asset marking products
requirements and test methods

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ATTENTION:
This document has been produced to assist in the testing of products. This version should be applied on a provisional basis so that information and experience of its practical application may be obtained. Anybody using this document is advised to contact the Technical Department of BSIA so that they can be informed about any updates to the document which may have been issued.

Form No. 121 Issue 1

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Foreword

This standard was developed by the Asset and Property Marking Section of the British Security Industry Association (BSIA) together with input from other companies in the marking industry and with involvement by Secured by Design.

This document was published by BSIA in June 2013.

Throughout this document references to ISO and EN standards should be considered to refer to the relevant national versions of these standards. In the UK this would be the BS version (e.g. EN ISO/IEC 17025 can be purchased from British Standards Institution as BS EN ISO/IEC 17025).

Use of this document

It has been assumed in the preparation of this document that the execution of its provisions will be entrusted to appropriately qualified and experienced people, for whose use it has been produced.

Users of this document are recommended to consider the following:

a) **Assessment of capability.** An assessment of the capability of organisations offering services or products referred to by this document may be indicated by a quality system assessment and registration against the appropriate standard in the EN ISO 9000 series by an accredited third-party certification body.

b) **Accreditation of test laboratories.** It is recommended that test laboratories be accredited to EN ISO/IEC 17025 by a national or international accreditation body.

c) **Product certification.** Independent third-party certification of product conformance to this document is recommended. For certification of products in the United Kingdom the BSIA can offer assistance regarding identification of independent third party certifiers.

Presentation conventions

In this document roman type is used to present provisions and requirements are expressed in sentences in which the principal auxiliary verb is "shall".

Italic type is used for the presentation of commentary, explanations and general informative material. Such comments are not normative.

Contractual and Legal

This publication does not purport to include the necessary provisions of a contract.

The purpose of this document is to enable a standardised method of testing. It is not intended to constitute professional advice. No liability is accepted for reliance upon this document. Purchasers of products claiming conformance to this standard are recommended to seek professional advice regarding the suitability of the product for their needs.

0. Introduction

This standard was devised to allow for testing of products used to mark, in a broad sense of the word, items and materials having value or to offer evidence that contact has been made with the mark. It was considered beneficial to purchasers or specifiers of these products to be able to make decisions based on a standardised method of testing. The standard recognises that there is a wide diversity of products and that very few of these will be suitable for an identical range of applications. The standard therefore relies on the principle that it is used to confirm the claims made by manufacturers.

1. Scope

This standard gives requirements related to products used for the marking of assets, including cash, for the purposes of deterrence against theft and/or identification of stolen goods or identification of a suspect exposed to a marking product. This standard also gives requirements for products used to indicate the authenticity of an item.

This standard includes requirements for means to enable specifiers and purchasers of asset marking products to determine their suitability for purpose and gives test methodologies to confirm products meet the performance claims of manufacturers. The test methods included in this standard may be used as part of a certification scheme.

Some products claiming conformance with this standard may require the use of an associated database or asset register to enable identification of the legitimate owner of the marked asset. This standard does not include requirements for the design, management or operation of such databases or asset registers.

This standard gives requirements for the provision of information to ensure purchasers can make correct use of the asset marking product. This standard does not give requirements regarding the method of application of asset marking products nor does it give requirements for design and installation of equipment for the application of marks (e.g. spray systems or etching equipment).

This standard does not give requirements for the manufacture of the product but could be used as part of a certification process to ensure that manufactured product continues to meet the requirements of this standard.

2. References

2.1 Normative References

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN ISO 4892-1: 2001 Plastics – Methods of exposure to laboratory light sources – Part 1: General guidance

EN ISO 4892-3: 2006 Plastics – Methods of exposure to laboratory light sources – Part 3: Fluorescent UV Lamps

2.2 Bibliography

The following documents are referenced in this standard and may be read to gain further information.

EN ISO/IEC 17025	General Requirements for the Competence of Testing and Calibration Laboratories
ISO/IEC 27001: 2005 (BS 7799-2: 2005)	Information technology – Security techniques – Information security management systems – Requirements
EN ISO 9000	Quality Management Systems. Fundamentals and Vocabulary
EN ISO 9001	Quality Management Systems. Requirements
LPS 1224	Requirements for Secure Database Registers
LPS 1225	Requirements for the LPCB Approval and Listing of Asset Marking Systems
PAS 820	Laboratory-identifiable forensic codes. Classification of performance when exposed to artificial weathering

3. Terms, definitions and abbreviations

3.1 Definitions

For the purposes of this code of practice, the following terms and definitions apply:

3.1.1 Application

The action of applying the mark either to the surface of an asset or, in the case of event triggered marking, to other surfaces or persons close to marking equipment.

3.1.2 Contamination

Deliberate or accidental mixing of the components of a mark (typically in liquid form) such that the mark is rendered incapable of providing forensic quality proof of connection to a crime or identification of asset ownership.

3.1.3 Database Management Company (DMC)

A company that has operational control of a secure asset register.

3.1.4 Dispersal

Application of an event triggered mark usually in the form of a spray.

3.1.5 Event triggered mark

A mark applied to an asset and/or suspected criminal to provide evidence of a crime where the application results from detection of a genuine or possible crime or a manual activation.

Note: The action of attempting to remove a mark does not, in isolation, constitute an event. An event-triggered mark is not applied until the event that triggers it.

3.1.6 Forensic Coding Material

A material that enables the mark (and therefore the asset) to be uniquely identified using content that can be distinguished only by personnel trained in the appropriate method and using appropriate technology.

Note: The process of identification may require the use of a laboratory.

3.1.7 Functional Life

The period of time from the correct application of the product, during which the product should achieve its purpose in accordance with the requirements of this standard. (compare with Operational Life).

3.1.8 Linked mark

A mark containing information uniquely linking the asset to its recorded owner.

3.1.9 Manufacturer

The company that makes the product or marking equipment.

3.1.10 Mark

An attribute given to an asset, or other object by transfer or dispersal, intended to provide information linking the asset to its recorded owner or evidence used as proof of criminal behaviour.

3.1.11 Marking device

A form of mark, such as a tag, in which application is by an individual item.

3.1.12 Non-transferable mark

A type of mark intended to not transfer.

Note: This characteristic of the mark applies only when the mark is in a stabilised state (e.g. after curing).

3.1.13 Operational Life

The period of time from the filling or loading of the marking equipment during which application of the mark should achieve its purpose in accordance with the requirements of this standard (cf. Functional Life).

3.1.14 Overt Mark

A type of mark that is easily and deliberately visible to a majority of people under normal lighting conditions.

3.1.15 Postcode

A series of letters and/or numbers that form a recognised code corresponding to a specific postal address or group of addresses.

3.1.16 Product

A marking device or non re-usable material used in the application of a mark as it exists at the point of application.

Note: Where a material contains a forensic coding material in combination with other materials (e.g. in solution) it is the combination of materials that is considered the product for the purposes of the test methods described by this standard.

3.1.17 Purpose

The intended use of the product as defined within the documentation supplied by the manufacturer and in conformance with this standard.

