

Aircraft Loading - Vehicles

Introduction

This content of this publication was originally produced by the UK CAA, as a Safety Notice (issued July 2013), prompted by the Safety Alert for Operators (SAFO) 13005 issued by the Federal Aviation Administration (FAA) in May 2013.

Scope

This document has been produced to reiterate the potential safety impact of carrying/restraining vehicle loads and to remind operators of their responsibilities concerning:

- **Mass and balance policies and procedures.**
- **Loading policies and procedures.**
- **Personnel training, and;**
- **Management and oversight of the above.**

Regardless of State, accurate and secure loading is essential for safe flight operations. It is the aircraft operator's responsibility to ensure that related procedures are established, documented and implemented, and that the correct certified equipment is utilised, whether the duties are subcontracted or in-house.

Vehicle loads may require special handling or restraint devices other than a Unit Load Device (ULD) - such as a pallet or a container - and therefore appropriate robust procedures for carrying and securing such items must be established, documented and trained.

Vehicle loads, due to the non-standard and irregular nature of the cargo, require careful consideration of the limitations of the aeroplane and the characteristics of the cargo. There are often overlapping limitations on the basic airframe and floor, cargo loading system, attachment points and restraint equipment. These limitations must be considered before defining a safe configuration for all special cargo.

In accordance with the data provided within the respective Weight and Balance Manual or the Aircraft Flight Manual, the associated documentation should contain aircraft-specific information and

instruction and must be provided to everyone involved in the load planning and load restraint process.

Operational Standards

Load Planning

For load planning purposes, the actual mass of the vehicle must be used and must include the mass of the pallet, load spreading material and restraint equipment.

When the mass has been accurately established, calculations are then required to ensure that the aircraft floor and tie-down limitations are complied with. Instructions and procedures must clearly indicate the methods of calculating the appropriate quantity and standard of load spreading materials and certified restraint equipment required:

- Load spreading calculations must consider both the appropriate material and thickness of spreaders.
- Restraint calculations must consider equipment material, orientation (forward/aft, lateral and vertical direction) and angles of efficiency.

Loading instructions must clearly indicate the exact position the vehicle is to be loaded into the aeroplane and also how the load spreading and restraint equipment is to be applied. The documentation should also include any supplementary information regarding any pre-flight preparation requirements for the vehicle itself.

The loading documentation should be presented in a format that will be practical and useable for airside ramp/loading teams.

Loading

Loading procedures and documentation are to be type-specific and in accordance with the aircraft Weight and Balance Manual and be based on approved data.

During loading, clearances around the vehicle must be monitored to ensure no damage is caused to the aircraft structure.

As determined by the aforementioned load planning calculations, sufficient load spreading material and restraint equipment must be readily available at the aircraft.

When loading, it must be ensured that there is sufficient space between vehicles to accommodate effective forward and aft longitudinal restraints.

Loading procedures and instructions must also include any other provisions required to be used with special loads. For example, contoured pallet builds/tail stands etc.

Before the application of supplementary restraint, it is recommended that all available means of design-incorporated restraint, such as handbrakes or stabilisers, are utilised. The use of chocks should also be considered.

Restraint Equipment

Restraint equipment procedures and documentation are to be type-specific and in accordance with the aircraft Weight and Balance Manual and be based on approved data.

All supplementary restraint equipment must be certified to the requirements specified in European Technical Standard Order (ETSO) C-172 or equivalent (e.g. an EASA approved modification from the Aircraft Manufacturer or Supplemental Type Certificate Holder).

Aircraft frame spacing limitations must be adhered to at all times.

Vehicles must be secured using the required amount of restraint, with no fewer than the minimum number of tie-down devices. The maximum available restraint capability for any tie-down is determined by using the lesser rating of the following: the tie-down (floor) fittings used, the tie-down attachment points on the cargo item or the effective strength of the tie-down device used.

Effective restraint can be achieved by wrapping straps around the chassis of the vehicle or each wheel axle and/or wheel. If available, approved vehicle tie-down points can be used but the capacity of the tie-down point must not be exceeded.

Only structural parts of the vehicle should be used for tie-down. Non-structural parts such as steering rods, exhaust etc. are inadequate attachment points for straps, and must not be used. Care must be taken not to pinch any hydraulic, fuel or electrical cables.

The use of different types of tie-down devices/materials on the vehicle or pallet must be prohibited as different types have different rates of stretch under tension.

An even number of tie-downs, in pairs, must always be attached in a symmetrical pattern by using corresponding fittings on each side of the cargo floor centreline.

Note: Asymmetrical tie-downs permit load distributions that may ultimately result in tie-down failure. Such a failure would result from the different load-deflection rates of dissimilar materials or of identical materials of different length. Any material subjected to a tension load will stretch. A longer length tie-down has more stretch potential than a shorter length tie-down. If two tie-downs of the same type and capacity are used to restrain a load in a given direction and one is longer than the other, the longer tie-down, with its greater stretch potential, will permit the shorter tie-down to

assume the majority of any load that may develop. If the shorter tie-down becomes overstressed and fails, the longer tie-down would then be subjected to the full load and it, too, would likely fail. Therefore, symmetrical tie-downs should be as close to the same length as possible.

Any unused cargo locks should be raised to minimise any potential migration.

Loading Supervision

Loading Supervisors or Loadmasters must have a thorough understanding of the principles, calculation and application of mass and balance, loading and restraint. They must be present for the entire loading process in order to ensure that it has been completed in accordance with the established procedures. On completion of loading, the loading supervisor will sign the appropriate documentation to confirm that loading has been conducted to the required standards.

If the vehicle is to be carried on a cargo aircraft, the operator is encouraged to adopt procedures that require one of the other operating crew members to conduct a gross error check of the vehicle, when loaded and restrained, to ensure that it has been safely loaded and secured.

If the aircraft is to operate subsequent sectors with no changes to the load, operators should implement procedures to inspect restraints on each leg of the flight prior to take-off and verify the security of the vehicle. Any apparent minor shift of the load or a broken strap may be an indication of an inadequately secured load.

Do not continue to operate an aircraft if you believe there has been a cargo load shift.

Personnel Training

All personnel involved in the load planning and loading process must be appropriately trained, prior to being assigned operational duties.

Training programmes need to specify standards which personnel at all stations, including those subcontracted, are required to meet. This applies to initial and recurrent training, as well as periodic assessment to ensure ongoing competency.

Standards must also ensure operational personnel undergo evaluation or testing by written, oral or practical means, as applicable, to demonstrate adequate knowledge, competency and/or proficiency to perform duties, execute procedures and/or operate equipment.

It is suggested that the training organisation have standards to ensure that the completion of all required training and evaluation by operational ground handling personnel, instructors (trainers) and evaluators is documented in records, and such records are retained in accordance with requirements of the Ground Handler, relevant authorities and/or customer airlines.

It is permissible for the aeroplane operator to adopt existing Ground Service Provider training and the associated course material, provided it has been reviewed and deemed acceptable by the aircraft operator.

Recommended Actions

Operators that are able to offer the carriage of vehicles, and Ground Handling Agents that provide a service to do so, should review all related:

- Documented policies and procedures.
- Training syllabus and materials.
- Compliance monitoring programmes.

To ensure that the topic is covered in appropriate detail, based upon the information provided in this document.

For additional information and instruction, also refer to the IATA Airport Handling Manual.

Note: Whilst this document is focused on the safe loading of vehicles, attention is also drawn to compliance with the International Civil Aviation Organization's Technical Instructions for the Safe Transport of Dangerous Goods by Air.

For any related comments, feedback or information please contact GHOST@caa.co.uk