BMW CCA Club Racing

Guidelines for Annual Technical Inspections 2011 Season

1/28/2011

CLUB RACING Technical Inspection Guidelines

A How-to Guide

The purpose for a technical inspection

The purpose behind a technical inspection is to assure that the car is safe enough for BMW CCA Club Racing, and to provide the driver with protection enough to survive most racing accidents. One can never protect against all accidents. A tech inspection must be performed annually to review the safety items outlined in the Club Racing rule book. Even veteran drivers sometimes overlook one or more areas that a tech inspection will uncover.

The purpose behind this guide is to allow you, the tech inspector, to start from a structured and stable base of knowledge as to what to look for when inspecting these cars. Remember, it is your responsibility to assure (for the driver of the car you are inspecting as well as all other drivers on the track) that the car you are to inspect will be safe!

The first thing in a tech inspection is to have a check list and a routine.
This will insure that you have covered all the areas required to do a thorough tech inspection. **Do not assume**, because you know the driver or the shop that assembled the car, that the car will be safe or compliant with the rules. **Do not assume**, because the car has a logbook from another organization, that the car will pass a BMW CCA Club Racing tech inspection. Rules vary between different organizations and other tech inspectors can overlook some areas. Our goal is for BMW CCA Club Racing to have the best and safest organization for racing, period!

Logbook

The first thing to do when inspecting a race car is to ask the driver for his logbook. If this is a new car without a BMW CCA Club Racing logbook, ask if it has a logbook from another organization. If it does have a logbook of any kind, take a look at the logbook and assure that there are no entries that require maintenance. It is the driver's responsibility to determine which class the car is to be raced in. The inspector should verify the class and number, as well as all other required decals, are properly displayed on the car. You can refer to the BMWCCA Club Racing (CR) website for decal placement and requirements.

Whether this car requires a new logbook or it is in for an annual inspection, the procedure should be exactly the same. This is usually the only opportunity for an official BMW CCA Club Racing inspector to thoroughly look at the car for the year. Many things can happen in one year's time. The car could have gone through multiple crashes, a new cage welded in, items removed or added...all of which could make the car unsafe or illegal. It is your job to discover these items. Any car that has crashed severely is required to be re-inspected. Always check the VIN or roll cage number (if applicable) to make sure it matches the logbook's entry to assure that you have the proper logbook.

Always keep an eye out for the unusual. If something does not look right, check it out. For instance, the cage tubing could look too large or too small. The window net may be at a weird angle. The seat could be in crooked. If the car looks unprofessional, it deserves a closer look.

Window and Interior Nets

Check the window net and interior or right side nets. The mounting must be to the cage and should allow for quick one handed removal. The hardware must be of high-quality. If there is doubt, get permission to punch the net from the inside toward the outside with your open hand (palm first). There should be no holes in the cage for mounting the window net.
There should be manufacturers SFI date tag on every net which must be date punched. If the tag on the net, or any other safety equipment, is not date punched it should be treated as if it was out of date. CR racing rules state that SFI nets expire two years after their date of manufacture which is punched on the SFI tag. If the nets installed will expire during the current year, you should point that out to the owner/racer even if the nets are currently less than 2 years old.

For window net and interior or right side net installation, refer to the BMW CCA Club Racing Rules for specific requirements.

Restraint System

Check the restraint system for general appearance and condition. If it looks ratty, torn, or frayed the belts need to be replaced. The 6 point system needs to be SFI 16.1.1 rated or FIA-rated. Belts which are SFI rated expire two years after the date they are punched, FIA rated belts for 5 years from the

date of manufacture (be sure to check for FIA tags). Check to assure that the belts are properly threaded through the hardware on all points. Belts must be of the individual strap or “H-style” type. Ensure that the mounting positions of the restraint system rulebook requirements. Check to make sure that the hardware is of the correct type and backed by large-diameter washers. Refer to the BMW CCA Club Racing Rules Appendix B for specific requirements.

Seat

Make sure the seat is of the proper type. The seat needs to be securely mounted. Carefully inspect any seat which shows any signs of looseness. Sliding seat brackets may exhibit looseness but loose bolts may appear similar to adjustable brackets – take care! For seats which have expired, a rear brace is required. Although the rearward brace does not need to be bolted to the seat, it must make contact with the seat with a minimum specified surface area. See BMW CCA Club Racing Rules for specific requirements.

Steering Wheel

Check the steering wheel is attached securely and there is no excessive play in the steering. Note that some quick release steering hubs have some rotational play in them. Be careful to discern this from steering column/rack play.