3.1.18 Secure Asset Register (SAR)

A database containing a reference to a unique mark on an asset and linking it to the identity of the recorded owner and / or installed location of that asset.

3.1.19 Shelf Life

The maximum period of time from manufacture to application, that a product can be stored according to the manufacturer's documentation, in its original undamaged and unopened packaging, such that its fitness for purpose is maintained.

3.1.20 Stabilised State

The condition of a mark when any processes (curing) necessary to stabilise it have completed and it is intended to be capable of meeting the requirements of this standard.

3.1.21 Stabilisation

The process a mark undergoes from its time of application until it has reached a stabilised state.

Note: 1 This process is commonly known as curing. Typically the curing consists of a chemical process such as hardening of an adhesive.

Note: 2 During the stabilisation period a mark need not function according to the requirements of this standard. For example it may not withstand an attack test or it may have increased visibility.

3.1.22 Substrate

The material to which a mark is applied.

3.1.23 Temporary mark

A type of mark of intentionally reduced longevity.

3.1.24 Transfer

The process of a mark passing between objects or persons coming into contact with it (see 3.1.12 and 3.1.25).

Note: When transfer occurs it is not necessary for all of the originally applied mark to transfer.

3.1.25 Transferable mark

A type of mark intended to transfer (see 3.1.24).

Note: In its intended use the person should not be deliberately intending to achieve transfer nor trying to avoid transfer.

3.2 Abbreviations

ARL Attack Resistance Level
COSHH Control of Substances Hazardous to Health
DMC Database Management Company
HST Highest Stated Temperature
LMC Linked Mark Category
LST Lowest Stated Temperature
MRC Mark Reader Category
MRN Manufacturer Reference Number
MVC Mark Visibility Category
SAR Secure Asset Register
TRN Test Reference Number
UV Ultraviolet

4. Types of Mark

4.1 General

Marks take many forms. For the purposes of this standard several categorisations exist so that requirements and test methodologies can be applied as appropriate to the type of mark. The manufacturer shall for the purposes of product testing declare the categories to which a mark is assigned.

Note: It is not a requirement for manufacturers to provide documentation to customers and users making reference to the categories of this standard. Documentation should however enable determination of the product's applicability to the intended application.

4.2 Designed Security Purpose

The manufacturer shall declare the purpose of the product using the categories given below. The purpose shall determine the type and severity of test methods to which the product is subjected (see 7). The designed purpose may assist the purchaser of the product when choosing between products but is not intended to restrict its usage. A product may be designed for more than one purpose.

Refer to Annex A for advisory information.

Note: The suitability of the product should be determined by the user on the basis of an individual assessment of the product and its intended use.

Designed Purpose	Description
Asset Identification	The purpose of the product is to identify the owner of the asset.
Theft Indication	The purpose of the product is to indicate that the asset has been taken from its owner. This includes products that deliberately devalue.
Counterfeit Protection	The purpose of the product is to indicate that the product is not counterfeit.
Suspect Verification	The purpose of the product is to provide evidence to support an allegation that a suspect is connected with a crime because they or their clothing are marked in a way that implies they were at the scene.
Event Detection	The purpose of the product is to show that an event has occurred (e.g. a tamper evident label).

4.3 Mark Transferability Category

The manufacturer shall declare whether the products are transferable or non-transferable.

4.4 Mark Visibility Category

MVC	Description
V0	Visible mark (probably for overt marking)
V1	Less visible mark that can be located using simple equipment (e.g. UV lamp)
V2	Less visible mark that may require knowledge of its location to assist in discovery (e.g. a subsurface tag). *Note: Whilst normally marks are intended to be discovered (by law enforcement agencies or other parties), to prove theft or return stolen goods, in some cases the design of the mark is intended to render it difficult to locate such that the legitimate owner of the product would need to advise a person seeking the mark of its location. This is acceptable providing the product documentation states this.*

A product may combine the characteristics of more than one Mark Visibility Category. For example a mark of type V0 may convert to a V1 following attempts to remove or defeat it. In these circumstances the requirements of this standard shall be applied accordingly to include both categories (i.e. for this example tests for V1 conformance should be applied prior to an attack test and V1 tests after the attack).

4.5 Environmental Use Category

The manufacturer shall declare the temperature and humidity conditions for which the product is intended. The manufacturer shall declare to the test house whether the product is to be tested for internal or external use.

Note: The declaration that a product is to be tested as "external" does not imply that the product is suitable for any external use. This is subject to separate declaration.

For products intended to be used with temperatures between +5 °C and +35 °C the tests shall be conducted at the general test conditions (see 7.1).

For products stated as being suitable for environments above or below the limits given above, environmental conditions for testing shall be adjusted (see 7.6.3). In particular manufacturers of products intended to survive long duration high temperatures (e.g. on engine components) shall declare this.

Note: The environmental conditions stated above are for the temperature at the time of triggering for event triggered marks and the typical long-term environment for other products. Other temperatures may be applicable for any application or stabilisation/curing process.

The manufacturer shall clearly declare the suitability of products for relatively harsh environments, in particular suitability for long duration exposure to sea-water or other liquids.

4.6 Linked Mark Category

The manufacturer shall declare the linked mark category (LMC) of the product.

Note: In all categories (i.e. including L2) the mark need not be overt or visible and may require the use of a reader (see 4.7).

LMC	Description
L0	No link provided between mark and owner e.g. a simple staining *Note: The mark may reduce the value of the asset (e.g. cash degradation) or be used to mark a person committing an offence.*
L1	Directly readable link between mark and owner e.g. a label with a postcode or address
L2	Link via an in-house asset management system e.g. an asset label including a registration number used by an organisation to identify its location or a person to whom it has been loaned, hired or otherwise temporarily provided.
L3	Link via a secure asset register (SAR) *Note: The SAR may associate an individual item with its owner (e.g. a VIN) or associate a mark to a list of assets owned by an individual or organisation (e.g. a single mark is used with many assets).*

4.7 Mark Reader Category

The manufacturer shall declare the mark reader category (MRC) of the product.
The MRC is determined by the equipment needed to read the required information from a mark.

Note: Readability and visibility, as declared using MVC, are different. Visibility relates to how easy it is to see that there is a mark but not necessarily how easy it is to extract the necessary information from it.

MRC	Description
R0	The mark contains no information to be read (e.g. a degrading stain). *Note: This would be typical of an L0 LMC product and is likely to be overt.*
R1	Mark is clearly readable with the naked eye
R2	Mark is readable with a simple, readily obtainable reader (e.g. Magnifying glass, microscope)
R3	Mark is readable with a custom or specialist, high specification reader (e.g. electronic scanner). *Note: Typically such equipment may be portable.*
R4	Identification of the mark requires analytical equipment or laboratory analysis. The mark contains forensic coding material.

A product may combine the characteristics of more than one Mark Reader Category. For example a mark of type R2 or R3 may be fixed in position with an adhesive containing an R4 mark. In these circumstances the requirements of this standard shall be applied accordingly to include both categories.

4.8 Mark Attack Resistance Level

4.8.1 General

The manufacturer shall declare the mark attack resistance level (ARL) of the product.

Refer to Annex A for advisory information.

