

GENERAL REQUIREMENTS FOR CARS AND DRIVERS

Schedule J - Safety Cage Structures

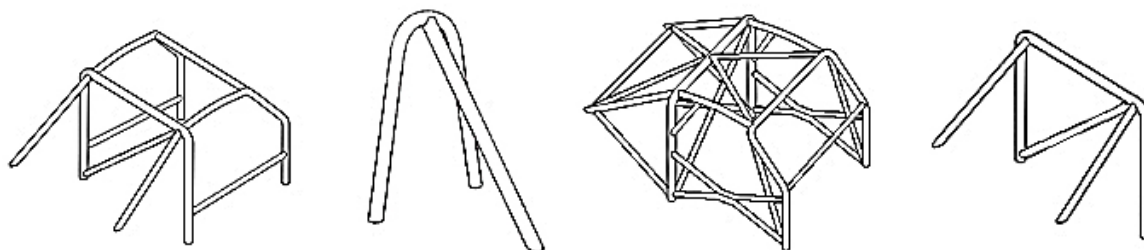


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I. GENERAL

- 1.1 Where the fitting of a safety cage structure is specified, it shall be constructed and installed in accordance with this Schedule.
- 1.2 Any repair to a safety cage structure shall comply with the requirements applicable at the time of original manufacture.
In the case of an FIA homologated or CAMS certified safety cage structure any repair shall be carried out by the manufacturer or with the manufacturer's approval. The repaired safety cage shall remain in compliance with the homologation VO or certificate.
- 1.3 Any tube forming part of a safety cage structure shall not carry fluids or any other materials.
- 1.4 The safety cage structure shall not unduly impede the entry or exit of the driver/crew.
- 1.5 Unless category regulations permit, complete parts of upholstery or trim shall not be removed, however the interior trim and dashboard may be modified locally (eg, by cutting or distorting) in order to fit a safety cage structure. A rear seat may be folded down. A fuse box may be relocated to enable a safety cage structure to be fitted.
- 1.6 Supplementary Regulations may impose more stringent requirements than those specified in this Schedule.
- 1.7 If a vehicle is to incorporate carbon fibre survival cell technology, refer to CAMS Technical Department for advice prior to purchase or building.

2. DEFINITIONS

- 2.1 **Safety cage structure:** A multi-tubular structure designed to protect the occupant/s in a rollover or impact.
- 2.2 **Rollbar:** A tubular frame with two mounting feet, forming a hoop.
- 2.3 **Main rollbar** (Drawings J-2 and J-3): A transversal and near-vertical (maximum angle $\pm 10^\circ$ to the vertical) single piece hoop located across the vehicle and immediately behind the front seat/s. The tube axis shall be within a single plane.
- 2.4 **Front rollbar** (Drawing J-3): A rollbar, the shape of which follows the pillars and upper edge of the windscreen (where fitted).
- 2.5 **Lateral rollbar** (Drawing J-4): A near-longitudinal single piece hoop located along one side of the vehicle, the rear pillar part of which is near-vertical (maximum angle $\pm 10^\circ$ to the vertical) and straight in side view and located immediately behind the front seat/s, and the front part of which follows the windscreen pillar.
- 2.6 **Lateral half-rollbar** (Drawing J-2): Similar to the lateral rollbar but without the vertical rear leg. Also referred to as a 'front leg'.

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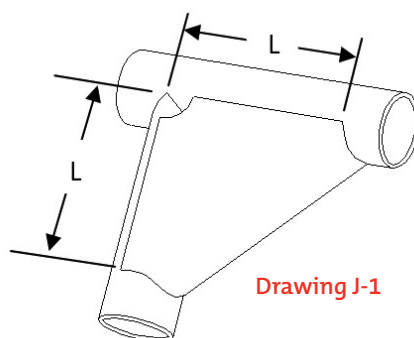
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- 2.7 Longitudinal member** (Drawing J-3): near-longitudinal tube joining the upper parts of the front and main rollbars.
- 2.8 Transversal member** (Drawing J-4): A transversal tube joining the rollbars or backstays.
- 2.9 Diagonal member** (Drawings J-5 to J-9): A tube between a top corner of the main rollbar, or (in the case of a lateral rollbar) one end of the transversal member, and the lower mounting point of the rollbar on the opposite side or between the upper end of a backstay and the lower mounting point of the other backstay.
- 2.10 Removable member:** A member of a safety cage structure which can be removed by unbolting.
- 2.11 Cage reinforcement:** A member added to the safety cage structure to improve its strength.
- 2.12 Mounting foot:** A plate welded to the end of a rollbar tube or member to enable it to be bolted and/or welded to the bodyshell/chassis.
- 2.13 Reinforcement plate:** A plate attached to the bodyshell/chassis to support a mounting foot.
- 2.14 Backstay** (Drawing J-4): A straight and near-longitudinal member located rearward between the top of the main roll bar or of a lateral roll bar, and the bodyshell/chassis.
- 2.15 Gusset** (Drawing J-1): A reinforcement, made from sheet steel of not less than 1.0mm thick, formed to a U-shape and welded to a bend or junction. The dimension (L) shall be between two and four times the diameter of the larger of the tubes joined.



3. APPLICATION

A safety cage structure complying with Schedule J is required as follows:

3.1 Races (includes practice, qualifying and warm-up):

- (a) **Contemporary:** Each vehicle other than a closed, road-registered vehicle participating in a Club or Multi-Club level race.
- (b) **Historic (5th Category):** Each vehicle in a race exclusively for the 5th Category shall be fitted with a safety cage structure as required by the 5th Category Historic Technical Regulations and, where applicable, these regulations.
- (c) **Trucks:** As specified in Appendix A to the Truck Formula.

3.2 Speed and Modern Regularity Events:

- (a) Each 1st Category vehicle in a Speed or Modern Regularity Event.
- (b) State Championship and above level Speed Events and Modern Regularity Events, other than:
 - (i) a vehicle of the 5th Category (unless otherwise specified in the Historic Technical Regulations); or
 - (ii) a vehicle which is road registered.

3.3 Off Road Events:

- (a) Each Extreme 2WD¹, Performance 2WD, Production 4WD and Extreme 4WD¹ vehicle in an Off Road event.
Note ¹: These vehicles may alternatively comply with the prescriptions of GR9 of Off Road Vehicles – General Requirements.
- (b) Each Pro, Prolite, Super 1650, Sportsman and Clubman class vehicle shall comply with the prescriptions of GR9 of Off Road Vehicles – General Requirements.

3.4 Rally / Road Events:

- (a) **Timed Rallies / Trials:** Each vehicle in a timed rally or trial, other than in (c) below:
- (b) **Touring Road Events:** Refer to Touring Road Event Regulations and event Supplementary Regulations.
- (c) **Exceptions:** A safety cage structure is not mandatory in:
 - (i) a rally or trial conducted entirely in compliance with the normal civil road regulations. **Note:** as an example, this exemption does not apply to an event where elements of the competition allow the statutory speed limit to be exceeded;
 - (ii) an Introductory Rally;
 - (iii) a closed vehicle in a Club or Multi-Club Stage 1 Rallysprint;
 - (iv) a Touring Assembly; or
 - (v) a 5th Category Historic Car entered in a rally, unless the vehicle is required to be fitted with a safety cage structure when entered in a 5th Category, Historic-only circuit race. The safety cage structure fitted shall

be to at least the same specification as required in a race. This provision shall apply only to a vehicle subject of and which remains in conformity with, a 5th Category Certificate of Description. This exception does not apply to Historic Touring Cars (Group N) or Historic Production Sports Cars (Group S).

3.5 Motorkhana, Khanacross and Observed Section Trials: As specified under the Auto Test section of the Manual.

3.6 Drifting: A safety cage structure is mandatory in each open vehicle and is strongly recommended for each closed vehicle.

3.7 International Events: As specified by the FIA. Competitors should note additional or different requirements to Schedule J may apply.

3.8 Other Events and Additional Requirements: As specified in the Supplementary Regulations.

4. SAFETY CAGE STRUCTURES BUILT TO PREVIOUS AND FOREIGN REGULATIONS

4.1 Vehicles built to previous CAMS Regulations: Where a safety cage structure is fitted to a vehicle which is subject of a CAMS log book, or where the safety cage structure has been certified by CAMS, such safety cage structure may continue to be used in competition provided it remains in conformity with the regulations that were in force at the date of issue of either the initial log book for the vehicle, or the certification document.

Regardless of when the car was first subject of a log book, the following requirements apply:

- (a) a Type 3 Full Safety Cage structure is the minimum requirement in a closed vehicle in a national or state level race, except in competition exclusively for the 5th Category (and unless otherwise specified in the relevant Historic Technical Regulations);
- (b) a Type 3 Full Safety Cage structure is the minimum requirement in a closed vehicle in a national level rally and/or a Tarmac Rally;
- (c) a Type 3 Full Safety Cage structure with a roof reinforcement configuration complying with Drawing J-14, J-15 or J-16 is the minimum requirement in an open vehicle in a timed rally/trial or off road event; and
- (d) protective padding is required in accordance with Article 11.

