

中華民國國家標準

商用車－倒車障礙物偵測裝置－要求  
與試驗

總號

**CNS**

類號

Commercial vehicles - Obstacle detection device during reversing -  
Requirements and tests

編訂說明：本案建議案號為「建-制 1000257」，草案編號為「草-制 1000430」，係參考 ISO/TR 12155：1994 並委託財團法人車輛研究測試中心編擬而成，依程序辦理徵求意見，敬請 惠賜卓見。

## 1 Scope

This Technical Report specifies requirements and tests for detection devices which indicate to the driver of a commercial road vehicle, when he is reversing, the presence of objects which are within the monitoring range of the device.

## 1. 適用範圍

本標準規定偵測裝置之要求及試驗項目，此偵測裝置用以告知商用車駕駛者，在倒車時，偵測裝置之監測範圍內有物件出現的情形。

It applies to detection devices with non-contact sensors which can be fitted on commercial vehicles to improve safety during manoeuvring. They are to be regarded as an additional aid to the vehicle driver when reversing at a speed of up to 5 km/h (approximately walking pace), but they do not relieve the driver of his special responsibility when reversing (i.e. this is not a reversing alarm for other personnel in the area).

適用於裝配在商用車輛之偵測裝置具非接觸式感測器，當駕駛者倒車時車速達到 5 km/h 時(大約為步行的速度)，用以增進車輛操控時之安全性。偵測裝置被視為車輛駕駛者額外之輔助，但此裝置非用以免除駕駛者倒車時之特定責任(亦即，此非用以警告在車輛後方區域其他人員之倒車警示)。

This Technical Report describes two basic designs:

本標準敘述兩個基本設計：

- reversing detection devices with a pre-warning range;
- 具預警範圍之倒車偵測裝置;
- reversing detection devices without a pre-warning range (see 5.1).
- 無預警範圍之倒車偵測裝置(參照 5.1)。

NOTE 1 Detection devices having a monitoring range which extends to the full height of the vehicles are called rearward warning devices. The Technical Report currently does not include requirements for such devices.

備考 1. 具有擴展監測範圍至車輛全高的偵測裝置被稱為後方警告裝置。本標準不包括此裝置的要求。

(共 頁)

公 布 日 期  
年 月 日

經濟部標準檢驗局印行

修 訂 公 布 日 期  
年 月 日

## 2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this Technical Report. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this Technical Report are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

### 2. 引用標準

下列標準因本標準所引用，成為本標準之一部分。有加註年分者，適用該年分之版次，不適用於其後之修訂版(包括補充增修)。無加註年分者，適用該最新版(包括補充增修)。

ISO 1176:1990	Road vehicles - Masses - Vocabulary and codes
ISO 3833:1977	Road vehicles - Types - Terms and definitions
ISO 7637-2:1990	Road vehicles - Electrical disturbance by conduction and coupling - Part 2: Commercial vehicles with nominal 24 V supply voltage - Electrical transient conduction along supply lines only
ISO 7637-3:1995	Road vehicles - Electrical disturbance by conduction and coupling - Part 3: Vehicles with nominal 12 V or 24 V supply voltage - Electrical transient transmission by capacitive and inductive coupling via lines other than supply lines
ISO 7731: 1986	Danger signals for work places - Auditory danger signals
ISO 9227: 1990	Corrosion tests in artificial atmospheres - Salt spray tests
ISO 11451-1:1995	Road vehicles - Electrical disturbances by narrowband radiated electromagnetic energy - Vehicle test methods - Part 1: General and definitions
ISO 11452-1:1995	Road vehicles - Electrical disturbances by narrowband radiated electromagnetic energy - Component test methods - Part 1: General and definitions
CNS 14165:1998	電器外殼保護分類等級 ( I P 碼 )
DIN-VDE 0879-3:1981	Radio interference suppression of vehicles, vehicle equipment and internal combustion engines - Part 3: Interference suppression for on-board radio reception

## 3 Definitions

### 3. 用語及定義

For the purposes of this Technical Report, the following definitions apply.

下列用語及定義適用於本標準。

- 3.1 reversing detection device: Warning device which gives an acoustic and visual indication to the vehicle driver (not an alarm to other personnel in the area), when he selects reverse gear, of whether there are objects in the monitoring range.

3.1 倒車偵測裝置：當車輛駕駛選擇倒車檔時，無論是否有物件在監測範圍內，此警告裝置提供車輛駕駛聽覺與視覺的指示(非警告在車輛後方區域的其他人員)。

NOTES 2 When reverse gear is selected, the detection device is automatically activated if the device for starting or stopping the engine is in such a condition that the engine can operate.

備考2. 在車輛電源或引擎啟動狀態下，當排檔選擇倒車檔時，偵測裝置將會自動啟動。

3 The reversing detection device is a system consisting of several components which are necessary to permit operation of the system. It includes in particular the following components: sensors, signal-processing unit (evaluation device), visual and acoustic indicator, and the transmission equipment.

備考3. 倒車偵測裝置是一個系統，它包含了數個組件來構成系統的運作。特別是包括以下的組成部分：感測器，信號處理單元(鑑定裝置)，視覺及聲音指示器，與傳輸設備。

3.2 sensor: Component which detects objects in the monitoring range.

3.2 感測器：於監測範圍內偵測物件之組件。

3.3 evaluation device: Component which evaluates the sensor signals and monitors operation.

3.3 評估裝置：評估感測器信號與監督操作之組件。

3.4 indication device: Component which transmits signals to the vehicle driver in the form of visual and acoustic information.

3.4 指示裝置：以視覺與聲音的形式傳輸訊息給車輛駕駛之組件。

3.5 monitoring range: Specific three-dimensional area behind the vehicle, which is divided into a pre-warning range, a main warning range and a collision range. (See figure 1.)

3.5 監測範圍：定義車輛後方之三維空間區域，分別為預警範圍，主要警告範圍，以及碰撞範圍(參照圖1)。

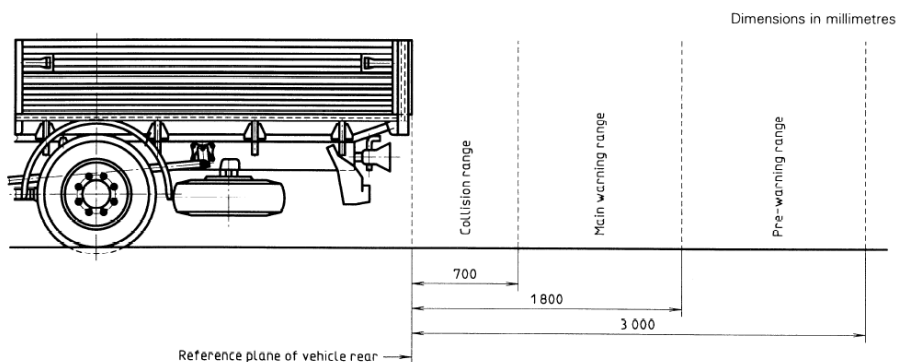


Figure 1 — Monitoring range of reversing detection device

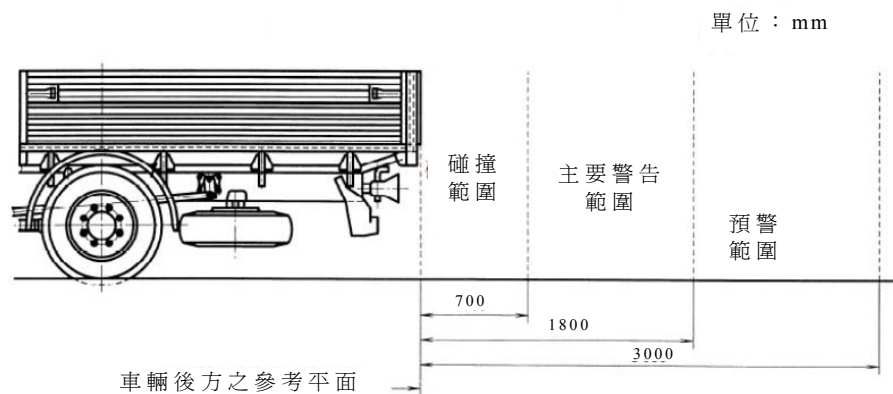


圖1 倒車偵測裝置之監測範圍

3.6 test object: Object with a specific geometry and surface for testing the monitoring range.

3.6 測試物件：用於測試監測範圍之特定幾何與外觀的物件。

#### 4 Designation

##### 4. 稱呼

When ordering, a model designation needs to be added to the standard designation in 4.1 and 4.2 to allow precise correlation between a reversing detection device and the intended vehicle model or vehicle range (see also 9.1).

分類時，型式命名需要加入4.1及4.2的標準名稱，以界定倒車偵測裝置及欲設車輛型式或車輛範圍兩者間確切之關係(參照9.1)。

4.1 The designation of a reversing detection device with a pre-warning range

(monitoring range 3 m) (RW 30), which meets the requirements of this Technical Report is as follows:

Reversing detection device ISO/TR 12155 RW 30

4.1 具預警範圍倒車偵測裝置之命名(監測範圍3 m): RW30, 符合本標準之要求如下:

倒車偵測裝置 CNS\_\_\_ RW 30

4.2 The designation of a reversing detection device without a pre-warning range

(monitoring range 1,8 m) (RW 18), which meets the requirements of this Technical Report is as follows:

Reversing detection device ISO/TR 12155 RW 18

4.2 無預警範圍倒車偵測裝置之命名(監測範圍1.8 m: RW 18), 符合本標準之要求如下:

倒車偵測裝置 CNS\_\_\_ RW 18

#### 5 Safety requirements

##### 5. 安全要求

##### 5.1 Monitoring range

##### 5.1 監測範圍

The monitoring range for reversing detection devices is defined by the measuring points in figures 3 to 6. For application- and vehicle- related reasons, the pre-warning range can be dispensed with, if desired, for vehicles below 7,5 t complete vehicle kerb mass as defined in ISO 1176.

