U.S. Department of Transportation

Pipeline and Hazardous Materials Safety Administration

1200 New Jersey Ave, SE
Washington, D.C. 20590

MAR 2 1 2011

Mr. Lalit Sabramanian
Product Engineer
Syncro Medical Innovations, Inc.
20 W Federal Street, Suite M5B
Youngstown, OH 44503

Reference No. 09-0084

Dear Mr. Sabramanian:

This is in response to your letter concerning the provision in § 173.21(d) under the Hazardous Materials Regulations (HMR; 49 CFR Parts 171-180) that forbids from transportation by aircraft a package that has a magnetic field measurement of more than 0.00525 gauss at a distance of 4.5 meters (15 feet) from any surface of the package. We have paraphrased your questions and answered them in the order you provided. We apologize for the delay in responding and any inconvenience this may have caused.

The HMR also authorize use of the International Civil Aviation Organization (ICAO) Technical Instructions for the Safe Transport of Dangerous Goods by Air (Technical Instructions) when all or part of the transportation of a hazardous material is by aircraft, so we have included information relative to these requirements. Under the provisions of §§ 171.22-171.24, the HMR give shippers and carriers the option of preparing shipments of hazardous materials offered or intended for transportation by aircraft in conformance with the ICAO Technical Instructions.

Q1. The earth's magnetic field is 0.5 gauss. Why then does § 173.21(d) forbid from transportation by aircraft a package with a magnetic field measurement greater than 0.00525 gauss at a distance of 4.5 meters from any surface of the package when this measurement is 100 times greater than that of the earth? Is this a typographical error or are the units expressed in teslas?

A1. The magnetic field measurement in § 173.21(d) is expressed in gauss and is based on tests conducted by the Federal Aviation Administration (FAA) to determine when a magnetic material would adversely affect the operation of an aircraft. In a 1987 advisory, entitled "Preparation and Loading of Magnetic Materials for Air Transportation" (enclosed), the FAA concluded a material with a measurable magnetic field of more than 0.00525 gauss at a distance of 4.5 meters from any surface of the package can cause an aircraft's magnetic compass or compass master unit to have "compass deviations as high as 125 degrees, cause navigation errors, and jeopardize the safety of the transporting

aircraft." The FAA is especially concerned magnetic fields of this strength will affect older or smaller aircraft because they may have magnetic master units located inside or near their cargo compartments. Under the HMR, packages with magnetic field of 0.00525 gauss or less at a distance of 4.5 meters are considered non-magnetic and are not subject to regulation.

Effective January 1, 2011, the ICAO revised its requirements for transporting magnetic materials by aircraft in its 2011-2012 edition of the Technical Instructions. These changes substantially revised the requirements for shipping magnetized material in former Packing Instruction (PI) 902, moved this revised language to new PI 953, and deleted PI 902. Specifically, the new requirements permit magnetized materials to be transported by aircraft with magnetic field strengths that can cause a compass deflection of 2 degrees or more at a distance of 2.1 meters but not more than 2 degrees at a distance of 4.6 meters (equivalent to 0.418 amperes per meter (A/m) or 0.00525 Gauss measured at a distance of 4.6 meters). Also, PI 953 excepts magnetized materials from all other requirements under the ICAO Technical Instructions provided they comply with the following:

1) the shipper must make prior arrangements with the operator (i.e., carrier) identifying the magnetized material. The dangerous goods transport document requirements of Part 5;4 are not applicable provided alternative written or electronic documentation includes the words "magnetized material" in association with the description of the goods;
2) the package must bear the magnetized material handling label (as shown in Figure 5-24 (enclosed) of Part 5; Chapter 3 of the 2011-2012 ICAO Technical Instructions);
3) the operator must stow the packaged magnetized material in accordance with 7;2.10; and
4) the incident reporting requirements of 7;4.4 must be met.

Finally, PI 953 requires magnetized material with a field strength sufficient to cause a compass deflection of more than 2 degrees at a distance of 4.6 meters to be transported only with the prior approval of the appropriate authority of the State (i.e., country) of origin and the State of the operator.

Q2. If the magnetic field measurement in § 173.21(d) is not an error, is this a field value relative to the earth's magnetic field of 0.5 gauss?

A2. Yes. Also see Answer A3.

Q3. Do you recommend any specific test to be able to measure magnetic field strength that is this low?

A3. The HMR do not prescribe any test methods to measure a magnetic field strength. Please note, however, that the ICAO Technical Instructions provide several methods for measuring magnetic field strength in § 9.2.1(d).

Q4. Is any special labeling or documentation required for us to transport this package?

