



Brookhaven
National Laboratory

FOCUS:

SUPERCONDUCTING

MAGNETS

Guidance for Determining the ECCN for Superconducting Magnets

Purpose

This document provides guidance for identifying the correct Export Control Classification Number (ECCN) for superconducting magnets and associated technology. It focuses on the criteria and parameters under the U.S. Department of Commerce, Export Administration Regulations (EAR) that determine whether a superconducting magnet is controlled under ECCN 3A001.e.3 or 3A201.b, and which associated technology ECCNs (3E001 and 3E201) apply.

What's Controlled? – The Big Picture

Superconducting magnets are considered dual-use technologies. They can serve peaceful research purposes (e.g., medical imaging or fundamental physics) but may also have applications in sensitive or strategic areas such as advanced physics, nuclear, or defense programs.

A superconducting magnet becomes export controlled when its performance or design exceeds certain criteria for speed, power, or field precision, or when it is specially designed for such high-performance use.

If a magnet meets those criteria, or if related technical information enables its development or full operation, an export authorization may be required before sharing it internationally or with foreign nationals, including internal and external collaborations. This control is for both the hardware (the magnet itself) and the associated “technology”.

ECCN 3A001.e.3 High-Performance Superconductive Electromagnets

This control applies to magnets or solenoids that are “**specially designed**” to be **fully charged or discharged** in **less than one second** and **THEN** having **all** of the following characteristics:

- e.3.a. Energy delivered during the discharge exceeding 10 kJ in the first second;
- e.3.b. Inner diameter of the current carrying windings of more than 250 mm; *and*
- e.3.c. Rated for a magnetic induction of more than 8 T *or* “**overall current density**” in the winding of **more than** 300 A/mm²;

EAR Definition of Overall current density. (Cat 3): The total number of ampere-turns in the coil (i.e., the sum of the number of turns multiplied by the maximum current carried by each turn) divided by the total cross-section of the coil (comprising the superconducting filaments, the metallic matrix in which the superconducting filaments are embedded, the encapsulating material, any cooling channels, etc.).

Export Control Classification Number and Reason for Control:

- ECCN 3A001.e.3 (NS2, NP1, AT1)

ECCN 3A201.b Large Solenoidal Superconducting Magnets

This control applies to superconducting solenoidal electromagnets having all of the following characteristics:

b. Superconducting solenoidal electromagnets having all of the following characteristics:

- b.1. Capable of creating magnetic fields greater than 2 T;
- b.2. A ratio of length to inner diameter greater than 2;
- b.3. Inner diameter greater than 300 mm; *and*
- b.4. Magnetic field uniform to better than 1% over the central 50% of the inner volume;

Export Control Classification Number and Reason for Control:

- ECCN 3A201.b (NP1, AT1)

Applicable Technology Controls

Controls on the magnet's associated information are determined by the type of activity:

- ECCN 3E001 – "**Technology**" for the "**development**" or "**production**" of the controlled magnet. (Reason for Control: NS1, MT1, NP1, AT1) .
- ECCN 3E201 – "**Technology**" for the "**use**" of the controlled magnet. (Reason for Control: NP1, AT1) .

Clarification on Controlled Technology

Sharing general performance data, publications, or theoretical calculations that do ***not*** specifically enable design or operation generally does not constitute controlled "**technology**." Controlled "**technology**" typically includes schematics, detailed design documentation, integration procedures, or proprietary technical data that would **enable** "**development**", "**production**", or full "**use**" of a **controlled** magnet.

How to Determine the Correct ECCN

1. **Confirm the magnet's purpose and design intent.**
 - Was it "***specially designed***" for high-speed discharge or high uniformity?
2. **Check performance characteristics.**
 - Does it exceed export control thresholds for power, field strength, or geometry?
3. **Match to the ECCN criteria.**
 - If it fits the high-performance category → **3A001.e.3**
 - If it fits the large solenoidal category → **3A201.b**
4. **Determine applicable technology controls.**
 - "***Development***" or "***Production***" information → **3E001**
 - "***Use***" information (see definition of "use") → **3E201**
5. **When uncertain, consult the Export Control Office** before sharing data or hardware internationally.

Note: If none of the technology parameters are met, then the magnet is NOT export controlled and would fall under EAR99 and only be restricted for export to embargoed countries and prohibited end users.

Key Terms:

Term	Definition
ECCN	Export Control Classification Number, a code identifying items subject to U.S. export control
Specially Designed	A unique or customized design that makes an item meet control criteria under the EAR (772.1). Items may be excluded if of general commercial availability and not configured for restricted applications.
Technology	Information required to develop, produce, or use an item (may include design, manuals, and instructions)
Dual-Use	Items used for both civilian and potentially sensitive or military applications.
Use	Activities that include operation, installation, maintenance repair, overhaul, and refurbishing. To qualify as controlled “use” technology, information must enable all six of these functions. Note: • Full manuals or technical data covering <u>all</u> these aspects are likely controlled under ECCN 3E201 • Basic operation instructions alone generally do not meet this definition
Reasons for Control	NS1/NS2 - National Security Levels 1 & 2 MT1 – Missile Technology Level 1 NP1 – Non-Proliferation Level 1 AT1 – Anti-Terrorism Level 1

Key Takeaways:

- **STOP** - Superconducting magnets that are not EAR99, require export licensing authorization. Consult your Export Control Office before sharing superconducting magnets or related technology internationally or with foreign nationals, including in both internal and external collaborations.
- Document how the ECCN was determined for each item
- Update your classification if the magnet’s performance, design, or application changes.

References and Contacts:

15 CFR Part 774 Category 3 – Electronics

15 CFR 772.1 (Definitions)

Supplement No. 1 to Part 774 (CCL entries 3A001, 3A201, 3E001, 3E201)

For export classification assistance, contact the BNL Export Control Office @ export@bnl.gov