Technical ✓
Specification

dhf
Raising Standards
Advancing Safety

Electromagnetic Locking Devices Performance Requirements

DHF TS 010:2016 + A1:2019

Technical specification produced by **dhf**

Contents

Foreword

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This performance specification does not replace any existing performance specification. This specification defines the type of products, the technical and performance requirements for electromagnetic locking devices, including internal face fixed, internal morticed, internal shear magnets and external magnets. This does not include any other electro-magnetic device such as magnetic bolts etc.

This specification does not provide for certification against European standards; it is designed to provide **dhf** approval for electromagnetic locking devices.

Approval against the requirements of this performance specification is possible from February 2016. The aim of this specification is to provide approval for electromagnetic locking devices from **dhf**.

The technical provisions of this specification have been adopted as a common basis for the approval of electromagnetic locking devices.

This Technical Schedule does not cover the requirements for use on panic or emergency escape doors as this is covered by other standards.

1. Scope

This performance specification gives the requirements and test methods for the security, durability, fire and environment for electromagnetic locking devices when used on hinged, pivoted or sliding internal, external doors or gates.

This specification does not detail the requirements for a certified ISO 9001 quality management system BUT will require compliance with the Clause 7 which relates to the requirements of Factory Production Control.

The main purpose of the test is to prove the performance of the product when it is tested and passes to this specification.

In addition to the requirements of this technical document TS 010, if additional fire characteristics are needed, then these shall be performed to EN 1634-1 or EN 1634-2.

It is expected that the products to be tested have been EMC tested for low voltage devices to EN 61000.

This performance specification does not cover those locks and strikes that are covered by EN 14846 or products covered by prEN 13637 electromechanical exit systems.

The use of Z & L brackets reduces the holding force between the armature plate and the electromagnetic lock, which will vary depending on the fixings used, the doorframe material and the size of the door. Due to the number of configurations which would affect the holding force, the standard does not include testing with brackets.

2. References

Normative References

EN 1634-1	Fire resistance and smoke control tests for doors, shutters and openable window assemblies and elements of building hardware. Part 1: Fire resistance tests for doors, shutters and openable windows
EN 1634-2	Fire resistance and smoke control tests for door, shutter and openable window assemblies and elements of building hardware. Part 2: Fire resistance characterisation test for elements of building hardware
EN 1670	Building hardware corrosion resistance – requirements and test methods
EN 13637	Electromechanical exit systems for use on escape routes – requirements and test methods
EN 61000-4-2	Electromagnetic compatibility (EMC) - Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test
EN 61000-4-3	Electromagnetic compatibility (EMC) - Part 4-3: Testing and measurement techniques - Radiated, radio-frequency electromagnetic field immunity test
EN 61000-4-4	Electromagnetic compatibility (EMC) - Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test
EN 61000-4-5	Electromagnetic compatibility (EMC) - Part 4-5: Testing and measurement techniques - Surge immunity test
EN 60529	Degrees of protection provided by enclosures (IP code)

3. Terms and definitions

3.1 **Internal electromagnetic shear lock**
The electromagnetic shear lock which is designed to lock the door in the shear position.

3.2 **Internal face to face fixed electromagnetic locks**
The face fixed electromagnetic locks are mounted under the top header rail or side frame, with the armature plate fixed to the door face.

3.3 **Internal mortice face to face electromagnetic locks**
The mortice face to face electromagnetic locks are either morticed into a frame or a housing.

3.4 **External electromagnetic magnets**

The electromagnetic external magnets are suitable for external applications such as vehicle and pedestrian entrance gates, barriers and doors.

3.5 **Z & L brackets**
The Z & L brackets are used with face to face electromagnetic locks so that they can be fitted to inward opening doors.

3.6 **L bracket**
A bracket used for fixing a face to face electromagnetic or outward opening doors which have a shallow frame depth.

3.7 **Single action**
Doors that can only open in one direction and close against a fixed stop.

3.8 **Double action**
Doors that are operable in both directions.

3.9 **Safety bolts**
A secondary fixing which prevents the magnet fixing bolts from becoming loose or completely free whilst providing anti-tamper.

3.10 **Safety straps**
Safety straps are a secured method of fixing the electromagnetic lock's armature plate to prevent the armature from failing from its fixed position if the fixings work loose.

