ANCAP
Crash testing for safety

GUIDELINES FOR RECORDING COMPLIANCE WITH CRASH TEST PROTOCOL POLE IMPACT CRASH TEST

Test Organisation Reference No.:		
Test Organisation		
Vehicle Make & Model:		
ANCAP Reference Code:		
Date of ANCAP authorisation to proceed with test:		
Euro NCAP Test Protocol	Version:	Date:
Test Date:		
Test Engineer (name):		
Task	Date Completed	Initials
A. Vehicle Specification Checks		
B. Vehicle Preparation & marking		
C. Pole/Trolley Preparation		
D. Passenger Compartment Setup		
E. Dummy installation		
F. Final pre-test checks (OK to "fire")		
G. Post-test tasks		
H. Data processing & reporting		

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INTRODUCTION

This document sets out the *information that is required to be recorded* in association with the pole impact crash test. *It is not intended to be a description of how the tests are to be performed.* Test organisations must develop their own documentation for this purpose.

The test is to be conducted in accordance with the version of the published Euro NCAP Test Protocol that has been agreed to by ANCAP, subject to variations described in this document and in the ANCAP Test Lab Protocol.

Test organisations may use this document or their own checklists, provided that the in-house checklists cover all items described in this document and that the checklists are made available to authorised ANCAP personnel for inspection, if requested.

Requirements that are additional to the Test Protocol are shown in red text.

A. VEHICLE SPECIFICATION CHECKS

Purpose:

- To record delivery information
- To ensure that the vehicle meets the specifications required by ANCAP
- To ensure that manufacturer's settings have been sought and received
- To record safety-related features of the vehicle

ITEM	PROTOCOL	DESCRIPTION	CHECKED	PHOTO
A1 Delivery information & manufacturer's settings				
A1.1	-	Delivery date	(date)	
A1.2	-	Name of motor dealer		
A1.3	-	Date manufacturer's settings requested	(date)	
A1.4	-	Date manufacturer's setting received (see A4)	(date)	
A1.5	-	Name of manufacturer's representative		

A2. Vehicle specifications				
A2.1	-	Variant (eg "GLX")		
A2.2	-	Body type (eg "5 door hatch")		
A2.3	-	Photographs of vehicle (without signage)		
		Front		A2.3a
		Front ¾		A2.3b
		Driver's side		A2.3c
		Rear ¾		A2.3d
		Passenger side		A2.3e
		Underside - front		A2.3f
		Underside - rear		A2.3g

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ITEM	PROTOCOL	DESCRIPTION	CHECKED	PHOTO
		Under bonnet Plan view		A2.3h A2.3i
A2.4	-	Build date (photo of build plate)		A2.4
A2.5	-	ADR Compliance Plate date (photo of plate)		A2.5
A2.6	-	VIN (& photo):		A2.6
A2.7	-	Engine number (& photo):		A2.7
A2.8	-	Engine size & configuration		
A2.9	-	Transmission type and number of gears		
A2.10	-	Odometer reading	km	
A2.11	-	Wheels (type & size)		
A2.12	-	Tyres (type & size)		
A2.13	-	Tyre placard pressures Front: for "normal" load (photo of placard) Rear	kPa kPa	A2.13
A2.14	-	Is steering column tilt (vertical) adjustable? Is steering column reach adjustable? (X)	Y / N Y / N	
A2.15	-	Function of instrument warning lights		
A2.16	-	Vehicle roadworthy		
A2.17	-	Vehicle clean outside, inside & underneath		
A2.18	-	Condition of bodywork (eg dents) Have pedestrian tests been performed?	 Y / N	

A3 Seats and Restraints				
Item	Driver	Front Passenger	Rear Outboard	Rear Centre
A3.1 Seat style (BU=bucket or BE=bench)				
A3.2 Seat back angle adjustment*				
A3.3 Seat fore/aft adjustment*				
A3.4 Seat height adjustment*				
A3.5 Seat cushion tilt adjustment*				
A3.6 Head restraint fitted?				
A3.7 Head restraint height adjustment				
A3.8 Head restraint tilt adjustment				
A3.9 Active head restraint?				
A3.10 Seat belt type#				
A3.11 Upper anchorage height adjustable				

A3.12 Seat belt pretensioner				
A3.13 Seat belt load limiter				
A3.14 Front airbag				
A3.15 Side airbag - thorax				
A3.16 Side airbag - head (Curtain, Tube, Bag or None)				
A3.17 Knee airbag				
A3.18 Anti-submarining seat design (where claimed by manufacturer)				
A3.19 Top tether anchorage location@				
A3.20 ISOFIX anchorages				

* E=electrical adjustment, M=manual adjustment F=fixed (non-adjustable)

ELR=3 point emergency locking retractor. ALR=3 point automatic locking retractor, L=2 point LS=fixed 3 point

@ P=parcel shelf, S=back of seat, F=floor, T=tailgate sill, R=roof/ceiling

A4. Manufacturer-specified settings (for tyre pressures see A2.13)

Where "page number" is requested, indicate the page number in the owner's handbook that explains *how to adjust* the item concerned.

Where the manufacturer provides set-up information this must be retained for archive purposes but should not be included in the report, unless to explain a variation to the set-up.

