



NZJBRRRA Safety Cage Application for Endorsement

Introduction

Safety cage Specification:

All Race Boats Competing in NZJBRRRA Sanctioned Events must have a Safety Cage Fitted that complies to the RRA Safety Cage Specification.

These Specifications can be found in the Current yearbook Rules for River racing and on the NZJBRRRA Website.

Technical Committee:

All Safety Cages will require Inspection by the RRA Technical committee before they can be used in competition.

The RRA Technical committee is a group of competent people which will gauge the following criteria.

- Material Selection.
(and compliance against minimum specifications for Tube and consumables used)
- Design (Fit for Purpose as prescribed in the Specification)
- Build Quality.
- Assess the Safety cage against the RRA Safety cage Specification document and endorse them as being compliant against the Specification.
- It is Recommended any new Cage build follows the design set out in the Safety Cage Specifications.
- Any Existing Steel Cages that are being modified to comply with the intent of the Safety Cage Specification will also be allowed and will require the design to be approved by the Technical committee.

Endorsement Procedure:

- Minimum 3 members of The Technical Committee will be required to endorse a safety cage as compliant.
- RRA Technical Committee then endorses the Boat Logbook.
(Which will be supplied on issue of compliance) and applies compliance Label to Cage all associated paperwork is then recorded in database on server (Like driver medical).
- Compliance Label will be a tamperproof Sticker that is displayed on each cage to the scrutineers for the annual inspection to imply the cage has already been vetted as compliant for competition use.
- In the event of incident or damage to Compliance label only tech committee can reassess the damage or re-apply compliance labels

If members require any Assistance or Guidance with the design, manufacture or compliance with the technical specification please contact the NZJBRRRA Technical Committee:

**Instructions for using this Form.**

1. Complete ALL applicable boat details
2. In Section 2 complete Constructor details and in Section 9 the appropriate Declaration must be completed and signed.
3. In section 7 Constructor Declaration is for all individuals constructing compliant safety structure.
4. In section 8 A clear and accurate line drawing of the structure must be provided detailing all the tube members incorporated into the safety structure.
5. All tube members of the structure must be detailed and identified in the drawing.
6. Only tube complying to the NZJBRRRA specification for safety cages is authorised.
7. All Materials individual specifications should be stated in the endorsement form as per the material 'specification sheet' available from the material supplier.
8. Measurements of the main roll bar and front/lateral roll bar top bends; reduction (A) and expansion (B) must be accurate to the nearest 0.1mm. Measurements should be performed at the centre of the bend radius and prior to welding in other members.
9. The person performing the welding must be an accomplished trade's person with trade qualifications and/or proven/trade experience.
10. The welding declaration MUST be ticked to confirm that all joins of the principle structure are welded through 360° using a full penetration weld.
11. A reinforcement plate welded to the hull is mandatory for each lower attachment point of the main & lateral/front roll bars and the backstays – material and measurements used must be provided. The minimum area for coverage is that portion of the Cage tube in full contact with the hull.
12. Accompanying Photographs: All applicable photographs must be included with this application. All photographs must be of the UN-PAINTED structure and must be clear and close-up views. Hi resolution digital photos are preferable.
13. A visual inspection of the Safety cage will be required by the RRA technical committee before endorsement will be given. This can be arranged during fabrication or upon completion and will also require an unpainted structure to confirm no Joins or filling is present in the safety structure. Photographic evidence may be acceptable however this will need to be approved by technical committee prior to endorsement is solely at the discretion of the committee.

**Section 1 - Boat details (All details are at time of endorsement)**

Boat Make:

Boat Model:

Year of Manufacture:

Boat Hull No:

Registration No:

Section 2 - Safety cage Constructor Details

Constructor Name:

Postal Address:

Email Address:

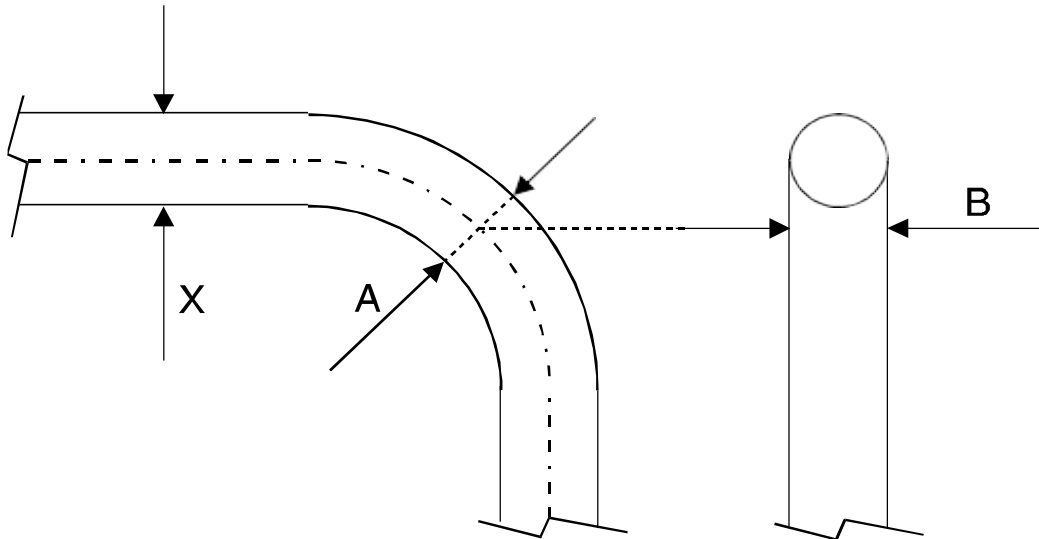
Daytime Phone No:

