



Welded Rollcage Specification v3.2

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1.0 About This Specification.

This document is the official Welded Rollcage Specification of the Australian National Drag Racing Association Ltd (ANDRA), the preeminent controlling body of drag racing in Australia, recognised by the Confederation of Australian Motor Sport (CAMS) and the Federation Internationale de l'Automobile (FIA). The validity of this specification as an official ANDRA publication will be noted by ANDRA Stewards Hearings, Tribunals and the Australian Motor Sports Appeal Court (AMSAC).

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All changes to requirements of the ANDRA Removable Rollcage Specification v3.1 are highlighted by Orange text in this new ANDRA Removable Rollcage Specification v3.2.

The requirements published in this specification remain in effect until suspended or revised by the ANDRA Board. Announcement of such changes will be notified in writing to all ANDRA Divisional Councils and posted on the ANDRA website giving at least 28 days' notice on implementation of a change, or immediately in the case of urgent safety amendments.

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2.0 Introduction

All ANDRA Specification Welded Rollcages that begin fabrication **after 1st August 2019** should comply with the applicable specification in this document.

This design specification is intended for a full-bodied car with a stock or modified/ OEM floorpan with a firewall and with an OEM frame or Uni-Body construction, used in ANDRA drag racing competition. There is no competition ET limitation on a welded rollcage, except for those specifically listed under Single Rollover Hoop and Four Point Rollcage. Please note that in some classes there are mandatory minimum requirements where the rollcage structure must meet SFI requirements, refer to the ANDRA Rulebook for specifications. Vehicles with a performance of 8.00 seconds or quicker (1/4 mile or equivalent) are recommended to be built to the applicable SFI chassis specification. Vehicles built to SFI chassis specifications are not required to adhere to the ANDRA Rollcage Specifications.

This specification is concerned only with the protective characteristics of the driver area and its adjoining structure in the event of a crash, and not with racing performance properties.

A representation of compliance with this specification is not an indication, nor an assurance that the rollcage will provide adequate driver protection in all situations of a vehicle crash. However, it is suggested that rollcages which do not comply with the design information given, may not perform their intended function nor might they provide adequate protection to a driver in a crash situation.

This specification is advisory only. There is no agreement between ANDRA, or any other party to be guided by it and its use by any association, organisation, manufacturer or individual is entirely voluntary. ANDRA will not accept any responsibility for consequences resulting from its application.

This specification is in addition to the ANDRA Rulebook. All applicable requirements and specifications in the ANDRA Rulebook must also be followed.

This document pertains to a welded rollcage only, if you wish to install a removable rollcage, you are encouraged to contact ANDRA Technical at technical@andra.com.au

ANDRA understand that there is a vast array of vehicles competing under its sanctioning and that due to this; a rollcage design may require tailoring to a certain vehicle. If there is a requirement to diverge from these specifications, please contact ANDRA Technical prior to the design stage of the build. Any divergence from these specifications requires written permission to do so by ANDRA Technical prior to rollcage fabrication. No retrospective permission will be granted if a rollcage that does not comply with these specifications is fabricated without prior written permission granted by ANDRA Technical, this is the case even if a vehicle, and rollcage, has passed an ANDRA Technical Inspection.

3.0 Welded Rollcage Definition

A rollcage with no removable sections or components. All points of attachment are welded to the vehicle.

3.1 Rollcage Declaration and Registration

Currently ANDRA does not require a welded rollcage to be registered. Rollcage registration for welded rollcages may be a requirement in future.

4.0 Materials

A welded rollcage may be fabricated from either 350 MPa minimum yield stress Mild Steel or 4130N Chromoly to 4130N-MIL-T-6736B specification.

Table 1

Minimum Specification of Materials Used in ANDRA Mild Steel Welded Rollcage		
Rollcage Component	Mild Steel	Chromoly
Main Hoop	1 5/8" x 0.120" or 1 3/4" x 0.102"	1 5/8" x 0.083"
Main Hoop Diagonal Brace	1 1/4" x 0.102"	1" x 0.049"
Rear Stay without X Supports	1 5/8" x 0.120"	1 5/8" x 0.083"
Rear Stay with X Supports	1 1/2" x 0.102"	1 3/8" x 0.049"
Rear Stay Stiffening Tube	As per Rear Stay material	As per Rear Stay material
Taxi Bar	1 1/2" x 0.102"	1 1/2" x 0.065"
Back-set Taxi Bar Supports	1 1/2" x 0.102"	1 1/2" x 0.065"
Side Intrusion Bar	1 1/2" x 0.102"	1 1/2" x 0.065"
Forward Support	1 5/8" x 0.120" or 1 3/4" x 0.102"	1 5/8" or 1 1/2" x 0.083"
Windscreen Brace	1 5/8" x 0.120" or 1 3/4" x 0.102"	1 5/8" x 0.083"
Mounting Plate	3mm gauge 350N/mm ² minimum tensile strength Mild Steel plate or 3mm gauge 4130N Chromoly.	

