EURO NCAP

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Hybrid III 5th 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).

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1 HYBRID III 5TH SPECIFICATION

1.1 General

Hybrid III 5th dummies must conform to U.S. Department of transportation, Code of Federal Regulations Part 572 Subpart O, except for modifications and additions stated later.

1.2 Certification

Full details of the Hybrid III 5th certification are available in Part 572 Subpart O of US Department of Transportation Code of Federal Regulations.

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 5th shall be re-certified after every FOUR impact tests.

The chest shall be certified according to the frequency above and must meet both the low speed thorax test as prescribed by SAE J2878, 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, 2022.

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.

A copy of the dummy certification certificate 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.

The Hybrid-III 5th dummies shall be instrumented to record the channels listed below.

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		13kN
	Moment, M_y		500Nm
Pelvis	Acceleration, A_x A_y A_z		150g
Iliac (L & R)	Force, F_x		9kN
	Moment, M_y		220Nm
Femurs (L & R)	Force, F_z		20kN
Driver only	**Parameter**		**CAC**
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 parts of the dummy shall follow the latest agreed harmonised design from Humanetics.

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

Part	Original manufacturer
Neck shields	Neoprene, part number ABA-211-DN
Jacket	Harmonised version in accordance with SAE J2921
Lower leg cavity	Denton version

Spine box	SAE J2915

1.5 Dummy clothing and footwear

Each dummy will be clothed with formfitting cotton stretch garments with short sleeves and bottoms which should not cover the dummy's knees.

Each dummy shall be fitted with shoes equivalent to those specified in UN Regulation No. 137.

1.6 Dummy joints

All constant friction joints should 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 should 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 should be set as close as possible to the time of the test and, in any case, not more than 24 hours before the test.

Maintain the dummy temperature within the range 19°C 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.

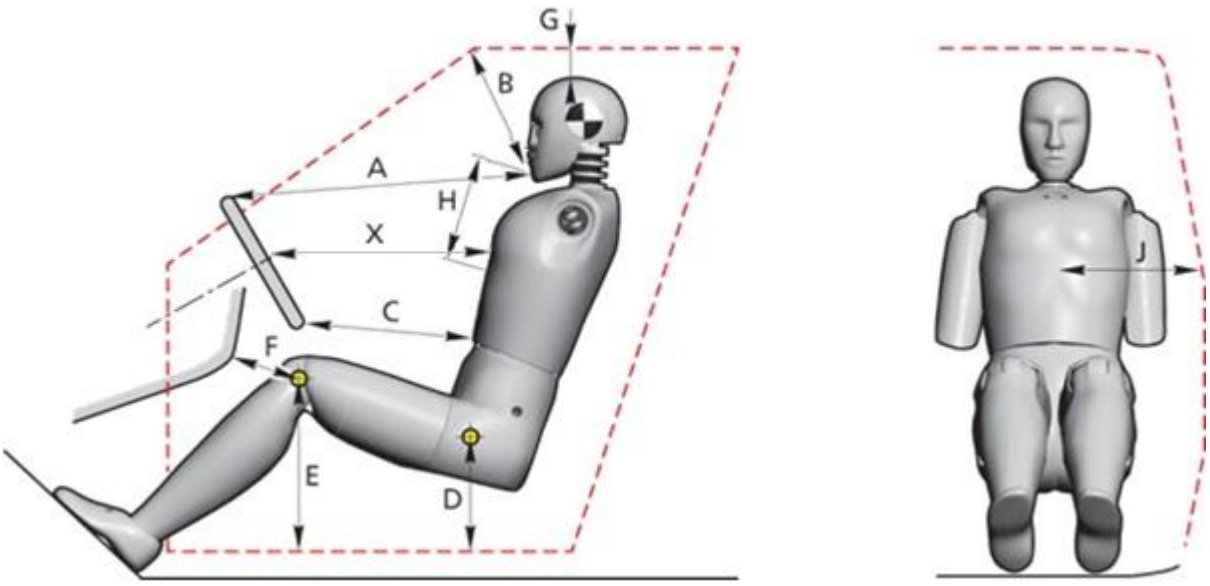


Figure 1 Dummy measurements

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

Driver measurements	Description
γ	T1 neck
ε	Pelvic angle (x and y)

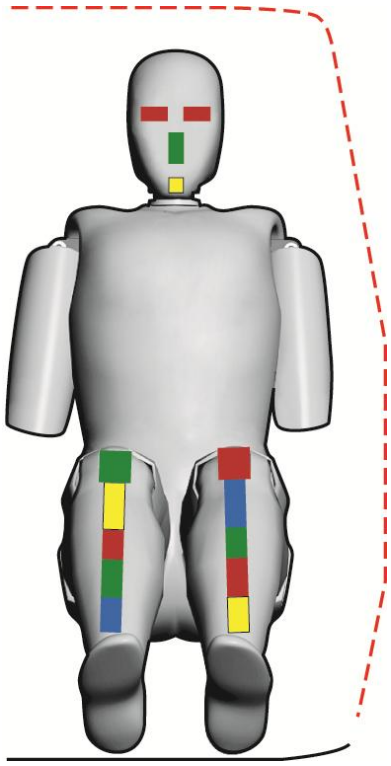
Passenger measurements	Description
A	Chin to top of rim or front passenger's seatback
B	Chin to top edge of glass
C	Stomach to facia or front passenger's seatback
D	H-point to top of sill
E	Knee bolt to top edge of sill
F	Knee bolt to top edge of bolster or front passenger's seatback
G	Head to roof surface
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

With the exception of the face, the dummies should have masking tape placed on the areas to be painted using the size table below. The tape should be completely covered with the following coloured paints. The paint should 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
Top of head – rear passenger only	Blue 50 x 50mm square.
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 19ºC to 22ºC.

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.