National Motor Vehicle
Theft Reduction Council
*driving down vehicle theft*

# NMVTRC Technical Specification:

# Secure Compliance Labels and Vehicle Security Labels

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**Prepared by:**
**EMANAR Consultants Pty Ltd**

[1] The document has been revised to align it with other NMVTRC vehicle identification related publications. It also includes changes in relation to how the in-field verification performance requirement of a secure label is described.

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# 1 INTRODUCTION

Improving the standard of vehicle identification at the point of manufacture is a central element of the National Motor Vehicle Theft Reduction Council's (NMVTRC) integrated theft reduction strategy.

The traditionally poor standard of vehicle identification has:

- greatly contributed to the ease with which criminals have been able to convert stolen vehicle into cash; and
- a significant "downstream" impact on the ability of transport agencies and police to detect suspect vehicles.

Secure compliance (or vehicle security) labels are one of the vehicle identification technologies endorsed by the NMVTRC as meeting the basic principles of an effective vehicle identification system. More details on the NMVTRC's policy and strategic framework for improving vehicle identification is contained in its publication ***Towards Effective Vehicle Identification*** *(Revised April 2005)*

This document:

- articulates the minimum design and application characteristics for secure compliance (or vehicle security) labels; and
- calls up certain durability tests to demonstrate their fitness for purpose.

Before endorsing a supplier or product the NMVTRC may require the supplier to provide samples of their product to it for testing by an appropriately qualified, independent testing laboratory nominated by the NMVTRC. All test costs will be borne by the supplier.

This document may be amended at any time at the NMVTRC's absolute discretion.

# SPECIFICATION FOR SECURE COMPLIANCE (OR VEHICLE SECURITY) LABELS

## 2 BACKGROUND

This specification has been developed on the basis of using performance requirements wherever possible. The physical properties of the materials used to make the labels including the bond strength of adhesives and their softening temperatures have not been specified to provide the maximum flexibility for the supplier to utilise the most suitable technologies available at the time. This approach will also allow emerging technologies to be utilised when they become available provided the end product continues to meet the required performance standards.

The only areas where specific (and design restrictive) provisions have been included are in the areas where the appearance of the label and the data placed on it are involved.

### 2.1 Secure Compliance Labels

A secure compliance label is one that is:

A. Secure – cannot be copied and is easy to authenticate.

*It must be very difficult (and/or expensive) to reproduce copies of, or replicate the labels outside authorised channels. Genuine labels must also incorporate some non-technical, non-destructive and practicable means of readily identifying them in the field as genuine.*

B. Self-voiding – cannot be transferred between vehicles or physically altered without detection.

*Removal of the label must damage it to the extent that it is not possible to hide the damage and reaffix it to another vehicle without easy detection. Any changes to the information on the label fixed to a vehicle must also be readily detectable.*

C. Durable – long lasting and resistant to damage under the environmental conditions typical of its location.

*The label should remain permanently fixed to the vehicle and easily readable for a long period under normal vehicle use/maintenance situations. Ideally, it should also leave some trace of its presence if it does come off.*

### 2.2 Security Labels

A vehicle security label should incorporate all the same basic security and physical characteristics as a secure compliance label but the only data it carries is the Vehicle Identification Number (VIN) in both plain text and bar code form and the one common logo.

## 3 REQUIRED LABEL CONSTRUCTION

The currently available technology for producing a secure compliance label that meets the above requirements to the maximum extent possible at an acceptable cost has been examined. It was concluded that the label design that meets the criteria and fits best into the present vehicle manufacturing and importing systems is as follows:

Data security and durability are provided by:

- printing the data on a first surface layer or using a thermal transfer process and subsequently applying a protective overlay so that in the final product all data on the label is effectively placed on sub-surface layers.

- the use of materials and adhesives that meet suitable physical and chemical specifications.

Self-voiding, prevention of removal or protection of data are ensured by:

- the use of a selectively treated layer that produces a “VOID” pattern or other obvious and non-repairable damage to the label when any attempt is made to remove it after initial placement.

- the incorporation of features that protect the plain text version of the VIN from tampering and which will render the VIN data illegible upon removal of the label in any circumstances.