3.11 **Test specimen**
Complete full working electromagnetic lock supplied by the manufacturer ready for test.

4. General requirements

4.1 **Before the commencement of any testing, the applicant shall supply detailed information about the product to be tested including the following.**

a) Name and address of all relevant manufacturing facilities, if different to the applicant

b) All configurations for which classification is required

c) Detailed drawings of all configurations

d) Manufacturer's installation instructions

4.1.1 The electromagnetic lock sample shall be supplied for testing fully functioning, complete with all hardware, accessories/brackets/fixings and instructions.

4.1.2 All tests shall be conducted in accordance with the appropriate grades detailed in Clause 6 of this technical specification

4.1.3 Minimum level of IP54 Category 2 enclosure is required for all magnets used for box 8 Grade D in the classification

4.2 **The test requirements cover the following characteristics:**

4.2.1 Category of use

4.2.2 Durability

4.2.3 Suitable for use on fire / smoke doors

4.2.4 Safety

4.2.5 Corrosion resistance

4.2.6 Security

4.2.7 Security - electrical function

4.2.8 Security - electrical manipulation

4.2.9 Type of device.

NOTE: dhf recommend that test evidence be generated at an independent test facility with third-party accreditation.

5. Classification

5.1 Category of use

Grade 3 - for doors used by the public and others with little incentive to exercise care and with a chance of misuse to the door

5.2 Durability

Grade 5: 50,000 cycles
Grade 6: 100,000 cycles
Grade 7: 200,000 cycles
Grade 8: 500,000 cycles

5.3 Suitable for use on fire / smoke doors

Grade 0: Not intended for use on fire doors
Grade A: Suitable for use on smoke door assembly only
Grade B: Suitable for use on smoke / fire door assemblies

5.4 Safety bolts & straps

Grade 0: Not supplied
Grade 1: Safety bolts supplied
Grade 2: Straps supplied
Grade 3: Safety bolts and straps supplied

5.5 Corrosion resistance

Grade 1: Up to 24 hours - mild resistance
Grade 2: Up to 48 hours - moderate resistance
Grade 3: Up to 96 hours - high resistance
Grade 4: Up to 240 hours - very high resistance

5.6 Security - Holding force without additional brackets

Grade 1: Holding force above 1000N (225 lbf)
Grade 2: Holding force above 2000N (450 lbf)
Grade 3: Holding force above 3000N (675 lbf)
Grade 4: Holding force above 5000N (1125 lbf)
Grade 5: Holding force above 7000N (1570 lbf)
Grade 6: Holding force above 10000N (2250 lbf)

5.7 Security - electrical function

Grade 0: No status indication
Grade 1: Status indication of the position of the electromagnetic lock either audio or visual indicator of the element
Grade 2: Status indication of the position of the electromagnetic lock either audio or visual indicator of the element with additional output signal

5.8 Type of device

Grade A: Internal face to face fixed electromagnetic locks
Grade B: Internal mortice electromagnetic locks
Grade C: Internal electromagnetic shear locks
Grade D: External electromagnetic locks

Category of use	Durability	Fire	Safety bolts & straps	Corrosion	Security	Electro function	Type of devices
3	2	B	1	3	3	1	A

Example of classification

6. Test requirements and procedures

6.1 Minimum of three samples will be required.

Sample A	Sample B	Sample C
6.7 Security holding force	6.7 Security holding force	6.7 Security holding force
6.3 Durability	6.6 Corrosion resistance	
6.7 Security holding force	6.7 Security holding force	

Locks shall be tested at the lowest nominal rated voltage and installed to the manufacturer's instructions

6.2 **Category of use**
All locks should be classified as Grade 3

6.3 **Durability**
The durability test is to identify the correct function of the electromagnetic lock, the electromagnetic lock is to be assembled in accordance with the manufacturer's fitting instructions excluding any brackets such as Z&L bracket.

The durability testing is carried out on a test rig. It is performed on an apparatus that allows the armature to be moved in isolation to the magnet for example spring loaded.

