

Technical Specification

Portable Lightweight High-Pressure Fire Pump

1. Scope and Purpose

This specification defines the minimum technical and performance requirements for a portable lightweight high-pressure fire pump designed for wildland and forest firefighting applications, to fight fires on mountains or long-distance areas. The fire pump is capable of being deployed in narrow lanes in urban and rural areas / suitable to use in high rise towers. The pump shall deliver high pressure and reliability while remaining light enough for one-person transport over rugged terrain. It shall be suitable for water-transfer, hose-lay, and direct-attack operations in both mountainous and flat regions, operating effectively in hot, humid, or high-altitude environments. All equipment offered shall have been qualified through a minimum 100-hour continuous endurance test under USFS 5100-274 protocols or equivalent recognized testing and shall be equal to or superior to a pump meeting NFPA 1906 wildland equipment standards.

2. Applicable Standards and Certifications

- The pump and engine shall comply with or exceed the following recognized standards:
 - US Forest Service Specification 5100-274e (or latest revision)
 - NFPA 1906 – Wildland Fire Apparatus
 - EN 14466:2005 + A1:2008 – Portable Fire Pumps
 - ISO 12100:2010 – Safety of Machinery
 - CE Directives 2006/42/EC (Machinery), 2014/30/EU (EMC), 2014/53/EU (Radio)

3. General Requirements

- The unit shall consist of a two-stroke, air-cooled petrol engine directly coupled to a four-stage centrifugal pump mounted on a composite frame with integrated vibration isolation and a single carry handle.
- The complete assembly shall be light enough for one operator to carry and stow in a vehicle compartment.
- The unit shall be suitable for operation at ambient temperatures from -20 °C to +45 °C.
- All materials in contact with water shall be corrosion-resistant and non-ferrous.

4. Performance Requirements

- The pump/engine assembly shall meet or exceed the following performance values from a 5 ft (1.5 m) draft under standard NFPA conditions:
 - 80 GPM (303 L/min) @ 100 PSI (6.9 bar)
 - 70 GPM (265 L/min) @ 150 PSI (10.3 bar)
 - 40 GPM (151 L/min) @ 250 PSI (17.2 bar)
- Maximum Pressure: 380 psi (26.2 bar)
- Maximum Flow: ≈ 100 US gpm (379 L/min)
- Maximum Head: ≥ 877 ft (267 m)

- Continuous Operation: Minimum 100 hours endurance qualification under USDA Forest Service at the San Dimas Technology and Development Center or equivalent recognized laboratory.
- Hydrostatic Test: Shall withstand 1 000 psi (68.9 bar) for 10 minutes without leakage per NFPA 1906.

5. Pump Construction

- Four-stage centrifugal design.
- Pump casing and suction cover made from anodized aluminum alloy; impellers and diffusers constructed of glass-fiber-reinforced polyphenylene sulfide (PPS-GF) or equal composite to prevent galvanic corrosion and reduce weight.
- Stainless steel shaft supported by two maintenance-free bearings (one sealed roller bearing and one internal bushing).
- Flexible gear coupling between engine and pump to absorb vibration and protect components.
- Silicon-carbide mechanical rotary seal, balanced, heat-resistant and maintenance-free.
- The complete pump end shall be coupled to the engine through the means of a Quick-release clamp system enabling complete pump removal or replacement within one minute without tools.
- The pump end exterior is finished in high-visibility red.

6. Engine Specifications

- Single-cylinder, two-stroke, air-cooled petrol engine manufactured by the same OEM as the pump and designed for continuous full-throttle operation without loss of performance.
- Displacement \approx 140 cc; rated power \approx 10 HP (7.5 kW) @ 8 000 rpm.
- Fuel: unleaded gasoline (\leq 10 % ethanol), minimum 91 RON, mixed 50:1 with two-stroke oil.
- Starting system: recoil starter with manual rope backup.
- Dual overspeed protection (main electronic module and backup module).
- USDA-approved spark arrestor.
- Muffler heat shield.
- Clear fuel line and purge bulb to permit visual priming without flooding.

7. User Interface and Controls

- Daylight-visible LED User Interface Module (UIM) showing warm up, overheat, overspeed, and fault status.
- Automatic engine shut-off for overspeed or overheat.
- USB-C port for diagnostics and firmware updates.
- Bluetooth® connectivity for run-time monitoring and maintenance logging through a mobile application.
- Throttle with detents to prevent throttle drift.

8. Frame and Ergonomics

- Composite frame with integrated backboard and aluminum cross-member.
- Low center of gravity and anti-slip base for stability.
- Foothold for steady pull start.
- Optional backpack harness with padded shoulder straps and military-grade quick-release fasteners.
- Single top carry handle for transport by one person.

9. Weight and Dimensions

- Maximum Weight: 20 kg (44 lb) including frame.
- Length: 21.6 in (549 mm)
- Width: 12 in (305 mm)
- Height: 14.6 in (371 mm)

10. Markings and Documentation

Each unit shall bear permanent markings for model designation, serial number, manufacturer name, year of manufacture, and performance ratings. Technical data sheet, test certificate for 100-hour endurance qualification, and operator's manual shall be provided with each pump.

11. Warranty and After-Sales Support

Minimum two-year manufacturer warranty covering engine and pump assembly. A global dealer and service network shall be available for spare parts, training, and technical assistance.

12. Procurement Reference Clause

For reference only, this specification is based on a portable pump design equal or superior to the MARK-3® Watson Edition, which meets USFS 5100-274 F and NFPA 1906 requirements. Any product offered must meet or exceed all performance, design, and certification criteria stated herein.