



**FEDERATION INTERNATIONALE DE L'AUTOMOBILE**

# **Seat for Category 2 Hill Climb Cars Derived from CN & E2-SC Chassis - Educational Document**

**(28/03/2022)  
Version 1**



## 1. FOREWORD

The FIA Safety Department has been mandated by the Hill Climb Commission to start a research project with the intent to develop regulations for seats for Category 2 cars. As it is anticipated that the research project will deliver the regulations in Q4 2022 and the deployment will start from 1.1.2024 at the earliest, the FIA Safety Department has been asked to create an educational document for driver installation best practice to be distributed in the meantime.

This document defines the role of a seat, the minimum surface area for several parts of the seat, the loads that the seat should be able to withstand, the seat foam insert geometry and recommended materials, seat position within the car, driver's seating position, safety harness and helmet clearance.

## 2. TIMETABLE

From 1.1.2022 and until the new seat regulations are mandated in a specific car category: competitors are recommended to install a seat that complies with the information in this document.

From 1.1.2024 the deployment will start for a new seat specification for CN and E-II-SC Hill Climb Car Categories. It is anticipated that the deployment will be completed in different phases (i.e., start with cars from a certain period and cascade to older cars step by step).

## 3. ROLE OF THE SEAT

A seat is an item of racing equipment designed to support the driver during both race and crash conditions. It includes the seat shell, seat brackets, plus all energy-absorbing foam, cladding and slot cover(s), if any.

The seat shall be rigidly fixed to the car using the attachment points and seat brackets (metallic load bearing structures) supplied by the seat manufacturer. The seat brackets must be able to withstand loads during a crash without excessive deformation.

In order to reduce the risk of injury, it is fundamental that the pelvis, torso, neck and head remain aligned during rear, side and frontal-angled impacts. It is therefore important that the seat is designed to provide support to the pelvis, shoulder and head during side impacts, and to the back and head during rear impacts.

## 4. SEAT AREAS OF SUPPORT

### 4.1 MINIMUM GEOMETRY

The seat shall comprise of the following areas:

- Seat Base - Part of the seat supporting the underside and upper legs of the driver.
- Seat Back - Part of the seat supporting the rear surface of the driver's torso, shoulders, and head.
- Seat Sides - Parts of the seat supporting the side surfaces of the driver's pelvis, shoulders, and head. The seat shall have three main seat sides:
  - Seat-Side-Pelvis - Part of the seat supporting the driver's pelvis and upper legs in left and right lateral directions.
  - Seat-Side-Shoulder - Part of the seat supporting the driver's shoulders in left and right lateral directions.
  - Seat-Side-Head - Part of the seat supporting the driver's head in left and right lateral directions.

The minimum area for the seat sides shall comply with the areas shown in Figure 1.

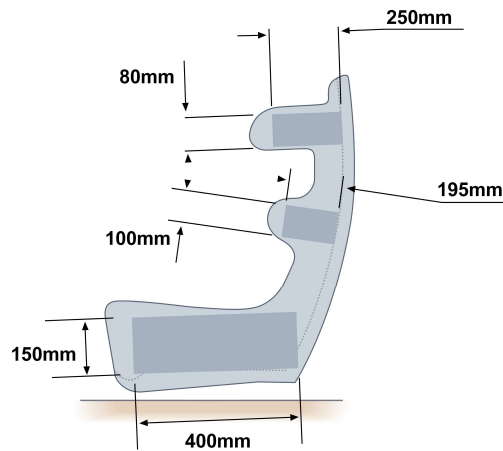


Figure 1 – Minimum dimensions for head, shoulder and pelvis side support

The seat shall have belt slots. The belt slots shall be fitted with protective covers with a minimum radius of 2 mm and a minimum thickness of 1 mm, or the seat shell shall have a minimum radius of 2 mm and a smooth surface.

The maximum bridge width of the shoulder belt slots shall be 100 mm. A single aperture for both left and right shoulder belts is authorised.