Fire Extinguisher/System

Make sure the bottle mounting is secure with a metal bracket. The driver must be able to reach the extinguisher or the firing button or lever while seated and belted in. The fire extinguisher must meet capacity requirements as stated in the BMW CCA Club Racing Rules. Check the charge gauge; it must be in the green. Tap the gauge to make sure the gauge is not stuck. Note that some fire systems do not have a gauge. They may have a CO2 charge. You can check the CO2 cartridge by unscrewing it from the bottle and checking the seal on the end. (if the bottle is mounted vertically, it must be dismounted and laid horizontally before removing the CO2 cartridge) If the seal is any way damaged, the system is unserviceable. If the CO2 cartridge is removed you may see residual fluid weep from the bottle. This is normal and not indicative of any problem whatsoever. Also you can check the head rupture disc by; 1) ensuring a safety pin is in the actuator, 2) loosening the discharge lines from the bottle. They should be dry, so if any fluid at all is seen in these lines it is indicative of a damaged rupture disc and the system is unserviceable.

Some fire systems have a date tag on them that states an expiration date. This date is often over looked. If the system is out of date, the extinguisher must be serviced. If the extinguisher will become out of date in the current year, then you should point this out to the owner/racer.

If the fire system is an electronic type that uses a battery, have the owner/racer show you how he checks for both the battery being good and for the continuity of the fire buttons.

Check for external operation of the fire system. How is it labeled? Does it appear that the outside the car actuator will operate correctly? If not, this must be corrected. The time available to exist a car in the event of a fire is limited.

Fire systems are required for all cars.

Roll Cage

Check the roll cage for 360° welds near the roof at A-pillars and B-pillars. Also check the welds on the mount plates. If the welds look of poor quality, there may not be proper penetration, a note should be made and the box on the form should not be checked as “Approved.” For cars with a bolt-in cage, check underneath the car for backing plates. These plates must be of equal size to the top plates. Check the nuts to make sure that they are locked in place. This means either double nuts, lock washer, or Nylock nuts. This applies to the tubing connections inside the car, too. Check the placement, security and condition of the roll bar padding. The padding must be anywhere the driver’s head, arms or legs could contact in an accident. The thick part of the padding must face the area of concern. SFI 45-1 rated high density padding is required on any tube within 12” of the driver’s head. Check the BMW CCA Club Racing Rules Appendix A for specific requirements.

Brake Lights

Have the driver open the hood and trunk. While the driver is in the cockpit, have them touch the brake pedal to confirm proper brake lights function. Ensure all brake lights work.

Windows, Windshield

Check general safety of all windows. Consult CR Rulebook section 3. Safety part H.1 for any damage to the windshield. If the car is Modified class, verify the windshield complies with Rulebook section 7. Modified and Super Modified Classes part N.4.

Fuel Cell –

While in back, check for a fuel cell. Fuel cells are not required in most classes but some have them anyway. If they have a fuel cell, it must be legal and safe. Make sure there is a sealed metal bulkhead between the fuel cell and the driver’s compartment. The cell must be in a container. Check to see if there is foam inside. To do this, you must have access to the filler near the cell. Assuming you do, open the cap and look inside. There should be a black rubber flapper valve directly under the cap. This should push down out of the way, easily. You should see the foam right inside. If there is doubt as to whether the bladder is legal, the only sure method to know is to remove the top of the “can” and look at the bladder itself. The filler cap should be ‘positive lock’ type (no flip type).
For fuel cell details, see Section 5 part M. Fuel cells have a useful life and the date of manufacture is supplied by the manufacturer. The owner/racer should supply a copy of this. Fuel cell bladders require recertification after 5 years. Only one re-certification for 2 years is allowed. If the fuel cell has been recertified, the owner/racer should supply a copy of this also.

Under Hood Check

If the battery is under the hood, check it to assure the terminals are properly covered. Check all the positive lines and verify that each end is covered. The battery must also be secure.

Carefully check all fuel lines for tightness at the connection points. Check for wear/condition. Also be sure they are properly supported, both hard and soft lines. Check the fuel pump(s) and its connections. Is there an excessive amount of fuel vapor smell coming form under hood? If so have the owner explain the source. Fuel leakage is a dangerous potential source of fire and should be minimized.

Check the steering fluid lines for signs of leaking. Most lines will show some weeping but there should not be heavy dripping. Be sure to check the connections at the banjo fittings for signs of tearing/ripping, this is not uncommon.

Check engine mounts by firmly pushing/pulling on the engine. Take care to not pull/push on the intake plenum as this could cause gasket leaks. Check any oil lines for signs of leaking, wear, and condition.

Check any wiring for condition. There should be no visible wear on the protective coating, wires should be protected by heat shielding where appropriate. For those with oil pressure gauges, check the sender mounting. It is common for the typical heavy sender to be mounted hanging on a brass or aluminum fitting right off the engine. This is not good practice it induces a crack and leak in the sender; suggest remote mounting of the sender using stainless braided line.

Check the firewall for holes. Any holes larger than about 1/8” must be covered in metal or other fire resistant material, not just taped. Check to make sure that all wires going through the firewall are grommetted to prevent abrasion leading to an electrical short.

