APPENDIX I. 2007 ROLL CAGE RULES

9.4. DRIVER PROTECTION STRUCTURES

These general specifications are for all automobiles. Roll cages are required in all automobiles.

Roll cages may be of two (2) designs, low front hoop (top of steering wheel) or high front hoop (top of windshield). Specific installations are subject to approval by the Technical and Safety Inspectors at each event.

The Technical Staff of Club Racing shall have the responsibility to ensure specification compliance with SCCA safety standards. To that end, the Technical Staff of Club Racing may or may not accept alternate construction standards from any source that significantly vary from SCCA standards of protection.

9.4.1. BASIC DESIGN CONSIDERATIONS

A. The basic purpose of the roll cage is to protect the driver if the car turns over, runs into an obstacle such as a guardrail or catch fence, or is struck by another car. It shall be designed to withstand compression forces from the weight of the car coming down on the rollover structure and to take fore/aft and lateral loads resulting from the car skidding along on its rollover structure.

B. Forward braces and portions of the main hoop subject to contact by the driver's helmet (as seated normally and restrained by seatbelt/shoulder harness) shall be padded with non-resilient material such as Ethafoam® or Ensolite® with a minimum thickness of one-half (1/2) inch. Padding meeting SFI spec 45.1 or FIA 8857-2001 is strongly recommended.

C. No portion of the safety roll cage shall have an aerodynamic effect by creating a vertical thrust.

D. Roll cage or chassis design shall prevent engine intrusion into the driver compartment.

E. Material:

1. Seamless, or DOM (Drawn Over Mandrel) mild steel tubing (SAE 1010, 1020, 1025) or equivalent, or alloy steel tubing (SAE, 4130) shall be used for all roll cage structures. Proof of use of alloy steel is the responsibility of the entrant.

2. Minimum tubing sizes (all Formula, Sports Racing, GT, and Production Category automobiles, and all automobiles registered prior to June 1, 1994) for all required roll cage elements (All dimensions in inches):

Vehicle Weight Without Driver	Material	
	Mild Steel	**Alloy Steel**
Up to 1500 lbs.	1.375 x .095	1.375 x .080
1500-2500 lbs.	1.50 x .095	1.375 x .095
Over 2500 lbs.	1.50 x .120	1.50 x .095
	1.625 x .120	
	1.75 x .095	

3. Minimum tubing sizes for (all Showroom Stock, Touring and Improved Touring Category auto-mobiles registered after June 1, 1994) for all required roll cage elements (All dimensions in inches):

Up to 1500 lbs. 1.375 x .095 DOM / Seamless / Alloy

1501-2200 lbs.	1.500 x .095 DOM / Seamless / Alloy
2201-3000 lbs.	1.500 x .120 DOM / Seamless / Alloy
	1.625 x .120 DOM / Seamless / Alloy
	1.750 x .095 DOM / Seamless / Alloy

(American Sedans may construct to these specs regardless of weight.)

3001-4000 lbs.	1.750 x .120 DOM / Seamless / Alloy
Over 4000 lbs.	2.000 x .120 DOM / Seamless / Alloy

Note: ERW tubing is not permitted in any car registered after 1/1/2003.

Main hoop: 4 bends max., totaling 180º ± 10º
Front hoop: 4 bends max. or
Front downtubes: 2 bends max.
Rear hoop supports: No bends.

If any of the above bend requirements cannot be met, all components of the roll cage shall be fabricated from the tubing size(s) listed for the next heavier category of automobiles.

4. For purposes of determining tubing sizes, the vehicle weight is as raced without fuel and driver. The minus tolerance for wall thickness should not be less than .010" below the nominal thickness. Improved Touring roll cage tubing size are to be calculated based on the published vehicle weight minus 180 lbs.

5. An inspection hole at least 3/16 inch diameter, but no greater than 1/4 inch diameter shall be drilled in a non-critical area of the front and rear hoop as well as the one of the supplemental braces to facilitate verification of wall thickness. Formula Cars and Sports Racers with alternate roll structures are not required to have inspection holes, the wall thickness will be indicated on the back of the homologation certificate.

