

# Ontario Fire Code

## SECTION 5.17

# ***WELDING AND CUTTING***

## Illustrated Commentary



***Office  
of the  
Fire Marshal  
of Ontario***



**5.17.1. General***Application*

- 5.17.1.1. The protection of persons and property from injury or damage by fire or other causes arising from electric and gas welding and cutting equipment, its installation, operation and maintenance, shall conform to CSA-W117.2, "Code for Safety in Welding and Cutting", and to the requirements in this Section.

This Article clarifies that both the provisions of Section 5.17 and the CSA Standard W117.2 apply to welding and cutting operations.

Compliance with these requirements will:

- minimise the risk to persons using welding or cutting equipment, and
- minimise the possibility of welding and cutting operations igniting flammable or combustible materials.



### 5.17.2. Use and Maintenance of Equipment

#### *Fuel gases*

- 5.17.2.1. The operation of acetylene generating systems and the storage and generation of welding fuel gases shall conform to NFPA 51, "Oxygen-Fuel Gas Systems for Welding, Cutting and Allied Processes", Chapter 6.

The requirements stated in NFPA 51, Chapter 6 apply to acetylene and oxygen cylinder storage and use. They also apply to MAP (methyl acetylene-propadiene), other stable gases, and acetylene generation. Conforming with these requirements reduces the risk of fire and explosion.

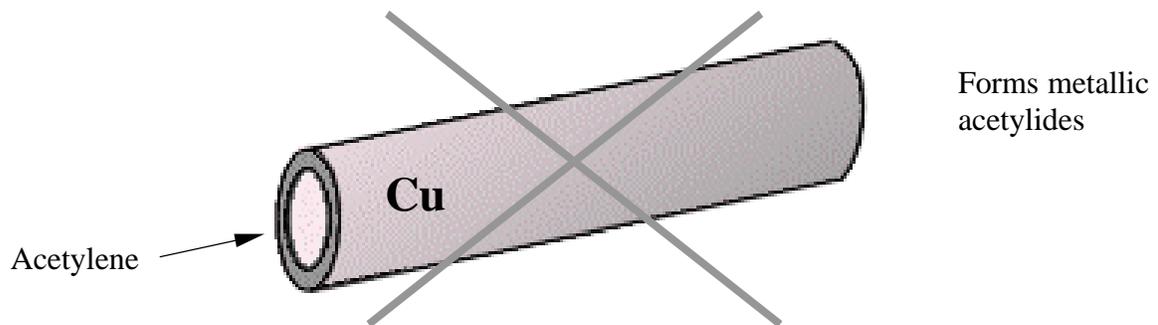


## 5.17.2. Use and Maintenance of Equipment

*Piping*

5.17.2.2. Acetylene gas shall not be piped through copper or high copper content alloy, tubing, piping or fittings.

When unalloyed copper and acetylene are combined, they react to form metallic acetylides. These chemical compounds are unstable and may detonate under shock or heat. Prohibiting the use of copper or high copper content alloy, tubing, piping or fittings in acetylene gas welding and cutting is intended to prevent this chemical reaction and reduce the risk of explosion and fire.



5.17.2. Use and Maintenance of Equipment  
*Cylinder storage*

Cylinders stored inside **buildings** shall conform to the requirements in Section 5.6.

This Article is a reminder that the storage of compressed gas cylinders must comply with Section 5.6, "Compressed Gas Cylinders". (Refer to Illustrated Commentary on Section 5.6)



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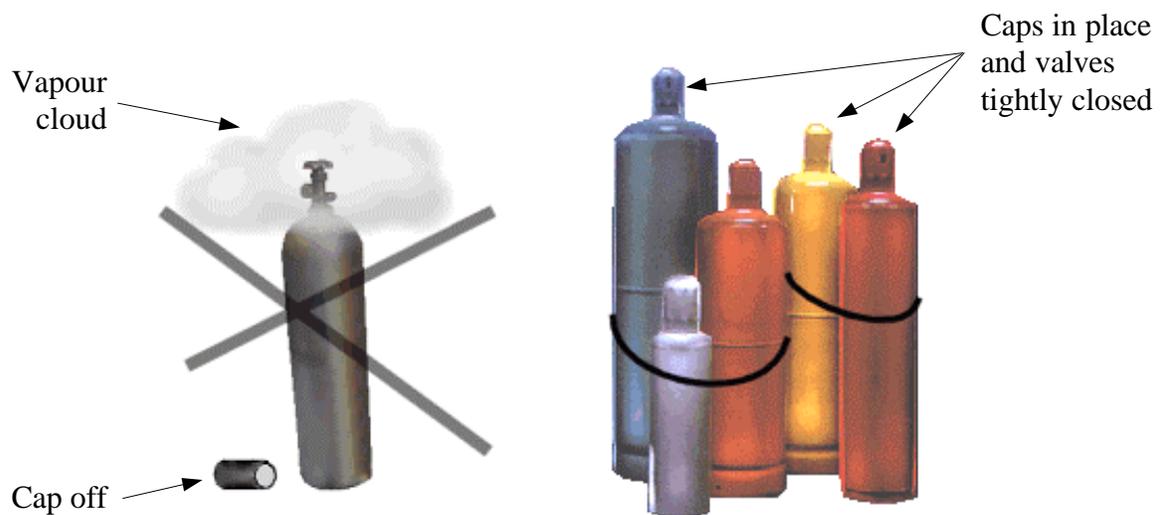
**Building** means any structure used or intended for supporting or sheltering any use or occupancy.