倒車偵測裝置的監測範圍是由圖3至圖6的測量點界定。基於應用與車輛相關的理由，

若需要時，定義於ISO 1176之整車空車重在7.5噸以下的車輛，預警範圍可以免除。  
The dimensions relate to the complete vehicle kerb mass (ISO-M06), with fully laden rear axle.

具滿載後軸，其整車空車重相關尺寸，參照ISO-M06。

## 5.2 Arrangement of sensors

The sensors shall be arranged so that the monitoring range specified in 5.1 is covered.

### 5.2 感測器之配置

感測器之配置應涵蓋如5.1所規定的監測範圍。

## 5.3 Indicators and signals

Reversing detection devices shall be equipped with indicators for conveying visual and acoustic signals.

### 5.3 指示器及信號

倒車偵測裝置應配備指示器以傳達視覺與聲音的信號。

#### 5.3.1 Visual indicators

The visual indicators shall convey the messages in 5.3.1.1 to 5.3.1.3.

Range indicators may be either digital or analogue, so long as the requirements below are met.

##### 5.3.1 視覺指示器

視覺指示器應傳達5.3.1.1至5.3.1.3的訊息。

只要達到以下的要求，範圍指示器的顯示可為數位或類比。

##### 5.3.1.1 Warning

Warning indications shall be as follows:

###### 5.3.1.1 警告

警告指示應如下：

- intermittent yellow [not necessary for warning devices without a pre-warning range (see 5.1)]: if there are objects in the pre-warning range;
- intermittent red: if there are objects in the main warning range;
- continuous red: if there are objects in the collision range.
- 斷續黃色 [無預警範圍的裝置不需要(參照5.1)]：若有物件在預警範圍之內；
- 斷續紅色：若物件在主要警告範圍之內；
- 連續紅色：若有物件在碰撞範圍之內。

##### 5.3.1.2 Monitoring

Monitoring indications shall be as follows.

###### 5.3.1.2 監測

監測指示應如下。

- a) Activation check: to check the operation of the visual indicator, it is acceptable when switching on the ignition, and necessary when activating the system, for both signals to light up briefly.

(a)啟動檢查：為檢查視覺指示器的運作狀況，可接受當開啟點火開關時，以及發動

引擎系統時，兩者以簡單的信號燈指示。

b) Readiness check: if desired, there may be an additional signal (e.g. green) which indicates that the reversing detection device is ready to operate correctly. This signal shall go out if there is a warning (5.3.1.1) or a fault (5.3.1.3).

(b)就緒檢查：若需要，可以有額外的信號(例如：綠色)，用以指示倒車偵測裝置已準備就緒並且正確運作。若有警告(5.3.1.1)或故障(5.3.1.3)，信號將熄滅。

#### 5.3.1.3 Faults

#### 5.3.1.3 故障

System faults should be indicated by the signals in 5.3.1.1 and 5.3.1.2 flashing.

System faults occurring when the system is activated should be indicated as follows:

系統故障時，必須顯示5.3.1.1與5.3.1.2之閃爍信號。在系統啟動後發生故障時，必須有如下的指示：

- in the case of devices with a pre-warning signal, by continuous illumination of the red and yellow signals,
- in the case of devices without a pre-warning signal, by continuous illumination of the red signal.
- 具有預警信號的倒車偵測裝置，連續紅色與黃色的亮燈信號，
- 不具有預警信號的倒車偵測裝置，連續紅色的亮燈信號。

#### 5.3.2 Acoustic Signal

The acoustic Signals as specified in ISO 7731 have the functions given in 5.3.2.1 to 5.3.2.3.

#### 5.3.2 聽覺信號

在ISO 7731定義的聽覺信號，具有5.3.2.1至5.3.2.3之功能。

##### 5.3.2.1 Warning

Acoustic warning signals shall be as follows:

##### 5.3.2.1 警告

聲音警告信號應如下：

- a) a continuous sequence of individual tones with a pulse frequency of 2 Hz: when there are objects in the pre-warning zone;
  - b) a continuous sequence of individual tones with a pulse frequency of 4 Hz: when there are objects in the main warning zone;
  - c) a continuous tone: when there are objects in the collision zone.
- (a)當有物件在預警區域內時：一脈波頻率為2 Hz連續不間斷之獨特音調；  
(b)當有物件在主要警告區域內時：一脈波頻率為4 Hz連續不間斷之獨特音調；  
(c)當有物件在碰撞區域內時：連續音調。

NOTE 4 This continuous tone acoustic signal may be wired so that the volume can be reduced manually, if required (advisable, e.g. when parking on a ramp between two other trucks). The volume reduction applies to the current activation process only.

備考4. 若需要的話，此連續聲音信號可以手動控制方式減低音量，(例如在斜坡上停靠於兩輛貨車的前後之間)。音量的減小只作用於當次的操作。

#### 5.3.2.2 Readiness check

A short acoustic signal is necessary to check the operation of the acoustic indicator, and may only sound on activation of the system (if there is no warning as in 5.3.2.1).

#### 5.3.2.2 就緒檢查

短促的信號聲是檢查聽覺指示器運作狀況所必要的，且可只在系統啟動時發出聲音（若無5.3.2.1的警告情形）。

#### 5.3.2.3 Faults

Faults should be indicated by a continuous tone. This tone shall differ markedly from the normal warning tones in its frequency and shall have a minimum duration of 3 s after selection of reverse gear. It shall only sound when reverse gear is engaged and sound every time this gear is selected as long as the fault remains.

The circuit for the continuous tone shall be such that the volume can be manually reduced or switched off, or shall automatically switch off after 3 s. The ability to reduce the volume or switch off applies only to the current activation process.

#### 5.3.2.3 故障

故障應由一連續之音調提示。此音調在頻率上應明顯不同於正常的警告音調，且在排入倒車檔後應至少保持3 s的時間。此警告音調只有在排入倒車檔時才會發出，且只要故障尚未排除，則每次倒擋時必須發出故障警告聲音。此連續警告聲音的電子回路可以手動降低音量或關閉，或者3 s後自動關閉。此音量的減低或關閉，只作用於當次的操作。

#### 5.4 System measuring time

The measuring time including all sensors in a reversing detection device should not take longer than 200 ms before the indication appears. This time is calculated as the arithmetic mean of at least 50 measurements, in the course of which a test object [as specified in 7.1 a)] is moved at a speed of 1 m/s from outside the main warning zone to the 1,6 m grid position - the trigger point for time measurement. The maximum measuring time until an indication is made should not be longer than 300 ms in these tests.

#### 5.4 系統量測時間

倒車偵測裝置所有感測器的偵測時間，在指示出現之前，不應該超過200 ms。測試物件 [參照7.1 (a)說明] 以1 m/s的速度移動，從主要警告區域外方至1.6 m格線位置 -作為時間量測之觸發點，時間的計算至少為50次量測結果的平均數值。直到指示產生前，最大的偵測時間不應該超過300 ms。

#### 5.5 System activation time

The first indication of an object in the monitoring zone shall be made at the latest 600 ms after activation of the system - by engagement of reverse gear.

#### 5.5 系統啟動時間

在排入倒車檔動作啟動系統後，最晚應在600 ms之內對監測區域內之物件產生第一次指示。

#### 5.6 Resistance to manipulation

It shall not be possible to disable, by simply switching it off, the warning device.

#### 5.6 防易關

此警告裝置不能輕易的被斷開使其失去作用。

The reversing detection device shall be so designed and installed that its reliable operation cannot easily be altered.

在設計與安裝方面，倒車偵測裝置必須能可靠運作，而且不容易被更改。

#### 5.7 Monitoring of operational reliability

Reversing detection devices shall be equipped with test devices for the following self-testing functions.

##### 5.7 操作可靠度之監測

倒車偵測裝置應配備以下自我測試功能之測試裝置。

##### 5.7.1 Signal generation and echo reception

The test equipment shall verify the transformation of the electrical signal into a waveform (e.g. ultrasonic). This can be performed directly (e.g. with reference sensors) or indirectly (e.g. by the post-pulse oscillation of the sensor diaphragm).

The test is performed in accordance with 6.5.1.

##### 5.7.1 信號產生與回波接收

測試設備需驗證電子信號的波形轉變(例如超音波)。可以直接(例如以感測器做參考)或間接之方法執行(例如，藉由後脈衝振盪薄膜感測)。根據6.5.1說明執行測試。

##### 5.7.2 Measurement of distance

The test equipment shall check whether an echo signal from an object in the main warning range can still be related to this zone of the reversing detection device. This can be achieved, for example with an additional signal on an echo line which simulates the detection of an obstacle at a distance of 1 m. The correct correlation should be checked with the test device.

##### 5.7.2 距離量測

在主要警告範圍內，測試設備必須檢查是否有物件的回波信號，以及與倒車偵測裝置之關聯性。要達到如此，例如在回波線上可用一個額外信號，來模擬在1 m距離處的物件偵測。以測試裝置檢查其正確的關聯性。

##### 5.7.3 Self-testing device requirements

The self-testing device shall exhibit the following features with regard to the requirements specified in 5.7.1 and 5.7.2:

##### 5.7.3 自我測試裝置要求

自我測試裝置應具有5.7.1及5.7.2規定的如下特性：

a) the procedures are obligatory;

(a)其程序是必須的；

b) they shall detect any fault which impedes the specific function;

(b)將檢測任何影響特定功能之失效；

c) when a fault is detected, they shall produce a warning signal (as described in



5.3.1.3 and 5.3.2.3); the warning signal may not be cancelled until the fault has been rectified (except as in 5.3.2.3);

(c)當檢測到故障時，應發出警告信號(如5.3.1.3與5.3.2.3之敘述);警告信號在失效未得到矯正前無法被取消(5.3.2.3除外);

d) they shall be activated each time reverse gear is engaged.

