EURO NCAP

#FORSAFERCARS

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Sled Pulse Requirements

Crash Protection

Technical Bulletin CP 500

Implementation 1st January 2026

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 Secretary General should be immediately informed. Any such incident may be reported by the Secretary General to the manufacturer and the person concerned may not be allowed to attend further Euro NCAP tests.

DISCLAIMER: Euro NCAP has taken all reasonable care to ensure that the information published in this protocol is accurate and reflects the technical decisions taken by the organisation. In the unlikely event that this protocol contains a typographical error or any other inaccuracy, Euro NCAP reserves the right to make corrections and determine the assessment and subsequent result of the affected requirement(s).

CONTENTS

1 FRONTAL IMPACT

The pulse used for the knee mapping tests may be based on either the actual struck side vehicle pulse from the official MPDB test, or one of four pre-defined generic pulses.

Where a generic pulse is used, the maximum permissible different in OLC between the struck side B-pillar pulse of the official test and chosen generic pulse is +/-5g. Where this tolerance is exceeded, the official test pulse is to be used for all sled tests.

The generic pulses are divided into four OLC ranges, see below:

Class	OLC range	OLC generic
A	< 22.0g	18.8g
B	22.0g < 29.0g	25.5g
C	29.0g < 36.0g	32.0g
D	>36.0	39.0g

The pulse performed on the sled facility shall be close to or more severe than either the vehicle test pulse or generic pulse. The following process is used to evaluate pulse severity.

Sled pulse = the pulse measured with the accelerometer installed on the B-Pillar struck side of the body in white (BIW).

Vehicle pulse = the pulse measured via the accelerometer installed on the B-Pillar struck side of the official MPDB test or the generic pulse corresponding to its OLC.

Pulse severity evaluation
Change the orientation to have sled pulse and vehicle pulse in globally positive values.
Calculate by integration the Delta V DV1(t) from vehicle pulse, setting the initial velocity to 0.
Calculate by integration the Delta V DV2(t) from sled test (BIW), setting the initial velocity to 0
Calculate the difference DV(t) = DV1(t) – DV2(t).
Calculate by integration of DV1(t) the X displacement from vehicle pulse DX1(t), setting the initial value to 0.
Calculate by integration of DV2(t) the X displacement from sled test DX2(t), setting the initial value to 0.
Calculate the difference DX(t) = DX1(t) – DX2(t).
Calculate DX at 100ms.

Requirement #1
If all the DV values up to 100ms are in the zone as shown below, requirement #1 is OK – check requirement #2.
If some DV values up to 100ms are outside the zone, requirement #1 is not OK: ⇨ **Sled test is less severe than the vehicle test pulse – NOT accepted**

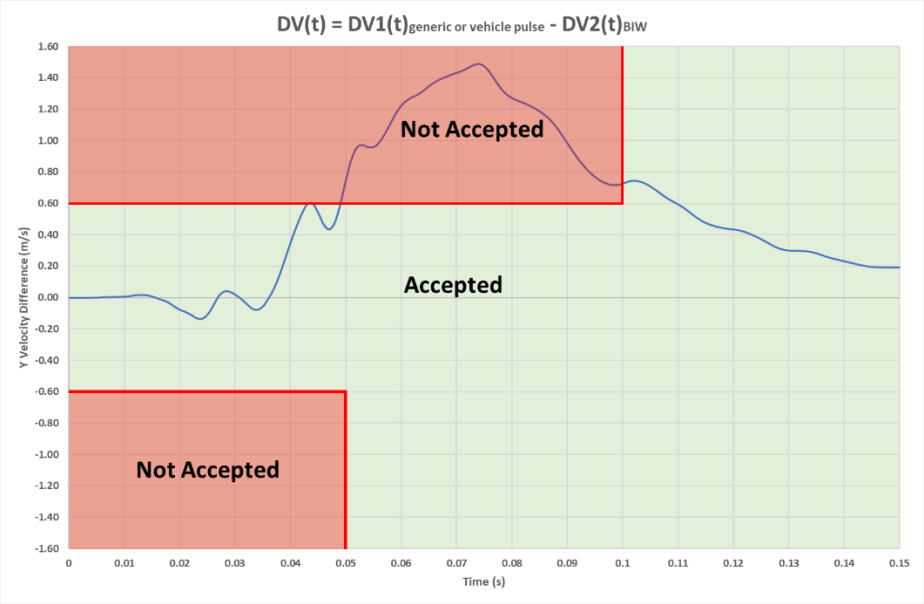

Figure 1 Sample pulse showing a less severe sled test that cannot be accepted as parts of DV are outside the acceptable zone

Requirement #2
If DX value at 100ms is negative, requirement #2 is OK: ⇨ **Sled test accepted for knee mapping**
If DX value at 100ms is positive, requirement #2 is not OK: ⇨ **Sled test NOT accepted**