ARL	Description
AE	**Tamper Evident** The mark is not designed to withstand an attack. It is intended that an attack on the mark shall leave evidence of the mark.
A0	**Attack Resistance not stated** The product may resist attempts to remove it but it has not been deliberately designed to withstand an attack.
A1	**Basic Attack Resistance** For marks intended for asset identification (see 4.2) the product will withstand a short attempt to remove it without the use of chemicals. For marks intended for suspect verification (see 4.2) the product will withstand attempts to remove the mark using typical hand-cleaning or laundry techniques. It is assumed that an offender will have no prior knowledge of how to attack the mark and that they have access only to tools that may be typically carried by an opportunistic offender (e.g. a knife, dry rag, saliva). It is also assumed that they spend no more than 2 minutes in their attempted attack.
A2	**Standard Attack Resistance** It is assumed that the offender will have no prior knowledge of how to attack the mark but that they have removed it to a location where they can employ general tools and materials. It is assumed that they will spend no more than 5 minutes in their attempted attack.
A3	**Enhanced Attack Resistance** It is assumed that the offender will have little prior knowledge of how to attack the mark and that they have removed it to a location where they can employ a greater number of tools and materials. It is assumed that they will spend no more than 10 minutes in their attempted attack.

4.8.2 Specific Attack Resistance

In addition to the levels described in 4.8.1 it is permitted for a manufacturer to request additional specific attack tests appropriate to the product when it is assumed that the offender will have some knowledge of how to attack the mark. Refer to 7.6.6.5 for testing.

5. Documentation

5.1 Labelling of the product

The product label and/or packaging shall include the following information so that it is accessible to the user without opening:

a. Supplier or Manufacturer's name and/or trade mark.
b. Special storage requirements (e.g. refrigeration) if necessary to maintain shelf-life.
c. Date by which product should be used or equivalent (if applicable).
d. Date of manufacture or Batch code (if c. not applicable). This information may be in any format suitable to the customer (e.g. text, barcode).
e. Identification of conformance with this standard.

Note: Other regulations and legal requirements may apply concerning packaging information including the use of pictographic safety warnings.

5.2 Documentation for the customer

Documentation shall be available to the customer / user that includes the following:

a. The fitness for purpose of the product for the application it was designed for.
b. The suitability of the product with regard to safety and its safety data sheet.
c. Details of the standards or certification with which the product conforms (i.e. this standard).

   Note: It is not a requirement for manufacturers to provide documentation to customers and users detailing the categories of this standard.

d. The functional life of the product together with any criteria that may affect this (e.g. storage conditions prior to use, materials to be avoided, etc) and shelf-life of the product.
e. Advice about any limitations regarding the duration of storage of the product prior to use and any effect that a prolonged period of storage may have upon its subsequent use. Additionally any particular requirements for storage shall be stated.
f. Identification of the secure asset register to which the product is linked (where applicable).
g. Minimum time taken to reach a stabilised (cured) state under typical conditions as defined by the manufacturer (if applicable).

Note 1: It is accepted that information that may be of use to a criminal attempting to overcome the marking product may be restricted.

Note 2: It is not a requirement that this information be provided on the packaging.

6. Functional Requirements

6.1 General

The manufacturer shall use the descriptions given in this standard to determine the type of mark and the categories (see 4) that they consider the product is intended to meet. Products shall have the ability to pass the basic functional test following conditioning tests that are intended to represent environmental exposure and deliberate attempts to remove the mark. The basic functional tests are based on the following functional requirements.

6.2 Mark Visibility

There are three different categories of mark visibility (MVC).

Marks of category V0 shall be visible for the purposes of location (not necessarily for reading) under typical visible natural or artificial lighting conditions (i.e. not including infrared or ultraviolet spectrum). Marks of category V1 shall not be obvious under the same lighting conditions but it shall be possible to locate them using simple methods or equipment (i.e. readily available) as described in the manufacturer's documentation.

Note 1: For category V1 marks there are no specific tests related to whether these marks cannot be found in normal light.

Marks of category V2 shall be capable of being used in a manner in which they are not obvious to an observer using visible, infrared or ultraviolet lighting. It is not necessary for the mark to be discoverable. It is permitted for tools to be used to locate the mark providing these tools are of a specialist nature.

Note 2: Category V2 marks are intentionally difficult to find but this does not mean that they are invisible. There are no specific tests related to whether these marks can be found.

6.3 Mark Readability

There are five different categories of mark reader (MRC).

Note: Marks of category R0 achieve their function simply by their presence. There is no need to extract information from the mark and there are no related tests. It is not a requirement that marks of category R0 have any particular associated MVC category. This standard does not include requirements for category R0 event triggered marks to cover defined areas following triggering.

For all marks excluding those of category R0 it shall be possible to read or extract all necessary information from the mark using the method and/or equipment described in the manufacturer's documentation.

7. Test Methods

7.1 General

7.1.1 Procedure

Testing shall be performed according to the methods given here. Some tests are not applicable to certain product types as detailed in each test. Figure 1 gives an overview of the test procedure. Following initial checks of documentation and creation of samples conditioning tests shall be performed (see 7.6). To ensure that the products achieve the fundamental expectations the samples are then subjected to Basic Functional Tests (see 7.7).

The test-house shall agree with the manufacturer which tests are to be performed and the test-house shall inform the manufacturer the quantity of product to be provided so that these tests may be performed.

Note: It is recommended that the manufacturer considers the benefits of performing indicative tests on a number of samples prior to full testing.

7.1.2 Test Conditions

Unless otherwise stated, nominal temperature, humidity and air pressure conditions for tests shall be any convenient combination of temperature and relative humidity within the following ranges:

Temperature	+15 °C to +35 °C
Relative humidity	25 % to 75 %
Air pressure	86 kPa to 106 kPa
Illuminance	200 to 500 lux

7.2 Provision of Samples and Equipment for Testing

7.2.1 Samples

7.2.1.1 MRC Categories R0 to R3

For event triggered marking products sufficient product shall be supplied to allow for a minimum of six individual dispersals. The product shall be supplied in the same form and style of container that a customer would receive it. Adequate equipment and instructions shall be given for the correct use of the product within the dispersal equipment provided for testing.

For manually applied marking products sufficient product shall be supplied to enable four substrate materials of each type identified as being applicable for testing.

7.2.1.2 MRC Category R4

For products of MRC category R4 the manufacturer shall supply the tester with a minimum of ten unique samples of marking product. The supplied product shall be capable of applying a functional mark to a minimum of fifty test pieces (i.e. if an individual product can be applied to only one test piece then fifty are required, if the product is of liquid type and can be applied to multiple pieces then ten different bottles each with a volume of liquid capable of being applied to five pieces are needed).

