

WATER SUPPLY FOR FIRE FIGHTING FOR INDUSTRIAL BUILDINGS

DISCUSSION

The Alberta Building Code 2006 requires that a water supply be provided for fire fighting for all Part 3 buildings that exceed 600 m² in area or 3 storeys in building height. Article 3.2.5.7. outlines the requirements for providing a supply of water to a Part 3 building for exterior fire fighting purposes, with three exceptions:

1. If the building is less than 600 m² and not more than three (3) storeys in building height,
2. If a standpipe and hose system is provided in a building, the water supply to the system must conform to NFPA 14, "Installation of Standpipe and Hose Systems", and
3. If a sprinkler system is provided in a building, the water supply to the system must conform to NFPA 13, "Installation of Sprinkler Systems" or NFPA 13R, "Installation of Sprinkler Systems in Residential Occupancies up to and Including Four Storeys in Height".

The calculation of water supply from Article 3.2.5.7. must take into account

1. the loss of available water due to ice formation (a minimum of 600 mm thickness should be assumed),
2. the loss of available water due to the piping and pumping system used,
3. the effects of sustained periods of drought, and
4. the delivery system available.

Industrial buildings such as welding shops, steel fabrication plants or manufacturing facilities are often constructed on the outlying areas of a municipality. Because of this, the infrastructure required to provide water for adequate fire fighting purposes may not be available in the area at the time of construction or for many years afterward. When an industrial building is constructed of noncombustible construction and is not involved in the storage or manufacture of combustible materials, it is generally accepted that the

Unless stated otherwise, all Code references in this STANDATA are to Division B of the Alberta Building Code 2006.

use of the building constitutes a fairly low fire risk to adjacent properties, especially considering that most industrial parks are subdivided into lots with fairly large setbacks and side yards.

This STANDATA has been developed to provide an alternative solution to the requirement for providing a supply of water for the purpose of exterior fire fighting in a building of industrial occupancy in locations where a municipal water supply is not available.

CODE REFERENCES

Article 3.2.5.7. and the associated appendix note state:

3.2.5.7. Water Supply

(See Appendix A.)

1) Except as required in Sentences (3) and (4), and except for a *building* that is neither more than 3 *storeys* in *building height* nor more than 600 m² in *building area*, a *building* shall have a supply of water available for firefighting purposes that is not less than the quantity derived from the following formula:

$$Q = V \times O \times S$$

where

- Q = minimum water supply (litres),
- V = total *building* volume (cubic metres),
- O = water supply coefficient (from Table 3.2.5.7.),
- S = spatial coefficient whose value is 1.5 for a *building* that has any *limiting distance* less than 7.5 m, otherwise whose value is 1.0.

Table 3.2.5.7.
Water Supply Coefficient
Forming Part of Sentence 3.2.5.7.(1)

Type of Construction	Classification by Group and Division in Accordance with Table 3.1.2.1.				
	A-1, A-3, F-3	A-2, B-1, B-2, C, D	A-4	E, F-2	F-1
Applicable Water Supply Coefficient					
A <i>building</i> of <i>noncombustible construction</i> with all <i>loadbearing walls</i> , columns and arches, having a <i>fire-resistance rating</i> at least equivalent to that required for the supported assembly, but not less than 45 min	11	10	14	17	23
A <i>building</i> of <i>noncombustible construction</i> in accordance with Article 3.1.5.1.	17	15	20	25	34
A <i>building</i> having all structural members of <i>noncombustible material</i> , or if of <i>combustible material</i> , a <i>fire-resistance rating</i> of at least 45 min, or of <i>heavy timber construction</i>	22	19	27	34	45
A <i>building</i> of <i>combustible construction</i>	34	27	40	50	67

2) The water supply required by Sentence (1) shall be capable of being delivered at a rate of not less than 45 L/s for a *building* required to have a quantity less than 75 000 L and at a rate of not less than 60 L/s for a *building* requiring a quantity of 75 000 L and greater.