Section 3 – Material Specification

Cage Member Number	Cage Member Name	Material used (CrMo, NZRCT)	External Diameter (MM)	Wall Thickness (MM)	Tensile Strength MPA
1	Front Loop				
2	Rear Loop				
3	Backstays				
4	Diagonals				
5	Screen bar				
6	Harness bar				
7	Side intrusion				
8	Reinforcing				
9	Brush bar				
10	Seat base				
11					
12					
13					
14					
15					



Section 4 – Cage Bend Measurements (Tube Ovality)



Item	Main Loop	Rear Loop
Original Tube OD	X = MM	X = MM
Reduction	A = MM	A = MM
Expansion	B = MM	B = MM
Calculation	A / B = MM	A / B = MM

Section 5 – Welding Details

Primary Welding Method and Declaration: Please tick appropriate Box	Mig Weld <input type="checkbox"/>	All Joints Mitered and welded through 360 degrees <input type="checkbox"/>
	Tig weld <input type="checkbox"/>	
Welders Name and Qualifications / Endorsement		
Welding Consumable used	UN # Heat # Brand Name:	

**Section 6 - Hull Attachment**

	Front Loop	Rear Loop	Backstays
Base Plate Cage (Cage Mounting plate)	Material: Thickness: Area:	Material: Thickness: Area:	Material: Thickness: Area:
Footing plate Hull (Alloy Hull Plate)	Material: Thickness: Area:	Material: Thickness: Area:	Material: Thickness: Area:
Attachment fixing details: (Minimum Grade 8.8 Fasteners to be used)	Fastener Size: Fastener Grade: Locking Method:	Fastener Size: Fastener Grade: Locking Method:	Fastener Size: Fastener Grade: Locking Method:
Demountable joints (specific details e.g. bolted, sleeved, clamp etc.)			

Section 7 – Constructor Declaration

I hereby declare that I have read and understood the requirements of this endorsement and that the structure as detailed in this application has been designed, fabricated and installed with every intent to comply with the current specified requirements of NZJBRRRA Safety Cage Specification.

Constructor Name:

Company (If applicable):

Formal Qualification /Endorsed Competency:

Signature:

NZ JET BOAT



RIVER RACING ASSOC.

Section 8 - Safety Cage detail drawings

A large, empty rectangular box with a thin black border, intended for safety cage detail drawings.

1) Safety Cage Design Specification

- a) RRA Safety Cage Design Specifications
 - i) The intention of these minimum specifications is to provide the best possible protection to drivers and navigators, taking into consideration the accidents which have occurred within the sport over all nations that compete. NO guarantee is implied or stated, nor is any responsibility taken regarding the degree of protection or safety afforded by any safety cage construction to these specifications. Owners are encouraged to seek the advice of a structural engineer qualified in safety cage design.
- b) Roll Cage Materials
 - i) The 2 main hoops shall be made out of 44.5mm diameter, either round chrome moly tube (SAE 4130), minimum wall thickness 2.1mm or NZ Tube Mills - Roll cage Tube (NZTM-Q29/C350/ERW) or ITM - Roll cage Tube (MSNZ-Q29/C350/ERW), minimum wall thickness 2.6mm or DOM tubing (1018 to 1026) with a minimum wall thickness 2.6mm. All other braces & struts can be made out of 38.1mm diameter of the same tube type and minimum thickness. Aluminium is NOT permitted.
 - ii) For existing steel safety cages (prior to June 2018) with main hoops of 38.1mm diameter, these may be acceptable providing proof of the material type can be confirmed and the configuration is acceptable to the NZJBARRA Technical Committee.
 - iii) Attaching plates shall be a minimum of 5mm thick steel.
 - iv) No equipment inside the boat may be attached to the cage structure if it compromises the safety cage integrity.
- c) Welding and forming
 - i) All joints shall be fully welded by a competent welder and remain unground using the correct welding process for the material and TIG (Tungsten Inert Gas) or MIG (Wire Feed) welds shall employ a steel filler metal which is compatible with the base material.
 - ii) Chrome Moly joints shall be preheated and welded in 90-degree increments to avoid brittleness.
 - iii) Tubes shall be contoured and shaped for a close fit prior to welding.
 - iv) Tubes cannot be flattened in order to make a joint.
 - v) The manufacturer shall fill out the declaration on the appropriate Endorsement form.
 - vi) The main hoops of the cage may not be repaired by splicing, patching, cam-shelling, etc. All other components may be repaired by splicing, patching, clam-shelling, etc. according to generally accepted aircraft repair procedures. Each splice joint shall have an insert of 6" (152mm) minimum 3" (76mm) on each side of the joint centreline with rosette welds visible.
- d) Configuration & crew protection
 - i) The recommended configuration of the cage is either a "A" frame or half "A" frame with additional rear bracing struts and shall have a minimum of 2 main hoops. Rear bracing struts may be removable with a bolted splice (Fig. 1). Other configurations are acceptable providing they provide the same level of protection as set out below and are approved by the NZJBARRA Technical Committee.
 - ii) The main hoops shall be one-piece continuous tubing. No welds permitted other than at attachment points.
 - iii) The top corners of the main hoops shall be formed with one bend formed on a bender suitable for bending the material size used, ovality distortion to be no more than the wall thickness of the tube.

