EURO NCAP

#FORSAFERTRUCKS

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Safe Driving Vehicle Assistance

Speed Assist Systems

Test Protocol

Implementation November 2024

PREFACE

During the test preparation, vehicle manufacturers are encouraged to liaise with the laboratory and to check that they are satisfied with the way cars are set up for testing. Where a manufacturer feels that a particular item should be altered, they should ask the laboratory staff to make any necessary changes. Manufacturers are forbidden from making changes to any parameter that will influence the test, such as dummy positioning, vehicle setting, laboratory environment etc.

It is the responsibility of the test laboratory to ensure that any requested changes satisfy the requirements of Euro NCAP. Where a disagreement exists between the laboratory and manufacturer, the Euro NCAP secretariat should be informed immediately to pass final judgment. Where the laboratory staff suspect that a manufacturer has interfered with any of the set-up, the manufacturer's representative should be warned that they are not allowed to do so themselves. They should also be informed that if another incident occurs, they will be asked to leave the test site.

Where there is a recurrence of the problem, the manufacturer’s representative will be told to leave the test site and the Euro NCAP secretariat should be immediately informed. Any such incident may be reported to the manufacturer and the person concerned may not be allowed to attend further Euro NCAP tests.

CONTENTS

DEFINITIONS

Throughout this protocol the following terms are used:

$V_{indicated}$ – The speed the vehicle travels as displayed to the driver by the speedometer as in ECE Regulation No. 39.

V_{limit} – Maximum allowed legal speed for the vehicle at the location, time and in the circumstance the vehicle is driving.

Speed Limit Information Function (SLIF) – means a function with which the vehicle identifies the prevailing speed limit and communicates it to the driver.

Adjustable speed (V_{adj}) – means the voluntarily set speed for the speed control functions, which is based on $V_{indicated}$ and includes the offset set by the driver.

Speed Control Function (SCF) – means any function that allows the vehicle to directly ensure that a defined speed is not exceeded. The functions include:

Speed Limitation Function (SLF) – a system which allows the driver to set a vehicle speed V_{adj}, to which they wish the speed of the VUT to be limited and above which they wish to be warned.

Intelligent Speed Limiter (ISL) – is a SLF combined with SLIF, where the V_{adj} is set by the SLIF with or without driver confirmation.

Intelligent Adaptive Cruise Control (iACC) is an ACC combined with SLIF, where the maximum speed is set by the SLIF with or without driver confirmation.

The following terms are used for the assessment of the Speed Limitation Function:

Stabilised speed (V_{stab}) means the mean actual vehicle speed when operating. V_{stab} is calculated as the average actual vehicle speed over a time interval of 20 seconds beginning 20 seconds after first reaching a speed 10 km/h less than V_{adj}.

1 INTRODUCTION

Exceeding the speed limit and driver inattention, whether through distraction or impairment by fatigue or alcohol, are widely regarded as being among some of the biggest factors contributing to the cause of road collision. In the case of excess speed, it also makes collisions more severe.

Heavy Goods Vehicles (HGVs) are no exception to these key safety facts, but the relative priority and importance can vary, as can the availability of technologies to address the problems.

Relative to passenger cars, exceeding the speed limit was less frequently coded as a contributory factor in HGV collisions (6 %) than was the case for passenger cars (3 %) (based on GB national collision statistics). However, it is also thought that police reported data underestimates the extent to which speed contributes to the causes and consequences of collisions. Evidence considering correlations between average speed and injury risks on different road types predict a much higher influence (Elvik & Vaa, 2004).

HGVs have been required to be equipped with fixed speed limiters governing their maximum speed to 90 km/h on any road. Type approval Regulation from 2024 will require them to be fitted with a speed assist system that informs the driver of the prevailing road speed limit and imposes certain technical standards if the manufacturer offers the driver the option to automatically control the speed to be within the limit. This protocol aims to increase the standard of those systems.

2 REFERENCE SYSTEM

2.1 Convention

For both the VUT and the GVT use the convention specified in ISO 8855:1991 in which the x-axis points towards the front of the vehicle, the y-axis towards the left and the z-axis upwards (right hand system), with the origin at the most forward point on the centreline of the VUT for dynamic data measurements as shown in Figure 1.

Viewed from the origin, roll, pitch and yaw rotate clockwise around the x, y and z axes respectively. Longitudinal refers to the component of the measurement along the x-axis, lateral the component along the y-axis and vertical the component along the z-axis.