ITEM	PROTOCOL	DESCRIPTION	CHECKED	PHOTO
A4.1	1.1.1	Fuel tank capacity Page number	litres	
A4.2	1.1.7	Unladen kerb weight	kg	
A4.2b	1.2.1	Max permitted laden mass (gross mass) (or obtain from build plate)	kg	
A4.2c	1.2.1	Rated number of occupants		
A4.3	6.1.1	H-point machine torso angle (if only seat back angle is provided then the reference system must be described) Page number (seat back angle adjustment)	degrees	
A4.5	5.3.1	Seat base tilt angle (from horizontal) or position of control(s) Page number	degrees	
A4.6	5.3.2	Seat lumbar support setting Page number		

A4.7	5.1	Height of seat belt upper anchorage (if adjustable) (distance from highest setting) Page number	mm	
A4.8	-	Whether front seat belts have pretensioners, webbing grabbers and load limiters		
A4.9	-	Whether rear seat belts have pretensioners, webbing grabbers and load limiters		
A4.10	5.5	Steering wheel horizontal adjustment (eg diagram of mid-point, if adjustable) Page number		
A4.11	5.6	Steering wheel vertical adjustment (eg diagram of mid-point, if adjustable) Page number		
A4.12	5.1	Is driver's seat height adjustable?	Y / N	
A.4.13	9.1.3	Door handle pull angle - from horizontal from vertical	degrees degrees	
A.4.14	-	Acceptable battery voltage range 5 minutes prior to test (measured at terminals)	V to V	
A4.15	-	Does the engine need to be run just prior to the test? (eg for suspension system) If YES, see manufacturer's instructions (eg providing fuel to the engine, running time)	Y / N	
A4.16	-	Does spare wheel need to be retained for crash performance?		
A4.17	1.3	Expected Test Mass Expected front axle load Expected rear axle load	kg kg kg	
A4.18	-	Does vehicle have “pre-crash” features (eg pre-emptive firing of pre-tensioners or application of brakes)? If YES, how can this be dis-engaged, if necessary?	Y / N	

A5	-	Special instructions/requests from manufacturer: Recommendation from test organisation:

		Authorised by ANCAP on (date):

A6 Notes about vehicle specifications

Date & initial cover page when this section is complete

B. VEHICLE MASS CALCULATIONS AND PREPARATION

Purpose:

- To measure vehicle unladen mass
- To calculate the reference (test) mass and simulate the test mass distribution
- To prepare the vehicle and add ballast, if necessary
- To determine the R point and mark the side of the vehicle

B1. Measuring unladen mass

ITEM	PROTOCOL	DESCRIPTION	CHECKED	PHOTO
B1.1	1.1.1	Fuel tank capacity (see A4.1)	litres	
B1.2	1.1.1	Mass of fuel in full tank = B1.1 x 0.745 for Petrol. Use 0.8 for diesel.	kg	
B1.4	1.1.1	Volume of fuel substitute = B1.2 / density (density of water is 1 kg/litre)	litres of [water]	
B1.5	1.1.3	Fuel tank drained and refilled to the equivalent of 100% of capacity (B1.4) Dye colour	litres of [water]	
B1.6	1.1.4	Other liquids at maximum Engine oil Coolant Power steering Brake reservoir Transmission Washer bottle(s) Others		
B1.7	1.1.5	Spare wheel & tools present		
B1.8	1.1.6	Tyres pressures (+/-10kPa of A2.13) Front L Front R Rear R Rear L	 kPa kPa kPa kPa	
B1.9	1.1.7	Close bonnet, boot and doors. Rock vehicle to settle suspension then measure unladen wheel loads **Unladen Kerb**		

kg	Left	Right	Total
Front			
Rear			
Total			UKM

		Mass					
B1.10	-	Difference between measured mass and stated kerb mass (A4.2)			kg		
B1.11	1.1.8	Mark body panel at top of wheelarch, in same vertical line as wheel centreline.Measure height of this point above the ground ("ride height") Front L Photograph 2 measurements Front R Rear R Rear L			mm mm mm mm		B1.9a B1.9b

B2. Measuring reference (laden) mass

Caution: Do not switch on ignition with battery, airbag or pretensioner disconnected
Vehicle should have equivalent of 100% of capacity in fuel tank (B1.4)

ITEM	PROTOCOL	DESCRIPTION	CHECKED	PHOTO
B2.1	1.2.1	Calculate the rated cargo and luggage mass Gross(A4.2b) - UKM (B1.10) = Capacity Occupants (A4.2b) x 68 = Occ mass OM Capacity - OM = Cargo mass CM Lesser of CM and 136 kg = Cargo Ballast CB	kg kg kg kg	
B2.2	1.3.1	Determine mid-position (fore/aft) of driver seat and place in mid-position (or first notch rearward). Photograph position of seat		B2.2
B2.3	1.3.1	Determine mid-position (fore/aft) of front passenger seat and place in mid-position (or first notch rearward). Photograph position of seat		B2.3
B2.4	1.3.2	Place 80kg ballast on driver's seat Photograph ballast on seat		B2.4
B2.5	1.3.3	Evenly distribute CB kg of ballast (B2.1) in luggage compartment (rear seats not to be stowed) Photograph ballast in luggage compartment	kg	B2.5
B2.8	1.3.4	Rock vehicle back and forth to settle tyres		
B2.9	1.3.5	Close bonnet, boot and doors. Rock vehicle to settle suspension then	kg / Front: Left / Right / Total / FRM	

		measure laden wheel loads					
			Rear			RRM	
		Reference laden mass	Total			RLM	
B2.10	-	Difference between measured mass and unladen kerb mass (B1.9)			kg		
B2.10a	1.5.7	Calculate acceptable ranges for final test masses (see B4.12). Round to nearest kg. Front axle is FRM +/- lesser of FRM x 0.05 or 20kg (= kg) Rear axle is RRM +/- lesser of RRM x 0.05 or 20kg (= kg) Total mass is RLM +/- RLM x 0.01 (= kg)	kg	Min	Max		
			Front range				
			Rear range				
			Total range				
B2.11	1.3.6	Measure laden ride heights Photograph 2 measurements	Front L Front R Rear R Rear L		mm mm mm mm		B2.11a B2.11b
B2.12	1.3.7	Remove all weights from driver's seat and luggage compartment					

Note: R-Point marking is not required for the pole test

B4. Vehicle preparation

ITEM	PROTOCOL	DESCRIPTION	CHECKED	PHOTO
B4.1	1.5.1	Remove carpet, tools and jack from luggage compartment		
B4.2	1.5.1	Remove spare wheel, unless manufacturer indicated otherwise (see A2.16)		
B4.3	1.5.2	Battery connected and fully charged ANCAP does not permit an auxiliary battery.		