Check all coolant hoses for condition and signs of age or rubbing. Inspect the radiator for proper mounting and condition. If it’s a stock BMW radiator carefully inspect the neck(s) for cracking. If applicable, inspect the coolant overflow catch tank and hose for condition and proper mounting. Many overflow containers are a source of leakage.

If the engine is extremely oily and or dirty, suggest to the owner that cleaning and degreasing the engine is an excellent way to uncover potential problems that can lead to mechanical failure or even avoidable crashes.

Check belts for condition and signs of cracking/wear.

Master Battery Switch

Appendix C details the electrical disconnect. A functioning electrical disconnect switch that cuts the power to the car’s electrical system and stops the engine is required. This means that it must shut off

the engine while running. Have the driver start the car and then have them turn it off by the Battery Master Switch. The engine must shut off or the switch and the way that it operates must be repaired or modified. A proper decal must also show the off position of this switch.

It is preferred that the switch be mounted externally on the drivers side.

Roll Cage Measurement

Check the roll cage for the tubing diameter and wall thickness. This should be done even if the logbook has already been issued. Measure the tubing in the three required places noting (on a new logbook) these exact figures in the front of the logbook. Check to make sure the tubing is legal for the weight and class of the car. Refer to Roll Cage Specifications in the BMW CCA Club Racing Rules for specific requirements.

Underneath Inspection

Now get the car up in the air. Carefully examine all the suspension mounting points, sway bar mounts, bushings, ball joints, exhaust hangers, engine/trans mounts, wheel bearings, steering linkage, brake lines, hard lines, underside of the fuel tank/cell, etc for signs of wear, tightness, condition, etc.

Perform a check for play on all 4 wheels. Use both hands on the top and bottom of the wheels to check for any wheel play. Try to feel for any popping or clicking that might be from a worn suspension part. Does the wheel turn freely without noise? Be aware there may be some brake drag.

Many BMW cars suffer broken front lower suspension arm ball joints. This is the result of wear but also of improper installation. CR has made several recommendations in this regard over the years. Is the owner/racer aware of these issues and does he check for play in the interior ball joints on a regular basis?

Check for any fluid leaks. Depending on the age and preparation level of the car, there may be some seepage, but seepage usually does not improve on its own. If the seepage is heavy, the car should be cleaned with a good degreaser so that the source of the seepage or leak can be identified. Fluids on the racing surface are one of the most dangerous hazards on the racetrack, and they usually affect a car behind the offending car.

Manny E36 cars have experienced detached trailing arm buckets. If this car is an E36, have the trailing arm buckets been reinforced? If not, when will this be performed?

Brakes and brake system components should be examined including pad thickness and rotors for cracks and thickness.

General examination of all components for potential safety issues should be completed. Take care to spend extra time during the inspection of the underside.

Final Details

This concludes the safety check. But the car will still need to have other things checked, especially for a newcomer to racing. Make sure the logbook has the required two photos in the front. Make sure the required BMW CCA Club Racing decals and sponsor decals are on the car. Follow the inspection form, take your time, look at everything very carefully (even a well prepared and maintained car can have an issue), and do not sign off on anything that is uncertain. The safety of the racer and the other competitors depends on the safety of every car on the track.

Notes on the Annual Inspection

All variances from the rulebook must be noted on the Annual inspection form. The back of the form can be used to document any actionable items for correction. Write “The following items must be fixed by _____:” and then list the items needing correction. If the items are severe enough so that the driver should not race, make the driver fix the item before going on track, otherwise, give the driver enough time to do the corrections.

Conclusion

Be sure to be courteous during the inspection. Remember that the car you are inspecting is the driver’s pride and joy. Be polite, but firm, when requiring that items be fixed. Give the driver written and verbal instructions for fixing violations along with the reasons why the item(s) needs fixing. Make suggestions on how the car could be safer and what needs to be done to comply with the rules. Understand that most drivers value your input and want to do what is right.

Although it may be difficult for you, do not allow a car on track that is unsafe. It is better that the driver be mad at you for not allowing him/her to race than the driver be injured or killed because you let them drive. Any problems can be directed to the Regional Technical Steward, National Technical Steward, or Club Racing Chairman.

Make a note in a separate book as to any violations needing correction for each car inspected. By making these notations, a future inspection can be made at the track to assure that the driver has complied with the logbook entry.

Appendix A
Roll Cage Specifications

1. General / Purpose

   A. The basic purpose of the roll cage is to protect the occupant in case of a rollover or a collision. It must be able to withstand the weight of the car landing on the roof. FIA-approved roll cages (not bolt-in) with a manufacturer's certificate of approval are allowed with any required braces being added. Factory/BMW Motorsport roll cages with documentation (matching serial number to manufacturer's certificate) are allowed.

   B. Vehicles issued logbooks prior to **1 July 2006** may have construction based on the final set of 2005 BMW CCA Club Racing Rules. These vehicles are "grandfathered" and may continue participation in BMW CCA Club Racing. However, their owners or future owners are highly encouraged to update the cages to the current standards.

