

# BOA

Building Operators Association of

# Canada

Official Publication of the Building Operators Association (Calgary)

March 2026



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# What's Inside?

Executive & Committees	3
Important Phone Numbers	3
Presidents Message	4
Test Your Operator IQ	7
Introduction to a Waste Management System (Part 1)	8
Impacts of AC & DC Capacitors Aging on UPS Reliability and Performance	17
Important Update: LockBox Program	20
Superheat & Subcooling—HVAC	22
Introduction to a Waste Management System (Part 2)	24
Why Plumbing Vent Pipes Are Critical in Buildings...?	32
KenKen Puzzle	34
BOMA Course	36
Kenken Puzzle & Operator IQ Answers	37
March 2026 Guest Speaker	38
Advertising Rates & BOA Calgary Sponsors	39
Advertisers Directory	40

**Front Cover:**

Calgary Skyline—Jeff Whyte

## 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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# President's Message

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



BOA is offering to management companies, a corporate membership that will allow their property management staff access to the association.

BOMA Calgary will put out a notification to their members via the electronic newsletter, BOA meeting times and dates along with who will be the guest speakers and the topics presented. Hopefully this will encourage operators to attend the monthly educational sessions.

The Building Operators Association is looking to have a **trade show** this year. It has been a while since the last one and some interest has been shown to have another. We will reach out to companies that in the past, had a booth to see if they would be interested in having another one this year as well. If you did not attend with a booth the last trade show and would like to participate, please contact me at [president@boacalgary.com](mailto:president@boacalgary.com) and we will arrange to have a table set aside for you. The prices for the afternoon show are very reasonable, and there are limited booths. The last show we had was pre-covid and had 35 booths. The Trade Show is a very intimate affair, I think much better than the other types from our industry. It will be held at the **Thornccliffe Community Centre**. It is a

great venue for our monthly meetings and there is sufficient room to accommodate our Trade show of any size. The cost of the tables will be **\$350 for a regular sized** and **\$550 for a corner booth**. There is a lot of foot traffic expected; in the past we have had approximately 750 attendees. Coffee and finger food will be available and there will be plenty of door prizes to go around for the attendees. It has been 5 years since our last trade show, and we are now due for another!

If you would like to volunteer to assist in the organization of the trade show please, reach out; many hands make light work.

The monthly meeting with a guest speaker and times will remain the same: **second Tuesday of each month. Meetings from 5-7 PM at the Thornccliffe Greenview Community Association 5600 Centre Street North**, there is plenty of parking available. **We look forward to seeing you there!**

Smiles))

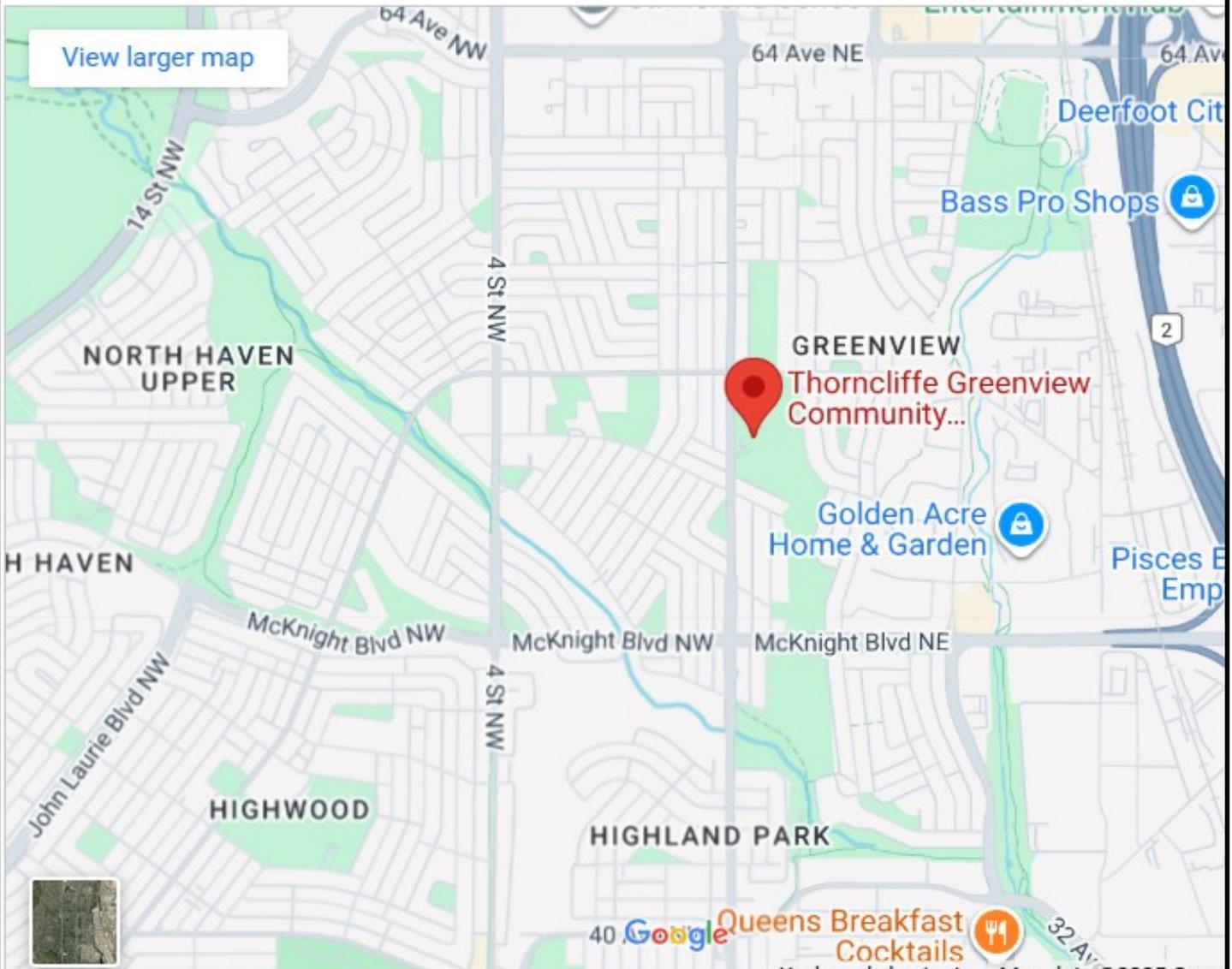
**Les Anderson**  
**BOA Calgary President**



**Join us at our Monthly Meeting on  
Tuesday March 10th, 2026**

at our new location:

**Thornccliffe Greenview Community  
5600 Centre St N, Calgary, AB T2K 0T3**



**Meeting starts at 5pm to 7pm  
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## 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 37