B4.5	1.5.2	Switch ignition on and check airbag warning light		
B4.6	1.5.3	Install on-board data acquisition system and related components in luggage area and route cabling to seats		B4.6
B4.7	1.5.3	Check that cabling is not vulnerable to damage and will not affect dummy kinematics		
B4.8	3.2.4	Install accelerometer on the unstruck b-pillar in the Y-direction. Remove carpet and trim. Fit mounting plate to sill at bottom of B-pillar, inside the vehicle. Fix accelerometer to mounting plate. Ensure accelerometer horizontal to ± 5°. Photograph accelerometer		B4.8
B4.9	1.5.5	Place 80kg ballast on driver's seat		
B4.12	1.5.6	Measure laden wheel loads Front L Front R **Front total (TFM)** Rear R Rear L **Rear Total (TRM)** **Trial Test Mass (TTM) (Total)**	kg kg kg kg kg kg kg	

B4.12	1.5.6	Close bonnet, boot and doors. Rock vehicle to settle suspension and measure laden wheel loads. *Adjust ballast to achieve required axle and total masses* Total Test Mass	kg	Left	Right	Total
			Front			FTM
			Rear			RTM
			Total			TTM

B4.13	1.5.7	Is TTM within required range (B2.10a)?	Y / N	
B4.14	1.5.7	Is FTM within required range (B2.10a)?	Y / N	
B4.15	1.5.7	Is RTM within required range (B2.10a)?	Y / N	
B4.18	-	Difference between final test masses and manufacturer' expectations	kg	

		(A4.17) Front Rear Total	kg kg	

B5. Vehicle Marking (see example photographs, see specifications for logos and identification lettering)				
ITEM	**PROTOCOL**	**DESCRIPTION**	**CHECKED**	**PHOTO**
B5.1	1.6.1	Attached ANCAP logo to bonnet and roof (front half).		
B5.2	-	Attach vehicle and test identification sheets to bonnet and roof (Vehicle model, test date, test identification number)		
B.5.3	165.2	Attach test organisation logos of a size and location that does not detract from the other markings		
B5.4	8.4.1	From manufacturer's reference points, or by using several symmetrical points on the vehicle body, attached two marks on the vehicle roof that aremark a point at the front of the vehicle thatis in the longitudinal centreline of the vehicle and are spaced at least 1m apart. Repeat for a point at the rear of the vehicle. These will be used to check that the impact vehicle angle is within tolerancescorrect (90 degrees to impact).		
B5.5	ANCAP	Mark grid points on the side of the vehicle for measuring crush profile. There should be 7 vertical lines spread along the length of the vehicle (lines 1 and 7 correspond to each end of the side of the vehicle and line 3 or 4 should correspond to the R-point). There should be 3 horizontal lines at heights of 300, 550 and 800mm above the ground. This gives a total of 21 points to be measured before and after the crash. Record the 3D positions of these grid points (electronic record is acceptable)		

B6 Notes about vehicle preparation

Date & initial cover page when this section is complete

C. Pole and trolley preparation

Purpose:

- To check specifications of the pole and apply markings
- To prepare trolley

C1. Pole and trolley/carrier

Pole must be vertical metal structure with a diameter of 254+/-3mm (8.2)

Bottom of pole must clear trolley and be no higher than 102mm above the supporting surface of the trolley (or "lowest point of tyres")

Top of pole must be at least 100mm above the highest point of the vehicle under test

Trolley must have a flat, horizontal surface on which the test vehicle can freely slide during the critical parts of the impact.

PTFE (eg Teflon) sheet is to be placed between the vehicle tyres and the trolley surface.

ITEM	PROTOCOL	DESCRIPTION	CHECKED	PHOTO
C1.5	7.1.5	Mark a line along vertical centreline of pole (to check alignment with vehicle)		
C1.6	9.3.1	Mount rivet or pin at pole centreline where it will impact the approximate centre of the door panel Photograph line and rivet/pin		C1.6
C1.11	-	Are pole dimensions within tolerances? If not, describe remedial action at C2	Y / N	
C1.12	3.3.1	Mount accelerometer to trolley in X-direction near at Centre of Gravity ± 100mm in Y and Z direction (may be located at any convenient point in the X direction) Photograph installed accelerometer		C1.12

C2 Camera preparation pending

C3 Notes about trolley and pole preparation

Date & initial cover page when this section is complete

D. Passenger Compartment Setup

Purpose:

- To set seats in required positions
- To set steering wheel in required position
- To seat belt upper anchorage in required position
- To determine H-point position

D1. Seat adjustments

Refer to settings and owner's handbook page numbers at A4.3 to A4.6

Driver head restraint is adjusted after dummy is installed

Only test organisation personnel are permitted to adjust vehicle settings. With ANCAP approval. manufacturer's representatives may observe and advise on adjustments but must not touch any controls.

"Set" stickers or masking tape should be applied to controls after they have been adjusted to the required test position.

