Shipping Magnets by Air Freight – Technical Guide

1. Why Are Magnets Regulated for Air Freight?

Magnets and magnetic assemblies that produce strong external magnetic fields are subject to packaging and transport regulations. If uncontrolled, magnetic fields may:

- Disrupt sensitive aircraft instruments, e.g. magnetic compasses and avionics.
- Cause mechanical attraction to ferromagnetic aircraft components.
- Present hazards during ground handling or sorting operations at airports.

To mitigate these risks, the IATA Dangerous Goods Regulations set thresholds for the maximum allowable magnetic flux density emitted from packages intended for air transport.

2. Testing and Classification of Magnetic Materials

Prior to shipment, magnets must undergo magnetic flux density testing to determine the intensity of their external magnetic fields. Two key regulatory tests apply:

Test	Distance	Maximum Allowable Flux Density	Classification
Primary Field Strength Test	4.6 metres (15 feet)	0.00525 gauss (5.25 milligauss or 0.525 \u00b5T)	Exceeding this level prohibits air freight.
Secondary (Stricter) Test	2.1 metres (7 feet)	0.002 gauss (2 milligauss or 0.2 \u00b5T)	Passing allows classification as non-magnetic for shipping.

Key Points:

- Packages exceeding 0.00525 gauss at 4.6 metres cannot legally be transported by air. In this case, magnets must be shipped via ground or sea freight.
- Packages measuring less than 0.002 gauss at 2.1 metres may be treated as non-magnetic and do not require Dangerous Goods documentation.
- Packages falling between these two thresholds must be declared as Magnetised Material and shipped under **UN2807, Class 9 Dangerous Goods** classification.

Important: Magnetic field measurements must be performed using calibrated, high sensitivity gaussmeters capable of detecting flux densities as low as 0.001 gauss. This adds to the complexity of shipping by air.

Important: Dangerous Goods fees apply in addition to standard air freight charges, making air shipment of magnets more expensive than ground or sea alternatives.

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3. Packaging Requirements

If magnets are to be shipped by air, precise packaging techniques must be employed to ensure external magnetic fields remain within acceptable limits.

- **Magnetic Shielding**: Magnetic shielding must be used to ensure that magnetic fields within the package are contained. This is usually accomplished using steel or specialised shielding alloys placed around the magnetic source.
- **Opposing Orientation:** Arranging magnets with poles opposing helps to minimise net external magnetic fields.
- **Internal Securement:** Use strong tape, fasteners, or restraints to secure magnets firmly inside the package. Fill any voids with dense foam, shredded cardboard, or rubber to prevent movement during transit. Ensure magnets are internally isolated within package.
- **Labelling and Documentation**: Clearly label packages containing magnets with a Magnetised Material warning. If magnetic shielding is used, indicate this clearly on the packaging. Attach Dangerous Goods labels if applicable.

Important: Packaging designs may involve Finite Element Analysis (FEA) to model and optimise magnetic field containment. Any modification to certified packaging after testing invalidates the original certification and may require retesting before shipment.

4. Contact GUK Magnetics

For expert advice or to discuss your air freight requirements for magnets, please contact our team.

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Date Issued: 30.04.2025