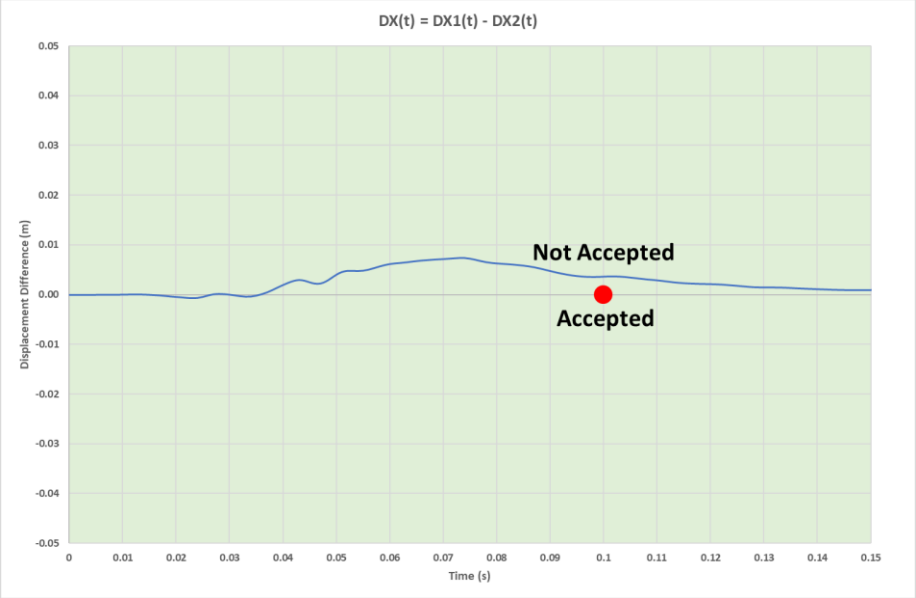

Figure 2 Sample picture shows a sled test that cannot be accepted as DX is positive @ 100ms

2 FAR SIDE

The pulse performed on the sled facility should be close to or more severe as the pulse recorded in the official Euro NCAP AE-MDB and Pole impact tests, Ax_{sled}. The following process is used to evaluate pulse severity.

Sled pulse = the pulse measured with the accelerometer installed on the struck side B-pillar (passenger's side) of the BIW.

Vehicle pulse = the pulse measured via the accelerometer installed on the non-struck side B-pillar of the official AE-MDB and Pole tests.

Pulse severity evaluation
Change the orientation to have body-in-white B-pillar pulse and vehicle pulse in globally positive values.
Calculate by integration the Delta V DV1(t) from vehicle pulse, setting the initial velocity to 0.
Calculate by integration the Delta V (DV2(t) from sled test (BIW), setting the initial velocity to 0.
Calculate the difference DV(t) = DV1(t) – DV2(t).
Calculate by integration of DV1(t) the X displacement DX1(t) from vehicle, setting the initial value to 0.
Calculate by integration of DV2(t) the X displacement DX2(t) from sled test (BIW), setting the initial value to 0
Calculate the difference DX(t) = DX1(t) – DX2(t)
Calculate DX at 120ms

Requirement #1
If all the DV(t) values up to 120ms are in the zone as shown below, requirement #1 is OK – check requirement #2.
If some DV(t) values up to 120ms are outside the zone, requirement #1 is not OK: ⇨ **Sled test (BIW) is less severe than the vehicle test pulse - NOT accepted** ⇨ **Sled test (BIW) is more severe than the vehicle test pulse - NOT accepted**

