

BS ISO 27470:2011



BSI Standards Publication

# Aircraft ground equipment — Upper deck catering vehicle — Functional requirements

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The UK participation in its preparation was entrusted to Technical Committee ACE/57, Air cargo and ground support equipment.

A list of organizations represented on this committee can be obtained on request to its secretary.

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**Aircraft ground equipment — Upper deck  
catering vehicle — Functional  
requirements**

*Matériel au sol pour aéronefs — Camion commissariat de pont  
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## Foreword

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ISO 27470 was prepared by Technical Committee ISO/TC 20, *Aircraft and space vehicles*, Subcommittee SC 9, *Air cargo and ground equipment*.

## Introduction

This International Standard specifies the minimum functional, performance and safety requirements to be taken into account by manufacturers for the design of catering vehicles intended to service the upper deck of very large capacity aircraft. It identifies the various concerns to be taken into consideration to ensure vehicle safety for operators and aircraft.

Throughout this International Standard, the minimum essential criteria are identified by use of the key word “shall”. Recommended criteria are identified by use of the key word “should” and, while not mandatory, are considered to be of primary importance in providing safe, economical and usable aircraft catering vehicles. Deviation from recommended criteria should only occur after careful consideration and thorough service evaluation have shown alternate methods to provide an equivalent level of safety.

# Aircraft ground equipment — Upper deck catering vehicle — Functional requirements

## 1 Scope

**1.1** This International Standard specifies the minimum functional, performance and safety requirements for a catering vehicle capable of transporting and loading/unloading in-flight service (catering) equipment and supplies into or from the upper deck of very large capacity aircraft, as well as the main deck of these or other aircraft types.

**1.2** The intent of this International Standard is not to specify equipment design, but rather to define minimum functional and performance requirements and highlight those criteria which are known to be essential to an efficient and safe operation on civil transport aircraft in the environment of international airports.

**1.3** This International Standard specifies the worldwide requirements recognized by aircraft and vehicle manufacturers as well as airlines and catering agencies. In addition, it shall be applied with due reference to the national governmental regulations of the country where the vehicle is to be operated. The main though not exclusive areas in which such national regulations may apply are:

- general requirements applicable to road vehicles;
- sanitary requirements regarding design, cleaning and disinfection of vehicles used to carry food for human consumption;
- stability and other safety requirements applicable to elevating equipment carrying personnel in the elevated position.

Nothing in this International Standard, however, shall be deemed to supersede any locally applicable law or regulation, unless a specific exemption has been obtained for this purpose from the appropriate Authority.

**1.4** Certain requirements of this International Standard are specifically dictated by overwing access to doors of certain aircraft types, and may not apply to other aircraft types. However, the intent of this International Standard is that any upper deck catering vehicle shall be capable of safely handling this specific situation.

## 2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 6966-1, *Aircraft ground equipment — Basic requirements — Part 1: General design requirements*

ISO 6966-2, *Aircraft ground equipment — Basic requirements — Part 2: Safety requirements*

ISO 7000, *Graphical symbols for use on equipment — Index and synopsis*

ISO 10841, *Aircraft — Catering vehicle for large capacity aircraft — Functional requirements*

ISO 11532, *Aircraft ground equipment — Graphical symbols*

ISO 11995, *Aircraft — Stability requirements for loading and servicing equipment*

### 3 Structure and overall dimensions

#### 3.1 General

**3.1.1** The vehicle shall be constructed on a standard automotive chassis of appropriate gross weight rating.

**3.1.2** The vehicle's design, construction, equipment and operating rules shall meet all applicable requirements of ISO 6966-1. In addition, the vehicle shall be capable of operating at aircraft main deck, and accordingly meet all applicable requirements of ISO 10841.

**3.1.3** The vehicle's dimensions, laden weight and other characteristics shall satisfy all the applicable government regulations for vehicles to be used on public roadways.

**3.1.4** The vehicle shall be equipped with a fully enclosed elevating van body with a front platform, capable of reaching heights between 2,54 m (100 in) and 8,40 m (330 in) above the ground.

**3.1.5** The allowable load capacity in the elevating van body should be no less than 3 500 kg (7 700 lb). A 4 500 kg (10 000 lb) load capacity is recommended, consistent with the number of standard trolleys (see 3.3.1) required.