4.2 Foreign Vehicles not complying with Schedule J:

- (a) A safety cage structure approved by an ASN other than CAMS is not necessarily eligible for competition in Australia. Prior to importing a vehicle, a competitor is strongly advised to contact the CAMS Technical Department for guidance.
- (b) CAMS may accept a vehicle recognised by *Motorsport New Zealand (MSNZ)* fitted with a safety cage structure not complying with Schedule J. The safety cage must comply with Schedule J in all respects except for:
 - (i) the main roll bar tubing, the minimum size of which is 38.1mm x 2.5mm; and/or
 - (ii) the use of ERW tubing to MSNZ specification.

In each case:

- (i) the vehicle must be subject of a MSNZ log book;
- (ii) the safety cage structure must be subject of a MSNZ safety cage structure homologation document;
- (iii) the vehicle must have been used in a rally or race competition in New Zealand, evidenced by a valid entry in the log book; and
- (iv) where the dimension of the main roll bar tubing is less than 44.45mm x 2.5mm, the safety cage structure shall incorporate a double diagonal (cross) configuration in the main roll bar in accordance with Drawing J-7.

Notes:

- A vehicle with a 38.1mm diameter main roll bar shall be acceptable only if the MSNZ log book was issued prior to 1 January 2011. This aligns with MSNZ material requirements.
- The documents detailed above shall be presented at scrutiny and/or upon request of the Chief Scrutineer.
- A vehicle which is normally domiciled and/or is road registered in New Zealand is permitted to compete in rallies in Australia for a maximum period of three calendar months without being required to comply with (iv)

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of this article, provided that the vehicle complies with MSNZ safety cage regulations. Thereafter the vehicle must either comply fully with the requirements of Schedule J or be exported from Australia before any further dispensation can be considered.

- 4.3 Safety Cage Kits:** Despite some manufacturers' claims, not every safety cage structure built from a commercially available 'kit' complies with the *current* FIA and/or CAMS regulations. A competitor proposing to install such a kit is strongly advised to contact the CAMS Technical Department for guidance prior to purchasing.

5. REGISTRATION

- 5.1** A registered safety cage structure is one which has been accepted by CAMS for a specific vehicle on the basis of a declaration by the manufacturer that it complies with the requirements of this Schedule. This registration shall record the specification of the safety cage structure. The registration number shall be recorded in the log book.
- 5.2** A safety cage structure fitted to a vehicle for which a log book is issued after 31 December 2000 shall be registered with CAMS and shall have affixed a valid CAMS safety cage registration label. Prior to this date, registration is not required.
- 5.3** Registration is not required when the type and/or status of a competition does not require the use of a safety cage structure.
- 5.4** Registration of a safety cage structure is not evidence of its compliance with Schedule J.

6. CERTIFICATION BY CAMS

- 6.1** A certified safety cage structure is one which has been approved by CAMS for a specific vehicle, notwithstanding that it may not comply in all respects with the specifications of this Schedule.
- Important Note:** The certification process does not provide for 'free design' safety cage structures. It is intended primarily to prove that the manufacturer has met the strength criteria through engineering calculation despite the use of material to alternate specifications. A safety cage structure must still comply with the design criteria detailed in the applicable regulations to be eligible for certification by CAMS.
- 6.2** Where the vehicle is subject of safety cage certificate, the safety cage certification number shall be recorded in the log book.
- 6.3** A manufacturer may apply to CAMS for the certification of a safety cage structure. The certification regulations are available from the CAMS Technical Department.
- 6.4** Approval in principle for any proposed design shall be sought from CAMS prior to commencement of construction.
- 6.5** A safety cage structure certified after 1996 shall carry a unique identification plate (stamped, engraved or tamper-proof sticker) affixed to it by the manufacturer. Such identification shall be neither copied nor moved. The identification plate shall bear the name of the manufacturer, the manufacturer's unique serial number of the safety cage structure and the certification number of the CAMS certificate (or, where applicable, that of another ASN).
- 6.6** Where a safety cage structure is subject of a certificate or homologation VO, this documentation shall be presented at event scrutiny and be available to the Chief Scrutineer and/or Technical Commissioner upon request. The safety cage structure must comply with this document at all times.

7. NON-COMPLYING SAFETY CAGE STRUCTURES

Where the type and/or status of the event does not require a vehicle to be fitted with a safety cage structure, the use of a non-compliant structure is permitted, provided it is not deemed unsafe by the Chief Scrutineer.

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8. MATERIAL SPECIFICATIONS

8.1 Tube Profile: Only tubes with a circular section are permitted.

8.2 Sports and Touring Cars: The following shall apply to a sports or touring car:

Table 1

Material	Minimum tensile strength	Minimum dimensions	Use
Cold drawn seamless (CDS) or cold drawn welded (CDW) unalloyed carbon steel	350 N/mm ²	Metric: 44.45mm x 2.5mm or 50 x 2.0mm	Main rollbar and lateral rollbars
		Imperial: 1.75" x 0.095" or 2.0" x 0.083"	
		Metric: 38mm x 2.5mm or 40mm x 2.0mm	Lateral half-rollbars and other parts of the safety cage
		Imperial: 1.5" x 0.095" or 1.6" x 0.083"	

8.3 Single-seat Vehicles: The following shall apply to a single-seat vehicle weighing 700kg or less, as defined in Article 14:

Table 2

Material	Minimum tensile strength	Minimum dimensions	Use
Cold drawn seamless (CDS) or cold drawn welded (CDW) unalloyed carbon steel	350 N/mm ²	Metric: 38mm x 2.5mm or 40mm x 2.0mm	Main rollbar and single brace
		Imperial: 1.5" x 0.095" or 1.6" x 0.083"	
		31.7mm x 2.5mm or 1.25" x 0.095"	Dual braces

For a vehicle that weighs over 700kg, the material specifications detailed in Article 8.2 shall apply.



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8.4 Steel Type and Composition: The steel shall be cold drawn seamless (CDS) or cold drawn welded (CDW) unalloyed carbon steel containing a maximum of 0.3% of carbon, with adequate elongation and weldability properties. For an unalloyed steel, the maximum content of additives is 1.7% for manganese and 0.6% total of all other elements.

8.5 Material not in Compliance: CAMS may accept other steels and sizes not in compliance with this article through the process of safety cage structure certification.

9. BENDING

The tubing shall be bent by a cold working process and the centreline bend radius shall be at least three times the tube diameter.

If the tubing is ovalised or otherwise distorted during bending, the ratio of minor to major diameter shall be 0.9 or greater.

The surface of the tube at the bend shall be smooth and even, without ripples or cracks.

10. GUIDANCE ON WELDING

Welding shall be carried out along the whole perimeter of each tube joint and shall be of the highest possible quality with full penetration, preferably using a gas-shielded arc.

Although good external appearance of a weld does not necessarily guarantee its quality, a weld of poor appearance may indicate that it is unsatisfactory.

When using heat-treated steel any special instructions of the tube manufacturer shall be followed (eg, ambient temperature, special electrodes, gas protected welding).

II. PROTECTIVE PADDING

11.1 Helmet and Head Protection:

- (a) Where the helmet of an occupant could come into contact with the safety cage, protective padding shall be fitted in that area, which complies with:
 - (i) International competition and below, FIA standard 8857-2001, type A (see FIA Technical List No 23 "Roll Cage Padding Homologated by the FIA"); or
 - (ii) For national competitions and lower, SFI specification 45.1.
- (b) Implementation Dates

Padding of the type specified in 11.1(a) is required as follows:

- Any FIA category vehicle (eg, Group N, Super 2000) – refer FIA Appendix J, Article 253 – currently in place;
- National competitions – from 1 January 2012; and
- All competitions – from 1 January 2013.

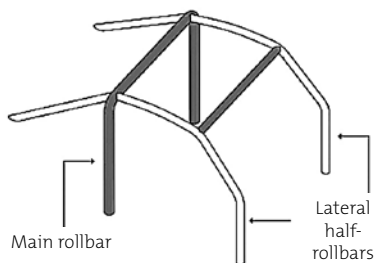
The use of the specified padding is highly recommended in the meantime.

11.2 Body Protection: Where the body of an occupant could come into contact with the safety cage, it is recommended that flame retardant padding be fitted. FIA standard 8857-2001 or SFI specification 45.1 padding is recommended.

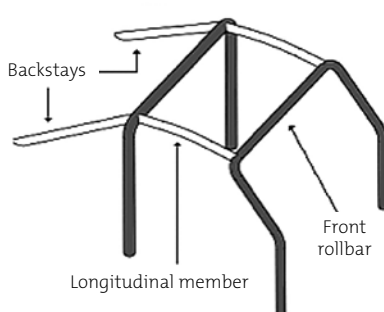
12. SPECIFICATIONS – CLOSED SPORTS AND TOURING CARS

12.1 Basic Structure: The basic structure must be made according to one of the following designs :

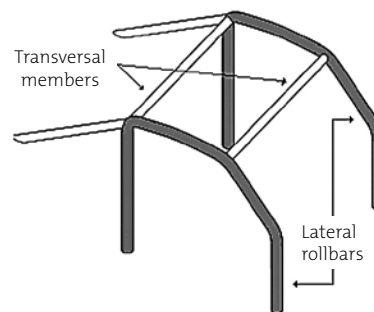
- 1 main rollbar + 2 lateral half-rollbars + 1 transversal member + 2 backstays + 6 mounting feet (Drawing J-2)
- or
- 1 main rollbar + 1 front rollbar + 2 longitudinal members + 2 backstays + 6 mounting feet (Drawing J-3)
- or
- 2 lateral rollbars + 2 transversal members + 2 backstays + 6 mounting feet (Drawing J-4)



Drawing J-2



Drawing J-3



Drawing J-4

The vertical parts of the main rollbar must be as close as possible to the interior contour of the bodyshell and may have only one bend in each lower near-vertical part.

