

# Rating of Winches – SAE J706 JUN84

SAE Standard  
Completely Revised June 1984

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Report of the Transportation and Maintenance Technical Committee, approved January 1954, completely revised by the Truck and Bus Powertrain Committee June 1984.

**1. Scope**—This SAE Standard applies only to new winches which are primarily designed for intermittent pulls and lifts and whose configuration and condition are the same as when they were shipped by the manufacturer. They are not intended to be used in any manner for the movement of personnel. They may be driven by any power source recommended by the manufacturer and will be capable of being powered in either direction. They will be equipped with an automatic safety brake system to control a load when lowering under power and positively hold a load when power is not being delivered to the winch. A hydraulic flow control valve or similar device may be used in the brake system to control a load when lowering under power. A clutch to release the drum for "free-spooling" may be provided and will be designed not to disengage itself under load. A drag brake may be provided to control "free-spooling," but will not be relied on to control or hold a load. Power sources, such as hydraulic motors, even though they may be supplied or recommended by the winch manufacturer, are not considered a part of the winch so far as this standard is concerned, except to whatever extent they are a part of the brake system.

**2. General Specifications**

**2.1 Name Plate**—A name plate containing the following information will be permanently attached to a major winch component in a location on the winch that is both conspicuous and protected.

- 2.1.1 Manufacturer's name
- 2.1.2 Manufacturer's model designation
- 2.1.3 Rated line pull
  - Full drum layer (pounds)<sup>1</sup>
  - First layer (pounds)
- 2.1.4 Rated input speed at rated line pull (rpm)
- 2.1.5 Duty cycle rating (feet or °F)
- 2.1.6 Maximum recommended wire rope diameter (inches)

**2.2 Safety Brake System**—The safety brake system will be capable of automatically and continuously holding rated load when power is not being delivered to the winch. When lowering a load under power, it will operate automatically and have adequate thermal capacity to control rated load at rated speed for a distance of 50 ft without appreciable loss of effectiveness due to temperature rise. Any loss—other than that due to normal wear—is expected to return when the brake cools. Adjusting means, automatic or manual, will be provided to compensate for wear of friction materials. When raising a load, the safety brake will automatically release and not generate an appreciable amount of heat.

**2.3 Drum Release Clutch**—The clutch, if provided, will be a positive-engagement type; friction-type clutches are not acceptable. Automatically-applied means such as springs, detents, or angled jaw faces will be provided to insure that the clutch will not slip out of engagement under load.

**2.4 Drum Drag Brake**—A drum drag brake will be provided if a drum release clutch is provided. Its purpose is to prevent the drum from overrunning the wire rope when "free-spooling," and it will not be relied on to control or hold a load.

**2.5 Drum Diameter**—The drum diameter will be at least eight times the maximum recommended wire rope diameter.

**3. Published Data**—The manufacturer's literature will contain, as a minimum, the information in paragraphs 3.1–3.8.

**3.1 Duty Cycle Rating (feet or °F)**—The duty cycle rating is the total number of feet of wire rope travel at rated line speed and one-half rated line pull to achieve a temperature rise from 100 to 250°F, or, if the temperature stabilizes below 250°F, the duty cycle is the stabilization temperature. See paragraph 4.1 for the procedure to establish the duty cycle rating.

**3.2 Starting Input Torque (pound-feet)**—The starting input torque is the torque at the winch input shaft required to start rated load upward from a suspended position.

<sup>1</sup> Letters on this line to be approximately 50% larger than letters on the "first layer" line.

The φ symbol is for the convenience of the user in locating areas where technical revisions have been made to the previous issue of the report. If the symbol is next to the report title, it indicates a complete revision of the report.

**3.3 Running Input Torque (pound-feet)**—The running input torque is the torque at the winch input shaft required to maintain upward movement of rated load.

**3.4 Rated Input Speed (rpm)**—The rated input speed is the maximum permissible input speed at rated load as determined by each manufacturer.

**3.5 Maximum Permissible Number of Layers**—The maximum permissible number of layers of wire rope on the drum will be calculated from the following formula. (See Fig. 1.)

$$L = \frac{F - D - 2m}{2d} \text{ (Use integer portion of result)}$$

Where: L = maximum permissible number of layers

F = drum flange diameter (inches)

D = drum barrel diameter (inches)

d = wire rope diameter (inches)

m = free ≥ 0.7d (inches)

**3.6 Drum Storage Capacity (feet)**—The drum storage capacity will be calculated from the following formula and published as a cumulative figure for each layer, using the maximum recommended wire rope size.

$$C = \frac{Kw\pi n(D + nd)}{12d}$$

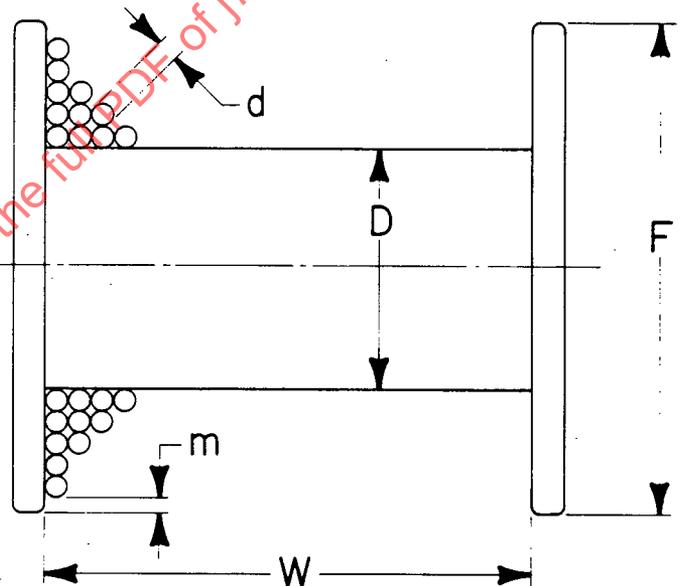


FIG. 1

- Where: C = drum storage capacity (feet)  
 K = wire top compensation factor  
 n = number of layer (L = maximum number)  
 D = drum barrel diameter (inches)  
 d = wire rope diameter (inches)  
 w = width between drum flanges (inches)

The wire rope compensation factor, K, is used to correct for spooling and dimensional variations. It has a normal range of 0.7–0.9. The manufacturer will include in the literature the value of K used to calculate the drum storage capacity.

**3.7 Rated Line Pull (pounds)**—The rated line pull is the line pull on any layer that results from the output torque that produces maximum rated line pull on the first layer. The rated line pull will be calculated from the following formula and published for each layer, using the maximum recommended wire rope size.

$$P = P_{max} \left[ \frac{d + D}{d(2n - 1) + D} \right]$$