- the use of adhesives that can withstand solvents and temperature extremes in excess of the likely environment to which the label will be exposed in normal usage and in excess of those that the label itself can withstand.

Prevention of copying or replicating and ease of recognition of a genuine label is achieved by the incorporation of a feature which permits a non-scientific, non-destructive and practicable means of in-field verification.

A security label should also incorporate all the above security and durability characteristics.

# 4 GENERAL REQUIREMENTS

It is likely that two versions of either type of label will be required.

## 4.1 Secure Compliance Labels

***Version A*** is a completed adhesive-backed label constructed in a manner which protects all variable data, non-variable data, logos and the in-field verification feature so that the security and durability requirements are met. This label is to be provided cut to size on a suitable backing/release film ready for removal from the backing and placing on the vehicle.

***Version B*** is a partially completed adhesive-backed label with all non-variable data, logos and the in-field verification feature placed on the surface or on sub-surface layers within the label construction and ready for printing of the variable data using a suitable printing process. These labels are to be provided on a suitable backing/release film in a form ready for printing of the variable data. In addition, the finished label must be constructed in a manner which protects all variable data, non-variable data, logos and the in-field verification feature so that the security and durability requirements are met.

## 4.2 Security Labels

***Version A*** is a completed adhesive-backed label constructed in a manner which protects the VIN, bar coded VIN and the in-field verification feature so that the security and durability requirements are met. This label is to be provided cut to size on a suitable backing/release film ready for removal from the backing and placing on the vehicle.

***Version B*** is a partially completed adhesive-backed label with the in-field verification feature placed on the surface or on sub-surface layers within the label construction and ready for printing of the VIN and bar coded VIN using a suitable printing process. These labels are to be provided on a suitable backing/release film in a form ready for printing of the VIN information. In addition, the finished label must be constructed in a manner which protects the VIN, bar coded VIN and the in-field verification feature so that the security and durability requirements are met.

## 4.3 Specific General Requirements – Secure Compliance Labels

4.3.1 The colour of the finished label's background and text shall be of sufficient contrast to ensure easy readability using a font of a style and size acceptable to the Administrator of Vehicle Standards.

4.3.2 The finished label shall be of a size and shape and contain all the data and images required by the various circulars and determinations issued by the Administrator of Vehicle Standards.

4.3.3 The label will incorporate features that protect the plain text version of the VIN from tampering and which will render the VIN data illegible upon removal of the label in any circumstances.

4.3.4 The label shall include a feature that permits the authenticity of the label to be verified in the field by non-scientific, non-destructive and practicable means.

4.3.5 The label shall be flexible and constructed of suitable materials such that the performance criteria as set out in Section 5 are met.

## 4.4 Specific General Requirements – Security Labels

4.4.1 The colour of the finished label's background and text shall be of sufficient contrast to ensure easy readability using a font of a style and size similar to that used for compliance labels.

4.4.2 The finished label shall be approximately 80 mm wide by 32 mm high and carry the information in the style and format as illustrated in Figure 1 below.


**Figure 1 - Vehicle Security Label**

Note: Label above shown full size. Data and background pattern are examples only.

4.4.3 The label shall incorporate features that protect the plain text version of the VIN from tampering and which will render the VIN data illegible upon removal of the label in any circumstances. The bar coded version of the VIN shall be printed immediately below this window. (The bar code protocol used shall be the same as one of the protocols approved by the Administrator of Vehicle Standards for bar coded VINs on compliance labels.)

4.4.4 The label shall include a feature that permits the authenticity of the label to be verified in the field by non-scientific, non-destructive and practicable means.

4.4.5 The label shall be flexible and constructed of suitable materials such that the performance criteria as set out in Section 5 are met.

# 5 PERFORMANCE REQUIREMENTS

## 5.1 Rationale for Particular Tests

The test requirements set out below have been developed to ensure that the label has adequate durability in any likely location on the vehicle and that the integrity of the data and the recognition or identification systems remain effective. They have also been developed to ensure that the label will remain securely fixed to the vehicle and that the label itself cannot be removed or transferred to another vehicle without clearly identifiable indicators.

No abrasion tests have been included as the current location requirements for compliance plates will still apply and these have been formulated to ensure that the label will have reasonable protection from impact and abrasion. In the case of security labels, it is expected that the vehicle manufacturers will adopt similar practices to those used for the location of compliance plates.