Only one bend is permitted in the front leg of a front rollbar or of a lateral rollbar. The front leg must follow the windscreen pillar as closely as possible with the sole bend in its lower near-vertical part. For non-international competition, the front leg may depart from the contour of the windscreen ('A') pillar to enable it to be located rearward of the dashboard. The sole bend permitted in the front leg may be incorporated in its upper part, to enable it to follow the windscreen pillar.

Each connection between a half-lateral rollbar and the main rollbar (J-2), between a longitudinal member and a front or main rollbar (J-3), and between a transversal member and a lateral rollbar (J-4) shall be situated at the roof level.

There shall be not more than four removable connections in the basic structure at the roof level.

Each backstay shall be attached to the main or lateral rollbar near the roofline and near the top outer bend on each side of the vehicle. A removable connection (subject to the limit of four above) may be used. Each backstay must form an angle between 30° and 60° with the vertical, must run rearwards and be straight and be as close as possible to the interior side panels of the bodyshell.

For closed sports cars and utes, and where permitted by the relevant Group technical regulations, the backstays may extend beyond the interior/cockpit of the vehicle in order to achieve an angle between 30° and 60° with the vertical. If the required angle cannot be achieved, certification by CAMS is required.

12.2 Design: In addition to the basic structure, the safety cage must be completed by the addition of compulsory members and reinforcements (see Article 12.2.1), to which optional members and reinforcements may be added (see Article 15).

12.2.1 Compulsory Members and Reinforcements:

(a) **Diagonal Member:** The safety cage structure designs detailed in Drawings J-5, J-6, J-7 and J-8 shall be referred to as 'Type 3 Full Safety Cage'.

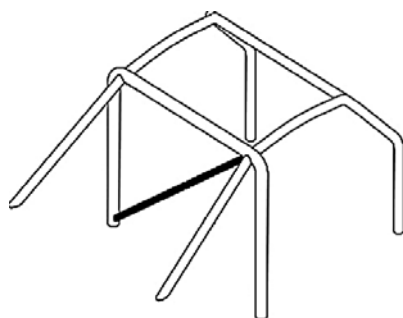
- (i) **For a competition with a driver only,** the safety cage structure shall be configured in accordance with Drawing J-5, J-6, J-7 or J-8, incorporating at least one diagonal member. If configured in accordance with Drawing J-5 or J-6, the diagonal shall have the upper end attached on the driver's side.

Each diagonal member shall be straight and may be removable.

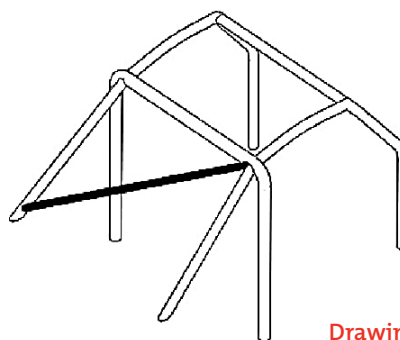
For Drawing J-5 the upper end of the diagonal member shall join the main rollbar no further than 100mm from its junction with the backstay. For Drawing J-6 the upper end of the diagonal member shall join the backstay no more than 100mm from its junction with the main rollbar. See Drawing J-62 for the measurement.

The lower end of the diagonal shall join the main rollbar or the backstay no further than 100mm from the mounting foot.

A 'double diagonal' configuration detailed in Drawing J-7, J-8 or J-9 is recommended and where fitted shall be in accordance with Article 12.2.1(a)(ii).



Drawing J-5



Drawing J-6

- (ii) **For a competition with more than one occupant,** the safety cage structure shall be configured in accordance with Drawing J-7 or J-8, incorporating two diagonal members in the main rollbar or between the backstays. One of the diagonal members shall be a single piece and shall be straight. The diagonal members may be removable.

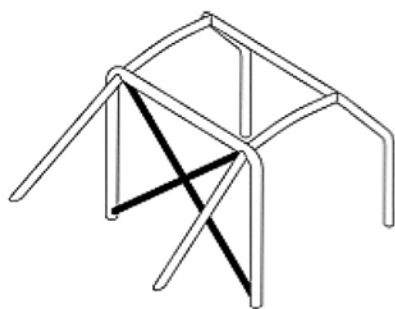
The lower end of each diagonal shall join the main rollbar or backstays no further than 100mm from the mounting foot (see Drawing J-62 for the measurement).

For Drawing J-7 the upper end of each diagonal member shall join the main rollbar no further than 100mm from its junction with the backstay. For Drawing J-8 the upper end of each diagonal member shall join the backstay no more than 100mm from its junction with the main rollbar. See Drawing J-62 for the measurement.

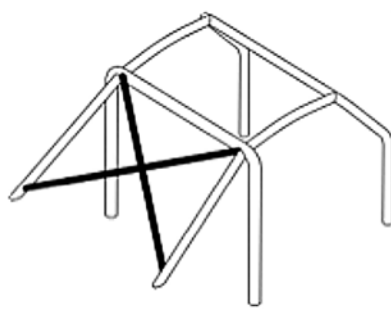
In addition to the minimum configuration detailed in Drawing J-7 or J-8, the combination of diagonal members (J7 + J6 or J8 + J5 or J9) may also be used.

Note: For international competition the safety cage must incorporate the double diagonal configuration of Drawing J-7 and at least a single diagonal member in the backstays as detailed in Drawing J-6.

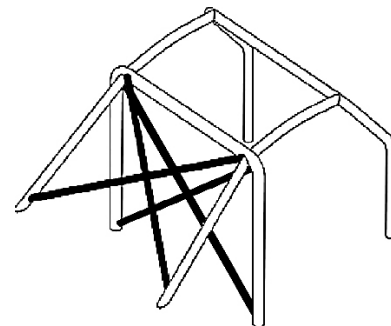
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Drawing J-7



Drawing J-8



Drawing J-9

(b) Doorbars:

For Off Road competitions, State Championship and above level Race and Rally competitions (and recommended in other competitions):

One or more doorbars must be fitted at each side of the vehicle according to Drawings J-10, J-11, J-12 or J-13.

Note: In international competition the safety cage structure in each vehicle homologated from 1 January 2007 shall comply with Drawing J-11, J-12 or J-13.

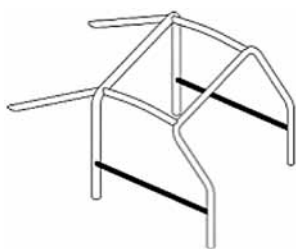
Doorbars may be removable, subject to the use of dismantable joints complying with Article 16.

The side protection shall be as high as possible, subject to its upper attachment point not being higher than half the height of the door opening measured from its base. If these upper attachment points are located in front of or behind the door opening, this height limitation is for the intersection of the door bar and the door opening. Refer Drawing J-59.

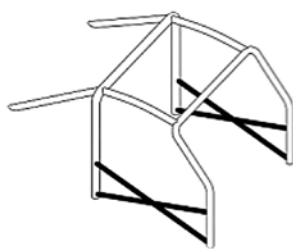
In the case of doorbars in the form of an "X" (Drawing J-11), it is recommended that the "X" be formed by two continuous bars which are joined in the centre. It is recommended that this join be reinforced by two gussets in accordance with Article 2.15 (see also Drawing J-59).

The connection of each doorbar to the windscreen pillar reinforcement (Drawing J-17) is permitted.

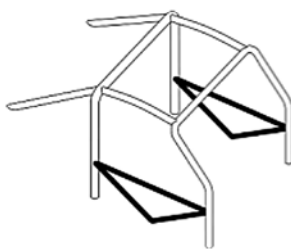
For a competition with a driver only, doorbars are required only on the driver's side.



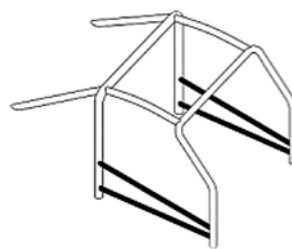
Drawing J-10



Drawing J-11



Drawing J-12



Drawing J-13

(c) Roof Reinforcement:

For Off Road competitions, National Championship and National Series level Race and Rally competitions (and recommended in other competitions):

The upper part of the safety cage structure shall comply with Drawing J-14, J-15 or J-16. However, for a driver only competition, in the case of Drawing J-14, only one diagonal member is required subject to its front connection being on the driver's side.

The reinforcements may follow the curve of the roof.

The ends of the reinforcements must be less than 100mm from the junction between rollbars and members (not applicable to the top of the 'V' formed by reinforcements in Drawings J-15 and J-16).