(d)每次切入倒車檔，檢測設備都應啟動。

There are additional recommendations for computer controlled systems:

對於電腦控制系統額外之建議：

e) a ROM test should be carried out for all safety-related data storage areas (e.g. by signature formation using ROM with a single word width);

(e)所有安全相關之數據存儲區必須執行唯讀記憶體(Read Only Memory, ROM)測試(例如，若標記型態使用單一字寬之ROM)

f) a logical program run check should be performed (e.g. with a watch-dog circuit).

(f)應執行邏輯程式之運作檢查(例如，使用看門狗電路)。

NOTE 5 Tests other than those in e) and f) which are at least equivalent may be performed as an alternative.

備考 5. (e)與(f)以外的試驗，只要驗證具等效性，可以作為執行替代。

## 5.8 Trailer operation using trailers without detection devices

### 5.8 使用無偵測裝置之拖車的拖車操作

With this type of operation, the reversing detection device on the tractor shall be switched off. To achieve this, the reversing detection device shall be so designed or connected to the electrical system of the commercial vehicle that it is switched off when an electrical connection is made between the tractor and the trailer (see also clause 11).

操作此類型作業時，應關閉牽引車上之倒車偵測裝置。因此，商用車輛倒車偵測裝置在設計上，或當曳引車與拖車之間電路連接時，倒車偵測裝置應被關閉(參照第11節)。

## 6 Components: requirements and tests

### 6. 零組件：要求與試驗

Unless specified otherwise, the tests on the components shall be performed in the following sequence, and at an ambient temperature of  $(23 \pm 5)^\circ\text{C}$  and with relative air humidity of  $(60 \pm 25)\%$ .

除另有規定外，應在環境溫度為 $(23 \pm 5)^\circ\text{C}$ 及相對濕度 $(60 \pm 25)\%$ 的條件下，進行零組件試驗。

### 6.1 Mechanical Vibration

#### 6.1 機械振動

##### 6.1.1 Test

Fit the component on the test device in the same position and with the same fixings as in the vehicle. Subject the component to be tested to the following sinusoidal vibrations on a suitable vibration test device:

### 6.1.1 試驗

以安裝在車輛上相同之位置及固定方式，將零件安裝在測試裝置上。使用適當的振動測試裝置對零件進行下述的正弦振動試驗：

frequency: 5 Hz to 200 Hz

vibration amplitude:  $\pm 15$  mm

acceleration:  $49 \text{ m/s}^2$  (5g)

transition frequency: about 8 Hz to 9 Hz

number of frequency cycles: 50

rate of change of frequency: 1 octave/min

The frequency cycles may be interrupted.

頻率：5 Hz至200 Hz

振幅： $\pm 15$  mm

加速度： $49 \text{ m/s}^2$  (5g)

過渡頻率(transition frequency)：約8 Hz至9 Hz

頻率週期數：50

頻率變化率：1 octave/min

頻率週期可被中斷。

The test shall be performed for 16 h in each of three directions of vibration which are perpendicular to one another, and one of which shall lie along the vehicle longitudinal axis.

應在三個方向軸上各執行16 h試驗，彼此相互垂直，其中一軸平行於車輛縱軸方向。

### 6.1.2 Requirements

After the test, no cracks or changes shall be visible, and the component tested shall be capable of operation.

### 6.1.2 要求

試驗後，目視檢查應無裂痕或變化，零件也必須能夠正常操作。

## 6.2 Climatic conditions

### 6.2 氣候條件

#### 6.2.1 Test

Subject the components to be tested to five test cycles each lasting 24 h with the following climatic conditions:

#### 6.2.1 試驗

將零組件置於下列氣候條件執行五個試驗循環，每循環為24 h：

a) Allow temperature equalization for 4 h at an ambient temperature of  $(23 \pm 2)^\circ\text{C}$  and 45 % to 75 % relative air humidity.

(a) 在環境溫度 $(23\pm 2)^\circ\text{C}$ 及相對濕度45% ~ 75%之溫度下允許均化4 h。

b) Increase the temperature in the test chamber to  $(55 \pm 2)^\circ\text{C}$  and the relative humidity to 95 % to 99 % within 0,5 h.

(b) 在0.5 h內，測試箱溫度增加至 $(55\pm 2)^\circ\text{C}$ 及95% ~ 99%相對濕度。

c) Maintain the temperature/humidity levels indicated in conditioning stage b) for 10

h.

(c) 維持步驟(b)的溫/濕度條件10 h。

d) Reduce the temperature in the test chamber to  $-(40 \pm 2) ^\circ\text{C}$  within 2,5 h.

(d) 在2.5 h內，降低測試箱溫度至 $-(40\pm 2)^\circ\text{C}$ 。

e) Maintain the temperature indicated in conditioning stage d) for 2 h.

(e) 維持步驟(d)的溫度條件2 h。

f) Increase the temperature of the specimen to  $(100 \pm 2) ^\circ\text{C}$  within 1,5 h.

(f) 在1.5 h內，增加樣品溫度至 $(100\pm 2)^\circ\text{C}$ 。

g) Maintain the temperature indicated in conditioning stage f) for 2 h.

(g) 維持步驟(f)溫度條件2 h。

h) Reduce the temperature in the test chamber to ambient temperature within 1,5 h.

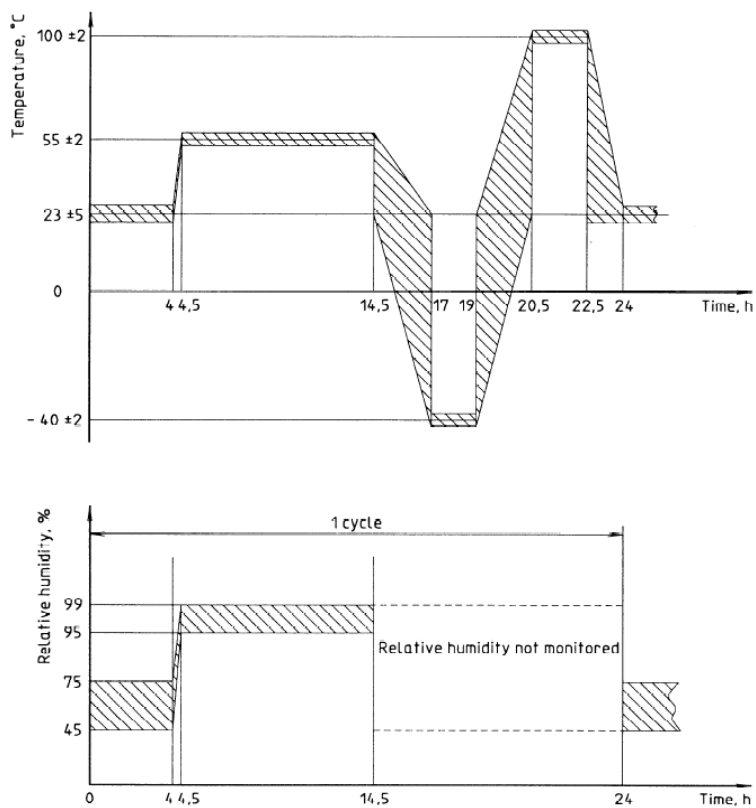
(h) 在1.5 h內，降低測試箱溫度至環境溫度。

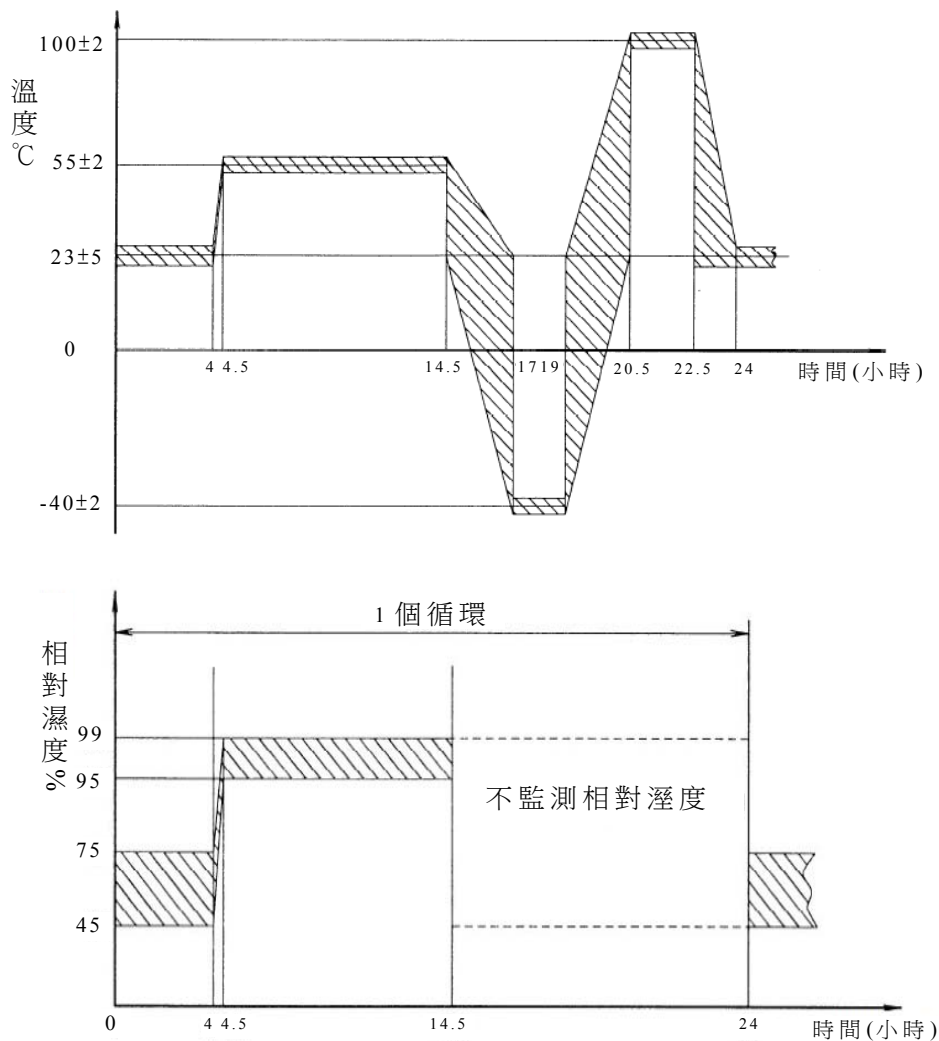
NOTE 6 During conditioning stages d), e), f), g) and h), the relative humidity is not monitored. During a break in the test procedure between two test cycles, the specimens are to be stored at ambient temperature.