**3.1.6** The vehicle's driver shall have maximum unobstructed view of the platform and aircraft interface or potential interference areas (e.g. engines, wing) under all operating conditions. Particularly, for final positioning to the aircraft at walking speed, the driver's position while at the steering wheel shall provide a free upward line of sight towards these critical areas. This visibility field may be achieved through appropriate window section(s), equipped with wiper and defrosting, in the cab's roof, and either:

- a) the front platform in its fully retracted position leaving the visibility field unobstructed; or
- b) the front platform being raised enough during final positioning to leave the visibility field unobstructed.

#### 3.2 Overall dimensions

**3.2.1** The overall height of the vehicle in the fully lowered position shall not exceed 4,00 m (157 in), in order to be compatible with standard airport infrastructure.

**3.2.2** The van floor's height in the fully lowered position should not exceed 1,62 m (64 in) for docking.

**3.2.3** The overall width of the vehicle in a driving condition (with stabilizers retracted) should meet locally applicable governmental regulations.

**3.2.4** The overall plan view dimensions of the vehicle shall be kept to a minimum, consistent with intended payload (see 3.3.1). In order to facilitate main deck use on aircraft other than very large capacity ones, it is recommended that the vehicle's overall length should preferably not exceed 12,20 m (40 ft).

**3.2.5** The vehicle's overall swept turning radius shall be kept to a minimum, and should preferably not exceed 12,20 m (40 ft).

#### 3.3 Van body

**3.3.1** The van body shall be designed to handle, transport and secure standard catering trolleys of 762 mm × 305 mm (30 in × 12 in) plan view size, or corresponding half-size units. The volume capacity of the van body shall be a minimum of 36 full-size trolleys.

**3.3.2** The usable internal width of the van should be no less than 2,30 m (91 in).

**3.3.3** The minimum clear height at any point within the van body with doors open or closed shall be 1,90 m (75 in).



**3.3.4** The interior of the van body shall be fully lined with a smooth, non-moisture-absorbent, non-toxic material, sanitarily approved for use in vehicles carrying food for human consumption. In addition:

- a) the lining material shall be compatible with repeated cleaning with strong detergents and disinfecting agents, as well as suitable for repeated water pressure cleaning and/or steam cleaning;
- b) any joints or appurtenances inside the van body shall be flush, rounded, sloped or otherwise protected to prevent any accumulation of dirt or rubbish and facilitate comprehensive cleaning.

**3.3.5** The floor shall repeatedly withstand a full complement of catering trolleys weighing up to 80 kg (175 lb) each on four 50 mm (2 in) diameter and 25 mm (1 in) width castor wheels located 750 mm × 250 mm (30 in × 10 in) apart from each other, without deflecting more than 6 mm (0,25 in). No permanent deformation is allowable.

**3.3.6** In addition, the floor shall:

- a) be smooth and free from any joint or recess allowing accumulation of dirt or rubbish, and meet the cleaning requirements in 3.3.4;
- b) provide an anti-slip surface throughout its whole area;
- c) provide drainage to cater for elimination of any spilled fluids.

**3.3.7** Both of the van body's internal sidewalls shall be equipped with:

- a) protective devices to avoid deterioration by impact from fully loaded catering trolleys as defined in 3.3.5;
- b) quick-fastening restraint devices capable of ensuring proper restraint of a full complement of catering trolleys under normal over the road horizontal and vertical accelerations.

**3.3.8** The van body shall be equipped with two doors at the forward and rear ends, with a minimum usable width of 0,80 m (32 in) and a minimum clear height of 1,90 m (75 in) when open.

**3.3.9** Lighting shall be fitted within the van body to provide a minimum illumination of 50 lx (5 ft-candle) at any point of the floor.

## **3.4 Front platform**

**3.4.1** The vehicle shall be equipped with a front platform designed to be level with the van body floor within the working height range specified in 3.1.4. The front platform may consist of a) fixed part(s) and b) movable part(s), which may be telescoping, sliding, turning, folding or otherwise adapting, to provide an aircraft wing overhanging capability and continuous staff and trolley access to any aircraft upper or main deck door. The platform floor shall provide an anti-slip surface throughout its whole area.

**3.4.2** The geometry of movable platform(s) shall be such as to adequately accommodate the safe opening and closing of upper deck doors, but also provide a standard interface with main deck doors. Steps at junctions between platforms shall not exceed a height of 25 mm (1,0 in), and shall include a ramp at an angle not exceeding 15° with the horizontal plane, in order that handling of trolleys be as smooth as possible.