5.0 Design and Fabrication of an ANDRA Specification Welded Rollcage

- 5.0.1 All rollcages must be fabricated by an established fabricator or a person with relevant skills and experience in metal fabrication and welding.
- 5.0.2 It is recommended that all welds be performed by a holder of an AS1796 Certificate No. 2 and No. 7 or international equivalent.
- 5.0.3 Rollcages must be designed and fabricated so that, when correctly installed, they substantially reduce body shell deformation and so reduce the risk of injury to occupants, in the event of a crash.
- 5.0.4 The fabricator must label each rollcage with the manufacturer's name and serial number, as well as the date of manufacture. Such identification should be on the driver's side leg of the Main Hoop facing the front of the vehicle. The identification must be clearly legible at all times and not covered by any component that may inhibit the visual inspection of the identification information.
- 5.0.5 Longitudinally, the rollcage should be entirely contained between the mounting points of the front and rear suspension elements carrying the vertical loads.
- 5.0.6 No rollcage tube may carry fluid.
- 5.0.7 No section of a rollcage may be electroplated.
- 5.0.8 All rollcage tube components must be fabricated from one single piece of tube.
- 5.0.9 No rollcage tube may unduly impede the egress of the occupant(s) from the vehicle or the use of any controls including foot pedals.
- 5.0.10 All tubing must be bent by a cold working process.
- 5.0.11 The bend radius centreline must be at least three times the outside diameter (OD) of the tube being bent.

e.g. If 1 5/8" (41.3mm) OD tube is being bent the minimum bend centreline radius is 123.9mm.
- 5.0.12 If tubing is ovalised during bending, the ratio of thinnest OD to original OD must be 0.9 or greater.

e.g. if using 1 5/8" (41.3mm) tube the minimum tube diameter within the bend, must be no less than 37.17mm.
- 5.0.13 The surface of the tube must be smooth and even, without ripples or cracks.
- 5.0.14 When measuring from the end of a bend in a tube, the end of the bend is defined as where the tube returns to its original diameter and is circular in section.
- 5.0.15 The minimum distance between the end of one bend and the start of another bend in the same plane is two times the tube OD.

- 5.0.16 The minimum distance between the end of one bend and the start of another bend in differing planes is three times the tube OD.
- 5.0.17 The minimum distance to the start of a bend from the end of a tube is two times tube OD.
- 5.0.18 All welds on chromoly material must be by the Gas Tungsten Arc (TIG) welding process. MIG welding may be used on Mild Steel material.
- 5.0.19 Compatible filler rods should be used in the welding of 4130N Chromoly. Examples of compatible filler metal that could be used, dependent upon desired strength and ductility, are ER80SD-2, ER70S-2 & ER70SD-6.
- 5.0.20 To prevent carbide precipitation, excessive heat must not be applied to 4130N Chromoly.
- 5.0.21 To prevent embrittlement, 4130N Chromoly must not be allowed to quickly cool.
- 5.0.22 It is recommended that pre-weld heating and post-weld stress relief be undertaken on 4130N Chromoly which has a gauge of greater than 1/8", 3.2mm.
- 5.0.23 If welding of 4130N Chromoly is undertaken in an ambient temperature of 15°C or below it is recommended to preheat the area to be welded.
- 5.0.24 If welding of 4130N Chromoly is undertaken in an ambient temperature of 15°C or below, it is recommended that the weld is cooled in a controlled manner.
- 5.0.25 Fillet size must be a minimum of the sum of the gauges of the two components being welded. e.g. 2.1mm gauge tube to 3mm plate, weld fillet must be a minimum of 5.1mm.
- 5.0.26 No excessive grinding of a weld is allowed.
- 5.0.27 All welds must be continuous (not stitched) around the whole circumference of a tube.
- 5.0.28 Where the welding of a joint will produce a fully sealed tube section, a relief hole should be drilled into the tube, within the welded section, to allow gasses to escape. The diameter of the hole should be approximately two times the material gauge.