A4. Under the HMR, a magnetized material is either not of sufficient magnetic strength to be regulated or is forbidden in transportation (see § 173.21(d)); therefore, no labels or shipping papers are required. However, the ICAO Technical Instructions require magnetized material that is not excepted from regulation to be described on a shipping paper as "UN 2807, Magnetized material, 9 (miscellaneous);" and marked and packaged as prescribed in PI 953. The package must also be labeled with a MAGNETIZED MATERIAL label that complies with the image in Figure 5-24 discussed earlier in Answer A1. Also, packages correctly labeled with the MAGNETIZED MATERIAL label under the ICAO Technical Instructions do not need to bear the Class 9 (MISCELLANEOUS) label (see § 3.2.11).

I hope this satisfies your request.

Sincerely,

T. Glenn Foster

T. Glenn Foster
Chief, Regulatory Review and Reinvention Branch
Standards and Rulemaking Division

Enclosures

U.S. Department of Transportation
Federal Aviation Administration

Advisory Circular

Subject: PREPARATION AND LOADING OF MAGNETIC MATERIALS FOR AIR TRANSPORTATION

Date: 3-19-87 **Initiated by:** ACS-100

AC No: 121-28 **Change:**

1. PURPOSE. This circular provides information relevant to the preparation and loading of magnetic materials for shipment in civil aircraft. Air transportation of improperly located or improperly shielded magnetic materials presents specific hazards in aircraft having compass master units located within the fuselage. Magnetic materials which are loaded in the vicinity of a magnetic compass or compass master unit could produce compass deviations as high as 125 degrees, cause navigation errors, and jeopardize the safety of the transporting aircraft. Physical separation can contribute significantly to reduce magnetic interference.

2. CANCELLATION. Advisory Circular 121-23 dated 2-10-77 is cancelled.

3. REFERENCE. Title 49 of the Code of Federal Regulations (49 CFR) Part 173.21(f) strictly forbids the carriage by aircraft of any material which, when packaged, has a measurable magnetic field of more than 0.00525 gauss when measured from any surface of the package at a distance of 15 feet. 49 CFR 175.85(g) states no person may load magnetized material (which might cause an erroneous magnetic compass reading) on an aircraft, in the vicinity of a magnetic compass, or compass master unit, that is a part of the instrument equipment of the aircraft, in a manner that affects its operation. If this requirement cannot be met, a special aircraft swing and compass calibration may be required.

4. DISCUSSION. A material is considered to be magnetized when it has a magnetic field strength greater than 0.00525 gauss at a distance of 15 feet from any point on the surface of the package, or which is of such mass that it could affect aircraft instrumentation, particularly magnetic compasses. Such material must be shielded to reduce the readings to a level that is no greater than 0.00525 gauss before being offered for transportation by aircraft.

Certain materials with a magnetic field of less than 0.00525 gauss were previously classified as hazardous materials. Auto fenders, automotive parts, metal stock and other large metal objects which are not intentionally magnetic, but have acquired magnetic properties during their manufacture or because of their

orientation with other cargo, fall into this category. Although slightly magnetized, such materials pose little or no transportation hazard. Modern aircraft use electronic compasses with magnetic compasses as backups. The sensors for magnetic backup compasses are sufficiently distant from the cargo bays, that a measurable deflection effect on the compass will not be caused by the potential marginal magnetic properties of metal objects such as those mentioned above.

5. HAZARDS. The hazard associated with the carriage of magnetized materials on older types of aircraft, where the magnetic master units are not located outside and away from the cargo compartments, is that a compass deviation as great as 125 degrees could be experienced and cause unacceptable navigation errors which can jeopardize the safety of the transporting aircraft.

6. PRECAUTIONS AND RECOMMENDATIONS.

a. When offering magnetized materials for air transportation, the shipper must ensure that each package has a magnetic field strength no greater than 0.00525 gauss when measured at 15 feet from all surfaces of the package.

b. The shipper should also take the following measures when offering magnetized materials for air transportation:

1. Whenever possible, magnets or magnetized devices should be packaged so that the polarities of each unit opposes the other.

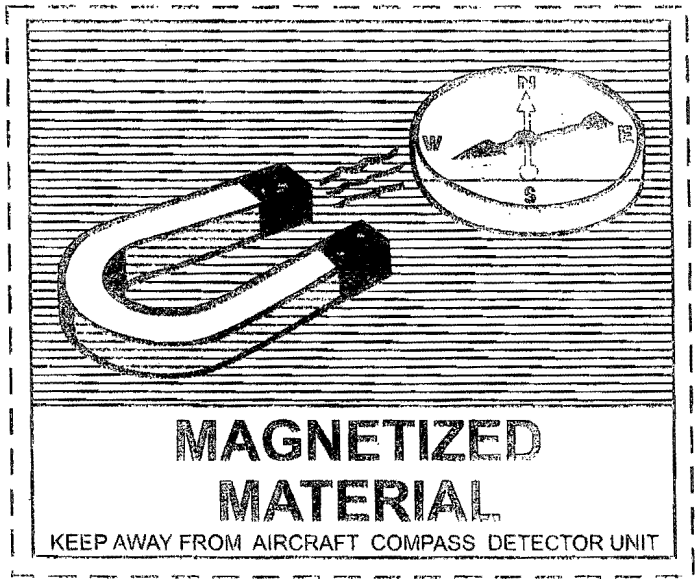
2. Keeper bars should be installed on permanent magnets to prevent the magnetic field from affecting the magnetic compass.