7.2.2 Equipment

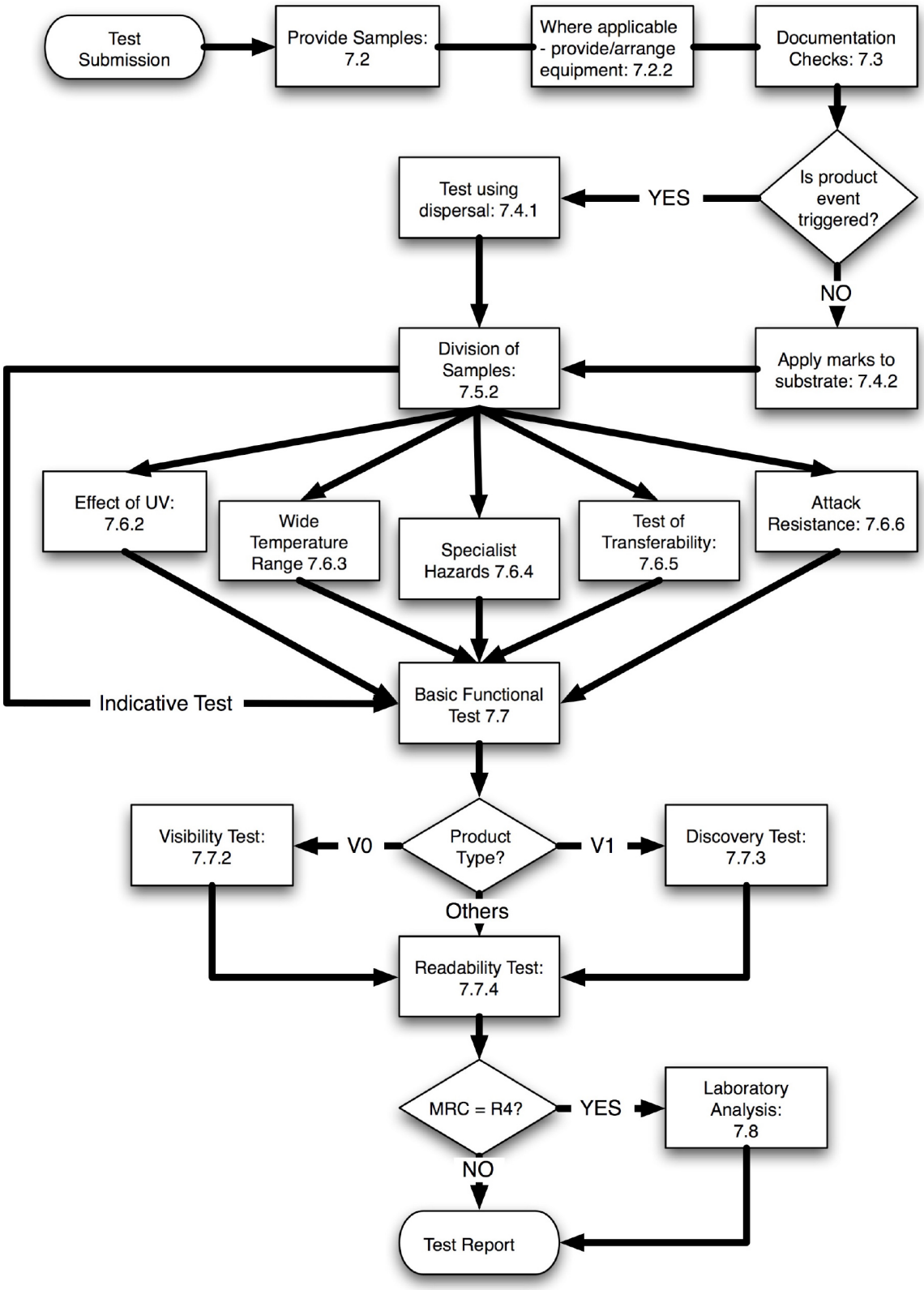
For products with a MRC of category R2 or R3 the manufacturer shall provide or allow the test house access to a reader of the documented type.

For event triggered products the manufacturer shall provide or allow the test house access to typical equipment for the dispersal of the marking product.

Where it is not possible for an independent test of the event triggering equipment to be performed by the test house it is permitted for representative samples of marked materials to be provided to the test house. In such circumstances the test house may reserve the right to be present during creation of the test samples. The test report shall include a record of the method by which such test samples were produced and whether the creation was observed.

Note: Examples of circumstances whereby the test house may not be able to perform the event triggering include the use of sealed cash carrying boxes with pressurised or explosive charges.

Figure 1 - Flowchart of Tests



7.3 Documentation

7.3.1 Documentation for testing

Documentation shall be available to test houses (and certification bodies when necessary) that includes the following:

a. Information regarding equipment or methods needed by the tester to read the mark.
b. The declared Mark Transferability Category, MVC, Environmental Use Category, LMC and MRC of the product.

7.3.2 Documentation Checks

The tester shall confirm by visual observation that the product labelling and documentation provided for customers meets the requirements of 5.1 and 5.2 respectively.

Where the information required by clause 5.2 has been judged by the manufacturer or their customer, to be subject to restricted access (to avoid revealing information of use to criminals) it shall be provided to the tester with the unrestricted information (as per 7.3.1).

7.4 Application Procedures

7.4.1 Testing of Dispersal (Event Triggered Products)

Refer to 7.2.2 for requirements related to marking equipment.

Event triggered marking products shall be tested by use of typical equipment intended for its dispersal. The equipment shall be mounted in a manner designed to simulate its use in accordance with the manufacturer's instructions.

Note 1: The design and testing of the equipment used for the dispersal of the mark is not covered by the requirements of this standard.

Products intended for dispersal from hand-held spray devices (e.g. aerosol dispensers) should be tested by spraying horizontally at the target in accordance with manufacturer's instructions.

Note 2: If a distance is not specified the dispenser should be between 1 m and 2 m from the target.

For event triggered products with a specific application where the object to be marked is of a limited type (e.g. banknotes) the target materials for testing shall be representative of those objects.

For products specifically intended to cause a mark to be applied in a predetermined and controlled manner (e.g. a staining device operating in an enclosed container) the test shall replicate this manner without restrictions on the direction or time of operation.

The duration of spraying shall not exceed 3 s.

Note 3: The purpose of this is to simulate the maximum time an offender is likely to be within range of the spray. If the dispersal unit cannot be controlled (e.g. by release of a trigger) then the target should be covered to prevent excess exposure.

For products intended to be used for the marking of persons the target materials for testing shall include:

a) A cloth of 100% cotton with width (150 ± 50) mm and length (150 ± 50) mm
b) A cloth of minimum 60% polyester with width (150 ± 50) mm and length (150 ± 50) mm
c) For MRC categories R0, R1, R2 and R3 only, living human skin consisting of a dry, grease free hand

Note 4: The colour and type of the cloth should be selected so as to not adversely affect the test (e.g. white cloth likely to fluoresce when exposed to UV should not be used).

Note 5: The target cloths should not be reused in subsequent tests.

7.4.2 Marks (excluding event-triggered and transferable marks)

7.4.2.1 Substrate Test-pieces

For the purposes of testing, the product shall be applied to a substrate material. A number of different test substrate types are available. Only those indicated as suitable by the manufacturer's documentation (see 5.2) shall be used for testing unless the manufacturer requests further types.

Note 1: Example substrate materials include: paper, banknote, wood (rough), wood (varnished), plastic, glass, metal, ceramic (unglazed), ceramic (glazed), cables (insulated, non-insulated). Some types may not be suitable for the test procedure required by this standard.