1. A chemical dot placed under the glass lens of a sight glass so that it is exposed to the liquid refrigerant in order to monitor the:
  - a. liquid flow
  - b. refrigerant levels
  - c. presence of moisture
  - d. presence of foreign particles
  - A. pressure levels
2. A direct expansion type evaporator that has more than one refrigerant circuit in it requires a:
  - a. A. stop valve
  - b. B. purge valve
  - c. C. distributor
  - d. D. purge valve
  - e. E. thermal regulator
3. A pressure relief device on a refrigeration system shall have sufficient capacity to prevent the pressure in the pressure vessel from rising more than \_\_\_\_\_ above the setting of the pressure relief device.
  - a. 10 percent
  - b. 15 percent
  - c. 20 percent
  - d. 25 percent
  - e. 50 percent
4. A simple trap located in the suction line before the compressor that collects liquid, where it evaporates and returns to the compressor as a gas, is called:
  - a. an oil separator
  - b. a strainer-drier
  - c. a distributor
  - d. an accumulator
  - e. a stop valve
5. An emergency discharge line is used to deal with which of the following problems?
  - a. dangerously low system pressures
  - b. toxic refrigerant leaks
  - c. combustion of flammable refrigerants
  - d. dangerously high system pressures
  - e. all of the above
6. Moisture in a refrigeration system can result in which of the following?
  - a. formation of ice
  - b. acid formation
  - c. corrosion
  - d. deterioration of motor insulation
  - e. all of the above



# Introduction To A Waste Management System

## (Part - 1)



### Introduction

Global thinking about the importance of the environment has changed dramatically. Reflecting this change, businesses are taking responsibility for the environmental consequences of their operations to a greater extent. Increased environmental stewardship and accountability to a growing range of stakeholders, including investors and creditors, governments and regulatory agencies, community and environmental interest groups, employees and organized labour groups, consumers and customers and suppliers, means increased demands for environmentally responsible actions and improved environmental performance for many organizations. The result is an ever-

strengthening relationship between effective environmental management and an organization's economic success.

The Canadian Standards Association (CSA) defines an environmental management system as "the organizational structure, responsibilities, practices, procedures, processes, and resources for implementing environmental management."

Waste management is an integral component of environmental management and accordingly, a waste management system is a key aspect of a comprehensive environmental management system. A waste management system thus may be described as the organizational structure, responsibilities, practices, procedures,

processes, and resources for establishing and implementing an organization's waste management policy, objectives, and targets.

The strong correlation between sustainable environmental management and economic profitability provides organizations that implement and maintain an effective waste management system with the opportunity to make significant environmental and economic gains both in the short- and long -terms.

The materials in this document are intended to provide guidance on implementing a waste management system to organizations carrying on a wide variety of activities that generate waste. As guidelines, they primarily are intended to provide directing principles rather than step-by-step instructions.

## Waste and Society

A wide variety of materials is required to meet the need of present-day society, ranging from construction materials to computers and from toilet paper to telecommunications equipment. Some materials have a useful life measured in decades, but the lifespan of many other materials is much shorter. Over time however, virtually all materials cease to serve a useful purpose.

Generally speaking, a material becomes waste or garbage when it has been used by its final end user and discarded. Waste may be defined as any material or product that no longer serves its intended purpose and has no further marketable value. Any material or product that is disposed of to the environment through the air, water, and/or land, possibly before the end of its useful life, also may be considered waste.

Waste is a by-product both of our past and present economic system - one largely based



on exploiting our natural resources without accounting for the environmental costs, particularly the value of the resources consumed and the costs of waste management. Our attitude towards waste and the



methods we used for managing it resulted to a great extent from our emphasis on convenience. Our consumer-oriented economy resulted in the massive growth of waste generation, particularly through huge increases in the amount of product packaging and the development of new convenience-oriented "throwaway" products.

Over the last decade, increased public concern about the rapidly deteriorating state of our overall environment has led to several significant developments.

First, the public as a whole has become much more aware of the major environmental issues and has redefined its expectations of the roles and responsibilities of both the business community and government in dealing with them. The public now expects businesses to operate in an environmentally sound manner and responsibly manage the resources consumed. Governments are expected to regulate this behaviour.

Secondly, we have begun to quantify the price of exploiting the environment and to factor the direct and indirect costs of waste-generating activities into our decision-making processes. Organizations are finding that generating waste is expensive and that making environmentally sound choices actually can reduce costs. For example, production and operating costs may decrease through savings in waste disposal haulage and tipping fees, more efficient use of raw materials and reduced liability exposure. Similarly, revenues from the sale of reusable or recyclable waste materials may well be significant. Furthermore, many organizations have begun to develop and introduce products and services that are less harmful to the environment, putting increased pressure on their competitors who have not responded to the shifting demands of the market.

Finally, the environmental concerns of the public have resulted in the introduction of environmental legislation by all levels of government with increased performance



evaluate environmental performance and involve all their employees in the environmental management process. As discussed below, effective environmental management should result both in benefits to the environment and economic benefits to the organization.

### **Benefits of Effective Waste Management**

In determining whether to establish a waste management system, an organization will need to evaluate the benefits of effective waste management and weigh them against the costs of doing so. Properly structured waste management efforts not only encourage activities that promote sustainable development, they also translate into significant tangible benefits for the organization.



These benefits may be grouped into four main categories:

- ✦ economic benefits
- ✦ regulatory compliance
- ✦ risk and liability reduction
- ✦ improved image.

### **Economic Benefits**

The most compelling reason for an organization to establish a waste management system is to benefit from the

economic advantages of effective waste management. Reducing waste generation presents potentially significant economic benefits derived from reduced requirements for input materials, energy, inventory, packaging, processing and waste management and disposal. Lower waste management costs, for example, could result from a reduction in the need for pollution control equipment, waste storage facilities, waste handling equipment, waste transportation and disposal and reduced manpower requirements for record keeping, paperwork and reporting. Economic benefits also may accrue to an organization through increased revenues from greater recovery and sales of reusable or recyclable materials that otherwise would have been treated as waste.

As well, heightened environmental awareness in the new global economy has forced organizations to re-evaluate their products and activities. These organizations have begun to develop and introduce more environmentally-benign products and services, not only reaping the economic benefits of doing so, but putting their competitors under increased economic pressure to do the same.

Each of the other benefits of effective waste management - regulatory compliance, reduced risk and liability and improved corporate image - also presents significant opportunities for direct or indirect economic benefits.