**3.4.3** A safe operator position shall be provided on either the fixed part of the platform or the forward part of the van body to allow direct visibility of the aircraft interface area during vehicle positioning. It shall be within reach of the upper control panel (see 5.2) and protect the operator against risk of falling while the platform's movable part(s) and corresponding guardrails or side panels are not yet in the extended and locked-in position.

**3.4.4** In order to prevent the hazards that can result from handling heavy items high above the ground without a safeguard, all movements of movable platforms should be powered and controlled from the upper control panel (see 5.2).

**3.4.5** In order to facilitate positioning at the interface with aircraft upper deck doors at night and under poor visibility conditions, an adequate working light shall be provided on the platform or forward exterior face of the van body, to provide the platform and aircraft interface area with a minimum illumination of 200 lx (18,5 ft-candle).

**3.4.6** The fixed section(s) of the front platform shall be designed to support a minimum total distributed load of 5 900 (1 320 lbf) or 3 000 Pa (63 lbf/sq.ft), whichever is higher, or a minimum 2 950 N (660 lbf) concentrated load on either forward quarter area of the fixed part(s), without deflecting by more than 6 mm (0,25 in). No permanent deflection is allowable.

**3.4.7** The movable part(s) of the platform shall be designed to support a minimum distributed load of 3 450 N (770 lbf) or 3 000 Pa (63 lbf/sq.ft) of maximum deployed area, whichever is higher, or a minimum local single load of 980 N (220 lbf) at its (their) leading edge when fully extended. The maximum deflection of the leading edge shall not exceed 20 mm (0,79 in) under the maximum allowed loads of the platform. No permanent deflection is allowable.

**3.4.8** Any edge(s) of the platform part(s) likely to come into contact with the aircraft fuselage shall be protected by a full width soft rubber cylindrical bumper with a minimum diameter of 130 mm (5,0 in) or equivalent. The area directly beneath the front platform shall be free from any components and/or protrusions within at least 0,30 m (12 in) aft from its forward end, and its overall thickness in this area shall not exceed 150 mm (6,0 in).

**3.4.9** Access to certain aircraft upper deck doors requires all or part of the front platform to be extended over the aircraft wing. In order to safely perform such an overwing operation:

- a) adequate drainage means shall be provided on all platforms to prevent any fluid spillage from falling;
- b) a watertight collection pan or equivalent should be provided under any hydraulic device or rigid or flexible hydraulic line under the platform;
- c) adequate means (see 6.4, side panels) shall be provided to prevent any object from falling;
- d) due to the position of the vehicle partly within the aircraft's fuel hazard zone (proximity to fuel tanks), specific regulations may apply to any electrical components, including controls, and require systematic assessment.

## 4 Stability

### 4.1 Stability objectives

**4.1.1** When supported by the extended stabilizers, the vehicle in both the maximum payload and empty conditions shall meet the static and wind stability objectives of ISO 11995, with both the van body and the front platform in either the main deck or the upper deck level elevated positions.

**4.1.2** In addition to actual calculated or tested stability, i.e. prevention of the risk of the vehicle tipping over, utmost design care should be brought to minimizing any feeling of instability for staff standing on the platforms in the elevated position, resulting from both vehicle structure oscillations and perceived vibrations due to wind gusts or movement of personnel and loads on board the vehicle. Typically, for this purpose:

- stabilizers and their attachment structure should be designed to eliminate any flexibility;
- mechanical play between structural or lifting system parts should be minimized;
- structural parts found to contribute to flexibility and oscillations should be stiffened;
- damper devices should be provided where effective;
- trolley rolling surfaces should be as smooth as possible;
- guardrails or safety panels should be provided with a positive locking device ensuring they do not deflect.

## 4.2 Stabilizers

**4.2.1** A minimum of four stabilizers shall be provided for van body elevation.

**4.2.2** The stabilizers in the retracted position shall not protrude from the vehicle's overall width defined in 3.2.3.

**4.2.3** The stabilizers in the extended position with the van body elevated at main deck height should preferably not protrude from the vehicle's overall width defined in 3.2.3, and in any event shall not protrude out of the vehicle width by more than 0,30 m (12 in) on each side.

**4.2.4** The stabilizers in the extended position with the van body elevated at upper deck height may protrude from the vehicle width to the extent required to meet the stability objectives, but shall not protrude out of the vehicle width by more than 0,76 m (30 in) on each side.