From the available types of substrate the tester shall select a maximum of three types of material. Where a product is designed to be applied to a particular substrate, it shall be tested against that substrate. Consideration should include the effect of any exposure testing on the substrate that may increase the likelihood of failure.

Note 2: Care should be taken that the chosen substrate type does not adversely affect the test (e.g. by mistakenly selecting a substrate that fluoresces under UV light).

The size of substrate test-piece shall be suitable for use in the testing apparatus required in 7.6.2 and shall have a minimum area of 500 mm^2 available for application of the product and subsequent testing.

Note 3: Several test-pieces may be tested together in the apparatus and the size chosen to facilitate this.

Application of the product shall be in accordance with the manufacturer's instructions. Unless otherwise stated application should be performed under the general test conditions. It is permitted to attach or paint more than one product type to a single test-piece provided that they are clearly separate and do not interfere with each other or otherwise influence the test. For products painted on the substrate the application area shall be between 500 mm^2 and 1000 mm^2 unless a smaller size is necessary and indicated in the manufacturer's documentation.

For each substrate type used a control sample shall be retained. This control sample should have product applied to it but it shall be kept in an environment free from UV radiation and excesses of humidity and temperature (i.e. within a temperature range +15 °C to +35 °C and relative humidity 25 % to 75 %).

7.4.2.2 MRC Category R4

Substrate test pieces, as required, shall be labelled in a manner devised by the tester (see 7.2.2) and samples of the product applied to the test pieces in accordance with the manufacturer's instructions.

The method of labelling shall be capable of surviving all tests that the test piece will be subjected to.

7.4.2.3 Stabilisation

Testing of samples should not begin until the product has stabilised in accordance with the manufacturer's documentation.

Note: Not all products undergo a stabilisation/curing process.

7.5 Requirements for Testing According to Product Type

7.5.1 General

Tests shall be performed as applicable to the product type.

Note: The basic principle is that the mark is applied and is then subjected to a form of conditioning (e.g. UV exposure, attack test) and then a basic functional test performed to verify that the mark performs as necessary. In some cases the functional test will need to be repeated before and after conditioning.

A number of different samples shall be subjected to certain tests in a sequence as shown in the flowchart (Figure 1).

7.5.2 Use of Samples

As shown in the flowchart (Figure 1) the test house shall complete initial tests on the documentation and then create a number of test samples. These samples shall be divided so that a number of each may be subjected separately to the Conditioning tests (see 7.6) and then the Basic Functional Test (see 7.7). Some samples shall undergo the Basic Functional Test (7.7) without being subjected to other conditioning first (the latter is labelled "Indicative Test" in Figure 1).

Note: The varied nature of products and their intended use mean that the method of performing the Basic Functional Test may need to be varied. If the way in which the test is performed may affect the sample being tested then it is recommended that the sequence of tests be considered carefully. Whilst performing all of the basic functional tests at the same time may seem more efficient it may be preferable to try the test method on samples prior to their conditioning.

7.6 Conditioning Tests

7.6.1 General

Several forms of conditioning test are described. Samples shall normally be subjected to one form of conditioning only (i.e. the sample that is exposed to UV is not also subject to the attack test.) Provisional on agreement between the test house and the manufacturer, samples may be subjected to more than one conditioning test. This shall be documented in the test report.

7.6.2 Resistance to Artificial Weathering (primarily UV exposure)

7.6.2.1 Applicability

This test applies to any product that is intended to have a functional life in excess of 3 months unless the documentation provided to the customer clearly states that it must only be used in a location that is permanently dark (e.g. on the inside of an electronic device).

Note: The test conditions given represent an approximation to two years of the environment experienced in Northern Europe.

7.6.2.2 Preparation

The sample shall be subjected to testing for UV exposure undertaken using conditions similar to those stated in the EN ISO 4892-1 and EN ISO 4892-3 standards but with modifications as given in this standard. The sample shall be in a stabilised state (see 3.1.20).

Equipment used during the test (e.g. sample holders, isolating or insulating materials) should be made from materials that will not affect the test. If testing of other materials is performed simultaneously (to achieve optimum use of the test equipment) care shall be taken that the other materials will not affect the test.

7.6.2.3 Exposure conditions

The samples shall be exposed to fluorescent UV radiation, heat and water in apparatus designed to simulate the conditions experienced by materials exposed in actual use environments. Different types of lamps and exposure conditions will be used to reproduce the effects of daylight and exposure to moisture (external / industrial use) and daylight through glass (interior / domestic use).

The conditions used for testing shall be one of the cycle options given in Table 1. Products declared by the manufacturer as "Internal" shall be tested using test option EC3. "External" products should be tested using option EC1 or EC2.

During testing water spray should be applied in the case of "external" products unless there are specific reasons not to this and adequate warning is given in the documentation provided to customers.

Note: The application of water spray during the test is intended to test for exposure for moisture in any form (e.g. rain, condensation, pooling of water, accidental spillage, etc).

Table 1 - Exposure Cycle Options

Cycle Option	Duration	Lamp type	Irradiance	Exposure cycles	Black-standard temperature	Relative humidity
EC1	79 days	Type 1 (UVA-340)	0.84 $W.m^{-2}.nm^{-1}$ at 340 nm	5 h dry	50 °C ± 3 °C	Not controlled
			Light off	1 h water spray	25 °C ± 3 °C	Not controlled
EC2	66 days[c]	Type 1A Lamp combination	Continuously 45 $W.m^{-2}$ (290 nm to 400 nm)	5 h dry	50 °C ± 3 °C	< 15
				1 h water spray	25 °C ± 3 °C	Not controlled
EC3[a]	66 days	Type 1B (UVA-351)	0.76 $W.m^{-2}.nm^{-1}$ at 340 nm	24 h dry	50 °C ± 3 °C	Not controlled

Notes:

a) Equivalent to EN ISO 4892-3 Table 4, Method B, Cycle No. 5

b) 66 days exposure is equivalent to exposure to 257 $MJ.m^{-2}$ at 45 $W.m^{-2}$

c) The 50 °C temperature in EC2 is different to ISO 4892-3.

d) EC3 is described by ISO 4892-3 as "Daylight behind glass window".

The exposure procedure shall be equivalent to that stated in EN ISO 4892-3:2006 except as modified in this standard. The procedures are the same as those given in PAS 820.

7.6.3 Resistance to wide temperature ranges

Refer to 4.5

For products intended to be used with temperatures between +5 °C and +35 °C and with an average relative humidity (non condensing) between 25% and 75% the tests shall be conducted at the general test conditions (see 7.1). Where the manufacturer claims that a product is intended for use at temperatures that are outside the range given above or, where by agreement, the test house is requested to perform additional testing the product shall be exposed to tests to confirm this. Temperature tests shall be performed according to one of the following schedules. The schedule and temperatures used shall be documented in the test report.

Note 1: Test schedule TT1 is intended to test for potential effects of the cycling of temperatures.
Note 2: Test schedule TT2 is to test for the effects of sustained high or low temperatures.
Note 3: Test schedule TT3 is to test for a combination of temperatures.

