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NSA/CSS Requirements for Magnetic Degaussers



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1 Introduction

A magnetic degausser must pass an evaluation by meeting requirements set by the National Security Agency/Central Security Service (NSA/CSS) to sanitize classified magnetic storage devices such as magnetic tapes and magnetic hard disk drives. Secondly, the device's operational, administrative, power, safety, environmental and mechanical areas will be evaluated to minimize potential risks.

If the evaluation yields acceptable results, then the NSA/CSS will include the device in the next release of the "NSA/CSS Evaluated Products List for Magnetic Degaussers." The Evaluated Products List (EPL) is meant to serve as guidance; inclusion in this document is not an endorsement by the NSA/CSS or the U.S. Government. **All listed products on the EPL sanitize Top Secret/Sensitive Compartmented Information (TS/SCI) and below.**

2 Purpose and Use

A magnetic degausser vendor should use this document as a guide for the NSA/CSS evaluation. For a vendor's product to be included in the "NSA/CSS Evaluated Products List for Magnetic Degaussers," it must satisfy all requirements in this document and go through an evaluation performed by the Center for Storage Device Sanitization Research (CSDSR). During an assessment, the magnetic degaussers will be evaluated against a random assortment of magnetic storage devices which the vendor claims it sanitizes.

3 Definitions

- **Center for Storage Device Sanitization Research (CSDSR):** The office that guides the sanitization of information system (IS) storage devices for the NSA/CSS.
 - **Electromagnetic degausser:** A magnetic degausser generates an electric current passed through a coil to produce a large magnetic field. The direction, duration, and intensity of the current passing through the coil determines the polarity, duration, and magnitude of the magnetic field produced by the coil.
 - **Evaluated Products Lists (EPL):** A list managed by the CSDSR lists sanitization/destruction equipment that meets NSA/CSS specifications. The list applies to all NSA/CSS elements and pertains to all IS storage devices utilized by NSA/CSS elements, contractors, and personnel.
 - **Evaluator:** The destruction engineer performing the evaluation.
 - **Hard disk drive:** A hard disk drive (sometimes abbreviated as a hard drive, HD, or HDD) is an air-sealed non-volatile magnetic storage device containing one or more disks (sometimes referred to as platters) coated with magnetic material. Data is stored in the magnetic coating in magnetic patterns, which are written and read by magnetic heads that move rapidly over the spinning disks. Disk drives come in many physical shapes, known as form factors. Currently, the typical hard disk drive form factors are:
 - 3.5" form factor used in desktop computers and data centers
 - 2.5" form factor used in laptop computers and other portable applications, and some data centers
- NOTE:** For this document, the hard disk drive definition does not include electronic storage devices or solid-state storage devices commonly known as SSDs.
- **Impulse noise:** A category of acoustic noise that includes almost instantaneous sharp sounds.
 - **Jam:** The instance of a device seizing or becoming stuck through an operation. The CSDSR considers a machine jammed when the operator must manually interfere with unjamming or resetting the device. Any automatic unjamming systems will be regarded as a part of the device's operation as long as the operator does not need any significant interference.

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- **Magnetic degausser:** A device that produces a large magnetic field for permanently altering the magnetic alignment of small, magnetized regions (domains) in a magnetic medium so that any magnetic patterns representing data are changed, making the data patterns undecipherable. When exposed to the strong magnetic field, data on the magnetic medium is permanently erased (sanitized).
- **Magnetic medium chamber:** The enclosed space within the magnetic degausser where magnetic storage devices or magnetic media are located during the sanitization process.
- **Magnetic medium noise:** The unpredictable signal created by the random magnetic alignment of magnetized domains in regions of the magnetic medium containing no recorded data patterns. The sensing device that produces the signal can be any suitable device sensitive enough to detect and reconstruct the magnetic patterns written by the recording heads in the magnetic storage device, which contain the recording medium.
- **Magnetic medium:** The physical object (tape, hard disk, etc.) in magnetic storage devices that contains magnetic patterns representing stored data. They are also referred to as recording media.
- **Magnetic storage device:** Generalized device containing a magnetic medium on which information is stored in magnetic patterns.
- **Magnetic tape:** A magnetic medium consisting of a long thin, flexible polymer substrate with a magnetizable coating.
- **Operator:** The person using the magnetic degausser to perform the erasure of data from a magnetic storage device.
- **Permanent magnet degausser:** A magnetic degausser that contains one or more permanent magnet assemblies that generate a perpetual magnetic field.

4 General Requirements

4.1 Magnetic Degausser Passes

Magnetic degaussers requiring a multiple pass procedure, special adapters for accommodating specific magnetic storage devices, or prior disassembly of magnetic storage devices must be identified.

4.2 Magnetic Degausser Onboard Sanitization Verification

Electromagnetic degaussers, in particular, must have a built-in capability for verifying that the magnitude of the magnetic field produced by the degausser is sufficient for purging data from the magnetic media. (See the section on Magnetic Degausser Magnetic Field).