ITEM	PROTOCOL	DESCRIPTION	CHECKED	PHOTO
D1.1	5.1	Set seat in lowest position, apply masking tape along sill for measuring seat movement		
D1.2	5.2.2	Mark mechanical foremost seating position on the sill tape		
D1.3	5.2.4	Mark mechanical rearmost seating position on the sill tape		
D1.4	5.2.6	Measure distance between marked points Half of distance =	mm mm	
D1.5	5.2.6	Mark centre position between foremost and rearmost position on sill tape		
D1.6	5.2.7	Adjust seat to centre position		
D1.7	5.2.9	Ensure seat is latched on both rails (move rearward if required to latch) Photograph seat and marked tape		D1.7
D1.8	5.3.1	Is seat base tilt adjustable? If YES, set seat base tilt at flattest (or any point up to mid-range, if specified by manufacturer - see A4.5)	Y / N	
D1.9	5.3.1	If seat is tilt adjustable, mark and photograph the adjustment devices to clearly show their position Least tilt Largest tilt Test position		D1.9a D1.9b D1.9c

D1.11	5.1	If seat is height adjustable, set it to its lowest position. Photograph the seat and its height control		D1.11
D1.12	5.3.2	Is lumbar support adjustable? If YES set to fully retracted & photograph control position	Y / N	D1.12
D1.13	5.1	Set armrest in lowered position (unless interferes with dummy positioning)		
D1.14	5.1	Front passenger seat adjusted to same setting as driver seat, where applicable Fore/aft adjustment Height adjustment (lowest) Base tilt adjustment Lumbar support adjustment Armrest in lowered position Photograph test position of passenger seat., showing alignment marks		D1.14
D1.15	5.1	Rear seat adjustments, where applicable Fore/aft adjustment - mid-point (move rearward to latch) Height adjustment - mid-travel Base tilt adjustment - flattest Lumbar support adjustment - retracted Head restraints - lowest (or removed) Armrests stowed Photograph the test position of the rear seat(s), showing set-up marks		D1.15
D1.16	ANCAP	Mark lateral centreline of drivers seat near front of cushion and at top of seat back, where they will be visible with the dummy installed		
D1.17	ANCAP	Apply at least two marks in line with the lateral centreline of the seat cushion (point 1 in B3.10). One should be on the windscreen at about dummy nose height. The second shoiuld be on top of the instrument panel and the other at the top of windscreen vertically above 		

		below (Z) the instrument panel windscreen mark. *Install string between these two marks* (this will be used to visually check dummy alignment). The third mark should be on the windscreen at about mid-height between the other two points. These will be used to visually check dummy alignment.		

D2 Steering Wheel Adjustments				
ITEM	**PROTOCOL**	**DESCRIPTION**	**CHECKED**	**PHOTO**
D2.1	5.5	Is horizontal adjustment provided? If YES, mark steering column fully forward Mark steering column fully rearward Calculate distance (X) between marks Mark mid-position and adjust steering column to this position. Lock in place Photograph marks and steering column position	Y / N mm	D2.1
D2.2	5.6	Is vertical adjustment provided? If YES, mark steering column fully down Mark steering column fully up Calculate distance (X) between marks Mark mid-position and adjust steering column to this position. Lock in place Photograph marks and steering column position	Y / N mm	D2.2
D2.3	-	Determine axis of steering wheel and mark a cross on the hub, in line with this axis (eg the mark should not move when the steering wheel is rotated)		
D3 Seat belt upper anchorage (driver)				
ITEM	**PROTOCOL**	**DESCRIPTION**	**CHECKED**	**PHOTO**
D3.1	5.1	Is vertical adjustment provided? Did manufacturer specify a setting? If provided, adjust to manufacturer's setting If adjustable but no manufacturer's setting, mark anchorage fully down Mark anchorage fully up Calculate distance (X) between marks Mark mid-position and adjust anchorage to this position. Ensure it is locked in place (nearest notch upwards)	Y / N Y / N mm	

		Photograph marks and seat belt anchorage position		D3.1

D4 H-Point position

Install H-Point machine as described in SAE J826 and section 6.1 of Test Protocol

Seat must not be loaded and must be at room temp for 1 hour before H-Point check

Only test organisation personnel are permitted to install and adjust the H-point machine. With ANCAP approval, manufacturer's representatives may observe but must not touch the H-point machine. Remove machine and repeat procedure if this occurs).

ITEM	PROTOCOL	DESCRIPTION	CHECKED	PHOTO
D4.1	6.1	New seat cycled by 65-85kg person for 1 minute on two occasions		
D4.2	6.1	Place jack stands under vehicle		
D4.3	6.1.1	Did manufacturer provide seat back angle setting? (see A4.3)		
D4.4	6.1.1	Set seat back angle to manufacturer's setting or 25 degrees (default)		
D4.5	6.1.2	Muslin cloth placed on seat		
D4.6	6.1.3	Install seat and back components of H-point machine		
D4.7	6.1.4	Set leg lengths 401mm thigh and 414mm lower leg. Photograph setting		D4.7
D4.8	6.1.5	Attach lower legs to H-point machine and check that t-bar is horizontal		
D4.9	6.1.6	Place right foot on undepressed accelerator pedal with heel as far forwards as possible		
D4.10	6.1.6	Measure Y distance from foot to centreline of machine	mm	
D4.11	6.1.7	Place left foot at same distance from centreline, foot flat on footwell		
D4.12	6.1.8	Install lower leg and thigh weights		
D4.13	6.1.9	Tilt back pan fully forward and draw machine away from seat back		
D4.14	6.1.10	Push machine back against seat back		
D4.15	6.1.11	Apply (nominal) 100N load twice as specified		
D4.16	6.1.12	Return back pan to normal position, against seat back		
D4.17	6.1.13	Install buttock weights		
D4.18	6.1.14	Install torso weights (alternatively)		
D4.19	6.1.15	Tilt back pan fully forwards, rock 5 degrees		

		side to side (feet unrestrained). Return upright so T-bar is horizontal. Ensure manikin is at lateral centreline of seat		
D4.20	6.1.16	Reposition feet by lifting then lowering so heel contacts floor and sole on undepressed accelerator pedal		
D4.21	6.1.18	Return back pan to normal position, against seat back		
D4.22	6.1.18	Check that the machine is horizontal		
D4.23	6.1.19	Using the spirit level on the machine, adjust torso angle to manufacturer's setting or 25 degrees. Ensure back pan stays in contact with seat and is level. Record angle	degrees	
D4.24	6.1.20	Measure H-Point (relative to reference point A4.10) X:	Y:	Z:
		Photograph measurement of H-Point		D4.24
D4.25	-	Mark and record one point on seat back and two points on seat base/cushion (points chosen to B3.10 may be used for this purpose). These can be used to check if seat has been moved out of position, if necessary.	mm: X / Y / Z	
			Seat back:	
			Seat base 1:	
		Photograph alignment marks	Seat base 2:	D4.25
D4.26	-	Remove H-point machine. Jack stands may also be removed.		