2. Bends

   A. None of the tubing may show any signs of crimping or wall failure. All bends must be Mandrel type. The center radius of the bends may not be less than three (3) times the outside diameter of the roll cage tubing.

3. Main Hoop

   A. The main roll cage hoop shall be as wide as the full width of the interior and must be as close to the roof as possible without violating the provisions of "**Inspection"** outlined below. One continuous length of roll bar tubing shall be used as the main hoop. The main hoop must consist of not more than four (4) bends maximum, totaling one hundred eighty (180) degrees +/- ten (10) degrees and in the same plane.

4. Diagonal Brace

   A. At least one (1) diagonal brace shall be used in the same plane as the main hoop. One end of the diagonal brace shall attach to the corner, or horizontal part, of the main hoop above the driver's head, within twelve (12) inches of the driver's-side corner. The other end of the diagonal brace shall attach to the mounting plate (or to the main hoop as close to the mounting plate as practically possible) diagonally opposed to the driver's head (passenger floor).

5. Forward Hoops (Option 1)

   A. The forward hoops shall extend from the main hoop (in a forward direction) to the floor by following the roof and the "A" pillar of the car. There shall be a bar connecting the two (2) forward hoops at the top of the windshield mounted as close to the roof as possible without violating the provisions of "**Inspection"** outlined below. The forward hoops shall incorporate no more than four bends each. Optionally a **"Halo Hoop (Option 2)"** or **"Front Hoop (Option 3)"** construction is also acceptable.

6. Halo Hoop (Option 2)

   A. A "halo bar" extends from the main hoop (in a forward direction) following the roof line to the windshield then following along the top of the windshield, then following the roof line back to the main hoop, thus creating a "halo" over the driver's head. A "halo" bar shall be constructed of one continuous piece of tubing. One (1) down tube following the "A" pillar must support the "halo" on each side of the car. The down tubes shall incorporate no more than two (2) bends each.

7. Front Hoop (Option 3)

   A. A "front hoop" is a bar that extends up from the floor, then follows the "A" pillar up to the roof, then follows the roof line across the top of the windshield, then back down the other "A" pillar, and then terminates on the floor. There must be one (1) horizontal bar (following the roof line) connecting the main hoop and the forward hoop on each side of the car. The front hoop shall incorporate no more than four (4) bends.

8. Rear Braces

A. The main hoop must have at least two (2) braces extending to the rear. The braces shall be attached as near as possible to the top of the main hoop, and no more than six (6) inches below the top. **The braces must not contain any bends**. There must be at least 30 degrees between the plane of the main hoop and the plane of the rear braces. The main hoop rear braces shall be installed to form no more than a one hundred five (105) degree angle or no less than a seventy-five (75) degree angle with the main hoop when viewed from the top. They may go through any rear bulkheads provided the bulkhead is sealed around the cage braces, except in Stock.

9. Door Bars / Side Impact Protection

A. At least one (1) roll cage door bar on driver side and one (1) on the passenger side must be used.

B. Stock and Prepared classes: if the roll cage is equipped with side protection door bars which extend to the outer skin of the door, the door's stock side impact beam may be removed. If the roll cage door bars do not extend fully to the outer skin of the door, the stock side impact beam, if originally equipped, shall not be removed.

C. Stock and Prepared classes: the outside door latch/lock mechanism shall not be removed or modified.

10. Foot Protection

A. A maximum of two (2) additional bars may be extended from each front hoop downbar to the front foot well (two on each side) to protect the occupant's feet/legs. The two foot protection bars on each side must use the same mounting point on the wheel well in Stock and Prepared classes.

11. Mounting Points

A. The roll cage shall be mounted to the floor of the car in six, seven, or eight points. The cage shall not go through the firewall in Stock or Prepared classes. The seventh and eighth points must attach to the firewall or front foot wells solely for the purpose of foot protection. All cage attachment points must be mounted to plates. Each required cage bar shall terminate on a plate with a 360 degree weld to the mounting plate. There shall be only one (1) mounting "point" per plate. This point is defined as where the "required tube" mounts. All additional tubes mounted to that plate must be mounted as close to the required tube as possible.

12. Mounting Plates

A. Each mounting plate shall be no greater than one hundred (100) square inches and no greater than twelve (12) inches or less than two (2) inches on a side. Welded mounting plates shall be at least 0.080-inch thick, and must contain an inspection hole of 3/16" diameter. Plates may extend onto vertical sections of the structure. Any mounting plate may be multi-angled, but shall not exceed one hundred (100) square inches total including vertical sections**.** Each mounting plate must have an area of not less than nine (9) square inches. Each mounting plate must be welded around a minimum of 50% of each edge, and with a minimum stitch weld length of 1.5 inches.

13. Tube / Mounting Plate Specifications

A. Any number of tubes may attach to a plate so long as they are touching each other at the plate. There may be a small gap between tubes to allow welding 360 degrees around each tube. If there is no gap between the tubes, they must be welded around the base as much as possible to form a single figure-eight weld, AND the tubes must be welded to each other two (2) inches up from the base plate.

