NOTICE OF CHANGE

NON MEASUREMENT SENSITIVE

MIL-STD-1784A (USAF)
NOTICE 1
18 December 1990

MILITARY STANDARD

MOBILITY, TOWED AND MANUALLY PROPELLED SUPPORT EQUIPMENT

TO ALL HOLDERS OF MIL-STD-1784A

1. PAGES 9 AND 28 OF MIL-STD-1784A HAVE BEEN REVISED AND SUPERSEDE PAGES 9 AND 28 OF THAT DOCUMENT DATED 29 JUNE 1990. PAGES 10 AND 27 ARE REPRINTED WITH NO CHANGES.

2. REPLACE PAGES 9-10 AND 27-28 OF MIL-STD-1784A WITH THE NEW PAGES 9-10 AND 27-28 ATTACHED. FILE THIS NOTICE WITH MIL-STD-1784A.

3. Holders of MIL-STD-1784A will verify that the page changes indicated above have been entered. This notice will be retained as a check sheet. This issuance, together with appended pages, is a separate publication. Each notice is to be retained by stocking points until the military standard is completely revised or canceled.

WARNING

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Custodian:
Air Force - 11

Preparing activity:
Air Force - 11

Project No. 1740-F168

AMSC N/A

FSC 1740

TABLE III. Coefficients for random road roughness.

Description	Gs ft/cycle x 10^{-4}	Ge ft^3/cycle x 10^{-6}	IRI* (m/km)
Moderate	0.656	0 0	2 5
Rough	3.28	35.3	5 6
Limit Roughness	9.83	283 0	9 7

* The IRI is included in this table to give the designer a better intuitive feel for the surface roughness

4.3.1.3 Track width. The track width of all axles on the equipment shall be between _____ and _____ inches.

4.3.2 Manual propulsion. The equipment shall be maneuverable by _____ person/people. The maximum force required to move the equipment shall not exceed those specified in MIL-STD-1800. Means shall be provided for adequate handling of the equipment. Handholds and grasps, if used, shall also conform to *MIL-STD-1800*.

4.3.3 Towing. The equipment shall be designed for towing by _____. Trailers shall be designed to permit towing, in train, up to _____ fully loaded trailers of the same weight and size behind a prime mover Trailers shall be towable at constant speed on a level concrete or macadam surface with a drawbar load not exceeding _____ pounds per ton of GVW. The trailer, when towed in a straight line, on a level surface at constant speed, shall track within _____ inches of the prime mover. Power assist or self propulsion features, if employed on the trailer, shall not affect the force required for normal towing.

4.3.3.1 Towbar. The towbar shall be equipped with a lunette (towbar eye) conforming to MS 51336. Except for three-quarter trailers, the towbar shall be detachable from the equipment. Towbars on three wheel and full trailers shall be hinged and provided with a convenient and positive hold in the up (vertical) position that works at all turning angles of the wheels. To keep a horizontal line of action for the force between the trailer and the prime mover, the height of the towbar, when parallel to the ground (measured from the ground to the horizontal centerline of the lunette), shall be within plus or minus _____ inches of the height of the pintle assembly on the prime mover. If a prime mover has not been specified the height of the towbar shall be no more than _____ inches. The force at the lunette required to lift a hinged towbar to its towing position shall not exceed 50 pounds (222 Newtons).

4.3.3.2 Pintle assembly. If tandem towing is required, trailers shall be equipped with a rear mouonted pintle assembly that will transfer towing forces directly and evenly to the chassis frame members. Pintle assemblies shall conform to the following standards as applicable:

Capacity (pounds)	Standard
up to 18,000	MS 51335
18,001 to 40,000	MS 51118
40,001 to 100,000	MS 51117

To keep a horizontal line of action for the force between the trailers, the height of the pintle assembly (as measured from ground level to the center of the opening in the closed pintle) shall be within plus or minus _____ inches of the height of the towbar (when parallel to the ground, as measured from ground level to the horizontal center of the lunette). To allow for ramp negotiation and turning, the pintle assembly shall be installed to allow towbar vertical and horizontal articulations no less than 45 degrees up and 60 degrees on each side of the center position. There shall be no structural extensions beneath the pintle that could interfere with the downward movement of the towbar.

4.3.3.3 **Fifth wheel plate and kingpin.** Fifth wheel plates shall be sized to cover a _____ diameter fifth wheel assembly and shall protect underbody surfaces of the trailer against damage during towing operations and while coupling and uncoupling from the prime mover. The kingpin on trailers having a GVW of less than 48,400 pounds (22,000 kg) shall conform to *MS 53036*. The kingpin on trailers having a GVW of 48,400 pounds (22,000 kg) or more shall conform to *MS 53037*. The fifth wheel plate and the angular relationship between the kingpin and the fifth wheel plate shall conform to *SAE J700*. The kingpin location shall comply with *SAE J701*. The kingpin to trailer support clearance (LWC) shall be no less than _____. The unloaded height of the kingpin, as measured from ground level to the lower surface of the fifth wheel plate, shall be 50 plus or minus 1 inch (127 plus or minus 2.5 cm) on trailers for which the prime mover has not been specifically identified. If a prime mover has been specified, the kingpin of an unloaded trailer shall be no more than 3 inches (7.6 cm) lower than the prime mover manufacturer's specified loaded height for the fifth wheel assembly.

