

Common Regulations for Competitors: Safety

152	General
152	Safety Roll-Over Structures
158	Seats, Seat Belts and Headrests
158	Fire Extinguishers
160	Safety Fuel Cells
160	Red Warning Light
160	Tank Fillers, Vents and Caps
160	Crushable Structure
162	External Circuit Breaker
162	Overalls
162	Crash Helmets
163	Goggles and Visors
163	Front-Engined Cars
164	Head Restraints
164	General Safety Regulations
166	Appendix 1: Tables and Drawings
168	Appendix 2: Safety Cage Drawings

General

1. You should also refer to the Technical sections of the Specific Regulations for each Motor Sport Discipline included in this book to confirm which of the following requirements are mandatory or just recommended for any particular branch of motor sport.

Safety Roll-Over Structures

2. The following are various specifications and configurations that can be used in designing, manufacturing and installing Rollcages, Rollbars and Safety Cages into various types of competition vehicle. Many permutations are given but the MSA mandatory requirements are the minimum acceptable. Care should be taken to check FIA International requirements for Groups, Classes and Formulae which may not be covered in this section, which covers National A and lower status events.

Note: Throughout these sections an asterisk(*) indicates a requirement for additional information to be printed in the Supplementary Regulations (SRs).

Text shown in Italics indicate a Regulation which may be amended in the SRs.

3. International Safety Roll-Over Structure Regulations issued by the FIA became mandatory in 1994 and the MSA aligns itself with these regulations wherever possible.

Definitions

- **Safety cage.** A structural framework designed to prevent serious bodyshell deformation in the case of a collision or a car turning over
- **Rollbar.** A structural frame or hoop and mounting points
- **Rollcage.** A structural framework made up of a main rollbar and a front rollbar (or two lateral rollbars), their connecting members, one diagonal member, backstays and mounting points (see Appendix 2, Drawings 5 & 6)
- **Main rollbar.** A structure consisting of a near-vertical frame or hoop located across the vehicle just behind the front seats
- **Front rollbar.** Similar to a main rollbar but its shape follows the windscreen pillars and top screen edge
- **Lateral rollbar.** A structure consisting of a near-vertical frame or hoop located along either side of the vehicle. Its rear legs must be just behind the front seats. The front leg must be against the screen pillar and dashboard so that it does not unduly impede the entry or exit of Driver or Co-Driver
- **Longitudinal member.** A longitudinal tube which is not a part of the main, front or lateral rollbar (eg a backstay)
- **Diagonal member.** A transverse tube between a top corner of the main rollbar or upper end of a backstay and a lower mounting point on the opposite side of the rollbar or backstay
- **Framework reinforcement.** A reinforcing member fixed to the rollcage
- **Reinforcement plate.** A metal plate fixed to the bodyshell or chassis structure under a rollbar mounting foot to spread load into the structure
- **Mounting foot.** A plate welded to a rollbar tube to Permit its bolting or welding to the bodyshell or chassis structure, usually onto a reinforcement plate
- **Removable members.** Removable structural members of a safety cage.

General Specifications

4. **Safety cages must be designed and made so that, when correctly installed, they substantially reduce the risk of injury to the occupants. The essential features of an efficient safety cage are that it is designed to suit the particular vehicle, is of sound construction, has adequate mountings and is a close fit to the bodyshell.**
5. **The safety cage must not unduly impede Driver and Co-Driver access to the vehicle. Members may intrude into the interior space by passing through the dashboard, front side-trim, rear side-trim and rear seats, which may be folded down. Safety cages must not**



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extend beyond the front upper or rear suspension mounting points of the vehicle. Any modification to a homologated safety cage is prohibited. Tubes must not carry any fluids.

6. Different ways of fitting the compulsory diagonal member are illustrated in Appendix 2, drawings 5 & 6. The combination of several members is permitted. The illustrations Appendix 2, drawings 7 & 12 show optional types of reinforcing member, each of which can be used separately or combined with others.

Technical Specifications

Main, Front and Lateral Rollbars

7. These frames or hoops must be made in one piece without joints. Their construction must be smooth and even, without ripples or cracks. The vertical part of the main rollbar must be as straight as possible and as close as possible to the interior contour of the bodyshell.

8. The front leg of a front or lateral rollbar must be straight, or if this is not possible, must follow the windscreen pillars and have only one bend with its lower vertical part. Where the main rollbar forms the rear legs of a lateral rollbar (see illustration Q6), the connection to the lateral rollbar must be at roof level.

9. To achieve an efficient mounting to the bodyshell, the original interior trim may be modified around the safety cage and its mountings by cutting it away or by distortion. However, this modification does not permit the removal of the complete parts of upholstery or trim. Where necessary, the fusebox may be relocated to enable a rollcage to be fitted.

Mounting of Rollcages to the Bodyshell

10. Minimum mountings are:

- 1 for each leg of the main or lateral rollbar
- 1 for each leg of the front rollbar
- 1 for each backstay [see 12-14]

11. Each mounting foot of the front, main and lateral rollbars must include a reinforcement plate at least the same thickness as the wall of the tube to which it is being welded (minimum 3mm). Each mounting foot must be attached by at least three bolts (minimum M8 ISO grade 8.8) on a steel reinforcement plate at least 3mm thick and of at least 120cm² area which is welded to the bodyshell (see Appendix 2, drawings 13 & 18).

Alternatively the mounting feet may be welded direct to the reinforcement plate. This does not apply to backstays (see below).

Backstays

12. These are compulsory and must be attached near the roofline and near the top outer bends of the main rollbar on both sides of the car. They must make an angle of at least 30 degrees to the vertical, must run rearwards and be straight and as close as possible to the interior side panels of the bodyshell. Their material specification, diameter and thickness must be as defined below.

13. Their mountings must be reinforced by plates. Each backstay should be secured by bolts having a cumulative section area at least two thirds of that recommended for each rollbar leg mounting above, and with identical reinforcement plates of at least 60cm² area (see Appendix 2, drawing 19).

14. A single bolt in double shear is permitted, providing it is of adequate section and strength (see Appendix 2, drawing 20) and provided that a bush is welded into the backstay. The mounting feet may alternatively be welded direct to the reinforcement plate.

Diagonal Members

15. At least one diagonal member must be fitted. Their location must be in accordance with Appendix 2, drawing 9 and they must be straight. Their attachment points must be so located that they cannot cause injuries. They can be removable but must be in place during events.

16. The lower end of the diagonal must join the main rollbar or back-stay not further than 100mm from the mounting foot. The upper end must join the main rollbar not further than 100mm from the junction of the backstay joint, or the backstay not more than 100mm from its junction with the main rollbar.

17. All diagonal members, and any reinforcement plates used to fix them to the body shell, must comply with the minimum material specifications set out below.

Optional Reinforcement of Rollcage

18. The diameter, thickness and material of any optional reinforcement must meet the minimum material specifications below. They must be either welded in position or installed by means of demountable joints. Reinforcement tubes must not be attached to the bodyshell.



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19. Transverse Reinforcing Members: The fitting of two transverse members as shown in Appendix 2, drawing 9 is permitted. Any transverse member fixed to the front rollbar must not encroach upon the Driver's and Co-Driver's space. It must be placed as high as possible but its lower edge must not be higher than the top of the dashboard.

20. Doorbars (for side protection): Longitudinal members must be fitted at each side of the vehicle (see Appendix 2, drawings 9 & 12). They may be removable. The side protection must be as high as possible but not higher than one half of the total height of the door aperture measured from its base.

21. Roof Reinforcement: Reinforcing the upper part of the rollcage by adding members as shown in Appendix 2, drawing 10 is permitted.

22. Reinforcement of bends and junctions: The reinforcement of the junction between the main rollbar or the front rollbar and the longitudinal members is permitted as shown in Appendix 2, drawing 12, as is reinforcement of the top rear bends of the lateral rollbars. The ends of these reinforcing tubes must not be more than half way down or along the members to which they are attached.

Protective Padding

23. Where the Driver's or Co-Driver's bodies or crash helmets could come into contact with the safety cage, non-flammable padding should be provided for protection [42].

Removable Members

24. If removable members are used in the construction of a rollcage, the demountable joints used must comply with an approved type (see Appendix 2, drawings 21 & 30). The screws and bolts must be of adequate diameter and of ISO Standard 8.8 or better.

Demountable joints must not be used as part of a main, front or lateral rollbar because they act as hinges in the principal structure and allow deformation. Their use is solely for attaching members to the rollbars and for attaching a lateral rollbar to a main rollbar (see Appendix 2, drawing 2). In this last case, hinged joints in Appendix 2, drawings 21 to 30 must not be used.

Welding

25. All welding should be of the highest possible quality with full penetration and preferably using a gas shielded arc. When using heat-treated steel, the manufacturer's instructions must be followed. Note that the use of heat-treated or medium carbon steels may cause problems and bad fabrication may result in a decrease in strength (caused by brittle heat-affected zones) or inadequate ductility.

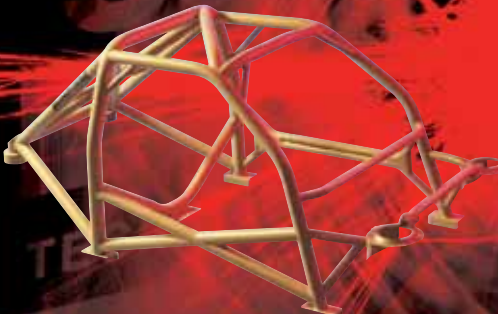
Material Specifications

26. In selecting the steel, attention must be paid to obtaining good elongation properties and adequate weldability. The tubing must be bent by a cold working process and the centreline bend radius must be at least three times the tube diameter. If the tubing is

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ovalised during bending, the ratio of minor to major diameter must be 0.9 or greater.

