

# Helmet test

# ECE 22-05

## Conditioning of the helmets

Prior to certain tests, the helmet must be "conditioned". This means that the helmet must be exposed to a certain temperature, relative humidity, UV radiation, water and solvent for a given amount of time before certain tests.

**Heat conditioning** = the helmet will be exposed to a temperature of 50° C (± 2 ° C) for not less than 4 hours and not more than 6 hours. (Used for shock absorption test with kerbstone anvil).

**Low-temperature conditioning** = the helmet will be exposed to a temperature of -20 ° C (± 2 ° C) for not less than 4 hours and not more than 6 hours. (Used for shock absorption test with flat anvil).

**Ambient temperature conditioning** = the helmet will be exposed to a temperature of 25 ° C (± 0,5 ° C) for at least 4 hours.

**Hygrometry conditioning** = the helmet will be exposed to a relative humidity of 65 % (± 5 %) for at least 4 hours.

**UV (ultraviolet-radiation) conditioning** = the outer surface of the helmet is will be exposed to ultraviolet irradiation by 125-watt xenon-filled quartz lamp for 48 hours at a range of 25 cm. (Used for shock absorption test with kerbstone and flat anvil).

**Moisture conditioning** = the outer surface of the helmet will be exposed to spraying for 4 tot 6 hours with water at ambient temperature at the rate of 1 litre per minute. (Used for shock absorption test with kerbstone and flat anvil).

**Solvent conditioning** = special solvent (liquid B/ISO 1817:1985 = 70% octane and 30% toluene) is applied with a cotton cloth to specified regions of the outer shell.

## Dynamic test of retention system

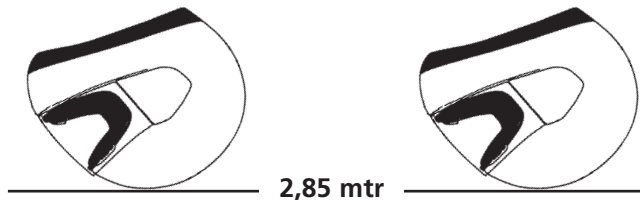
Preload	15 kg
Drop mass and height	10 kg x 0,75 mtr
Requirement	Allowance of dynamic displacement: less than 0,035 mtr Allowance of residual displacement: less than 0,025 mtr

## Shock absorption test

### Drop speed and height

Flat anvil	Kerbstone anvil
7.5 m/s (2,85 mtr) Point S 5.5 m/s	7.5 m/s (2,85 mtr) Point S 5.5 m/s

The maximum acceleration of the headform shall not exceed 275 G. De HIC value shall not exceed 2400. Each impact point is tested only once.



## Visors

Visors are subject to:

- 1) Abrasion (scratch resistance) test
- 2) Light transmission/diffusion test
- 3) Penetration test
- 4) Mist retardant test (optional)

## ECE 22-05

The ECE 22-05 describes the uniform provisions by the United Nations concerning the approval of protective helmets and their visors for riders and passengers of motor cycles and mopeds

## HIC VALUE = HEAD INJURY CRITERION

The acceleration against time at the centre of gravity of the headform, is measured and recorded and from those figures the Head Injury Criterion or the HIC value is calculated. In general, a lower HIC value means a lower head in jury criterion and is therefore regarded as a "better" value. But please keep in mind that the HIC value is however a purely theoretical value and represents a low speed test, comparable with a speed of only 27 kilometres per hour (7,5 meter per second) and is therefore favourable to certain helmet construction types. As is true for all test values: they are never a guaranteed for the true performance of any helmet during actual crash conditions.

## VISORS

- Abrasion test: 3 kg of abrasive material (natural quartz sand, grain size 0.50/0.7 mm) is allowed to drop through a gravity tube from a height of 1650 mm on the flattest part of the visor, that is fixed a on turntable. This turntable is situated on 45 degree angle to the direction of the sand. The speed of the turntable is 250 rpm. Afterwards the visor will be washed and cleaned and the luminous transmission shall be measured.

