

Hybrid III 50th Specification and Certification

Crash Protection

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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 HYBRID III 50TH SPECIFICATION | 3 |
| 1.1 General | 3 |
| 1.2 Certification | 3 |
| 1.3 Dummy instrumentation | 3 |
| 1.4 Additions and modifications | 4 |
| 1.5 Dummy clothing and footwear | 4 |
| 1.6 Dummy joints | 5 |
| 1.7 Dummy positioning measurements | 5 |
| 1.8 Dummy painting and marking | 7 |
| 1.9 Dummy temperature | 8 |
| 1.10 Post test inspection | 8 |

1 HYBRID III 50TH SPECIFICATION

1.1 General

Hybrid III 50th dummies must conform to U.S. Department of transportation, Code of Federal Regulations Part 572 Subpart E, except for modifications and additions stated later.

1.2 Certification

Full details of the certification procedure for the Hybrid-III dummy are available in Part 572 Subpart E of US Department of Transportation Code of Federal Regulations, SAE J2856 and Annex 10 of UN Regulation No. 94.

No manufacturer shall have access to any pre-test information regarding any of the test equipment to be used by Euro NCAP or be permitted to influence its selection in any way.

The Hybrid-III dummies shall be re-certified after every FOUR impact tests.

The chest shall be certified according to the frequency above and shall meet both the low speed thorax test as prescribed by SAE J2779, as well as the full certification test detailed in CFR572. Additionally, chest potentiometer calibration and polynomial post processing shall also be performed as detailed in SAE J2517.

The knee slider shall be certified to SAE J2876 after every FOUR impact tests and as specified in SAE J2856 after every TWELVE impact tests.

If an injury criterion reaches or exceeds its normally accepted limit (eg HIC of 700) then that part of the dummy shall be re-certified.

If any part of a dummy is broken in a test then the part shall be replaced with a fully certified component.

Copies of the dummy certification certificates will be provided as part of the full report for a test.

1.3 Dummy instrumentation

All instrumentation used in the dummy shall be:

- Calibrated before the test programme.

- Re-calibrated after one year, regardless of the number of tests for which it has been used.

- Re-calibrated if it reaches its channel amplitude class (CAC) during any test.

- Listed in the test report along with calibration dates

- Mounted according to procedures laid out in SAE J211.

- Transducer sign convention is detailed in SAE J1733.

- In accordance with the performance specifications detailed in SAE J2570.

The CAC for each transducer shall be chosen to cover the Minimum Amplitude listed in the table. In order to retain sensitivity, CACs which are orders of magnitude greater than the Minimum Amplitude may not be used.

Euro NCAP

Version 1.0 — March 2025

The Hybrid III 50th shall be instrumented to record the channels listed below. Additional channels may be recorded.

| Location | Parameter | CAC | |
|------------------------|-----------------------------|-----------|------|
| Head | Acceleration, $A_x A_y A_z$ | 250g | |
| Neck | Force | $F_x F_y$ | 9kN |
| | | F_z | 14kN |
| | Moment, $M_x M_y M_z$ | 290Nm | |
| Chest | Acceleration, $A_x A_y A_z$ | 150g | |
| | Deflection, D_{chest} | 100mm | |
| Thoracic temperature | Temperature | 30°C | |
| T12 | Force, $F_x F_z$ | 5kN | |
| | Moment, M_y | 300Nm | |
| Pelvis | Acceleration, $A_x A_y A_z$ | 150g | |
| Femurs (L & R) | Force, F_z | 20kN | |
| Knees (L & R) | Displacement, D_{knee} | 19mm | |
| Upper Tibia (L & R) | Force, $F_x F_z$ | 12kN | |
| | Moment, $M_x M_y$ | 400Nm | |
| Lower Tibia (L & R) | Force, $F_x F_z$ | 12kN | |
| | Moment, $M_x M_y$ | 400Nm | |

The onboard temperature sensor shall be attached in accordance with ISO TR 27957, and the temperature sensor shall meet the requirements of ISO 6784.