- 3) Water supply for a standpipe system shall conform to the requirements of NFPA 14, "Installation of Standpipe and Hose Systems."
- 4) Water supply for a *sprinklered building* shall conform to the requirements of
- a) NFPA 13, "Installation of Sprinkler Systems," or
 - b) NFPA 13R, "Installation of Sprinkler Systems in Residential Occupancies up to and Including Four Stories in Height."

A-3.2.5.7. Water Supply. The intent of Article 3.2.5.7. is that an adequate water supply for firefighting be readily available and of sufficient volume and pressure to enable emergency response personnel to control fire growth so as to enable the safe evacuation of occupants and the conduct of search and rescue operations, prevent the fire from spreading to adjacent buildings, and provide a limited measure of property protection.

Sentences 3.2.5.7.(1) and (2) define the minimum water and flow requirements for buildings exceeding 3 storeys in building height or 600 m² in building area. NFPA 1142, "Water Supplies for Suburban and Rural Fire Fighting," and Fire Underwriters Survey, "Water Supply for Public Fire Protection - A Guide to Recommended Practice 1996," should be consulted to determine optimum values.

For a building with no internal fire suppression system, the determination of the minimum requirements applicable to the water supply for firefighting is relevant mainly to building sites not serviced by municipal water supply systems. For building sites serviced by municipal water supply systems, where the water supply duration is not a concern, water supply flow rates at minimum pressures is the main focus of this provision. However, where municipal water supply capacities are limited, it may be necessary for buildings to have supplemental water supplies on site or readily available.

The water supply requirements for buildings containing internal fire suppression systems, including sprinkler systems and standpipe systems, are contained in specific standards referenced in Sentences (3) and (4). Compliance with the referenced standard, including any variations made by this Code, is deemed to satisfy the intent of Article 3.2.5.7. However, it will be necessary to verify that an adequate source of water is available at the building site to meet the required quantities and pressures.

The sources of water supply for firefighting purposes may be natural or developed. Natural sources may include ponds, lakes, rivers, streams, bays, creeks, and springs. Developed sources may include aboveground tanks, elevated gravity tanks, cisterns, swimming pools, wells, reservoirs, aqueducts, artesian wells, tankers, hydrants served by a public or private water system, and canals. Consideration should be given to ensuring that water sources will be accessible to fire department equipment under all climatic conditions.

The volume of on-site water supply is dependent on the building size, construction, occupancy, exposure and environmental impact potential, and should be sufficient to allow at least 30 minutes of fire department hose stream use.

VARIANCE

The building area mentioned in Sentence 3.2.5.7.(1) is permitted to be increased to 1200 m² for a building classified as Group F, Division 2 medium hazard industrial occupancy or Group F, Division 3 low hazard industrial occupancy that is not more than

one storey in building height in an area that is not provided with a municipal water supply system, provided the following conditions are met:

1. The building shall be of noncombustible construction.
2. The building shall not be used for the manufacture or storage of combustible materials.
3. The building shall not contain a Group E mercantile occupancy.
4. The building is permitted to contain a Group D business and personal services occupancy, provided it occupies not more than 10% of the building area.
5. A single stage fire alarm system shall be installed in the building in accordance with Subsection 3.2.4.
6. In addition to the requirements of Subsection 3.2.4., the fire alarm system shall be provided with an alarm bell on the exterior of the building.
7. In addition to the requirements of Subsection 3.2.4., the fire alarm system shall be designed to notify the fire department, in conformance with Sentence 3.2.4.7.(4), that an alarm signal has been initiated.
8. The owner shall provide evidence of compliance to the authority having jurisdiction as required by Sentence 3.2.4.7.(6).
9. The building interior shall be a primarily open space with minimal subdivision into small rooms.
10. The building use will result in an occupant load not greater than the occupant load determined in accordance with Article 3.1.17.1.
11. The travel distance to an exit shall not exceed 20 m.
12. Portable fire extinguishers shall be installed in accordance with NFPA 10, "Portable Fire Extinguishers", except that
 - a. the permitted area for each extinguisher shall be one half that permitted in the standard,
 - b. the capacity of each extinguisher shall be double that required by the standard, or
 - c. an equivalent combination of clauses (a) and (b).
13. The building shall be not more than 10 m in height above grade at the highest point.

This VARIANCE applies throughout the province of Alberta.