- Visors should have a minimum luminous (light) transmittance of Tv...80%

- If the visor is marked with the "Daytime use only" text or the appropriate "sun" symbol, a luminous transmittance of Tv...50% is permissible.



- (optional) If the visor is regarded as having a mist retardant facility, this may be indicated by the words "MIST RETARDANT"

# Helmet test

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### Rigidity test

Preload: an initial load of 30 N shall be applied for 2 minutes.

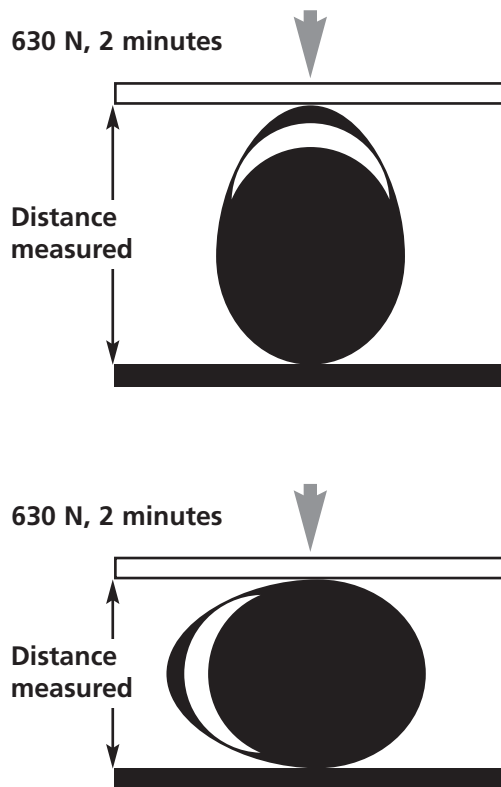
The load shall be increased by 100 N every 2 minutes to a maximum of 630 N.

After 2 minutes of application of 630 N, the distance between the plates shall be measured.

**Allowance: less than 0,04 mtr**

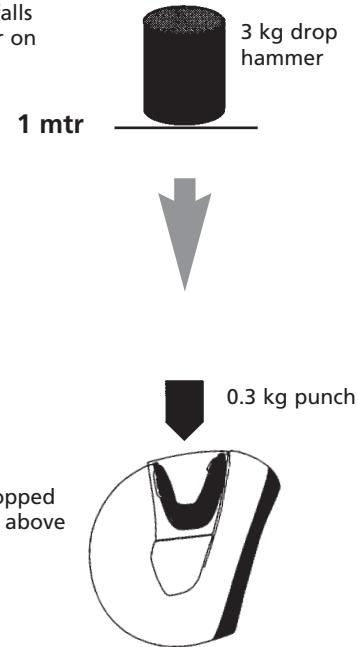
After restoration of the 30 N load, the deformation shall be measured.

**Allowance: less than 0,015 mtr**



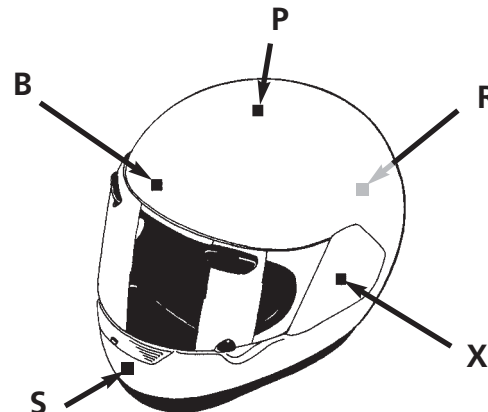
### Resistance to penetration visor test

A 3 kg drop hammer falls from a height of 1 mtr on 0.3 kg punch (striker).



The punch must be stopped no less than 0,005 mtr above the headform.

