SAE The Engineering Society For Advancing Mobility Land Sea Air and Space®
INTERNATIONAL
400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE RECOMMENDED PRACTICE

SAE ARP1348 REV. A

Issued 1978-08
Revised 1993-11
Reaffirmed 2002-06

Baggage/Cargo Trailer Requirements

1. SCOPE:

This SAE Aerospace Recommended Practice (ARP) applies to airline trailer equipment with four wheel running gear pulled and steered through an integral tow bar, for use on airport ramps and other airport areas for transporting baggage, freight, and other materials. This ARP can apply to any airline/airport trailer chassis regardless of its equipment; the trailer bed can be designed to carry either bulk baggage/cargo, or a cargo unit load device by means of a rollerized conveyor system, or a piece of aircraft servicing equipment (e.g., ground power unit, air start unit, etc.).

1.1 Purpose:

This ARP provides recommendations for the design and use of trailer equipment which will permit safe operations and which will minimize exposure to inadvertent disconnections of trailers while being towed.

2. APPLICABLE DOCUMENTS:

The following publications form a part of this specification to the extent specified herein. The latest issue of all SAE Technical Reports shall apply.

Portions of the following documents shall become part of this ARP.

2.1 SAE Publications:

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

ARP1247	General Requirements for Aerospace Ground Support Equipment - Motorized and Nonmotorized
ARP1330	Welding of Structures for GSE
ARP1334	Equipment Requirements for Compatibility With Aircraft Unit Load Devices

TO PLACE A DOCUMENT ORDER: Tel: 877-606-7323 (inside USA and Canada)
Tel: 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: custsvc@sae.org
SAE WEB ADDRESS: http://www.sae.org

SAE values your input. To provide feedback on this Technical Report, please visit
http://www.sae.org/technical/standards/ARP1348A

2.1 (Continued):

J684 MAY87	Trailer Couplings, Hitches and Safety Chains - Automotive Type
J847 NOV87	Trailer Tow Bar Eye and Pintle Hook/Coupler Performance

2.2 Other Documents:

IATA AHM 916	Basic Requirements for Ramp Handling Equipment Towing Interface

3. TRAILER DESIGN CONSIDERATIONS:

Designs for trailer units planned for in-train towing should include the following considerations:

3.1 Trailer design shall allow for towing speeds based on the type of wheels/tires used as specified in ARP1334, 4.1.1.

3.2 Ensure that in-train towing loads are transmitted internally along the line of the tow bar pull.

3.3 Anticipate for all dynamic loads. Impact loads on tongues, pintles, and chassis frames are frequently critical and require careful analysis to establish their magnitude and frequency.

3.4 Running gear should be completely within the confines of the frame. All steering linkages, brake system components, or other mechanisms located beneath the trailer should be protected from damage.

3.5 In assembling running gear components, it is desirable to match the capacities of the axle, tires, wheels, brakes, etc. as closely as possible. The component with the lowest capacity determines the capacity of the entire running gear.

3.6 The trailer should be capable of being towed at 15 mph, when loaded to 50% of rated load capacity, across a normally smooth ramp without generating vertical accelerations in excess of 2 g.

3.7 The force to actuate any lever or tow bar should not exceed 30 lb.

3.8 Welds and welding shall be accomplished in accordance with the recommendations of ARP1330.

3.9 The bed perimeter frame should be designed to sustain heavy impact loading. Corners with a generous radius, front to rear tapered rub rails, or similar design features for deflecting impact loads should be considered.

3.10 The bed shall be smooth in order to avoid damage to baggage, cargo or mail, and made in such a way to permit an easy replacement in case of damage. An adequate central slope shall be provided to permit an easy drainage of liquid spillage.

4. STEERING:

4.1 For trailers with steering through the tow bar, provide adequate mechanical advantage to permit easy movement of the controlling wheels under static full load condition by one man. The force necessary to steer the tow bar by hand under this condition shall not exceed 30 lb.

4.2 Design for turning radius as short as possible. Provide stops as necessary to prevent damage to the axle, or to prevent fifth wheel steering design from turning past an angle which would create significant instability of trailers during turns. Design the load carrying mechanism to withstand stresses induced by towed vehicles or personnel attempting to turn the equipment shorter than the stops will allow.

4.3 Consistent with the type of steering provided, design the trailer geometry so that the wheels of the last trailer in the train will track the wheel path of the first trailer, as closely as possible, in a series of successive full left and right turns.

5. BRAKES:

Provide trailer units with a parking brake system which applies brakes to at least two wheels. The brakes should be self-equalizing and should be capable of locking each wheel against a tangential force, applied at the periphery of the wheel (in either direction) which is equal to the trailer gross weight divided by the number of braked wheels. The trailer gross weight is trailer weight plus the rated load capacity and the brake system should be capable of holding this weight on a 10% grade. If required by procuring activity, the parking brakes shall be actuated by placing and locking the tow bar in the up position. Otherwise the brakes shall be actuated by a positive locking operating lever.

6. TOWING FORCE:

The towing force required to move the trailer on level concrete at maximum gross weight should not exceed 30 lb rolling, 50 lb breakaway per each ton of weight.

7. TOW BAR:

7.1 The tow bar shall swivel in the vertical plane. Consideration for stops to prevent the tow bar from contacting the ground and from contacting the trailer itself should be given.

7.2 In lieu of special requirements specified by the procuring activity, tow bar eyes shall meet the strength requirement of Section 8 and shall conform to the dimensional requirements of SAE J847.

7.3 The tow bar shall be designed to be usable within the eye height range over the ground between 12 in and 16 in in accordance with IATA AHM 916 without actuating the brake system. Reflective material or fluorescent painting, as recommended in ARP1247, 3.10.1, should be used to make tow bar visible in poor lighting conditions.

8. STRENGTH RATING FOR COUPLERS AND TOWING EYES:

The towing eyes and couplers shall meet the design and testing requirements as set forth in applicable parts of SAE J684. Maximum gross trailed weight is defined as the single gross trailer weight multiplied by the number of units towed in a train.

9. COUPLER DESIGN REQUIREMENTS:

9.1 Maximum Load Capabilities:

The coupler-load rating shall be equal to the towing-eye rating and shall be in accordance with Section 6.

9.2 Locking Devices:

Coupling should be designed to carry the load on the structure not on the locking device. The locking device must be located so that visual inspection can be easily performed. The physical force requirement to actuate the coupling should be less than 30 lb.

9.3 Positive Locking:

The locking device must have a positive locking action that will prevent inadvertent unlocking due to jostling of the units in tow.

9.4 Minimum Moving Parts:

By minimizing the number of moving parts, maintenance time and cost of repair will be substantially reduced. Maintainability is a prime design requirement.

9.5 Minimum Turning Radius, Incline Angle, and Towing Eye Handling Limitations:

Establishing a minimum turning radius and incline angle will allow for the proper design of the coupler in conjunction with the appropriate towing eyes. A maximum grade of 10% and a swing angle of 180° shall be used.

9.6 Ground Clearance:

Allowable vertical clearance from the ground line to the towing point should be established. These clearances will be in direct relationship to the maximum allowable incline angle.