

Fire Extinguisher Operations and Training Best Practice

Table of Contents

	page
1.0 Purpose	2
2.0 Fire Protection Equipment	2
3.0 Scope/Application	2
4.0 Training	2
5.0 Fire Extinguisher Operations.....	2
6.0 Access, Use and Availability.....	3
7.0 Portable Fire Extinguishers.....	3
7.1 Fire Extinguisher Markings	3
8.0 Types of Portable Extinguishers.....	5
8.1 Water Extinguishers	5
8.1.1 Water Pump Tanks	5
8.2 Carbon Dioxide.....	6
8.3 Halogenated Agent.....	7
8.4 Dry Chemical.....	7
8.5 Dry Powder	9
8.6 Foam	9
8.7 Wheeled Unit Extinguishers	10
9.0 Inspection and Maintenance of Extinguishers.....	11
9.1 Inspection.....	11
9.2 Maintenance.....	11
10.0 References.....	12
11.0 Management of Change.....	12
12.0 Definitions and Acronyms	12
13.0 Roles and Responsibilities	12
Appendix A – Applicable Legislation.....	12

1.0 Purpose

Cenovus H&S recognizes that employees are not firefighters and that any attempts to extinguish fires must be after activating the emergency response plan and be limited to those fires where there is low to no risk of personal injury or harm. Cenovus expects all employees to be familiar with the location and operation of extinguishers in work areas.

Cenovus recognizes that contractors have fire protection programs of their own and when attending Cenovus worksites are oriented to the fire protection practices at the work site. Contractors are also expected to meet the access, use, and availability requirements contained herein.

2.0 Fire Protection Equipment

Fire protection systems such as portable fire extinguishers, fire standpipe systems, sprinklers, or fire hydrant systems are governed by the building's design, size and use. Questions about fire protection equipment for Cenovus facilities or operations should be directed to the local Cenovus Engineering or Safety Representatives.

3.0 Scope/Application

The following are recommended hand portable fire extinguisher applications:

- a) **Cenovus Facilities** – Low temperature, dry chemical extinguishers, type BC (Purple K) recommended or ABC type, as determined by Cenovus engineering.
- b) **Cenovus or Contractor Service Vehicles** – Low temperature, dry chemical extinguishers, type BC (Purple K) recommended or ABC type. Fire extinguisher size is 20 lb. or 30 lb. Supply vehicles (one ton or less) have an extinguisher of adequate size based upon vehicle size and material being delivered. Mobile welding trucks have a 30 lb. low temperature, purple 'K' dry chemical fire extinguisher mounted in an easily accessible location.

4.0 Training

- a) Fire fighting training for employees must be appropriate for the worksite. The information in this document is designed as the mandatory core competency and as a prerequisite to any existing firefighting training that may be conducted at a worksite for the purpose of practical experience.
- b) Industrial fire fighting training by a qualified agency would be recognized as equivalent whether conducted at or away from the worksite.

5.0 Fire Extinguisher Operations

- a) The requirement for fire safety in commercial and industrial buildings and in manufacturing plants is a result of building and fire codes. Various systems such as communications, fire detection, alarm and annunciation, fire suppression, smoke control, and elevator control are required to be installed and maintained.
- b) Fire protection equipment such as portable fire extinguishers, fire standpipe systems, sprinklers, or fire hydrant systems are governed by the building's design, size, and use.
- c) Fire regulations are for the protection of persons and property and the maintenance of fire and life safety systems. Governmental agency regulations are directed to the protection of life and safety. Insurance fire protection requirements are designed to prevent excessive loss of property based on risk management experience.

- d) The purpose of the following sections is to provide general awareness-level information on the types of extinguishers that may be available at the worksite, the basic characteristics and capabilities, the use/operation, and the inspection and maintenance.