The minimum width of the crotch belt slots, including the belt slot edges cover if present, shall be 100 mm.

The shoulder belt slots, lap belt slots and crotch belt slots shall permit the respective straps to pass through the seat to the respective strap attachment points, with the angles shown in Figure 5.

## 4.2 LOAD TARGETS

During a lateral or rearward accident, the decelerations can be very high; therefore it is important that the seat can withstand very high loads. The FIA has two seat standards, the 8855-2021 and 8862-2009, which are designed to protect drivers during lateral or rearward accidents with decelerations up to 42 G and 70 G respectively.

It is therefore important that any seat for CN and E-II-SC Hill Climb Car Categories is designed to withstand the loads shown in the below Tables. As a minimum, the seat should withstand the loads defined for an FIA 8855-2021 standard seat.

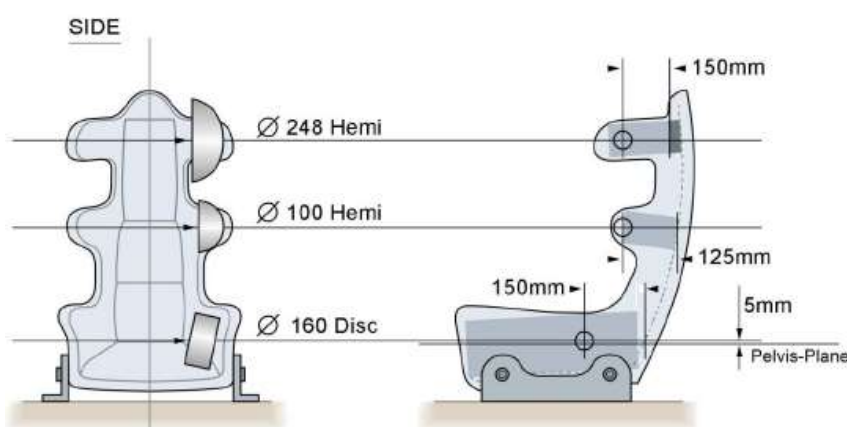
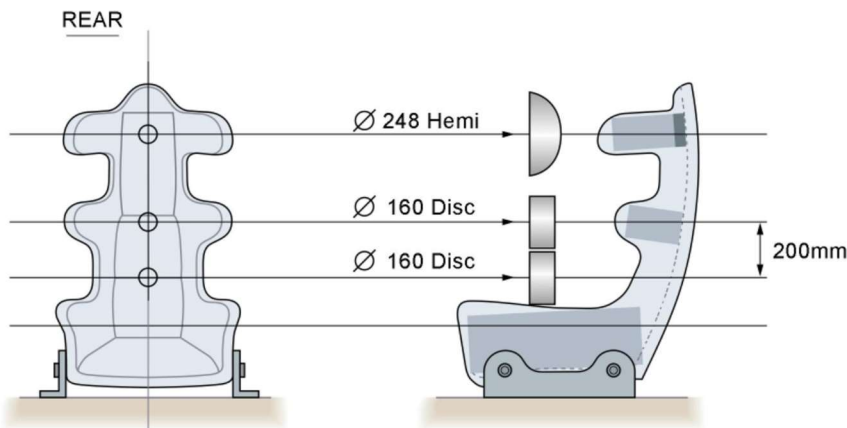


Figure 2 - Test configuration for loading in lateral direction

FIA Standard 8855-2021	
Target Loads [kN]	Max. Deflection [mm]
4.2	80
6.6	60
8.4	40



FIA Standard 8855-2021	
Target Loads [kN]	Max. Deflection [mm]
4.2	120
8.4	100
8.4	80

Figure 3 - Test configuration for loading in rear direction

In addition, the seat fixation method to the chassis shall be strong enough to withstand the forces mentioned in Figures 2 and 3.