- iv) The 2 main hoops shall be spaced apart at the head so that the helmet side elevation is fully protected from the front hoop and shall have a minimum of 3 tube spacers. (Fig. 1) Additional side intrusion bars may be added to provide this protection.
- v) The mounting points for the cage shoulder straps behind each crew member shall be between a line horizontal to the shoulders and a line drawn downwards from the shoulders at an angle of 25 degrees to the horizontal. (Fig.2)
- vi) On the side of the 2 main hoops there shall be a brace between approximately halfway up to form an A section. Each hoop at this point should be attached to the side panel (deck coaming) with 1x M8 bolt (Fig. 8). It is recommended that this brace extend around the inside of the top of the screen and be secured by 4x M8 bolts to the screen to provide support under impact loads from water or obstacle (Fig.7).
- vii) For new boats constructed after June 2018, Helmet clearance shall be 150mm from the main hoops for the tallest crew member and 100mm from the X brace or rear obstruction (Fig. 1). For older cages 100mm top clearance is acceptable providing there is sufficient inverted side escape area.
- viii) An X-styled brace going from the corner of the rear main hoop to either:
 - (1) The back cross bar then down to the engine bearers or outer chine area,
 - (2) Goes directly to the engine bearers or chine area and joined where they intersect (If the lower part of the X-brace goes to the outer chine, it shall have suitable load distributing plates on attachment points (Fig. 7), or,
 - (3) Bracing from the engine bearer to the deck coaming then to the centre of the hoop for turbines.
- ix) At the base of the side of the 2 main hoops, there shall be a brace between parallel above the chine for the seat rails to connect to. It is recommended that this brace extend around to the front screen support member then around to other side brace (Front impact struts) (Fig.5). This brace shall be clear of the crew's feet and is not required if there is a front bulkhead.
- x) The base connection to the hull of the main hoops shall be a 5mm minimum thick steel plate or angle, welded centrally to the hoop. This will be connected to the chine by a 10mm thick aluminium plate welded to the chine and bolted together with 2x M10 bolts or 4x M8 bolts or 6x M6 bolts (Fig. 8). There shall be a stiffening plate across the sponson at the fixing location.
- xi) The front hoop or side intrusion bars shall be in front of equal to the front of the crew's helmet when viewed from the side (Fig. 6). This is to provide protection to the crew from over hanging obstacles. It is important that this hoop position does not compromise the inverted side escape zone (Fig.2).
- xii) The top of the screen shall be of a height equal to the bottom of the crew's helmet (ie. No more than the crew's helmet may extend above the screen) and shall be of an angle that will deflect water and front on obstacles over the helmet. It is recommended that the top of the screen be supported from the centre deflection bar and screen support brace of the cage. This will then either be supported by a bulkhead or deck support struts to the base of the hull (Fig. 5).
- xiii) The top deck shall be supported to the base of the boat by support a bulkhead or vertical struts. This is to prevent the deck from collapsing under impact loads.
- xiv) A mid deflection bar from the centre of the front hoop to the top deck of the boat shall be installed to help deflect over hanging obstacles over the cage (Fig. 5).
- xv) Inverted side escape zone – There shall be sufficient space for the crew to escape and inverted or overturned boat (Fig. 2).

- xvi) Seat mounts shall be mounted to the cage. The seat base assembly shall either be constructed using the same welding & fabrication procedures as for forming the roll cage structure or constructed from Aluminium bolted to the A frame base brace (Fig. 9). Seats shall have side head support.
 - xvii) Seat belt harness points shall be secured to the safety cage and be constructed to withstand the same force as the harness is designed for. Harness anchoring bolts shall be a minimum size of a 7/16, 20UNF- threaded eye bolt and have suitable back up washer. Shoulder straps may be laced to the X frame as above.
 - xviii) Safety cage padding with a minimum 20mm thickness shall extend a minimum of 180 degrees around the safety cage tubing and be of high density foam padding. Padding shall be placed where in the event of an accident the expected trajectory of the occupant's body parts may make contact.
- e) Method of Securing
- i) Attachment plates or load-spreading flanges shall be welded to the tube ends to secure the cage to the boat and shall be at least 5mm minimum thickness.
 - ii) For rectangular plates:
 - (1) Minimum width of the plate = tube diameter.
 - (2) Minimum length of the plate + tube diameter x 2.
 - iii) For circular attaching plates: minimum diameter of round flanges should be tube outside diameter x 2.
 - iv) The safety cage may only be bolted to the boat as above.
- f) Safety Cage Endorsement
- i) Endorsement is the term applied to the process which ensures that a safety structure has been constructed to the RRA roll cage design specification. The purpose of this section is to provide guidelines relative to the application requirements and processing of safety cage endorsement by the NZJBARRA Technical Committee.
 - ii) As a general rule, safety structures may be fabricated by anyone who has the required knowledge, skills and ability although it is highly recommended that this work is entrusted to a qualified professional.
- g) Endorsement Process
- i) This is the general standard for safety cage/roll bar compliance (acceptance) and is required for all boats competing in events associated with NZJBARRA. The structure shall be endorsed by NZJBARRA and a copy of the compliance shall be contained in the boats NZJBARRA competition logbook.
 - ii) Each cage will have a self-destructing compliance sticker applied when endorsed by the RRA Technical Committee.
 - iii) All applications for Endorsement shall be submitted on the current Safety Cage Endorsement Application – Technical Form T1.
 - (1) Material Specification Unknown: Where the material specification is unknown the owner of the boat will be required to provide evidence to the RRA Technical Committee of the materials suitability.
 - (2) Material Dimensions Unknown: Where the material dimensions (specifically wall thickness) are unknown, these dimensions shall be determined physical measurement or UT thickness testing. This applies to all members used in the principal structure. Measurements shall be performed by a member of the NZJBARRA Technical Committee. Where the material dimensions differ from the stated minimums the structure will be subject to approval by the NZJBARRA Technical

Committee and (dependent upon approval) may be endorsed under Alternative Design.

