Society of Automotive Engineers, Inc.
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AEROSPACE INFORMATION REPORT

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MINIMUM SAFETY REQUIREMENTS FOR SPECIAL PURPOSE AIRLINE GROUND SUPPORT EQUIPMENT

INDEX AND DEFINITIONS

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DEFINITIONS

1. Booted foot is the foot of an operator sheathed appropriately for protection of the operator from normal job hazards and environmental weather conditions.

2. Deadman is a control design such that continuous, deliberate pressure on the control is necessary for activation and continuous operation, and such that relief of that pressure will cause control deactivation.

3. Elevated working surfaces is any platform or area, four feet or more above the next lowest working surface, on or in which an employee may be located in the performance of his working duties.

4. Equipment is any and all units, not an aircraft element, but mobile or semi-mobile, motorized or portable; intended or used as a means of providing access to aircraft; intended or used as an aid to an aircraft ground support activity, at or in the vicinity of an aircraft.

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5. FMVSS refers to the Federal Motor Vehicle Safety Standard.

6. Functional means capable of servicing the purpose for which it was designed.

7. Gloved hand is the hand of an operator sheathed appropriately for dexterity and protection of the hand from normal job hazards and environmental weather conditions.

8. Guardrail is a barrier erected along exposed edges of elevated work surfaces to prevent falls of persons.

9. Handrail is a member supported on a stairway or ramp, to furnish persons with a handhold.

10. Highway usage is the operation of equipment on a public street or road such that state motor vehicles licensing of the vehicle is required.

11. Operational means the ability to perform intended function.

12. Rise is the vertical distance from the top of one tread to the top of the next higher tread.

13. Rung is a ladder cross-member for use as a horizontal foot/hand hold.

14. Shall is a term used to stress maximum advisability, and to qualify a provision as the minimum acceptable.

15. Should is a term qualifying a provision as advisable but not critical.

16. Stability means the ability of remaining in the designed position and attitude.

17. Step is a horizontal flat surface member of a stair, ladder, or a single foot hold between two levels, capable of accepting a working load.

18. Step width is the distance between the handrails of a stair, inside to inside.

19. Toe board is a vertical barrier erected along exposed edges of elevated work surfaces to prevent falls of materials.

20. Tread is the upper horizontal flat surface of a step.

21. Tread depth is the horizontal distance from front tread facing edge to the riser or rear edge of the tread.

22. Unit is any piece of equipment; or a coupled equipment set.

23. Vehicle is any piece of mobile equipment which is self-propelled and capable of carrying the operator.

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1. PURPOSE AND SCOPE

1.1 This document applies to special purpose equipment, excluding fixed facilities, which is used in the ground handling, servicing, and maintenance of aircraft. Equipment covered under other sections of the Federal Register Part 1910 is excluded from this document. This document is to establish minimum safety requirements and should not be used for vehicle design criteria. Equipment existing prior to publication date is excluded from the requirements of this document.

2. ELEVATED WORKING SURFACES, ACCESS AND GENERAL CONDITIONS, GUARDRAILS, HANDRAILS AND GUARDS

2.1 Stair angles of incline shall not be less than 20° nor more than 75°.

2.2 Handrails shall be provided on all stairs. The handrail height in relation to the stair tread shall be constant with a minimum of 30 (76.2 cm) and a maximum of 42 in. (105.68 cm).

2.3 Stair treads shall be provided with a rise of not more than 12 in. (30.48 cm). Tread rise shall be constant throughout the entire length of the stair above the first step from ground level or a platform.

2.4 Stair treads shall provide a usable depth of not less than 7 in. (17.78 cm). These tread depths must remain constant throughout the entire length of the stair except when broken by a landing.

2.5 Where ladders are used for access, the incline angle shall not be less than 75° with a maximum of 90°.

2.6 Equal spacing between ladder rungs above the first rung shall be maintained with a maximum spacing of 12 in. (30.48 cm).