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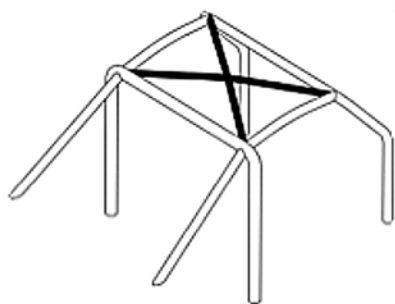
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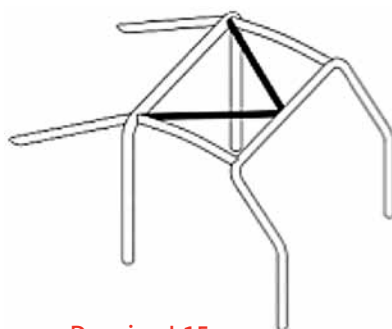
CHROME-MOLY 4130N TUBE 4130N SHEET & 350 Grade CDW

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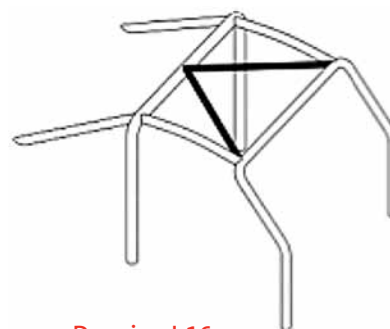




Drawing J-14



Drawing J-15



Drawing J-16

(d) **Windscreen Pillar Reinforcement:**

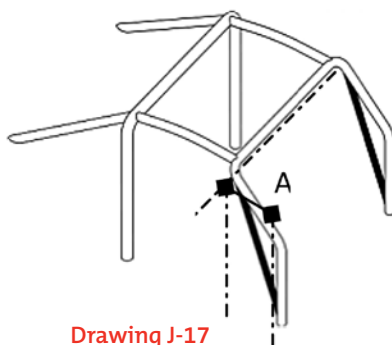
For National Championship and National Series level Race, Rally and Off Road competitions (and recommended in other competitions):

A windscreen pillar reinforcement member shall be fitted on each side of the front rollbar if dimension "A" is greater than 200mm (refer Drawing J-17).

The windscreen pillar reinforcement member may be bent on condition that it is straight in side view and that the angle of the bend does not exceed 20°.

Its upper end shall be less than 100mm from the junction between the front (lateral) rollbar and the longitudinal (transversal) member (refer Drawing J-62 for the measurement).

Its lower end shall be within 100mm of the front mounting foot.



Drawing J-17

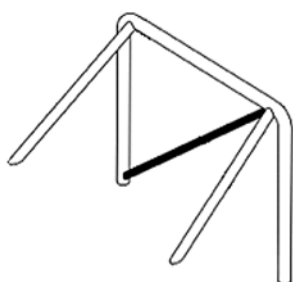
13. SPECIFICATIONS – OPEN SPORTS CARS

13.1 Race, Speed (State Level and above) and Drifting:

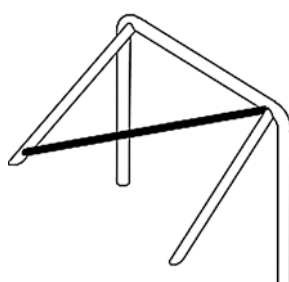
(a) **Basic Structure:** The basic structure shall be constructed according to the following design:

- 1 main rollbar + 2 backstays + 1 diagonal + 4 mounting feet (refer Drawing J-18 or J-19)

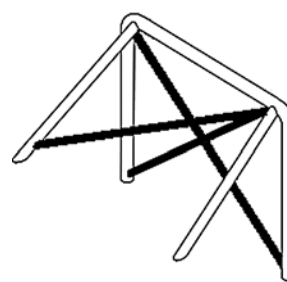
This structure shall be referred to as 'Type 2 Half Safety Cage'.



Drawing J-18



Drawing J-19



Drawing J-20

(b) **Stays:** The stays may be fitted either forward or backward of the main roll bar, shall be straight, and shall form an angle of between 30° and 60° with the vertical.

If this angle is not able to be achieved with the safety cage structure contained longitudinally between the mounting points of the front and rear suspension elements carrying the vertical loads (springs and shock absorbers), it is authorised to extend the rear stays beyond the rear suspension element carrying the vertical load.

(c) **Diagonal Member:** The safety cage structure shall have a diagonal member configured as defined in Drawing J-18 or J-19 with the the upper end of the diagonal attached on the driver's side.

Each diagonal member shall be straight and may be removable.

The upper end of the diagonal shall join the main rollbar within 100mm of its junction with the backstay, or the backstay within 100mm of its junction with the main rollbar (refer Drawing J-62 for the measurement).

One or more additional diagonal member/s is recommended and a double diagonal configuration is permitted in the main roll bar and between the stays (refer Drawing J-20).

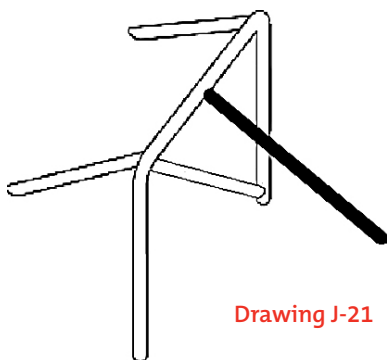
- (d) **General:** On each vehicle derived from a registrable production vehicle, the top of the main roll bar tubing shall be a minimum of 50mm above the top of the driver's helmet when the driver is in the normal seated position.

Each vehicle which is not derived from a registerable production vehicle shall have two rollover structures and shall comply with the following:

- The principal structure shall be positioned behind the driver.
- The secondary structure shall be in front of the steering wheel, but no more than 250mm forward of the top of the steering wheel rim in any position.
- Under no circumstance may the driver's helmet be less than 50mm below a line drawn between the highest points of the principal and secondary structures (refer Drawing J-26).

In conjunction with the vehicle's structure the safety cage structure shall not leave unprotected any part of the driver's shoulders when viewed from front or rear.

- (e) **Additional Bracing:** A forward mounted reinforcement is permitted (refer Drawing J-21).



Drawing J-21

The lower portion of this reinforcement may be mounted in the front passenger space, in which case a passenger is not permitted. Where fitted, the driver's helmet shall be at least 50mm from the member when seated in the normal driving position. A seat incorporating a lateral head restraint is recommended. Refer also to Article 11.1 regarding protective padding.

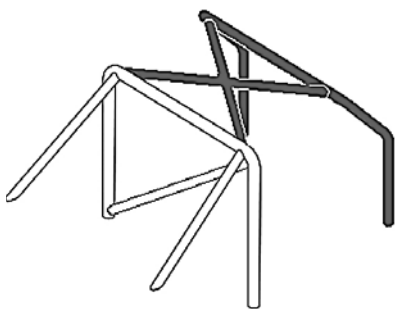
If incorporated into a Type 2 Half Safety Cage, the forward end of each door bar member or the reinforcement detailed in Drawing J-21 shall be fitted with a mounting foot which shall be attached to the bodysell/chassis in accordance with Article 18.5(c).

It is recommended that each competitor consider the fitment of additional reinforcing members and/or a Type 3 Full Safety Cage. For an open car fitted with a Type 3 Full Safety Cage, the basic structure detailed in Article 12.1 is the minimum requirement for the elements of the safety cage structure forward of the main roll bar, regardless of event status unless a higher specification is mandated in the regulations applying to that competition.

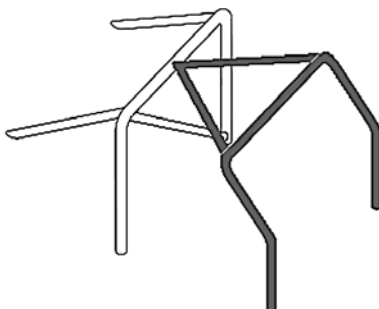
- 13.2 Rally and Off Road:** Each open vehicle used in a Rally/Road or Off Road event must be fitted a Type 3 Full Safety Cage structure which incorporates one of the roof reinforcement options detailed in Drawing J-14, J-15 or J-16, regardless of event status, except as detailed in Article 3.4(c).

- 13.3 Targa Roof Vehicles** (not applicable for rally/road or off road events): A targa roof is one where the top of the front windscreen support is connected to the rear window ('B') pillar, if fitted, but only in a narrow section inboard of the tops of the windscreen (or 'A') pillars or where there is no permanent connection at roof level between the A and B pillars.

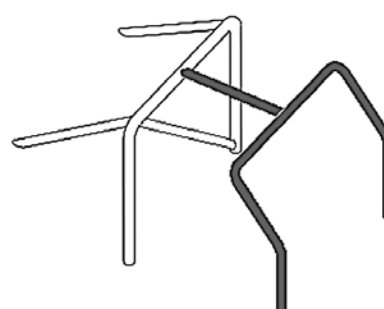
A vehicle deemed to have a targa roof may compete in a race, speed, modern regularity or drift event with a safety cage structure complying with Drawing J-22, J-23 or J-24 and with Article 13.1(a).



Drawing J-22



Drawing J-23



Drawing J-24

14. SPECIFICATIONS – SINGLE SEAT CARS

Except where varied by this regulation or Group or Technical regulations approved by CAMS, a purpose designed single seat vehicle shall comply with this Article. This Article shall not apply to a vehicle in which the passenger seat has been removed nor to any vehicle in Off Road competition.