## 5. SEAT FOAM INSERT

### 5.1 GEOMETRY

If a foam insert is used between the seat and the driver, the minimum lateral support to the driver's head, shoulders and pelvis must be guaranteed as follows:

- 230 mm min. at seat-side-head support along the head-plane;
- 180 mm min. at seat-side-shoulder support along the shoulder plane;
- 100 mm min. in height at seat-side-pelvis support along the pelvis plane over a length of 200 mm min.

This volume can be checked using the template in green below.

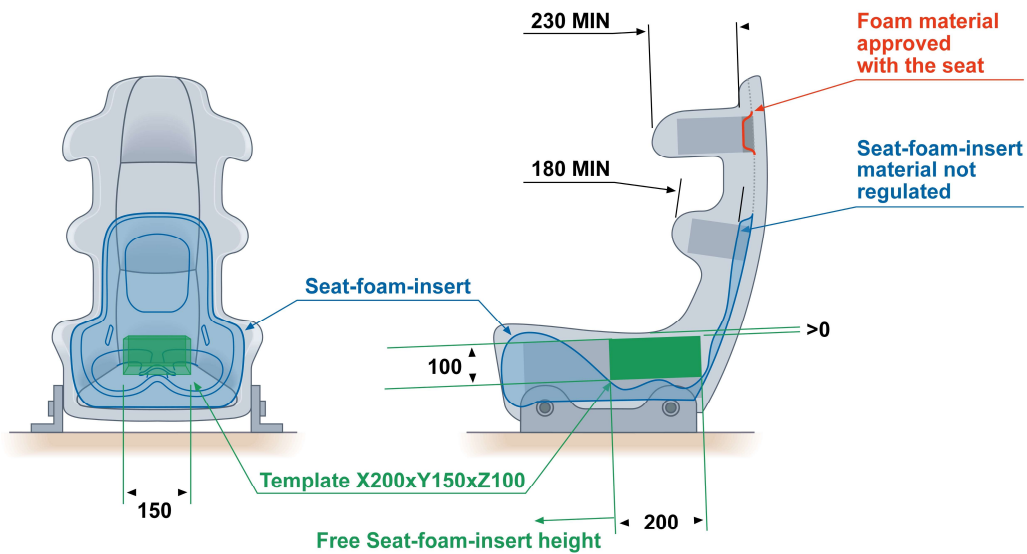


Figure 4 – Minimum lateral support provided by a seat fitted with a seat foam insert

## 5.2 MATERIALS

A foam insert may be used between the seat and the driver, in order to ensure that the driver remains stable during driving and keeps his original relative position in relation to the seat side and rear supports, safety harness and frontal head restraint device during an accident. It is important to ensure the foam does not collapse during frontal, vertical, side and rear impacts, therefore it is recommended to use a foam listed in TL 50 (Seat Insert Materials Specified by the FIA).

## 6. SEAT POSITION WITHIN THE CAR

The seat must be positioned in compliance with the Technical Regulations, but as close as possible to the centre line of the car. A centre line position has the following benefits:

- Allows more space to fit an appropriate structural seat shell for all driver sizes;
- driver is less vulnerable to intrusion during impacts;
- driver's helmet is further away from rollover structure bars.

## 7. Driver seating position

Competitors shall be positioned correctly in the seat, as this can play a key role in preventing injuries during serious accidents. To ensure that seats provide the most strength and support, when seated in racing position, the pelvis, shoulders, and head must be supported comfortably by the seat by following these three steps:

1. Eye line must be below the top edge of the side head support, and above the bottom edge of the side head support.
2. Shoulders must fit within the side shoulder support of the seat.
3. Pelvis must be adequately supported by the side pelvis support.