### **Regulatory Compliance**

There has been a dramatic increase in environmental regulation worldwide, particularly in industrialized countries, in the last decade. In addition to an increase in number, environmental regulations generally

are becoming more comprehensive and complex. Furthermore, the standards of environmental compliance are becoming more stringent and the consequences of non-compliance more serious. Enforcement practises are being stepped up, with regulatory agencies playing a greater role in monitoring the activities of organizations and prosecuting offenders. For most organizations, this means increased regulatory requirements for waste-generating activities, handling, transport, treatment and/or disposal of waste, including requirements for approvals, permits, licenses, reporting, etc. As noted throughout these guidelines, at a minimum, effective waste management practices should ensure an organization's compliance with all applicable regulatory requirements.

### **Risk and Liability reduction**

Waste management activities typically provide significant opportunities for an organization to reduce its liabilities by reducing the risk of penalties such as fines, damage awards and remediation orders and improving the health, welfare and safety of its employees and the surrounding community. For example, reduction in the quantity of waste generated by an organization should translate into less waste released to the environment, in turn reducing the risk of adverse health effects to employees and the general public. Effective waste management should minimize both the risk of adverse environmental effects resulting from an organization's waste-generating activities and the organization's exposure to liability.

### **Improved Image**

Finally, an organization may improve its image to any number of its stakeholder groups,

including its employees, customers, investors, lenders, regulatory authorities and the community, by visibly demonstrating its commitment to sustainable environmental practices, such as implementing a waste management system. This improved image quickly can lead to a competitive advantage in the marketplace. For example, instituting effective waste management policies and practices can influence the attitudes and morale of an organization's employees, who may well develop a more positive attitude toward the organization for its commitment to providing a safer and cleaner workplace and reducing the harmful effects of its



activities on the environment. Community attitudes and the confidence of consumers, investor; lenders and suppliers likewise can be favourably influenced by an organization's waste management practices. An organization's waste management efforts also may lead to improved relations with regulatory authorities.

### **Waste Management Systems**

#### **Traditional Definitions**

The definition of a waste management system used in these guidelines should be clearly understood and differentiated from

other definitions of a waste management system currently in use. For example, Ontario's *Environmental Protection Act* defines a waste management system as 'any facilities or equipment used in, and any operations carried out for, the management of waste including the collection, handling, transportation, storage, processing or disposal of waste, and may include one or more waste disposal sites. The CSA defines a waste management system in its *Life Cycle Assessment* guideline as "the mechanism for treating or handling a waste prior to its release to the environment."

The definitions in these two examples focus on a waste management process that commences after waste has been generated. The waste management system consists only of the facilities, equipment and operations necessary to manage waste once it has been generated. In this approach, the waste management system may be an incinerator, landfill or waste collection, handling and processing facility and would apply to an organization whose primary business activity involves the management of waste. In contrast, the definition adopted in this document takes a broader approach to waste management and considers the waste management system to encompass the complete process of waste management, from designing policies to implementing a system

for reducing the generation of waste, as well as handling any wastes produced, to reporting on the system both internally and externally. Accordingly, the system described in these guidelines is applicable to all organizations whose activities generate waste.

Ideally, an organization's waste management efforts should prevent the occurrence of any adverse environmental effects resulting from its waste-generating activities. To achieve this, an organization generating waste as a by-product of its activities should design a system to prevent the generation of waste at its source. This cannot be accomplished if the organization's waste management efforts start at the point at which waste is generated. The most effective waste management system will be a dynamic, evolving and continual process of defining, documenting, evaluating and improving the structure, responsibilities, practices, procedures, processes and resources by which an organization manages its waste-generating activities.

### Roles of a Waste Management System

The waste management system plays many roles in assisting an organization to achieve sustainable waste management practices. These include ensuring that:

- ✦ the organization's waste management policies, objectives and expectations are met
- ✦ emphasis is placed on the prevention of environmental effects, rather than the detection of these effects after they have occurred
- ✦ performance-related information is





collected and evaluated in a timely, accurate and efficient manner

- ✦ adequate resources are committed to the organization’s waste management efforts
- ✦ information demonstrating the organization’s due diligence is collected and reported adequately
- ✦ improvements to the organization’s waste management efforts are implemented and evaluated on an ongoing basis.

From a management perspective, the key role of an organization’s waste management system may be to attain and maintain the desired level of waste management performance at minimal cost. For customers and other stakeholders however, the most important role of the waste management system is to provide them with a sufficient degree of confidence in the organization’s ability both to achieve appropriate levels of waste management performance and improve its level of performance to the greatest extent possible.

From a legal perspective, the waste management system’s function is to ensure the organization’s compliance with all applicable legal requirements.

**Roles and responsibilities in a waste management system**

The initial step for an organization in the waste management process is to assign responsibility for the various aspects of the waste management system. There are several distinct roles for which an organization must designate responsibility in the development and operation of its waste management system:

- ✦ leadership and overall management
- ✦ system development
- ✦ system assurance
- ✦ system support
- ✦ external relations
- ✦ stakeholder groups.

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# Impact of AC and DC Capacitors Aging on UPS Reliability and Performance

Capacitors are one of the **most common failure components** inside double conversion UPS systems. Their aging directly impacts reliability, runtime, and power quality.

## 1- DC Capacitors (DC Bus / Bulk Capacitors) Where They Are Used

- DC link between rectifier and inverter
- DC bus capacitors smooth the rectified waveform
- Battery interface stage
- Inside inverter modules and booster section

Usually electrolytic capacitors (large cylindrical cans).

## Aging Mechanism

### DC capacitors age mainly due to:

- Heat (primary factor)
- Ripple current stress
- Electrolyte drying out over the time
- Chemical degradation of dielectric

Every 10°C temperature increase roughly halves capacitor life.

## What Happens as DC capacitors Age?

### Symptoms of old DC caps in UPS:

- Increased DC bus ripple
- Increased switching losses and IGBT thermal stress
- Inverter instability and intermittent issues
- Bus voltage dips then Control loop struggles

## What Happens as DC capacitors Age?

Parameter	Effect of Aging	UPS Impact
Capacitance	Decreases	Higher DC ripple
ESR (Equivalent Series Resistance)	Increases	Overheating & stress
Ripple handling	Reduces	Possible inverter instability
Leakage current	Increases	Efficiency loss

- Audible humming
  - Over-temperature alarms
  - Random shutdown under load
  - Visible bulging or leakage
- If ignored → can cause **IGBT failure** in the inverter stage.

**2- AC Capacitors (Output / Filter Capacitors)  
Where They Are Used**

- Output LC filters to modulating PWM signal
  - EMI suppression
  - Power factor correction
  - Rectifier Input passive Harmonic filtering
- Usually **film capacitors** (box-type).