F. General Construction

1. One (1) continuous length of tubing shall be used for the main hoop member with smooth continuous bends and no evidence of crimping or wall failure. The radius of bends in the roll cage hoop (measured at centerline of tubing) shall not be less than three (3) times the diameter of the tubing. Whenever possible, the roll cage hoop should start from the floor of the car, and, in the case of tube frame construction, be attached to the chassis tubes by means of gussets or sheet metal webs with support tubes beneath the joints to distribute the loads. It is recommended that gussets be used.

2. Welding shall conform to American Welding Society D1.1:2002, Structural Welding Code, Steel Chapter 10, Tubular Structures. Whenever D1.1 refers to "the Engineer" this shall be interpreted to be the owner of the vehicle. Welds shall be continuous around the entire tubular structure.

   All welds shall be visually inspected and shall be acceptable if the following conditions are satisfied:
   a. The weld shall have no cracks.
   b. Thorough fusion shall exist between weld metal and base metal.
   c. All craters shall be filled to the cross section of the weld.
   d. Undercut shall be no more than 0.01 inch deep.

3. Aluminum bronze or silicon bronze welding technique is permitted, but extreme care shall be used in preparation of

parts before bronze welding and in the design of the attaching joints.

9.4.2. SHOWROOM STOCK ROLL CAGE

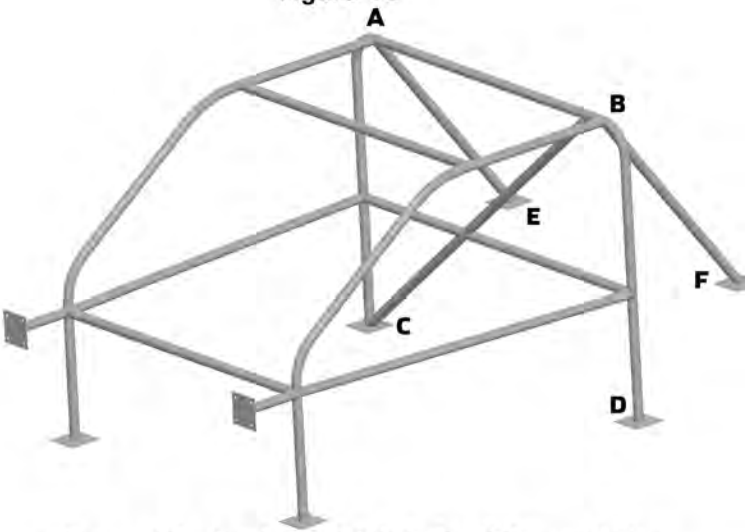
A. Full width roll cages are required in all Showroom Stock automobiles. Roll cages installed in Showroom Stock automobiles are for driver safety and shall be contained entirely within the driver/passenger compartment without removing any panel or accessory not specifically authorized in these rules. The carpet/padding may be cut around the mounting base plates.

1. The cage need not be removable. It shall be bolted and/or welded to the car.
2. It shall attach to the car at no more than eight (8) points, consisting of the basic cage with six (6) points and two optional braces.
3. The forward part of the cage shall be mounted to the floor of the vehicle. In addition, if the two optional braces referred to in item 2, above are utilized they shall be mounted, one on either side, from the forward section of the cage to the firewall or front fender wells (see figure 16). No braces shall pass through the front firewall.
4. Rollcage gussets shall be no thicker than .125". A maximum of two gussets per rollcage joint are allowed.

B. Removable roll cages and braces shall be very carefully designed and constructed to be at least as strong as a permanent installation. If one tube fits inside another tube to facilitate removal, the removable portion shall fit tightly and shall bottom by design and at least two (2) bolts shall be used to secure each such joint. The telescope section shall be at least eight (8) inches in length except forthe door bars which shall be a minimum of four (4) inches in length. Minimum bolt diameter is 3/8 inches.