4.3 Magnetic Degausser Storage Device Capability

Magnetic degausser vendors must specify the types, form factors, and quantity of magnetic storage devices that can be accommodated in the magnetic medium chamber. Explicit instructions must be provided if removal of magnetic media from the storage device is required before sanitization.

4.4 Magnetic Degausser Erasure Specification

Magnetic degaussers must permanently erase all recorded magnetic patterns representing data to the magnetic medium noise level, making the patterns unrecognizable and unable to be reconstructed by any known means.

4.5 Magnetic Degausser Magnetic Field

The magnitude of the magnetic field produced by magnetic degaussers must be large enough to permanently alter the magnetic alignment of all magnetized domains in the magnetic medium so that the readback signal from all areas of the magnetic medium that previously contained recorded magnetic patterns has been reduced to the magnetic medium noise level. Due to advances in magnetic recording technology, the CSDSR will only accept for evaluation magnetic degaussers capable of producing 30,000 Gauss or greater field magnitude in all areas of the media chamber.

NOTE: 30,000 Gauss will be able to sanitize most commercial magnetic media as of December 2020. Larger field magnitudes will be required for sanitizing magnetic media in magnetic storage devices based on Energy Assisted Magnetic Recording (EAMR) technologies currently under development, such as Heat Assisted Magnetic Recording (HAMR) and Microwave-Assisted Magnetic Recording (MAMR). Magnetic degaussers that pass the CSDSR's evaluation and have been approved for sanitizing HAMR and MAMR magnetic media to NSA/CSS specifications will be identified explicitly in the EPL.

4.6 Operational Time

Magnetic degaussers must be able to operate continuously for 1 hour. The magnetic degaussers may jam or require cooling up to three times during that one hour of continuous use. Electromagnetic degaussers must be capable of sanitizing at least 40 magnetic storage devices within that one-hour time frame. Permanent magnetic degaussers must be capable of sanitizing at least 100 magnetic storage devices within that one-hour time frame. The various magnetic storage devices will have different media types, form factors, and manufacturers.

5 Administrative Requirements

5.1 Labels

The magnetic degausser must have a label that can be easily viewed and includes:

- Company Name
- Model Number
- Serial Number

5.2 Feature Claims

Vendors of magnetic degaussers must clearly state in their documentation all media types and form factors the degausser is capable of destroying. The NSA/CSS will not test the device for media unclaimed by the vendor, nor will NSA/CSS approve untested media destruction capabilities. Failure to claim a requirement in the documentation may result in disqualification for evaluation.

5.3 User/Operator Guide

The magnetic degausser must have an English version of the user/operator manual. The manual must include the following:

- An accurate description of the magnetic degausser.
- A list of magnetic storage devices and media it will erase.
- An accurate summary of all features and functions.
- List of specifications (i.e., power consumption, motor size, etc.)
- Operator allowed maintenance procedures that do not alter calibration:
 - Changing Filters
 - Removing a jam
 - Lubrication
 - Safety procedures

6 Power Requirements

6.1 Electronic Operation

The magnetic degausser will be approved for a power source that is evaluated in testing. Every power source a magnetic degausser utilizes must be individually tested to claim approval.

6.2 On/Off Mechanism

The magnetic degausser must have an on/off mechanism that an operator can use safely.

Note: If your device does not have an emergency stop mechanism, then the on/off mechanism must follow all the functions outlined in [the 7.1 Emergency Off section](#).

6.3 Power Indication

The magnetic degausser must have a power-on indication display that the operator can see.

NOTE: some devices that are not electrically powered may be excluded from this requirement

6.4 Ready Indications

If the magnetic degausser requires a warm-up period before the operation, it must have a ready indication display.

6.5 Fault Indications

Suppose a magnetic degausser, particularly an electromagnetic degausser, fails to produce the required or designed peak magnetic field magnitude. In that case, it must show some indication that makes the operator aware of this.

6.6 Reset Indications

The magnetic degausser requires some indications that display when the device has reset and is ready for operation.

7 Safety and Environmental Requirements

7.1 Emergency Off

The magnetic degausser must have an emergency stop mechanism that is identified. This stopping mechanism should be able to be initiated in a single human action and override all other functions without hindering protective functions (see [reference f](#)). The stop mechanism must be within 0.5 meters from the location where the storage media is fed into the machine for sanitization. Disengaging the emergency stop mechanism should not start the machine. The emergency procedure must be documented, which should include directions on how to reset the device.

NOTE: some devices that are not electrically powered may be excluded from this requirement.

7.2 Operator Protection

The magnetic degausser must protect the operator. The operator must not contact any moving parts, toxic dust, dangerous magnetic fields, or projectiles during operation.

7.3 Noise

Sound levels for the magnetic degaussers must meet both the National Institute for Occupational Safety and Health (NIOSH) and the Occupational Safety and Health Administration (OSHA) standards (see [References b and c](#)). CSDSR requires the sound level of magnetic degaussers that create impulse noise to be less than 120 dB. Devices that make continuous noise must follow Table 1 - Permissible Noise Exposures. Since the magnetic degausser's

operation time varies among users, the CSDSR requires the sound level of magnetic degaussers to be less than 85 dBA.