**Aging Mechanism**

AC capacitors age due to:

- High voltage stress
  - Thermal cycling
  - Large Harmonic currents
  - Dielectric breakdown over time
- Film capacitors generally last longer than electrolytics.

**Symptoms in UPS**

- Increased output voltage Distortion
- Out put voltage Phase angle deviation
- Reduced power quality
- Nuisance alarms
- Blown filter stage

Rarely: explosive failure (in severe cases)

**Real-World UPS Impact**

**In industrial UPS systems:**

- AC/DC capacitor aging is a major cause of inverter failure
- AC capacitor aging affects power quality more than system survival

Capacitors usually determine the mid-life overhaul cycle of a UPS

**Many manufacturers recommend:**

- Capacitor inspection at year 3–5
- Proactive replacement at year 7–10
- Thermal scanning & ESR testing during PM

**What Happens as They Age?**

Parameter	Effect	UPS Impact
Capacitance	Slight reduction	Filter tuning shift
Dissipation factor	Increases	More heating
Insulation resistance	Drops	Possible fault
Dielectric integrity	Weakens	Risk of catastrophic failure
Power Quality Distortion	Voltage and current	Increase output <u>THDv</u> and input <u>THDi</u>

### AC vs DC Capacitor Aging Comparison

Factor	DC Capacitors	AC Capacitors
Type	Electrolytic	Film
Life Expectancy	6–10 years typical	8–10 years typical
Most Sensitive To	Heat & ripple	Voltage & harmonics
Failure Mode	Gradual degradation	Often sudden
Risk Level	High (affects inverter directly)	Medium (affects filtering)

#### How to Monitor Capacitor Aging Professional methods include:

- ESR measurement
- Ripple current measurement
- Infrared thermography
- DC bus ripple scope analysis
- Capacitance testing during shutdown

#### Strategic Insight for UPS Operators If you are managing critical facilities:

- Capacitors age faster in hot electrical rooms
- Light load does NOT mean low stress (ripple can still be high)
- Poor airflow dramatically accelerates failure
- Capacitor replacement is cheaper than inverter module replacement

#### Last words:

Proactively monitor temperature, ripple voltage, and perform regular visual inspections, replacing DC bus capacitors at mid-life to minimize inverter stress and prevent unexpected failures. Periodically

evaluate AC capacitors for harmonic and voltage stress to preserve filter performance, ensure proper unit operation, and maintain overall power quality.



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# IMPORT UPDATE: LOCKBOX PROGRAM



Honeywell has discontinued the TRACcess (Supra) lockbox product line along with all support and services. Because this change comes directly from the manufacturer, any Supra lockbox lids currently installed on business premises will need to be replaced or retrofitted to remain compliant with the National Fire Code.

To maintain secure emergency access and code compliance, all existing Supra lockbox lids must be retrofitted with the approved Knox Lift-Off Retro Lid before **December 31, 2026**. Orders should be placed through the Knox website before **October 30, 2026**, and installations must be completed by CFD. Non-compliance fees will apply after the deadline.

We've also implemented several cost-saving measures for businesses, including removing third-party lockbox inspection requirements, waiving key-add fees during retrofit, and eliminating the need for locksmith/provider contracts.

If you're able to distribute the notice below to your members, it would be extremely helpful in ensuring building operators are aware of these requirements and timelines.

If anyone has questions or needs clarification, they can visit [calgary.ca/lockboxes](https://calgary.ca/lockboxes) or contact [lockbox@calgary.ca](mailto:lockbox@calgary.ca).

Best regards,

**Michael Garner**

Fire Inspections Coordinator

Calgary Fire Department

**31**  
DAYS IN THE MONTH

**Womens History Month**

**National Crayon Day**

**Pi Day**  
 $\pi$   
3.1415

**National Craft Month**

**Daffodil**

**Aquamarine Birthstone**

**National Teenage Mutant Ninja Turtle Day is March 19**

**Dr. Seuss' Bday & Read Across America**

**St. Patrick's Day Mar 17th**

**Goodbye Winter**

**Hello Spring**

**Coca-Cola was invented in March 1886.**

**Astrology Signs**  
Pisces Aries

**3rd Month of The Year**

# MARCH FUN FACTS

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# Superheat & Subcooling – A Must-Know Concept for Every HVAC Professional

Many technicians check only pressure...  
But real HVAC professionals analyze  
'Superheat & Subcooling'

If you understand these two values clearly,  
you can diagnose almost 80% of AC & Chiller  
issues accurately — without guesswork.

Let's understand it step by step

## What is Superheat?

Superheat tells us whether refrigerant is  
completely vapor before entering the  
compressor.