Test method

- Energize the magnet to the correct voltage (+or - 10%)
- Attached the armature so it is secured correctly on to the face of the magnet
- Leave energized for a minimum of 5 seconds
- For type A, B and D electromagnetic locks, de-energize the magnet and remove the armature making sure there is a gap of 10mm (+ or - 1mm) between magnet and armature
- For type C electromagnetic shear locks, de-energize the magnet and remove the armature making sure that the distance of separation is in accordance with the manufacturer's instructions
- Leave for a minimum of 5 seconds
- Re-energize the magnet and repeat the cycle
- After the test the locks will continue to function
- When tested to 6.6 Corrosion resistance the lock shall still meet the security holding force grade

6.4 **Suitable for use on fire / smoke doors**
The electromagnet shall be included in a full scale fire test to EN 1634-1; pass and fail criteria are given in the fire test standard.

Following the full scale fire test, it could be possible to cover other designs/family members by having a fire assessment or using small scale testing to EN 1634-2.

6.5 **Safety bolts and straps**
Safety bolts and straps shall be declared by the supplier of the electro magnet as per grading in clause 5.4.

6.6 **Corrosion resistance**
The corrosion test shall be performed to EN 1670 for the required exposure time.

Prior to the corrosion test, the security holding force shall be performed in accordance with clause 6.7.

Electro-magnetic locks that are to be corrosion tested shall have the external wiring and locating position protected for the duration of the test.
Whilst in the chamber, the magnet face shall be covered by the armature plate for the required duration, by securing using the specified voltage in 6.1.2.

After the required exposure time, the security holding force shall be repeated and should still be within the security holding force grade previously tested. There is no visual inspection required.

6.7 **Security holding force**

The security holding force test shall be tested on a rigid test apparatus.

The electromagnetic lock is fixed by the supplied fixings to a steel section 100 mm x 50 mm x 4 mm NS RHS. If the supplied fixings are not suitable for attaching the electromagnetic lock to steel, then they may be replaced by the same number of suitable fixings of a similar or greater size. The steel section is fixed rigidly to the test bed; if necessary, the steel section may be reinforced to prevent distortion.

The armature plate shall be connected to a load-cell for applying the correct holding force.

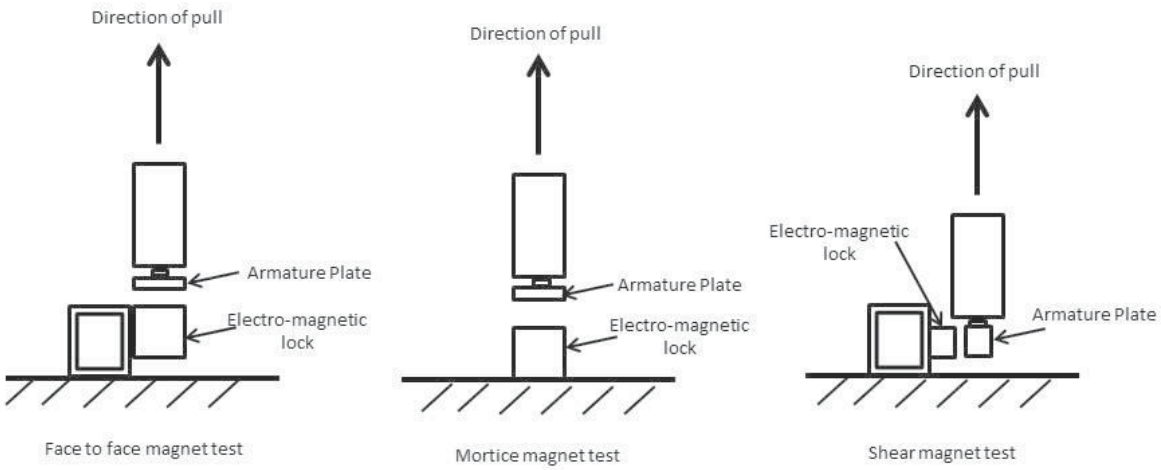
The armature bracket shall be free to move whilst under load. The armature plate shall be fitted correctly (square) to the face of the magnet prior to the load being applied.

Apply rated voltage to the magnet.

The load is applied to the desired grade to ensure the armature, fixings and magnet housing remain

secure.

Typical sample mounting methods



6.8 **Security - electrical function**

Three grades are identified as the following and are for identification only and therefore do not have a pass or fail

criteria: Grade 0 No status indication

Grade 1 Status indication of the position of the electromagnetic lock in the energised or non-energised state either audio or visual indicator of the element

Grade 2 Status indication of the position of the electromagnetic lock in the energised or non-energised state either audio or visual indicator of the element with additional output signal

6.9 **Type of device:**

This shall be declared by the supplier.