2.7 Where steps are used on ladders, they shall be provided with a minimum depth of 1-1/2 in. (3.81 cm). Where rungs are used, the minimum diameter shall be 3/4 in. (1.9 cm).

2.8 A 7-in. (17.78 cm) clearance shall be maintained to any obstruction. This clearance shall be measured from the front face of a step or the centerline of a rung. When a 7-in. (17.78 cm) clearance cannot be maintained due to unavoidable obstructions, the minimum clearance shall be 1-1/2 in. (3.81 cm).

2.9 A minimum 16 in. (40.64 cm) clear width shall be provided between the side rails of a ladder.

2.10 Where vertical grab bars are provided, a minimum of a 2-1/2-in. (6.35 cm) clearance shall be maintained.

2.11 Where off-set ladders are used, the side rails and rungs must be carried to a minimum of 3-1/2 ft (1.07 m) above the next section unless it creates an unavoidable obstruction.

2.12 Off-set ladders shall have a maximum step over distance of 18 in. (45.72 cm).

2.13 All working surfaces shall be self-draining and provided with a non-slip surface.

2.14 Ladder side rails shall extend a minimum of 3-1/2 ft (1.07 m) above a landing or working surface unless it creates an unavoidable obstruction.

2.15 Ladder and stair treads shall be designed to support a minimum working load of 200 lb (90.8 kg).

2.16 Access ramps to cargo compartments of wide-body aircraft or other working areas of equivalent height shall have a minimum of one handrail provided.

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2.17 Stairs, ramps, ladder rungs, or treads shall be of non-slip material.

2.18 Working platforms elevated 4 ft (1.22 m) or more above adjacent surface or ground level shall be provided with guardrails.

2.19 Sprockets, gears, chains, belts, fans and pulleys or other nip or pinch point hazards that are not protected by vehicle structures or covers shall be guarded.

3. FUNCTIONAL/OPERATIONAL CONTROLS

3.1 Functional and operational controls, for the purpose of this document, are those controls specifically designed for aircraft support usage, and exclude those designed into the basic unit such as steering, brakes, etc.

3.2 Units equipped with an automatic transmission shall have the transmission shift sequence conforming to FMVSS #102. If the transmission shift lever is steering column mounted or operates in a transverse vertical plane, the shift positions should be P, R, N, D, L, in a clockwise direction while seated in the operator's seat. If the shift lever operates in a longitudinal vertical plane, the shift pattern should be P, R, N, D, L, going from the front of the vehicle to the rear while seated in the operator's seat.

3.3 Transmission shift selector shall be located on either the right side of the steering column or to the right side of the operator.

3.4 It is permissible to block out the park position on automatic transmission vehicles and/or low gear.

3.5 Hydrostatic or electric driven vehicles shall have the control move in the direction of travel.

3.6 Transmission shift selector shall be sized and located to be handled with a gloved hand with a minimum of 3 in. (7.62 cm) unobstructed clearances.

3.7 All other operational controls shall move in the direction of travel, for the function which they control, and shall be of the deadman type, unless the control is set to achieve a function to permit the user to accomplish another task. In these cases, such set controls must be detented or similarly locked into the operating positions to prevent inadvertent deactivation or reversing. Such controls shall be readily accessible to the operator(s). Emergency only operating controls need not meet this requirement.

3.8 On-off switches shall be on in the UP position or away from the operator if mounted in a horizontal plane.

3.9 Controls shall be logically grouped in a location convenient to the operator.

3.10 Controls shall be sized and spaced to provide easy operation with a gloved hand.

3.11 No more than 33 lb (15 kg) of force shall be required to actuate any hand control. No more than 100 lb (45 kg) of force shall be required to actuate any foot pedal control.

3.12 Controls shall be identified with permanently affixed and non-fading placards. Contrast shall be sharp and in large enough letters or symbols to be easily read from the operator's position, indicating the function and direction of motion of the control.