Table 1: Permissible Noise Exposures

Duration per day, hours	Sound level dBA slow intervals
8	90
6	92
4	95
3	97
2	100
1 ½	102
1	105
½	110
¼ or less	115

8 Mechanical Requirements

8.1 Fit and Finish

The magnetic degausser should have a tight fit with no gaps greater than 2 millimeters between panels, loose panels, faulty doors, loose windows, or sharp edges that could cause safety or operational issues.

The magnetic degausser must be a production unit, and all claimed features should be operational. Special features for service engineer diagnoses are allowed but should not be available to the operator.

8.2 Vibration

The effects of vibration can be severe. Unchecked vibration can accelerate rates of wear (e.g., reduce bearing life) and damage equipment. Vibrating machinery can create noise, cause safety problems and lead to degradation in plant working conditions.

The magnetic degausser must not exhibit vibration velocity in the unsatisfactory or unacceptable range shown below in Table 2. The unsatisfactory or unacceptable ranges differ among the four different listed machine classes:

- Class A: small machines to 15 kW
- Class B: 15-75 kW on light foundations and 15-300 kW on heavy foundations
- Class C: above 300 kW on heavy and rigid foundations
- Class D: above 300 kW on flexible foundations (soft mount).

The measurements will be taken at four locations around the device using a digital vibration instrument.

Table 2: Vibrations Severity

Vibration Severity						
	Machine		Class A	Class B	Class C	Class D
	in/s	mm/s				
Vibration Velocity V _{ms}	0.01	0.28	Good	Good	Good	Good
	0.02	0.45	Good	Good	Good	Good
	0.03	0.71	Good	Good	Good	Good
	0.04	1.12	Satisfactory	Good	Good	Good
	0.07	1.80	Satisfactory	Satisfactory	Good	Good
	0.11	2.80	Unsatisfactory	Satisfactory	Satisfactory	Good
	0.18	4.50	Unsatisfactory	Unsatisfactory	Satisfactory	Satisfactory
	0.28	7.10	Unacceptable	Unsatisfactory	Unsatisfactory	Satisfactory
	0.44	11.20	Unacceptable	Unacceptable	Unsatisfactory	Unsatisfactory
	0.70	18.0	Unacceptable	Unacceptable	Unacceptable	Unsatisfactory
	0.71	28.0	Unacceptable	Unacceptable	Unacceptable	Unacceptable
	1.10	45.0	Unacceptable	Unacceptable	Unacceptable	Unacceptable

Key	
Good	Green
Satisfactory	Orange
Unsatisfactory	Red
Unacceptable	Dark Red

Note: Table 2 is based on the general guidelines from International Organization for Standardization (see [reference e](#)).

8.3 Heat Generation

ASTM C1055 (the Standard Guide for Heated System Surface Conditions that Produce Contact Burn Injuries) recommends that surface temperatures remain at or below 44°C (see [reference d](#) and Table 3 below).

Table 3: Thermal Sensations and Associated Effects Throughout Range of Temperatures Compatible with Tissue Life

Sensation	Skin Color	Tissue Temperature		Process	Injury
		deg. C	deg. F		
Numbness	White	72	162	Protein Coagulation	Irreversible
	Mottled Red and White	68	140		
Maximum Pain		Bright Red		64	111
	60				
Severe Pain	Light Red	56	93	Normal Metabolism	Reversible
		52			
Threshold Pain	Flushed	48	72		
Hot		44			
Warm		40	50		
		36			
		32	93		None

An average operator can touch a 44°C surface for up to six hours without causing damage to the skin. Heat measurements will be taken in various places on each side of the machine, and no measurement should be above 44°C. Measurements will be taken inside the machine in areas that the operator can access (e.g., to empty debris, perform

maintenance, reset motors, etc.). Warning labels must be visible if the temperature in these locations can exceed 44°C. No temperature above 60°C in accessible areas will be allowed.

8.4 Calibration or Maintenance

Any machine will require calibration and maintenance during its lifetime. All calibration or maintenance tasks performed by the operator must be safe and easy to perform. Some specific requirements:

- Unit jams must be cleared within 5 minutes.
- A thermally induced shutdown of degausser operation must last no longer than 10 minutes to reset and permit regular operation.

9 References

- a. [NSA/CSS Policy Statement 9-12](#), “NSA/CSS Storage Device Sanitization Manual”
- b. [OSHA 1910.95](#), “Occupational noise exposure.”
- c. [NIOSH Publication Number 98-126](#), “Occupational Noise Exposure”
- d. [ASTM C1055](#), “the Standard Guide for Heated System Surface Conditions that Produce Contact Burn Injuries”
- e. [ISO 20816](#), “ISO 20816 Mechanical vibration” — Measurement and evaluation of machine vibration
- f. [ISO 13850](#), Safety of machinery – Emergency Stop Function – Principles for design