



Coffee Break Training - Fire Protection Series

Storage Practices: Controlled Atmosphere Storage

No. FP-2014-28 July 15, 2014

Learning Objective: The student will be able to identify fire protection considerations for warehouses with controlled atmosphere (CA) storage.

If you live near an agricultural area, you may have experience with controlled atmosphere (CA) storage. CA fruit storage has existed in the United States since the 1960s, after farmers learned that their produce kept longer if stored in an airtight enclosure.

In CA storage, oxygen levels in the sealed rooms are reduced (usually by the infusion of nitrogen gas) from the approximate 21 percent in normal atmospheres to 1-2 percent. Temperatures are generally maintained in the 32-36 F (0-2.2 C) range through mechanical refrigeration systems. Humidity is maintained around 95 percent, and carbon dioxide levels are also controlled between 5 and 10 percent based on the product.



This Type II construction, tilt-up building, houses agricultural products in a controlled atmosphere (CA).

Gas-tight enclosures are needed to sustain a reliable CA. Modern CA storage facilities are often made from metal-faced, insulated panels (usually polyurethane foam) that are fitted together with gas-tight locking devices. The joints between panels are usually taped with gas-tight tape or painted with flexible plastic paint to ensure that they are gas-tight.

Low oxygen levels (1-2 percent) during the storage period make normal combustion impossible and would mitigate against the expense of installing automatic fire sprinklers. However, a fire hazard may still exist, either before the warehouse reaches its optimal storage conditions of near freezing temperatures with low oxygen or from outside threats to the envelope of the building or cold storage room. Several significant fires have been reported during building construction or remodeling as a result of combustible polyurethane insulation being ignited by welding equipment.

The off-season is more problematic for fire protection, since at that time the warehouse area may be used for ordinary combustible storage (including wooden or plastic tote boxes and other combustible materials or equipment, such as trucks, cars, boats, motor homes or packaging materials) or the space may be used to set up a temporary packing line.

Adequate precautions should be taken when working in areas close to CAs. Nitrogen atmospheres containing less than 14 percent oxygen, or more than 5 percent carbon dioxide, are dangerous to human life. Personnel entering a nitrogen atmosphere containing less than 10 percent oxygen may collapse without warning and become unconscious. Carbon dioxide produces respiratory discomfort, lightheadedness and nausea; unconsciousness may occur in less than five minutes in 9 percent concentrations.

For additional information, consider attending the National Fire Academy course “Fire Inspection Principles” (R0220). Obtain more information and apply at <http://apps.usfa.fema.gov/nfacourses/catalog/details/47>.



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