## 4.3 Mobility

**4.3.1** It shall not be possible to drive the vehicle when the van body is not in the fully lowered position, unless the vehicle has been designed to meet the ISO 11995 stability objectives under this operational condition. A manual override of this interlock shall be possible.

**4.3.2** Retraction of stabilizers shall not be possible under normal or emergency conditions until the van body has been lowered within the ISO 11995 stability objectives.

**4.3.3** It shall not be possible to raise the van body above 2,54 m (100 in) height unless the stabilizers are fully extended and supporting the vehicle's weight against a supporting surface.

**4.3.4** It shall not be possible to raise the front platform when stabilizers are not extended, unless the ISO 11995 stability objectives are met.

**4.3.5** Stabilizer collapse or uncontrolled lowering of van body or front platform in the event of a system failure shall be prevented by fail-safe devices.

## 5 Controls

**5.1** Controls for raising and lowering the van body and the front platform shall be mounted at the driver's position and at an upper operator's position. Selection for priority between both controls shall be located only at the upper operator's position.

**5.2** The upper control panel shall be located at the forward end of the van body or on the fixed platform element, under the requirement that the corresponding operator's position be fully protected by guardrails. Its location shall provide unobstructed view over the platform, guardrails, and aircraft interface area.

**5.3** Controls for any powered movable platforms, guardrails or side panel sections or optional canopy shall be provided only at the upper control panel.

**5.4** Controls for extending and retracting the stabilizers shall be located at the driver's position only, and shall be protected against inadvertent activation. Positive confirmation, by warning lights or an equivalent device, that the stabilizers are either fully retracted or fully extended and supporting the vehicle's weight against a supporting surface, shall be provided at both the driver's position and the upper control panel.

**5.5** An indication showing the van body is not fully lowered shall be provided at the driver's position.

**5.6** It shall be possible to start and stop the engine from both the driver's position and the upper control panel.

**5.7** Emergency stop (engine kill) buttons shall be provided at both control panels.

**5.8** All controls shall be identified by the appropriate ISO 7000 or ISO 11532 graphic symbol for their function.

**5.9** The control panel layout should, insofar as is practical, meet the requirements of the IATA AHM 915 standard, section 2 (see Bibliography).

## **6 Safety requirements**

**6.1** The vehicle's design, construction, equipment and operating rules shall meet all applicable requirements of ISO 6966-2.

**6.2** A ladder shall be provided to allow access from the ground to the front platform when in the lowered position. The ladder shall not extend beyond the overall width of the vehicle as defined in 3.2.3. It shall be fitted with anti-slip rungs and adequate handholds.

**6.3** Steps shall be provided at the rear or side of the van body to allow access to/from the van body in the lowered position. The steps shall have an anti-slip surface and be fitted with adequate handholds.

**6.4** The front platform and its movable parts shall be fitted on both sides with rigid fixed and adjustable guardrails or side panels with a minimum height of 1,40 m (55 in) to continuously close the gap between the van body and the aircraft during operation. All guardrails or side panels shall be filled by continuous material throughout. Where wire mesh or equivalent filling is used in order to minimize wind force for stability purposes, the mesh size shall not allow any object of 50 mm × 50 mm (2 in × 2 in) cross-section to pass through. Any local gaps, drainage provisions or handrail junctions shall meet the same requirement.

**6.5** All adjustable, movable or extendable guardrails or side panels shall be fitted with a means of positive locking in either deployed or stored position, with as many intermediate positions as may be necessary.

**6.6** The guardrails or side panels shall be designed to allow safe opening and closing of the aircraft main or upper deck doors, regardless of the relative positions of the vehicle and the aircraft. Any handrail part likely to come into contact with the aircraft fuselage shall be protected by soft non-marking rubber padding or equivalent.

**6.7** It shall be possible to deploy and retract the adjustable guardrails or side panels without putting the operator into an unsafe position. In order to prevent the hazards resulting from handling such heavy items high above the ground without a safeguard, it is recommended that guardrail adjustment movements should be powered and controlled from the upper control panel (see 5.3). As an exception, the last telescoping sections to close the gap with the aircraft fuselage should remain manual, but with an operating force not exceeding 100 N (22 lbf) and a positive locking device fitted with a handle release.

**6.8** A vertical safety shield shall be fitted in front of the van body to close the gap between the body floor in the lowered position and the aft floor line of the front platform. The shield shall be flush mounted with a maximum 6 mm (0,25 in) clearance from the forward edge of the van body's floor.