27. Minimum tube specifications are:

- Minimum Material: Cold Drawn Seamless Carbon Steel
- Minimum Yield Strength: 350 N/mm²
- Minimum Dimensions (Ø mm): 45x2.5 or 50x2.0; 38x2.5 or 40x2.0 (for roll cages/bars approved prior to 1995)

Exceptions

28. The only exceptions to the foregoing requirements for Saloon, Single-Seater and Sports Cars are as follows:

29. Safety Cage manufacturers can apply to the MSA Technical Department for a Roll Over Protection System (ROPS) Certificate. Authorised copies of this certificate, including a drawing, photographs, a manufacturer's declaration that the ROPS meets the required regulations and a copy of the stress engineer's declaration that the design is capable of withstanding the loadings specified in the regulations must be made available to event Scrutineers.

30. ROPSS manufactured after 1996 for which the MSA or the FIA has issued a ROPS (Rollcage) Certificate must bear an identification plate detailing the manufacturer and the cage part number. Details of this identity plate are to be included on the ROPS (Rollcage) certificate.

Vehicle Categories Covered

Production, Touring and Sports Cars

Production cars, Touring Cars, Sports cars up to 2,000cc	Basic rollbar/rollcage complying with drawings 1 or 2
Production Cars and Touring Cars over 2,000cc	Rollbar/rollcage complying with drawings 3 or 4
Sports cars over 2,000cc	Rollbar/rollcage complying with drawings 3, 4 or 60(i) & (ii) and 31

31. The compulsory diagonal member for all events except rallies can be fixed as illustrated in all basic rollcages (Appendix 2, drawings 5 & 6). The combination of several diagonal members is Permitted.

32. The different types of optional rollcage reinforcing members are shown in Appendix 2, drawings 7 to 12. Each can be used separately or combined with others. These reinforcements can be installed in each of the basic rollcages (Appendix 2, drawings 1 to 4). Minimum material specification is as in 26-27.

33. For all Touring Car rollcages homologated by the FIA after 1999, the presence of the rollcage in the door aperture must comply with the following criteria (see illustration FIA 253-17D):

- Dimension A: Minimum 300mm
- Dimension B: Maximum 250mm
- Dimension C: Maximum 300mm
- Dimension D: Maximum 100mm (from upper corner of windscreen, without the seal)

- Dimension E: Not more than half the height of the door aperture.

34. MSA-certified and non-homologated rollcages constructed after 2000 in accordance with Appendix 2, drawing 12 must also comply with the above dimensions.

35. Vehicles of FIA Periods A-Z with a valid FIA Historic Vehicle Identity Form or an MSA-approved Vehicle Log Book/Identity Form/Passport must be fitted with a rollbar/rollcage as specified within the papers issued for each individual vehicle.

Sports Racing Cars

36. The rollbar must conform to Appendix 2, drawing 1 with diagonal brace (6 and 31).

- Height: Minimum 92cm measured along the line of the Driver's spine from the bottom of the car seat
- Material: Minimum cold drawn seamless carbon steel 350N/mm²
- Dimensions: Minimum 48.3 diameter x 2.6mm

Single Seater Racing Cars

37. The rollbar must be symmetrical about the lengthwise centre-line of the car and of minimum height 90cm measured vertically from the base of the cockpit, or 92cm measured along the line of the Driver's spine from the bottom of the car seat.

38. There must be at least one brace (of the same diameter as the rollbar) rearwards from the top of the rollbar at an angle not exceeding 60° to the horizontal. If two braces are fitted, the diameter may be reduced to 20mm-26mm, the wall thickness being maintained. Forward-facing braces should also be considered. The width inside the roll-over bar main tubes must be 38cm minimum measured 60cm above the base of the seat. It must incorporate a crossbrace to restrain the Driver's head and give rearward support. The top hoop radius must not be less than 10cm measured at the centre line of the tube.

- Material: Minimum cold drawn seamless Carbon steel 350N/mm²
- Dimensions: Minimum 42.4 diameter x 2.6mm

Other Considerations

39. An effective rollbar must be fitted with its top edge not less than 5cm above the helmet of the normally seated Driver. It must be wider than the Driver's shoulders at that height. It must be constructed of good quality seamless steel tubing of minimum 35mm diameter and wall thickness of 2mm. It should have a 6mm hole drilled in the underside for checking the tube thickness. It should have the top bar straight or slightly curved but no tubes meeting in an inverted 'V'. It must be effectively braced to structural members.

40. Non-standard cars are advised to fit a rollbar to the following minimum requirements. Minimum height 72cm from the rear of the uncompressed seat cushion. It must have minimum flat width of 38cm running into radiused corners and affording Driver and Passenger equal protection.

41. It must be effectively mounted and braced to structural members forward and aft of the cockpit and not less than cockpit width. It must be constructed of good quality seamless steel tubing of minimum 32mm diameter and wall thickness of 1.5mm.

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42. It is recommended that rollbar/rollcage tubes within 150mm of a vehicle occupant's helmet are covered with a suitable energy absorbing material. A number of suitable materials are homologated by the FIA who publish specific regulations for their fitment in vehicles participating in international events.

43. The following are prohibited:

- Using a rollbar to improve the aerodynamic of a vehicle
- All aluminium alloy Roll Cages

Seats, Seat Belts and Headrests

Safety Belts

44. All seat safety belts must be complete units sourced from a recognised manufacturer and fitted in accordance with the manufacturer's instructions, MSA recommendations or FIA requirements (see FIA drawings 253-42, 253-43, 253-44 and 253-45). It is not Permitted to mix parts of seat belts. They must be worn and correctly adjusted at all times during events.

45. Configurations must be as follows:

Three point	One diagonal shoulder strap and one lap strap, with three anchorage points on the chassis/body shell or roll over bar of the vehicle on either side and to the rear of the Driver's seat.
Four point	Two shoulder straps and one lap strap, with four anchorage points on the chassis/body shell or roll over bar of the vehicle. One either side of the Driver and two to the rear of the Driver's seat (or one symmetrical for the two shoulder straps).
Six point	Two shoulder straps, one lap strap and two straps between the legs, with six anchorage points on the chassis/body shell or roll over bar of the vehicle. One either side of the Driver, two to the rear of the Driver's seat (or one symmetrical for the two shoulder straps) and two between the legs.

46. Only one release mechanism is Permitted on each seat belt configuration and this must be accessible to the wearer when seated in the competing position. The anchorage points to the rear should be positioned so that the strap from the shoulder is as near horizontal as possible. It should not be located on the floor directly behind the Driver/Co-Driver.

47. It is Permitted to make a hole in series production seats to allow secure anchoring of seat belts. Seat belts subjected to oil, acid or heat, or involved in a serious accident should be discarded.

48. All seat belts used on International events must be homologated by the FIA, and carry their label.

49. Where safety harnesses are mandatory, it is recommended that those described in 45 are homologated by the FIA and carry their label.

Seats

50. All seats should be correctly located and securely

allowing no movement in squab or backrest. The following checks should be carried out before purchase:

- Study the vehicle requirements and ask the manufacturer's advice
- Check the seat is suitable for the forces to which it could be subjected, eg fore, aft and lateral loadings
- Check the seat carries full instructions for installation in your vehicle
- Check that suitable mounting installations are available from the manufacturer.
- Ask the manufacturer to confirm that the seat frame is suitable for your motor sport discipline
- If the original seat attachments or supports are changed, the new parts must either be approved for that application by the manufacturer or must comply with the following (see Appendix 2, drawing 32):
 - The supports must be attached to the shell/chassis via at least four mounting points per seat using bolts with a minimum diameter of 8mm and counterplates (see Appendix 2, drawing 32).
The minimum area of contact between support, shell/chassis and counterplate is 40 sq cm for each mounting point. If quick release systems are used, they must be capable of withstanding vertical and horizontal forces of 18,000N, applied non-simultaneously. If rails for adjusting the seat are used, they must be those originally supplied with the homologated car or with the seat
 - The seat must be attached to the supports via four mounting points, two at the front and two at the rear of the seat, using bolts with a minimum diameter of 8mm and reinforcements integrated into the seat
 - Each mounting point must be capable of withstanding a force of 15,000N applied in any direction
 - The minimum thickness of the supports and counterplates is 3mm for steel and 5mm for light alloy materials. The minimum longitudinal dimension of each support is 6cm.

Headrests

51. On vehicles where headrests are not mandatory [103-104], it is strongly recommended that one is fitted as near to the Driver's/co-Driver's helmet as possible.

Fire Extinguishers

52. A fire extinguisher or extinguishing system charged with one of the Permitted extinguishants must be carried on all vehicles. The system must be operable by the Driver (either manually, mechanically or electrically) whilst normally seated.

53. It is recommended that all fire extinguisher bottles be securely mounted within the main structure of the vehicle. It is prohibited to mount bottles of over Medium capacity outside the main vehicle structure.

54. Dry powder extinguishers are prohibited. The use of Halons (commonly known as 'BCF') in certain



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countries is now illegal. When undischarged Halon systems are removed for disposal they MUST NOT be vented to atmosphere. Bottles containing Halon should be returned to a local fire extinguisher service point or to a manufacturer. Disposal advice may also be sought from local Environmental Health Offices.