For test schedule TT2 if the lowest stated temperature is between +5 °C and +35 °C then cycle 1 and 2 can be omitted. For test schedule TT2 if the highest stated temperature is between +5 °C and +35 °C then cycle 3 and 4 can be omitted.

The lowest stated temperature (LST) shall be the lower of the lowest temperature of that given by the manufacturer in their claims or the lowest temperature agreed for testing. The highest stated temperature (HST) shall be the higher of the highest temperature of that given by the manufacturer in their claims or the highest temperature agreed for testing.

Any single or combination of the three test schedules may be used to test the product.
Upon completion of the wide temperature range tests the basic functional tests 7.7 shall be performed according to the product classification.

Table 2 - Wide temperature range test schedules

Schedule	Cycle 1:	Cycle 2:	Cycle 3:	Cycle 4:	Sequence
TT1	Reduce to LST at 1°C per 5 minutes.	Maintain LST for 3 hours	Raise temperature to HST at 1°C per 5 minutes.	Maintain HST for 3 hours.	Repeat cycle 1 to cycle 4 for 21 days
TT2	Reduce temperature to LST at 1°C per 15 minutes.	Maintain LST for 10 days	Raise temperature to HST at 1°C per 15 minutes.	Maintain HST for 10 days	Perform cycle 1 to cycle 4 then stop.
TT3	Reduce to LST at 1°C per 5 minutes.	Maintain LST for 12 hours	Raise temperature to HST at 1°C per 5 minutes.	Maintain HST for 12 hours.	Repeat cycle 1 to cycle 4 for 21 days

7.6.4 Resistance to Other Specialist Hazards

At the request of the manufacturer the test house may agree to undertake specific testing for conditions that the product may be exposed to in use and for which the manufacturer wishes to make claims. Any such tests shall be restricted to those for which there is a claim within the manufacturer's documentation.

The procedures adopted for testing shall be included in the test-report together with an explanation of the equivalent environmental or other conditions that the test was intended to replicate and the basis for the pass/fail criteria used.

Note: These tests are for environmental conditions, not for methods of simulated attack. An example condition could be to consider the effect of X-Rays used during airport baggage checks upon labels on computer equipment. In this example the test report should indicate the equivalent frequency of baggage check (e.g. twenty checks per annum).

7.6.5 Test of Transferability

7.6.5.1 Applicability

This test is applicable to all products that may be applied in a liquid, gel or grease form and that contain materials used to enable a linked mark category of L1, L2 or L3. The test is not applicable to dyes or stains of LMC type L0. The test is not applicable to metal tags, engravings, printed labels and similar devices.

Note: It is assumed that the method of transfer is by physical contact of a person or object with the marked asset.

For some products, particularly event triggered marks, there may be a duration after application when the mark is transferable. The manufacturer should specify this. Testing of this type of product for transferability shall be by agreement with the manufacturer.

7.6.5.2 Object of the test

The purpose of the test is to ensure that products that are intended to be transferable are and those that are not intended to be transferable are not.

7.6.5.3 Test conditions

If the conditions for use are specifically stated in the manufacturer's documentation supplied to the customer then the test conditions shall be within the limits set by the manufacturer. Otherwise the test shall be performed under standard conditions (see 7.1.2).

7.6.5.4 Procedure

A number of test pieces shall be made by application of the mark in accordance with the manufacturer's instructions. Only those substrates indicated as suitable by the manufacturer's documentation (see 5.2) shall be used for testing unless the manufacturer requests further types. Where applicable the mark shall be in a stabilised state.

From the available types of substrate the tester shall select a maximum of three types of material. Where a product is designed to be applied to a particular substrate, it shall be tested against that substrate.

Note: Care should be taken that the chosen substrate type does not adversely affect the test (e.g. because the nature of the material enhances or reduces the possibility of transfer).

For products that are intended to be transferable the mark shall not cover an area greater than 1000 mm^2. For products that are intended to be non-transferable the mark shall cover an area of at least 1000 mm^2 unless a mark of this size is not possible and this is stated in the manufacturer's documentation.

The materials and procedure for testing shall be as given in Table 3. The materials to which the transfer of the mark is tested are referenced as "receiver" materials.

Table 3 Transferability Test Materials and Procedures

No.	Receiver Material	Test Piece Preparation	Procedure
1	An unmarked test piece.	Place the marked test piece on a horizontal surface with the marked face upwards.	Place the receiver test piece face down on the marked test piece for a maximum of 5s. No pressure shall be applied.
2	A cloth of 100% cotton with width (150 ± 50) mm and length (150 ± 50) mm.	Place the marked test piece on a horizontal surface with the marked face upwards.	Place the cloth on the marked test piece and apply a mass of 100g aligned with the location of the mark for a maximum of 5s.
3	A cloth of minimum 60% polyester with width (150 ± 50) mm and length (150 ± 50) mm.	Place the marked test piece on a horizontal surface with the marked face upwards.	Place the cloth on the marked test piece and apply a mass of 100g aligned with the location of the mark for a maximum of 5s.
4	Living human skin consisting of a dry, grease free hand.	The mark shall be applied to a cylinder of diameter (65 ± 10) mm, minimum height 100 mm and mass (250 ± 20) g.	The person shall pick up the test piece in such a way that their hand makes contact with the marked surface. The test piece shall be lifted for a maximum of 3s.
Note: a) The colour of the cloth should be selected so as to not adversely affect the test (e.g. white cloth likely to fluoresce when exposed to UV should not be used). The target cloths should not be reused in subsequent tests. b) The 100g mass shall have a flat contact surface with a diameter (25 ± 5) mm			

Basic tests for mark visibility (see 7.7.2) and mark discovery (see 7.7.3) as applicable shall be performed on the receiver materials.

For products intended to be transferable the test of mark readability (see 7.7.4) shall be performed on the receiver materials.

7.6.5.5 Pass/Fail Criteria

For transferable product the mark shall have transferred to the cloths and hand.
For non-transferable product the mark shall not be detectable on the cloths or hand.

7.6.6 Simulated Attack Procedure

7.6.6.1 General

The types and extent of testing to be performed shall depend on the type of product and the declared Attack Resistance Level (ARL). No attack testing shall be performed on products declared to have ARL of A0. Products to which a Specific Attack Resistance test is desired (see 4.8.2) shall be tested according to tests designed specifically for the product. The manufacturer and the test house shall agree these tests. Any claim of

Specific Attack Resistance should be accompanied by a suitable test report to enable a purchaser to consider the validity of the testing to their specific application.

The tests specified below shall be applied according to the material to which the mark was applied.
In such cases that the substrate material is damaged during the attack test so that a marked asset would be rendered useless or significantly devalued the product this may be declared as a mitigating factor in case the product subsequently fails the basic functional tests. This should be clearly stated in any test report.

7.6.6.2 Attack test for Cloths

Attack tests on cloths relate only to ARL A1 (Basic Attack Resistance).

For tests on marks after transfer and for tests on event triggered products the attack test shall begin between 15 and 20 minutes after the cloth has been exposed to the mark. For other types the mark shall be stabilised (see 7.4.2.3).

The cloths shall be immersed in water at +5 °C to +15 °C for a maximum of 10 s. The cloths shall then be rubbed vigorously for a maximum of 1 minute to simulate an attempt to rub off the mark.

