



A Recommended Standard for Off-highway, Ground-based Water Delivery Systems for Alberta

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FERIC has recommended standards for the general operation, system design, plumbing and attachments, pump capability, and foam proportioning systems for use in off-highway, ground-based water delivery systems.

General operational requirements

- The water delivery system is designed with firefighter and operator safety in mind.
- The operation of the water delivery system is consistent with the basic training that all firefighters receive, and uses equipment familiar to firefighters.
- The tank and water delivery system do not compromise the rollover stability of the prime mover and can be operated under normal conditions (less than 30% slope).
- The water delivery system components and attachments are compatible with standard Alberta SRD equipment.
- The system facilitates cost-effective water delivery by matching tank size to prime mover capability, by including appropriate plumbing, by using a pump with sufficient pressure, and by including a foam proportioning system.

Recommended minimum system design

- Utilize tank volume appropriate for the operating capacity of prime mover (Table 1).

Table 1. Suggested skidder tank size based on flywheel horsepower (Taylor et al. 2003).

Flywheel horsepower	Tank capacity (US gal)	Tank capacity (litres)
69–82	50–100	190–378
83–100	101–200	379–756
101–135	201–300	757–1135
136–187	300–400	1136–1513
188–200	400–500	1514–1892

- Where the center of the water tank is positioned both above and behind the wheels of a skidder, surge

control baffles and a stability analysis are recommended.

- The tank incorporates a water level indicator.
- The tank placement should not limit the operator's visibility.
- The tank incorporates a gravity drain to empty the tank with a 7.6 cm (3-in.) diameter.
- The tank capacity is written on the side of the tank.
- A three-digit identification number on the sides and top of the tank is visible from the air.

Plumbing and attachments

- 5 cm (2 in.) diameter discharge pipe
- Adequate tank filler ports and tank venting of 10cm (4 in.) or larger)
- Pump discharge using standard 3.8 cm (1-1/2 in.) forestry hose with forestry quick connect couplings
- 3.8 cm (1-1/2 in.) nozzle (adjustable and foam)
- Foam supply line shut-off valve.
- 5 cm (2 in.) cam lock fittings on pump suction side (male) National Pipe Tapered (NPT) thread
- 5 cm (2 in.) cam lock fitted (female) semi-rigid suction hose capable of reaching 6 m (20 ft.) with debris strainer prior to the pump
- 1.9 cm (3/4 in.) low-volume gravity feed spigot to fill back pack tanks
- Hose strangler
- Hose wrench
- Piping capable of withstanding pressures beyond the pump pressure shut-off
- Shut-off valve to allow pump removal while retaining water in tank

Pump capability

A balance between pressure and water volume is desired. A high-volume pump is preferred when filling the tank; however, pressure is needed during fire operations. Higher pressure at the nozzle results in increased water penetration into fuels during mop-up operations and a greater spray distance.

- Pumps used for tanks under 2270 L (500 gal.) must produce a minimum of 379 kPa (55 psi) at shut off and deliver 227 L (50 gal.) per minute free flow.
- Pumps used for tanks between 2270 and 9090 L (500 and 2000 gal.) will require a pump capable of supporting two or more independent hose lines. A minimum requirement for these larger systems is 1379 kPa (200 psi) at shut off and delivery of at least 410 L (90 gal.) per minute free flow.

The pumping system should satisfy the following requirements:

- Can be used to fill the tank without being removed from the vehicle.
- Must be capable of producing a minimum 207 kPa (30 psi) from a 9.525 mm (3/8 in.) nozzle when connected to 91.4 m (300 ft) of 38 mm (1.5 in.) fire hose and delivering a volume of 90 L (20 gal.) per minute.
- The pump used to fill the tank must be capable of doing so in 12 minutes or less.
- The pump must be capable of priming and drafting water through 6 m (20 ft.) of suction hose with a 4 m (13 ft.) lift.

Foam proportioning system – Class A fire foam

The Wildfire Foam Application Manual (Alberta Sustainable Resource Development 2001) lists the scope and objectives of Class A foam use in Alberta.

The four foam injection methods are referred to as suction side, discharge side, around the pump, and batch mixing. The following are examples of foam proportioner units that avoid introducing foam into the pump:

- Robwen Hydro Flo 100 and 500 foam proportioning systems
- Blizzard Wizard Around the Pump foam proportioner
- Fire-Trol FT-150 1-1/2-in foam proportioning system
- Scotty Around-the-Pump 4071 and 4072 foam eductor/mixers

Ault, R. 2006. Development of a recommended standard for off-highway, ground-based water delivery systems for Alberta. FERIC Advantage Report Vol. 7 No. 13. For more information, please call Ray Ault at 780 865 6977.

When producing foam using an in-line induction system, the pump should be located above the water suction valve on the tank. Otherwise, insufficient venturi is produced for foam production. Also, field staff have found that a 25.4-mm (1 in.) hose diameter is too small for mixing within the line. Sixty-one metres (200 ft.) of 38 mm (1-1/2 in.) hose is needed to produce foam.

Considerations when designing and constructing water tanks

- Place tank where it will not obstruct the operator's vision.
- If skidder tanks are to be used on slopes greater than 30%, the maximum adverse grade and side slope capabilities should be analyzed and posted in a visible location for the benefit of the operator.
- Incorporate lifting eyes to remove the tank.
- The tank shape affects stability and strength. A cylindrical shape is the worst for stability but the best for strength.
- Include a stable platform on which to mount the pump, and place a containment area under the pump with removable absorbent pad to catch fuel or foam spills.
- Locate the pump at or above the water source to avoid head pressure for ease of starting the pump and of foam mixing.
- Incorporate a carrying system to transport 91 m (300 ft.) of 38 mm (1.5 in.) forestry hose with attachments.
- Provide storage and protection for a 6 m (20 ft.) suction hose.

Water pump selection

Several pumps meet wildfire requirements, and selection should be based on tank volume, number of hose lines to be supported, and desired pressure (CIFFC 1997). Generally, four-cycle pumps are preferred because of their durability and simple fuelling. This is a partial list of pumps suitable for lower-volume tank units designed for wildfire use:

- Mercedes Textiles Ltd.: Wick 375, Wick 250, Wick 100, Wickman 100
- Wildfire Manufacturing: Wildfire Mark 3, Mark 26, Mini Striker, Moskito, Striker 2
- Honda power pumps: WH15 and WH20