14. Welds

A. All welding must be of the highest quality with full penetration and shall conform to the American Welding Society D1.1, 1994 Edition, Structural Welding Code, Chapter 10, Tubular Structures and Standards for the material used. Arc welding should be used whenever possible. It is strongly recommended that the welder inspect all welds using Magnaflux™, x-ray, or other effective methods. All tubes must be welded 360-degrees around the circumference of the tube.

B. Tube Structure Design / Body

C. Tubes may touch the body in any place (not to violate the provisions of **"Inspection"** outlined below), but shall not be attached anywhere except as permitted by the preparation rules. No deformation of the interior body panels is permitted, except that the horizontal part of the sheet metal between the top of the "B" pillar and the top of the "A" pillar (next to the driver's and/or

passenger's head), may be pushed in to accommodate the roll cage. The intent of this allowed deformation is strictly to allow for more headroom for the driver.

15. Additional Reinforcement

A. Any number of additional reinforcing bars/braces are permitted within the structure of the cage provided that they meet all the installation, weld quality and material/bend specifications. Installation of additional reinforcing bars/braces does not allow for removal of any required bar/brace/hoop and does not allow for alterations in these.

16. Roll Cage Tubing Specifications

A. **Material.** Seamless, or DOM (Drawn Over Mandrel) mild steel tubing (SAE 1010, 1020 or 1025) or equivalent, or chromolly steel tubing (SAE 4130) shall be used for all roll cage structures.

B. **Size.** For the purposes of determining roll bar tubing sizes, vehicle weight is as raced, **WITHOUT** fuel and driver. Note: There is an allowance of minus 0.010 inches on all tubing thicknesses. Minimum tubing size for the required tubes of the roll cage is:

1. Up to 1500 lbs.

a. 1.375" x 0.095" DOM/Chromolly/Seamless

2. 1501 - 2200 lbs.

a. 1.500" x 0.095" DOM/Chromolly/Seamless

b. 1.500" x 0.120" ERW* (No issuance of log books for cars with ERW cages after 07/01/03) *Note- Specifications listed for reference for inspection of grandfathered vehicles.

3. 2201 - 3000 lbs.

a. 1.500" x 0.120" DOM/Chromolly/Seamless

b. 1.750" x 0.095" DOM/Chromolly/Seamless

c. 1.750" x 0.120" ERW* (No issuance of log books for cars with ERW cages after 07/01/03) *Note- Specifications listed for reference for inspection of grandfathered vehicles.

4. 3001 - 4000 lbs.

a. 1.750" x .120" DOM/Chromolly/Seamless.

b. No ERW allowed.

5. Over 4000 lbs.

a. 2.000" x 0.120" DOM/Chromolly/Seamless.

b. No ERW allowed.

17. Bending Allowances

A. If the maximum number of bends is exceeded all components shall be made from the tubing size listed for the next heavier category and must be approved by a BMW CCA Club Racing Technical Steward.

18. Inspection

A. A 3/16-inch inspection hole must be drilled in each of the required bars and mounting plates in a non-critical area for the purpose of determining wall thickness. All welds, except those mounted to plates on the floor, must be accessible for inspection (360 degrees).

19. Alternate Design/Construction

A. Alternative roll cage design and/or construction may be accepted with the designers and/or constructors or structural engineers certification that the cage meets or exceeds the specifications described herein.

1. Certificate must include the certifiers name, address, business name, business license number, professional credentials.

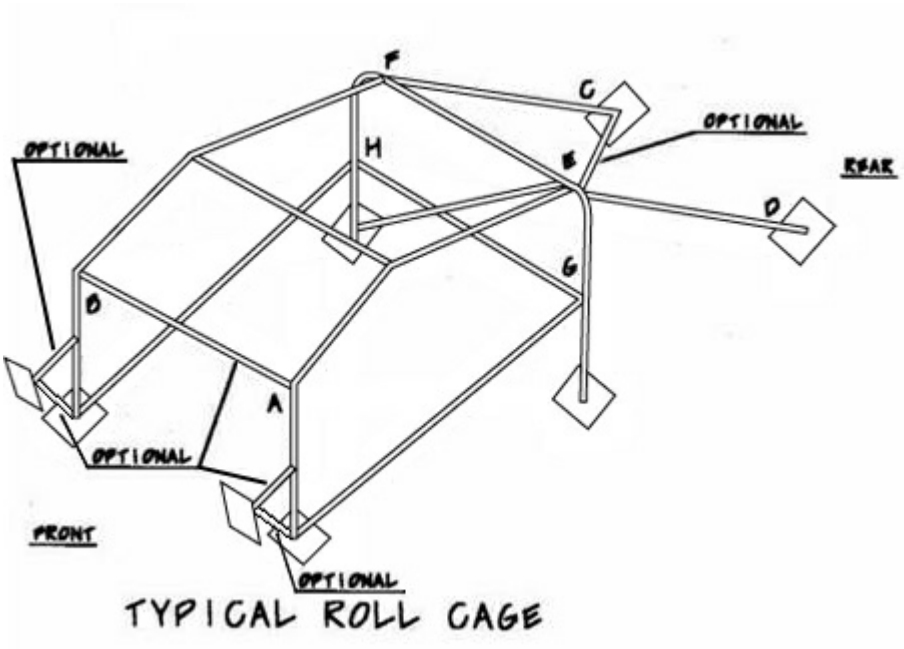
2. The certification document must be attached to the vehicles logbook.