備考6. 在條件步驟 (d), (e), (f), (g)與(h)，不監測相對濕度。在兩個測試步驟之間的轉換，樣品要保存在室溫條件下。

The test cycle is shown diagrammatically in figure2.

測試循環如圖2所示。





NOTE - The hatched areas show the acceptable temperature changes (upper part of diagram) and the acceptable changes in relative humidity (lower part of diagram) of the test chamber(s) as a function of operating time.

備考 斜線區域表示測試箱內運作之時間與可接受之溫度變化(圖上部),以及可接受之相對濕度變化(圖下部)。

圖2 溫度/濕度循環

### 6.2.2 Requirements

After conditioning in the climates specified in 6.2.1, no changes shall be detected and the **components** shall be capable of operation.

#### 6.2.2 要求

在經過6.2.1指定的氣候條件測試之後,不得發現有任何的改變,而且組件也必須能夠正常運作。

### 6.3 Static loading

#### 6.3 靜態負載

##### 6.3.1 Test

Place exterior components between two cylindrical metal plates at least 80 mm in diameter and subject them to a vertical load of 50 kg acting on the plates. Position the components between the plates such that the load is distributed over as large an

area as possible.

#### 6.3.1 試驗

將外部零組件放置於兩個直徑至少80 mm的圓柱形金屬板之間，並施加50 kg的垂直負載於金屬板。將組件定位於金屬板之間，使負載盡可能分佈於最大的面積。

#### 6.3.2 Requirements

After the test no cracks or changes shall be visible and the component shall be capable of operation.

#### 6.3.2 要求

試驗後，目視檢查不得發現有裂痕或改變，且組件應正常操作。

### 6.4 Salt Spray

#### 6.4 鹽水噴霧(鹽霧)

##### 6.4.1 Test

Subject exterior components to the NSS test procedure in ISO 9227 for a period of 96 h. Test the components in the as-installed Position. Seal cable ends. Use new, unused components for the tests.

##### 6.4.1 試驗

將外部零組件進行CNS\_\_\_(ISO 9227 NSS)的試驗程序，時間為96 h。試驗時，使用新的零組件進行試驗，其安裝如同實車安裝位置，並密封電纜兩端。

##### 6.4.2 Requirements

After the salt Spray test, no corrosion shall be visible on the parts tested in a visual check with the naked eye, corrected if necessary.

##### 6.4.2 要求

鹽霧試驗後，目視檢查測試零組件應無腐蝕現象，若必要時可對裸眼做矯正。

### 6.5 IP protection

#### 6.5 IP 防護

##### 6.5.1 Test

Perform the test in accordance with IEC 529.

##### 6.5.1 試驗

依據CNS 14165執行測試。

##### 6.5.2 Requirements

Components mounted externally (e.g. sensors) shall conform to IP 59, and other components shall conform to IP 54, as specified in IEC 529.

##### 6.5.2 要求

安裝於外部的組件(如感測器)應符合CNS 14165 IP 59之規範，其他組件應符合CNS 14165 IP 54。

### 6.6 Electromagnetic compatibility

#### 6.6 電磁相容性

##### 6.6.1 Line-related interference on supply lines

Apply test pulses 1, 2, 3a, 3b, 4 and 5 in accordance with ISO 7637-2:1990 on supply lines and on all other lines of the reversing detection device which are connected

with the supply lines.

#### 6.6.1 電源線路之關聯線路(Line-related)干擾

依據ISO 7637-2:2011施加試驗脈波1, 2, 3a, 3b, 4與5, 於供應線路以及其他所有連接至倒車偵測裝置的供應線路。

##### 6.6.1.1 System in non-activated condition

Apply test pulses 1 to 5 and severity level III. After the test, the system shall not be in functional status D or E according to ISO 7637-2:1990.

##### 6.6.1.1 系統在非啟動狀態

施加試驗脈波1至5, 嚴酷位準III。測試後, 系統不得有ISO 7637-2:1990中D或E之功能狀態。

##### 6.6.1.2 System in activated condition

Apply test pulses 1 to 5 and severity level III. The operating states specified in table 1 shall be observed for the individual test impulses.

##### 6.6.1.2 系統在啟動狀態

施加試驗脈波1至5, 嚴酷位準III。操作狀態明確說明於表1, 必須觀察個別的試驗脈衝。

**Table 1**

Test pulse	Test severity level	Operating state
1	III	C
2	III	A
3a	III	A
3b	III	A
4	III	B
5	III	A

表 1

試驗脈波	試驗嚴酷位準	操作狀態
1	III	C
2	III	A
3a	III	A
3b	III	A
4	III	B
5	III	A

#### 6.6.2 Immunity from interference with excited interference on sensor and signal lines

Apply test pulses 1, 2, 3a, 3b and severity level III in accordance with ISO 7637-3.

Operational state C is acceptable with test pulse 1; A shall be maintained with 2 and 3.

#### 6.6.2 感測器與信號線激發干擾(excited interference)的免疫力

依據CNS 14499-2(ISO 7637-3)使用試驗脈波1, 2, 3a, 3b, 嚴酷位準III。使用試驗脈波1, 其操作狀態C為可接受; 使用試驗脈波2, 3時, 其操作狀態需保持在狀態A。

### 6.6.3 Immunity from high-frequency radiated disturbances

During and after one of the test procedures specified in ISO 11451-1 and ISO 11452-1, operating status A shall be maintained during and after exposure to severity level II over the whole frequency range from 10 kHz to 1 GHz.

#### 6.6.3 高頻輻射擾動的免疫力

當進行CNS 15194-1(ISO 11451-1)與CNS 15207-1(ISO 11452-1)中的試驗程序期間及之後，從10 kHz至1 GHz 整個頻率範圍時，暴露在嚴酷位準II期間及之後必須保持操作狀態A。

### 6.6.4 Interference emission

Interference suppression level III to DIN-VDE 0879 Part 3 shall be maintained.

#### 6.6.4 干擾發射

干擾抑制位準III，DIN - VDE 0879第3部分必須維持。

NOTE 7 CISPR is preparing equivalent international specifications.

備考7. 相對應的國際規範正在準備中。

## 7 Operational test of reversing detection device

### 7. 倒車偵測裝置之操作測試

#### 7.1 Test object

Maintenance of the geometry of the monitoring range is tested with the following test objects:

#### 7.1 測試物件

監測範圍的幾何圖形是藉由以下的測試物件進行測試：

a) test object H for the horizontal test: plastics tube, grey,  $\Phi 75$  mm, length 1 000 mm;

b) test object V for the vertical test: plastics tube, grey,  $\Phi 75$  mm, length 300 mm.

(a)測試物件H用於水平測試：塑膠管，灰色， $\Phi 75$  mm，長度1000 mm；

(b)測試物件V用於垂直測試：塑膠管，灰色， $\Phi 75$  mm，長度300 mm。

NOTE 8 Such plastics tubes are available commercially for domestic installation.

備考8. 此種塑膠管可在家用設備商場中購得。

#### 7.2 General ambient conditions

During the test the wind speed shall not exceed 5,4 m/s (wind force 3). The temperature shall be  $(23 \pm 5)$  °C and the relative air humidity  $(60 \pm 25)$  % (see however 7.4). The test shall not be affected by reflected sound from surrounding walls, auxiliary test equipment or other objects.

#### 7.2 一般環境條件

在測試過程中風速不得超過5.4 m/s (wind force 3)。溫度應為 $(23 \pm 5)$ °C及空氣相對濕度 $(60 \pm 25)$ %(參照7.4)。測試時應不受周圍牆壁之回音、輔助測試設備或其他物件所影響。

### 7.3 Test procedure

#### 7.3 測試程序

Perform the operational test on a vehicle or on a test structure with which the installation conditions of the selected vehicle model or selected vehicle range can be reproduced (see also clause 10).

在車輛或測試結構上執行操作測試，被選用的車輛型式或車輛範圍其安裝條件可以被複製(參照第10節)。

Perform the operational test with components which have previously been tested in accordance with clause 6.

在先前依據第6節所做測試之零組件上執行操作測試。

Carry out all tests on each of three specimens of the same model. If one specimen fails, replace it with a fourth, which shall pass all tests. If two specimens fail, the tests shall be performed with new specimens. The sequence of the tests shall be maintained.

對同一型號三個樣品逐一執行所有試驗。若有一個樣品失敗，以第四個取代，所有試驗都必須通過。若有兩個樣品失效，試驗必須重新取樣。應維持相同試驗程序。

Activate the system to be tested and perform tests 1 to 4. Note in a test log whether the test object is detected or not. Only appropriate aids should be used to discover the test object positions.

啟動系統來進行測試，並執行試驗1至試驗4。無論測試物件是否被偵測到，需在檢測記錄表上做記錄。只有適當的輔助可被用來發現測試物件的位置。

#### 7.3.1 Test 1: delimitation of individual zones

##### 7.3.1 試驗 1：個別區域的界定

##### 7.3.1.1 Test

Position test object H with the longitudinal axis static in the monitoring range, standing perpendicular on the ground, in such a way that its longitudinal axis is in the grid positions shown in figure 3. If the distance from the outermost measuring point of the 200 mm grid to the outer edge of the vehicle is more than 100 mm, an additional measuring point should be located there.