This reference system should be used for both left- and right-hand drive vehicles tested, where in Figure 1 nearside and far-side are shown for a left-hand drive vehicle. For a right-hand drive vehicle, nearside and far-side are swapped.

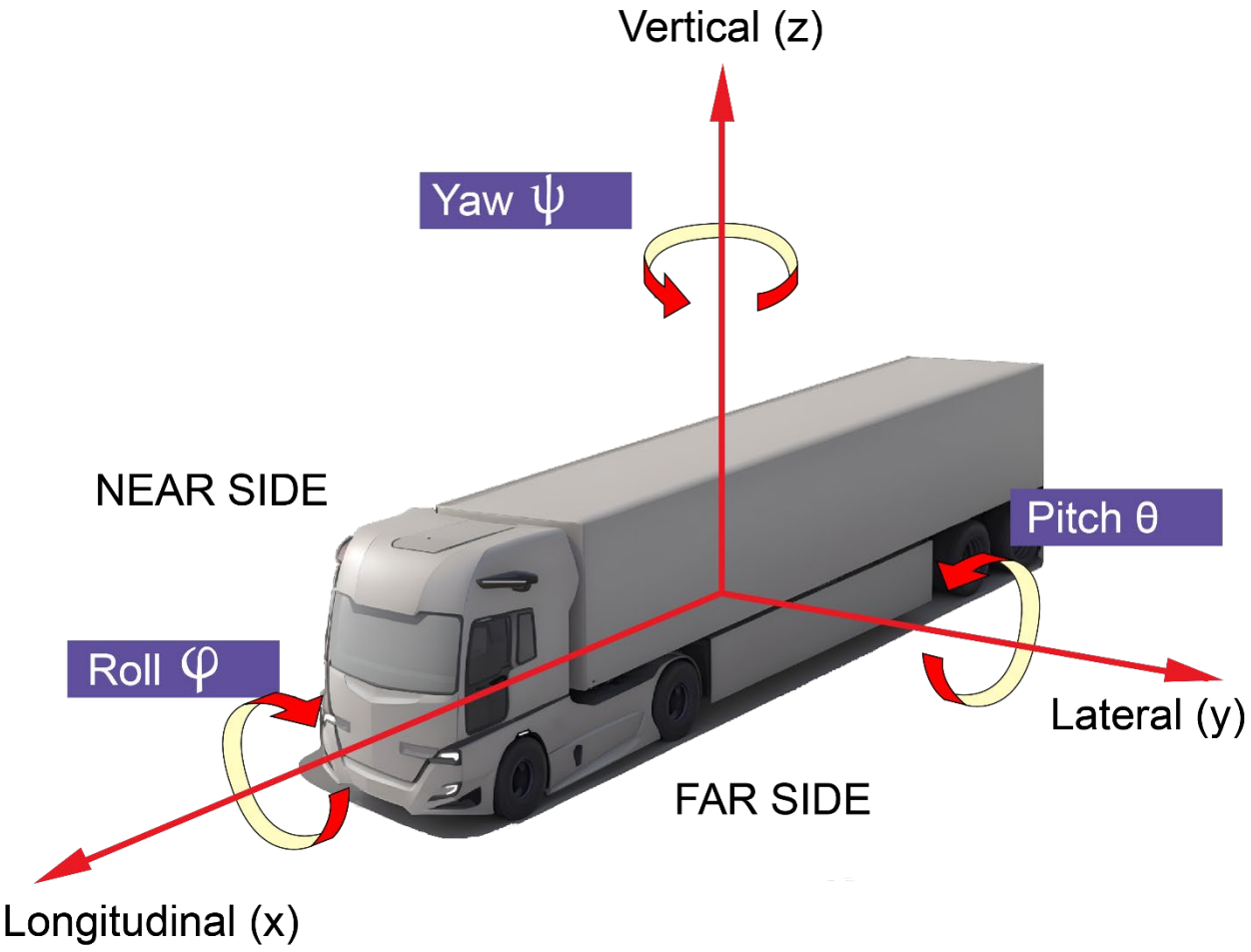

Figure 3-1 Coordinate system and notation

3 MEASURING EQUIPMENT

Sample and record all dynamic data at a frequency of at least 10 Hz.