3. If "plinth" boxes are used the constructor must include in the certification the structure includes a load distributing bottom plate.

B. Approval by the National Technical Steward or his/her designee is required.

1. Plans/drawings may be submitted in advance.

2. Final approval requires a physical inspection.ROLL CAGE DIAGRAM



Appendix B
Harness belt Supplemental Information

1. APPROVED BELT CONFIGURATIONS

All harness belts must be installed based on the instructions provided by the harness belt manufacturer. Figure 1 details the recommended installation angles of each harness belt anchor point based on the latest testing completed by the FIA. The following types of harnessbelts are approved. Both latch-link and CAM lock, locking systems are allowed.

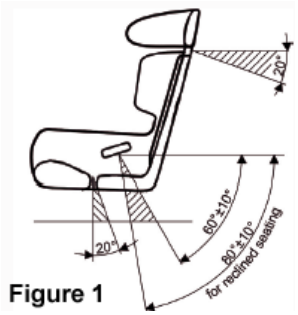


Figure 1

A. Standard Belt – Six point system for automobiles with an upright (to 30 degrees) seating position. See figures 2-4. A six-point system consists of a two-inch or three-inch lap belt, three-inch shoulder straps (two-inch allowed with HANS), or two-inch shoulder straps with three-inch wide professional padding (padding NOT allowed with HANS), and two approximately two-inch leg straps. The buckles for the lap and shoulder straps must be of metal-to-metal quick-release type at the locking mechanism (i.e. cam-lock)

The dual leg straps have a single metal-to-metal connection to the locking mechanism and a separate mounting point to the floor or roll cage for each leg of the anti-submarine strap. Leg straps must pass through the sub-strap hole provided in the race seat located immediately in front of the crotch. Locate the mounting points by following the plane of the shoulder belts as they pass over the chest extending the plane to intersect the floor and then measure a 20 degree angle rearward. This is the center point. Measure two inches left and right of the center to locate each mounting point for an eyebolt or direct bolt. If the legs are wrapped, the center point is the center of the webbing for each strap. A seventh point is not used in this configuration.

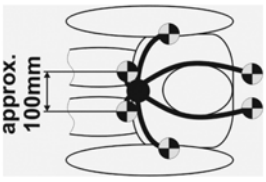


Figure 2

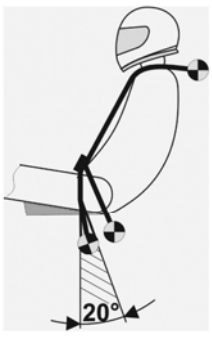


Figure 3

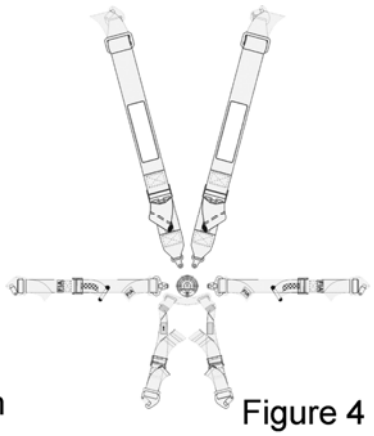


Figure 4

Standard 6-Point Belt Installation

B. Formula Belt – Six or seven point system for automobiles with semi-reclined (recline of +30 degrees) seating position. See figures 5-7. Consists of a two-inch or three-inch lap belt, three-inch shoulder straps (two-inch allowed with HANS), or two-inch shoulder straps with three-inch wide professional padding (padding NOT allowed with HANS), and two, approximately two-inch, leg straps. The buckles for the lap and shoulder straps must be of metal-to-metal quick-release type at the locking mechanism (i.e. cam lock or latch-link). Formula Style belts with rear mounted sub straps

(Figure 5) are not recommended for use in upright seating positions unless a 7th point is added (Figure 5.A)

Each side lap belt and leg strap share a single (or immediately adjacent) mounting point located within the seat or seating tub or at a point with direct unencumbered routing. Each leg strap loops around the shoulder belt connector - passes down through a "D-Ring" on the lap belt - wraps around the thigh - and passes directly under the driver's bottom outwards to the same or an immediately adjacent location of the lap belt mounting point. The significant incline of the seat bottom combined with the weight of the driver sitting directly on the leg straps helps to load the lap belt thereby reducing "ride-up" of the lap belt when loaded. If used in an automobile with an upright seating position a seventh point is recommended and pictured in Figures 5.A-7.A. The purpose of the seventh point is to provide better and faster loading to the lap belt and to help minimize upward movement in the seat allowed by rearward mounted leg straps. Locate the mounting point by following the plane of the shoulder belts as they pass over the chest extending the plane to intersect the floor - this is the mounting point.