- (3) Welding Details Unknown: Where the welding details are unknown, and the appearance of the welds clearly show a professional standard of workmanship this information may be omitted. Should the appearance be questionable, in any way, then confirmation of weld integrity must be proven by the manufacturer/boat owner. All member joins of the Principle Structure shall be welded through 360°.
 - (4) Declaration by Manufacturer / Constructor: When, for whatever reason, the declaration is not completed by the original manufacturer / constructor then a signed Letter of Compliance shall be submitted by the applicant. This shall state that the applicant has unsuccessfully attempted to obtain the required signoff by the original manufacturer / constructor and the reasons why, the material description / dimensions have been established and a hardness test performed (for indicative strength), and that to the best of the applicant's knowledge the structure meets the minimum requirements of these rules.
 - (5) Painted Structure: When, for whatever reason, the applicant elects to submit photographs of a painted structure with an initial Endorsement application, then a physical inspection of the structure will be required by a member of the NZJBRRR Technical Committee. A report may be produced detailing any specific features / necessary work required prior to Endorsement / approval being granted.
- iv) Repairs to a damaged Safety Cage
- (1) Where damage is sustained to an approved Safety Cage, repairs may be authorised by the NZJBRRR Technical Committee.
 - (2) In all cases the following applies;
 - (a) Initially contact the NZJBRRR Technical Committee for approval/guidance prior to any repair work commencing.
 - (b) Repairs may only be performed by a competent welder and remain unground using the correct welding process for the material.
 - (c) Any damaged tube members (in the principle structure) shall be replaced in their entirety.
 - (d) All material used shall respect the original specification and dimensions of the originally endorsed structure or as approved in writing by the NZJBRRR Technical Committee.
 - (e) If there are any changes made during the repair to the original specification and dimensions of the originally endorsed structure, then approval shall be authorised by the NZJBRRR Technical Committee prior to the repair commencing.
- v) Figures 1-4
- vi) Figures 5-8
- vii) Figures 9-10
- h) The NZJBRRR Technical Committee;
- i) Shall be appointed by the NZJBRRR Management committee,
 - ii) The role of the committee is to provide the NZJBRRR with a pool of suitably qualified individuals who together can make technically sound decisions around safety cage design and manufacture,
 - iii) The committee need not be members of the NZJBRRR, more importantly they should have the technical/trade background to support their inclusion,
 - iv) The committee shall consist of not less than 3 members.

