



TECHNICAL BULLETIN

FIRE UNDERWRITERS SURVEY™

A Service to Insurers and Municipalities

INSURANCE GRADING RECOGNITION OF USED OR REBUILT FIRE APPARATUS

The performance ability and overall acceptability of older apparatus has been debated between municipal administrations, the public fire service and many others for years. Fire Underwriters Survey (FUS) has reviewed experiences across Canada and in other countries and has developed a standard for acceptance of apparatus as the apparatus becomes less reliable with age and use.

The public fire service is unique compared to other emergency services in that fire apparatus vehicles are not continuously in use. However, when in use, the apparatus is subject to considerable mechanical stress due to the nature of its function. This stress does not normally manifest itself on the exterior of the equipment. It is effectively masked in most departments by a higher standard of aesthetic care and maintenance. Lack of replacement parts further complicates long term use of apparatus. Truck and pump manufacturers maintain a parts inventory for each model year for a finite time. After that period, obtaining necessary parts may be difficult. This parts shortage is particularly acute with fire apparatus due to the narrow market for these devices.

Fire Underwriters Survey lengthy experience in evaluating fire apparatus indicates that apparatus should be designed to an acceptable standard. The standard that is accepted throughout Canada by Fire Underwriters Survey is the Underwriters Laboratories of Canada CAN/ULC-S515-13 titled, "Standard FOR Automobile Fire Fighting Apparatus," which has been adopted as a National Standard of Canada. Alternatively, NFPA 1901, the Standard for Automotive Fire Apparatus is also accepted by Fire Underwriters Survey with respect to apparatus design. Fire apparatus should be built by recognized manufacturers and tested by a suitably accredited third party.

Fire apparatus should respond to first alarms for the first fifteen years of service. During this period, it has reasonably been shown that apparatus effectively responds and performs as designed without failure at least 95% of the time. For the next five years, it should be held in reserve status for use at major multi-alarm fires, or used as a replacement for temporarily out-of-service first line apparatus. Fire apparatus should be retired from service at twenty years of age. Present practice indicates the recommended service periods and protocols are usually followed by the first purchaser. However, at the end of that period, the apparatus is either traded in on new apparatus, or sold to another fire department. At this juncture, the unit may have one or more faults which preclude effective use for emergency service. These deficiencies include:

- a. Inadequate braking system,
- b. Slow pick-up and acceleration,
- c. Structurally weakened chassis due to constant load bearing and/or overloading,
- d. Pump wear,
- e. Etc.



FUS has modified its application of the age requirement for used or rebuilt apparatus. Due to municipal budget constraints within small communities apparatus may continue to be recognized for fire insurance grading past twenty years of age, provided the apparatus successfully passes the recommended annual tests and has been deemed to be in excellent mechanical condition. The specified service tests are outlined below under the heading “Recommended Service Tests for Used or Modified Fire Apparatus”. Testing and apparatus maintenance should only be completed by a technician who is certified to an appropriate level in accordance with NFPA 1071, *Standard for Emergency Vehicle Technician Professional Qualifications*.

Insurance grading recognition may be extended for a limited period of time if documentation verifying that the apparatus has successfully passed the specified tests and other evidence of reliability are submitted and approved by FUS. However, if fire apparatus does not pass required tests or for any reason is deemed to be inadequately reliable for use in emergencies, the apparatus may be required to be replaced or refurbished to retain published fire insurance grades. If reliable apparatus is not in place, fire insurance grading recognition may be revoked which may adversely affect the fire insurance grades of the community. This can also affect the rates of insurance for property owners throughout the community.

Table 1 Service Schedule for Fire Apparatus For Fire Insurance Grading Purposes

Apparatus Age	Major Cities ³	Medium Sized Cities ⁴	Small Communities ^{5,6} and Rural Areas
0 – 15 Years	First Line Duty	First Line Duty	First Line Duty
16 – 20 Years	Reserve	2 nd Line Duty	First Line Duty
20 – 25 Years ¹	No Credit in Grading	No Credit in Grading <i>or</i> <i>Reserve</i> ²	No Credit in Grading <i>or</i> <i>2nd Line Duty</i> ²
26 – 29 Years ¹	No Credit in Grading	No Credit in Grading <i>Or</i> <i>Reserve</i> ²	No Credit in Grading <i>or</i> <i>Reserve</i> ²
30 Years +	No Credit in Grading	No Credit in Grading	No Credit in Grading

¹ All listed fire apparatus 20 years of age and older are required to be service tested by recognized testing agency on an annual basis to be eligible for grading recognition. (NFPA 1071)

² Exceptions to age status may be considered in a small to medium sized communities and rural areas conditionally, when apparatus condition is acceptable and apparatus successfully passes required testing.

³ Major Cities are defined as communities that have:

- a total population of 100,000 or greater within the fire protection jurisdiction

⁴ Medium Communities are defined as communities that have:

- a total population of 30,000 – 99,999 within the fire protection jurisdiction

⁵ Small Communities are defined as incorporated or unincorporated communities that have:

- a total population of 1,000 – 29,999 within the fire protection jurisdiction

⁶ Rural Areas are defined as incorporated or unincorporated communities that have:

- a total population of less than 1,000 within the fire protection jurisdiction





Table 2 Frequency of Listed Fire Apparatus Acceptance and Service Tests

	<i>Frequency of Test</i>					
	@ Time of Purchase New or Used	Annual Basis	@ 15 Years	@ 20 Years <i>See Note 4</i>	20 to 25 Years (annually)	After Extensive Repairs <i>See Note 5</i>
Recommended For Fire Insurance Purposes	Acceptance Test if new; Service Test if used & < 20 Years	Service Test	Acceptance Test	Acceptance Test	Acceptance Test	Acceptance or Service Test depending on extent of repair
Required For Fire Insurance Purposes	Acceptance Test if new; Service Test if used & < 20 Years	No Test Required	No Test Required	Acceptance Test	Acceptance Test	Acceptance or Service Test depending on extent of repair
Factor in FUS Grading	Yes	Yes	Yes	Yes	Yes	Yes
Required By Listing Agency	Acceptance Test	No	No	No	N/A	Acceptance Test
Required By NFPA <i>See Note 6</i>	Acceptance Test	Annual Service Test	Annual Service Test	Annual Service Test	Annual Service Test	Service Test