14.1 Open Cockpit Cars: Each vehicle shall be fitted with a principal structure and a secondary structure.

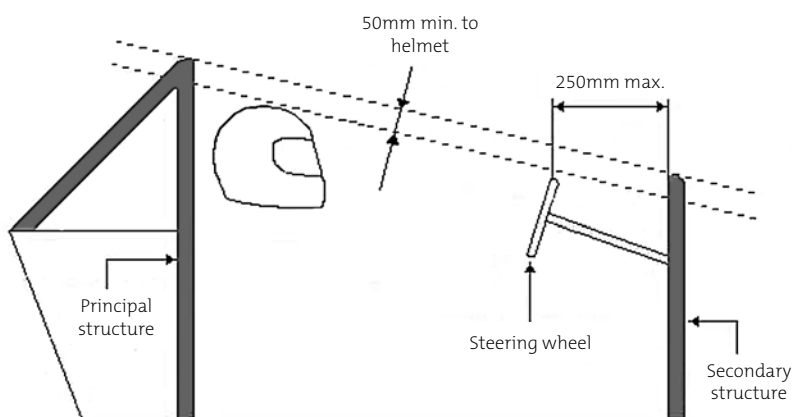
(a) Principal Structure:

- (i) The principal structure shall consist of a main rollbar and a backstay as a minimum (refer Drawing J-25). This structure shall be referred to as 'Type 1 Solo Roll Bar'.



Drawing J-25

- (ii) The principal structure must be positioned behind the driver.
 - (iii) The main rollbar shall be made in one piece, without joints.
 - (iv) There shall be at least one brace from the top of the main rollbar. The brace/s shall form an angle between 30° and 60° with the vertical. The diameter and material of the brace/s shall comply with Article 8.3. Where two braces are used, they may be fitted either side of the rollbar, and shall be within 100mm of the top of the main roll bar. The stays may face rearward and/or forward.
 - (v) The main roll bar (together with any additional members and/or a head rest) shall be configured such that the driver's helmet cannot pass through it.
 - (vi) The bend radius on the centreline of the main rollbar shall be between two and four times the tube diameter.
 - (vii) In conjunction with the vehicle's structure, the main rollbar shall not leave unprotected any part of the driver's shoulders, when viewed from the front or rear.
 - (viii) Each leg of the main rollbar shall be straight from the uppermost bend to within 100mm of where it meets the chassis.
 - (ix) Any removable connection shall comply with Drawings J-47 to J-56.
 - (x) Under no circumstance may the driver's helmet be less than 50mm below a line drawn between the highest points of the principal and secondary structures (refer Drawing J-26).
- (b) **Secondary Structure:**
- (i) A substantial secondary structure shall be incorporated forward of the steering wheel, but no more than 250mm forward of the top of the steering wheel rim.



Drawing J-26

14.2 Closed Cars: Each vehicle shall be fitted with a safety cage structure complying as a minimum with Drawing J-5, J-6, J-7 or J-8 and Article 12. Refer also to 'Compulsory members and reinforcements'.

14.3 Alternative Designs: A safety cage structure not in compliance with Schedule J specifications may be approved through the CAMS certification process. The static load tests detailed in FIA Appendix J, Article 277 shall apply. Approval in principle for any proposed design shall be sought from CAMS prior to commencement of construction.

15. REINFORCEMENT OF BENDS, JUNCTIONS AND TUBES

It is recommended to reinforce by a minimum of two gussets complying with Article 2.15 particularly the junctions between the:

- diagonal members of the main rollbar;
- roof reinforcements (Drawing J-14);
- doorbars (Drawing J-11);
- doorbars and the windscreen pillar reinforcement (Drawing J-17); and
- main roll bar and lateral roll bar reinforcement (Drawing J-43).

If the doorbars and the windscreen pillar reinforcements (where fitted) are not in the same plane, the reinforcement may be fabricated from sheet metal complying with the dimensions in Article 2.15.

Any hole in a tube forming part of a safety cage structure shall be fitted with a bush, the wall thickness of which is at least the same as that of the tube. The bush shall be welded around its whole perimeter at both exit points.

15.1 Optional Members and Reinforcements:

- (a) **General:** Except where otherwise specified in Articles 12, 13 and 14, members and reinforcements shown in Drawings J-14 to J-16, J29 to J-33 and J-35 to J-45 are optional.

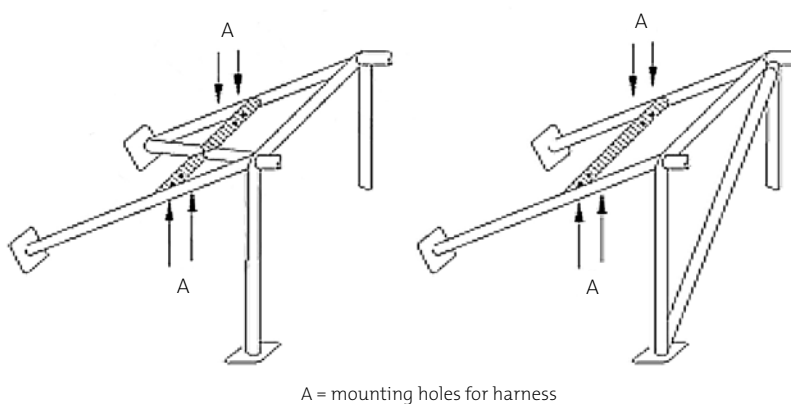
Installation shall be by welding or by dismantable joints detailed in these regulations.

Members and reinforcements may be used separately or in combination.

- (b) **Backstay Diagonals** (Drawing J-33): The configuration of Drawing J-33 may be replaced with that of Drawing J-34 only if a roof reinforcement complying with Drawing J-16 is used.
- (c) **Front Suspension Mounting Points** (Drawing J-37): Where Group technical regulations allow, the extensions detailed in Drawing J-37 may be incorporated. Where fitted, they shall be mounted to the front suspension top mounting points.
- (d) **Transversal Members** (Drawings J-38 to J-42): The transversal member fixed to the front rollbar shown on Drawing J-41 shall not encroach upon the space reserved for the occupants and shall not be positioned below the steering column. It may be placed as high as possible subject to its lower edge not being higher than the uppermost point of the dashboard.

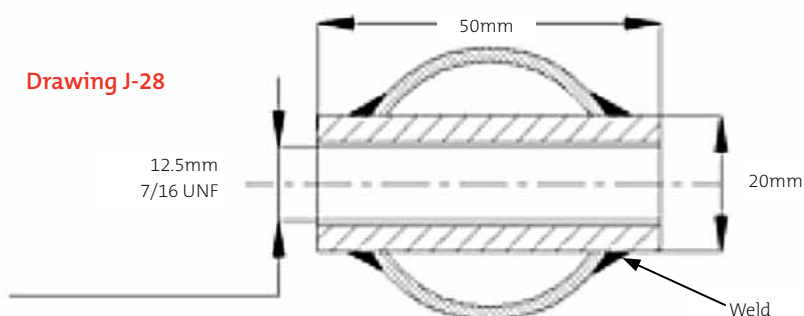
For members shown on Drawings J-38 and J-39, the angle between the central leg and the vertical shall be at least 30°.

- (e) **Safety Harness Mounting to a Transversal Member:** Welded transversal members fitted on the main rollbar or between the backstays may be used for the safety harness mountings provided the installation complies with Schedule I.



Drawing J-27

The harness shall be installed in accordance with the manufacturer's instructions and Schedule I. Any bolted attachment shall comply with Drawing J-28. Where a bush is inserted (which may be threaded) it shall be welded around its entire perimeter at each point it exits the member. The harness/es shall be mounted using bolts of M12 8.8 (ISO standard) or 7/16UNF or to manufacturer's specification.

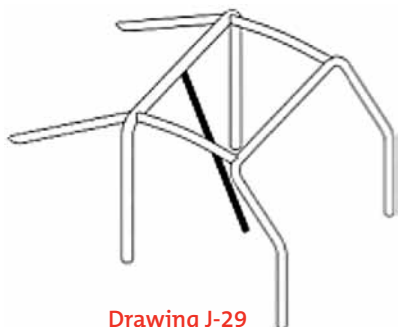


Drawing J-28

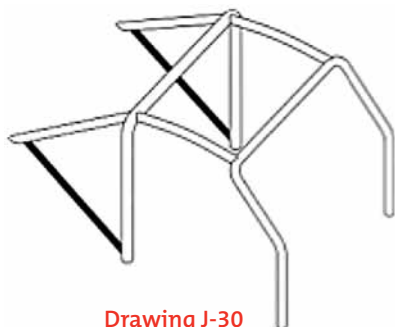
15.2 Reinforcement of Bends and Junctions:

Reinforcements shall consist of tubes or gussets made from sheet metal formed into a U-shape complying with Article 2.15.

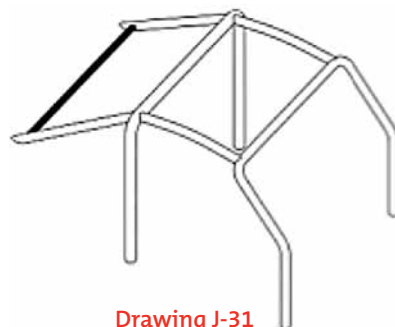
The end of a tubular reinforcement shown in Drawings J-43, J-44 and J-46 shall not be attached beyond the mid-point of the member.