Half A-frame with rear bracing struts

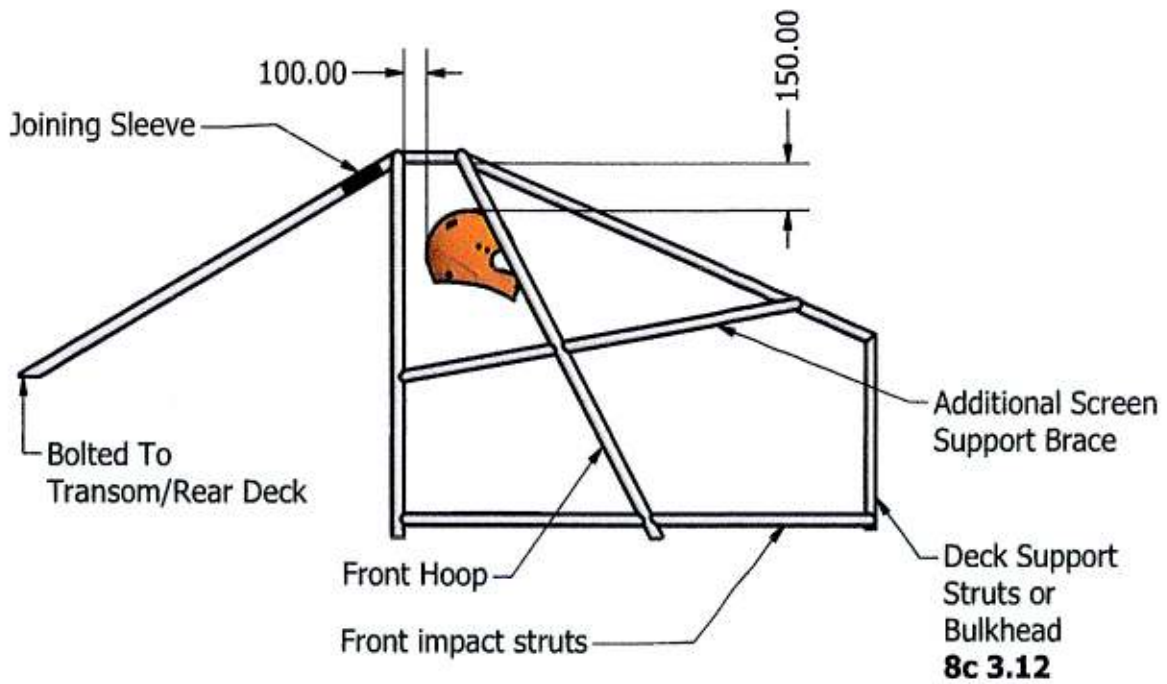


Fig.1

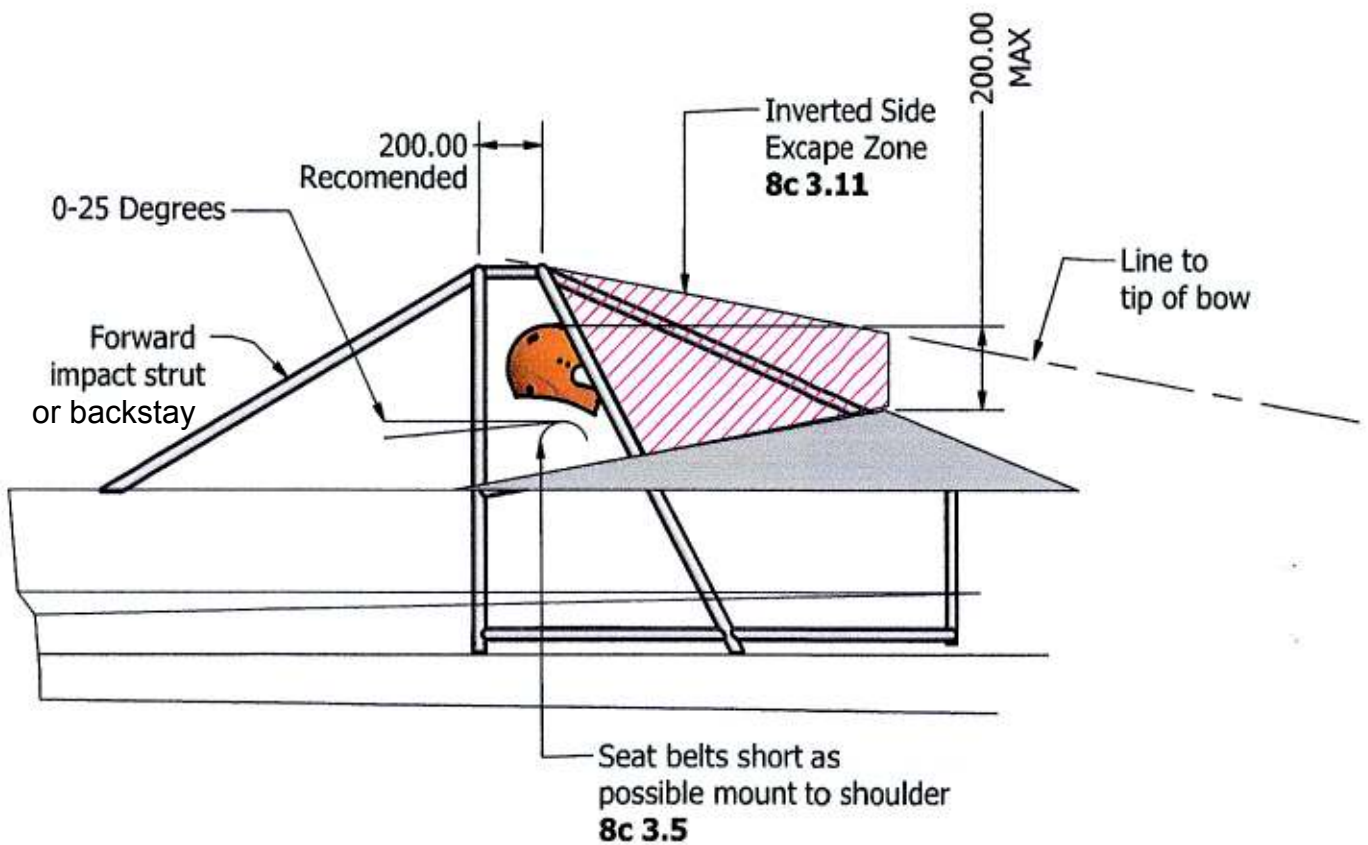


Fig.2

Half A-frame with rear bracing struts