Capacities

55. Extinguishers are classified as Small, Medium or Large and designated as Hand-Operated/Held or Plumbed-In.

56. Minimum quantity of extinguishant:

- See Table 56 in Appendix 1

57. Copies of the list of FIA/MSA approved plumbed systems are available from the MSA.

Plumbed-In Systems

58. A list of MSA-approved plumbed-in extinguisher kits is available on request. If AFF, these must be FIA/MSA homologated. The Large unit should have two points of triggering, one for the Driver (and Co-Driver in Rallies) and one outside the car for activation by Marshals etc. The triggering point from the exterior must be positioned close to the Circuit Breaker (or combined with it) and must be marked by the letter 'E' in red inside a white circle of at least 10cm diameter with a red edge.

59. When installing units, the direction of nozzles should be carefully considered, remembering that Induction, Exhaust, Ignition and Fuel pumping systems are the most likely areas for fires to occur. For possible fire risks outside the engine or cockpit areas (eg front-mounted fuel tanks) advice about plumbed-in systems should be sought from the MSA.

60. All bottles should discharge simultaneously and must operate in any position, even if inverted. It is strongly recommended that plumbed-in bottles should be mounted in the fore and aft direction in the vehicle. The fitting of a pressure gauge is recommended (and is mandatory for pressurised AFFF units).

61. Electrically-operated equipment is preferred with an independent source of energy for triggering, and ideally including provision for checking the integrity of the system's triggering circuit. Mechanically-operated systems should be fitted with 'Total Discharge' valves (ie ones that continue to discharge even if the operating mechanism fails after triggering). Hand-held extinguishers which have been adapted by addition of pull-cables are not acceptable.

62. Extinguisher systems should be capable of being dismantled for the purpose of checking the weight of the extinguishant and the integrity of the cylinder, and to enable the operating system to be serviced without discharging the contents. The tare weight of the unit must be marked on the cylinder.

63. Particular attention should be paid to the installation and maintenance of any system, especially if it is mechanically operated. Pull cables should be fitted in such a way that no kinks or 'S' bends are formed which could cause malfunction.

64. During events, all plumbed-in extinguisher systems must be in an 'Armed' condition (ie be capable of being operated without the removal of any safety device) at all times whilst competing or practising in Races or Speed

events (including during post-event scrutineering), and at all times that crash helmets are worn on Rallies (ie on Stages etc).

65. Checking for correctly 'Armed' extinguisher systems should only be carried out by MSA Scrutineers or Judges of Fact nominated for the purpose. Any plumbed-in extinguisher system found to be incapable of being operated will be reported to the Clerk of the Course/Stewards for possible penalty.

Hand-held extinguishers

66. Hand-held extinguishers must not be carried loose but should be retained in positive quick release brackets, secured to the vehicle by a minimum of two 6mm bolts. The tare weight of the unit must be clearly marked on the cylinder. Extinguishers with pressure gauges are recommended.

Safety Fuel Cells

67. The FIA approved standard for Safety Fuel Cells is FIA/Spec/F3 and FT5. Fuel cells complying with this standard are only manufactured by authorised companies and bear the name of the company, specification, code and date of manufacture on each cell. No other cells are approved by the FIA.

68. Under FIA regulations, homologation expires once the cell is five years old. The validity of this homologation may be extended for a further two years if the cell is inspected and re-certified by the original manufacturer. It is recommended that any safety cell is inspected on a regular basis.

Red Warning Light

69. A rearward facing red warning light of a minimum of 21 watts with surface area minimum 20cm²/ maximum 40cm², or of 21 watts with a minimum surface area of 50cm² and with lens and reflector to EU Standards, must be located within 10cm of the centre line of the vehicle and be clearly visible from the rear.

70. Vehicles fitted with full width bodywork may alternatively use two lights symmetrically located about the vehicle centre line. An alternative light unit of equal or greater constant luminosity, or LED lights that are either homologated by the FIA or comply with relevant EU Regulations, may be used.

71. The warning light must be switched on when visibility is reduced, when so instructed in any event regulations, or when instructed by the Clerk of the Course.

Tank Fillers, Vents and Caps

72. Tank fillers and caps must not protrude beyond the bodywork or be situated within the Driver/Passenger compartment. The caps must have an efficient locking action to reduce the risk of opening during an accident and to ensure closing after refuelling [108-109].

73. Air vents must be at least 25cm to the rear of the cockpit and must be designed to prevent the escape of

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Competitors: Safety [C(c)]

fuel should the vehicle be inverted. It is recommended that a non-return valve is incorporated in the vent system.

Crushable Structure

74. The entire fuel tank area 'Licked by the open air stream' must incorporate a crushable structure as follows:

- The structure should be a sandwich construction, minimum thickness 10mm, based on a fire resistant core of minimum crushing strength 25lb/sq.in. Water pipes can be passed through this core.
- The fore and aft fuel tank area must have a crushable structure of at least 100mm thick at its thickest point (the position of this point is at the constructor's discretion) over a length of at least 35cm, after which it may be reduced to 10mm.
- The sandwich construction must include two sheets of 1.5mm thick aluminium sheet with a tensile strength of 14 tons/sq in and minimum elongation of 5%.
- All oil tanks mounted outside the main chassis structure must be surrounded by crushable structures of minimum thickness 10mm.

External Circuit Breaker

75. When operated, the circuit breaker must isolate all electrical circuits with the exception of those that operate fire extinguishers. The circuit breaker triggering system on saloons should be located at the lower part of the windscreen mounting, preferably on the Driver's side or below the rear window. On Open Cars it should be located on the lower main hoop of the Roll-over Bar on the Driver's side, or at the lower part of the windscreen mounting (as above).

76. On cars of periods A to F, the mounting point may also be mounted approximately vertically below the line of the scuttle on the Driver's side. The location must be identified by a red spark on a white-edged blue triangle (12cm base), and the 'On' and 'Off' positions clearly marked.

Overalls

77. Individual Competitors are responsible for ensuring their own safety and that appropriate flame resistant

overalls are worn when mandatory. Competitors are also strongly advised to wear flame resistant gloves, socks, balaclavas and underwear. Plastic shoes (such as trainers) should be avoided. Specific regulations concerning flame resistant gloves, socks, balaclavas and underwear are published by the FIA and applicable to International events.

78. Clean flame-resistant overalls must be worn which can be manufactured from Nomex III, Proban or equivalent materials. Acceptable standards are

79. Racing:

- FIA 8856-2000
- FIA 1986 Standard

80. Karting:

- As defined in K 100-106

81. All other events (including overalls in accordance with J14-2-2):

- BS6249 part 1 Index A or B (but not part C)
- BSEN533
- pr EN533:1995 Index 3
- FIA 8856-2000
- FIA 1986 Standard.

82. For International use overalls must comply with FIA 8856-2000.

83. Drivers of three-wheeled cars competing in accordance with Background to the Regulations 10 may wear ACU or FIM-approved leather overalls.

84. Due to the varied nature of national test standards, it is not possible to quote 'equivalents' from foreign national standards unless they are FIA-approved as detailed above. National test standards are in the process of being superseded by European standards (CE Marks) which will in time provide a common standard throughout Europe.

85. Two-piece overalls should be avoided, but if worn must overlap and provide flame-resistant coverage. Repeated or incorrect washing, broken seams or stitching and worn patches can render overalls unsuitable for use.

86. For FIA Standard Overalls the homologation label will be stitched into the fabric of the garment or onto a sewn-in label. When a name appears on a Driver's or Co-Driver's helmet or overalls, this must be the name of the person wearing them.



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Crash Helmets

87. Crash helmets bearing an MSA approval sticker must be worn at all times during training, practice and competition. It is strongly recommended that a flame resistant balaclava, helmet bib or face mask is also worn.

88. It is Permitted to incorporate an FIA-approved Hans Device fitted in accordance with FIA regulations.

89. Every user must ensure that their helmet is:

- Manufactured to the correct technical Standard
- Correctly and securely fitted
- In a serviceable condition.

Helmet Standards

90. Helmets bearing one of the following standards may be approved by the MSA (subject to other criteria also being met).

91. All MSA and International Events

- FIA 8860-2004
- SNELL SA2005
- SNELL SA2000
- SFI Foundation 31.1A, 31.2A
- BS 6658 Type A/FR

92. All MSA Events

- BS 6658 – 85 Type A (Type 'B' is not acceptable)

93. International and MSA National Kart Racing Events

- SNELL K98 and K2005.

94. Snell standards can be verified by either a self-adhesive or cloth label. The self-adhesive label has a silvered background and the cloth label will approximate to this colour (see drawing 94).

95. MSA approval stickers (£1.30 each) must be affixed to the outside of the helmet, in the approximate location of the Driver's right ear. This can only be carried out by selected Scrutineers, by the MSA at Motor Sports House, only after the helmet has been checked for conformity with the standard required and is considered to be in a satisfactory condition.

96. MSA approval stickers are printed on foil and once affixed cannot be reapplied. Helmet standards are regularly updated and hence an element of 'lifing' will always remain. Helmets approved for use in all disciplines require a blue MSA sticker. Helmets used in Kart racing only require a green MSA sticker, available from issuing Scrutineers (see drawing 96).

