saving insulation applications, technicians should start with boilers, unit heaters, package air conditioners and chillers, and work through the system, following all of the energy paths. The energy source itself should be insulated and jacketed with protection from mechanical damage, as should pressure piping and condensate return piping for a steam or hot water system.

Along the way, technicians should check for energy loss. Traps that leak or discharge into a drain can result in big energy losses. Hot or cold spots that are not where they should be can be detected with contact pyrometers or, in remote locations, with infrared imaging instruments.

Also, have technicians trace air flow from the supply fans through ducts to building spaces and, finally, to exhaust fans.

Ducts should be checked for missing or damaged insulation and leaking duct joints. Single- and double-application foam sealants are available in polyurethane and silicone varieties that eliminate

duct joint leakage better than duct tape, which almost always leaks with time. High-temperature tape and cement are required near the boiler for sealing furnace gas vents.

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High-temperature tape and cement are required near the boiler for sealing furnace gas vents.

Managers should make sure than MSDS information about these materials is available to all users to ensure that technicians use proper care when applying them.

Sweating cold water piping or refrigerant lines also are signs of energy losses. Tape wrap or molded insulation is available to eliminate these problems.

Among the most important areas to pay special attention to are additions to the original HVAC system. Ifa valve or other fitting has been added, or if a new heating or air conditioning run has been added, technicians should be sure that all the insulation in these areas is in place.

Sealing the envelope

Once supply and exhaust systems are inspected and brought up to date, the next step is to check the building envelope. Building insulation is as important as HVAC system insulation. A tip-off of a big problem is when snow on a roof starts melting right after a heavy snow, even when the sun is not shining.

Heated warehouses and equipment garages should be insulated to conserve energy. Melting indicates heat is coming through the insulation. Usually, this is due to leaks in the weather seal that allow water to penetrate and soak the insulation.

Water is an excellent conductor. In dry cold, an

infrared imaging detector can identify the heat signature of the roof areas.

If the deck is generally cold, check for leaks around equipment supports, air supply and exhaust ducts and other roof penetrations. Sealing leaks in these areas not only saves energy but extends the life of the weather seal, flashing, insulation and decking.

When specifying insulation materials, managers should make sure to specify the proper R-value for the application.

The higher the R-value, the better the insulation. R-value is a function of the insulation properties of the material and the thickness.

Some duct insulation materials are made for indoor use only and are not designed for exposure to ultraviolet light, even that which comes through atriums and windows. Managers should check local codes when selecting insulating materials because code compliance varies by location.

Impact of HVAC insulation

Facilities can make major strides by focusing simultaneously on energy use, occupant comfort, noise level and indoor air quality.

Energy use is the sum of the energy required to maintain the system balance plus the energy required to offset losses. Insulated systems have far fewer losses, so the energy demand for a facility is also far less.

The amount of energy lost is a function of the conductivity of the enclosure walls and the surface area exposed — that is, uninsulated. For example, duct walls are meant to direct airflow, not to provide insulation. They are very thin and conduct heat rapidly. When insulated, however, they pass more of the generated cooling or heating to the space intended and lose less along the way.

A closer look at windows An often unnoticed place for large energy losses is windows. Older window construction did not have the same insulation properties as newer construction. Cracks due to aging caulk and seals add to this source of energy loss.

Upgrading these areas with modern construction, the addition of good thermal barrier glass systems, and new caulking and sealing can lower energy demand substantially. This same benefit applies to roof insulation. Since heat rises, losses can be large if the insulation under the weather seal is deteriorated due to leaks in the weather seal. Once the insulation becomes water logged, much of its insulation value is lost.

Occupant comfort depends on the time it takes the system to respond to a call for heating or cooling. If there are many leaks or uninsulated sections of the system, the supply of heated or cooled air must meet two demands: demand caused by the temperature and demand caused by the losses.