### Impact measuring points



### APPROVAL NUMBERS AND SYMBOLS

The international approval mark ( a circle surrounding the letter E followed by the country number : E4 for The Netherlands for instance) and one of the following letters:

- J** = Jet (if the helmet does not have a lower face cover)
- P** = Protective (if the helmet has a protective lower face cover)
- NP** = Non Protective (if the helmet has a non protective lower face cover)

Example: **E4 P-0595011 0087340**

- E4** = The Netherlands
- P** = protective lower face
- 05** = conform to the ECE 22-05 homologation
- 95011** = type approval of the medium-large sized RX-7 Corsair model
- 0087340** = unique continuous Arai serial number



If the helmet is fitted with a non protective lower face cover, the cover shall be marked with the text "DOES NOT PROTECT CHIN FROM IMPACTS" or the following symbol:

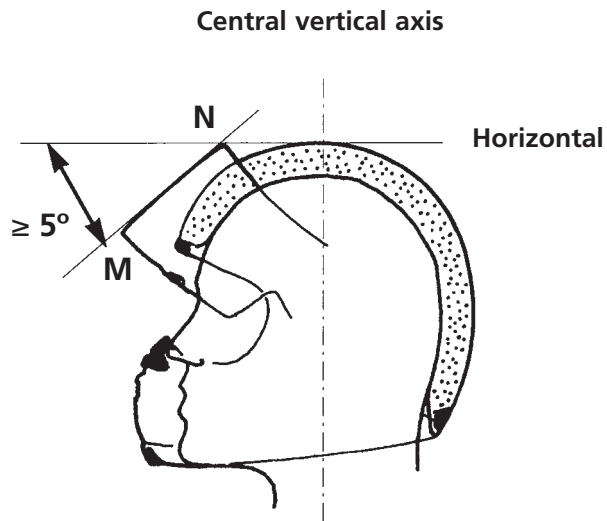


# Helmet test

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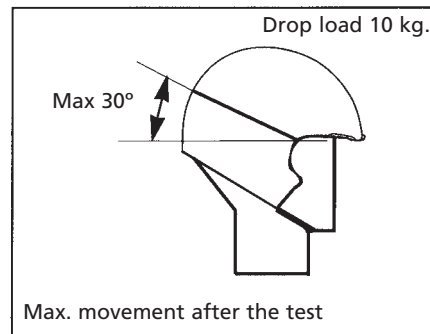
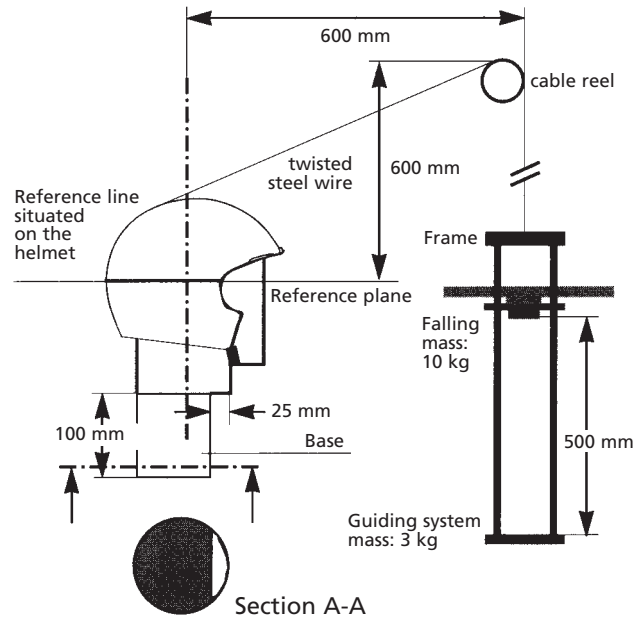
## Visor opening

Testing the angel of visor opening



The MN line is the straight line joining the points of the upper and lower edges of the visor contained in the median vertical plane of the helmet.

## Retention (roll-off) test



## HEADFORMS

Five different headforms are used for testing:

Symbol	Size in cm.	Mass in kg
A	50	3.1
E	54	4.1
J	57	4.7
M	60	5.6
O	62	6.1