6.0 Rollcage Classification

6.1 Single Roll Over Hoop

6.1.1 A Single Roll Over Hoop (Figure 1) is the minimum rollcage specification that is required in the following vehicles;

- a) Cars with unmodified construction and a fixed steel roof, slower than 10.00 seconds 1/4 mile (or equivalent) but faster than 10.99 seconds 1/4 mile (or equivalent).
Excluding Modern Street Cars slower than 10.00 seconds 1/4 mile (or equivalent).
- b) Cars with modified structural construction, slower than 11.00 seconds 1/4 mile (or equivalent) but faster than 11.99 seconds 1/4 mile (or equivalent).
- c) Street registered Open Cars, slower than 11.00 seconds 1/4 mile (or equivalent) but faster than 12.99 seconds 1/4 mile (or equivalent).

Modified: A Unibody Car with modifications to the rear floor, rear wheelwells* or boot floor.

*Modified Rear Wheelwells: Where material has been added to the wheelwells and has changed the profile of the wheelwell, (e.g. mini-tubbing or tubing to accommodate larger rear tyres). Any changes to the chassis or floor at the wheelwell location is recognised as a modification and is therefore classed as "modified wheelwells".
The reshaping of existing OEM wheelwell material is not considered as a "modified wheelwell".

6.1.2 A Single Rollover Hoop must have the following components, in the positions illustrated in Figure 1, as a minimum;

- a) One Main Hoop
- b) Two Rear Stays
- c) One Taxi Bar
- d) One Intrusion Bar

6.1.3 A single Side Intrusion Bar on the driver's side is the minimum acceptable only if no passenger is present. If a passenger is present, then a Side Intrusion Bar is also required on the passenger's side of the vehicle.

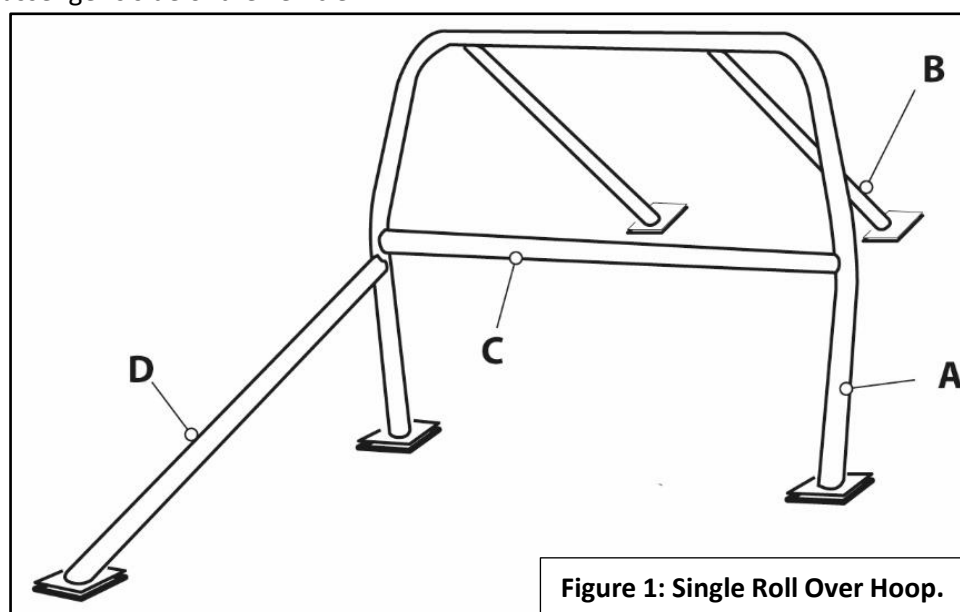


Figure 1: Single Roll Over Hoop.

6.2 Four Point Rollcage

6.2.1 A Four Point Rollcage (Figure 2) is the minimum rollcage specification that is required in the following vehicles;

- a) A Utility vehicle, 8.00 seconds or slower 1/4 mile (or equivalent). If a quicker ET is achieved a Six Point Rollcage or appropriate SFI or CAMS specification structure is required.
- b) 1930s style "Chop-Top" Coupes, Hot Rods and/or "T-Bucket" style vehicles where the fitment of Rear Stays is restrictive, 8.00 seconds or slower 1/4 mile (or equivalent).

6.2.2 A Four Point Rollcage must have the following components, in the positions illustrated in Figure 2, as a minimum;

- a) One Main Hoop
- b) One Diagonal Brace (in two sections)
- c) One Taxi Bar
- d) Two Side Intrusion Bars
- e) Two Forward Supports
- f) One Roof Support

6.2.3 A back-set Taxi Bar may be fitted to a Four Point Rollcage, as per Figure 7, component C.

A back-set Taxi Bar must be fitted with Taxi Bar Upper Supports (Figure 7, components H2). It is recommended to also fit Taxi Bar Lower Supports (Figure 7, components H1) to a back-set Taxi Bar.