## 5.17.2. Use and Maintenance of Equipment

*Cylinder storage*

- 5.17.2.4. Gas fuel cylinders, whether full or empty, whose valves are not in a recessed or protected location shall have their caps in place and their valves tightly closed when not in actual use.

Gas fuel cylinders with exposed valve assemblies may release compressed gases or vapours if the valve is damaged or improperly operated. This poses a risk of fire and explosion. Tightly closing the valve and placing the safety cap over the valve when the cylinder is not in use, regardless of whether the cylinder is full or empty, is a safe work practice that helps reduce these risks.



5.17.2. Use and Maintenance of Equipment

*Damaged equipment*

- 5.17.2.5. Torches, regulators, hoses and other oxyacetylene welding and cutting equipment which have been damaged shall not be used.

Prohibiting the use of damaged equipment is the intent of this Article.

Damaged oxyacetylene welding and cutting equipment may:

- release compressed gases and flammable vapours, and
- ignite these combustible materials during operation.

Any equipment with cracks, tears and other damage warrants replacement.



Example shows equipment in good condition.

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## 5.17.2. Use and Maintenance of Equipment

*Damaged equipment*

- 5.17.2.6.(1) Welding equipment shall be **inspected** daily or prior to use for defects by personnel in charge of the equipment.
- (2) Welding and cutting equipment shall be **tested** monthly for leaks with a leak test solution.
- (3) Defects in equipment shall be made good before reusing.

Regular, scheduled inspection and testing of equipment and components (including regulators, torches, hoses and connections, piping, oxygen cylinders and manifolds, and acetylene cylinders and manifolds) and correction of defects reduces the risk of fire or explosion.



Daily checklist	
_____	✓
_____	✓
_____	
_____	✓
_____	
_____	

Example shows the equipment being tested for leaks.

**Inspect** means physical examination to determine that the device or system will apparently perform in accordance with its intended function.

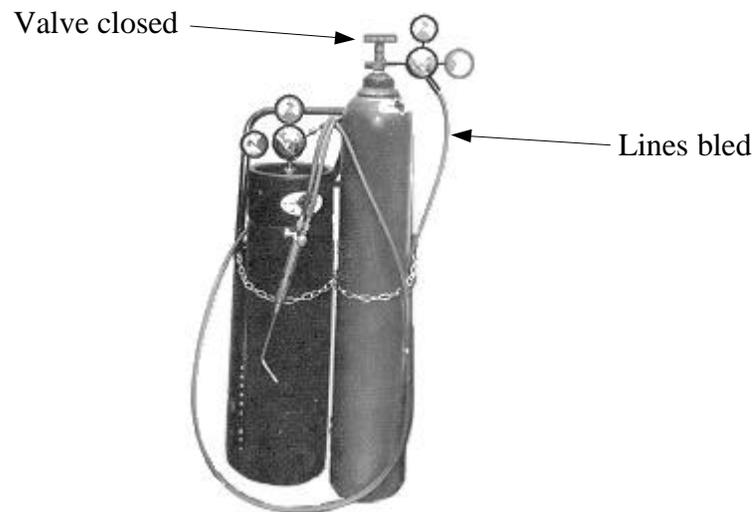
**Test** means the operation of a device or system to ensure that it will perform in accordance with its intended operation or function.

5.17.2. Use and Maintenance of Equipment  
*Equipment not in use*

5.17.2.7. Valves shall be closed and lines bled when equipment is not in actual use.

Closing valves and bleeding lines from hot work equipment when it is not in use, reduces the risk of fire or explosion by:

- preventing the release of compressed gases and flammable vapours, and
- preventing possible ignition.