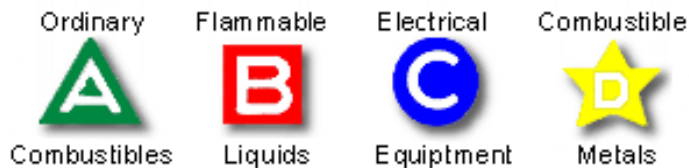
6.0 Access, Use and Availability

- a) Portable fire extinguishers on company vehicles and contractor vehicles must be accessible on the vehicle and readily accessible when the vehicle is parked on location at a facility.
- b) Travel and parking areas at facilities where vehicles are permitted, must be maintained in a manner that allows unimpeded vehicle entry to and exit from the work area.
- c) Vehicles must be parked in a manner that allows immediate and unrestricted access to the portable fire extinguisher. Any devices to secure the portable extinguisher must be removed while the vehicle is parked.
- d) In situations where the vehicle cannot access the work location or parking is restricted, the portable fire extinguisher must be placed near the work area in a manner that allows immediate and unrestricted access.

7.0 Portable Fire Extinguishers

Some portable extinguishers are suitable for only one class of fire, and some extinguishers are suitable for two or three classes of fire. No extinguisher is suitable for all four classes of fire. The most common method of identifying the class of fire for which the extinguisher is suitable is shown below. The identification is by the class letter, a distinguishing shape, and a colour code.

7.1 Fire Extinguisher Markings



Extinguisher markings that can be used until conversion to pictographs is complete. Color coding is part of the identification system, and the triangle (Class A) is colored green, the square (Class B) red, the circle (Class C) blue, and the five-pointed star (Class D) yellow.

- a) The most recently recommended marking system is one that combines pictographs of both uses and non-uses on a single label. Note the method of identification below:



- b) The pictographs are designed so that the proper application of the extinguisher can be immediately determined. If the application is prohibited, the background is black and the slash is bright red; otherwise, the background is light blue.
- 1. The top row** identifies an extinguisher that is suitable for Classes A, B, or C.
 - 2. The second row** shows an extinguisher that is suitable for Classes B and C but not Class A.
 - 3. The third row** indicates an extinguisher suitable for Class A and B fires.
 - 4. The fourth row** indicates an extinguisher for Class A fires.
- c) Rating numerals are also used on the labels of portable fire extinguishers. These numerals give the relative extinguishing effectiveness of the extinguisher. This system is only used for Class A and B fire extinguishers. The numeral precedes the Class letter, for example, an extinguisher may be marked "2A" or "40B:C". This indicates the effectiveness of this particular make and design of extinguisher as determined by standard reproducible test fires.
- d) An extinguisher with a 4A rating is four times more effective than an extinguisher with a 1A rating.
- e) Class C indicates the agent is non-conductive and can be used on energized equipment. Class C extinguishers do not have rating numerals. Electrical equipment is made of materials classified as either ordinary combustibles, or flammable liquids, or both once they have been de-energized. An extinguisher for Class C fires should be chosen according to the nature of the combustibles in the immediate area and the need for working around energized equipment.

8.0 Types of Portable Extinguishers

Currently approved types of fire extinguishers are characterized into six major groups based on the extinguishing agent used. The six types are:

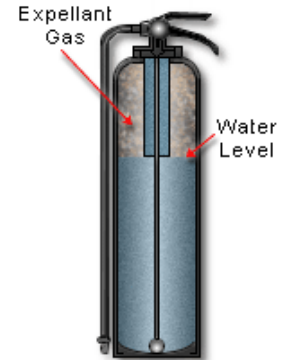
1. **Water**
2. **Dry Chemical**
3. **Carbon Dioxide**
4. **Dry Powder**
5. **Halogenated Agent**
6. **Foam**

8.1 Water Extinguishers

- a) Water extinguishers have two basic designs: **stored pressure** and **pump** types.

Figure 1: Water-Stored Pressure Extinguisher

- b) Water extinguishers are limited to Class A fires and create injury hazards when used on electrical equipment, flammable liquids, or combustible metals.
- c) A 14 kg capacity extinguisher is pressurized with air or an inert gas in the range of 600 to 900 kPa. It has a horizontal range of 9 to 12 metres and will discharge in about 60 seconds.
- d) To operate the extinguisher, set it on the ground, hold the combination handle loosely in one hand, and pull out the ring pin with the other hand. Move the unit to the best position, hold the hose in one hand, and squeeze the discharge lever with the other.