The Flexibility Test is to ensure that the label is flexible enough to be applied in a cool environment to a surface curved in one plane and will not lift or separate from the surface because of any stiffness in the label material.

The Barcode Readability Test and the In-field Verification Test are to ensure that these features are readable under the typical conditions in which the label will be examined in the field. The tests are repeated after labels have been exposed to a number of tests specified in the Accelerated Durability Tests to ensure that they remain readable under any normal environmental conditions likely to be encountered.

The Self Voiding Test is to ensure that attempts to remove the label provide sufficient damage to the label or indicators on the label so that it is visually obvious that the label has been removed after its initial application. This test is repeated after labels have been exposed to a number of tests specified in the Accelerated Durability Tests to ensure that the self-voiding characteristics are not reduced over time or can be defeated by exposure to solvents or extremes in temperature or humidity.

The Heat Removal Tests are to ensure that the label cannot be removed, either intact or without obvious evidence of removal, by the application of heat to soften the adhesives used.

The Accelerated Durability Tests are to ensure that the label and its data have adequate durability and provide “conditioned” labels for the performance of some of the other tests above.

## 5.2 Preparation of Standard Test Specimens

Unless otherwise specified in the test procedure, tests shall be carried out on *standard test specimens* produced by applying a label to a flat panel made of steel plate approximately 1.5mm thick that has been painted to represent a typical non-cosmetic vehicle surface such as the under bonnet or rear compartment finish. This panel may be a section of steel plate taken from the particular area of the vehicle or may be a production representative panel or component.

The label shall be applied to the panel using a process representing the application of the label in the production process.

Following application of the label, each *standard test specimen* shall be placed in a

controlled atmosphere of 23 ± 2°C, and at 50% ± 5% relative humidity for not less than 24 hours prior to testing.

Sufficient *standard test specimens* shall be prepared to enable **new** *standard test specimens* to be used for each test except where:

- Section 4.4 allows a *standard test specimen* that has been used for one or more non-destructive tests to used for a subsequent test; or
- Section 4.4 requires that the *standard test specimen* be "conditioned" in one test before the carrying out of another test.

Table 1 below sets out the test sequence for each *standard test specimen.*

## 5.3 Testing Environment

Unless otherwise specified all tests shall be carried out in a controlled atmosphere of 23 ± 2°C, and at 50% ± 5% relative humidity.

## 5.4 Testing

5.4.1 A new label shall be subject to the Flexibility Test in Appendix A.

5.4.2 New *Standard test specimens* shall be subject to each of the tests set out below: -

- Barcode Readability Test – Appendix B
- In-field Verification Test – Appendix C
- Self Voiding Test – Appendix D
- Heat Removal Test 1 – Appendix E
- Heat Removal Test 2 – Appendix E

Note: The same *standard test specimen* can be used for the Barcode Readability Test and the In-field Verification Test and then used for the Self Voiding Test or one of the Heat Removal Tests.

5.4.3 A new *standard test specimen* shall be subject to each of the tests set out below: -

- Accelerated Durability Tests 1 – Appendix F
- Accelerated Durability Tests 2 – Appendix F
- Accelerated Durability Tests 3 – Appendix F
- Accelerated Durability Tests 4 – Appendix F

5.4.4 Two new *standard test specimens* shall be subject to each of the tests set out below: -

- Accelerated Durability Tests 5 – Appendix F
- Accelerated Durability Tests 6 – Appendix F
- Accelerated Durability Tests 7 – Appendix F

5.4.5 Each of the *standard test specimens* that were used for the Accelerated Durability Tests 1 to 4 as required in clause 5.4.3 shall be subjected to the Barcode Readability test (Appendix B), the In-field Verification Test (Appendix C) and then the Self Voiding Test (Appendix D) immediately after the completion of the relevant Accelerated Durability Test.

5.4.6 One each of the *standard test specimens* that were used for the Accelerated Durability Tests 5 to 7 as required in clause 5.4.4 shall be subjected to the Barcode Readability test (Appendix B), the In-field Verification Test (Appendix

C) and then the Self Voiding Test (Appendix D) immediately after the completion of the relevant Accelerated Durability Test.