D5 Vehicle settings - see 5.1				
D5.1	-	Set all movable side windows and vents to the *fully open* position. Sunroof must be fully closed.		
D5.2	-	Set transmission to neutral		
D5.3	-	Set parking brake to disengaged		
D5.4	-	Set pedals to normal position of rest		
D5.6	-	Set roof to raised (convertibles)		
D5.7	-	Set sunvisors to stowed		

D5.8	-	Set rear view mirror to normal position of use		
D5.9	-	Set all other adjustments to mid position (record these components):		
D5.10	-	Remove any extra keys/key rings from ignition key		
D5.11	5.1	Where possible remove rear seat head restraints. Otherwise set to lowest position		

D6 Notes about passenger compartment setup

Date & initial cover page when this section is complete

E. Dummy installation

Purpose:

- To install EuroSID 2 dummy in vehicle
- To adjust the seat, if needed, to obtain the required daylight gap to the back of the dummy head
- To determine the impact point from the dummy head position and mark the side of the vehicle
- To align the vehicle with the pole
- To mark and paint dummies

E1 ES2 adult dummy installation

Note that H-point on the ES-2 dummy is 21mm forward of that on the H-point machine. The ES-2 dummy backplate is marked with an "Hm" point that corresponds to the H-point machine and is used to set the dummy position.

Dummy should not be sitting on seat for more than 2 hours before the test.

Only test organisation personnel are permitted to install and adjust the dummies. With ANCAP approval, manufacturer's representatives may observe but must not touch any dummy.

If the dummy is moved in a way that might cause the neck or spine to be unusually distorted, then remove dummy, hang by crown to straighten neck and spine and repeat procedure.

Dummy temperature (2.5.1) must be stabilised at least 5 hours prior to setting joint stiffness and holding force. Record dates as well as times if not all events on same day. Recording temperature inside dummy flesh is not necessary if ambient temperature is continuously recorded within 1 metre of the dummy and remains with the specified range of 18 to 26 degrees. This is a NHTSA provision.

Extract from FMVSS 201: *Daylight opening* means, for openings on the side of the vehicle, other than a door opening, the locus of all points where a horizontal line, perpendicular to the vehicle longitudinal centerline, is tangent to the periphery of the opening... If the horizontal line is tangent to the periphery at more than one point at any location, the most inboard point is used to determine the daylight opening.

ITEM	PROTOCOL	DESCRIPTION	CHECKED	PHOTO
E1.1		ES-2 dummy Serial no.: Date since last calibration: Number of times used since last calibration (prior to this test):		
E1.2	2.4.1	ES-2 rubber wetsuit fitted to dummy		
E1.3	2.4.1	Calf-length cotton pants and shoes fitted to dummy		
E1.4	2.5.1	Dummy temperature stabilised between 18 to 26 deg - Start date & time Measurement method (ambient temperature or dummy flesh): Photograph temperature measuring device	Date Time	E1.4

E1.5	2.5.2	Dummy joint stiffness set at (time) Time elapsed since temperature stablised	Date Time Hours	
E1.6	2.5.2	Dummy shoulder screw torque set to obtain 1-2g holding force (2.5.2.2)	Date Time	
E1.7		Dummy installed in vehicle at (time)	Date Time	
E1.8	6.3.1.1	Position the ES2 so its centreline is coincident with the seat centreline marks		
E1.9	6.3.1.2	Fasten seat belt and check that the dummy does not move. Seat belt may then be unfastened to facilitate adjustments, measurements and painting.		
E1.10	-	Support vehicle on jacks		
E1.11	6.3.1.4	Manoeuvre dummy until Hm point is within a 10mm radius of Target H Point, relative to the defined reference point on the vehicle		
E1.12	6.3.1.3	Visually check ES2 for a square, central and level positioning The line through the dummy Hm points should be horizontal with a maximum inclination of +/-2 degrees (equivalent to a vertical (Z) difference of 12mm).		
E1.13	6.3.2.2	Initially move the legs to adjust knee gap (measured from inner metal plate) so that each is 75mm (+/-5mm) from the seat centreline. Position right foot on accelerator centre line		
E1.14	6.3.2.1	Position left foot perpendicular to lower leg and move so that left heel in same transverse plane as right heel.		
E1.15	6.3.2.3	If necessary, move each leg to adjust knee gap (inner plate to seat centreline) to 75+/-5mm.		
E1.17	6.3.2.4	If possible, dummy thighs should touch seat cushion. Do thighs touch seat?	Y / N	
E1.18	-	Check all cables to ensure they are unlikely to become trapped or interfere with dummy movement		
E1.19	-	Visually check ES2 for a square and level positioning		
E1.20	6.3.2.5	Check that Hm point is still within 10mm radius of target H-point		