3.13 Controls and controlling circuits shall be designed in a manner that failure within a control or its circuitry will not introduce an unsafe operating condition.

3.14 Instruments and controls exposed to the weather shall be of a weatherproof type and shall be protected from snow and ice accumulations.

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3.15 A vehicle while stationary and operating a functional device that requires the engine to operate above idle speed shall be equipped with an interlock to insure that power cannot be transmitted to the drive wheels.

3.16 Power steering shall be provided on all vehicles with a steering axle of 9,000 lb (4,086 kg).

4. OPERATOR FOOT CONTROLS

4.1 Foot operated driver controls should be in the following sequence from left to right from the operator's position as applicable: parking brake, light dimmer switch, clutch, foot brake, and accelerator.

4.2 Clutch, foot brake, accelerator, and functional foot controls shall be a minimum size of 2 in. (5.1 cm) by 3 in. (7.62 cm) and provided with a non-slip material.

4.3 Controls shall be spaced to provide easy operation with a booted foot.

5. BRAKES

5.1 As a minimum number of vehicles used in the airline support equipment are equipped with air brakes, this section will not address itself to the minimum standard for same. If a vehicle is so equipped, it must conform to FMVSS #121.

5.2 Units equipped with a 4-wheel brake system shall incorporate a dual master cylinder to split the hydraulic brakes into two separate systems.

5.3 Based upon braking system design, two systems shall be provided for applying brakes. The primary system (service brakes) shall be pedal operated to apply brakes simultaneously on all braked wheels. The secondary system shall be hand or foot operated to apply a braking action sufficient to hold the vehicle on the maximum grade on which the vehicle is operated with rated capacity load, with the transmission in neutral and engine idling on a dry surface free of loose materials. The brake shall be effective for restraining vehicle movement in either a forward or reverse direction.

5.4 The secondary brakes shall remain applied after initial actuation without further energy input.

5.5 The maximum permissable stopping distance excluding reaction distance, from a minimum initial speed of 20 mph on level dry pavement using a maximum service brake pedal force of 100 lb (45.4 kg) shall be:

Single vehicles:

GVW 5,000 lb (2,270 kg) or less	25 ft (7.63 m)
GVW 5,000 lb (2,270 kg) to 10,000 lb (4,450 kg)	30 ft (9.15 m)
GVW over 10,000 lb (4,450 kg)	40 ft (12.2 m)

*(GVW) - Gross Vehicle Weight

5.6 Manually moved units shall have either parking brakes or other means capable of holding a maximum capacity load on a 15% grade or an empty or capacity load when subject to wind or blast load up to 80 mph (128.7 km/hr). Wheel chocks or similar braking devices, which accomplish this are acceptable.

5.7 Power brakes shall be provided on any vehicle with a GVW of 30,000 lb (13,620 kg) or over.

6. HOISTING/LIFTING EQUIPMENT

6.1 The maximum capacity of all hoisting equipment shall be displayed in a location readily visible.

6.2 Fail safe devices, to prevent the unit free falling, shall be provided.

6.3 Maintenance safety locks shall be provided.

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6.4 A safe means of lowering or disconnecting shall be provided in the event of a malfunction.

7. STABILITY DEVICES

7.1 Self-propelled type equipment with power actuated stabilizers, shall have an operator warning device to indicate when the stabilizers are not in the stowed position or an interlock to prevent driving the unit with the stabilizers or outriggers extended.

7.2 Lift type units exposed to blast, wind, irregular surfaces shall be equipped with stabilizing devices if necessary, to preclude overturning when exposed to wind or blast up to 90 mph (144.8 km/hr).

7.3 The stability is outlined in 7.2 shall determine at which point during elevation the stabilizing devices will be necessary. A safety device shall be provided to insure this elevation is not exceeded unless stabilizing devices are deployed and/or engaged. Retraction of the stabilizing device shall not be possible under normal conditions until the unit has been lowered to within the stability requirements of 7.2.