C. For tubing sizes for front and main hoop and all required bracing, see 9.4.1.E.3.

Figure 16



Improved Touring diagonal: tube A-D or B-C is required
Six point minimum, eight point maximum

D. Main Roll Hoop:
   1. Main roll hoop (behind the driver) shall extend the full width of the driver/passenger compartment and shall be as near the roof as possible. It shall incorporate a diagonal lateral brace to prevent lateral distortion of the hoop (See figure 16). Any number of additional reinforcing bars are permitted within the structure of the cage. It is required that the horizontal brace behind the driver's seat (described in Section 9.4.2.J.) continue from the diagonal to the passenger side main hoop upright or that a second diagonal be installed in the main hoop.

E. Front Roll Hoops:
   1. The front or side hoops shall follow the line of the front pillars to the top of the windshield (as close to the roof as possible) then horizontally to the rear attaching to the main hoop. These two side hoops are to be connected together by a tube over the top of the windshield, or

   2. A front hoop following the line of the front pillars and connected by horizontal bars to the main hoop on each side at the top may be used, or

   3. A top "halo" hoop following the roof line from the main hoop to the windshield with forward down tubes following the line of the front pillars to the floor.

   4. The front or side hoops may extend through the dash pad. This includes the forward part of the door panel if it is an extension of the dash panel.

   5. One (1) bar is recommended in a horizontal plane between forward cage braces in the dash area.

F. Bracing:
The main roll hoop shall have two braces extending to the rear attaching

to the frame or chassis. Braces shall be attached as near as possible to the top of the main hoop not more than six (6) inches below the top and at an included angle of at least thirty (30) degrees. On cars where the rear window/bulkhead prohibits the installation of rear braces (e.g., Honda del Sol), the main hoop shall be attached to the body by plates welded to the cage and bolted to the stock shoulder harness mounting points. This installation design must also incorporate a diagonal bar connecting the top of the main hoop to the lower front passenger side mounting point ("Petty Bar").

1. Rear hoop braces may pass through the factory bulkhead or panel separating the driver/passenger compartment from the trunk/cargo area/, fuel tank/fuel cell area, provided the bulkhead is sealed around said cage braces. Metal tape may be used to seal the openings between the bulkhead and the tubes.

G. Side Protection:
Two (2) side tubes connecting the front and rear hoops across both door openings are mandatory. Door side tubes may extend into the door. NASCAR-style side protection, or one bar bisecting another to form an "X" is permitted. The door window glass, window operating mechanism, inner door trim panel, armrest, map pockets, and inside door latch/lock operating mechanism may be removed and the inner door structural panel may be modified, but not removed to facilitate this type of side protection. The stock side impact beam and the outside door latch/lock operating mechanism shall not be removed or modified.

H. Mounting Plates:
1. Each mounting plate shall be at least .080 thick if welded and 3/16" thick (with appropriate backing plates) if bolted. There shall be a minimum of three (3) bolts per mounting plate if bolted.

2. Each mounting plate shall not be greater than 100 square inches and shall be no greater than twelve (12) inches or less than two (2) inches on a side.

3. Whenever possible, mounting plates shall extend onto a vertical section of the structure (such as a rocker box).

4. The mounting plate may be multi-angled but must not exceed these dimensions in a flat plane.

5. Any number of tubes may attach to the plate or each other.

I. Hardware: (Bolts)
All hardware shall be Grade 5 or better. 5/16" minimum diameter.

J. In order to provide a secure seat back support a section of tubing equal to the roll bar shall be installed horizontally from the main hoop upright to the diagonal brace. This tube shall be no higher than shoulder height.

9.4.3. TOURING ROLL CAGE

A. All cars registered after 1/1/03 shall conform to these roll cage rules. Effective 1/1/08 all Touring cars shall conform to these roll cage rules. Full width roll cages are required in all Touring automobiles. Roll cages installed in Touring automobiles are for driver safety and shall be contained entirely within the driver/passenger compartment without removing any panel or accessory not specifically authorized in these rules. The carpet/padding may be cut around the mounting base plates.