## Formula:

Superheat = Suction Line Temperature –  
Saturation Temperature

## Normal Range:

- Split AC: 8–12°C
- Chiller: 5–10°C

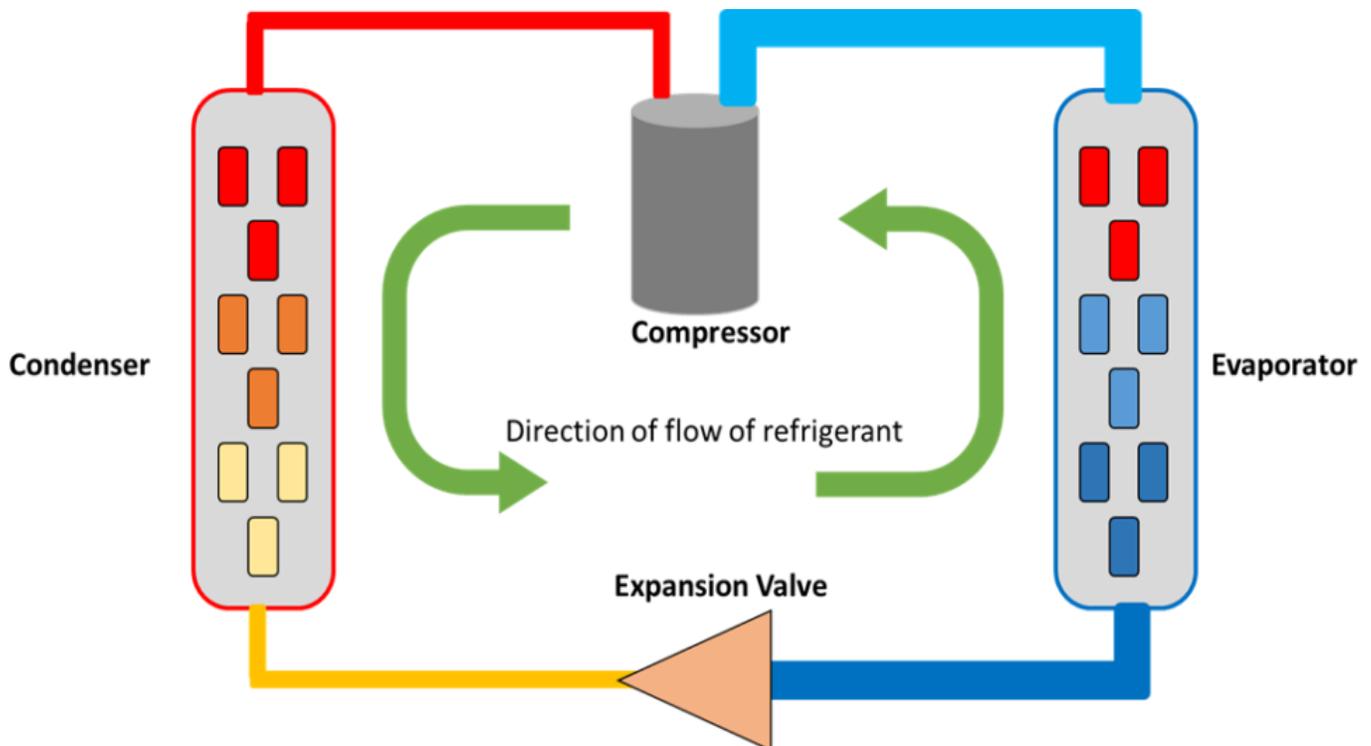
## When Superheat is TOO HIGH

- ◇ Low cooling performance
- ◇ Low suction pressure
- ◇ Compressor overheating
- ◇ Low ampere draw

## Possible Reasons:

- Refrigerant undercharge
- TXV restriction
- Poor airflow
- Blocked filter drier

**Risk:** Compressor damage due to



overheating

- ◇ High compressor ampere
- ◇ Risk of liquid floodback
- ◇ Possible slugging

**Possible Reasons:**

- Refrigerant overcharge
- TXV overfeeding
- Excess airflow

**Risk:** Severe compressor damage

**What is Subcooling ?**

Subcooling confirms whether refrigerant is fully converted into liquid inside the condenser.

**Formula:**

$$\text{Subcooling} = \text{Condenser Saturation Temp} - \text{Liquid Line Temp}$$

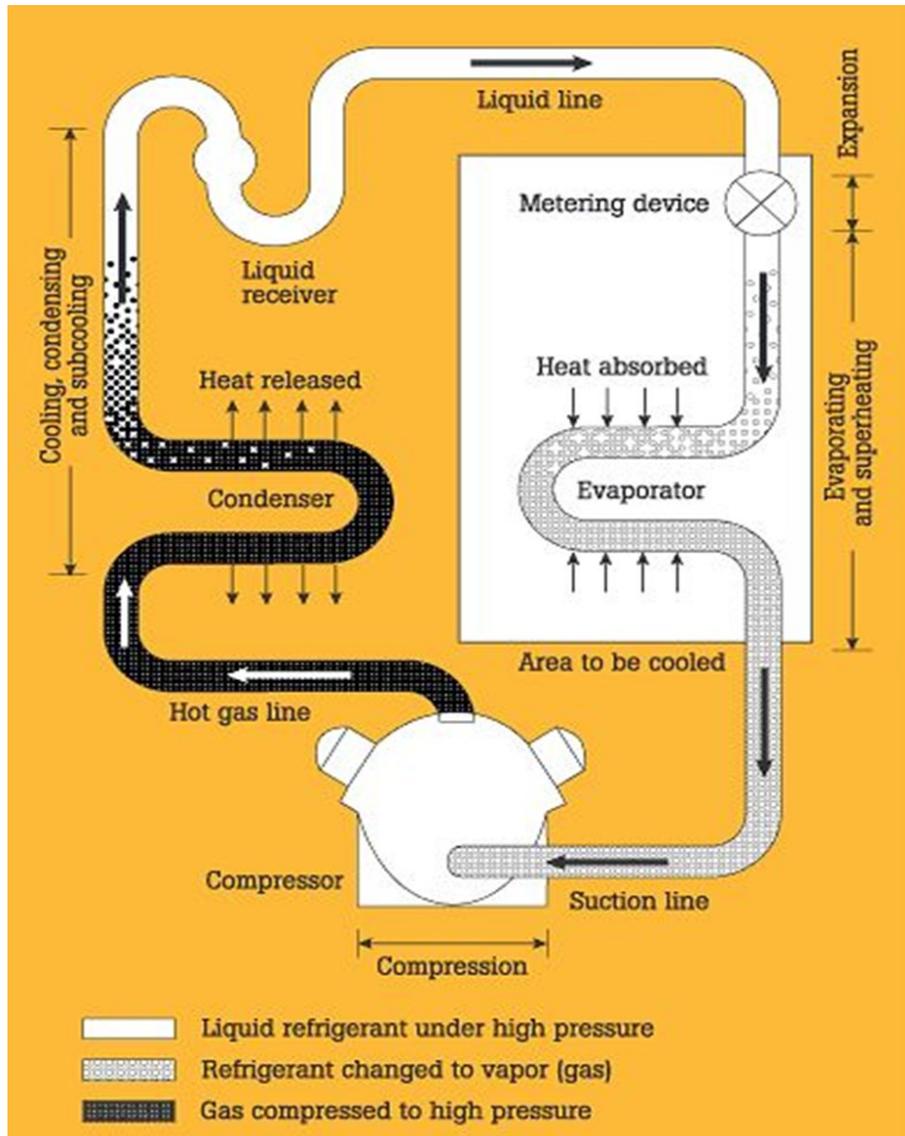
Normal Range: 8–12°C

**When Subcooling is TOO HIGH ;**

- ◇ High head pressure
- ◇ High ampere
- ◇ Overheated condenser

**Possible Reasons:**

- Overcharge
- Dirty condenser coil
- Non-condensable gases



**When Subcooling is TOO LOW ;**

- ◇ Poor cooling
- ◇ Bubbles in sight glass
- ◇ Low suction pressure

**Possible Reasons:**

- Undercharge
  - Refrigerant leakage
  - Liquid line restriction
- Field Experience Rule:

- ✓ High Superheat → Mostly Low Refrigerant
- ✓ Low Superheat → Risk of Floodback
- ✓ High Subcooling → Overcharge
- ✓ Low Subcooling → Undercharge

HVAC is not about adding refrigerant blindly.