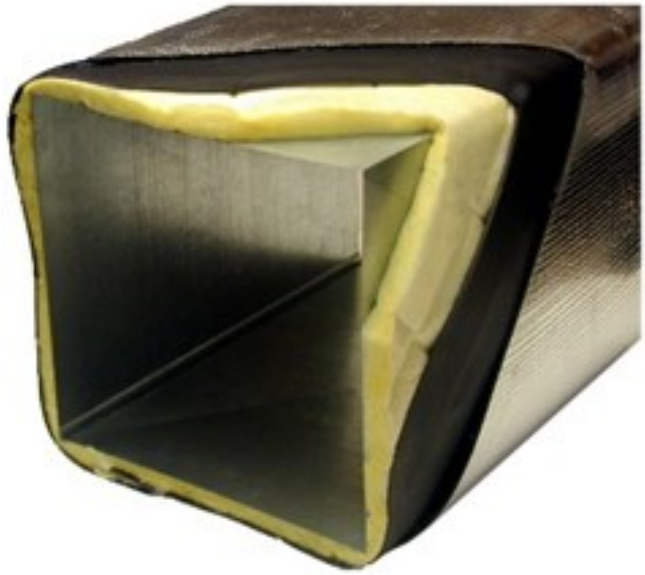
If losses are reduced through the use of better insulation, the demand is satisfied more quickly. Occupants do not notice the difference because it is present for only a short period of time, not long enough to be uncomfortable.

Insulation and noise

HVAC fans, blowers, pumps, power drives, steam and

air flow contribute to higher noise levels in the nearby work spaces. To test for the noise level of the equipment, measure the noise level using a decibel meter, with the equipment running and then with the equipment shut down. The difference is the noise contributed by the equipment.

Noise is easily transmitted and even magnified by uninsulated ducts and piping. Technicians can measure the noise contribution from individual units by progressively operating each unit and measuring the increased noise level. Then it is



possible to isolate the biggest offenders and concentrate on getting them properly insulated.

Noise levels should measure as low as 25-35 decibels on the A-scale for broadcast studios and schoolrooms, to as high as 40-55 in hospitals, private offices and restaurants. In some cases, 80 percent of the noise problem relates to only to 20 percent of the equipment. The most cost-effective solution is to fix the noisiest 20 percent first. Balancing equipment to reduce vibration or air velocity, along with adding dampers, sound traps and insulation, may be required if the HVAC equipment does not meet the specifications.

In HVAC systems with a large number of leaks and other losses, the air volume demand may be greater than the supply fans were designed to provide. Sealing joints with foam insulation and adding sheet or roll insulation to uninsulated sections of the ductwork can reduce the air volume demand.

The result of such efforts often is better, more efficient circulation into the building spaces, greater system efficiency and lower energy costs.

Efficiency Checklist

Managers can adapt and implement the following checklist points into preventive maintenance programs to help maximize energy efficiency by checking the condition of distribution ducts and insulation:

- Is duct work insulated?
- Are duct work seams sealed?
- Is duct work leaking air?
- Are duct connections to outlets tight?
- Is duct work accessible to repair leaks?
- Does the system have manual balancing dampers at zones? If not, how many would be required for balancing?
- Do supply outlets have dampers? If not, how many are needed?
- Do return outlets have dampers? If not, how many are needed?
- What is the velocity and CFM at each outlet with the system on full call?

To answer this last question, traverse each zone, test, and list the results with the system on full call. Compare the results with the original building specifications or the last inspection results to determine needed adjustments.

Thomas A. Westerkamp is a contributing editor to Maintenance Solutions.

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KenKen Puzzle

How to solve the Kenken puzzle:

(Answers on page 34)