1. The cage shall be welded to the car, and all mandatory tubes shall use welded joint construction.

2. It shall attach to the car at no more than eight (8) points, with the forward section of the cage attaching to the front bulkhead or front fender wells (see figure 16).

3. The front down tubes of the cage shall be mounted to the floor of the vehicle.

B. For tubing sizes for front hoop, main hoop, and all required bracing, see Section 9.4.1.E.3. It is recommended that gussets (flat steel, tubing, etc.) be utilized to strengthen the joints of all required cage elements.

C. Main Roll Hoop:
1. Main roll hoop (behind the driver) shall extend the full width of the driver/passenger compartment and shall be as near the roof as possible. It shall incorporate a diagonal lateral brace to prevent lateral distortion of the hoop (See figure 16). Any number of additional tubes/braces are permitted within the structure of the cage. It is required that the horizontal brace behind the driver's seat (described in Section 9.4.2.J.) continue from the diagonal to the passenger side main hoop upright or that a second diagonal be installed in the main hoop.

D. Front Roll Hoops:
1. The front or side hoops shall follow the line of the front pillars to the top of the windshield (as close to the roof as possible) then horizontally to the rear attaching to the main hoop. These two side hoops are to be connected together by a tube over the top of the windshield, or

2. A front hoop following the line of the front pillars and connected by horizontal bars to the main hoop on each side at the top may be used, or

3. A top "halo" hoop following the roofline from the main hoop to the windshield with forward down tubes following the line of the front pillars to the floor.

4. The front or side hoops may extend through the dash pad. This includes the forward part of the door panel if it is an extension of the dash panel.

5. One (1) bar is required in a horizontal plane between forward cage braces in the dash area.

E. Bracing:
The main roll hoop shall have two braces extending to the rear attaching to the frame or chassis. Braces shall be attached as near as possible to the top of the main hoop but, not more than six (6) inches below the top and at an included angle of at least thirty (30) degrees. On cars where the rear window/bulkhead prohibits the installation of rear braces (e.g., Honda del Sol), the main hoop shall be attached to the body by plates welded to the cage and bolted to the stock shoulder harness mounting points. This installation design must also incorporate a diagonal bar connecting the top of the main hoop to the lower front passenger side mounting point ("Petty Bar").

1. Rear hoop braces may pass through the factory bulkhead or panel separating the driver/passenger compartment from the trunk/cargo area/, fuel tank/fuel cell area, provided the bulkhead is sealed around said cage braces. Metal tape may be used to

seal the openings between the bulkhead and the tubes.

F. Side Protection:
Two side protection tubes (door bars) are mandatory on each side of the car. NASCAR-style side protection is required on the driver's side and is optional on the passenger side. The driver's window safety net may be mounted to this side protection and the top cage tube. NASCAR-style side protection tubes shall extend into the door. The door window glass, window operating mechanism, inner door trim panel, armrest, map pockets, and inside door latch/lock operating mechanism may be removed only if it interfered with the installation of NASCAR-style side protection tubes. The inner door structural panel may be modified, but not removed to facilitate this type of side protection. The stock side impact beam and the outside door latch/lock operating mechanism shall not be removed or modified.

G. Mounting Plates:
1. Each mounting plate shall be at least .080 thick.
2. Each mounting plate shall not be greater than 100 square inches and shall be no greater than twelve (12) inches or less than two (2) inches on a side.
3. Whenever possible, mounting plates shall extend onto a vertical section of the structure (such as a rocker box).
4. The mounting plate may be multi-angled but must not exceed these dimensions in a flat plane.
5. Any number of tubes may attach to the plate or each other.