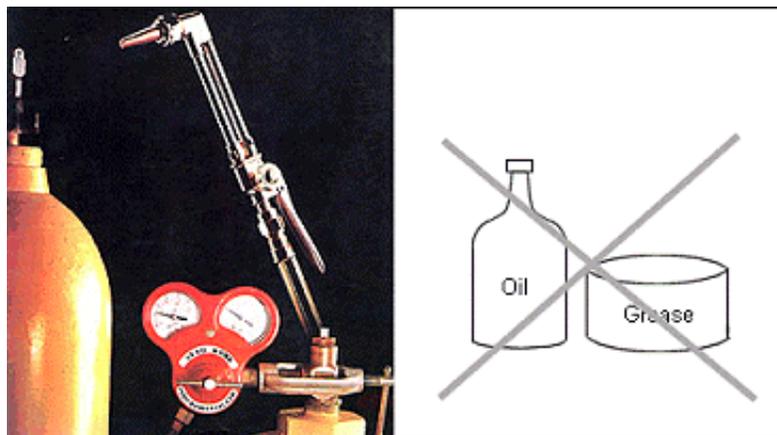
5.17.2. Use and Maintenance of Equipment  
*Equipment not in use*

5.17.2.8. Oil or grease shall not be used for lubrication of welding and cutting equipment.

Combustible organic materials, including oil or grease, will burn in the presence of air. However pure oxygen is a powerful oxidiser and these same materials:

- may spontaneously ignite in contact with pure oxygen
- burn violently in pure oxygen at normal pressure, and
- burn explosively in pressurised oxygen.

Prohibiting the use of oil or grease for lubricating welding and cutting equipment helps reduce the risk of fire or explosion caused by contact between an oxidiser and combustible organic materials.

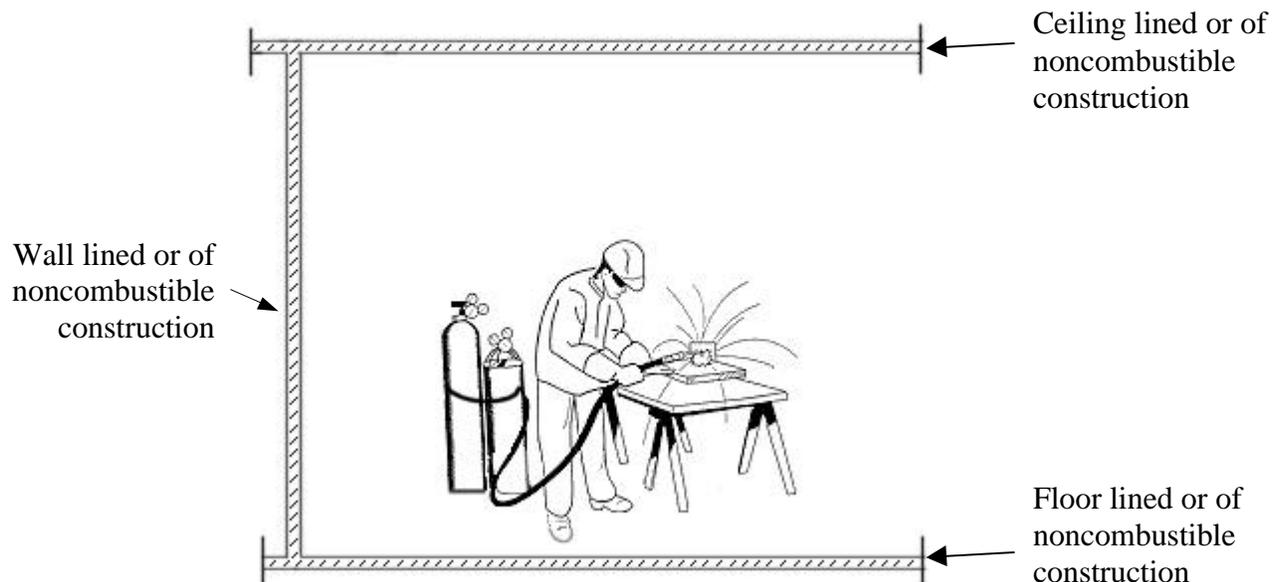


## 5.17.3. Prevention of Fires

*Location of operations*

- 5.17.3.1.(1) Welding and cutting operations in **buildings** shall be carried out in areas that are free of combustible and flammable contents, and that have walls, ceilings and floors of **noncombustible construction** or that are lined with noncombustible materials.