# Introduction To A Waste Management System (Part - 2)

*Effective Waste management; Benefits of Effective Waste Management and Waste Management Systems were some of the issue discussed in part-1 of this article.*

## **Leadership and overall Management**

Accountability and overall responsibility for an organization's environmental affairs, including its waste management system, should be assigned to a senior officer in the organization. This individual should assume responsibility for monitoring the effectiveness of the waste management system and reporting to other senior management on its performance. The individual should report directly to the person with overall responsibility for the organization, such as the CEO, president, owner, or director. In a large organization, a director of environmental affairs may have responsibility for the organization's environmental management system. In this type of organization, the director of waste management might be responsible for the waste management component of the environmental management system and report directly to the director of environmental affairs. In a small organization, the positions of director of environmental affairs and the president of the organization may be filled by the same



person.

The individual assigned overall responsibility for the organization's waste management system should be given clear written authorization and instructions about the scope and nature of the position. This person will be assessing the organization's current practices and procedures, recommending and implementing changes and therefore must have the CEO's authority to carry out the assigned responsibilities.

The importance of senior management's commitment to an organization's waste management policy cannot be overemphasized. Without a sincere and ongoing commitment to its waste management policy, the organization will not likely be able to achieve improved waste management performance. Senior management also must take responsibility for ensuring that environmental issues cross traditional functional lines in the organization, such as production, finance, personnel and marketing.

The CEO should provide leadership and direction to senior managers. Senior managers, in turn, should be responsible for appropriately delegating responsibility for the various components of the waste management system to specific departments and personnel in the organization. Management should describe the major tasks to be performed and identify the level of responsibility required to perform each. Specific roles then should be designated to those departments or individuals who are best qualified to fulfill. A description of the tasks should be incorporated into the job description of each department and individual.



In assuming overall responsibility for the waste management system, senior management should:

- ✦ establish waste management policies
- ✦ assign responsibilities for the components of the waste management system
- ✦ evaluate short- and long-term waste management strategies
- ✦ set priorities for action
- ✦ design activities to monitor adherence to policies, standards and procedures.

### System development

In order for an organization to achieve its waste management system objectives, both its management and employees must be committed to the development and operation of the system. To obtain this commitment, the organization first must convince management and staff that effective waste management practices not only will lead to more environmentally sustainable waste management, but will

provide economic benefits to the organization and improve the health and safety of its employees and the local community as well. Once these parties understand the potential benefits and rewards of the waste management system, they must agree on its individual components - the structure, responsibilities, practices, procedures, processes and resources for establishing and implementing the organization's waste management initiatives.

From the perspective of an organization's employees, developing the waste management system may be the most labour-intensive part of the waste management process. Management and employees throughout the organization are required to assist with this activity.

Responsibilities for the development of a waste management system include:

- ✦ managing and controlling projects
- ✦ reviewing waste-generating activities

(inventory analysis) and assessing the effects of these activities (impact analysis)

- ✦ identifying and evaluating waste management options (improvement analysis)
- ✦ designing waste management options and developing an implementation strategy
- ✦ implementing components of the waste management system
- ✦ measuring and monitoring performance of these components

evaluating possibilities for improvements, redesigning waste management options and implementing changes.

Employee insights and suggestions are particularly useful at the preliminary assessment stage in identifying waste-generating activities and proposing waste management options. For example, by directly involving line employees in the development of waste management options, the organization often will reach creative solutions. Approaching such employees early on in the process and requesting their input also will assist the organization in obtaining their future support for changes by reducing potential anxiety about these changes.

Other professionals, such as accountants, can play an important role in assisting an organization to develop an effective approach to costing and assessing the economic feasibility of the waste management options. Accounting and other financial professionals also can fulfill another significant development function by determining financial measuring and reporting requirements and monitoring these requirements once the waste management system has been implemented.

### System assurance

Many of the responsibilities in an organization's waste management system are assurance-related. Typical assurance responsibilities include:

- ✦ evaluating the effectiveness of control activities
  - ✦ verifying the organization's adherence to established control activities
  - ✦ evaluating the adequacy of monitoring and reporting requirements
  - ✦ reviewing the security of information generated by the waste management system
  - ✦ assessing the applicability and usefulness of information gathered through monitoring activities
- evaluating the established waste management policies and objectives.

Personnel that typically are well-suited to performing assurance activities in an organization are external auditors (including regulatory agencies) and internal audit departments. In fact, many large organizations have audit committees responsible for monitoring compliance with regulatory requirements, overseeing the internal environmental auditing system and appointing external environmental auditors.

### System support

During the various stages of planning and developing, design and implementation, information management, auditing and assessing, monitoring, reporting and ongoing evaluation of the waste management system, an organization will need to



provide support for the system. Support for an organization's waste management system may involve a broad range of responsibilities and therefore may require a wide variety of individuals. The individuals best suited to carrying out support activities generally are those who can provide specialized and technical expertise to the organization in areas such as information systems, engineering, accounting and law. These specialists may be recruited either from within the organization, for example, MIS personnel, in-house counsel and occupational health and safety personnel, or retained externally to provide expert advice on a particular component of the waste management system, as in the case of financial, engineering and other environmental consultants and lawyers.

### **External relations**

The external relations component of an organization's waste management system consists of managing all information relating to the system in a secure manner, reporting on all relevant information to the appropriate stakeholder groups, maintaining effective communication with these stakeholder groups and monitoring their information requirements. The personnel who are most appropriate for performing these functions include senior management and individuals responsible for the organization's public relations, communications, marketing and sales.

### **Stakeholder groups**

The various stakeholder groups of an organization also have roles and responsibilities in the organization's waste management system. Potential stakeholder groups include investors and creditors,

governments and regulatory agencies, community and environmental interest groups, employees and organized labour groups, consumers and customers and suppliers. Their roles are discussed in detail in Section 2.3. These groups play a significant part in the organization's determination of the requirements for its waste management system.

### **History of waste management**

Over the last two decades, significant changes



in environmental policy have taken place in a number of countries around the world that directly affect the management of solid waste. In many cases, these developments have been motivated by economic as well as environmental considerations. The overall effect of these developments has been to shift the focus of solid waste management efforts away from over-reliance on waste disposal through landfilling and incineration to a more comprehensive, integrative and "front-end" approach to all aspects of waste generation.

### **The developments are as follows:**

- widespread acceptance of the concept of "sustainable development"
- growing popularity and application of product life-cycle assessments
- development and acceptance of product stewardship models for the business

- community
- increased understanding of the environmental risks associated with an organization's activities
- assessment of waste management activities through the use of environmental audits
- adoption of integrated waste management approaches
- a shift in environmental controls from a traditional "end-of-pipe" approach to a "pollution prevention" approach
- development of more comprehensive methods of cost accounting and profitability analyses. These developments are significant because they enable organizations to understand the nature and extent of their waste-generating activities better, evaluate their waste management options more accurately and implement more effective solutions. The new approaches to environmental issues do not necessarily apply only to solid waste management. Many of the concepts outlined below are very broad and may be relevant to a wide variety of environmental issues, particularly those relating to a comprehensive environmental management system.