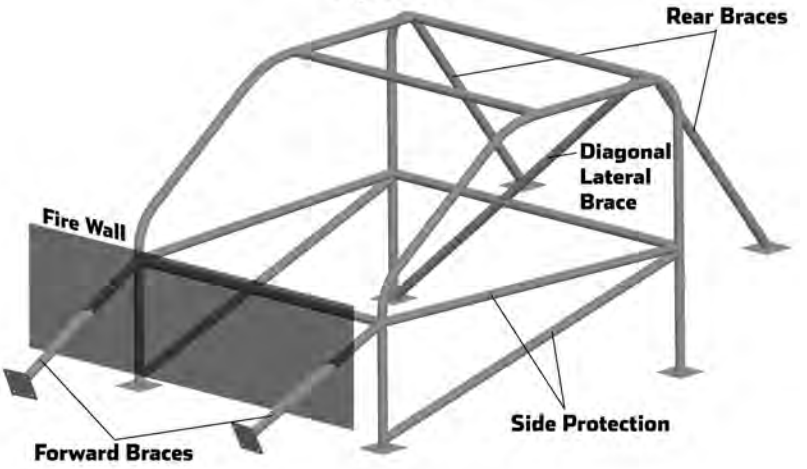
9.4.4. GT ROLL CAGE
All GT automobiles shall have full width roll cages. Open automobiles without full windshields may have a low front hoop. All closed automobiles shall have full height (top of windshield) front hoops.

A. Main and Front Hoops

1. Main Hoop:
The main hoop (behind the driver) shall be full width of the cockpit. The main hoop shall be as near to the roof as possible on closed automobiles and not less than two (2) inches above the driver's helmet on open automobiles, with the driver seated normally and restrained by seat belt/shoulder harness. Low front hoops shall be cowl height, or at a minimum, a straight line drawn from the top of the main hoop to the top of the front hoop shall pass over the driver's helmet.

2. Front Hoop:
   a. The front hoop shall follow the line of the front pillars to the top of the windshield and be connected, by horizontal bars, to the top of the main hoop on each side (as close to the roof as possible).
   b. Two (2) side hoops following the line of the front pillars to the top of the main hoop may be used. These two (2) side hoops are to be connected by a horizontal bar over the top of the windshield. (See figure 17), or
   c. A top "halo" hoop following the roof line from the main hoop to the windshield with forward down tubes following the line of the front pillars to the floor.
   d. Double "ear-type" joints are allowed, provided that they are fully welded at all mating surfaces.

Figure 17



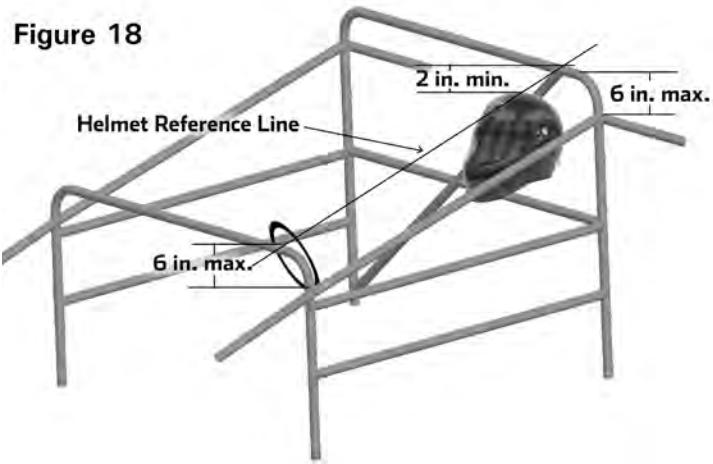
3. Fabrication:
The main hoop shall be one continuous length of tubing with smooth continuous bends with no evidence of crimping or wall failure. The minimum radius for all bends shall be three (3) times the tube diameter measured from the tube centerline. Whenever possible, the roll hoops should start from the floor of the automobile, and, in the case of tube frame construction, be attached to the tubes by means of gussets or metal webs in order to distribute the loads. On automobiles of frameless construction, consideration should be given to using a vertical roll hoop of 360 degrees completely around the inside of the automobile and attached with suitable mounting plates.