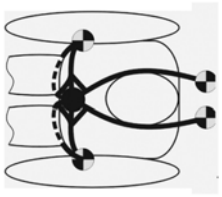


Figure 5

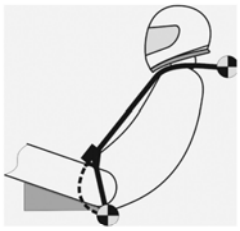


Figure 6

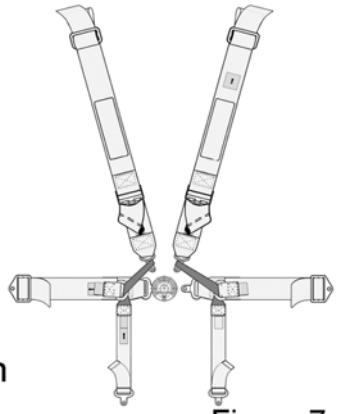


Figure 7

Formula Style Belt Installation

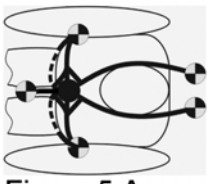


Figure 5.A

Applies only to Formula and Hybrid Style Belts with rear mounted anti-sub straps

Figure 6.A

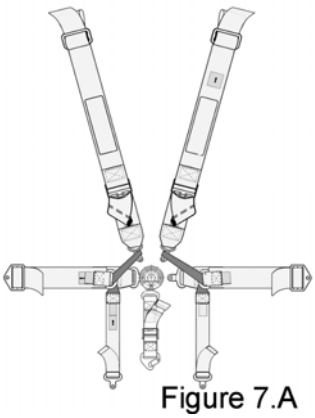


Figure 7.A

Seven Point Belt Installation

C. Hybrid Belt – Six or seven point system for automobiles with an upright OR semi-reclined seating position. See figure 8 for belt layout. Figures 2 and 3 show upright/forward mounting. Figures 5 and 6 show reclined/rearward mounting. Consists of a two-inch or three-inch lap belt, three-inch shoulder straps (two-inch allowed with HANS),

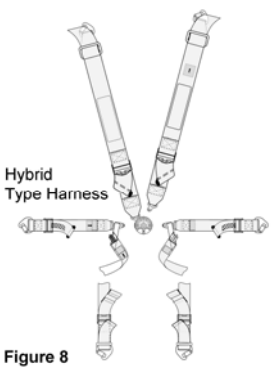


Figure 8

and two, approximately two-inch, leg straps.

In this configuration, the leg straps are looped around the lap belt connectors on either side of the locking mechanism. Anti-submarine straps can be mounted in either the Standard Belt mounting configuration or in the Formula Belt mounting configuration. If the Formula Belt mounting configuration is used, a seventh point can be added (see Figure 5.A & 6.A). Forward mounting position is recommended for upright seating positions.

2. LAP BELT MOUNTING

A. The lap belts shall be mounted rearward of the pelvis, between two lines drawn at 60-degrees, and 80-degrees, below the horizontal (see Figure 1).

B. The lap belts shall pass through the seat, without interference, to the attachment points, pulling in plane with the mounting hardware without any visible twisting or edge loading on adjusters or mounting brackets. Mounting points must be as close to the side of the seat and must not rub on any seat brackets, rough, or sharp edges.

C. Lap belt mounting points must be integrated with the frame of the car or to specific welded mounting tabs on the roll cage. If mounting points are located on seat brackets, they must be certified by the bracket manufacturers specifically for such use. Mounting points created in the floor or transmission tunnel must be reinforced with backing plates of sufficient size to spread the load.

D. Lap belts with bolt on connections must allow bracket to pivot either by use of a machined sleeve or by backing the lock nut off just enough so that bracket can pivot. This is critical to prevent loading of one edge. Eye bolts must be aligned properly so that the snap-on connector is not twisted or loaded at an angle that might load one edge of the webbing while the harness is being used.

E. If bolt-in or snap-on mounts are used in conjunction with a 3-bar adjuster the complete wrap must be completed as detailed in Figure 9 and described in article 6 below

3. SHOULDER STRAP MOUNTING

A. The shoulder harness shall be the over-the-shoulder type. There must be a single release common to the lap belt and anti-submarine straps. Only separate shoulder straps are permitted. (Y-type shoulder straps are not allowed.) "H"-type configuration is allowed.