5.4.7 The remaining *standard test specimens* that were used for Test 5 and Test 6 of the Accelerated Durability Tests (Appendix F) shall be subjected to either Test 1 or Test 2 of the Heat Removal Tests (Appendix E) within 12 hours of completion of the relevant Accelerated Durability Test.

5.4.8 The remaining *standard test specimen* that was used for Test 7 of the Accelerated Durability Tests (Appendix E) shall be subjected to either Test 1 or Test 2 of the Heat Removal Tests (Appendix E) immediately after completion of Test 7.

## 5.5 Acceptance of Test Results

A label design and construction shall only be deemed to comply with the performance requirements in this specification if it passes all the tests specified in Section 5.4.

## Table 1 - Test Sequence for *Standard Test Specimens*

| Specimen Number | Accelerated Durability Tests | | | | | | | Barcode Readability Test | In-field Verification Test | Self Voiding Test | Heat Removal Tests | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | | | | 1 | 2 |
| 1 | | | | | | | | X ► | X ► | X | | |
| 2 | | | | | | | | | | | X | |
| 3 | | | | | | | | | | | | X |
| 4 | X ► | | | | | | | X ► | X ► | X | | |
| 5 | | X ► | | | | | | X ► | X ► | X | | |
| 6 | | | X ► | | | | | X ► | X ► | X | | |
| 7 | | | | X ► | | | | X ► | X ► | X | | |
| 8 | | | | | X ► | | | X ► | X ► | X | | |
| 9 | | | | | X ► | | | | | | X or X | |
| 10 | | | | | | X ► | | X ► | X ► | X | | |
| 12 | | | | | | X ► | | | | | X or X | |
| 13 | | | | | | | X ► | X ► | X ► | X | | |
| 14 | | | | | | | X ► | | | | X or X | |

**X** in a shaded cell denotes a destructive test and is the last test in the sequence for that specimen.

# Appendix A - Label Flexibility Test

The test below shall be carried out on a new label that has been conditioned in a controlled atmosphere of 10 ± 2°C, and at 50% ± 5% relative humidity for not less than 24 hours prior to testing.

Apply the label to a cylindrical surface of radius 50mm that has been painted to represent a typical non-cosmetic vehicle surface such as the under bonnet or rear compartment finish. The cylinder shall have been placed in the same controlled atmosphere as the label and testing shall be carried out immediately on removal of the label and the cylinder from that environment. The label shall be applied to the cylinder using a process representing the application of the label in the vehicle production process.

The cylinder with the label affixed shall be allowed to condition in a controlled atmosphere of 23 ± 2°C, and at 50% ± 5% relative humidity for 24 hours.

The label shall be deemed to have passed this test if:

1 the backing/release film was readily removed from the label during initial application; and

2 after applying and conditioning there is no visible evidence of:
- any blistering, wrinkling or cracking;
- loss of adhesion of the label or separation between any layers of the label; and
- any tamper evident or self-voiding characteristics as a result of the test.

# Appendix B - Barcode Reader Test

For the purposes of these tests, a *test specimen* is either a new *standard test specimen* or a *standard test specimen* that has been “conditioned” by being subjected to another test as required.

Scan the barcode on the *test specimen* with an appropriate hand held barcode scanner programmed for the particular barcode type and note the data returned.

Repeat the scanning of the bar code four more times and note the data returned each time.

The label shall be deemed to have passed this test if the same data is returned on all five scans.

# Appendix C – In-field Verification Test

For the purposes of these tests, a *test specimen* is either a new *standard test specimen* or a *standard test specimen* that has been “conditioned” by being subjected to another test as required.

Use the in-field verification tool or technique supplied or nominated by the label manufacturer to view the in-field verification feature on the *test specimen*.

The label is deemed to have passed this test if the label’s in-field verification feature is clearly evident.

# Appendix D - Self-Voiding Test

For the purposes of these tests, a *test specimen* is either a new *standard test specimen* or a *standard test specimen* that has been "conditioned" by being subjected to another test as required.

Step 1 Insert a razor blade under one corner of the label and raise just sufficient to grip the corner with the fingers. Slowly pull the corner upwards using the razor blade to separate the label from the surface on which it is applied until about half the length of the label including half the length of plain text VIN is free.