4.3.4 **Trailer support.** Three-quarter trailers and semitrailers shall be equipped with a front end support (landing gear) which, without damage or permanent deformation, will hold the fully loaded trailer in a horizontal position while uncoupled from the prime mover. The support shall be retractable consistent with ground clearance and ramp negotiation requirements and shall incorporate a positive hold in the raised (travel) position.

4.3.4.1 **Landing gear, three-quarter trailers.** The landing gear on three-quarter trailers shall be as follows:

a. Trailers having a GVW of less than 500 pounds (227 kg) shall be equipped with either a vertically adjustable or folding support.

b. Trailers having a GVW of between 500 pounds and 1500 pounds (227 kg and 680 kg) shall be equipped with either a vertically adjustable or folding support with a full swivel caster.

c. Trailers having a GVW of 1500 pounds (680 kg) or more shall be equipped with a vertically adjustable support with a full swivel caster. Vertical adjustments shall be accomplished by means of a hand crank or lever. The adjustments shall be no less than 4 inches (10 cm) up and 4 inches down as measured from the horizontal centerline of the towbar lunette.

4.3.4.2 **Landing gear, semitrailers.** The landing gear on semitrailers shall consist of two vertically adjustable legs that can be simultaneously raised or lowered by one person. The mechanism provided shall quickly raise or lower the equipment when it is at curb weight. If necessary, the mechanism shall provide a second speed with the mechanical advantage required to raise and lower the equipment when it is at GVW. The mechanism shall be protected to preclude the entrance of foreign matter which would impair its functioning or mechanical efficiency. Each leg shall be equipped with a pivoted foot pad capable of supporting a trailer parked on the surfaces specified herein when loaded to GVW. The landing gear shall, without damage or permanent deformation, withstand the combined static and dynamic forces resulting from impact while the trailer is being coupled to, and uncoupled from the prime mover.

TABLE II. Mobility courses obstacles.

Surface Type	Distance (% of expected life cycle mileage)	Obstacles (# of obstacles per 100 miles of expected life)
Type I, Class 1a		
Level Paved	100	--
Slope, 5.7 degrees	--	--
Type I, Class 1b		
Level Paved	100	--
One-inch Bump	--	33
Slope, 5.7 degrees	--	--
Type I, Class 2		
Random Roughness		
Limit	5	--
Rough	30	--
Moderate	65	--
Localized Roughness		
One-inch Bump	--	24
Two-inch Bump	--	8
Three-inch Pothole	--	1
Four-inch Curb	--	1
Corrugations		
Two-inch Washboard	--	150
Type I, Class 3		
Level Paved	100	--
1⅝-inch Bump	--	70
Two-inch Bump	--	70
Slope, 15 degrees	--	--
Type II		
Random Roughness		
Limit	5	--
Rough	30	--
Moderate	65	--
Localized Roughness		
One-inch Bump	--	20
Two-inch Bump	--	20
Three-inch Pothole	--	4
Four-inch Curb	--	1
Corrugations		
Two-inch Washboard	--	150

TABLE III. Coefficients for random road roughness.

Description	Gs ft/cycle x 10^{-4}	Ge ft^3/cycle x 10^{-6}	IRI* (m/km)
Moderate	0 656	0.0	2.5
Rough	3.28	35.3	5 6
Limit Roughness	9.83	283.0	9.7

* The IRI is included in this table to give the designer a better intuitive feel for the surface roughness

jeopardize a mission. The expected life cycle mileage for support equipment is dependent on the vehicle type and class, the number of years the equipment is expected to be in service, and the equipment's specific mission. It is to be expected that some failures within equipment will occur during life cycle testing. End item equipment specifications need to clearly state that damage that would result in failure or loss of function of safety critical and mission critical components (e.g., a broken frame or broken axle) would be unacceptable. Damage within all categories of critical components (i.e., safety, mission, and durability) must be carefully evaluated to determine if it represents a design problem or is within the damage tolerance capability of the equipment. Testing would continue following damage to the equipment if that damage would not result in failure or loss of function. The surfaces described in *Table II* are representative of the surfaces each type and class of equipment is expected to encounter in the field. In general type I, class 2 or type II equipment is expected to spend 65 percent of its life on smooth surfaces, 30 percent on rough surfaces, and 5 percent on limit roughness surfaces. Designing to the limit roughness requirement assures that the equipment is capable of emergency operations in less than ideal environments. The Power Spectral Density (PSD) equation was selected to describe the surfaces since it is an effective and well established method for describing random roughness and has been in use for many years. Information on the use of PSD equations to describe road roughness can be found in Dynamic Terrain Inputs to Predict Structural Integrity of Ground Vehicles, a report by Mike Sayers at the University of Michigan Transportation Research Institute. The constants in the PSD equation were selected to represent typical surfaces around the world. Wavelengths longer than 100 feet have little effect on vehicles traveling no faster than 30 mph; the same is true of wavelengths longer than 50 feet for vehicles traveling no faster that 15 mph. Due to the natural filtering characteristics of tires, the equation is not accurate for wavelengths less than the tire footprint length.

REQUIREMENT GUIDANCE

The recommended mileage requirement per year of expected life is as follows:

Type/Class	Mileage (per year of expected life)
Type I, class 1a	25 (40 km)
Type I, class 1b	75 (121 km)
Type I, class 2	250 (402 km)
Type I, class 3	25 (40 km)
Type II	750 (1207 km)