##### 7.3.1.1 試驗

在監測範圍內，垂直於地面縱軸方向放置靜態測試物件H。此方式，其縱軸為圖3所示之格線位置。若最外面的200 mm格線測量點至車輛外緣的距離超過100 mm，額外的測量點應設在該處。



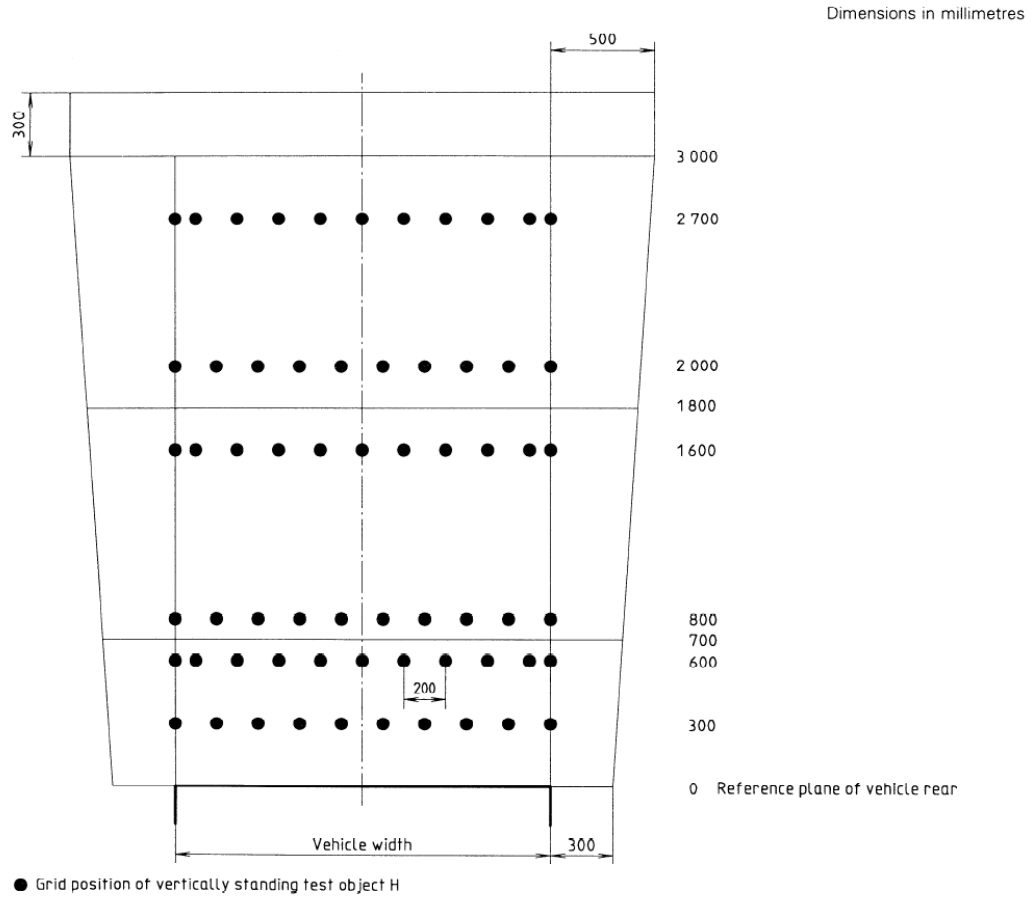


Figure 3 — Test 1 (plan view)

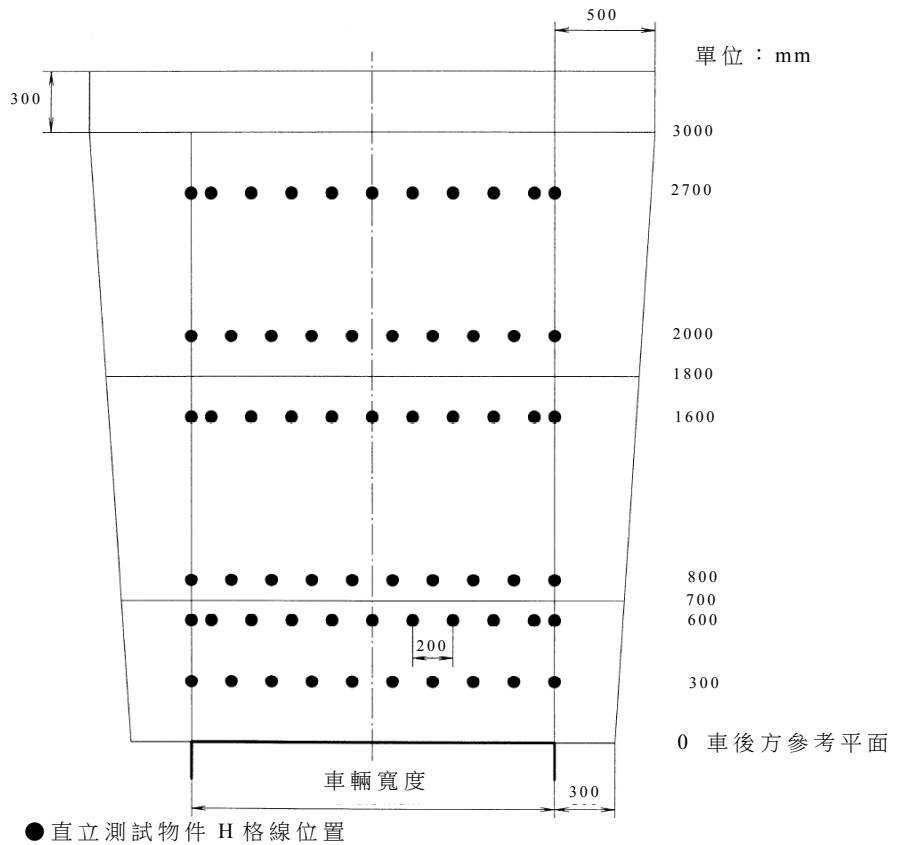


圖3 試驗1(平面圖)

### 7.3.1.2 Evaluation

Test object H shall be detected statically in all grid positions. Detection shall take place unambiguously with an uninterrupted sequence of the signal appropriate to the warning zone. If the test object is not detected in a position, displace that position to the left and right by the width of the test object. The test object shall be detected perfectly in both positions.

#### 7.3.1.2 評估

在所有格線內靜態測試物件H都應被偵測到。應以連續不中斷的信號於警告區域間產生明確偵測。若在某一個位置無法偵測到測試物件，對其位置向左及向右移動測試物件的寬度。測試物件在兩個位置內必須完全地被偵測到。

### 7.3.2 Test 2: height localization

#### 7.3.2 試驗 2：高度定位

##### 7.3.2.1 Test

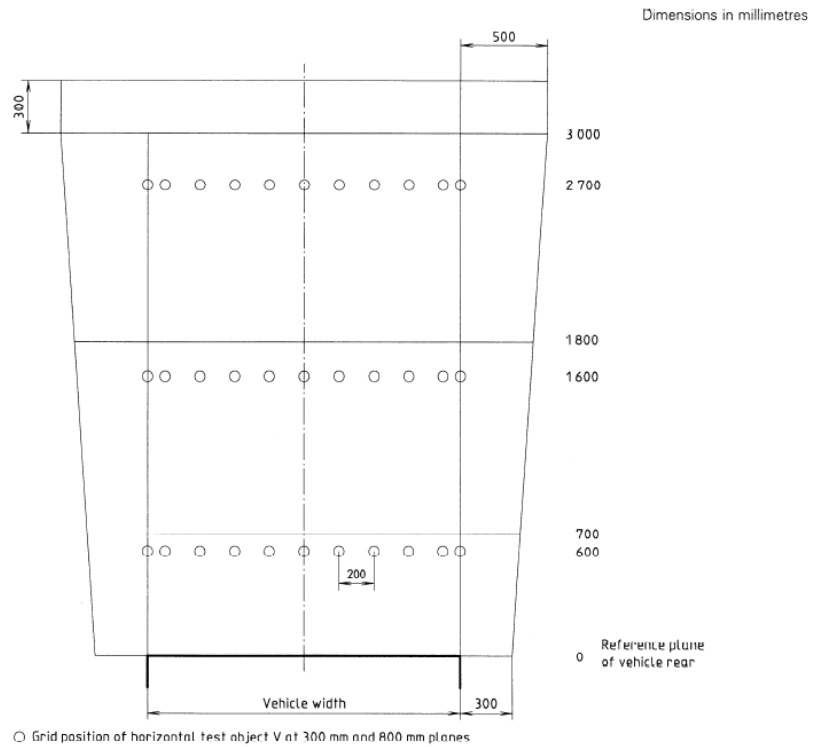
Position test object V statically, horizontally in the monitoring range, so that its three-dimensional centre is situated in the prescribed grid positions in figures 4 and 5, and at the height positions shown in figure 6.