1.4 Additions and modifications

The additions and modifications which will change the dynamic behaviour of the test dummies from Part 572E specification dummies are:

Roller ball-bearing knees shall be fitted.

A foam neck shield (Part 93051-1-DN or equivalent) must be fitted to the passenger if a frontal protection airbag is present.

1.5 Dummy clothing and footwear

The Hybrid III shall be clothed with form-fitting cotton stretch garments with short sleeves and bottoms which must not cover the dummy's knees.

The Hybrid III 50th shall be fitted with rubber soled shoes equivalent to those specified in UN Regulation No. 94.

1.6 Dummy joints

Dummy Joints

All constant friction joints shall have their 'stiffness' set by the following method.

Stabilise the dummy temperature by soaking in the required temperature range for at least 5 hours.

The tensioning screw or bolt which acts on the constant friction surfaces shall be adjusted until the joint can just hold the adjoining limb in the horizontal. When a small downward force is applied and then removed, the limb should continue to fall.

The dummy joints stiffness shall be set as close as possible to the time of the test and not more than 24 hours before the test.

Maintain the dummy temperature within the range 19° to 22°C between the time of setting the limbs and up to a maximum of 10 minutes before the time of the test.

1.7 Dummy positioning measurements

The following measurements are to be recorded prior to the test after the positioning procedures have been carried out, see Figure 1.

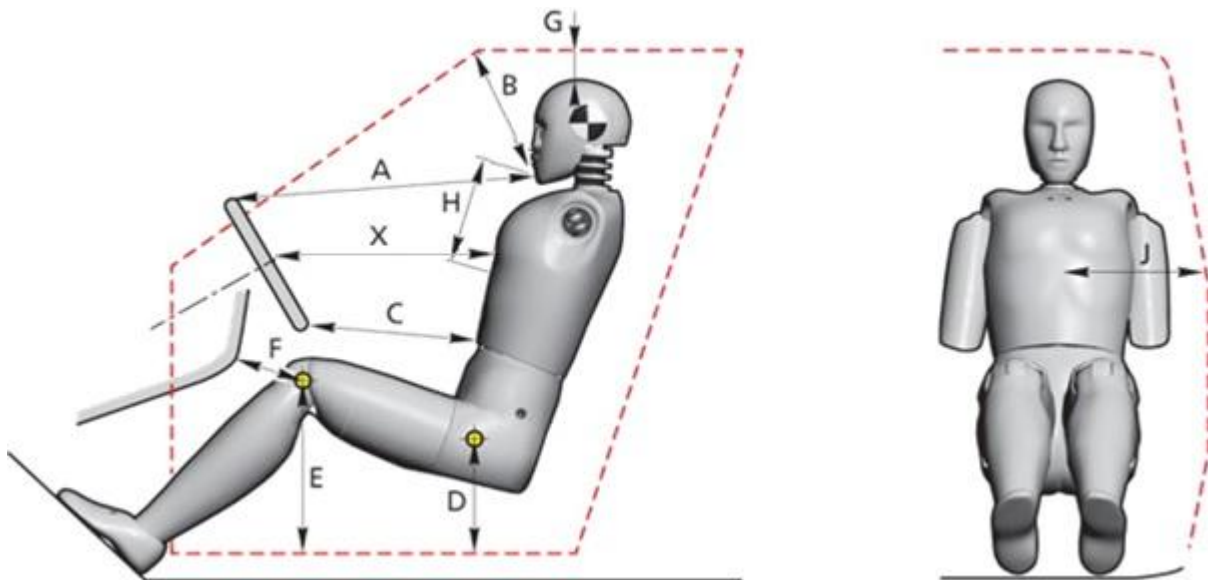


Figure 1 Dummy measurements

| Driver measurements | Description |
|---------------------|----------------------------------------------------------|
| A | Chin to top of rim |
| B | Chin to top edge of glass |
| C | Stomach to rim |
| D | H-point to top of sill |
| E | Knee bolt to top edge of sill |
| F | Knee bolt to top edge of bolster |
| G | Head to roof surface |
| H | Chin to webbing (vertically) |
| J | Belt webbing to door (horizontally) |
| X | Wheel centre to chest (horizontally) |
| θ | Neck Angle |
| | H-Point Co-ordinates (to vehicle reference) |
| α | Seat back angle as defined by torso angle of SAE manikin |
| β | Head angle |
| γ | T1 neck |
| ε | Pelvic angle (x and y) |