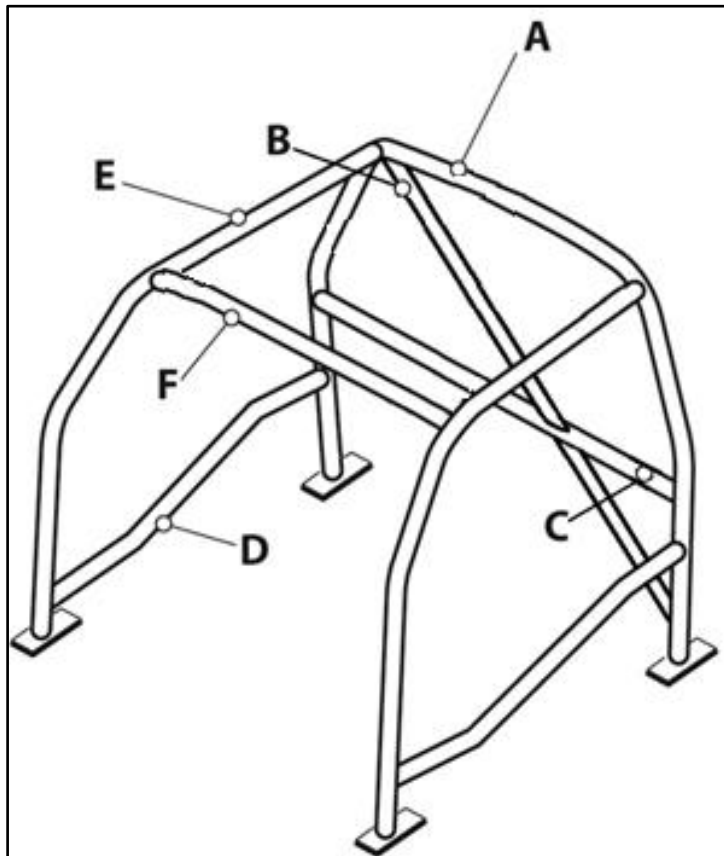


Figure 2: Four Point Rollcage.

6.3 Six Point Rollcage

6.3.1 A Six Point Rollcage (Figure 3) is the minimum rollcage specification that is required in the following vehicles;

- a) All vehicles not previously listed under Four Point Rollcage or Single Roll Over Hoop, 11.00 seconds or quicker 1/4 mile (or equivalent) and/or 10.00 seconds or quicker 1/4 mile (or equivalent) for Modern Street Cars.

Modern Street Cars: Street registered, sedan-based vehicle (and derivatives such as Coupes, Utilities and Station Wagons etc) built after 01JAN2008 and with a compliance identification plate dated 01JAN2008 or later.

6.3.2 A Six Point Rollcage must have the following components, in the positions illustrated in Figure 3, as a minimum;

- a) One Main Hoop
- b) Two Rear Stays
- c) One Taxi Bar
- d) Two Side Intrusion Bars
- e) Two Forward Supports
- f) One Roof Support