The cloths shall be subjected to two standard washing cycles at (40 ± 5)°C in a washing machine using typical biological household detergent and a household laundry stain removing agent.

Note: A typical 40 °C cotton washing cycle for a machine manufactured since 2007 is likely to be in the range of 90 to 130 minutes in total.

Cloths shall be washed separately to avoid mixing of marks from different test samples.

The basic test shall be performed after all of the attack methods given above.

7.6.6.3 Attack test for Hands (human skin)

Attack tests on human skin relate only to ALR A1 (Basic Attack Resistance).

Between 15 and 20 minutes after exposure to the mark the hands shall be immersed in water at +5 °C to +15 °C and the hands shall be rubbed vigorously for a maximum of 1 minute to simulate an attempt to rub off the mark.

Note: The normal stabilisation period should not apply to marks applied to skin in the expectation that the person to whom the mark has been applied will be aware of it. This may not be true in all cases but it cannot be expected that the person will wait for a stabilisation time before washing.

An attempt shall be made to remove the mark by washing the hands in a bowl of water at (35 ± 3) °C using a typical dishwashing detergent and drying using a 100% cotton towelling cloth.

The attempt shall be repeated by washing and drying of the hands in a second bowl of water at (35 ± 3) °C using an application of typical liquid hand soap and a second 100% cotton towelling cloth.

Note: Measures shall be taken to ensure that the towelling cloths are not the cause of contamination during the test (e.g. by the use of new cloths for each test).

7.6.6.4 Attack test tools and materials

The following table list tools and materials that may be used during attack tests according to the ARL.

Table 4 - List of permitted tools and materials

ARL	Tools	Materials
A1	Can opener Cork screw Craft knife Scissors Screwdriver (small flat) Table knife Dishcloth	Saliva Water
A2	Any tool in the A1 Tools list plus: Cotton wool buds Lighter Matches Screwdriver (large flat)	Any material in the A1 Materials list plus: Petroleum based water displacement spray (WD)
A3	Any tool in the A1 and A2 Tools list plus: Cook's knife Glass polishing kit Ice Packs (coolbox type) Pliers Razor Blades Sanding block Wire wool	Any material in the A1 and A2 Materials list plus: Scouring powder Household bleach Household cream cleaner Washing up liquid White spirit Acetone (diluted 50%)

Care shall be taken that tools and materials are not contaminated in such a way that subsequent tests may be affected. A clean cloth shall be used for each test.

7.6.6.5 Specific Attack Resistance

Refer to 4.8.2.

A standardised test is considered inappropriate for this type of attack. The manufacturer shall agree methods of test with the test house. Details of specific attack resistance tests and results shall be included in the test report. This part of the report may be provided as a supplement to enable restricted circulation.

7.6.6.6 Attack test for standard substrates (ARL A1, A2 and A3)

The tester shall employ any tools and materials listed in Table 4 for the applicable ARL.

For ARL A1 the attack shall last for a maximum of 2 minutes of physical activity during a 5 minute period. For ARL A2 the attack shall last for a maximum of 5 minutes during a 10 minute period. For ARL A3 the attack shall last for a maximum of 10 minutes during a 15 minute period.

On completion of the attack the mark shall be evaluated using appropriate basic functional tests (see 7.7).

7.6.6.7 Attack test for tamper evident (ARL AE) products

The tester shall employ any tools and materials listed in Table 4 for ARL AE. The attack shall last for a maximum of 2 minutes of physical activity during a 5 minute period.

On completion of the attack the mark shall be evaluated using appropriate basic functional tests (see 7.7).

7.7 Basic Functional Test

7.7.1 General

The basic functional tests shall be applied as appropriate during testing of the marks. This may mean that a test is performed repeatedly or that a test that is appropriate prior to attack testing is not following an attack test. For example: A label that has an MVC of V0 but converts to type V1 following an attack should be tested with the test of visibility before the attack test but the test of mark discovery after the attack test.

7.7.2 Test of Visibility (re: MVC)

7.7.2.1 Applicability and Object

This test applies to V0 category products.

The object of this test is to confirm that marks intended to be visible are visible under typical conditions before and after exposure to environmental tests.

Note: For marks that are intentionally less visible there is no associated test to confirm that the mark is in any way hidden. Nor is there a test that the mark can be found.

7.7.2.2 Test conditions

The substrate sample with the stabilised mark shall be illuminated at a level of 250 lux $\pm$ 50 lux using a white light source.

7.7.2.3 Procedure

A person with normal or corrected eyesight shall attempt to locate the mark on samples of each type of substrate from a distance of 0.5 m. Where relevant to the performance of the test the tester shall not suffer from colour vision deficiency.

7.7.2.4 Pass/Fail Criteria

The test is passed if the mark can be located.

For products designed for the purpose of event detection or counterfeit protection the test shall pass once the mark has been stabilised but is permitted to fail following an attack test.

7.7.3 Test of Mark Discovery (re: MVC)

7.7.3.1 Applicability and Object

This test applies to V1 category products.

The object of this test is to confirm that intentionally less visible marks can be located by the intended means.

7.7.3.2 Test conditions

Standard test conditions apply (see 7.1.2).

7.7.3.3 Procedure

For each substrate type a minimum of four substrate samples without marks and one marked sample shall be viewed under the lighting conditions specified by the manufacturer and employing any necessary equipment as specified by the manufacturer. The tester shall identify the marked and unmarked samples.

7.7.3.4 Pass/Fail Criteria

The test is passed if all marked sample can be identified and the unmarked samples are not mistakenly identified.

7.7.4 Test of Readability (re: MRC)

7.7.4.1 Applicability

This test is not applicable to products with R0 category.

7.7.4.2 Object of the test

The purpose of the test is to ensure that any information contained within the mark can be obtained from it under typical conditions before and after exposure to conditioning tests.

Note: Although described separately this test is likely to be performed immediately following the tests of either 7.7.2 or 7.7.3 for each test substrate type, as applicable.

7.7.4.3 Test conditions

The test shall be performed under standard conditions (see 7.1.2) unless specific conditions are necessary as indicated in the manufacturers documentation.

Note: An example change to the standard conditions will be the use of low ambient light and a portable UV light source instead of a white light source.

7.7.4.4 Procedure

7.7.4.4.1 Testing of R1 category products

Unless otherwise stated (see 7.7.4.3) the substrate sample with the stabilised mark shall be illuminated at a level of (250 $\pm$ 50) lux using a white light source. A person with normal or corrected eyesight shall attempt to read the mark on samples of each type of substrate from a distance not less than 0.25 m.

7.7.4.4.2 Testing of R2 category products

Unless otherwise stated (see 7.7.4.3) the substrate sample with the stabilised mark shall be illuminated at a level of (250 $\pm$ 50) lux using a white light source. Following the information provided by the manufacturer, as specified in 7.3, and using the equipment referenced in 7.2.2, the tester shall attempt to read the mark.

7.7.4.4.3 Testing of R3 category products

Following the information provided by the manufacturer, as specified in 7.3, and using the equipment referenced in 7.2.2, the tester shall attempt to read the mark.