Helmet Fit and Security

97. In selecting a helmet, take the following precautions:

- Ensure it is the correct size by measuring the crown of your head
- Helmets should be comfortable but fit snugly. Check there is no side-to-side movement
- Tighten straps securely. The chin strap must be under tension at all times. Chin cups are prohibited
- With head leant forward, attempt to pull up the

back of the helmet, as shown in the accompanying diagram, to ensure the helmet cannot be removed in this way

- Ensure you can see clearly over each shoulder
- Ensure nothing impedes your breathing in the helmet and never cover your nose or mouth other than with a flame resistant balaclava or face mask. Helmets with life-support attachments must only be worn if they are connected to a life-support system
- Ensure that the visor can be opened with one gloved hand
- Ensure the back of the helmet provides protection for your neck
- Never wear a scarf, tie or other loose clothing which could come loose and possibly cause an accident
- Do not buy mail order unless you can carry out the above checks; return a helmet unused if it does not fit.

Helmet Condition and Care

98. Total protection can never be given by any headgear, and the best of crash helmets may not entirely prevent head injury or death in a severe accident. Helmet users must understand that helmets are deliberately constructed so that the energy of a severe blow will be absorbed by the helmet and thereby partially destroy it. The damage may not be readily apparent; it is essential therefore that any helmet receiving a blow in an accident is either replaced or returned to the manufacturer for competent inspection – this of necessity must be the responsibility of the helmet user, who will have been aware of the circumstances under which the helmet was struck. It is not possible nor indeed reasonable to expect the scrutineer, in every case, to observe significant damage. Where there is any doubt about the helmet's fitness for its intended purpose then the Chief Scrutineer is empowered to remove the MSA Approval Sticker and impound the helmet for the duration of the meeting. This should be a rare occurrence since competitors must appreciate that, once a helmet has served its purpose, it is not only sensible but necessary to replace it. It is the competitor himself who must ensure that the helmet which he uses is fully fit for its purpose; it is clear that this is a small insurance to pay for one's life. The competitor also might consider that, should he survive an accident, but receive head injuries having knowingly used a previously damaged helmet, he could be placing an enormous burden of care upon his family.

99. It is in everyone's interest for the Competitor to buy the best helmet possible (which is not necessarily the most expensive) and to look after it. The following pointers regarding helmet care should be followed:

- There must be no alteration to the structure of a helmet. Where a radio intercom is fitted, this should only be in accordance with the helmet manufacturer's instructions
- Use a weak solution of soft soap and water to clean the interior and exterior of the helmet; do not get the interior too wet
- Some moulded plastic helmets, although meeting approved standards, can be seriously damaged by substances such as petrol, paint, adhesives, cleaning agents and stickers (not the MSA Stickers). Though

this damage may not always be apparent, crazing or obvious dulling of the surface finish could indicate serious structural weakening and is likely to result in the Scrutineer impounding the helmet

- The helmet should be stored, in a helmet bag, in a cool dry place away from sunlight when not in use.
- Do not strap the helmet to the roll cage or allow other unrestrained movement which could cause it to be damaged.

Impounding of Helmets

100. Where there is any doubt a helmet's fitness for purpose, the Chief Scrutineer is empowered to remove the MSA approval sticker and impound the helmet for the duration of the meeting.

Pre-Event	If the helmet does not conform to required Standards, or is in a poor or dangerous condition, the Chief Scrutineer will impound it for the duration of the meeting and remove the MSA sticker. At the close of the meeting the helmet will be returned to the Competitor as received, but without the MSA sticker
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Accident During Event	If a Competitor is injured during an event and the helmet is damaged, the Chief Scrutineer will impound the helmet, remove the MSA sticker and seek advice as to further action from the Steward
-----------------------	--

Accident During Event and Competitor Evacuated to Hospital with Head Injuries	The Chief Scrutineer will ensure the helmet has been seen by the Chief Medical Officer, then impound it and remove the MSA sticker. Unless the Chief Medical Officer wishes to retain the helmet, it must be sent to the MSA Technical Department, who will dispose of it after six weeks unless it is specifically called for by the Competitor
---	--

Goggles and Visors

101. Either goggles or a visor (made of clear or neutral density filters) must be worn at all times during training, practice and competing, unless in a closed vehicle. The recommended minimum visor standard is BS4110Z.

Front-Engined Cars

102. With front engine cars a propeller shaft restraint should be fitted. Either safety hooks or a rigidly fixed steel panel of not less than 18swg.

Head Restraints

103. Head restraints, where fitted, must be capable of restraining a 17kg mass decelerating at 5g. They must be minimum 10cms x 10cms and should be within 5cm of the Driver's/Passenger's helmet when they are normally seated.

104. A head restraint should be located to ensure the Driver's/Passenger's head/helmet cannot move past it under rearward forces, or be trapped between the rollbar and the head restraint itself.

General Safety Recommendations

105. Given the widely varying nature of Competitions and vehicles, the MSA takes the view it would not be practicable or useful to cover all aspects of safety precautions with mandatory regulations. As a general principal, Competitors are advised to replace any safety item, helmet, safety harness, seat etc, that has been involved in a serious accident. The attention of all Competitors is also drawn to the following general safety points:

Electrical

106. Batteries – precautions should be taken to reduce the possibility of acid burns from batteries in case of accident. Batteries should be secured within a non-conductive leak-proof compartment

107. Electrical System – all wiring should be secured and well protected to reduce the risk of fire from electrical short circuits.

Fuel

108. Tanks and Pipes – every effort should be made to isolate fuel tanks and pipes from the Driver/Passenger compartment. The risk of fuel spillage from accident damage can be reduced by use of bag type tanks or by

Polycarbonate Windows

If used on side and rear windows should be a minimum thickness of 4mm and manufactured from a high quality safety plastic such as LEXAN or MAKROLON polycarbonate to meet the relevant MSA / FIA regulations.

For more information see page 9 of this publication or visit www.plastics4performance.co.uk

coating metal tanks with GRP. Tanks should be located so that they are given maximum protection by the structure of the vehicle. Vents should be designed to avoid spillage if the vehicle becomes inverted.

109. Fillers – these should be designed and located to reduce risk of damage. Filler caps should not be liable to open in the case of an accident. Simple screw caps are effective. The positive locking of the fuel filler caps is recommended. The filler pipe to the tank should be of minimum possible length and not protrude beyond the bodywork [72-73].

Steering Wheels

110. The types least likely to inflict injuries due to breakage should be selected. Uncovered wooden rims should be avoided.

Fire Extinguishers

111. Even small extinguishers carried in a vehicle can efficiently extinguish or contain fires. The minimum recommendation is for a 1.75 litre AFFF extinguisher or equivalent, with BS4123/EN3 approval (EN3 minimum size is 2 litre AFFF) and a rating of at least 34B. More sophisticated equipment is required in many events and full vehicle systems are highly recommended [see 3].

Radiator Caps

112. These caps should be positioned or shielded so that if they open or break in an accident hot water or steam cannot scald the Driver.

Clutch and Bell Housing Protection

113. It is recommended that a shield be placed to guard the clutch/bellhousing and to protect in case of clutch/flywheel derangement. This can be constructed in 1/8in steel plate, or a sandbag type absorber as used in drag racing.

Paddock Safety

114. In areas to which the public has access, no engine must be run with the gears engaged whilst the vehicle has any driving wheels not in direct contact with the ground, unless all moving parts are adequately guarded and, with the exception of Karts, a competent person is seated in the driving seat.

Heat and Flame Resistant Clothing

115. Heat and flame resistant clothing should be worn where required by specific regulations. The FIA standards given below (see also FIA Yearbook, Appendix L, Chapter III, Article 2) are advised for all competition use where protective clothing is either mandatory or recommended. See Table at end of Section

116. Where MSA/FIA regulations specify the wearing of protective clothing, the labels on overalls and upper underclothing may be verified by the Organisers for compliance with regulations. Officials also have the right to examine other articles of clothing, subject of regulations, upon request. Wearers are warned of the particular vulnerability of neck, wrists and ankles. Balaclavas must extend inside overalls or undergarments around the neck and must not come free if the head is moved in any direction. Upper undergarments should have polo-style necks. Ankles and wrists should always be covered by at least two items of protective clothing.



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Appendix 1: Tables and drawings

Table 56

Minimum quantity of extinguishant (56)

Reference	Description	AFFF	ZERO 2000
(a)	Small, hand-operated	1.75 litres	N/A
(b)	Medium, plumbed-in, for discharge into both cockpit and engine compartment	2.25 litres	2.25 litres
(c)	Medium, hand-operated, for discharge into both cockpit and engine compartment	1.75 litres	N/A
(d)	Large, plumbed-in, for discharge into both cockpit and engine compartment	2.25 litres	2.25 litres
(e)	Large, plumbed-in, for discharge into engine compartment	2.25 litres	2.25 litres
(f)	Medium, hand-held for Driver or Rally Co-Driver use	1.75 litres	N/A
(g)	Hand-operated for cockpit (International)	2.4 litres	N/A

Table 114

Heat and Flame Resistant Clothing (114)

Underclothing	Materials tested to ISO 6940	An indication of this should appear on the front of the upper garment, which must cover the neck
Balaclavas	Materials tested to ISO 6940	All the part seen in frontal projection when worn to consist of at least two layers of minimum 180 gr/m ² each. The bottom of the balaclava to meet the requirements in sub para f
Socks	Materials tested to ISO 6940	Socks to be half hose (to mid-calf) and made from at least one layer of minimum 180 gr/m ²
Shoes	Materials tested to ISO 6940	To cover the whole foot and ankle with fastenings and laces of non-fusible material. Soles to be manufacturer certified as resistant to hydrocarbons and flames. Thread used to be flame resistant. Manufacturers to register all shoe models with MSA and FIA
Gloves	Materials tested to ISO 6940	Each glove to be ISO labelled. Backs of gloves to be made from at least two layers of 180 gr/m ² material. Thread must be flame resistant and non-melting. Seam stitching to be invisible from the outside. Gloves must be fitted at the wearer's wrist and cover the cuff of the wearer's overalls. Manufacturers to register all glove models with MSA and FIA