##### 7.3.2.1 試驗

在偵測範圍內，水平靜態置放測試物件V。因此，其三維中心位於規定的格線位置上，如圖4及圖5所示，其高度位置如圖6所示。

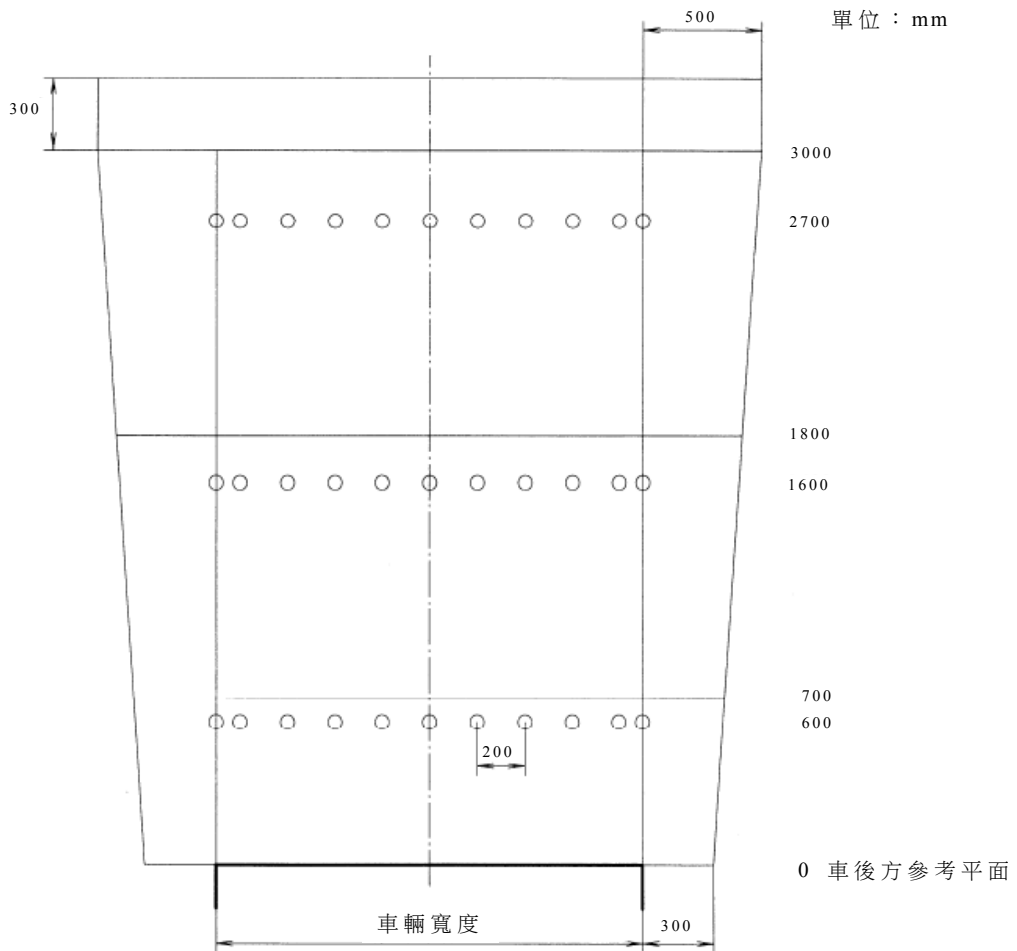
In the case of reversing detection devices which are designed for vehicles without a load platform or with a load platform height less than 800 mm, it is not necessary to perform the test at the 1100 mm level (see figures 5 and 6).

就倒車偵測裝置而言，此為無裝載平台或裝載平台高度小於800 mm的車輛所設計，故不需在1100 mm位準上執行測試(參照圖5及圖6)。



NOTE — For side view, see figure 6

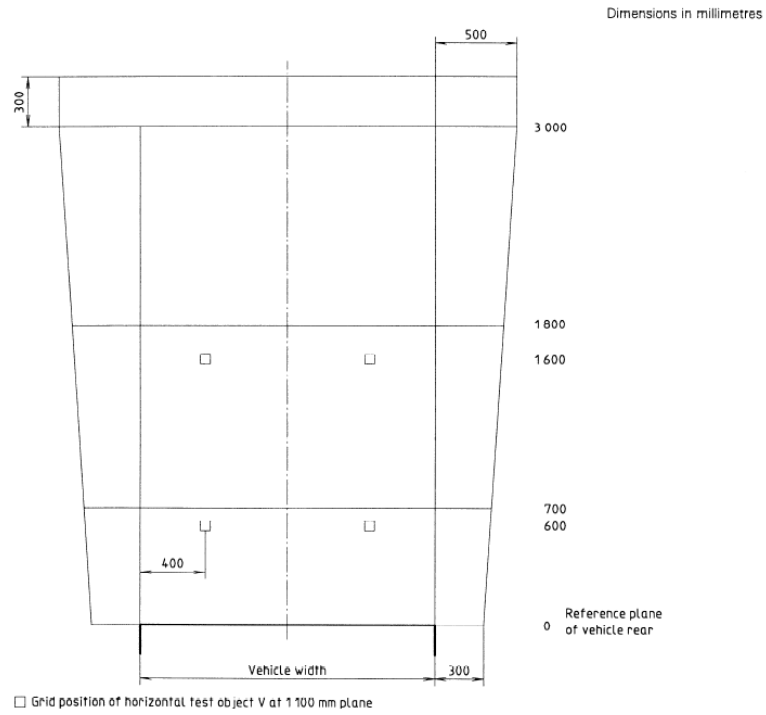
Figure 4 — Test 2 (plan view)



○ 水平測試物件 V 格線位置於平面 300mm 與 800mm

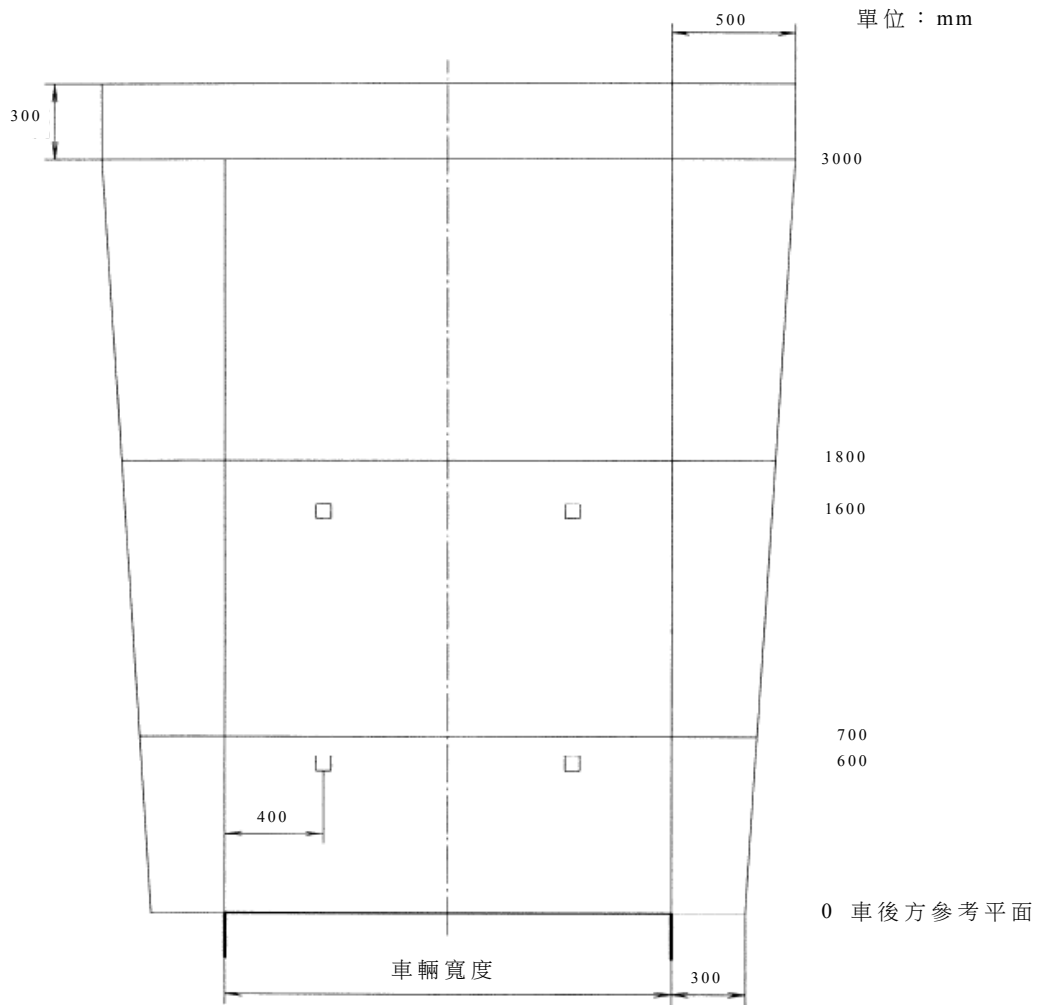
備考 側視圖，參照圖 6。

圖 4 試驗 2(平面圖)



NOTE — For side view, see figure 6.

Figure 5 — Test 2 (plan view)



備考 側視圖，參照圖6。

圖5 試驗2(平面圖)

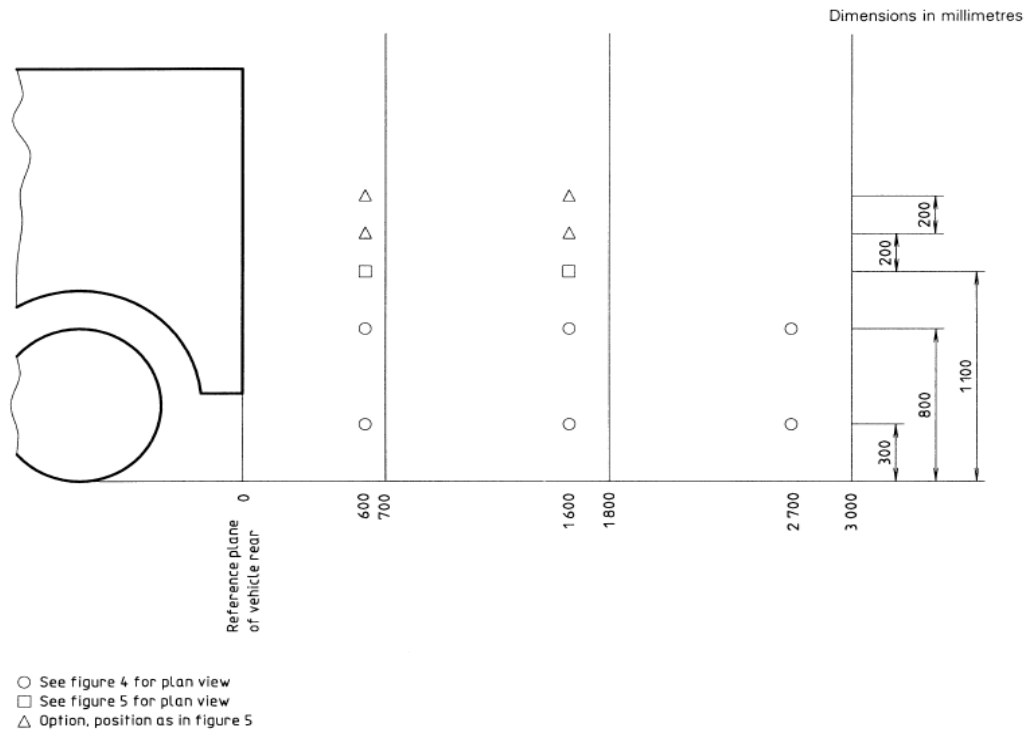


Figure 6 — Test 2 (side view)