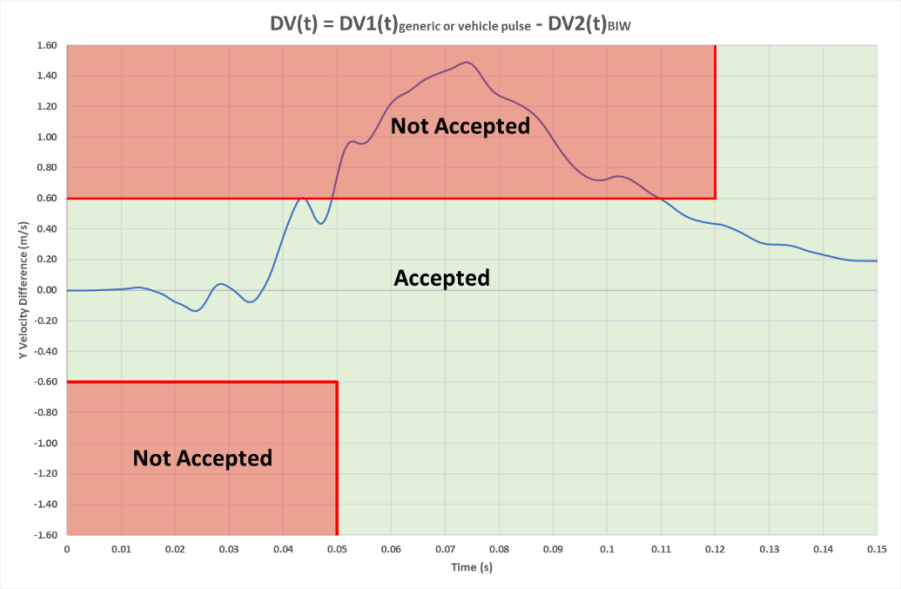

Figure 3 Sled test (BIW) is less severe than the vehicle test pulse

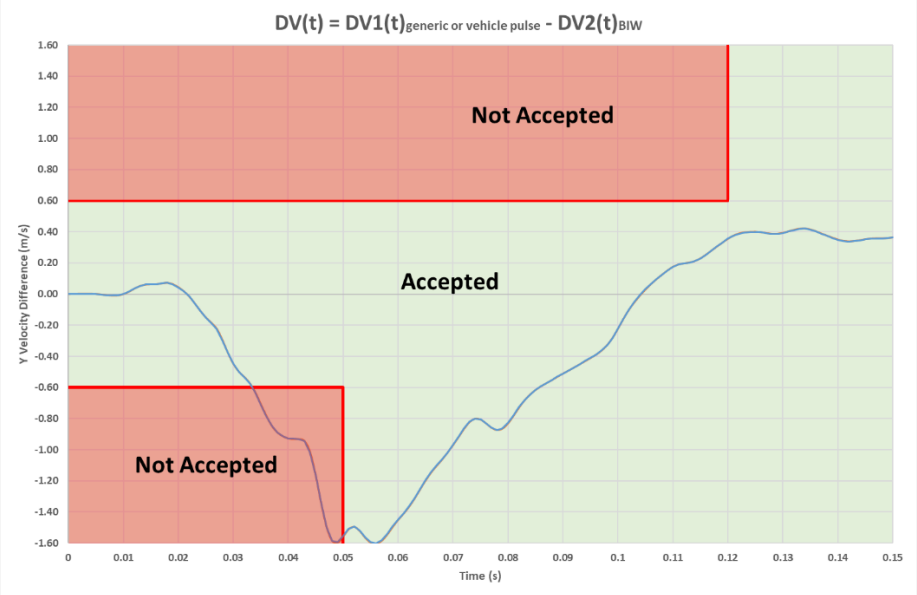

Figure 4 Sled test (BIW) is more severe than the vehicle test pulse in the early phase

Requirement #2
If $DX_{(120ms)}$ value at 120ms is negative, requirement #2 is OK: ⇨ **Sled test is accepted**
If $DX_{(120ms)}$ value at 120ms is positive, requirement #2 is not OK: ⇨ **Sled test NOT accepted**

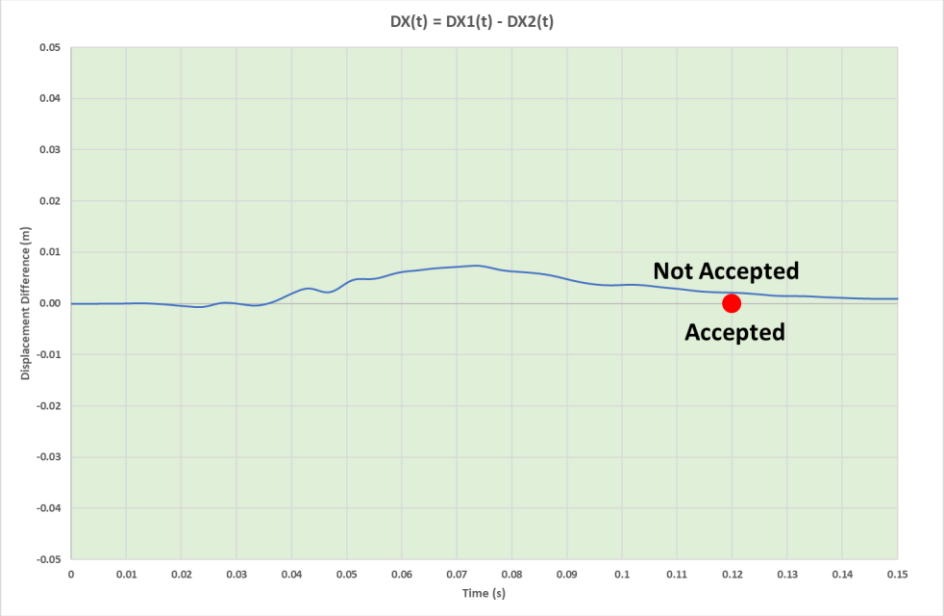

Figure 5 Sled test (BIW) at 120ms is positive