8.1.1 Water Pump Tanks

- a) Two types are available: a floor standing model and a backpack model.
- b) The capacity ranges from about 7 to 25 litres. The duration of operation ranges from 45 seconds to 180 seconds depending on capacity. The range of the stream is 9 to 12 metres.
- c) To operate, pump the handle up and down with one hand while holding the hose in the other hand. The disadvantage of this type of unit is that to move the unit, pumping has to stop. Also the force, range and duration of water flow depend to some extent on the operator.

Figure 2
Floor Model Pump Tank Extinguisher

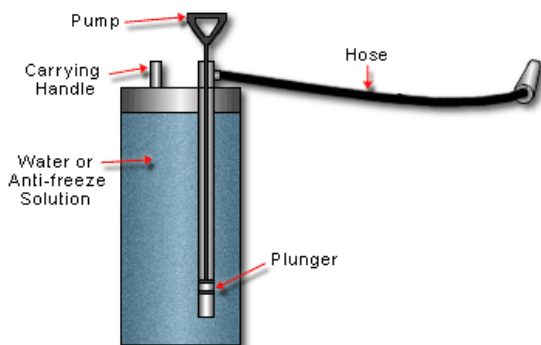
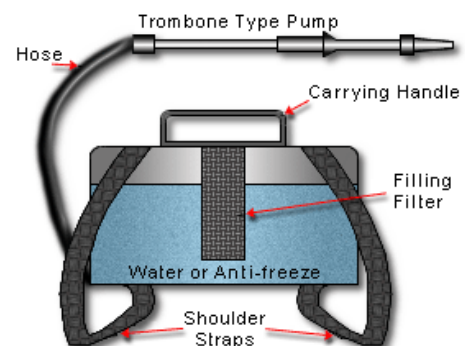


Figure 3:
Backpack Pump Tank Extinguisher



8.2 Carbon Dioxide

- a) Carbon dioxide (CO₂) is a compressed gas agent. It is intended for use on Class B and C fires but can be used on Class A fires until a suitable agent can be obtained.
- b) When released from the extinguisher, CO₂ displaces oxygen in the vicinity of discharge to the point where it no longer supports combustion. Carbon dioxide extinguishers have a short range as the agent is expelled in the form of a cloud consisting of a mixture of gaseous and solid CO₂.
- c) Carbon dioxide is non-toxic; however, if a CO₂ extinguisher is used in a confined or unventilated area, precautions should be taken to ensure people are not overcome due to a lack of oxygen in the atmosphere. The carbon dioxide "snow" may also cause visibility problems and the noise of discharge may frighten anyone who has not used a unit previously. The CO₂ may also drift into adjacent low spaces, if large quantities are released.