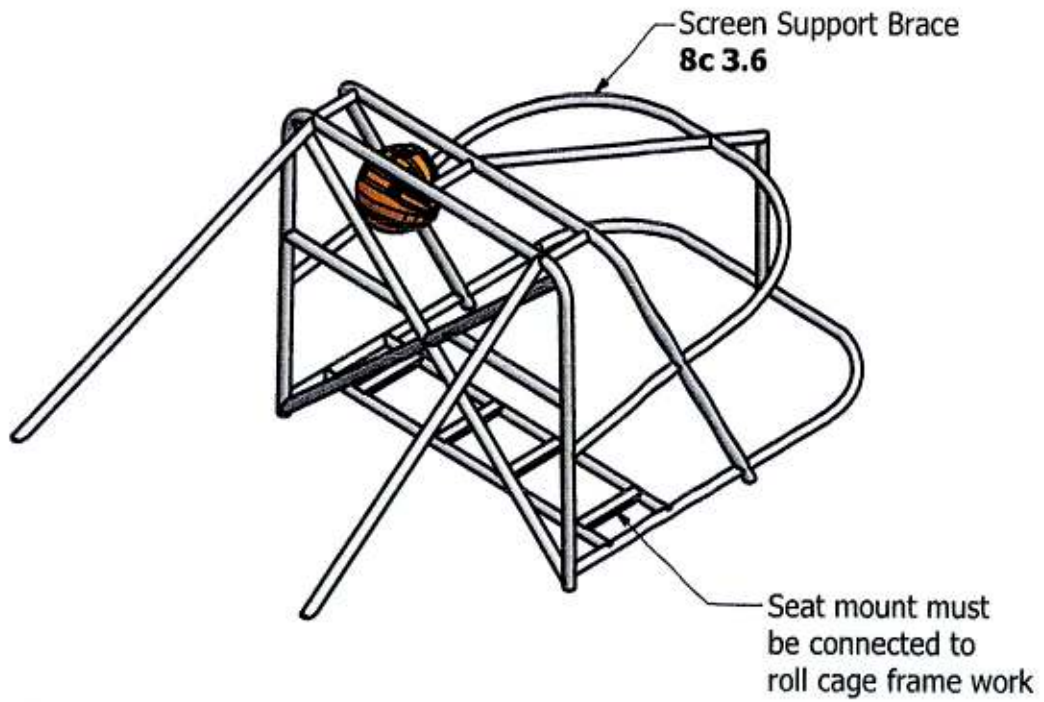


Fig.3

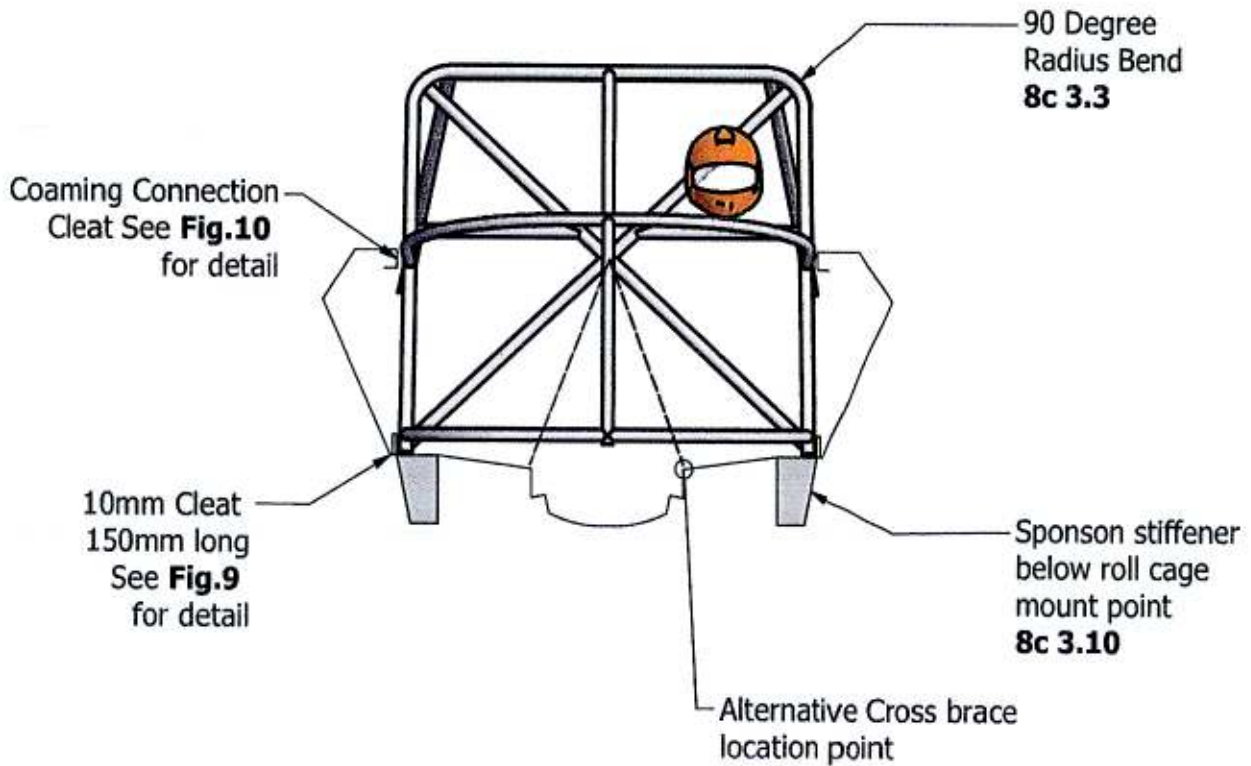


Fig.4

A-Frame Layout

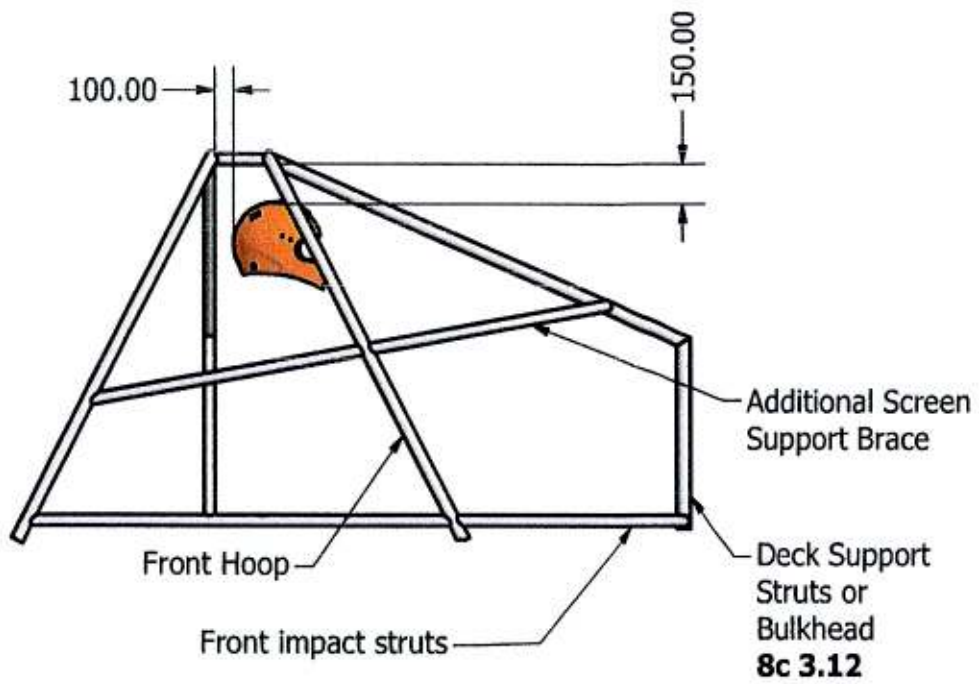


Fig.5