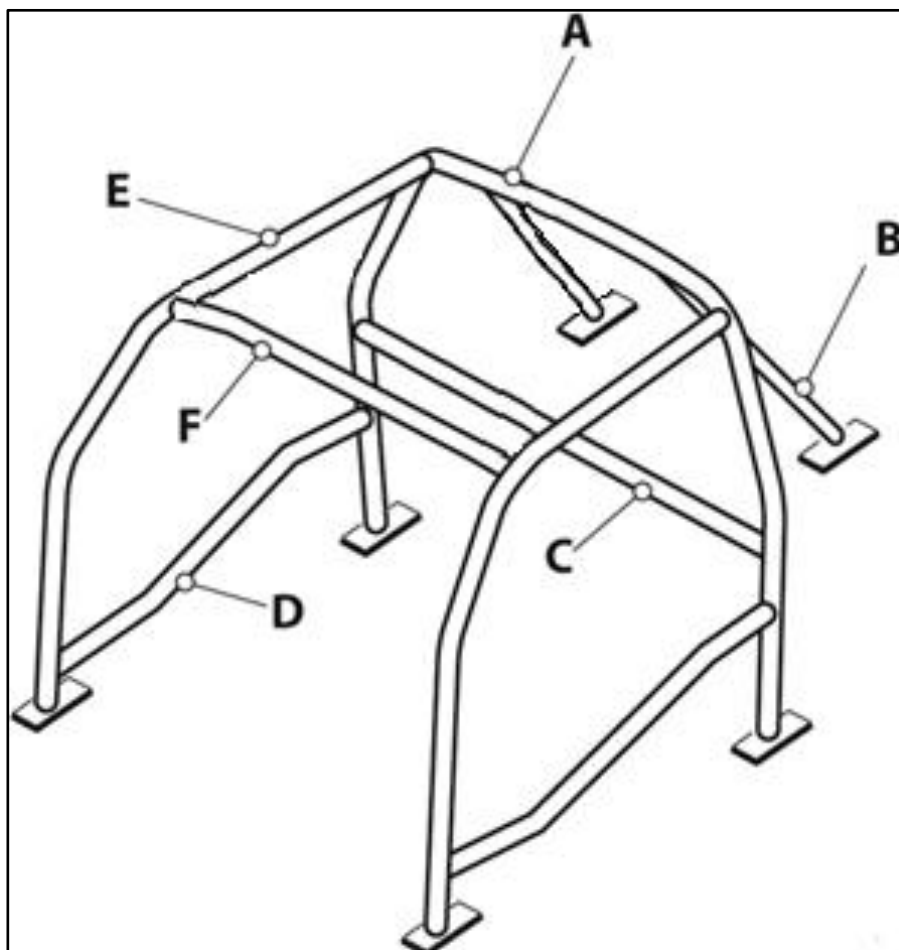


Figure 3: Six Point Rollcage.

6.4 No Rollage Required

6.4.1 The following vehicles do not require a rollage;

- a) Street registered Open Cars 12.99 seconds or slower 1/4 mile (or equivalent).
- b) Open Competition Cars, certified by and complying with relevant CAMS regulations, 11.00 seconds or slower 1/4 mile (or equivalent).
- c) Unmodified Cars, with a fixed steel roof, 11.00 seconds or slower 1/4 mile (or equivalent).
- d) Modern Street Cars, 10.00 seconds or slower 1/4 mile (or equivalent).

Modified: A unibody car with modifications to the rear floor, rear wheelwells* or boot floor.

*Modified Rear Wheelwells: Where material has been added to the wheelwells and has changed the profile of the wheelwell, (e.g. mini-tubbing or tubbing to accommodate larger rear tyres). Any changes to the chassis or floor at the wheelwell location is recognised as a modification and is therefore classed as "modified wheelwells".

The reshaping of existing OEM wheelwell material is not considered as a "modified wheelwell".

Modern Street Cars: Street registered, sedan-based vehicle (and derivatives such as Coupes, Utilities and Station Wagons etc) built after 01JAN2008 and with a compliance identification plate dated 01JAN2008 or later.

7.0 Rollage Components

7.1 Main Hoop

- 7.1.1 In no case must the driver's helmet centreline be behind the centreline of the Main Hoop.
- 7.1.2 The Main Hoop must be placed rearwards of any occupant's head, when their seat is in the rearmost position, to a maximum horizontal distance of 6" (150mm) between the rear of the helmet and the front of the Main Hoop tube.
- 7.1.3 There must be a minimum of 3" (76mm) clearance between the top of the driver's helmet and the bottom of the Main Hoop tubing or the top of the Main Hoop tube must be within 1" (25mm) of the roof/headliner in the area above the driver's helmet.
- 7.1.4 The Main Hoop should be near vertical and may have a maximum angle of +/-10 degrees to the vertical.
- 7.1.5 In closed vehicles, the Main Hoop must follow, as close as is practical, the profile of the vehicle's interior.

7.2 Straight Rear Stays

- 7.2.1 In a Single Rollover Hoop, where possible, Rear Stays should be straight.
- 7.2.2 In a Six Point Rollcage, where possible, Rear Stays should be straight.
- 7.2.3 If Rear Stays are bent, a Stiffening Tube (Figure 7 component K) must be fitted perpendicular to and in-between the Rear Stays within 100mm (4") of the bend in the Rear Stay.
- 7.2.4 If the Rear Stay Stiffening Tube is not positioned within 100mm (4") of the top of the rear window then a Rear Roof Support Tube must be fitted, perpendicular to the Rear Stays, within 100mm of the top of the rear window.
- 7.2.5 The Rear Stay Stiffening tube must have a maximum of two bends and be straight in side view.
- 7.2.6 No bend in the Rear Stay Stiffening tube may exceed 20 degrees.
- 7.2.7 The Rear Roof Support tube must have a maximum of two bends and be straight in side view.
- 7.2.8 No bend in the Rear Roof Support tube may exceed 20 degrees.
- 7.2.9 A Rear Stay should be mounted onto the vehicle structure at its rear termination by an approved Mounting Plate.