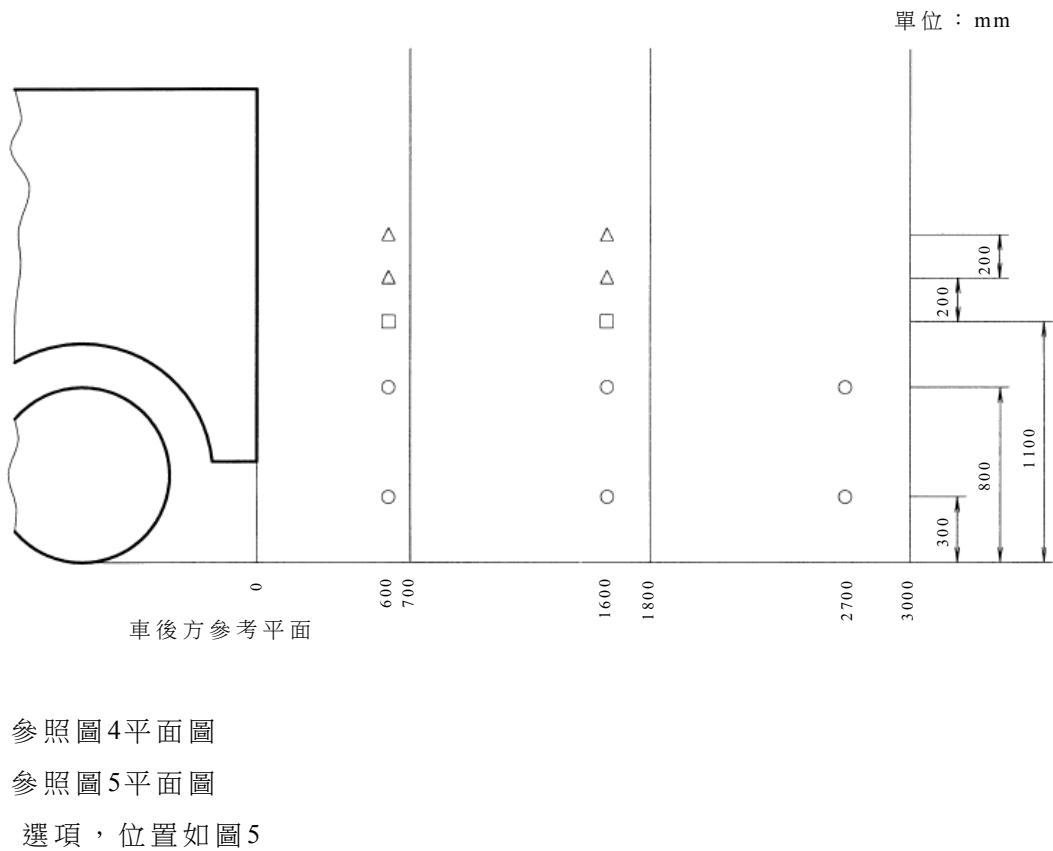


圖6 試驗2 (側視圖)

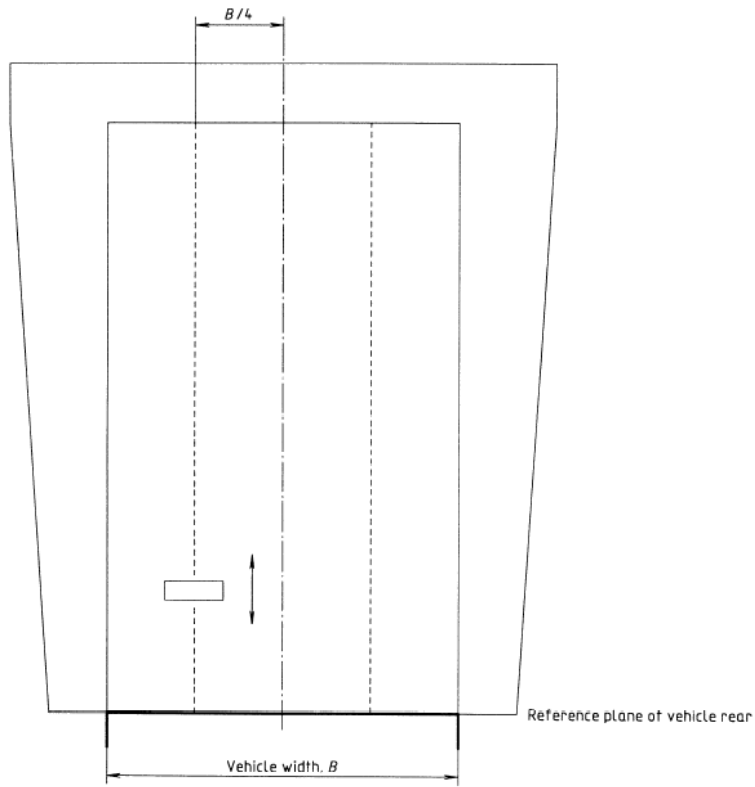


Figure 7 — Test 4 (plan view)

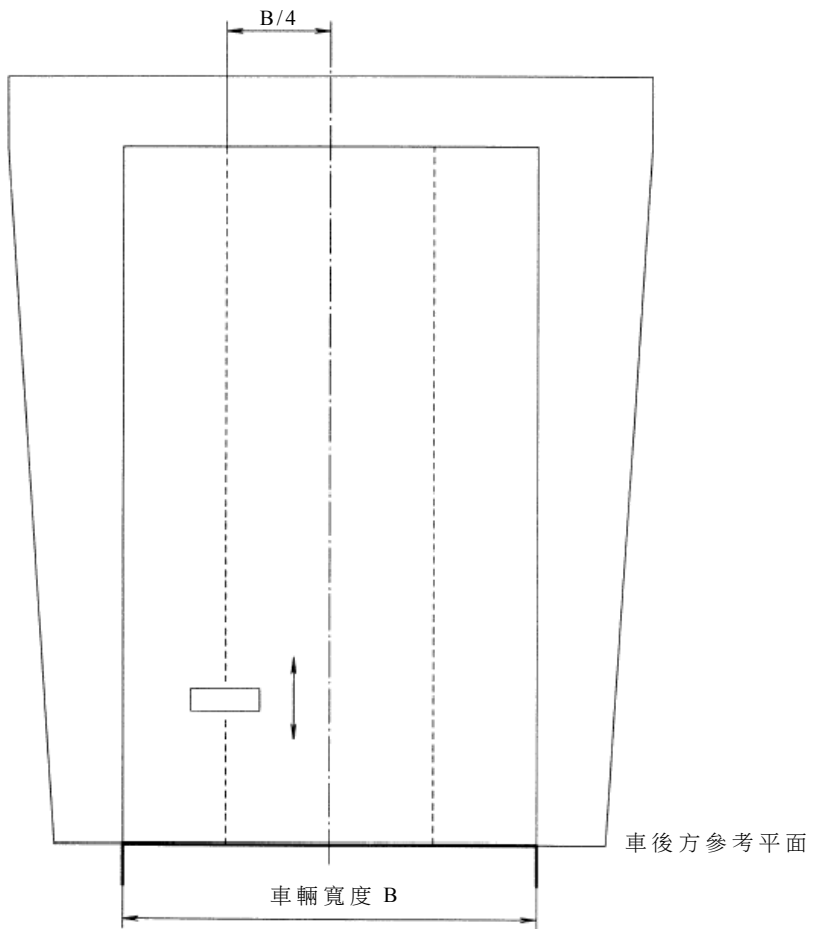


圖 7 試驗 4(平面圖)

### 7.3.2.2 Evaluation

Test object V shall be detected at all indicated positions of the test planes (300 mm, 800 mm, 1100 mm). Only perfect optical/acoustic warnings for the relevant warning zone are acceptable. If a measuring point is not detected, displace the test object to the right or left by half its length. The two new positions shall be detected.

#### 7.3.2.2 評估

在所有的平面上(300 mm, 800 mm, 1,100 mm)之指定位置應偵測到測試物件V。在相關警告區域，只有完整的視覺/聽覺警告是可以接受的。若一個測試點沒有偵測到，以測試物件一半之長度向右邊或左邊移動，這兩個新的位置點應被偵測到。

If test points are detected in the ranges which are 200 mm above the last test plane, only perfect optical/acoustic indication appropriate to the warning range is acceptable (see Symbol  $\triangle$  in figure6).

若測試點偵測的範圍高於最後的測試平面200 mm，只有完整的視覺/聽覺警告是可以接受的。(參照圖6，符號 $\triangle$ )。

### 7.3.3 Test 3: lateral localization

#### 7.3.3 試驗 3：橫向定位

##### 7.3.3.1 Test

Move test object H, standing vertically on the ground with its longitudinal axis on a line 300 mm to 500 mm away from the limits of the monitoring range, to the left and right sides, and to the rear of the monitoring range in accordance with figure 1.

##### 7.3.3.1 試驗

在離開監測範圍界限300 mm至500 mm的線上，向左及向右，以及在圖1所示的監控範圍後方移動測試物件H，並沿其縱軸方向垂直站立於地面上。

##### 7.3.3.2 Evaluation

Test object H shall not be detected statically or when moving.