E1.21	6.3.3	Set both arms to 40 degree indent position (6.3.4) (40 degrees +/-5 degrees from torso arm reference line)		
E1.22	5.1	If tilt adjustable, adjust tilt angle of head restraint to mid-position. Where only two locking tilt positions are available set it to the rearmost position.		
E1.23	5.1 (see also Whiplash Protocol)	If height adjustable, determine the highest and lowest lockable positions. Move the head restraint to the first lockable position at or above the mid-point. If this is more than 10mm above the mid-point then move the head restraint to the next lockable position below the mid-point. Where there are only two locking height positions the lowest should be used. If the head restraint touches the dummy head then the head restraint should be tilted rearward (if possible) or moved upward to the first lockable position at which no contact occurs.		
E1.24	6.3.4	Open the window and close the driver's door. Measure the X values for the back of the dummy head (point f) and the window opening (point g - see item E1.25 and diagram). Starting difference in X values (f_x - g_x) =: Is the difference > 50mm (or negative) If difference is less than 50mm (or negative), slowly make adjustments in the following order, until the 50mm difference is achieved: 1) Seat back angle, up to 5 degrees forward of initial position 2) Seat fore/aft adjustment forward, up to full travel or the dummy knees make contact with the dash/fascia 3) Seat back angle (beyond the 5 degrees), up to its full travel Final difference in X values (f_x - g_x) =: Obtain by adjustments:	mm Y/N mm 1 / 2 / 3	
E1.25	6.5	*With 3D machine*, measure & record dummy reference points (see diagram below). Photograph measurement of right Hm.	X Y Z	

		a) Right H-point Hm				E1.25
		b) Left H-point Hm (Z value should be within 12mm of point a)				
		c) Head C of G (outboard side of head)				
		d) Front centre of lower neck				
		e) Outboard knee outer pivot				
		f) Rearmost point of head at C of G height				
		g) Foremost point of b-pillar window opening, at head C of G height				
		h) Centre of steering wheel (D2.3)				
		i) Y value of lateral centreline of seat cushion (not illustrated - see B3.10)				

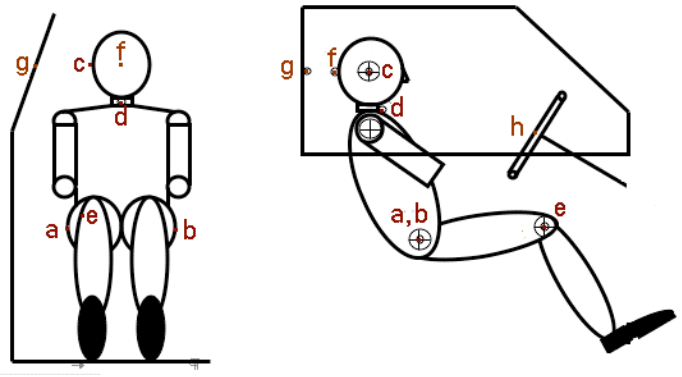


Diagram for E1.25

E1.26	-	Compare Y values of points d and f with the Y value of the seat centreline difference for d: difference for f:	 mm mm	
E1.27	6.5	Measure and record dummy to vehicle clearances (see diagram and notes below). Where horizontal measurements are taken with a tape measure use a spirit level or similar to ensure accuracy.		
		A. Top of head to roof lining (Z)	mm	
		B. Tip of nose to windscreen joint (XZ plane)	mm	
		C. Tip of nose to centre of steering	mm	

		wheel		
		E. Chest to centre of steering wheel(X)	mm	
		F. Hm point to door opening (Z)	mm	
		G. Knee bolt to floor covering (Z)	mm	
		H. Head (C of G decal) to side window or interior trim (Y)	mm	
		J. Shoulder bolt to side window or interior trim (Y)	mm	
		L. Hm point to interior door trim/handle (Y)	mm	
		M. Knee bolt to interior door trim (Y)	mm	
		N. Back of head (C of G point) to window opening (X)	mm	
		P. Minimum knee gap (see E2.15) (Y)	mm	
		Q. Minimum ankle gap (Y)	mm	

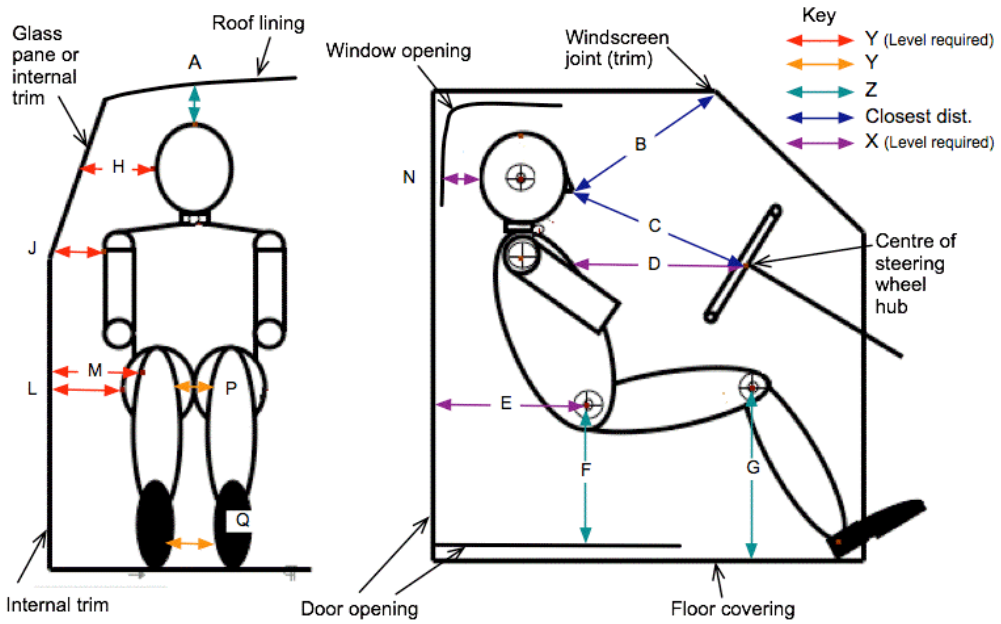
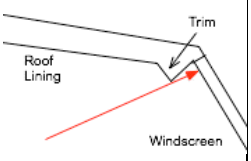


Diagram for E1.27

Notes for dimension measurements: (I, K & O are not used)

A. Locate topmost point of dummy head. Project a line vertically above this point. Measure the vertical (Z) distance to where this line intersects the interior roof lining (ceiling)

B. Locate the nose point on the dummy (foremost point of nose). In the same longitudinal (XZ) plane, locate the point where the windscreen glazing meets the roofline. Measure the distance to the *interior of the glass*, as close as possible to this point (that is, glancing the trim, if necessary - see diagram)



C. Locate the nose point on the dummy. Locate the centre mark on the steering wheel hub (D2.3). Measure the distance between these points (not necessarily in XZ plane if steering wheel is off-centre)

D. Locate the centre mark on the steering wheel hub (D2.3). Using a level (or similar device) project a line directly rearwards from this point (X direction). Measure the distance to where this line intersects the exterior of the wet-suit material on the dummy chest (this might not be the centreline of the dummy, if the steering wheel is off-centre).