The purpose of this Article is to minimize the possibility of combustible or flammable materials being ignited by welding or cutting operations. In addition, if the building is of combustible construction, the combustible walls, floors and ceilings must be protected, by lining them with noncombustible materials.



**Building** means any structure used or intended for supporting or sheltering any use or occupancy.  
**Noncombustible construction** means that type of construction in which a degree of fire safety is attained by the use of noncombustible materials for structural members and other building assemblies.

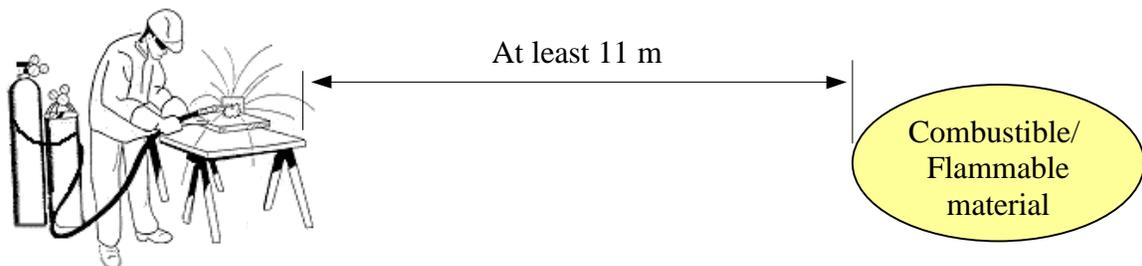
## 5.17.3. Prevention of Fires

*Location of operations*

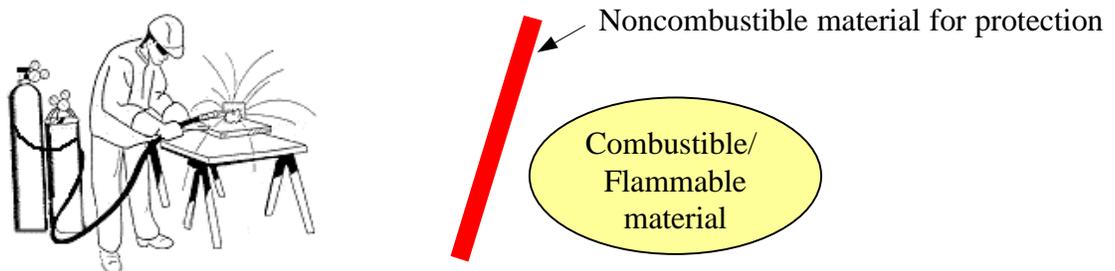
5.17.3.1.(2) When it is not practical to undertake welding and cutting operations in areas described in Sentence (1), combustible and flammable materials shall either be kept at least 11 m from the work area or otherwise protected against ignition by sheet metal, asbestos blankets or other noncombustible material.

Sentence (2) recognizes that it is not always possible or practical to conduct welding or cutting operations in area free of combustible and flammable materials.

For those situations, Sentence (2) allows for combustible or flammable materials in the vicinity of welding or cutting operations provided such materials are at least 11 m away from the operation, or shielded from the operations by noncombustible material.



OR

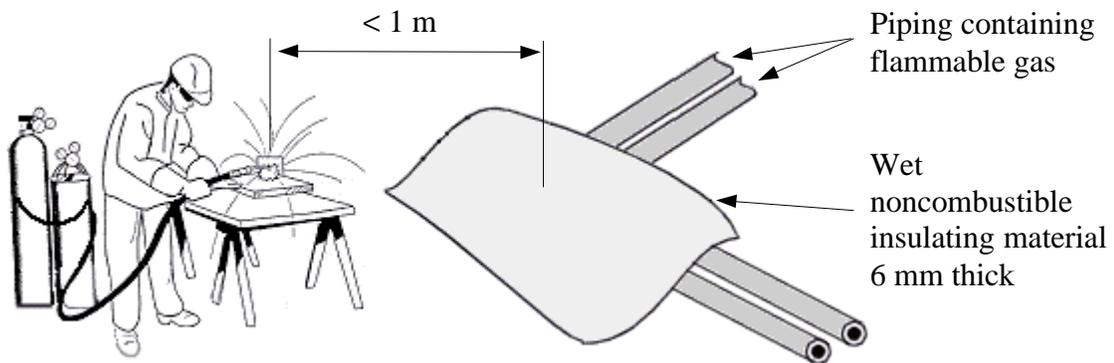


## 5.17.3. Prevention of Fires

*Work adjacent to piping*

- 5.17.3.2. When welding or cutting is to be carried out near piping containing flammable gas, the section of the piping located within 1 m of the torch shall be covered with wet noncombustible insulating material 6 mm thick.