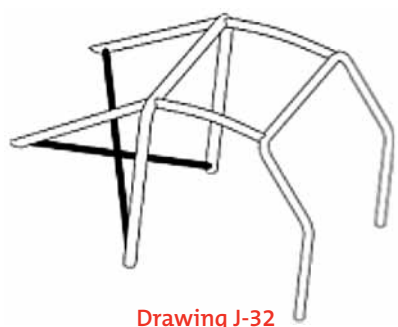
Drawing J-29



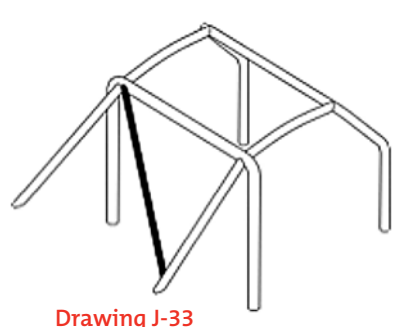
Drawing J-30



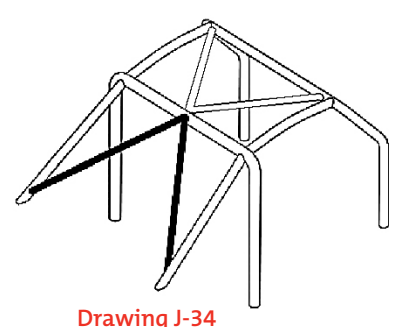
Drawing J-31



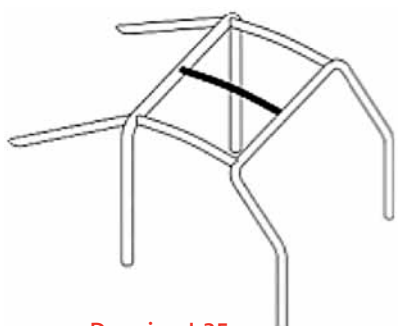
Drawing J-32



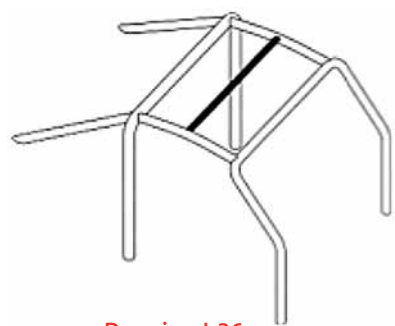
Drawing J-33



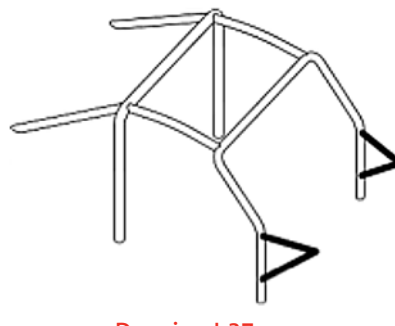
Drawing J-34



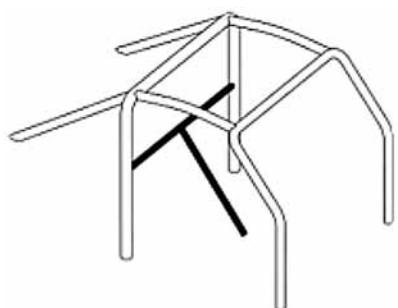
Drawing J-35



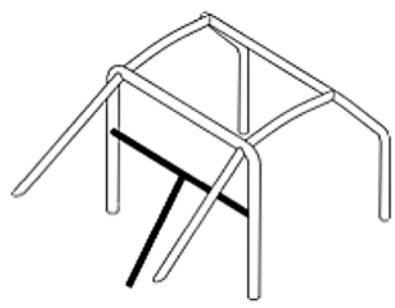
Drawing J-36



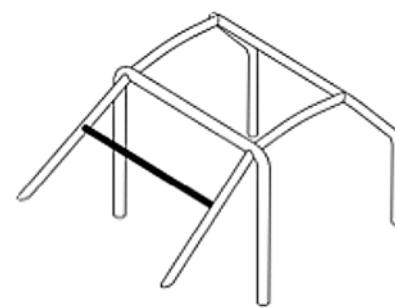
Drawing J-37



Drawing J-38

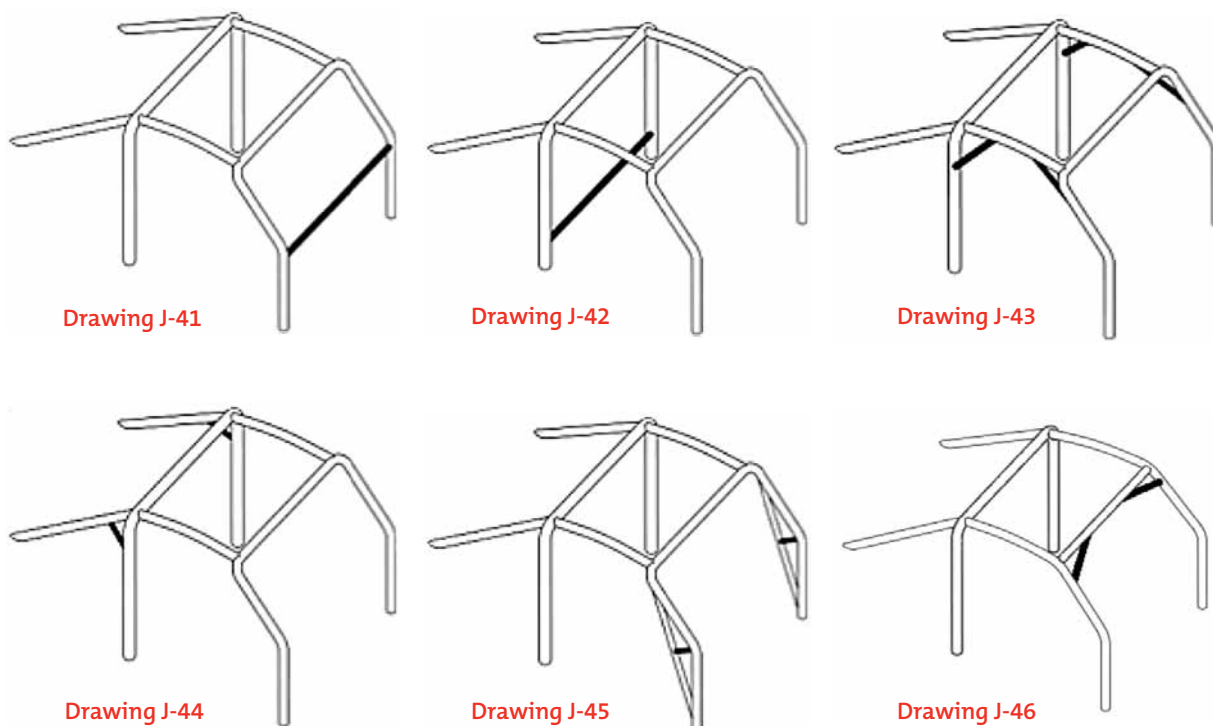


Drawing J-39



Drawing J-40

... continued

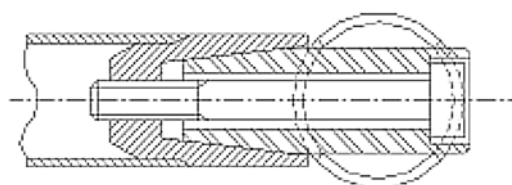
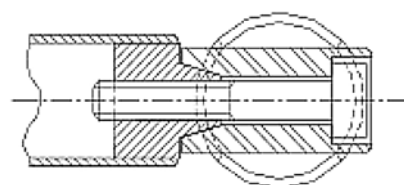
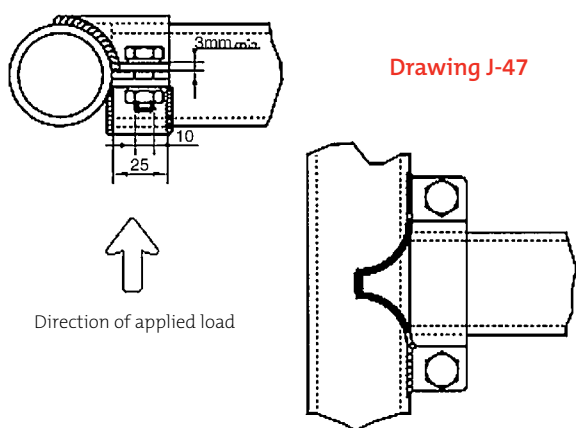


16. REMOVABLE MEMBERS

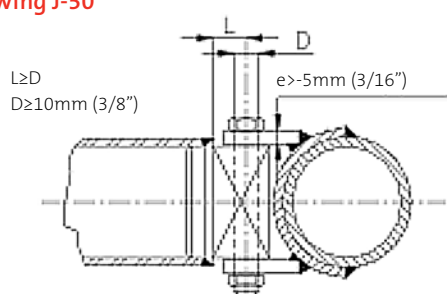
Removable members may be incorporated subject to the use of dismantable joints complying with Drawings J-47 to J-57. Such joints shall not be welded once assembled.

Any fastener used shall have a minimum quality of 8.8 (ISO standard).

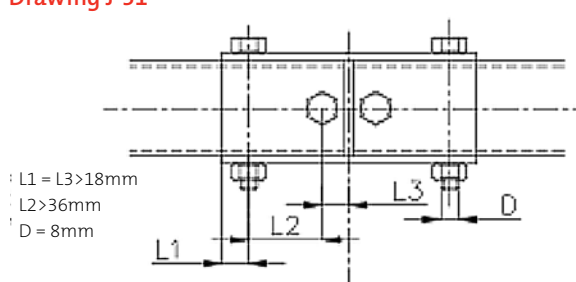
Dismantable joints complying with Drawings J-47, J-50, J-53, J-56 and J-57 shall be used only for attaching optional members and reinforcements described by Article 12.2. They are **not permitted** for joining the upper parts of the main rollbar, the front rollbar, the lateral half-rollbars or the lateral rollbars (refer Drawings J-2, J-3 and J-4).