##### 7.3.3.2 評估

測試物件H在靜置或移動時應不可被偵測到。

### 7.3.4 Test 4: ground clearance

#### 7.3.4 試驗 4：離地間隙

##### 7.3.4.1 Test

Move test object V, lying on the ground with its centre axis horizontal, as shown in figure 7 through the whole monitoring range along the median axis of the vehicle and parallel axes to the left and right halves of the vehicle. The velocity relative to the vehicle shall be not higher than 0,5 m/s.

##### 7.3.4.1 試驗

如圖7所示在整個監測範圍內，沿著車輛中心軸方向，以及車輛左右方各四分之一車寬之平行軸方向，並以測試物件V之中心軸平行地面置放方式移動。與車輛的相對速度不得高於0.5 m/s。

##### 7.3.4.2 Evaluation

Test Object V shall not be detected statically or when moving in the main warning

range or in the collision range.

#### 7.3.4.2 評估

測試物件V在主要警告範圍或碰撞範圍內靜置或移動時不可被偵測到。

### 7.4 Special ambient conditions

#### 7.4 特殊環境條件

Components designed for installation outside the cab should be subjected to further operational tests as in 7.4.1 and 7.4.2, in addition to the tests described in 7.3. See figure 2.

被設計安裝在載客空間外部的零組件，除了7.3所敘述的試驗外，應進一步執行如7.4.1及7.4.2所敘述的操作試驗。參照圖2。

#### 7.4.1 Low-temperature test

Perform the test in a climatic chamber at  $-(25 \pm 2)^{\circ}\text{C}$ . Soak the components at this temperature for at least 0,5 h before the test. Check a grid position at a distance of 1,6 m: see test 1, figure 2.

#### 7.4.1 低溫試驗

在氣候室為 $-(25 \pm 2)^{\circ}\text{C}$ 條件下執行此測試，測試前先將零組件靜置在此溫度至少0.5 h。在距離1.6 m的格線位置上參照試驗1與圖2之條件進行檢查。

NOTE 9 An alternative laboratory test is acceptable if its equivalence can be demonstrated.

備考9. 若一個替代的實驗室測試方法其等效性可被驗證，則該測試方法是可接受的。

#### 7.4.2 High-temperature test

Perform the test in a climatic chamber at  $+(60 \pm 2)^{\circ}\text{C}$ . Soak the components at this temperature for at least 0,5 h before the test. Check a grid position at a distance of 1,6 m.

#### 7.4.2 高溫試驗

在氣候室為 $+(60 \pm 2)^{\circ}\text{C}$ 條件下執行此測試，測試前先將組件靜置在此溫度至少0.5 h。在距離1.6 m的格線位置上進行檢查。

NOTE 10 An alternative laboratory test is acceptable if its equivalence can be demonstrated.

備考10. 若一個替代的實驗室測試方法其等效性可被驗證，則該測試方法是可接受的。

### 7.5 Self-test

#### 7.5 自我測試

#### 7.5.1 Signal generation and echo reception

A reduction in the effectiveness (e.g. by soiling of the sensor surface) of each sensor is produced intentionally for the purposes of the test, which means that test object H cannot be detected at a distance of 2 m with a pre-warning range or at 1,5 m without a pre-warning range (symmetrically in front of the sensor). This shall be detected by



the self-checking device.

#### 7.5.1 信號產生與回波接收

為達此試驗目的，刻意造成每一個感測器之效力降低(例如感測器表面塗污)，此測驗方法中，在有預警範圍2 m或無預警範圍1.5 m(對稱於感測器前方)之倒車偵測裝置，測試物件H將無法被偵測到。此部份應由自我檢查裝置偵測。

#### 7.5.2 Distance measurement

##### 7.5.2 距離量測

The self-check for monitoring operational reliability of distance measurement is tested by means of the circuitry and the programme.

經由電路系統及程式之測試方法，自我檢查用以監測距離量測之操作可靠度。

It is not necessary to test the self-check for monitoring operational reliability, if the manufacturer or importer states that the test equipment required meets the provisions in 5.7.

若製造商或進口商聲明其測試設備符合5.7之規範要求，則不需測試自我檢查以監測其操作可靠度。

### 8 Proof of compliance with standards

#### 8. 符合標準之證明

##### 8.1 Test requirement

The reversing detection devices shall be tested by an authorized test house to prove that they comply with standards.

##### 8.1 試驗要求

倒車偵測裝置應經由授權的測試機構來驗證，以證明其符合標準。

##### 8.2 Test certificate

In addition to any general information, the test certificate should contain the following:

##### 8.2 測試證書

除一般資訊外，測試證書應包含以下內容：

- a) name of the manufacturer or importer;  
(a) 製造商或進口商名稱；
- b) name of the test house;  
(b) 測試機構名稱；
- c) test date;  
(c) 測試日期；
- d) description of reversing detection device and model;  
(d) 倒車偵測裝置與型式之說明；
- e) test results;  
(e) 測試結果；
- f) confirmation of compliance with this Technical Report.  
(f) 符合本標準之確認。

##### 8.3 Modifications

If a manufacturer or importer modifies his tested product as compared with the design for which the last test certificate was issued, he shall notify the test house of this modification without delay if the modification is likely to affect the data obtained in the original test. The test house may require an additional test or a re-test.

### 8.3 修改

若製造商或進口商修改其已經測試過的產品，將其與最後簽發的測試證書之設計對照，若此項修改可能影響原始之測試資訊，其應當立即通知測試機構此項修改。測試機構可能會需要額外測試或重新測試。

### 8.4 Marking

Proof of compliance may be indicated by citing the number of this Technical Report. The existence of a test certificate as in 8.2 conveys the right to use this number.

### 8.4 標記

經由引用本標準編號可以指出其符合之證明。

在 8.2 所示之測試證書上的內容傳達了這個編號的權利。

### 8.5 Repeat testing

The manufacturer or importer shall have his detection device re-tested by the test house which granted the test certificate, at least every three years, to obtain a new test certificate to demonstrate that the product conforms to the tested type.

### 8.5 重複測試

當製造商或進口商被授與測試證書，至少每三年應由測試機構對其偵測裝置做重新測試，進而獲得新的測試證書以證明其產品符合已測試之類型。

## 9 Vehicle installation and assembly

### 9. 車輛安裝及裝配

#### 9.1 Application: general

Commercial vehicles are put into service in a variety of configurations. Vehicle model and design, as a function in particular of vehicle width, suspension, tyres, wheelbase, axle loads and vehicle rear (e.g. underrun guard, body overhang, coupling fitment), can impede the operation of the reversing detection device. Reversing detection devices should therefore be designed for a specific vehicle model or a clearly defined vehicle range.

#### 9.1 應用：一般

投入市場的商用車輛具有多樣化的結構。車輛型號、以及設計，特別是車輛的寬度、懸吊、輪胎、軸距、軸載、以及車尾（例如：底面防護，車體突出部分，聯軸節配件），都有可能阻礙了倒車偵測裝置的運作。因此，倒車檢測裝置，應針對特定的車型或界定明確的車輛範圍加以設計。

#### 9.2 Sensors

Sensors should be fitted in accordance with manufacturers' instructions. They should also be fitted in such a way that they are protected from dirt, soot and snow as far as possible. Requirements of road traffic law and the vehicle manufacturer's installation instructions should be observed.

## 9.2 感測器

感測器必須依照製造商的說明安裝。其應盡可能地依防塵、防油煙、以及防雪之保護方式安裝。且必須遵守道路交通法規與車輛製造商安裝說明之要求。

Sensors shall be so designed and installed that their position relative to the vehicle does not alter by itself and cannot easily be altered during operation. The sensors shall be clearly marked in their position and shall be prevented from turning. The sensors shall have an adjustment device with which they can be set correctly. Installation, adjustment and removal shall be simple, but shall require the use of a tool.

感測器的設計及安裝應確保其在車輛上之相關位置不會自行改變，且在運作時不會輕易被變動。感測器應清楚地標明它們的所在位置並防止轉動。感測器應具有調整裝置以便做正確的安裝，其安裝、調整、以及拆除應簡單化，但應需要使用工具執行之。

## 9.3 Warning indicators

The acoustic indicators shall be in the driver's cab. The visual indicators shall be in the driver's field of view.

### 9.3 警告指示

聲音指示應在駕駛室；視覺指示應在駕駛者的視野範圍內。

### Installation and service manual

## 10. 安裝與服務手冊

Reversing detection devices shall be supplied with an installation and service manual. The installation instructions should indicate clearly the scope of application of the system, i.e. the vehicle model and version, or the vehicle range, specifically with reference to vehicle width, suspension, tyres, wheelbase, axle loads (unladen, maximum) and vehicle rear (e.g. underrun guard, body overhang, coupling fitment), for which the system is suitable. The installation instructions should describe the precise geometrical position of the sensors and the clearance required around the sensors.

倒車偵測裝置應提供安裝及服務手冊。

安裝說明應明確指出該系統的適用範圍，例如：車輛型號與車款，或該車輛的範圍，特別是相關參照的車輛寬度、懸吊、輪胎、軸距、軸載（空載，最大）以及車尾（例如：底面防護，車體突出部分，聯軸節配件），以明確該系統是適用的。安裝說明應描述感測器安裝的精確幾何位置，以及感測器的周圍間隙。

The operating instructions should stipulate that the geometry and extent of the monitoring range should be checked with respect to the specification of the manufacturer of the reversing detection device before commissioning and at regular intervals.

操作手冊必須規定監測範圍及幾何圖形的寬度，倒車偵測裝置製造商應在投入使用前及定期確認其相關之規格。

Installation instructions are not necessary for reversing detection devices which are

factory-fitted by the vehicle manufacturer.

倒車偵測裝置若為車輛製造商的生產線所安裝，則不需提供安裝說明手冊。

#### 11 Vehicle combinations

##### 11. 車輛組合

NOTE 11 Requirements for the tractor/trailer interface will be compiled at a later date.

備考11. 拖車/曳引車的接合介面要求將於日後彙編。

#### 相對應國際標準

ISO/TR 12155 : 1994 Commercial vehicles – Obstacle detection device during reversing – Requirements and tests