Rear Stay Tubing may be welded directly onto an OEM chassis rail, or onto a non-OEM chassis rail, or via Mounting Plate onto a reinforced floor area providing all have been fabricated/reconstructed with 3mm gauge 4130N Chromoly, or 3mm gauge 350N/mm² minimum tensile strength Mild Steel plate, at a minimum.
- 7.2.10 A Rear Stay must make an angle of between 30-60 degrees from horizontal at its rear termination/attachment point (e.g. the Mounting Plate).
- 7.2.11 A Rear Stay must be connected to the Main Hoop, within 100mm of the upper Main Hoop bend. The centre line of the Rear Stay tube must be within 100mm from the start of the upper bend in the Main Hoop.
- 7.2.12 Each vehicle requires a minimum of two Rear Stays.

7.3 Bent Rear Stays with an X Support

- 7.3.1 If Rear Stays are bent, they require a Stiffening Tube as per 7.2.3 – 7.2.6, or an "X" Support may also be used. See Figure 4.
- 7.3.2 If an X Support is fitted, it must be fixed between the two Rear Stays where they are sub-horizontal.

- 7.3.3 The X Support upper connection with the Rear Stays must be within 100mm of the upper bend in the Rear Stay.
- 7.3.4 The X Support lower connection with the Rear Stays must be within 100mm of the Rear stay to chassis mounting point

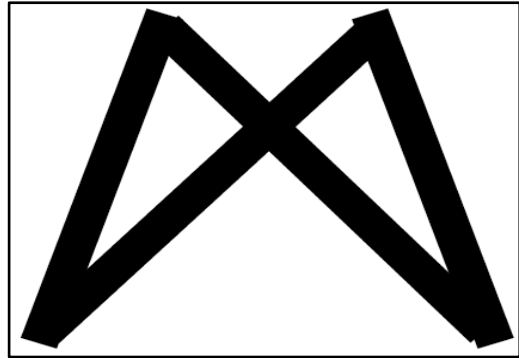
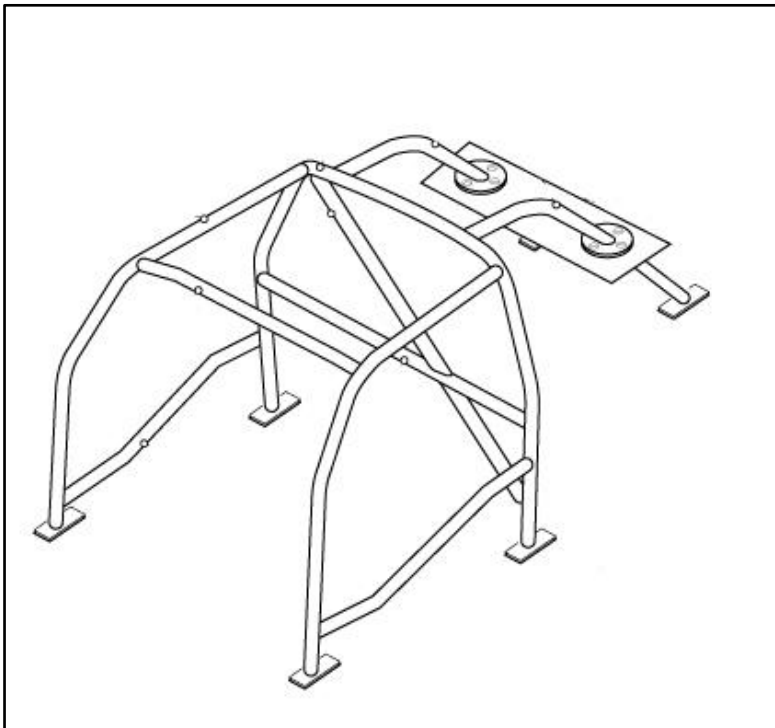


Figure 4: Rear Stay X Support viewed from rear of vehicle.

7.4 Additional Rear Stay Mounting Design

- 7.4.1 Rear Stays should be mounted/ welded to a substantial chassis component, or by any of the methods described in section 7.2.9 and 8.0 of this specification. To do this, Rear Stays can be split in design, as per Figures 5 (Rear Stay Stiffening Tube/ X Support not shown for clarity).
- 7.4.2 Split Rear Stay fabrication involves the fitting of Mounting Plates on the rear parcel shelf, with a supporting structure under the parcel shelf, which is mounted to a substantial chassis component between the front and rear suspension elements carrying the vertical loads.
- 7.4.3 The supporting structure under the parcel shelf can be designed and fabricated with;
- a) Two straight support tubes each connected to the underside of the Parcel Shelf and a substantial chassis component.
 - b) Two straight support tubes, with cross bracing, each connected to the underside of the parcel shelf and a substantial chassis component. The cross bracing must be welded to the supports no further than 100mm from the ends of the support tubes.