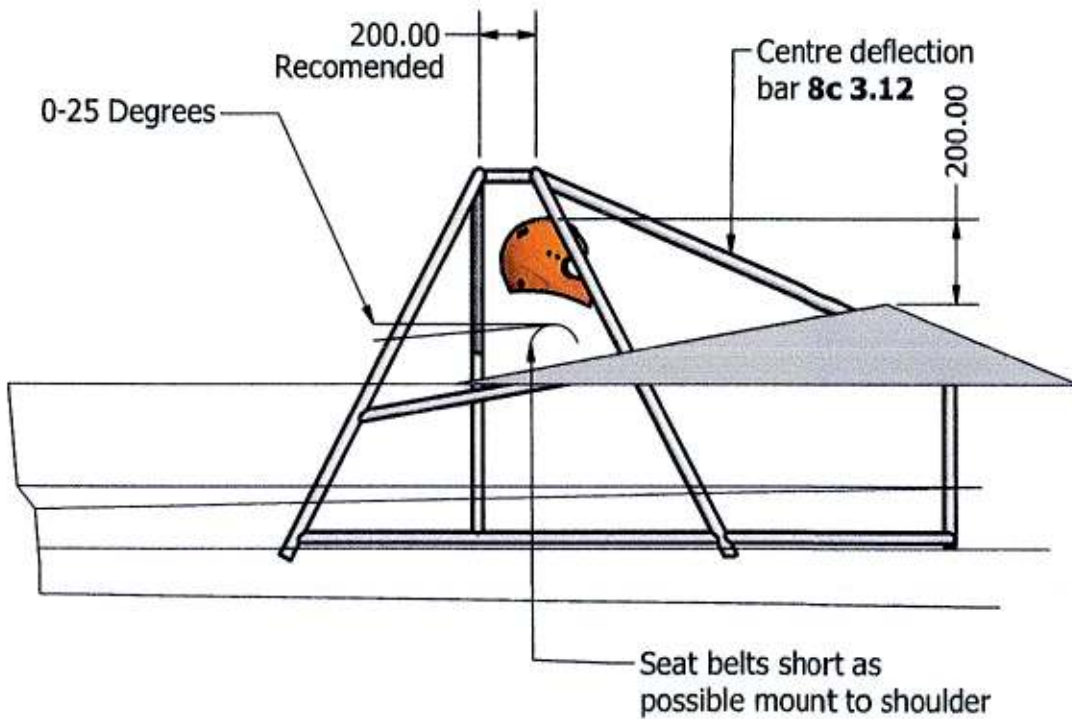


Fig.6

A-Frame Layout

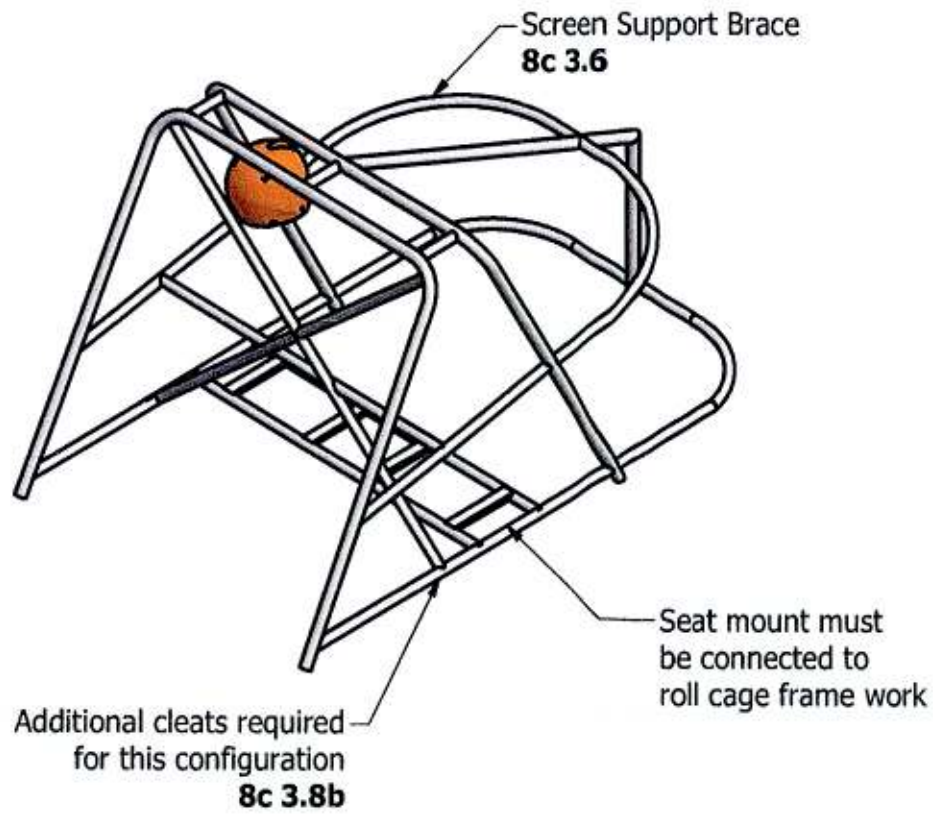


Fig.7

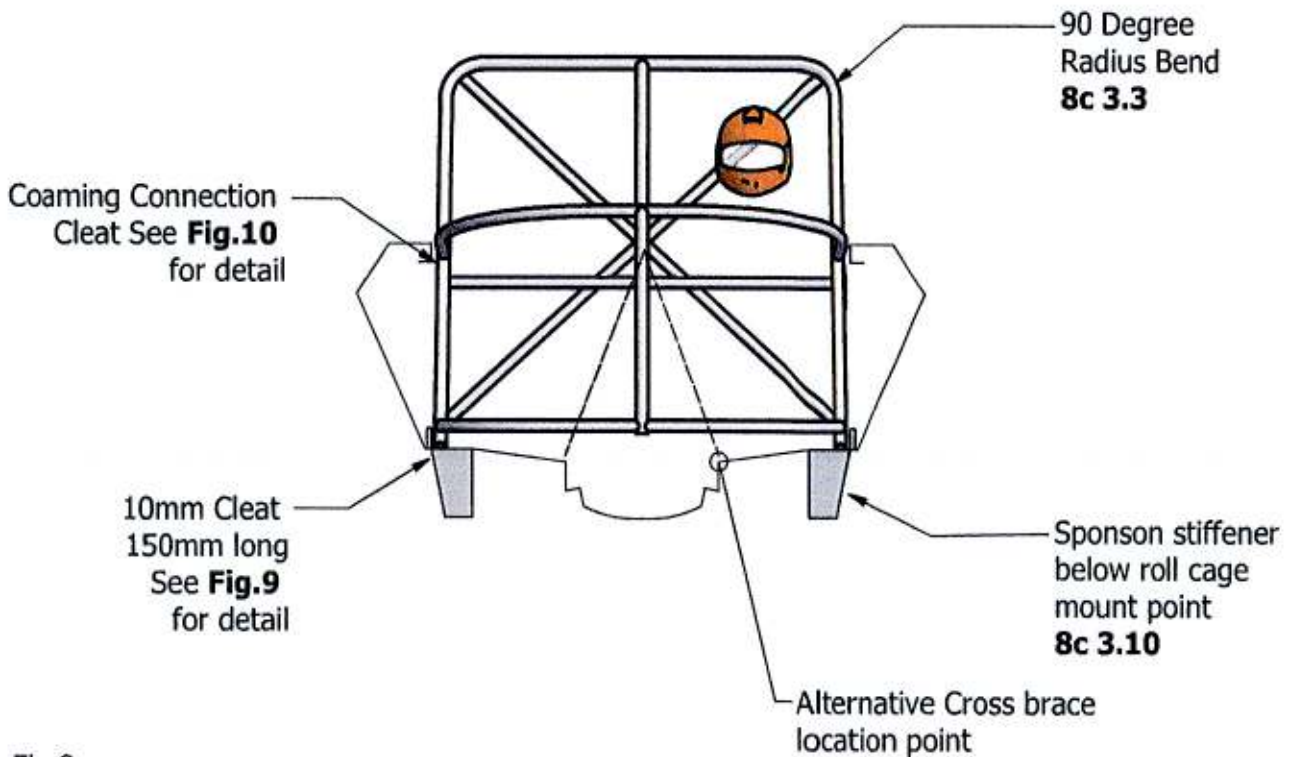


Fig.8