7. LOADING REQUIREMENTS. When accepting magnetized material, aircraft operators should ensure that the shipper verifies that the maximum field strength is no greater than 0.00525 gauss when measured at 15 feet from all surfaces of the package. If the aircraft being used does not have the magnetic compass master unit in a remote location and amply distant from the cargo hold, it is recommended that a special aircraft swing and compass calibration be made after loading and prior to operation. Aircraft operators should also check their compass calibration when transporting large amounts of metal assemblies such as auto fenders, frames, or other material which may not be magnetic in themselves but may have magnetic properties due to their manufacturing process or their orientation when placed aboard the aircraft. Cargo of this nature should be placed aboard the aircraft as far as possible from magnetic compass master units.

Raymond A Salazar

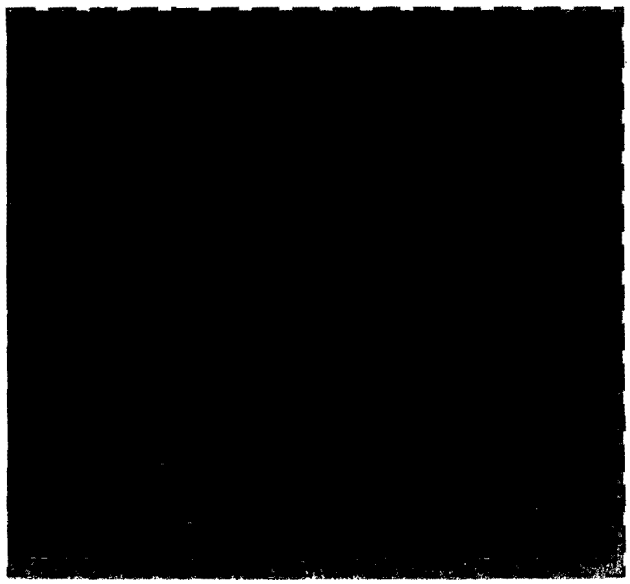
RAYMOND A. SALAZAR
DIRECTOR OF CIVIL AVIATION SECURITY

(Magnetic)



Colour: blue on white
Dimensions: 110 mm × 90 mm

Figure 5-24. Magnetized material



Colour: black on orange
Dimensions: 120 mm × 110 mm

Note.— Figure 5-24 as contained in the 2007-2008 edition of these Technical Instructions may continue to be used until 31 December 2012.

Figure 5-25. Cargo aircraft only

DOT/RSPA/OHMS
INIT

09 APR 15 PM 3:15

Lalit Subramanian (Syncro Medical Innovations, Inc.)
20 W Federal St., Suite M5B
Youngstown, OH 44503
Phone: (234) 855-1620

Edmonson
§173.21(d)
Forbidden Hazardous Materials
09-0084

To Who it may concern

U.S. Department of Transportation
Pipeline and Hazardous Safety Administration
Office of Hazardous Material Safety
1200 New Jersey Ave SE
East Building, 2nd Floor
Washington, DC 20590

Subject: Request for verification of specification in 49CFR §173.21(d) [Ref. # for Letter of Interpretation – 02-0316]

Dear Sir/Madam:

We are a medical device company and our product is a magnetically-guided enteral feeding tube. We are required to ship magnetic material. Could you please get back to me on the matter described below?

49CFR §173.21(d) states that, in order for magnetized material to be considered hazardous, the magnetic field measured at a distance of 15ft from the package must be at least 0.00525 gauss. We believe this specification to be in error, since the Earth's magnetic field is 0.5 gauss, which is 100x greater than this specification. We believe this is possibly a typographical error or the units are teslas and not gauss as stated?

If not, is this field value relative to the Earth's magnetic field of 0.5 gauss? Do you recommend any specific test to be able to measure field strength of this low magnitude? Finally, is there any special labeling or other documentation required in order for us to transport this package?

Thank you very much for your assistance in this matter.

Sincerely,

Lalit

Lalit Subramanian
Product Engineer
Syncro Medical Innovations, Inc.
April 7, 2009