Note 1: See: 'Service Tests for Used or Rebuilt Fire Apparatus' for description of applicable tests

Note 2: Acceptance Tests consist of 60 minute capacity and 30 minute pressure tests

Note 3: Service Tests consist of 20 minute capacity test and 10 minute pressure test in addition to other listed tests

Note 4: Apparatus exceeding 20 years of age may not be considered to be eligible for insurance grading purposes regardless of testing. Application must be made in writing to Fire Underwriters Survey for an extension of the grade-able life of the apparatus.

Note 5: Testing after extensive repairs should occur regardless of apparatus age within reason.

Note 6: Acceptance Tests: See NFPA 1901, Standard for Automotive Fire Apparatus

Service Tests: See NFPA 1911, Standard for Service Tests of Fire Pump Systems on Fire Apparatus, Article 5.1



SERVICE TESTS FOR USED OR MODIFIED FIRE APPARATUS

The intent of this document is to ensure that all used or modified fire apparatus, equipped with a pump or used for tanker service, essentially meet the requirements of Underwriters' Laboratories of Canada (ULC) "Standard for Automobile Fire Fighting Apparatus" S515-13 or subsequent (current) editions of the Standard. Full adherence with the following specified tests is recommended when purchasing used apparatus.

1.) *Weight Tests*

1.1) **Load Balance Test:**

When fully laden (including a 460kg personnel weight, full fuel and water tanks, specified load of hose and miscellaneous equipment), the vehicle shall have a load balance of 22% to 50% of total vehicle mass on the front axle and 50% to 78% of this mass on the rear axle.

Distribution of mass of 33% and 67% respectively on the front and rear axles is preferable for a vehicle having dual rear tires or tandem rear axles.

For a vehicle having tandem rear axles and dual tires on each axle, a loading of between 18% and 25% on the front axle with the balance of mass on the rear axles is permissible.

2.) *Road Tests*

2.1) **Acceleration Tests:**

2.1.1) From a standing start, the apparatus shall attain a true speed of 55 km/h within 25 seconds for Pumpers carrying up to 3,150 litres of water.

For apparatus carrying in excess of 3,150 litres or apparatus equipped with aerial ladders or elevating platforms, a true speed of 55 km/h in 30 seconds should be attained.

2.1.2) The vehicle should attain a top speed of at least 80 km/h.

2.2) **Braking Test:**

The service brakes shall be capable of bringing the fully laden apparatus to a complete stop from an initial speed of 30 km/h in a distance not exceeding 9 metres by actual measurement. The test should be conducted on a dry, hard surfaced road that is free of loose material, oil and grease.



3.) Pump Performance Tests

3.1) Hydrostatic Test

Recent evidence of hydrostatic testing of the pump for 10 minutes at a minimum pressure of 3,400 kPa. APPLICABLE TO NEW OR REBUILT PUMPS ONLY (see 3.3).

3.2) Priming and Suction Capability Tests

3.2.1) Vacuum Test:

The pump priming device, with a capped suction at least 6 metres long, shall develop -75 kPa (22 inches of mercury) at altitudes up to 300 metres and hold the vacuum with a drop of not in excess of 34 kPa (10 inches of mercury) in 10 minutes.

For every 300 metres of elevation, the required vacuum shall be reduced 3.4 kPa (1 inch mercury).

The primer shall not be used after the 10-minute test period has been started. The test shall be made with discharge outlets uncapped.

3.2.2) Suction Capability Test:

The pump (in parallel or series) when dry, shall be capable of taking suction and discharging water with a lift of not more than 3 metres through 6 of suction hose of appropriate size, in not more than 30 seconds and not over 45 seconds for 6000 L/min or larger capacity pumps. Where front or rear suction is provided on midship pumps, an additional 10 seconds priming time will be allowed. The test shall be conducted with all discharge caps removed.

3.3) Pump Performance

3.3.1) Capacity Test:

Consists of drafting water (preferably with a 3m lift) and pumping the rated capacity at 1000 kPa (150 psi) net pump pressure for a continuous period of at least 1 hour.

3.3.2) Pressure Test:

Under the same conditions as in 3.3.1 above pumping 50% of the rated capacity at 1700 kPa net pump pressure for at least ½ hour



For additional information on the above noted tests and test procedures, the following documents provide useful data:

- Underwriters Laboratories of Canada (ULC) publication titled S515 Standard for Automobile Fire Fighting Apparatus, latest edition.
- Fire Underwriters Survey (FUS) publication titled Fire Stream Tables and Testing Data latest edition.
- International Fire Service Training Association (IFSTA) publication titled Fire Department Pumping Apparatus, latest edition.
- National Fire Protection Association (NFPA) 1901 Standard for Automotive Fire Apparatus, latest edition.
- National Fire Protection Association (NFPA) 1911 Standard for the Inspection, Maintenance, Testing, and Retirement of In-Service Automotive Fire Apparatus, latest edition.
- National Fire Protection Association (NFPA) 1912 Standard for Fire Apparatus Refurbishing, latest edition.

For further information regarding the acceptability of emergency apparatus for fire insurance grading purposes, please contact Fire Underwriters Survey administrator at: fireunderwriters-admin@verisk.com