B. Bracing
All required bracing shall be the same diameter and wall thickness as listed in 9.4.1.E, Material. (Main and Front Hoops)

All main hoops shall incorporate a diagonal brace (same diameter and wall thickness as main hoop) to prevent lateral distortion of the main hoop.

1. Main Hoop Bracing:
Main hoops shall have two (2) braces extending to the rear, attaching to the frame or chassis. Braces shall be attached as near as possible to the top of the main hoop (not more than six (6) inches below the top) and at an included angle of at least thirty (30) degrees. Open cars with a low front hoop shall have (Effective 1/1/99) two braces extending from the main hoop to the low front hoop. These braces shall be mounted no lower than six inches below the top of the main hoop as illustrated in figure 18.

Figure 18



2. Front Hoop Bracing:
There shall be two (2) braces extending forward from the front hoop to protect the driver's legs. It is recommended that this bracing extend to the bulkhead in front of the driver's feet; but, in any case, it shall be integrated into the frame or chassis to provide substantial support for the front hoop.

C. Side Protection - Open and Closed Automobiles
1. The minimum side protection shall consist of a side tube connecting the front and rear hoops across both the door openings. Additionally, there shall also be either a diagonal tube from the front hoop to the rear hoop bisecting the door opening below the horizontal side tube, or not less than two (2) horizontal side tubes. Additional tubing may be added. NASCAR-style door bars are recommended.

2. In automobiles with full roll cage installations including side bars, interior door panels may be altered, replaced, or removed. When door panels are removed, all sharp edges or projections shall be protected.

D. Mounting Plates:
The thickness of mounting plates bolted to the structure of the car shall not be less than the thickness of the roll hoop or brace that they attach and shall be backed-up with a plate of equal dimensions on the opposite side of the panel, with the plates through-bolted together. A minimum of three (3) bolts per mounting plate is required for bolted mounting plates. All hardware (bolts) shall be Grade 5 or better with 5/16" diameter minimum. Mounting plates welded to the structure of the car shall not be less than .080" thick. Whenever possible the mounting plates should extend onto a vertical section of the structure (such as door pillar).

9.4.6. PRODUCTION ROLL CAGE
All automobiles shall have full width roll cages. Roll cages may be of two (2) designs, low front hoop or high front hoop. Specific installations are subject to approval by the Technical and Safety Inspectors at each event. The Technical Staff of Club Racing, with the concurrence of the Club Racing Board, shall have the responsibility to ensure specification compliance with SCCA safety standards. Alternate structures which do not meet the following criteria will not be considered unless they are

eligible under Section 9.4.6.D.

A. Main Hoop
For all cars, the main hoop (behind the driver) shall be full width of the cockpit.

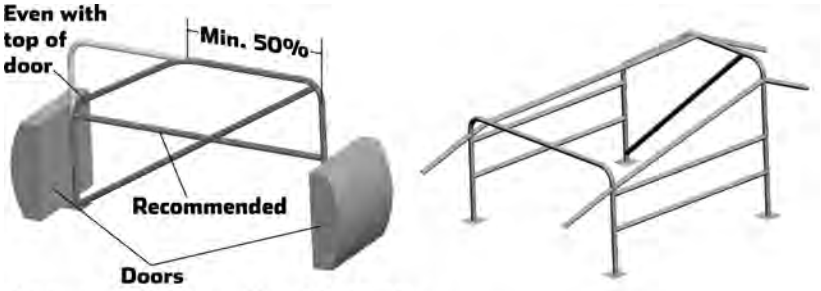
1. Closed Automobiles:
The main hoop shall be as near to the roof as possible on closed automobiles

2. Open top Automobiles:
   a. The main hoop shall be not less than two (2) inches above the driver's helmet on open automobiles, with the driver seated normally and restrained by seat belt/shoulder harness as illustrated in figure 18.

   b. Open top automobiles without a windshield may use an asymmetric main hoop provided:

      i. The main hoop shall be full height (over the driver) for at least 50% of the width of the hoop as illustrated in figure 19.

      ii. On the passenger side of the car, the hoop shall be at least as high as the top of the rear corner of the door as illustrated in figure 19.