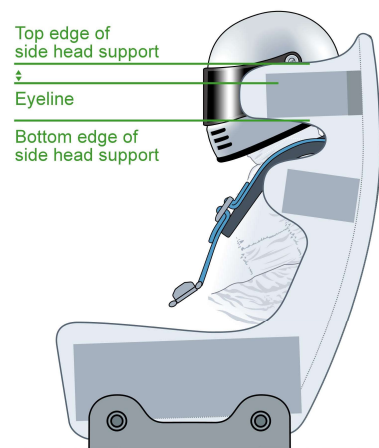


Figure 5

### 7.1 Orientation of the spine

The seat should be installed in the most upright position possible that allows the competitor to achieve a comfortable and ergonomic posture. It is recommended that the seat back should have an angle of around 60° from the horizontal.

## 8. SAFETY HARNESS

To ensure that safety harnesses provide optimal protection, competitors should follow best practice for their installation, as specified in the FIA International Sporting Code under Appendix J, or the championship technical regulations. Competitors should follow as closely as possible the information published [HERE](#).

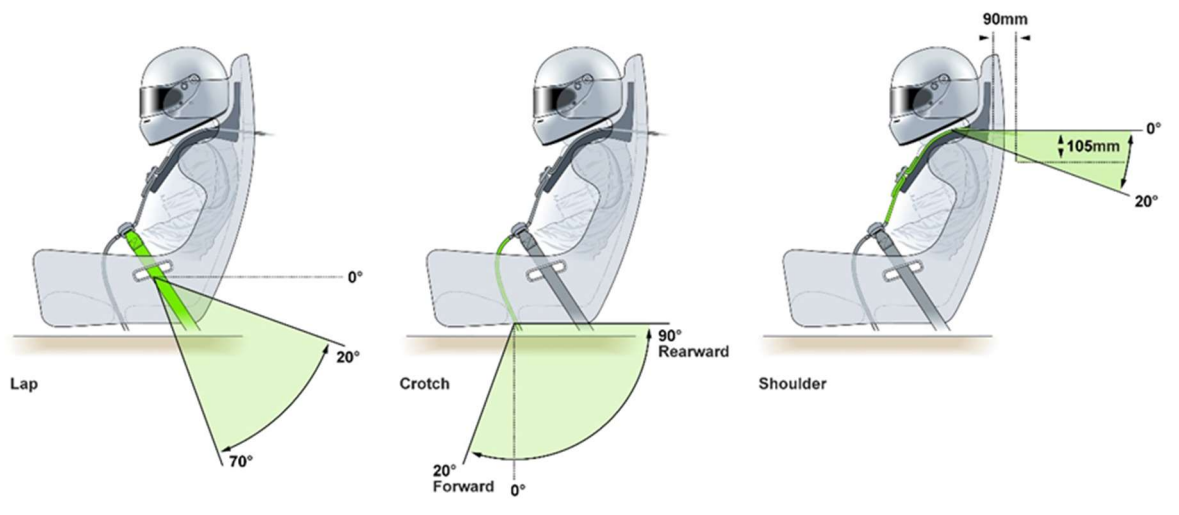


Figure 6 – Angles for crotch, lap and shoulder belts

## 9. HELMET CLEARANCE

Articles 259, 275 and 277 of Appendix J were written to protect the driver from impacts, based on the driver's specific seating position. If the seating position is incorrect (for example driver is sitting too high or too far forward), the driver's head may impact the ground in the event of a rollover. This applies equally to single seater chassis and sports prototypes.

For this reason, it is important that the driver's seating position comply with the following requirement (extract from Articles 277.2.2.1). This will form the basis of Rollover Structures in the Future Category 2 Technical Regulations:

Roll structures :

- The basic purpose of safety structures is to protect the driver. This purpose is the primary design consideration.
- All cars must have two roll structures.
- The highest point of the principal roll must be positioned behind the driver. The secondary structure must be in front of the steering wheel but no more than 250mm forward of the top of the steering wheel rim in any position.
- The two roll structures must be of sufficient height to ensure the driver's helmet and his steering wheel are at least 70mm and 50mm respectively below a line drawn between their highest points at all times.