**Figure 5: Stiffening Tube/
X Support not shown for
clarity.
Diagonal Brace shown as
an additional component.**

7.5 Taxi Bar

- 7.5.1 A Taxi Bar must be fitted between the uprights of the Main Hoop.
- 7.5.2 The Taxi Bar must be positioned horizontally such that it passes behind the driver between their shoulder height and the lowest point of their shoulder blades.

7.6 Taxi-Bar Bracing

- 7.6.1 In a Four Point Rollcage, a straight Taxi Bar must be reinforced with a Diagonal Brace as per Figure 6, component G.
- 7.6.2 The Diagonal Brace must be fitted between the Main Hoop horizontal tube behind the driver and the opposite Main Hoop vertical tube, via the Taxi-Bar.
- 7.6.3 The upper connection of the Diagonal Brace to the Main Hoop must be no further than 100mm from the end of the Main Hoop upper bend on the driver's side of the vehicle.
- 7.6.4 The lower connection of the Diagonal Brace to the Main Hoop must be no further than 100mm from the Main Hoop Mounting Plate on the opposite side of the vehicle.
- 7.6.5 Passengers are not allowed in the vehicle unless two Diagonal Braces are present in a cross formation to the dimension specifications above.
- 7.6.6 Figures 6 and 7 show the rear half of six Point Rollcages. The Front half is not shown for clarity.
- 7.6.7 If the Taxi Bar is back-set (Figure 7, component C) two Taxi Bar Upper Supports fixed to the horizontal section of the Main Hoop and the Taxi Bar are required (Figure 7, components H2).
- 7.6.8 It is also recommended to use Taxi Bar Lower Supports that are fixed to the Taxi Bar and the floorplan or transmission tunnel (Figure 7, components H1).

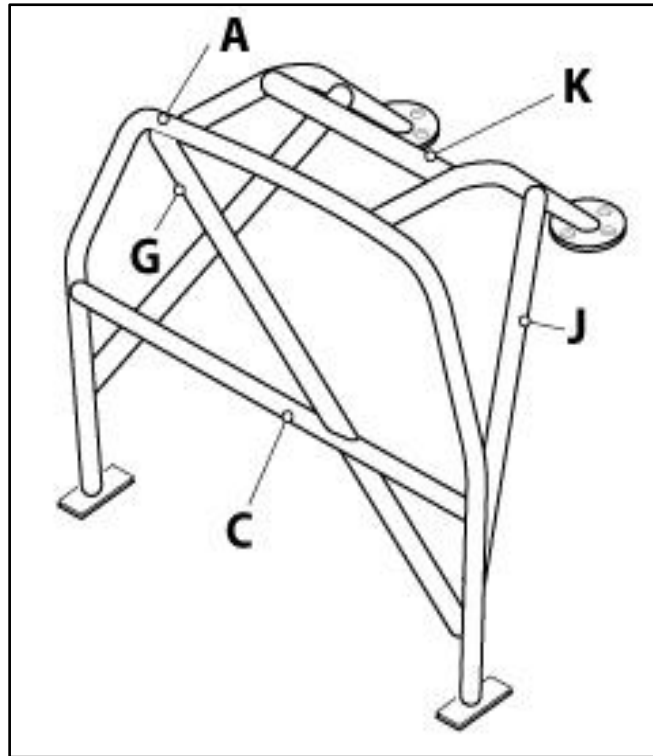


Figure 6: Component J is additional and optional. Component K is required if Rear Stays are bent. Component G is required in a 4 Point Rollcage but optional in a 6 point Rollcage.