E. Locate outboard Hm point on dummy. With door open, locate the foremost point on the door opening that is at the same

height as the Hm point. Use a level, or similar device, to ensure alignment is horizontal. Measure the longitudinal (X) distance between these points.

F. Locate outboard Hm point on dummy. With door open, locate the highest point on the door sill that is at the same X-dimension as the Hm point. Measure the vertical (Z) distance between these points.

G. Locate centre of the head of the outboard knee bolt on dummy. Project a line vertically below this point. Measure the distance where this line intersects the firm upper surface of the carpet or floor covering.

H. Locate C of G decal on outboard side of dummy head. Project a line transversely outboard (Y) from the C of mark. Measure the distance between the mark and the first point of contact with the vehicle (interior of window pane or interior trim). The window may be wound down partially to take this measurement. Use a level, or similar device, to ensure measurement is horizontal.

J. Locate centre of the head of the shoulder bolt on outboard side of dummy. Project a line transversely outboard (Y). Measure the distance along this line between the *exterior of the wet-suit material* and the first point of contact with the vehicle (interior window pane or interior trim). Use a level, or similar device, to ensure measurement is horizontal.

L. Locate the outboard Hm point. Project a line transversely outboard (Y). Measure the distance between the Hm point and the first point of contact with the vehicle (interior trim). Use a level, or similar device, to ensure measurement is horizontal.

M. Locate centre of the head of the knee bolt on outboard side of dummy. Project a line transversely outboard (Y). Measure the distance between the bolt head and the first point of contact with the vehicle (interior trim). Use a level, or similar device, to ensure measurement is horizontal.

N. Difference in X values between points f & g for item E1.25.. Record -ve value if head is behind window opening.

P. Measure the minimum transverse gap between the inside surface of the knees within a radius (about Y axis) of 50mm of the knee bolts. .

Q. Measure the minimum transverse gap between inner surface of the ankles within a radius (about Y axis) of 50mm of the ankle bolts.

E1.28	-	Compare dummy position measurements with manufacturer's target values (if any). Resolve any major discrepancy.		
E1.29	-	Does dummy positioning comply with protocol and reasonably match manufacturer's data? If not notify ANCAP before proceeding with test.	Y / N	
E1.30	1.4.2	Mark a point on the door panel that has the same X co-ordinate as the C of G of the dummy head (point c). Label as "P"		
E1.31	1.4.4	Mark points on roof gutter and door sill with same X co-ordinate as P-point		
E1.32	1.4.4	Apply contrasting tape to connect these points (in a vertical line, with front edge aligned with P-point). Photograph the markings.		E1.32
E1.33	-	Photograph dummy in position side view - driver's side side view - from passenger side front view (through windscreen) in line with seat centreline dummy feet position - driver side dummy feet position - from passenger side		 E1.33a E1.33b E1.33c E1.33d E1.33e
E1.34	-	Remove supporting jacks		
E1.35	8.4.1	With the vehicle in place on the trolley,	degrees	

		align it so that the angle between the vehicle's longitudinal and the impact direction (tow rail direction) is 90 degrees (see B5.4). Measure the angle. The tolerance during impact is +/-3 degrees. The pre-test tolerance should be less than this. +/-1 degree is recommended		
E1.36	8.1.2	With the vehicle in place on the trolley, roll the trolley up to the pole. Move the vehicle sideways to the tow direction so that the centreline of the pole (pin) aligns with the P-point of the vehicle (E1.30). Using the mark from B5.4 (centreline, near the front) drop a vertical line to the ground from this point. Mark the ground. Repeat for the point at the rear of the vehicle. These will be used to check the alignment of the vehicle prior to the test. Photograph the alignment marks		E1.36
E1.37	8.2	Check vertical distance between bottom of pole and trolley platform (max 102mm)	mm	
E1.38	8.2	Check vertical distance between top of pole and highest point on vehicle roof (min 100mm)	mm	
E1.39	3.1	Check that the data for the dummy and vehicle and carrier accelerometers are being acquired	Total 45ch	

E2 DUMMY PAINTING (Protocol 2.6)

Dummy painting must be done just prior to the test (or moistened) so that the paint is still wet during the impact. Alernatively. paint may be sprayed with water just prior to test or slow-drying paint used.

Apply masking tape to the parts of the dummy to be painted. The paint should completely cover the tape, except for the square of tape on the dummy head. In this case only the outer edge of the square should be painted.

Take care to not move the dummy during painting. If the arm is moved or the seat belt is unfastened to facilitate painting then the person who installed the dummy must restore the arm to the original position and fasten the seat belt.