Drawing 96

Approval Sticker



No expiry date

Approval Sticker



2002

No expiry date

Drawing 94

HELMET STANDARDS



BS 6658-85 Type A



BS 6658-85 Type A/FR



SA2000



SA2005



K98



K2005



SFI 31.1A

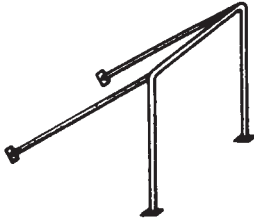


SFI 31.2A

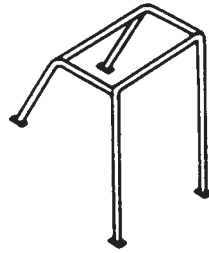


FIA

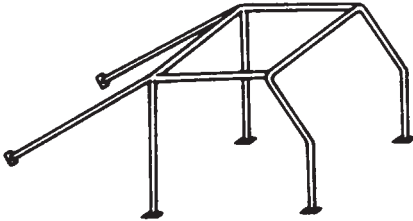
Appendix 2: Safety Cage drawings



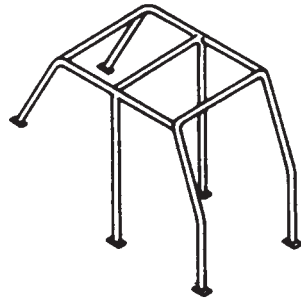
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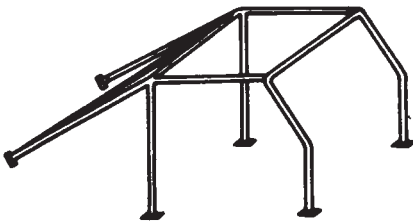
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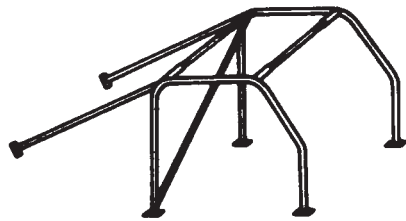
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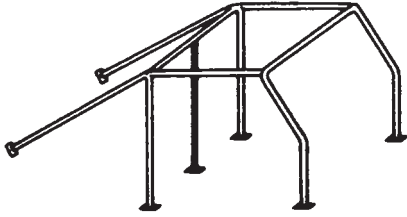
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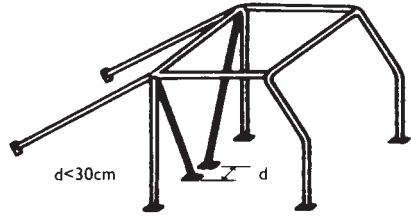
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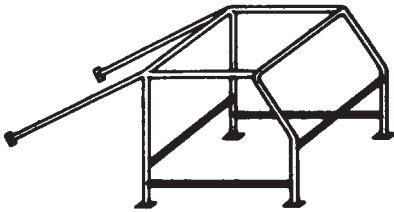
Note: Diagonal may be handed to left or right
Drawing No. 6



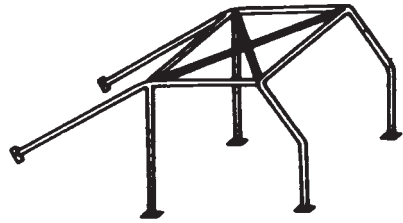
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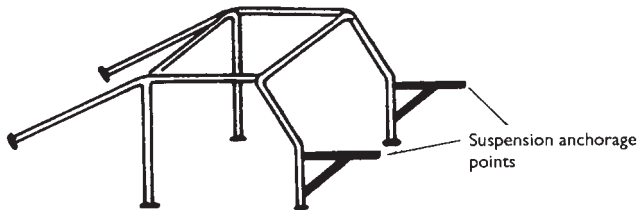
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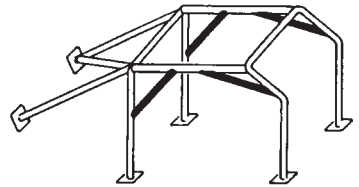
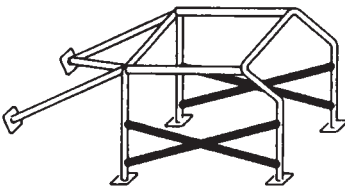
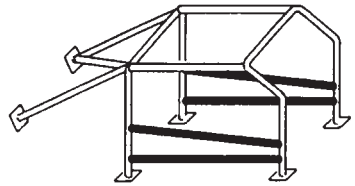
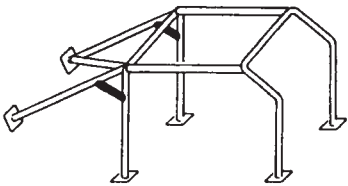
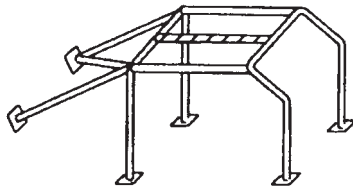
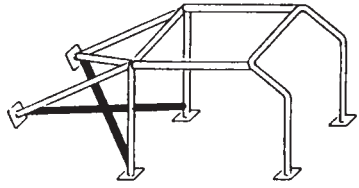
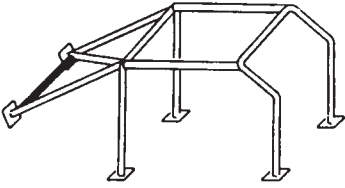
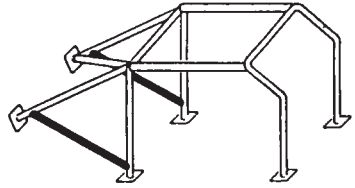
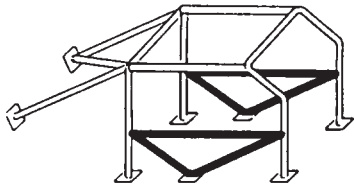
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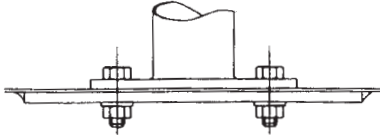
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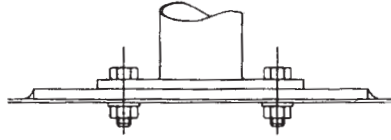
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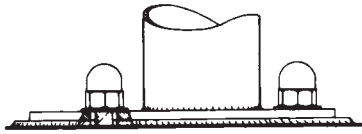
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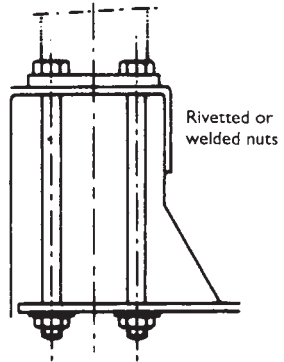
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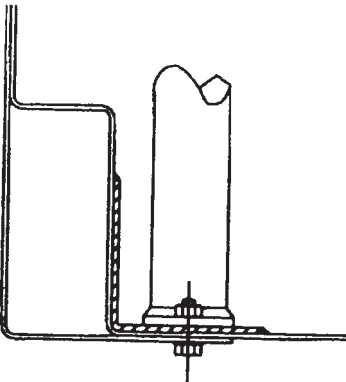
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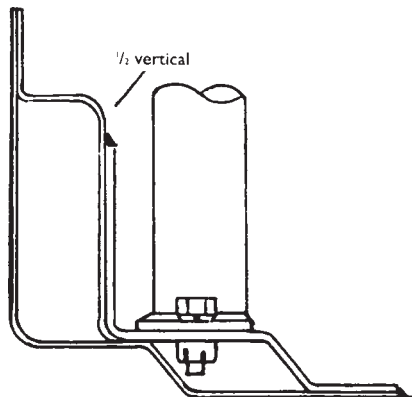
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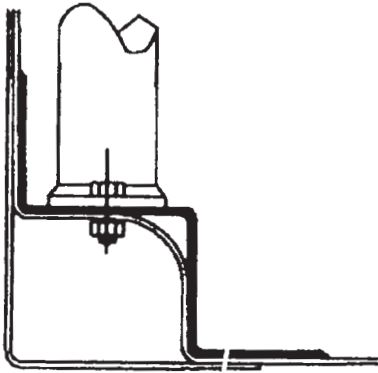
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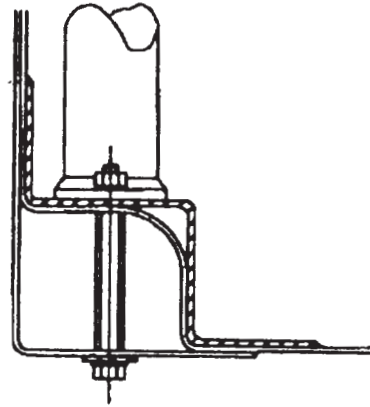
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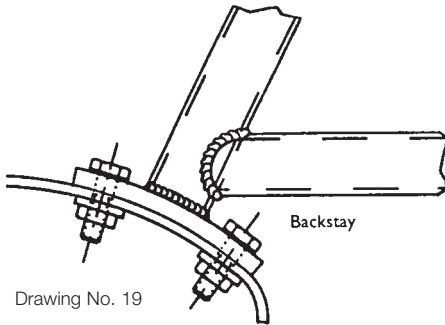
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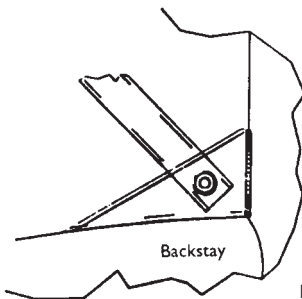
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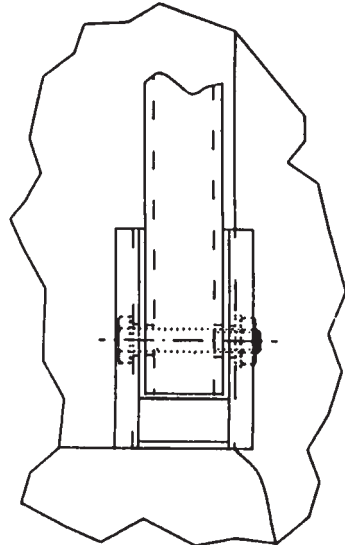
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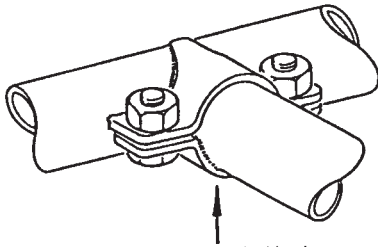