### **Sustainable development**

The publication in 1987 of *Our Common Future*, the report of the World Commission on Environment and Development, commonly referred to as the "Brundtland report," played a pivotal role in bringing environmental issues to the attention of both political leaders and the general public. With the publication of the

Brundtland report, "sustainable development" became a basic premise for developing environmental policies in the public and private sectors around the world. The commission defined this concept as:

"development that meets the needs of the



present without compromising the ability of future generations to meet their own needs."

Sustainable development rejects policies and practices that support our current living standards by depleting the productive base, including natural resources and leave future generations with poorer prospects than those of the current generation.

Economic growth based on an assembly line mentality that consumes raw materials at one end and generates finished products (ultimately to be discarded) along with waste materials at the other end has been proven to be unsustainable. A sustainable development approach advocates continual reduction in the use of virgin materials per unit of output and waste generation, as well as ongoing substitution of more abundant materials for those becoming more scarce

. Sustainable development is a concept of global application, providing a framework for

integrating environmental policy and economic development strategies in both developed and developing countries. However, the concept also is important for individual organizations and their waste management efforts. In this context, the development of a waste management policy, implementation of a waste management system and preparation of performance reports and audits assist an organization in achieving a sustainable approach to its waste management. Such an approach should result in both environmental and economic benefits for the organization.

### Product life cycle

As society increasingly becomes aware of the effects of its activities on the environment, particularly those resulting from the consumption of manufactured products and marketed services, consumers are demanding that producers develop products and processes with minimal environmental effects. As a result, a product's long-term viability, consumer acceptance and economic success are

becoming more dependent on the effects of the product on the environment throughout its existence. In order to produce a truly environmentally "friendly" or benign product, the developer must consider all the stages in the life cycle of the product.

Every product, package, process and activity goes through several stages from its development to its destination. These stages commonly are referred to as a "life cycle." Our consumer-oriented society traditionally has emphasized the consumption phase of a product's life cycle. However, the life cycle actually consists of four main stages:

- ✦ raw materials and energy acquisition
- ✦ manufacturing
- ✦ use, reuse and maintenance waste management.

### Raw materials and energy acquisition stage

The first life-cycle stage consists of the removal of resources, such as raw materials and energy, from the earth and includes the transport of these raw materials and energy to the point of processing. The acquisition of raw materials and energy usually requires the use of further resources and leads to environment effects such as the generation of waste.

### Manufacturing stage

The second stage of a life cycle is the transformation of raw materials into the products delivered to end users. The manufacturing process has three steps:

- ✦ materials manufacture
- ✦ product fabrication
- ✦ filling, packaging and distribution.

Materials manufacture involves all manufacturing processes required to process raw materials into intermediate products.



Following the manufacture of intermediate products, these products are converted into final products ready for their intended use and transported to the point of fillings, packaging and distribution. Filling and packaging consists of the steps taken to ensure that the products remain intact until they are ready for use. Distribution includes those actions required to transfer the products from the manufacturer to the intended user. The manufacturing of products typically generates offcuts and scrap materials that may be reused internally, sold as scrap, or disposed of as waste. Waste also may be generated during filling, packaging and distribution as a result of process inefficiencies, spillage or product deficiencies. In addition, manufacturing processes require the input of resources, including energy and may result in waste generation.

### **Use, reuse and maintenance stage**

The third stage in a life cycle is the one consumers generally are most familiar with the actual use, reuse and maintenance of a product. This stage begins after distribution of the product to its intended user and includes all activities of the user of the product, as well as any maintenance performed, either by the user or elsewhere.

Packaging often is included with products delivered to end users, for the purposes of effectively shipping, handling, marketing and promoting these products. The product life cycle also applies to packaging as it too requires the acquisition of raw materials and energy, manufacturing and is eventually consumed and disposed of as waste.

Waste is generated as well by maintenance

activities involving the replacement of defective or worn out parts and components. Finally, the use of a product itself may require the input of resources and result in the generation of waste and other environmental effects.

### **Waste management stage**

Once an end user has finished using a product and is unable to derive any further benefit from it, the product may be characterized as having reached the final stage of its life cycle. This is referred to as the waste management stage. Although the useful life of products varies considerably, most products eventually cease to serve a useful purpose and become waste. (When a product may be reused in its current form by the end user or by another party, it still may be classified as being in the use, reuse and maintenance stage.) At this stage, a product either may be recycled, composted, or disposed of as waste through landfilling or incineration. Recycling is preferable over waste disposal, as it is essentially a waste diversion measure. Closed-loop recycling is the preferred method of recycling and occurs where products are recycled into the same product. Open-loop recycling occurs where products are recycled into new products that eventually are disposed of. The exclusively waste-generating activities

of landfilling and incineration are the least preferred options.

All of the four stages



of the product life cycle require the input of resources and result in the output of a product and waste. Product developers will need to consider the environmental effects of each.