Figure 4: Carbon Dioxide Extinguisher

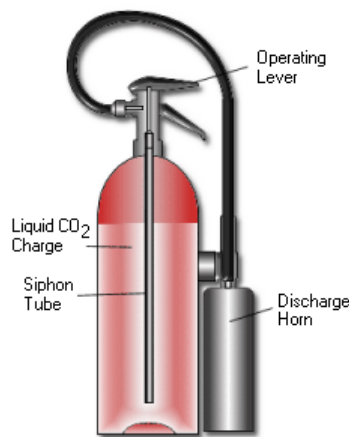
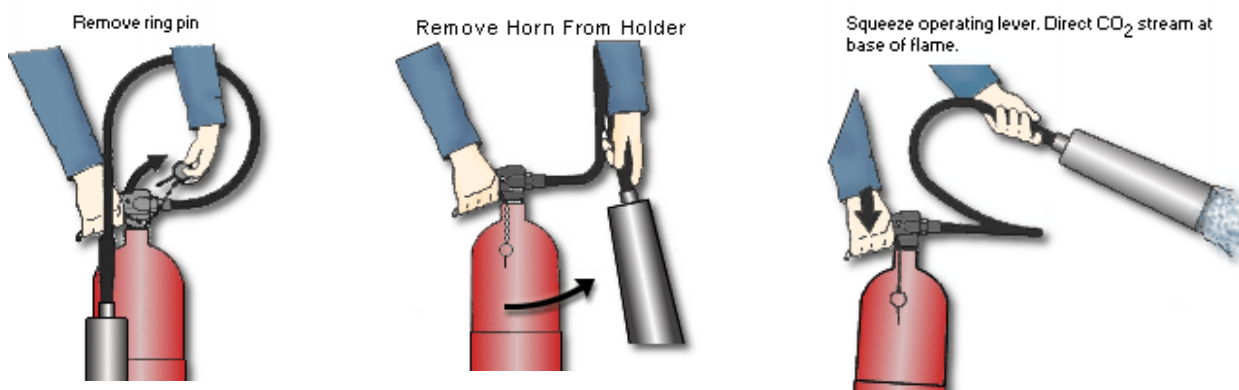


Figure 5: Operation of CO₂ Extinguisher



- d) The extinguisher discharge is controlled by squeezing the valve operating lever. Touching the discharge horn during operation should be avoided as it is likely to be very cold. If CO₂ extinguishers are used in sub-zero temperatures, the valve must remain open until the extinguisher is fully discharged; otherwise, the discharge system may become blocked.

- e) Carbon dioxide extinguishers have a limited range and are affected by wind and drafts. The extinguisher discharge should be directed as close to the base of the fire as possible. The agent should be applied even after the flames have been extinguished in order to allow time for cooling and to prevent re-flash. Equipment should be de-energized as soon as possible to eliminate the equipment as a re-ignition source.