**6.9** The vehicle chassis at ground level shall be entirely surrounded by a rigid protective structure to prevent any possibility of inadvertent access of personnel or equipment (e.g. dollies) under the van body while elevated.

## **7 Emergency**

**7.1** The vehicle shall be fitted with an emergency auxiliary system allowing:

- the platform and the van body to be retracted and lowered;
- the stabilizers to be retracted;
- the vehicle to be towed away;

in order to allow safe evacuation of personnel and removal of the vehicle from the aircraft.

**7.2** The auxiliary emergency system may be either manual (hand pump) or, as an option, with an independent power source. Its controls shall be located at ground level and be protected by a cover or equivalent.

**7.3** Emergency lowering shall not compromise vehicle stability, i.e. it shall not be possible to retract the stabilizers using the emergency system while the van body is above 2,54 m (100 in) height, unless the vehicle has been designed to meet the ISO 11995 stability objectives under this operational condition.

**7.4** Whenever chassis propulsion is still available while the van body cannot be completely lowered, it shall be possible to manually override the interlock preventing the vehicle from being driven while the van body is not fully down. The override control shall be located together with other emergency controls and sealed or otherwise protected against inadvertent or unauthorized use.

## 8 Options

The following optional additional features may be considered.

- a) Sliding or folding canopy over the front platform. The canopy shall not interfere with opening and closure of aircraft doors.
- b) Thermal insulation of the van body. General guidance on thermal insulation efficiency and performance can be found in ISO 1496-2 and ISO 8058 (see Bibliography).
- c) Refrigerated van body. General guidance on self-contained refrigeration unit classification and performance assessment can be found in ISO 1496-2 (see Bibliography).
- d) Folding tail gate to allow loading and unloading the vehicle from the ground level at its rear end.
- e) For maintenance purposes, two locking pins to be inserted into the front platform lifting member to raise the front platform simultaneously with the van body.
- f) Auxiliary hydraulic pump for emergency operations, driven by battery power or other independent power source.
- g) Intercom system between the upper operator's position and the driver's position.
- h) Guidance system to assist the driver for accurate positioning at aircraft.
- i) Detection device, on top of the platform below the aircraft door, that initiates a flashing light or audible warning in the event that the clearance between platform and door becomes too small, and/or an auto-levelling system for platform height adjustment during aircraft height changes.

## Bibliography

- [1] ISO 1496-2, *Series 1 freight containers — Specification and testing — Part 2: Thermal containers*
- [2] ISO 8058, *Air cargo — Insulated container — Thermal efficiency requirements*
- [3] IATA AHM 915, *Standard controls — Section 2: Standard layout*<sup>1)</sup>
- [4] IATA AHM 926, *Functional specification for upper deck catering vehicle*<sup>1)</sup>
- [5] IATA AHM 927, *Functional specification for main deck catering vehicle*<sup>1)</sup>
- [6] SAE ARP 1328B, *Aircraft Ground Support Equipment — Wind Stability Determination*. Available at: <http://standards.sae.org>
- [7] SAE AIR 1558A, *Interface Protective Devices — Ground Equipment to Aircraft*. Available at: <http://standards.sae.org>
- [8] OSHA Standards for General Industry Code of Federal Regulations Title 29 CFR Part 1910. Available at: <http://www.osha.gov>
- [9] ANSI/SIA A92.7-1990, *Airline Ground Support Vehicle-Mounted Vertical Lift Devices*. Available at: <http://webstore.ansi.org>
- [10] Directive 2006/42/EC of the European Parliament and of the Council of 17 May 2006 on machinery, and amending Directive 95/16/EC. Available at: <http://eur-lex.europa.eu>
- [11] EN 1915-1, *Aircraft ground support equipment — General requirements — Part 1: Basic safety requirements*. Available at: <http://www.cen.eu>
- [12] EN 1915-2, *Aircraft ground support equipment — General requirements — Part 2: Stability and strength requirements, calculations and test methods*. Available at: <http://www.cen.eu>
- [13] EN 12312-2, *Aircraft ground support equipment — Specific requirements — Part 2: Catering vehicles*. Available at: <http://www.cen.eu>

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1) AHM 915, AHM 926, and AHM 927 are part of the International Air Transport Association (IATA) *Airport handling manual*. Available at: <http://www.iata.org>.









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