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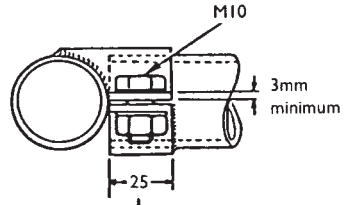
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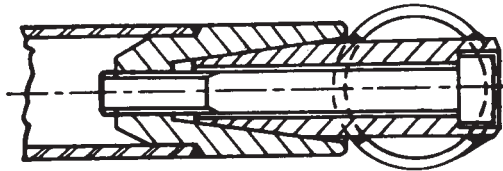
Direction of applied load

Drawing No. 21

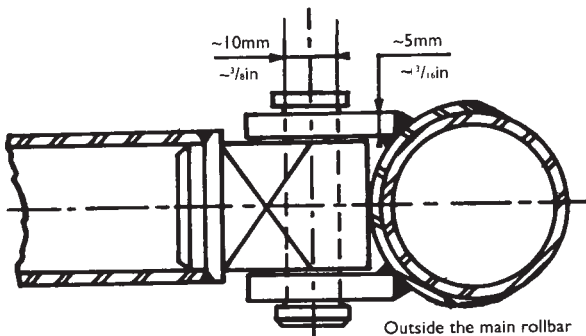


Direction of applied load

Drawing No. 22

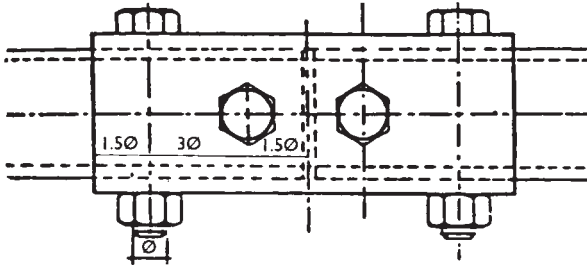


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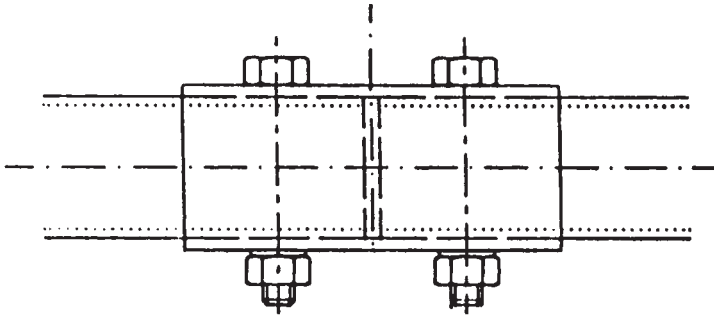
Outside the main rollbar

Drawing No. 24

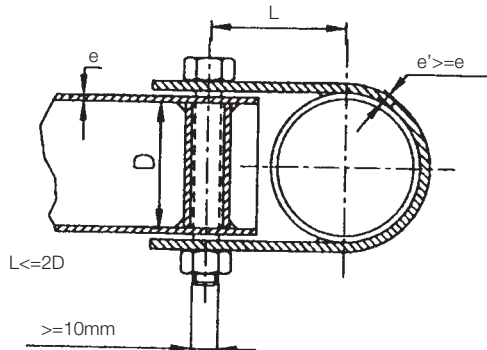


$\varnothing = 14\text{mm}$ (tube $\geq 40\text{mm} < 50\text{mm}$ diam. ext.)
 16mm (tube $\geq 50\text{mm}$ diam. ext.)

Drawing No. 25

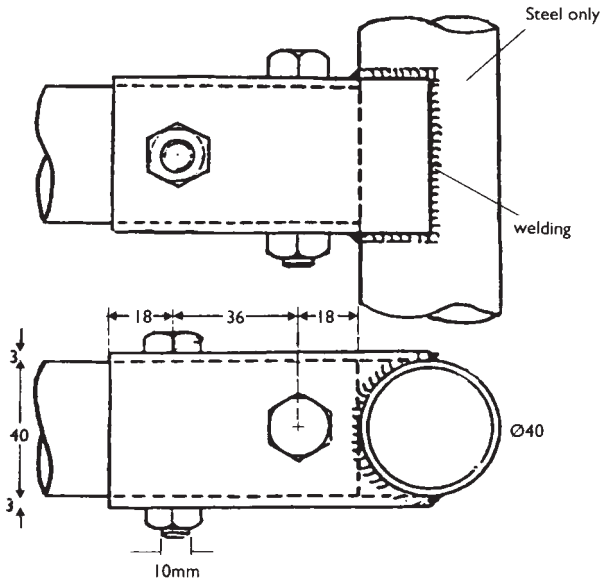


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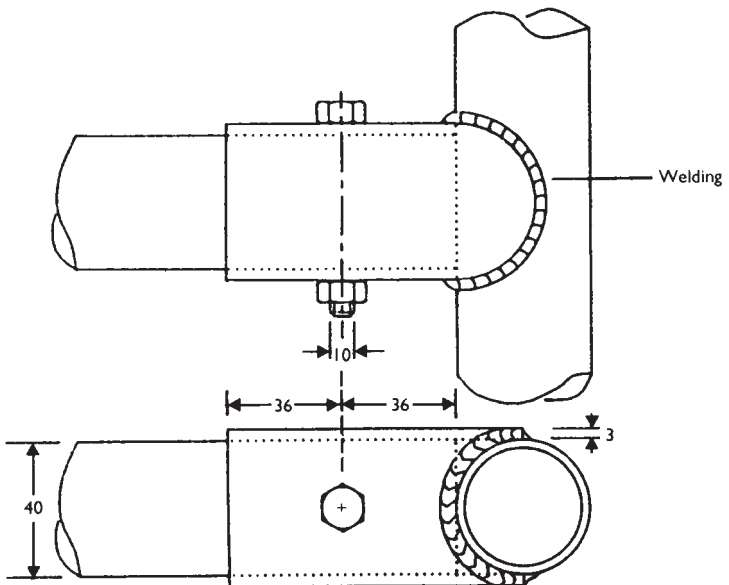


L must be minimum
 The clamp width must
 be at least 25mm

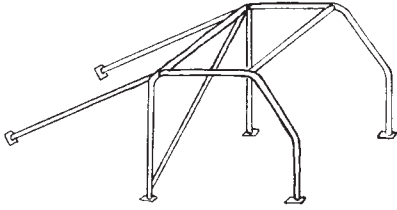
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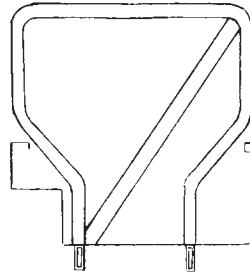
Drawing No. 28



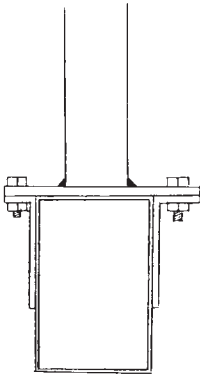
Drawing No. 29



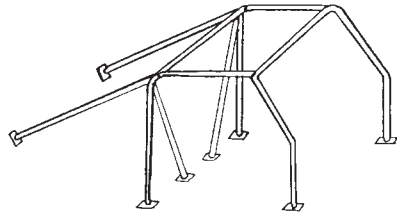
Drawing No. 6(a)