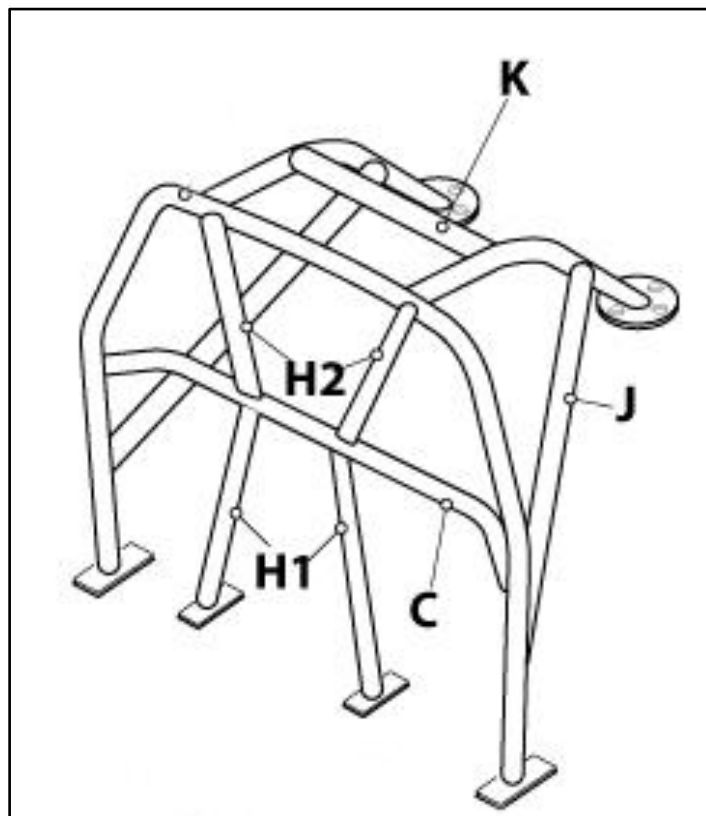


Figure 7: Component J is additional and optional. Component K is required if Rear Stays are bent. Components H2 are required if the Taxi Bar is back-set (C), Components H1 are recommended but optional.

7.7 Side Intrusion Bar

- 7.7.1 A Side Intrusion Bar must be designed and fabricated to ensure that it does not unduly impede egress from the vehicle when it is in place.
- 7.7.2 A Side Intrusion Bar must pass the driver's/passenger's body midway between their shoulder and elbow when seated in racing position.
- 7.7.3 A Side Intrusion Bar must be as straight as is practical, both laterally and vertically.
- 7.7.4 A Side Intrusion Bar must have its forward connection to a Forward Support tube no higher than half the height of the door opening.

7.8 Forward Supports

- 7.8.1 A Forward Support must be connected to the Main Hoop no further than 100mm from the upper Main Hoop bend on either side of the vehicle.
- 7.8.2 A Forward Support must follow the vehicle's body line across the top of the front window and the A-Pillar as close as is practical.
- 7.8.3 There must only be one bend in the vertical section of a Forward support.
- 7.8.4 Forward Support Tubing may be welded directly onto an OEM chassis rail, or onto a non-OEM chassis rail, or via Mounting Plate onto a reinforced floor area providing all have been fabricated/ reconstructed with 3mm gauge 4130N Chromoly, or 3mm gauge 350N/mm² minimum tensile strength Mild Steel plate, at a minimum.

Forward Stays should be mounted/ welded to a substantial chassis component, or by any of the methods described above or 8.0 of this specification.

7.9 Roof Support and Diagonals

- 7.9.1 A Roof Support tube must be fitted to a Four Point and a Six Point Rollcage.
- 7.9.2 A Roof Support tube must be connected to a Forward Support no further than 100mm from the upper bend in the Forward Support tube.
- 7.9.3 The Roof Support tube must have a maximum of two bends and be straight in side view
- 7.9.4 No bend in the Roof Support tube may exceed 20 degrees.

7.10 Additional Tubing

7.10.1 The addition of tubing that reinforces a rollcage is encouraged.

7.10.2 Additional tubing is such as Figure 7, component J.

8.0 Rollcage to Chassis Mounting

8.0.1 Main Hoop, Rear Stay and Forward Support tubing may be welded directly onto an OEM chassis rail, or onto a non-OEM chassis rail, or via Mounting Plate onto a reinforced floor area providing all have been fabricated/ reconstructed with 3mm gauge 4130N Chromoly, or 3mm gauge 350N/mm² minimum tensile strength Mild Steel plate, at a minimum.

8.0.2 Mounting Plates must be of at least 120cm², 19 in² (square inches) in surface area may be of any shape, provided the minimum width and area dimensions are maintained or exceeded.

8.0.3 If the mounting type requires two plates, one beneath the floor and one on top, the lower plate must be larger or smaller than the upper plate by at least 20mm all around the upper plates' perimeter. The minimum surface area specification must be maintained or exceeded by both plates.

8.0.4 It is preferential to have the gauge of the Mounting Plate material as close as possible to that of the material to which it is welded to, whilst staying within the minimum material specifications.

8.0.5 Mounting Plates must be designed and fabricated such that they can withstand minor deformation during a roll over, the Mounting Plates must not be designed and fabricated so that they shear through the supporting chassis/body material during a roll over.

8.0.6 Mounting Plates must be fabricated to reinforce the material which they are welded to.

8.0.7 A Mounting Plate must be attached to the body (including transmission tunnel) of a vehicle as close as possible to the chassis beams or a substantial chassis component.

8.0.8 Mounting Plates should be stitch welded to the vehicle around their whole perimeter. Appropriate stitch sizes are 1" weld with a 1" gap.

8.0.9 Tube to Mounting Plate welding must be continuous (not stitched) around the whole circumference of the tube.

8.0.10 All corners of Mounting Plates must be radiused to a minimum of 30mm radius.