Examine the appearance of the label.

Step 2 Gently smooth the raised portion of the label back down starting from the attached section so that it returns as near as possible to its original position. Press the whole area of the label that was previously raised firmly back onto the surface.

Examine the appearance of the label.

The label shall be deemed to have passed this test if, at the end of both Step 1 and Step 2 it exhibits one or more of the following:

- the thermal printed VIN on the portion of the label that was raised is illegible or shows clearly discernable signs of disturbance;
- a "VOID" pattern is evident over the area of the label that was raised; or
- other obvious damage has been done to the area of the label that was raised.

# Appendix E - Heat Removal Tests

For the purposes of these tests, a *test specimen* is either a new *standard test specimen* or a *standard test specimen* that has been "conditioned" by being subjected to another test as required.

## Test 1

**In this test every effort shall be made to remove the label intact without tearing it or otherwise causing damage or applying any more heat than is necessary.**

Mount a 1200 watt heat gun above a flat surface so that the outlet will be approximately 150mm above a *test specimen* placed on that surface and direct the output downwards. Slide a *test specimen* forward along the surface until the heat gun output is directed to one edge of the label. After about 30 seconds or when the label surface temperature reaches 105° to 107°C, quickly withdraw the *test specimen* and carefully insert a razor blade along the heated edge of the label pushing the blade through the adhesive and peeling the label slightly upwards. When the resistance to pushing the blade through the adhesive builds up (usually after 15mm to 20mm of travel) remove the razor blade and move the test specimen back under the heat gun and further forward by about 25mm than previously. Wait for the surface temperature to build up to 105° to 107°C again and push the razor blade further under the label. Repeat this process until the entire label is removed from the panel.

The removed label shall be placed on a smooth, flat surface and examined.

The label shall be deemed to have passed this test if:

1 the label exhibits visible and obvious discoloration or noticeably deforms before an edge can be raised; or

2 it cannot be removed intact without exhibiting one or more of the following:

- the thermal printed VIN is rendered illegible or shows clearly discernable signs of disturbance;
- a "VOID" pattern is evident; or
- the label exhibits visible and obvious discoloration or deformation or there are tears in the label.

## Test 2

**In this test every effort shall be made to remove the label intact without tearing it or otherwise causing damage or applying any more heat than is necessary.**

Mount a 1200 watt heat gun so that the outlet will be approximately 150mm from the rear of a *test specimen* and the air flow approximately square to the rear of the *test specimen.* Apply the heat to the rear of the panel near one edge of the label and as the temperature of the *test specimen* slowly rises attempt to insert a razor blade under that edge of the label and through the adhesive and slowly raise that edge of the label. Continue to attempt this until the razor blade can be inserted and the edge can be raised. Maintain the temperature of the backing panel at approximately this temperature by removing and re-applying the heat as necessary. Continue to insert the razor blade and gently draw the raised edge away from the backing panel progressively moving the heat application to the area being removed until the whole label is removed.

The removed label shall be placed on a smooth, flat surface and examined.

The label shall be deemed to have passed this test if:

- the label exhibits visible and obvious discoloration or noticeably deforms before an edge can be raised; or

2 it cannot be removed intact without exhibiting one or more of the following:

  - the thermal printed VIN is rendered illegible or shows clearly discernable signs of disturbance;
  - a “VOID” pattern is evident; or
  - the label exhibits visible and obvious discoloration or deformation or there are tears in the label.

# Appendix F - Accelerated Durability Tests

Each test below shall be carried out on a previously un-tested *standard test specimen*.

## Test 1 - High Air Temperature

Note the overall length and width of the label on the *standard test specimen*. Place the *standard test specimen* into an air circulating oven pre-heated to 110 ± 1°C and maintain this oven temperature for a period of 168 hours. Remove the *standard test specimen* and place it on a flat surface and allow it to cool to room temperature.

Visually examine the *standard test specimen* and measure the overall length and width of the label.

A label shall be deemed to pass this test if:

- it does not exhibit any blistering, wrinkling, cracking, or color change that effects legibility;
- no overall dimensional change exceeds 2.0%; and
- no tamper evident or self-voiding characteristics can be seen as a result of the test.