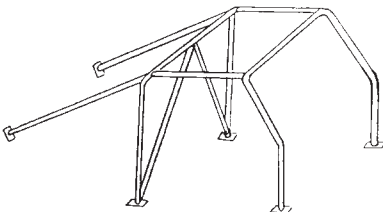
Drawing No. 38



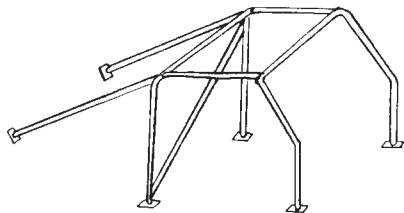
Drawing No. 33



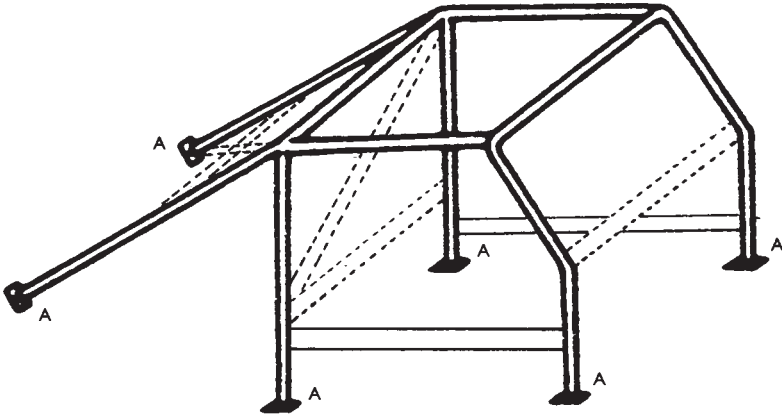
Drawing No. 34



Drawing No. 35



Drawing No. 36



==== Mandatory minimum requirement

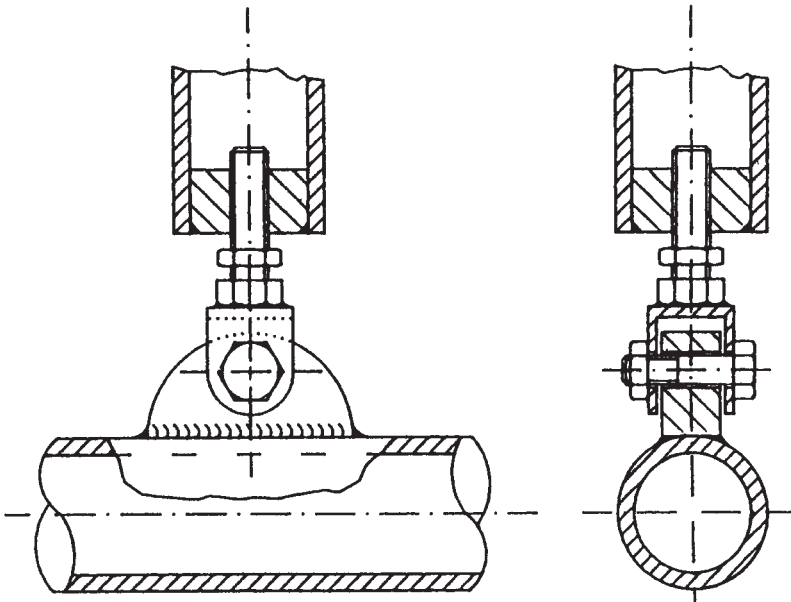
----- Maximum options permitted

A Mandatory mounting points

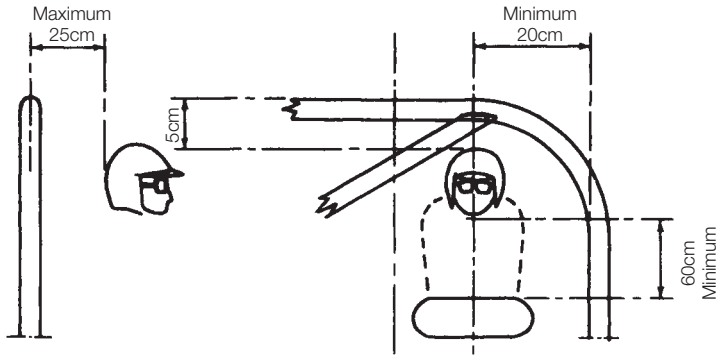
Additionally a further 8 points may be attached to the bodyshell.

Competitors should note that an installation to this drawing may contravene FIA Appendix K regulations.

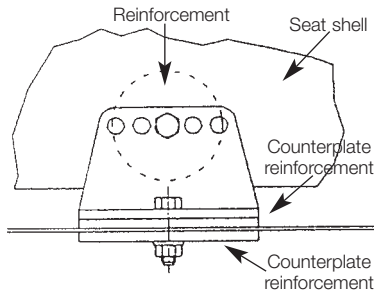
Drawing No. 37



Drawing No. 30

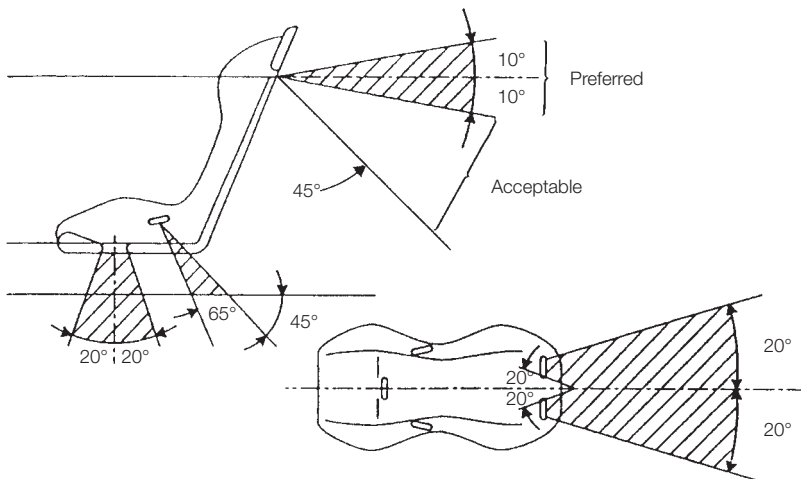


Drawing No. 31

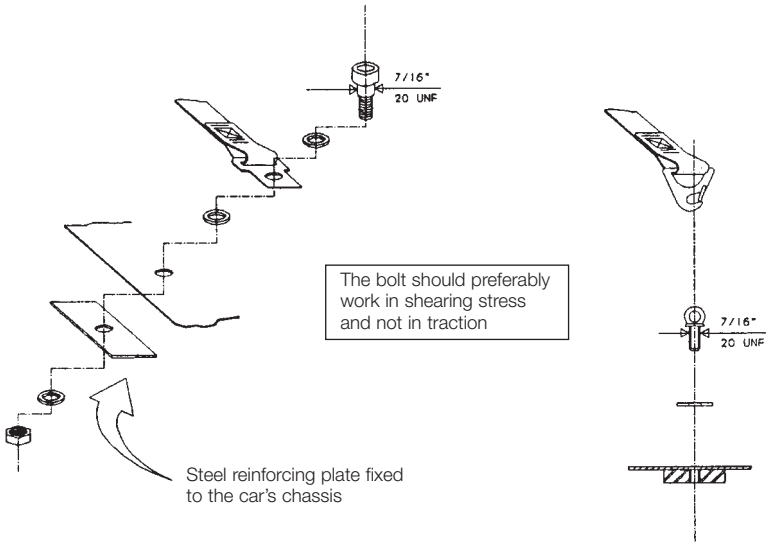


Drawing No. 32

Typical Safety Belt Installation

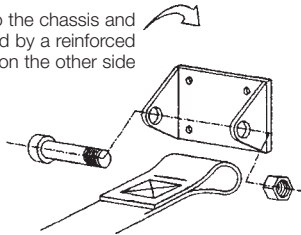


Drawing No. FIA 253-42



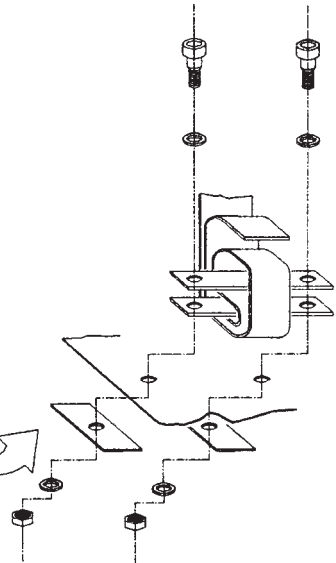
Drawing No. FIA 253-43

Plate fixed to the chassis and strengthened by a reinforced plate on the other side

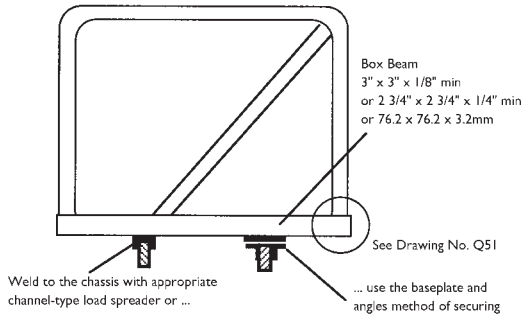


Drawing No. FIA 253-44

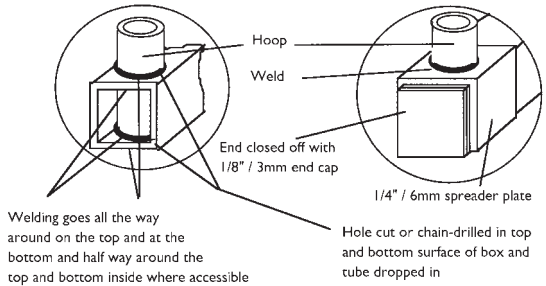
Reinforcing plate fixed to the car's chassis