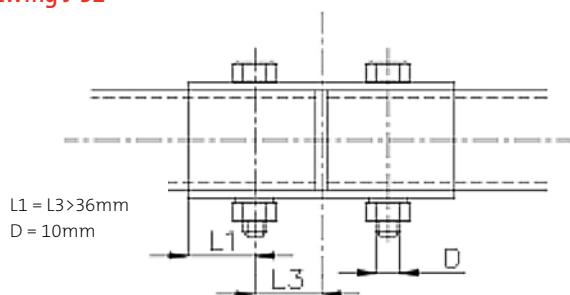
Drawing J-50



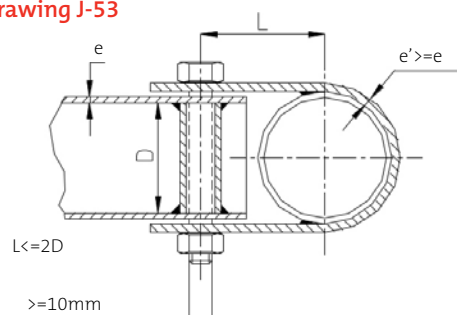
Drawing J-51



Drawing J-52

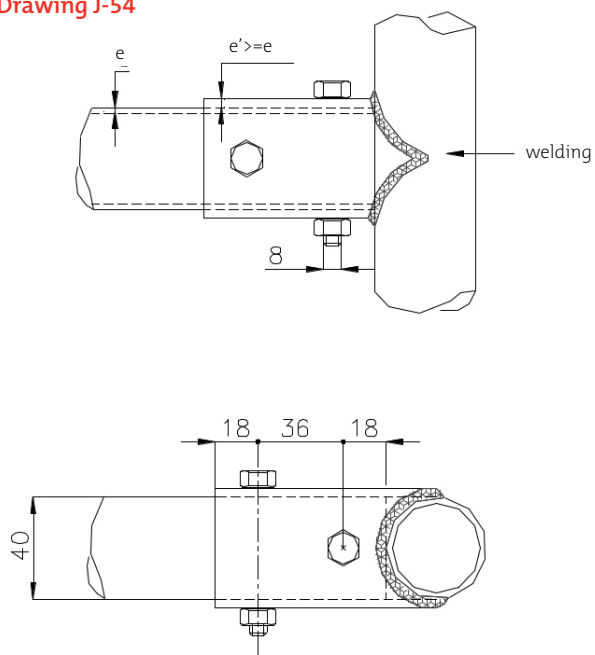


Drawing J-53

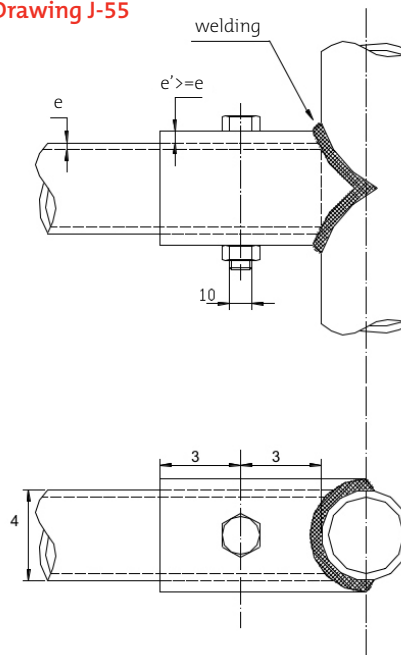


L must be minimum
The clamp width must be at least 25mm

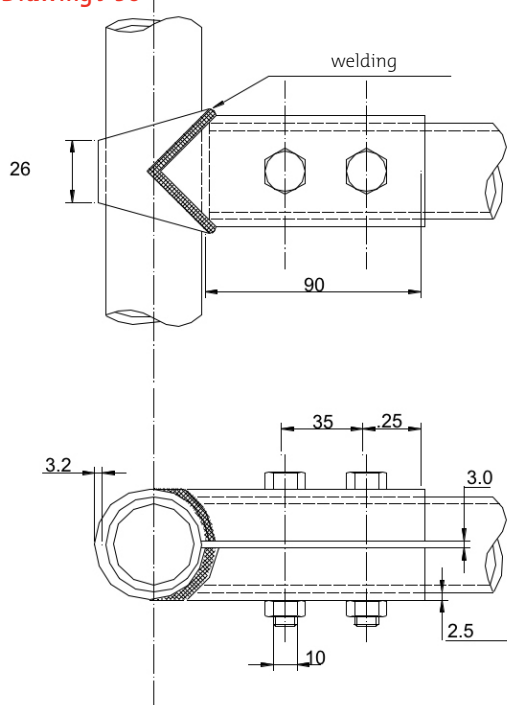
Drawing J-54



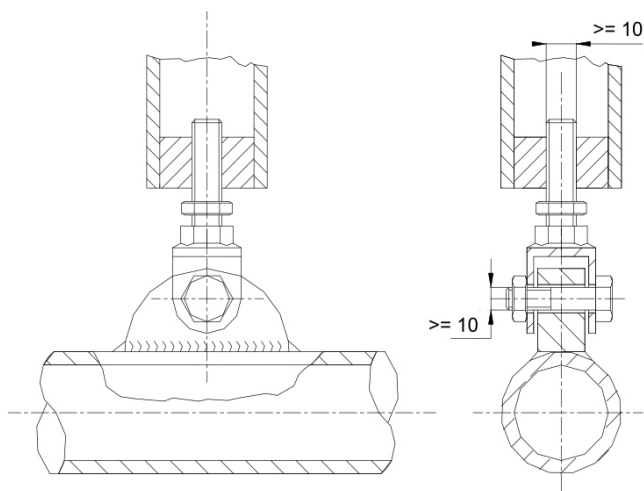
Drawing J-55



Drawing J-56



Drawing J-57



17. ADDITIONAL CONSTRAINTS

The safety cage structure shall be entirely contained longitudinally between centrelines of the front and rear axles. For international competition, refer FIA regulations.

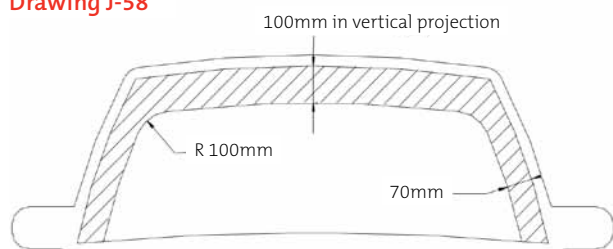
Supplementary reinforcements exceeding these limits are authorised between the safety cage structure and the anchorage points of the rear anti-roll bars on the bodyshell/chassis. Each of these anchorage points may be connected to the safety cage structure by a single tube with maximum dimensions of 30mm x 1.5mm.

In frontal projection, no additional member or reinforcement of the front rollbar (including the front legs) shall be visible beyond the shaded area of the windscreen, as shown in Drawing J-58.

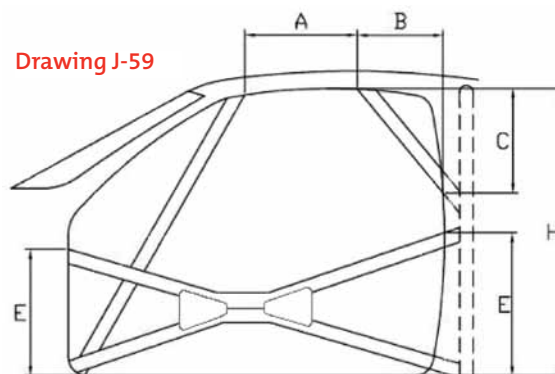
In side projection, any reinforcements in the front door aperture shall comply with the following criteria (refer Drawing J-59):

- Dimension A shall be a minimum of 300mm
- Dimension B shall be a maximum of 250mm
- Dimension C shall be a maximum of 300mm
- Dimension E shall not be more than half the height of the door aperture (H).

Drawing J-58



Drawing J-59



18. MOUNTING OF THE SAFETY CAGE STRUCTURE TO THE BODYSHELL/CHASSIS

18.1 Minimum Mounting Points:

The minimum mounting points are:

- one for each pillar of the front rollbar;
- one for each pillar of the lateral rollbars or lateral half-rollbars;
- one for each pillar of the main rollbar;
- one for each backstay.

18.2 Mounting Points of the Front, Main and Lateral Rollbars or Lateral Half-Rollbars:

- (a) Each mounting point shall include a mounting foot consisting of a plate at least 3mm thick.

Each mounting foot shall be attached by at least three bolts to a steel reinforcement plate at least 3mm thick and of at least 120cm² area which is welded to the bodyshell. Where attached by bolts, the angle between any two bolts shall not be less than 60° (measured from the tube axis at the level of the mounting foot circumference – Drawing J-60).

The area of 120cm² of the reinforcement plate shall be the contact surface between the reinforcement plate and the bodyshell.

Refer Drawings J-60 to J-66. For Drawing J-62 the reinforcement plate need not be welded to the bodyshell.