7. Factory production control

7.1 **General**

The manufacturer shall declare that they have a FPC system in accordance with this specification. Factory production control (FPC) system is the permanent internal control of production exercised by the manufacturer. The aim of the FPC system is to ensure that the product characteristics are maintained within specified limits during production.

The manufacturer shall set up a systematic FPC system in the form of written policies and procedures taking into account the following aspects:

- Product types and range of application
- Manufacturing processes (e.g. assembly of components purchased from external suppliers)
- Batch quantity

The manufacturer shall appoint a person to be responsible for the FPC system in each factory.

The production control requirements shall be decided by the manufacturer and shall include the following operations appropriate to the manufacturing processes:

- Specification and verification of raw materials and constituents
- Controls and tests, if any, to be carried out during manufacture in accordance with a frequency specified by the manufacturer
- Verifications and tests, if any, to be carried out on finished products in accordance with a frequency specified by the manufacturer
- Description of actions to be taken in case of non-conformity.

An FPC system according to EN ISO 9001 or to similar international standards and made specific to the product is deemed to meet the FPC requirements of this Specification and verified by the manufacturer's declaration of performance.

8. Marking and labelling

Example of label for packaging:

8.1

TS 010: 2016

Classification

3	8	B	0	4	6	1	B

Company Name: Electromagnets - R - US
Company Address: Electric Avenue, Birmingham, B1

Example of label for the product:

TS 010:2016

Classification

3	8	B	0	4	6	1	B

8.2 **3.4** The classified electromagnetic lock shall be provided with a label fixed to the item.

8.3 The label or means of identification should be fitted so it is visible before installation. The fitting instructions will detail the characteristics of the product to which it is tested or means of identification.

9. Audit requirements

9.1 Audit tests will be performed every year and fire testing will be reviewed every 5 years.

9.2 If any part of the audit test fails, the client will be notified and discussion on possible modifications and / or further samples to be taken and tested will be agreed.

10. Installation instructions

10.1 Each Electro-magnetic lock shall be supplied with full installation instructions.

These will contain the following:

- Company name
- Company address
- Product name and number
- Installation instructions
- Correct fixing positions
- Voltage requirements
- Maintenance
- The number and date of this technical standard
- Classification according to the standard

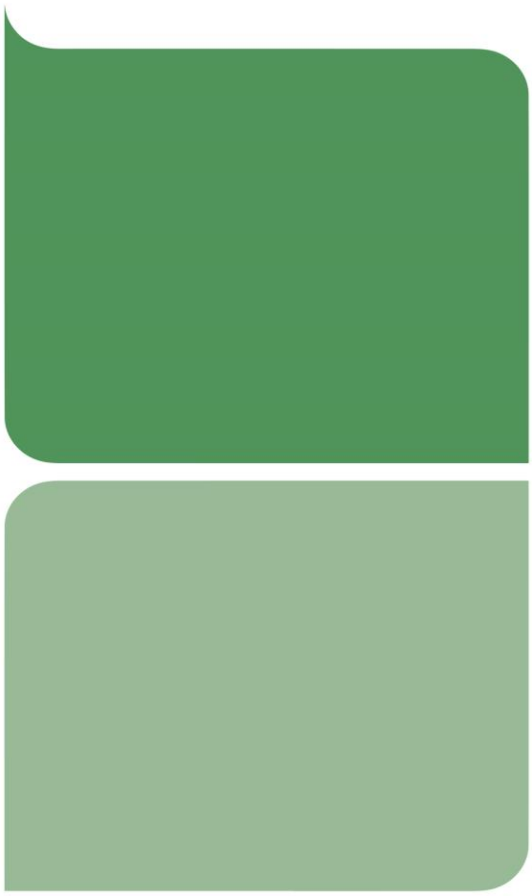
ANNEX A

A.1 Audit tests will be performed every year and fire testing will be reviewed every 5 years.

Organisations ratifying this schedule

- **dhf**
- Alpro Door Hardware
- ASSA ABLOY
- Exova Warrington Fire
- Securefast
- Secured by Design (SBD)

Notes:



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