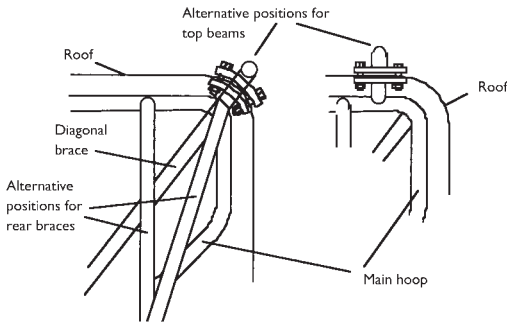
Drawing No. FIA 253-45



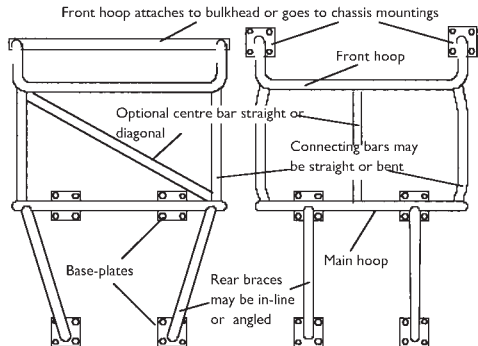
Drawing No. 50



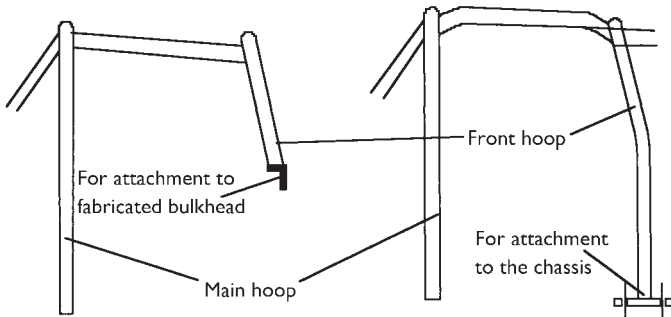
Drawing No. 51



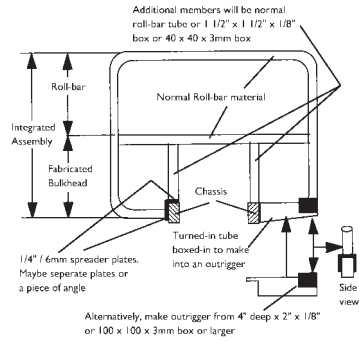
Drawing No. 52



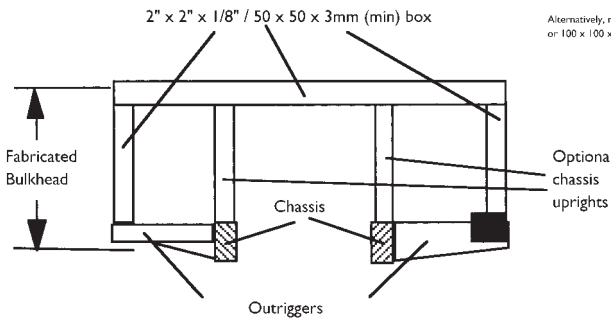
Drawing No. 53



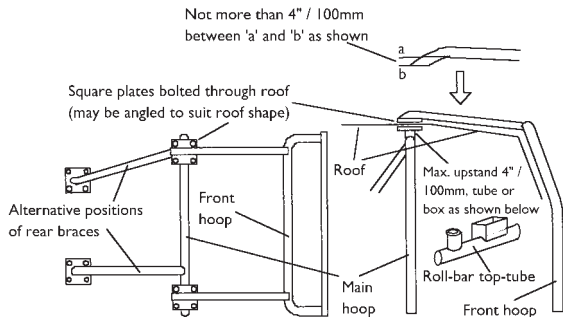
Drawing No. 54



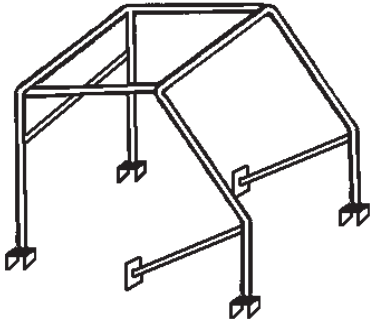
Drawing No. 55



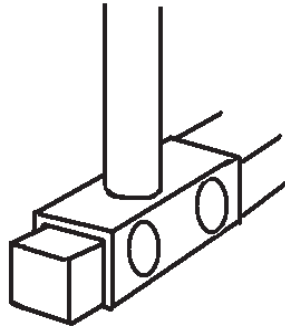
Drawing No. 56



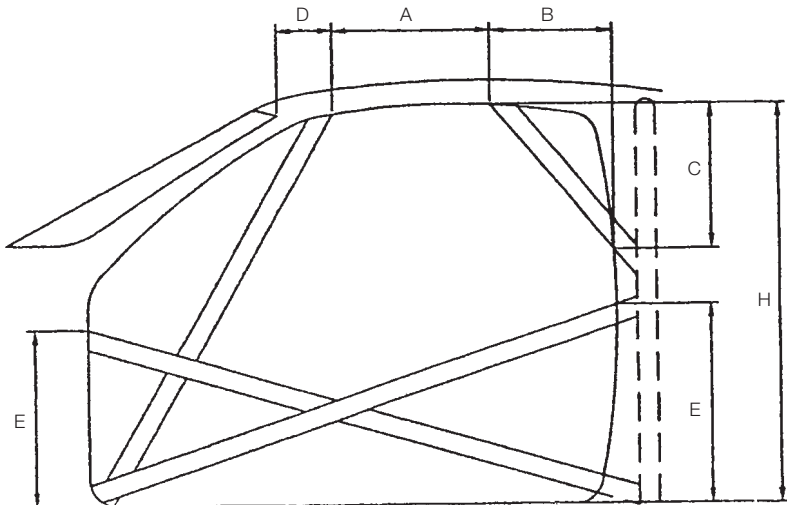
Drawing No. 57



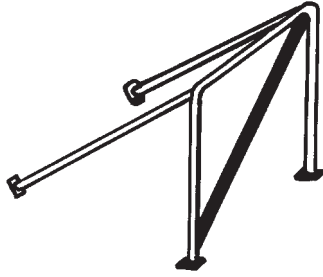
Drawing No. 58



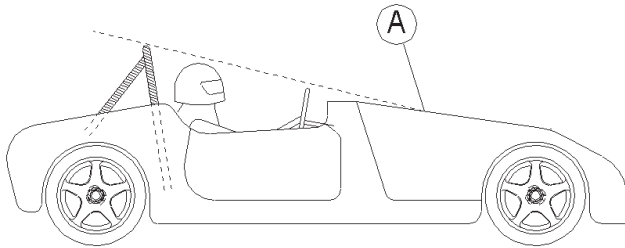
Drawing No. 59



Drawing No. FIA 253-17D



Drawing No. 60(i)



'A' is the substantial structure forward of the driver such as to act as the front rollbar. No part of the driver's helmet is to pass through a line struck from the top of the rollbar to this structure.

Drawing No. 60(ii)

caged
protection for everyone

**Roll Cages
Chassis Construction
CNC Turning & Machining
Powder Coating**

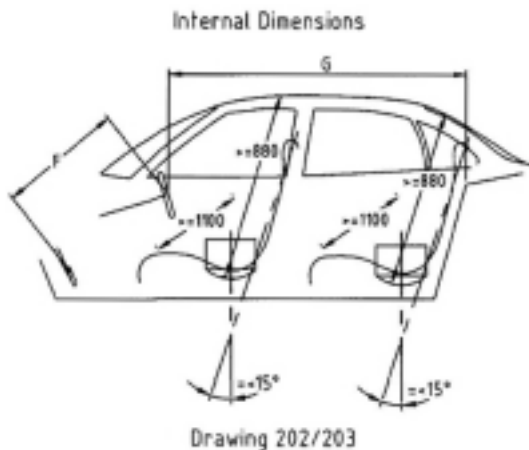
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A collage of eight photographs showing various vehicles equipped with roll cages. The vehicles include a red sports car, a blue classic car, a green classic car, a white rally car, a blue classic car, a green classic car, a blue classic car, and a green tractor.

Drawing number 61



Dimension B Height over front seats (measured between 0° and 15° towards the rear in relation to the vehicle using the test seat weight)

Dimension C Width for the front seats

Dimension D Height over the rear seats (measured as Dimension B)

Dimension E Width of rear seats.

Dimension F Distance from the centre of the hub of the steering wheel to the brake pedal (if the steering wheel is adjustable it must be placed in the median position).

Dimension G Length from the centre of the hub of the steering wheel to the bulkhead of the rear seat, or if possible to the rear face of the rear seat (maximum tilt 15°) If the steering wheel is adjustable it must be placed in the median position.

B and D are measured between the bottom of the seat compressed by the test seat weight, the axis of which is vertical, and the ceiling (padding compressed). If the seats are separate, the measurement is taken in the middle of each of the seats. In the case of

longitudinally adjustable seats, the seats will be placed in the median position. If there is a bench seat in the front, the measurement is taken at 25cm from the centreline of the car.

C and E are the maximum widths measured along the vertical plane passing through the axis of the standard test seat weights placed on the seats, being able to be freely maintained over a height of at least 25cm and a length of at least 40cm. The minimum dimensions (in cm) according to the cylinder capacity (in cm³) are the following, with $H = F + G$

Engine Capacity	Dim. B	Dim. C	Dim. D	Dim. E	Dim. H
From 0 to 1,300	Free	90	Free	90	180
From 1,300 to 2,000	88	110	88	110	200
Over 2,000	93	120	93	120	210

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