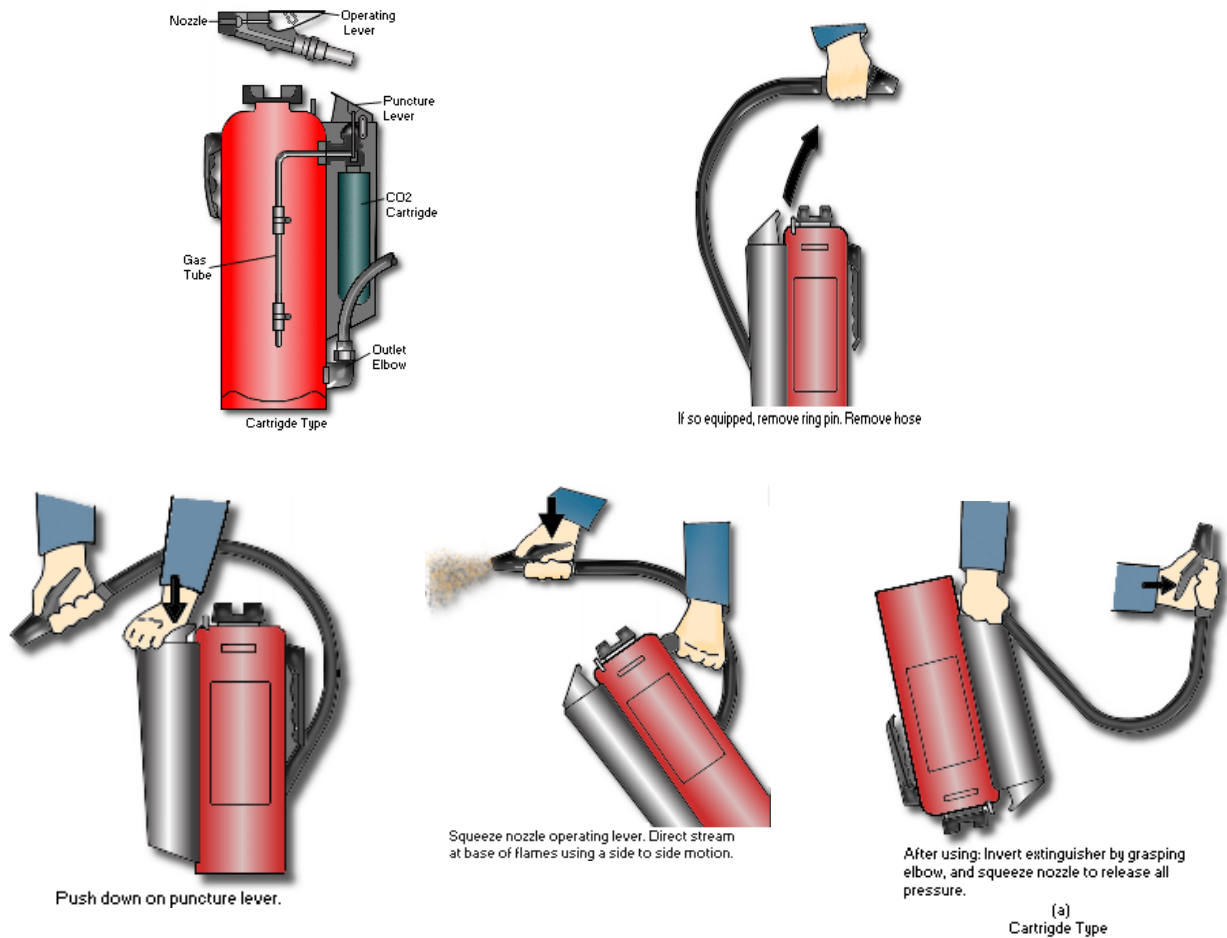
8.3 Halogenated Agent

- a) Extinguishers using halogenated agents are mostly intended for use on Class B: C fires.
- b) The most common are Halon 1211 (bromochlorodifluoromethane) and Halon 1301 (bromotrifluoromethane). Halon 1211 is effective on Class A fires. Halon has been determined to be an environmental hazard and has not been used as an extinguishing agent since 1994. Existing halon extinguishers should be replaced with CO₂ as they need servicing or are discharged.
- c) Halon agent extinguishers are operated and applied in the same manner as carbon dioxide extinguishers. Halon agents produce toxic by-products in extinguishing a fire and the permitted times of exposure should be known to users.

8.4 Dry Chemical

- a) Dry chemical extinguishing agents are known as regular dry chemicals or as multi-purpose dry chemicals. Regular dry chemicals (Purple K) are suitable for Class B (flammable liquids) and Class C (electrical equipment). Multi-purpose dry chemicals use an ammonium phosphate base agent and are Class ABC rated.
- b) There are two basic designs of dry chemical extinguishers.
 1. One design uses a cartridge of carbon dioxide or nitrogen to expel the agent. In this type of extinguisher, the cartridge can be either internal or external.
 2. The other design is of the stored pressure type, with either a rechargeable or disposable shell. Both operate in a similar manner as illustrated on next page.

Figure 6: Dry Chemical Cartridge Type



c) The characteristics and capabilities of dry chemical extinguishers are shown in the following table:

Table 1:

Type	Capacity (kilograms)	Horizontal Range of Stream (metres)	Approx. Time of Discharge (seconds)	ULC Class
Sodium Bicarbonate	0.5 – 1.0	1.5 – 2.4	3 – 12	2 – 10B:C
	1.25 – 2.3	15 – 61	8 – 20	5 – 20B:C
Potassium Bicarbonate	10 – 23	1.5 – 3.7	8 – 10	5 – 20B:C
	22	6.1	30	120B:C
Potassium Chloride	1.0 – 3.9	1.5 – 2.4	8 – 10	5 – 10B:C
	2.0 2.3 – 2.3	2.4 – 3.7	10 – 15	20 – 40B:C
Ammonium Phosphate	0.5 – 2.3	1.5 – 3.7	8 – 15	1 – 2A & 2 – 10B:C
	0.5 – 4.0	1.5 – 3.7	8 – 15	10 – 40B:C
	21	4.6 – 13.7	25	20A & 80B:C