Example Of Roll Cage Base Mount

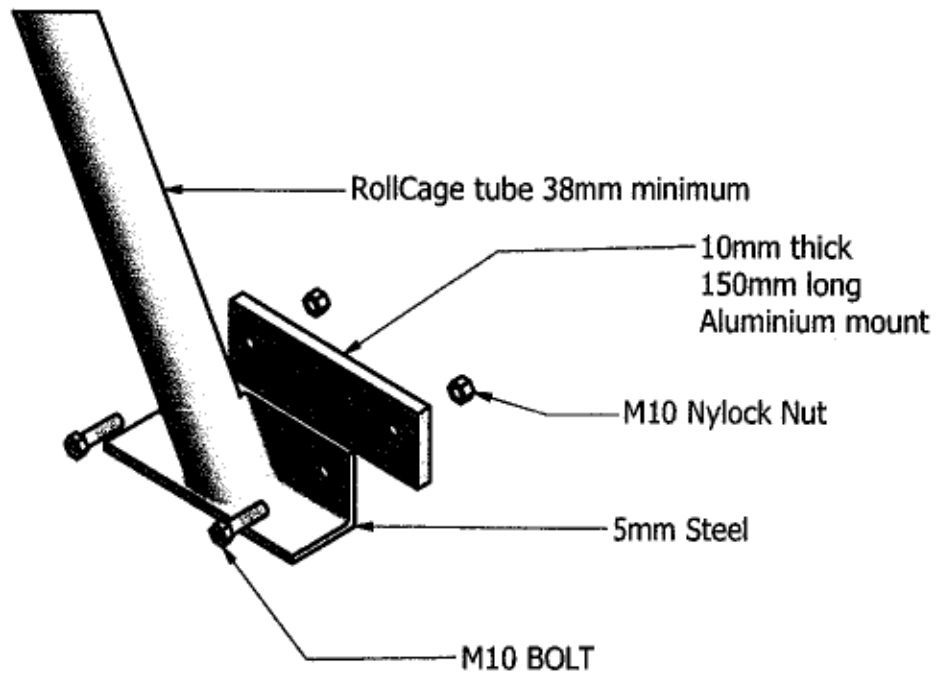


Fig.9

Example Of Roll Cage Coaming Cleat Mount

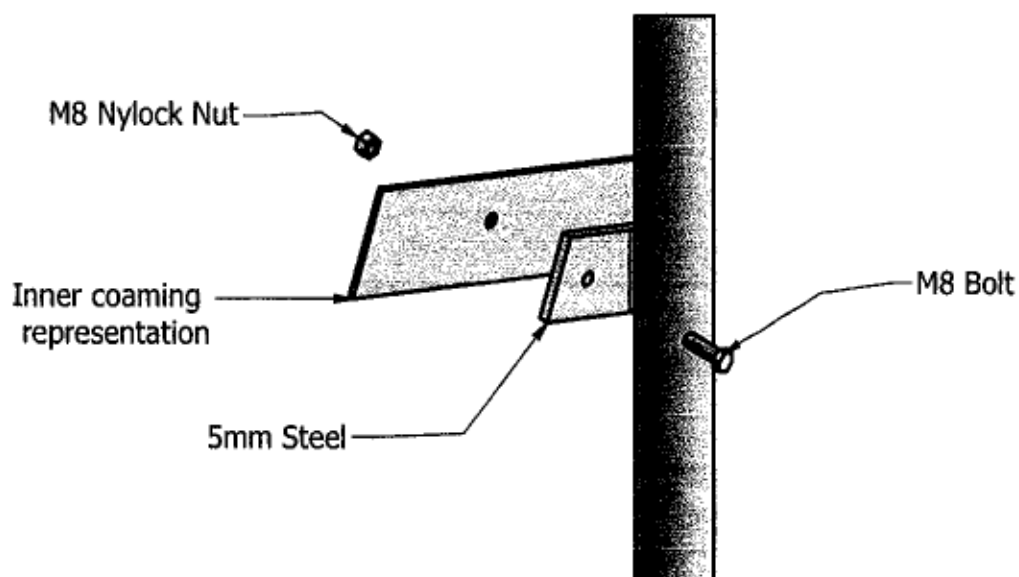


Fig.10