Paint on tape location	Size	Colour	Checked
ES2 struck side of head - lower edge of square at c of g	100x100	Red edge	
ES2 struck side shoulder - down from fixing hole	25x150	Blue	
ES2 struck side upper rib - start from seat back contact point	150 strip	Red	
ES2 struck side mid rib - start from seat back contact point	150 strip	Yellow	
ES2 struck side lower rib - start from seat back contact point	150 strip	Green	
ES2 struck side Abdomen	50x50	Red	
ES2 struck side pelvis - centred on hip point	50x100	Orange	

ITEM	PROTOCOL	DESCRIPTION	CHECKED	PHOTO
E2.1	2.6.1	Paper tape on CRS sides for head contact evaluation		
E2.2	-	All dummy painting completed to protocol (record time)	Time	
E2.3	-	Seat belt fastened by person who installed dummy		
E2.4		Arms returned to test position by person who installed dummy (see E2.21)		
E2.5	-	Visually check ES2 once more for square and level positioning		

E3 Notes about dummy installation

Date & initial cover page when this section is complete

F. Final checks prior to crash test

Purpose:

- To check that all tasks have been completed
- To secure the area
- To manage witnesses
- To check vehicle items

F1 Final checks

Witnesses to an ANCAP test may include test contractor personnel, ANCAP members, manufacturer's representatives and approved ANCAP contractors, No other individuals shall be allowed to witness any ANCAP vehicle test unless specifically authorized by an ANCAP member.

It is the contractor's responsibility to secure the test site area during a test and to shield the impact area from the public view.

Any witnesses to the test must be informed that, unless authorised by ANCAP, they must not :

- touch the vehicle or dummies at any time
- take any photographs or any other record of the test and
- divulge any aspects of the test to another party.

An attendance book with a statement based on the above wording may be used for this purpose.

ITEM	PROTOCOL	DESCRIPTION	CHECKED	PHOTO
F1.1		Sections A to E of cover sheet completed?		
F1.2		All pre-crash photos taken		
F1.3		Test area secured (all access points locked, all visitors in secure area)		
F1.4		All witnesses signed in and briefed about confidentiality and safety		
F1.5		Check alignment marks at front and rear of vehicle. Adjust vehicle position if necessary.		
F1.5a		Teflon sheets in place between tyres and platform.		
F1.5b		Crush tubes in place		
F1.5c		Check vehicle restraint devices (if any)		
F1.7		Drivers seat belt fastened		
F1.8		Windows down (for pole impact test)		
F1.9		Ignition on Witnessed by manufacturer's representative:		
F1.10		Check airbag warning light functions correctly (if applicable)		
F1.11		Remove external power supply. Check battery voltage within manufacturer's		

		recommendation (A4.13) Run engine, if specified by manufacturer (eg to charge suspension system)		
F1.12		Bonnet and boot closed		
F1.13		Temperature sensor removed & temperature reading confirmed within tolerances		
F1.14		Temperature-controlled conditions ceased at (eg record time that air-conditioning ceases and/or prep-room door is opened)	Date Time	
F1.15		Vehicle doors closed but not locked		
F.17	1.1.8	Measure laden ride heights Front L Front R Rear R Rear L Do any of the values differ from those measured at B2.11 by more than 10mm? If YES delay test and investigate problem.	 mm mm mm mm Y / N	
F1.18		Time elapsed since dummy was seated	hh:mm	
F1.19		Time of test	Time	

F2 Notes about test

Name of manufacturer's representative:

Comments by representative

Test organisation response/comments/recommendations

Name of ANCAP representative:

Comments by / Decision of ANCAP representative

Date & initial cover page when this section is complete

G. Post-crash checks & measurements

Purpose:

- To check that impact parameters were within tolerances
- To check and record vehicle items
- To remove dummies from vehicle

G Immediate post-crash checks and measurements

Vehicle and impact area should be secured. In particular, ensure that there is no danger from broken glass, leaked fluids (such as battery acid) or stored energy in deformed panels.

Ensure that only test organisation personnel touch the vehicle and dummies after the impact and that only authorised personnel take photographs or video - visitors with authority should be clearly identified by tag or similar means. Avoid moving the dummies and airbags before photographs have been taken.

ITEM	PROTOCOL	DESCRIPTION	CHECKED	PHOTO
G1	-	Photograph vehicle in post-crash positions		G1
G2	8.1.2	Locate pin mark and determine alignment difference (pin mark to P-point vertical line) Within +/-38mm? Photograph pins mark or alternative method of determining alignment	mm Y / N	G2
G3	8.3.3	Record test speed measurement Within 28.5 to 29.5 km/h?	km/h Y/ N	
G4	8.4.1	Determine and record impact angle Within 87 to 93 degrees? Snapshot of overhead video	degrees Y / N	G4
G5	-	Check whether any doors have opened during impact, including tailgate Photograph all doors, clearly showing the latch position if any are deemed to be "open"	Y / N	G5 (one for each door)
G6	9.1.2	Check if any doors have locked Photograph any controls that have locked	Y / N	G6 (if locked)
G7	9.1.3	Measure the opening force for each door on the unstruck side Front unlatch Front 45° Rear unlatch Rear 45°	N N N N	
G8	9.2	Removal of ES2 dummy. Use the following order:		

		a) removed without any vehicle adjustments b) recline seat back c) slide seat back on runners d) remove seat from vehicle	Y / N Y / N Y / N Y / N	
G9	-	Record seat belt condition Did pretensioners fire?		
G10	-	Record airbag deployments Photograph deployed airbags and any contact marks		G10
G11	-	Examine ES2 dummy for damage and record any damage Photograph damage		G11 (each item)
G12	-	Examine vehicle interior for paint marks and other signs of contacts with dummy Photograph contact marks		G12 (each mark)
G13	-	Check for fuel leaks Photograph any leaks		G13 (if leak)
G14	ANCAP	Locate the crush profile grid points from B5.5. Measure the 3D co-ordinates of points that are accessible and report the amount of crush (Y axis difference). Photograph measurement of crush.		G14

H. Data processing and reporting

Purpose:

- To process injury data, prepare graphs and calculate injury parameters
- To process crash test video and prepare edited footage in digital format
- To take remaining post-crash photographs
- To conduct post-crash damage inspection and record observations
- To prepare Crash Test Report and data CD/DVD
- To archive crash test data
- To store and dispose wrecked vehicle

No ANCAP checklists are associated with this section