- (b) Fasteners shall have a minimum diameter of M8 and a minimum quality of 8.8 (ISO standard) and shall be self-locking or fitted with lock washers.

- (c) **Mounting Points - non-international use only**

As an alternative to welding reinforcement plates to the chassis of the vehicle detailed in Article 18.2 and 18.3, each attachment point of the safety cage structure may be fitted with a mounting foot and lower plate complying with Table 3 below (see also Drawing J-69). The mounting foot, complying with the area requirements shown below may be welded to the bodyshell, in which case the use of bolts and the lower plate is not required (see Drawing J-70).

Table 3

Application		Minimum Area	Minimum single dimension
Mounting foot	Vehicles under 700kg	65cm ²	55mm
	701kg to 1150kg	75cm ²	65mm
	Over 1151kg	100cm ²	75mm
Lower plate		45cm ²	Matching upper plate

continued ...

18.3 Mounting Points of the Backstays: Each backstay shall be secured by at least two M8 (minimum) 8.8 (ISO standard) bolts with mounting feet of an area at least 60cm² (refer Drawing J-67). Alternatively it shall be secured by a single M10 8.8 (ISO standard) bolt in double shear (refer Drawing J-68), provided each mounting plate is at least 3mm thickness steel with a bush fully welded into the backstay.

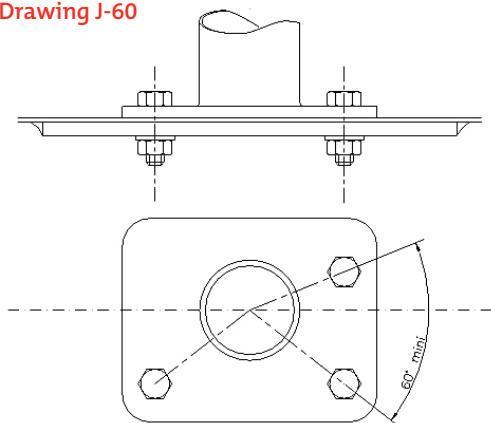
Note: Refer also to Article 18.2(c) for alternate provisions for non-international safety cage structures.

18.4 Additional Fasteners and Welding: Additional fasteners and/or fasteners of larger dimensions may be used. The safety cage may be attached to the bodyshell/chassis by welding or bolting in locations additional to the minimum mounting points detailed in Article 18.1.

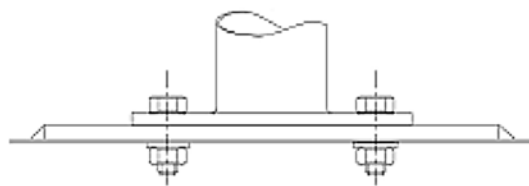
18.5 Special Cases:

- (a) **Non-steel bodyshells/chassis:** For non steel bodyshells/chassis, any welding between the safety cage structure and the bodyshell/chassis is prohibited. In addition to mounting by bolts, only the bonding of the reinforcement plate to the bodyshell/chassis is permitted.
- (b) **Spaceframe Construction:** The safety cage structure of a spaceframe constructed vehicle shall comply with Schedule J from at least above the predominantly horizontal portion of the chassis. Parts of the safety cage structure may extend below this horizontal plane and become integral with the chassis. The safety cage structure shall also comply with any relevant Group or other technical regulations.

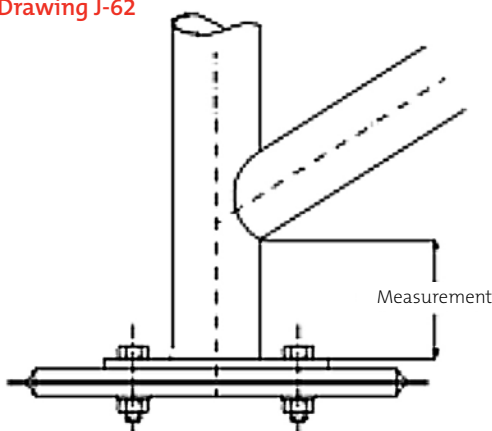
Drawing J-60



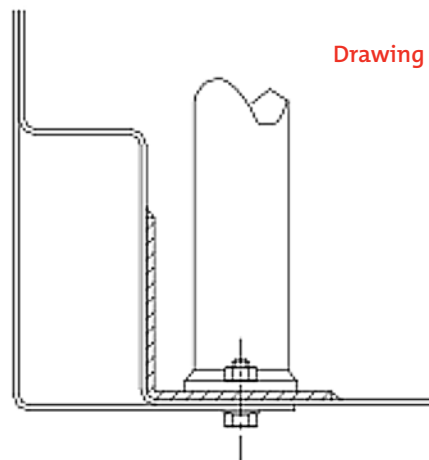
Drawing J-61



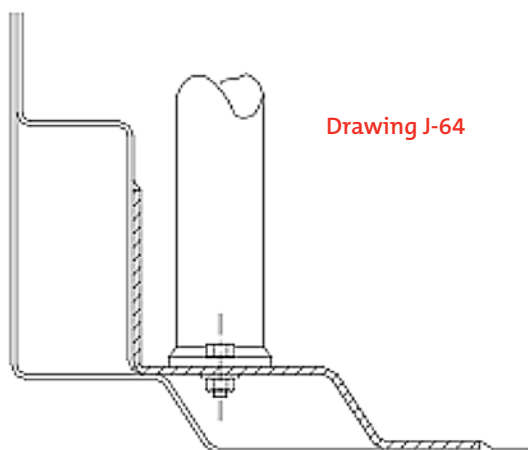
Drawing J-62



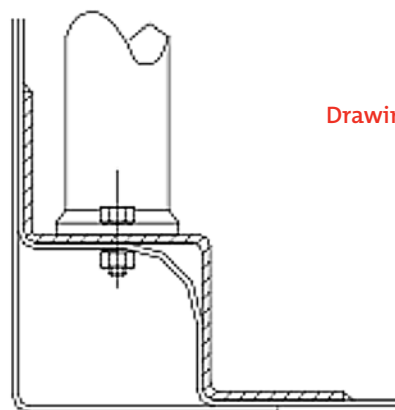
Drawing J-63

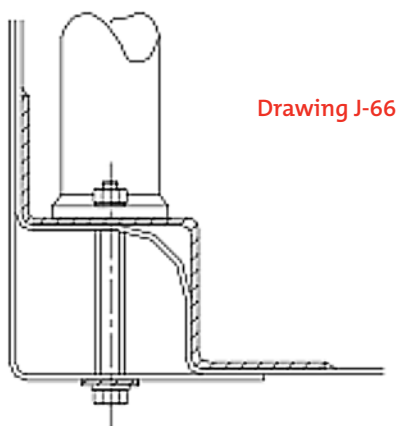


Drawing J-64

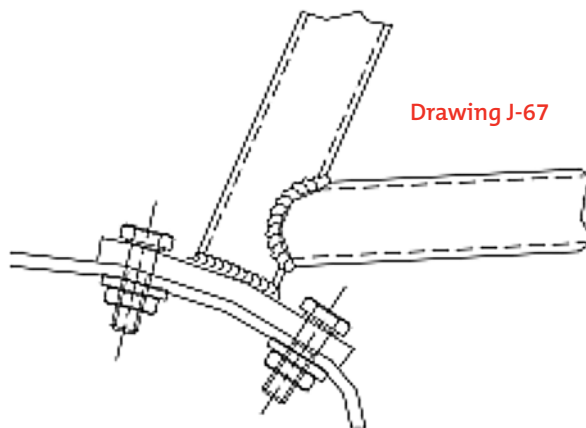


Drawing J-65

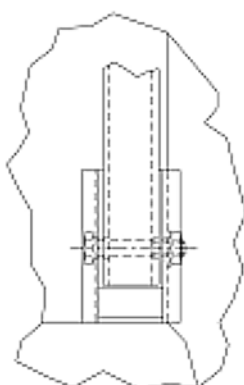




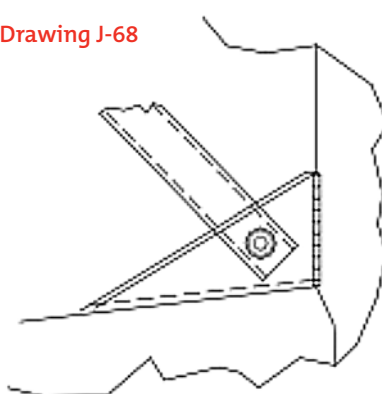
Drawing J-66



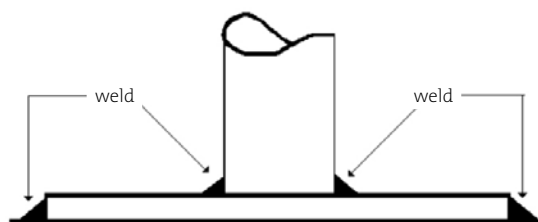
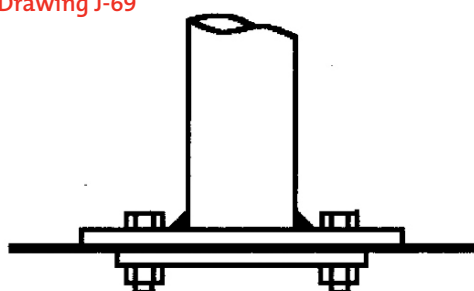
Drawing J-67



Drawing J-68



Drawing J-69



Drawing J-70