7.4 Stabilizer activating devices shall be located so as not to expose the operator to a personal injury.

7.5 When emergency controls for raising the stabilizers are provided, they shall be located so the operator is not exposed to injury.

7.6 Stabilizer ground contact pads shall have the outside edges radiused a minimum of 1/4 in. (.64 cm) and shall be smooth.

7.7 Stability devices that extend beyond the vehicle profile shall be painted yellow or illuminated.

8. DOORS, SERVICE AND ACCESS PANELS

8.1 All doors and panels shall be provided with securing devices to retain them in the open and/or closed position. These devices shall be capable of withstanding blast or ambient winds and shall be installed so that the doors, when open, do not create a personal injury hazard.

8.2 Equipment components and system requiring routine and frequent inspection and servicing shall be readily accessible. Suitable access doors or removable enclosures shall be provided for this purpose. Access doors, covers and protective guards, shall be designed for quick removal or opening. Access holes in protective guards for lubrication are acceptable, but shall be held to a minimum number and size.

9. EXHAUST SYSTEMS

9.1 Internal combustion engines, excluding gas turbine engines, shall be fitted with either a baffle-type muffler or spark arrestor.

9.2 The exhaust system, beyond the manifold, shall be supported at least 3 in. (7.6 cm) clear of combustible materials, excluding flexible mountings, and at least 2 in. (5.1 cm) clear of fuel and electrical system parts and shall not be subject to drippage of fuel, oil, or grease.

9.3 The surfaces and the discharge of exhaust systems shall be located so that they will not expose employees to injury.

10. FUEL SYSTEM

10.1 Fuel lines shall be constructed of steel tubing or seamless annealed copper. Flexible fuel lines may be used in locations to absorb vibration and prevent fatigue.

10.2 Fuel lines shall be secured with a minimum of 2 in. (5.1 cm) clearance to exhaust systems.

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10.3 The fuel tank and lines shall be located and installed so that any overflow, during filling, or any leakage will not impinge on the engine, exhaust, electrical system, or other ignition sources or enter the operator's compartment.

10.4 A visible permanent marking shall be installed adjacent to the filler indicating the type of fuel to be used.

11. ILLUMINATION

11.1 Motorized self-propelled vehicles shall be equipped with a minimum of two headlights and one combination stop/tail light.

11.2 Operational instruments and control panels exclusive of driving control panels, shall be illuminated to a minimum of 5 foot candles, and not produce a glare to the operator.

11.3 Units designed for interior used need not have illumination, as outlined in 11.1 and 11.2.

12. TRAINING

12.1 Only trained and authorized persons shall be permitted to operate ground support equipment. A qualification record shall be maintained by the operator's employer.

13. OPERATIONS

13.1 Foot hold, stairs, tractor and truck running boards, ladders, and work platforms shall be kept clear.

13.2 Vehicle lights and windshields should be kept clear.

13.3 Windshield wipers, defrosters, and frost shields should be properly maintained and used.

13.4 Tarpaulins, cargo restraining nets, side gates on carts, and other items of this nature provided to prevent cargo from falling, should be used.

13.5 Equipment capacities regarding cargo loads and personnel accommodations shall be enforced.

13.6 All units shall be operated in accordance with procedures established by the employer and/or manufacturer.

13.7 All motorized vehicles shall display lights from 1/2 hr after sunset to 1/2 hr before sunrise.

13.8 Vehicles towing unbraked trailers shall be operated in a manner to assure stopping the towed load in a distance, excluding reaction distance, not to exceed 100 ft (306 m).

14. MAINTENANCE

14.1 All vehicles shall be maintained in functional working order. The vehicle shall be examined before being placed in service and shall not be placed in service if the examination shows any condition adversely affecting the safety of the vehicle.

15. GENERAL AND MISCELLANEOUS

15.1 Cab and Operator Compartment

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