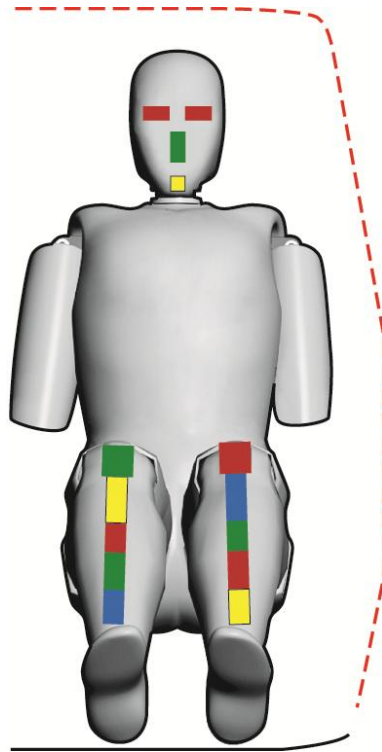
| Passenger measurements | Description |
|------------------------|---------------------------------------------------------------------------------------|
| A | Chin to top of rim or front passenger's seatback |
| B | Chin to top edge of glass |
| C | Stomach to facia or front passenger's seatback |
| D | H-point to top of sill |
| E | Knee bolt to top edge of sill |
| F | Knee bolt to top edge of bolster or front passenger's seatback |
| G | Head to roof surface |
| H | Chin to webbing (vertically) |
| J | Belt webbing to door (horizontally) |
| X | 200mm below chin to closet part of facia or front passenger's seatback (horizontally) |

| | |
|---------------|----------------------------------------------------------|
| θ | Neck Angle |
| | H-Point Co-ordinates (to vehicle) |
| α | Seat back angle as defined by torso angle of SAE manikin |
| ε | Pelvic angle |

1.8 Dummy painting and marking

The dummies shall have masking tape placed on the areas to be painted using the sizes detailed below. The tape shall be completely covered with the following coloured paints. The paint shall be applied close to the time of the test to ensure that the paint will still be wet on impact.

| Driver | |
|-----------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| Eyebrows – left and right | Red (25/2) x 50mm |
| Nose | Green 25 x 40mm strip, down nose centre line. |
| Chin | Yellow 25 x 25mm square, centre line of chin. |
| Left knee | Red 45 x 45mm square, knee centre line with bottom edge level with top of tibia flesh. |
| Right knee | Green 45 x 45mm square, knee centre line with bottom edge level with top of tibia flesh. |
| Left tibia – top to bottom | Blue, Green, Red, Yellow 25mm x 50mm, 4 adjacent areas down leg centre line with top edge level with top of tibia flesh. |
| Right tibia – top to bottom | Yellow, Red, Green, Blue 25mm x 50mm, 4 adjacent areas down leg centre line with top edge level with top of tibia flesh. |



1.9 Dummy temperature

The dummy shall have a stabilised temperature in the range of 19°C to 22°C.

A stabilised temperature shall be obtained by soaking the dummy in temperatures that are within the range specified above for at least 1 hour prior to the test. The temperature shall be recorded at intervals not exceeding 10 minutes and not exceeding 5 minutes before test. All readings shall be supplied as part of the standard output of the test.

After switching on the in-dummy data acquisition, the air inside the dummy and the sensors may warm up whereas the dummy itself is still at a lower temperature. Such sudden temperature rises do not reflect the actual dummy temperature and may be ignored as long as they do not exceed a duration of 20 minutes.

1.10 Post test inspection

All dummies shall be visually inspected immediately after the test.

Any lacerations of the skin or breakages must be noted in the test details, a dummy may have to be re-certified in this case.

Any screws that have become loose or detached shall be re-tightened to the required torque or replaced as necessary.