Minimum main hoop - Open Production

B. Front Hoop
For all cars, the front hoop shall be full width of the cockpit.

1. Closed Automobiles and open top automobiles with a windshield:
   a. The front hoop shall follow the line of the front pillars to the top of the windshield and be connected, by horizontal bars, to the top of the main hoop.

   b. Instead of a single front hoop, two (2) side hoops following the line of the front pillars to the top of the main hoop may be used. These two (2) side hoops are to be connected by a horizontal bar over the top of the windshield. (See figure 17)

   c. Another option is a top "halo" hoop following the roof line from the main hoop to the windshield with forward down tubes following the line of the front pillars to the floor.

   d. Double "ear-type" joints are allowed, provided that they are fully welded at all mating surfaces.

   e. It is recommended the hoop extend to the belly pan. If not, it shall be attached to the chassis with gussets and

triangulation in order to spread the loads.

f. It is recommended that the vertical bars of the front hoop be connected by a horizontal bar at a point above the driver's legs

g. All front hoop options (a, b, c) shall be connected to the main hoop in the following manner.
   i. On open top cars, attachments shall be no more than six inches below the top of the main hoop.

   ii. On closed top cars, attachments shall be as close to the roof as possible.

2. Open top Automobiles without a windshield and with a high front hoop design. Front hoop requirements for open top automobiles with a windshield are to be followed with the following exceptions.

   a. Since the windshield frame is to be removed with the windshield, there is no requirement to follow the line of the A-pillar.

   b. Since there is no windshield for the hoop to be above, the front hoop shall be above the driver's line of sight.

3. Open top Automobiles without a windshield and with a low front hoop design

   a. Low front hoops shall be cowl height, or at a minimum, a straight line drawn from the top of the main hoop to the top of the front hoop shall pass over the driver's helmet (See figure 18).

   b. Open cars with a low front hoop shall have two braces extending from the main hoop to the low front hoop. These braces shall be mounted no lower than six inches below the top of the main and front hoops as illustrated in figure 18.

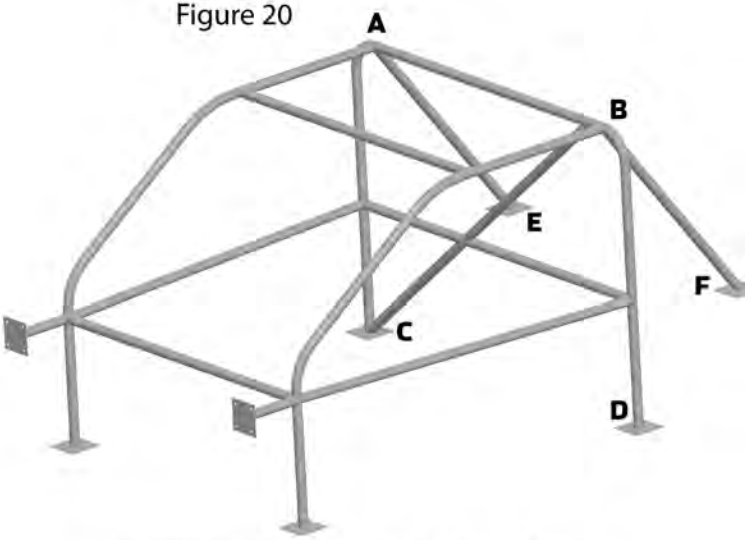
   c. Fabrication - Open and Closed Automobiles
   The main hoop shall be one continuous length of tubing with smooth continuous bends and no evidence of crimping or wall failure. The minimum radius for all bends shall be three (3) times the tube diameter measured from the tube centerline. Whenever possible, the roll hoops should start from the floor of the automobile, and, in the case of tube frame construction, be attached to the tubes by means of gussets or metal webs in order to distribute the loads. On automobiles of frameless or uni-body construction, consideration should be given to using a vertical roll hoop of 360 degrees completely around the inside of the automobile and attached with suitable mounting plates.