## Test 2 – High Humidity

Note the overall length and width of the label on the *standard test specimen*. Place the *standard test specimen* into a humidity cabinet at 38 ± 1°C with a relative humidity of 97 to 100% and a condensation rate of 1 to 2 millilitres/hour and maintain this environment for 168 hours. Remove the *standard test specimen* and place it on a flat surface and allow it to dry and attain room temperature.

Visually examine the *standard test specimen* and measure the overall length and width of the label.

A label shall be deemed to pass this test if:

- it does not exhibit any blistering, wrinkling or cracking;
- there is no color change or visible loss of adhesion of the label or visual separation between any layers of the label;
- no overall dimensional change exceeds 2.0%; and
- no tamper evident or self-voiding characteristics can be seen as a result of the test.

## Test 3 – Hot Engine Oil

Fully immerse the *standard test specimen* in 10W-30 engine oil pre-heated to 120 ± 1°C and maintain this oil temperature for 4 hours. Remove the *standard test specimen* and allow it to cool to room temperature for one hour. Wash the *standard test specimen* in mild soapy water; place it on a flat surface and allow it to dry.

Visually examine the *standard test specimen*.

A label shall be deemed to pass this test if:

- it does not exhibit any blistering, wrinkling or cracking;
- there is no color change or visible loss of adhesion of the label or visual separation between any layers of the label;
- edge penetration is less than 5mm; and
- no tamper evident or self-voiding characteristics can be seen as a result of the test.

## Test 4 – Hot Engine Coolant

Fully immerse the *standard test specimen* in a 50/50 mixture ethyl glycol antifreeze and distilled water pre-heated to 95 ± 1°C and maintain this environment for 4 hours. Remove the *standard test specimen* and allow it to cool to room temperature for one hour. Wash the *standard test specimen* in mild soapy water; place it on a flat surface and allow it to dry.

Visually examine the *standard test specimen*.

A label shall be deemed to pass this test if:

- it does not exhibit any blistering, wrinkling or cracking;
- there is no color change or visible loss of adhesion of the label or visual separation between any layers of the label;
- edge penetration is less than 5mm; and
- no tamper evident or self-voiding characteristics can be seen as a result of the test.

## Test 5 – Premium Unleaded Petrol

Note the overall length and width of the label on the *standard test specimen*. Fully immerse the *standard test specimen* in premium (96 to 98 RON) unleaded petrol at room temperature for 1 hour. Remove the *standard test specimen* and allow it to stand at room temperature for one hour. Wash the *standard test specimen* in mild soapy water; place it on a flat surface and allow it to dry.

Visually examine the *standard test specimen* and measure the overall length and width of the label.

A label shall be deemed to pass this test if:

- it does not exhibit any blistering, wrinkling or cracking;

- there is no color change or visible loss of adhesion of the label or visual separation between any layers of the label;
- edge penetration is less than 5mm;
- no overall dimensional change exceeds 2.0%; and
- no tamper evident or self-voiding characteristics can be seen as a result of the test.

## Test 6 – Brake Fluid

Note the overall length and width of the label on the *standard test specimen*. Fully immerse the *standard test specimen* in DOT 3 or DOT 4 brake fluid at room temperature for 4 hours. Remove the *standard test specimen* and allow it to stand at room temperature for one hour. Wash the *standard test specimen* in mild soapy water; place it on a flat surface and allow it to dry.

Visually examine the *standard test specimen* and measure the overall length and width of the label.

A label shall be deemed to pass this test if:

- it does not exhibit any blistering, wrinkling or cracking;
- there is no color change or visible loss of adhesion of the label or visual separation between any layers of the label;
- edge penetration is less than 5mm;
- no overall dimensional change exceeds 2.0%; and
- no tamper evident or self-voiding characteristics can be seen as a result of the test.

## Test 7 – Low Air Temperature

Place the *standard test specimen* in a freezer at minus 30 $\pm$ $2^0$C for 4 hours. While still within the freezer visually examine the *standard test specimen* and measure the overall length and width of the label.

A label shall be deemed to pass this test if:

- it does not exhibit any blistering, wrinkling or cracking;
- there is no color change or visible loss of adhesion of the label or visual separation between any layers of the label; and
- no tamper evident or self-voiding characteristics can be seen as a result of the test.