A flammable gas, even when contained in piping, may be heated to its ignition point if it is in close proximity (within 1 metre) to welding and cutting operations. Such piping must be protected with insulating material as specified in this Article to reduce the risk of igniting flammable gases and causing a fire or explosion.



## 5.17.3. Prevention of Fires

*Work on containers*

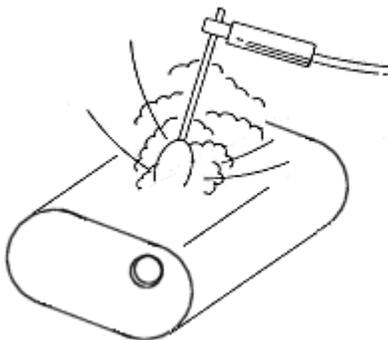
- 5.17.3.3.(1) Welding or cutting of metal containers shall not be undertaken until the containers and compartments within such containers have been cleaned of flammable and combustible materials and checked with an explosion meter.
- (2) Welding or cutting operations shall not be undertaken on a totally enclosed container.

Unless certain precautions are taken, welding and cutting operations on containers can cause the containers to explode or rupture due to the heat generated by the operations.

Under Sentence (1), a container used for flammable or combustible materials must be cleaned and proven to be free of ignitable materials (solid, liquid or gaseous) prior to welding and cutting operations. In addition, prior to welding or cutting a container, it must be checked with an explosion meter. These precautions minimise the possibility of fire or explosion.

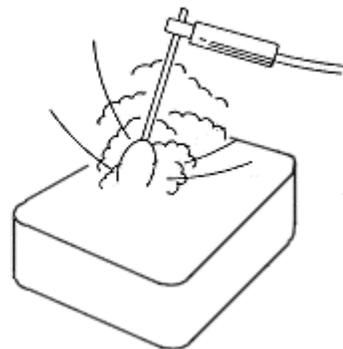
Sentence (2) prohibits welding or cutting a totally enclosed container regardless of what the container is used for. Welding or cutting operations on an enclosed container would increase the temperature of the container and its contents, possibly causing over-pressurisation and rupture.

Sentence (1)



Always be sure containers are clean and tested with an explosion meter before beginning.

Sentence (2)



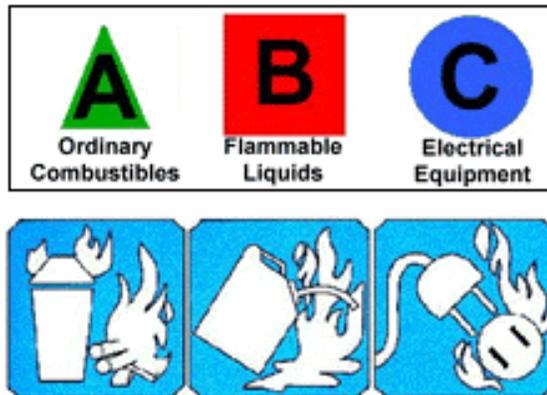
Never weld or cut a totally enclosed container (ie, not vented)

5.17.3. Prevention of Fires  
*Portable extinguishers*

5.17.3.3.(3) Suitable portable extinguishers shall be provided in conformance with Section 6.2 where welding or cutting operations take place.

Sentence (3) is a reminder that portable fire extinguishers must be provided.

Providing portable extinguishers in areas where welding or cutting operations take place facilitates quick response to extinguish a fire in its incipient stage before it involves additional combustible material.



Q1. What are the requirements for using and maintaining fuel gas cylinders for welding and cutting operations?

A1. Refer to Articles 5.17.1.1. to 5.17.2.4. of the Ontario Fire Code.

Q2. How often must welding and cutting equipment be inspected and tested.

A2. Refer to Ontario Fire Code Article 5.17.2.6., Sentence (1) and (2).

Q3. Why should acetylene gas not be piped through copper or high copper content alloy, tubing, piping or fittings?

A3. Refer to the intent of Ontario Fire Code Article 5.17.2.2.

Q4. Why should oil or grease not be used for lubrication of welding and cutting equipment?

A4. Refer to the intent of Ontario Fire Code Article 5.17.2.8.

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