C. Bracing - Open and Closed Automobiles
All required bracing shall be the same diameter and wall thickness as listed in 9.4.1.E, Material. (Main and Front Hoop)

All main hoops shall incorporate a diagonal brace (same diameter and wall thickness as main hoop) to prevent lateral distortion of the main hoop. The brace shall either be in the plane of the main hoop or extend from the top of one rear brace (see figure 20) to the bottom of the opposite brace. In the case of braces in the plane of the main hoop, the brace must be attached at both ends to the main hoop, span at least 50% of the main hoop, and at least 75% of the height of the main

hoop.

Figure 20



Diagonal brace may run B-C, A-D, A-F or B-E

1. Main Hoop Bracing
Main hoops shall have two (2) braces extending to the rear, attaching to the frame or chassis. Braces shall be attached as near as possible to the top of the main hoop (not more than six (6) inches below the top) and at an included angle of at least thirty (30) degrees. Rear braces may penetrate required bodywork provided the resulting hole serves no other function, and the holes are sealed around the braces.

2. Removable Bracing
Removable bracing shall incorporate connectors of the double lug, tapered, or muff-type as shown in figures 14 and 15. The double-lug type shall include a doubler, gusset, or capping arrangement so as to avoid distortion or excessive strain caused by welding.

3. Front Hoop Bracing
There shall be two (2) braces extending forward from the front hoop to brace the front hoop and protect the driver's legs. It is recommended that this bracing extend to the bulkhead in front of the driver's feet; but, in any case, it shall be integrated into the frame or chassis to provide substantial support for the front hoop. Front braces may penetrate required bodywork provided the resulting hole serves no other function, and the holes are sealed around the braces.

D. Exceptions
When it is manifestly impractical or unsafe to construct and install a roll structure meeting the minimum requirements as set forth above, an alternate design roll structure may be submitted to the SCCA Technical Staff who may, in a proper case, accept such alternate roll structure design on a specific case by case basis.

E. Side Protection - Open and Closed Automobiles

1. The minimum side protection shall consist of a horizontal side tube connecting the front and rear hoops across both the door openings. Additionally, there shall also be either a diagonal tube from the front hoop to the rear hoop bisecting the door opening below the horizontal side tube, or not less than two (2) horizontal side tubes. Additional tubing may be added. NASCAR-style door bars are recommended.

2. In automobiles with full roll cage installations including side bars, interior door panels may be altered, replaced, or removed. When door panels are removed, all sharp edges or projections shall be protected.

F. Mounting Plates:

1. Bolt In cages.

The thickness of mounting plates bolted to the structure of the car shall not be less than the thickness of the roll hoop or brace that they attach and shall be backed-up with a plate of equal dimensions on the opposite side of the panel, with the plates through-bolted together. A minimum of three (3) bolts per mounting plate is required for bolted mounting plates. All hardware (bolts) shall be Grade 5 or better with 5/16" diameter minimum.

2. Welded in cages.

Mounting plates welded to the structure of the car shall not be less than .080" thick. Whenever possible the mounting plates should extend onto a vertical section of the structure (such as door pillar).

9.4.7. APPENDAGES

The following procedures are approved for modification to roll bars/cages that do not meet the two (2) inch required minimum: The old main hoop may be cut off near the chassis mounting and a new main hoop of equal tube size or a section of equal tubing size may be added, and inner tube(s) must be used to mate all sections together. All braces must be minimum distance from top of hoop per Section 9.4. All welding for this modification must be arc welded (min.). The inner tube(s) must be rosette welded three (3) places near top and bottom, see figure 21.

Figure 21