Note: For products of R3 category the test of readability should not be performed by the manufacturer because it is intended that the reader is available to parties other than the manufacturer (e.g. law enforcement agencies).

7.7.4.4.4 Testing of R4 category products

The sample product described in 7.2.1.2 shall be used.

Substrate test pieces as described in 7.4.2.2 shall be sent for analysis to the manufacturer or their designated laboratory. The manufacturer shall inform the tester of the MRN that they have discovered relates to the TRN on each test piece. MRN and TRN are described in 7.8.

It is essential that the test piece shall not include any other marking, including any that may be part of the product, that would enable identification without analysis of the R4 category component (see 7.8). For example if a product contains an R4 category component such as a forensic coding material and normally also contains an R2 category component such as microdots then either the microdots should be removed from the sample or identical microdots used to prevent identification.

7.7.4.5 Pass/Fail Criteria

For categories R1, R2 and R3 the tester shall have successfully read all necessary information from the marked product.

For category R4 the tester shall check that the MRN discovered by the manufacturer/laboratory for each labelled test piece matches its TRN.

7.8 Verifying the Ability to Identify Products Requiring Identification by Laboratory Analysis

7.8.1 General

This procedure shall apply to products with MRC R4. The procedure is designed to ensure that the organisation performing the test has a low probability of bypassing the use of the content of the marking product that contains the identifying material.

7.8.2 Samples Provided

A minimum of 10 samples of each unique product shall be supplied (see 7.2.1.2). Each sample shall be supplied to the test house and labelled with a Manufacturer Reference Number (MRN). Without access to the label or analysis of the marking it shall not be possible to identify the MRN.

7.8.3 Test House Use

The test house shall allocate a Test Reference Number (TRN) to each MRN. There shall be no defined link between the TRN and MRN. The link between the TRN and MRN shall be random. The test house shall not reveal the relationship between the TRN and MRN to any party.

The samples shall be labelled with the TRN. The MRN shall be removed from the sample. Tests shall then be performed as appropriate to the product whilst ensuring that the relevant TRN can be linked to the test sample. Selected samples shall undergo one of the conditioning tests.

Note: It is not necessary to use all of the samples.

7.8.4 Analysis

For each type of conditioning test performed at least one sample and its associated TRN shall be sent to the laboratory for analysis.

Note: The intention is that a test is performed on a sample that has undergone each of the types of conditioning that is required or agreed (e.g. UV exposure). A larger number of samples can undergo conditioning tests provided at least one that has been conditioned by each type of conditioning is sent for analysis.

Following analysis the laboratory shall inform the test house of the MRN linked to by the sample and the TRN of that sample.

7.8.5 Pass Criteria

The test shall be passed if the test house confirms that the MRN matches the TRN.

Annex A (informative)
ADVISORY NOTES

A.1 General

This standard uses a number of categories solely for the purpose of identifying the relevant tests that a product should be subjected to. It is not intended that these categories be used for the labelling of products but it is suggested that, for the benefit of purchasers, manufacturers may wish to declare these categories. This is particularly true for wholesale purchasing decisions.

The products that are included by the scope of this standard are diverse and varied. Manufacturers may devise products for particular purposes that prevent them from passing tests related to particular categories. Users of products are recommended to consider whether a lack of conformance is significant. The following notes are intended to assist purchasers and specifiers.

A.2 Categories

A.2.1 For Manufacturers

Manufacturers wishing to have products tested should select the appropriate rating from each of the categories listed in this standard. The selection should be based on the rating that is considered to be closest to the intended use.

A.2.2 For Test Houses

Tests should be performed on the products according to the procedures given in clause 7 and as appropriate to the rating chosen by the manufacturer for each category. The diverse nature of products means that tests cannot be wholly standardised. For example it may not be possible to select one test substrate that is suitable for all products because of absorbency or resistance to adhesive. Additionally the manufacturer may be aware of reasons why a particular test may require a specific procedure. It is vital that the methods used for testing are accurately and thoroughly recorded.

Because of the nature of the products and their use for security purposes the knowledge of how tests are performed and the precise results should not be publicised without full consent of the manufacturer.

During testing the test house should employ randomisation of samples whenever possible. For example when testing labels on a reel it is preferable not to use consecutive labels, which would almost certainly have near identical characteristics. Similarly when testing products in category MRC R4 the same unique product should not be used for multiple different tests.

A.2.3 For Customers

The categories provided in this standard are provided to facilitate testing. Each category enables a selection of tests that are appropriate to the design of the product. It should not be inferred that a product with a particular category is better or inferior to another. For example an LMC quoted to be L3 is not better than L1 it is simply intended to fulfil a different purpose.

Products are frequently designed for a specific purpose that cannot be identified by the categories. Purchasers should seek further information about the tests that have been performed if the product has a specialist purpose. Such a specialist purpose may restrict the ability to test the product and this may mean that two otherwise similar products have not been tested in the same way. For example a test may normally be conducted by applying the product to a plastic sheet, but it could be that a product designed to work well on a textile surface

will not adhere to plastic.

A.3 Practical use of Asset Marking Products

Care should be taken when choosing an asset marking product to select one that performs well under the anticipated conditions. When considering a product it is important to think about the practicalities of its use and the behaviour of a person attempting to overcome the protection it provides. Questions to be considered include:

a) What is the threat that the mark is hoped to protect against? Is swift burglary possible, or will somebody have access to the item for an extended time prior to theft? Is the mark primarily to deter against theft or is it to be used to recover stolen goods? Is it acceptable if the mark is obvious or should it be discreet?

b) What environmental conditions will the mark experience? Will it be in bright sunlight, damp or subjected to extreme cold?

c) Is the mark intended to allow easy identification (e.g. a printed label with a serial number)?

d) How much effort will somebody attempting to remove the mark go to? Will they do this before or after a theft?

e) If the removal of the mark leaves the item it is designed to protect irreparably marked how will this affect the value or use of the item?

f) How long should the mark last? Is it expected that the mark will be re-applied? Will re-painting (e.g. of a vehicle) cover a mark? Is it likely that the protected item will be sold or disposed of within the life of the mark? Unless the relationship of the owner to the mark can be transferred then then use of a long lasting mark may not be appropriate.

Annex B (informative)
MANUFACTURE AND DATABASE OPERATION

B.1 General

The company should have a defined structure and a quality management system meeting EN ISO 9001. The manufacturer's quality system should be such that compliance of the finished product with the specification can be demonstrated and that the performance of the product remains consistent.

Suitable controls should be in place during the manufacturing process to ensure that no contamination codes can occur and all identifiers are consistent. This should be verified by routine quality control of products.

Records of the manufacture and despatch of each marking product should be securely kept.

Where the manufacturer also provides laboratory identification services, the outcome of the laboratory analysis process should be fit for purpose and robust when subject to legal process. The analysis process should provide a provable and unequivocal link between the produce containing the manufactured forensic material and the suspect sample.

Where a secure asset register is used to enable identification of a marked asset's owner it should conform to the requirements of ISO/IEC 27001: 2005, LPS 1224 (issue 2 or later), or a nationally recognised equivalent.