8.5 Dry Powder

- a) Many agents have been developed to extinguish Class D combustible metal fires. However, there is no one agent that is suitable for all metal fires. Some agents can be successfully used on several metals while others can be used only for one particular metal.
- b) Agents that are used for other classes of fire should not be used on metal fires. Water should not be used on sodium fires. Vaporizing liquids should not be used on magnesium fires. The agent, extinguisher, and method of application should be selected in accordance with the manufacturer's recommendations.
- c) The powder may be applied to the fire by means of an extinguisher using a CO₂ cartridge as the expellant, or from cardboard tubes or metal pails by means of a scoop or shovel. The agent should be applied so that it covers the fire and provides a smothering blanket.

8.6 Foam

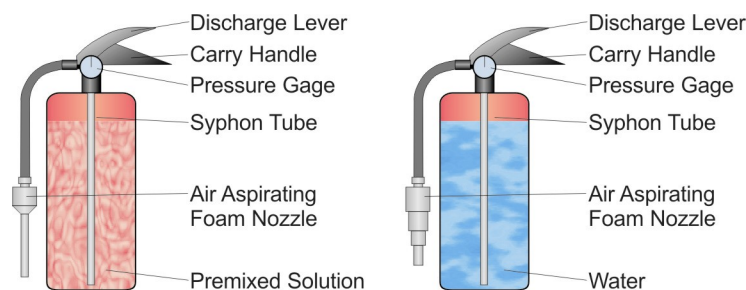
- a) The foam-type extinguisher is suitable for water soluble flammable liquids such as alcohols, acetone, esters, or ketones. The characteristics and capabilities of foam-type extinguishers are shown in the following table:

Table 2

Type	Capacity (kilograms)	Horizontal Range of Stream (metres)	Approx. Time of Discharge (seconds)	ULC Class
Stored Pressure	11	7 – 8	50	3A 20B
Nitrogen Cylinder	150	9	60	20A 160B

- b) The hand-held foam type extinguisher is a stored pressure unit. One type has a liquid solution of foam in the tank. Another type has plain water in the tank and a replaceable charge of foam in solid form in a compartment of the nozzle. Both types have an air aspirating nozzle. The two types are shown below:

Figure 7

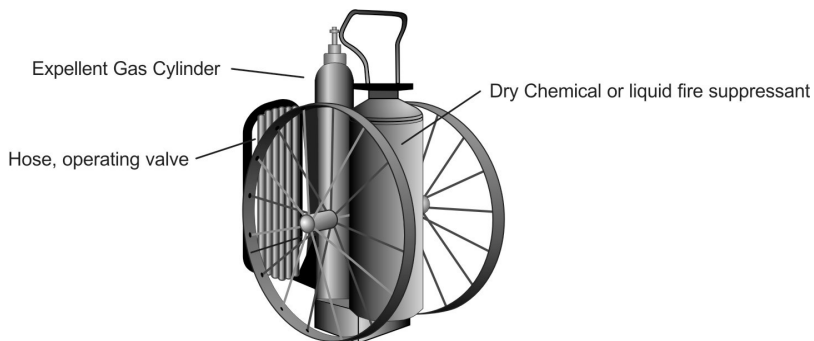


- c) The larger capacity foam units are on wheels and have a separate cylinder of nitrogen to pressurize the agent container. The foam-type extinguisher should only be installed or stored in areas where the temperature remains above 5°C.

- d) On a flammable liquid fire, the best results are obtained when the discharge is sprayed against the back wall of the tank. The foam should be placed just above the burning surface to permit the natural spread of the foam back over the burning liquid.
- e) If this is not possible, stand far enough away from the fire so as to allow the foam to fall lightly on the burning surface. If possible the operator should move around the fire while directing the foam stream to give maximum coverage during the extinguisher discharge period.
- f) Foam is not effective on fires involving flammable liquids and gases escaping under pressure.