3.1 Measurements and Variables

Time	T
Speed of the VUT during the entire test	$\mathbf{V}_{VUT}$

The velocity data needs to be recorded with a minimum sampling rate of 10 Hz for at least 20 seconds before and 40 seconds after reaching V_{adj} minus 10 km/h.

3.2 Measuring Equipment

Equip the VUT with data measurement and acquisition equipment to sample and record data with an accuracy of at least:

VUT longitudinal speed to 0.1 km/h

4 TEST CONDITIONS

4.1 Vehicle preparation

4.1.1 Drawing Vehicles

Where the VUT is designed as a prime mover intended for drawing a trailer, complete testing with the VUT coupled to an appropriate trailer of the following specification:

- Of length approaching but not exceeding maximum permitted
- Of adequate gross trailer mass to fulfil the gross train mass of the VUT
- Box or curtain side body
- Equipped with disc brakes, category A Antilock Braking System (ABS) and an Electronic Braking System (EBS)

4.1.2 Tyres

Perform the testing with new original fitment tyres of the make, model, size, speed and load rating as specified by the vehicle manufacturer. It is permitted to change the tyres which are supplied by the manufacturer or acquired at an official dealer representing the manufacturer if those tyres are identical make, model, size, speed and load rating to the original fitment. Use inflation pressures corresponding to the manufacturer's instructions for the appropriate loading condition. The tyres must be run-in before formal testing commences.

4.1.3 Running Order

Confirm that all VUT safety and operational systems are functioning correctly with no warning messages or indicators displayed to the driver. Rectify any faults before commencing testing.

Set any configurable driving controls to their automatic setting e.g. ride height setting. If an automatic setting is not available, set to a middle setting.

4.1.4 Loading and Vehicle Preparation

If only SLIF is to be tested, then the vehicle can be tested in any loading condition.

When tests of a speed control function are to be undertaken, then complete testing with the VUT half laden to represent typical category N vehicle operation, with 'as tested' mass as follows:

$$\text{As tested mass} = \text{Unladen kerb mass} + ((\text{GVW} - \text{Unladen kerb mass}) / 2)$$

4.2 Characteristics of the Test Track

Track tests shall be undertaken on a road surface suitable for enabling stabilized speed to be maintained and shall be free from uneven patches. Gradients shall not exceed 2 %. The test surface shall be free from standing water, snow or ice.

4.3 Ambient wind conditions

The mean wind speed measured at a height of at least 1 m above the ground shall be less than 6 m/s with gusts not exceeding 10 m/s.

5 TEST PROCEDURE

5.1 Test for the SLIF

Drive the vehicle on public roads for a distance of at least 400 km, covering a representative mix of urban roads, rural roads and highways. During the drive, the reaction of the SLIF with respect to conditional speed limits needs to be verified and recorded.

Where a speed control function is present, the VUT should be driven in manual mode for part of the drive and with the SCF activated in a representative part of the route.

Identify any major discrepancies between the signed speed limit, any implied speed limit specifically applied for HGVs in those circumstances (where different to the posted limit) and the speed limit indicated by the SLIF.

5.2 Test for the SLIF Warning Function

The tests will be performed during the test drive or on a dedicated test track where speed signs are installed and should cover at least three different speed limits.

The vehicle shall be accelerated up to a speed at least 10 km/h greater than V_{limit}.

This speed shall be maintained long enough to be able to assess the complete warning sequence.

5.3 Test for the Speed Control Function

The tests will be performed at two different test speeds typical for the following road types:

- City roads (50 km/h or 30 mph)
- Inter-Urban roads (80 km/h or 50 mph)

With the Speed Control Function activated, set V_{adj} to 50 km/h. In case of a Speed Limitation Function the vehicle shall be run at a speed of 15 km/h below V_{adj}. The vehicle shall then be accelerated to engage the SLF, without applying a positive action. Repeat the test with a V_{adj} of 80 km/h.

Set V_{adj} to 50 km/h and accelerate the vehicle to engage the SLF. Lower V_{adj} to a speed low enough to trigger the audiovisual warning and measure how long it takes for the vehicle to initiate this warning. Repeat the test with the V_{adj} set to 80 km/h.

Set Vadj to 80 km/h or a speed applicable at the road where the vehicle is tested and force the vehicle into an overrun condition (e.g. downhill), where the engine braking is not able to maintain the speed of V_{adj}. Measure the speed at which the warning is initiated.