- 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

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

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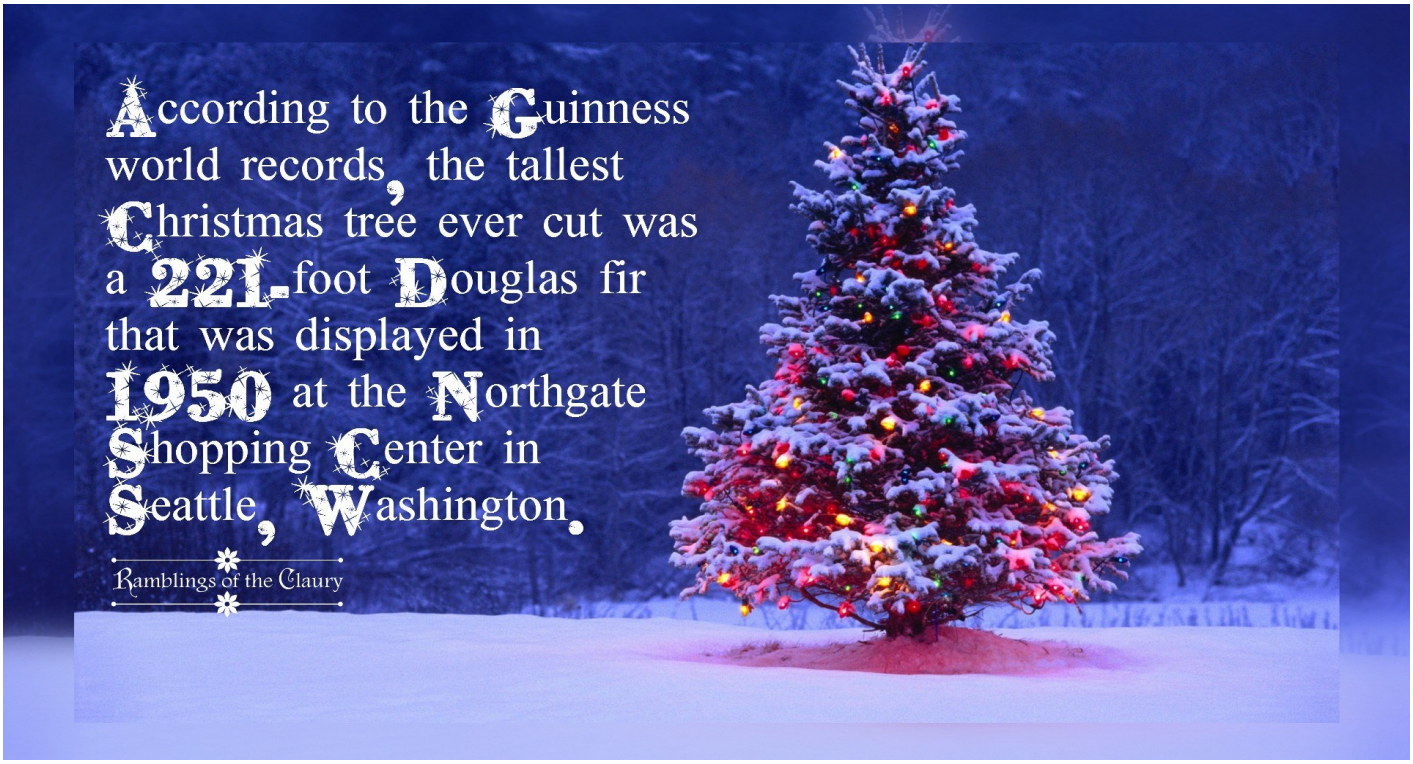
Kenken Puzzle Answer

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

TEST YOUR OPERATOR IQ ANSWERS

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



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PRESENTER: Kerrie Light
Factory Representative
Rinnai Canada for the Prairies

LOCATION:

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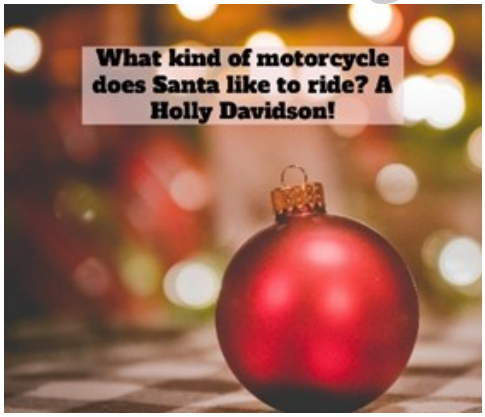

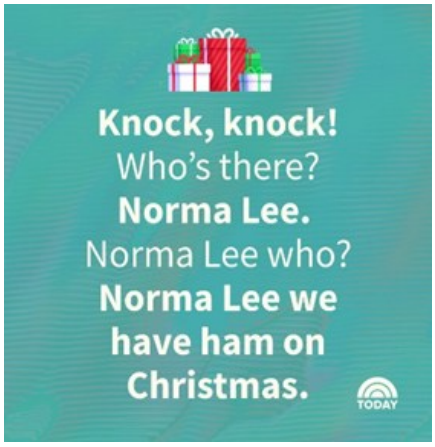

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