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**AEROSPACE
RECOMMENDED
PRACTICE**

ARP 1334A
Superseding ARP 1334

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GROUND EQUIPMENT REQUIREMENTS FOR COMPATIBILITY WITH
AIRCRAFT UNIT LOAD DEVICES

1. PURPOSE:

- 1.1 This document specifies requirements for those portions of the aircraft unit load device ground and terminal handling equipment that will have a direct bearing on the life of the device for the purpose of preventing undue wear on the device. Past experience has shown that in-service defects in regard to the above equipment cause high devices cost. Greater control of maintenance is required.
- 1.2 The term device used in this specification is intended to mean Aircraft Unit Load Device.
- 1.3 It is intended that this document apply to equipment manufactured or installed after publication of this document.

2. SCOPE AND APPLICABLE DOCUMENTS:

- 2.1 Included in this document are requirements for conveyor systems, guides, stops, restraint hardware that are used on trucks, transporters, dollies, storage provisions, pallet build-up hoists, or other device-handling equipment.

These requirements reflect state of the art criteria applied to known successfully operated hardware. Any design deviations shall be required to demonstrate equivalency to this specification criteria.

- 2.2 The devices (aircraft unit load devices) referred to in this specification can be containers, galley modules and pallets for aircraft galley and cargo systems.
- 2.2.1 These devices usually form an integral part of the aircraft and as such are subject to regulatory agencies' requirements to assure structural integrity.

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2.2.2 Size, shape and load capacities for devices are not included in this document. These can be obtained from SAE or IATA specifications, the airline operator and the device manufacturer.

2.3 Applicable Documents: The following other international documents are equivalent to the present document, have the same title, and should also be consulted for international application:

- a) ISO 4116
- b) IATA Airport Handling Manual (AHM) 911

3. EQUIPMENT REQUIREMENTS:

3.1 Conveyor systems for transport of devices.

3.1.1 Uni-directional Conveyor System (rollers):

Description	Requirement
a) Roller diameter	2 inches (Metric Standard 50 mm) minimum
b) Roller length	4 inches (Metric Standard 100 mm) minimum effective bearing length

NOTE: The cumulative length of any number of rollers on a common axis shall support at least 50% of the corresponding device dimension. Staggered pattern of rollers shall provide equivalent support.

Description	Requirement
c) Lateral spacing between roller ends	16 inches (405 mm) maximum
d) Distance between centerlines of rollers less than 4 inches (Metric Standard 100 mm) in diameter	10 inches (254 mm) maximum
e) Distance between centerlines of rollers between 4 and less than 6 inches (Metric Standard 100 to 150 mm) diameter	12 inches (305 mm) maximum
f) Distance between centerlines of rollers of 6 inches (Metric Standard 150 mm) diameter and larger	15 inches (380 mm) maximum
g) Radius at roller edges	.125 inches (3 mm) minimum

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3.1.1 (Continued):

Description	Requirement
h) Allowable overhang (distance between roller edge and guide)	6 inches (150 mm) maximum
i) The allowable height difference for rollers is a maximum of .125 inches (3 mm) in any 5 foot x 5 foot (1.5 x 1.5 m) area and .05 inches (1.3 mm) between any two adjacent rollers. The support structure stiffness and tolerance must be designed to meet the above requirement when supporting an empty device or one loaded to its maximum payload capacity.	

3.1.2 Multi-directional Conveyor (for transient traversing conditions only):

Description	Requirement
a) Allowable spacing for castored rollers throughout the area traversed by the device, for castored rollers of less than 4 inches (Metric Standard 100 mm) diameter	10 inches (254 mm) maximum in 2 directions 90° apart
b) Allowable spacing for castored rollers throughout the area traversed by the device, for castored rollers of 4 inches (Metric Standard 100 mm) diameter and larger	12 inches (305 mm) maximum in 2 directions 90° apart
c) Castored roller diameter	3 inches (75 mm) minimum
d) Castored roller width	1 inch (25 mm) minimum
e) Edge radius	.125 inches (3 mm) minimum
f) Minimum contact area	.75 inches (19 mm) minimum
g) Allowable spacing for ball transfers throughout the area traversed by the device, except for those areas where supported by other means, when using balls of less than 1.2 inches (30 mm) diameter	5 inches (127 mm) maximum in 2 directions 90° apart

ARP 1334A**3.1.2 (Continued):**

Description	Requirement
h) Allowable spacing for ball transfers throughout the area traversed by the device, except for those areas where supported by other means, when using balls of 1.2 inches (30 mm) diameter and larger	7 inches (180 mm) maximum in 2 directions 90° apart
i) Diameter for balls	1 inch (25 mm) minimum
j) The allowable height difference for castored rollers or unloaded ball transfers is a maximum of .125 inches (3 mm) in any 5 foot x 5 foot (1.5 x 1.5 m) area, and .05 inches (1.3 mm) between any two adjacent castored rollers or ball transfers. The support structure stiffness and tolerance must be designed to meet the above requirement when supporting an empty device or one loaded to its maximum payload capacity.	

3.2 Flat Top Systems:

3.2.1 Conveying or storage systems that provide flat area contact supporting means (such as flat top chain traverse systems, frame rack storage areas, or highway vehicles).

Description	Requirement
a) Percent of contact area supporting base of device, not otherwise supported	20% minimum
b) Allowable overhang (unsupported such as by rollers)	12.25 inches (310 mm) maximum
c) Allowable spacing between support surfaces lateral to movement, not otherwise supported	16 inches (405 mm) maximum
d) If spacing exists between supports in direction of movement, this allowable spacing is	12 inches (305 mm) maximum
e) Edge radius	.060 inches (1.5 mm) minimum for all edges

3.3 Conveyor Systems General Requirements:

- 3.3.1 The conveyor systems of two mated pieces of equipment must be relatively flat with each other consistent with the size and stiffness of the device so that the load is never totally supported by a single line of rollers or balls in a cresting situation or two lines in a bridging situation.
- 3.3.2 An edge or lead in roller shall be provided that has the maximum possible diameter commensurate with design in order to absorb the initial impact load of transferring devices.
- 3.3.3 Systems design shall provide that when a device is transferred between pieces of equipment, the maximum allowable span between roller centerlines shall be 12 inches (305 mm). Each piece of equipment shall have its conveying surfaces within 4 inches (100 mm) of the extreme projection of the bed in direction of the device movement. Any remaining structural projection must be ramped or sloped off at 45 deg minimum with no sharp edges.
- 3.3.4 All walkways, beams, or other structures must be at least .5 inches (13 mm) below the tops of the conveying surface.
- 3.3.5 Conveying surfaces must be able to convey distributed loads of 300 pounds per square foot (1465 kg/m²) and support distributed loads of 600 pounds per square foot (2930 kg/m²).
- 3.3.6 All mobile equipment must have means to adequately restrain devices in fore, aft, lateral and vertical direction, while in transit.
- Unless specifically exempted by device configuration, guide rails and end stops shall extend at least 4 inches (100 mm) above the conveying surface.
 - The maximum center to center distance for stops shall not exceed 25 inches (635 mm). The minimum width shall be 2 inches (50 mm).
 - Guides shall be smooth and as continuous as practical. Generous lead-in ramps must be provided on guides to cam devices into position to minimize impact loads.
 - The accumulated lateral dimensional clearance between guides and devices to be handled shall be .50 inches (13 mm).
- 3.3.7 Where vertical restraint lips are provided, they shall extend 1.00 inches (25 mm) horizontally over the conveying surface.
- Vertical restraint members shall be 1.25 inches (32 mm) from top of the conveying surface to the restraint under surface.