8.7 Wheeled Unit Extinguishers

- a) Large portable units on wheels contain more expellant and suppressant. Wheeled unit extinguishers characteristics and capabilities are described in the following table. Due to the size, stability and weight, wheeled unit extinguishers should be used by at least two experienced and competent people.



- b) Wheeled unit extinguishers are designed for yard use only and should not be transported in/on vehicles.

Table 3
Characteristics of a Wheeled Unit Extinguisher

Type	Capacity (kilograms)	Horizontal Range of Stream (metres)	Approx. Time of Discharge (seconds)	ULC Class
Dry Chemical Stored Pressure	22 – 158	4.5 to 14	30 – 60	320 – B:C
Dry Chemical Cartridge	22 – 158	4.5 to 14	20 – 60	320 – B:C
AFFF Foam	125 litres	12	50 – 60	20-A: 160 – B
Carbon Dioxide Self Expelling	22 – 45	3	8 – 30	10 – B:C

9.0 Inspection and Maintenance of Extinguishers

Once an extinguisher has been purchased, it is the responsibility of Cenovus or an approved service agent to maintain the extinguisher. Extinguishers should be inspected, recharged after use, and hydrostatically tested as required by the manufacturer or by regulation.

9.1 Inspection

An inspection is performed by Cenovus or an approved service agent to ensure the fire extinguisher is properly placed and ready for use. The purpose of the inspection is to give reasonable assurance that the extinguisher is fully charged and will function effectively if needed.

An inspection should determine that the extinguisher:

- a) Is in its designated place.
- b) Is conspicuous.
- c) Is not blocked in any way.
- d) Has not been activated and is neither partially nor fully discharged.
- e) Has not been tampered with.
- f) Has not been damaged or subjected to a hazardous environment.
- g) The gauges are indicated satisfactory operating pressure.

9.2 Maintenance

Maintenance, as required by the manufacturer or by regulation is to be performed by a certified agency. Maintenance should also be done after each use and when an inspection identifies tampering, leakage, or physical damage. Maintenance, as distinguished from inspection, means a complete and thorough examination of each extinguisher. Maintenance typically involves:

1. Disassembling the extinguisher.
2. Cleaning and replacing any defective parts.
3. Hydrostatic testing of the shell (cylinder) or even replacement
4. Re-assembly.
5. Recharging.
6. Re-pressuring where appropriate.
7. For more detailed instructions, see NFPA 10, Appendix A, Tables A-4.4.2(a) and A- 4.4.2(b).

10.0 References

1. Fire Protection Handbook – National Fire Protection Association (NFPA) Codes and Standards.
2. NFPA 10 Standard for Portable Fire Extinguishers
3. NFPA 12A Standard on Halon 1301 Fire Extinguishing Systems
4. NFPA 12B Standard on Halon 1211 Fire Extinguishing Systems
5. Provincial Statutes – refer to the applicable fire and building codes for your location.

11.0 Management of Change

Proposed changes to this practice can be directed to EH&S Document Management

12.0 Definitions and Acronyms

Roles and responsibilities for safety documents are described in the link below:

Cenovus CEN-EHS234, Roles and Responsibilities Standard

13.0 Roles and Responsibilities

Definitions and acronyms for safety documents are described in the link below:

Cenovus CEN-EHS243, Definitions and Acronyms

Appendix A – Applicable Legislation

The Fire Extinguisher Operations and Training Best Practice encompass requirements of the following legislation:

1. Alberta OHS Code (2009)

- a) Part 2 – *Hazard Assessment, Elimination and Control*
 - Section 7 – *Hazard Assessment*
 - Section 8 – *Worker Participation*
 - Section 9 – *Hazard Elimination and Control*

2. Alberta Municipal Affairs – Alberta Fire Code (2006)

3. Alberta Safety Codes Council – Safety Codes Act (2007)

4. Saskatchewan OH&S Regulations (amended to 2009)

- a) Part XXV – Fire and Explosion Hazards
 - Section 361 – *Fire Extinguishers*
- b) Part XXX – *Additional Protection for Electrical Workers*
 - Section 463 – *Fire Extinguishers*