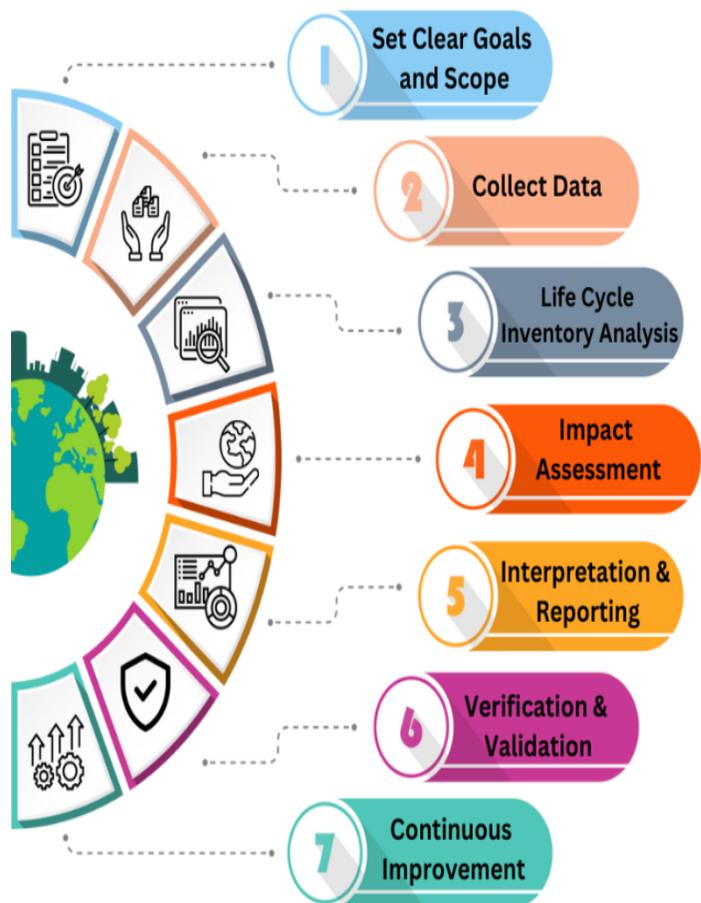
### Life-cycle assessment

The life-cycle assessment (often referred to as "LCA") is emerging as an effective method of evaluating the various environmental effects of a product, including waste management issues. The CSA Life Cycle Assessment guidelines define life-cycle assessment as "a concept and a method to evaluate the environmental effects of a product or activity holistically, by analyzing its entire life cycle." The strength of the life-cycle assessment is that it attempts to incorporate all factors from every stage of a product's life span, thereby providing a "cradle to grave" snapshot of the inputs and outputs of the product. As a result of its comprehensive nature, the life-cycle assessment is gaining acceptance as a tool for business planning and decision-making. A comprehensive life-cycle assessment should examine all the environmental implications of a product. However, from the perspective of effective waste management, an organization may use the life-cycle assessment specifically to evaluate the waste management implications of a product.

### Life-cycle assessment components

The life-cycle assessment consists of three related components: inventory, impact and improvement analyses. The inventory analysis is an objective, information-gathering process that identifies and quantifies the environmental effects occurring over the life cycle of a product. It

is useful in process analysis, material selection, product evaluation, product comparison and policy-making. The impact analysis then characterizes and assesses the environmental effects identified by the inventory analysis. Finally, the improvement analysis evaluates the opportunities to reduce the environmental effects of the product over its entire life cycle. The improvement analysis includes both the quantitative and qualitative aspects of potential improvements, such as changes in product design, raw material usage, industrial processing techniques, consumer use and waste management practices.



*Part 3 of this article will deal with Product stewardship; Environmental risk management; Environment audits; Integrated waste management; Pollution prevention; Accounting for environmental costs and Related initiatives and standards.*

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# Why Plumbing Vent Pipes Are Critical in Buildings...?

Ravi Shankar Kumar

In plumbing systems, most people focus on water supply and drainage lines. However, one of the most important yet often overlooked components is the plumbing vent pipe system. Without proper venting, even a perfectly installed drainage system can fail.

## 🔍 What Is a Plumbing Vent Pipe?

A plumbing vent pipe connects the building's drainage system to the atmosphere, usually terminating above the roof.

It does not carry wastewater — it carries air.

Its main role is to maintain pressure balance inside the drainage network.

## 🔧 Why Vent Pipes Are Important in Buildings

### 1️⃣ Maintains Proper Drainage Flow

When wastewater flows through a vertical stack, it creates pressure fluctuations:

- Negative pressure (vacuum) behind the flow
  - Positive pressure ahead of the flow
- Without venting, this pressure imbalance can:

- ✗ Slow down drainage
  - ✗ Cause gurgling sounds
  - ✗ Lead to poor fixture performance
- Vent pipes allow air movement, stabilizing internal pressure and ensuring smooth

drainage.

### 2️⃣ Protects Trap Seals

Every plumbing fixture has a P-trap filled with water to block sewer gases.

If proper venting is not provided:

- Vacuum pressure can siphon water from the trap
  - Trap seal can break
  - Sewer gases can enter indoor spaces
- Vent pipes prevent siphonage and back pressure, protecting indoor air quality.

### 3️⃣ Prevents Sewer Gas Entry

Drainage systems produce gases such as methane and hydrogen sulfide.

Vent pipes safely discharge these gases above roof level, preventing:

- ✗ Unpleasant odors
- ✗ Health hazards
- ✗ Indoor air contamination

### 4️⃣ Ensures Code Compliance

Modern plumbing codes (IPC, UPC, local regulations) require proper vent sizing, placement, and termination height.

Incorrect venting can lead to:

- Inspection failure
- System malfunction
- Long-term maintenance issues

### 5️⃣ Improves System Longevity

Proper air balance reduces:

- Pipe stress

- Back pressure damage
  - Water hammer effects in drainage
- This improves overall system durability and reduces maintenance complaints.

⚠ Common Problems When Venting Is Poor

- Slow draining sinks and toilets
- Gurgling noises
- Frequent trap seal loss
- Strong sewer smell
- Increased maintenance calls

🔄 Conclusion

A plumbing system is not complete without proper venting.

Drain pipes remove wastewater —  
Vent pipes protect the system.

In building services engineering, understanding vent pipe importance is essential for delivering safe, hygienic, and code-compliant plumbing systems.

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# KenKen Puzzle

How to solve the KenKen puzzle:

(Answers on page 37)

- 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 is in the same row or column

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

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*\*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](mailto:lloyd.suchet@boma.ca) for more details.*

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## Kenken Puzzle Answer

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

### TEST YOUR OPERATOR IQ ANSWERS

Answers: 1)c 2)c 3)a 4)d 5)c 6)e



# Just for laughs!

When is the best time  
to buy a trampoline?

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### JOKE OF THE DAY

What is green  
and can jump a  
mile in a minute?

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hiccups!



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be tied or untied?

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**About Jeff Wilson:**

Jeff has been in the door business for the past 15 years with a primary focus on pedestrian and automatic doors. Prior to that, he worked 5 years in the security industry. His original education was in journalism, and he then migrated into politics and eventually investor relations.



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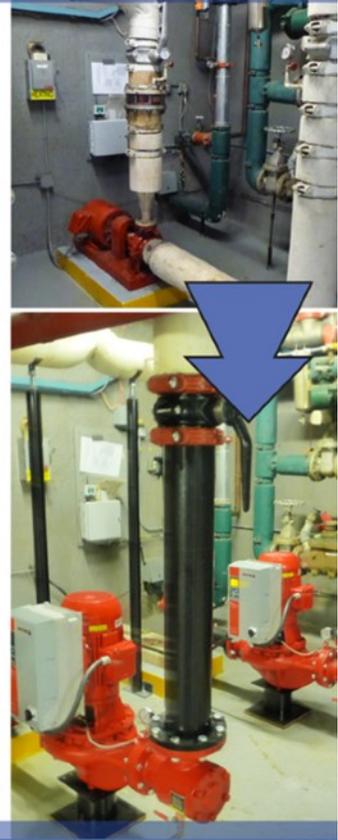
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