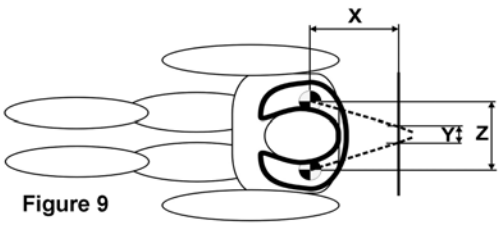


Figure 9

B. The shoulder harness shall be mounted as closely behind the seat back as possible, not to exceed twelve-inches (12").

C. The shoulder harness must be mounted at an angle of 0-degrees to -20-degrees from the horizontal plane measured from the top of the shoulder or the top of the HANS (see Figure 1). In no case shall the shoulder harness be mounted above the horizontal at shoulder height.

D. The shoulder straps shall pass over the driver's shoulders (or over the HANS) - through the seat, in a direct line to the attachment points without any interference caused by the seat back openings or other obstacles. The formula Y = Z – (X *.50) can be used to determine the "ideal" distance between attachment points (see figure 9). Where the shoulder belts are wrapped around a harness bar, the "Y"

dimension is measured from the center line of the webbing of each shoulder strap. Where the shoulder belts are bolted the "Y" dimension is measured center to center of each mounting bolt.

E. Proper alignment of shoulder straps, unencumbered belt routing, seat opening clearances, and optimum attachment locations **will be inspected and verified with the driver seated in the car and** wearing an approved head and neck restraint system, the harness belts, and a helmet.

F. In cases where the driver is in a semi-reclining position, the shoulder harness shall be attached so that the angle between a line drawn through the driver's spine and the shoulder harness is 70-degrees or greater.

G. Sternum straps are not recommended.

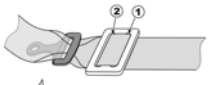


Figure 10

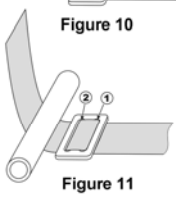


Figure 11

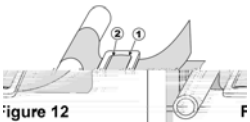


Figure 12

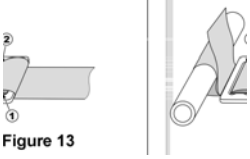


Figure 13

4. ANTI-SUBMARINE LEG STRAP MOUNTING

A. The double leg straps of the six-point system may be attached to the floor - to a purpose built element of the cage - or to purpose built mounting points in the seat as provided by an approved seat manufacturer.

B. A separate attachment point connection must be provided for each leg strap.

C. Attachment points may use bolts, eye-bolts with snap-on connectors, or wrap mounts to roll cage, seat, or chassis points designed for the sub strap loads.

D. Bolts and eye-bolts through the floor must be reinforced with backing plates provided by the harness manufacturer or large washers on the underside to spread loads.

E. Wrap mounts to specific bars as part of the cage are allowed using only wrap mount hardware provided by the harness manufacturer following the manufacturers defined wrapping instructions.

F. Formula belt and Hybrid belt anti-sub leg straps may share the lap belt mounting point in rearward mounting installations providing there is a direct unencumbered routing as outlined in the belt descriptions. A 7th point is always recommended when sub-straps are mounted rearward to points at or near the lap belt.

5. WEBBING MATERIAL

A. The material of all straps shall be nylon, or Dacron polyester, and in new or perfect condition. Belts showing any significant signs of wear shall be disallowed at the discretion of the Tech Steward regardless of expiration date.

6. THREE BAR ADJUSTERS

A. 3-bar adjusters may be used for wrap mounting shoulder belts around harness bars or leg straps around mounting bars. The adjusters can also be used to secure webbing wrapped through attachment hardware. When 3-bar adjusters are used, they shall be placed as close to the mounting points as possible. Figures 10-14 have the proper wrapping techniques detailed in them:

1. Slide the webbing through slot 1 and 2 as shown
2. Make sure the protruding strap end is long enough to have sufficient webbing length available for the following wrapping procedure. A minimum of 360 – 400 mm (14.2 – 15.75”) is recommended.
3. The 3-bar slide shall be positioned as close as possible to either the roll cage bar or to the end bracket.
4. Wrap the free strap end from underneath around the roll cage bar or through the webbing slot of an end bracket.
5. In case of the combination of a 50 mm bracket slot and 75 mm webbing, fold the webbing in as shown.
6. Wrap webbing back through slot 2 and 1.
7. Fold strap end back and run it through slot 2 again.
8. Make sure the strap end protrudes at least 100 mm (4“) or even longer from slot 2. If it is less than 100 mm disassemble and start over again. If longer, roll in the strap end and fix it by a cable tie to the shoulder belt.
9. Check again for proper shoulder belt tilt lock adjuster positioning and for the 3-bar slide to be as close as possible to the roll cage bar or end bracket.

7. MOUNTING POINTS AND HARDWARE

A. The minimum acceptable bolts used at the attachment points of lap, shoulder, or anti-submarine straps must be SAE Grade 5 minimum diameter of 3/8”.

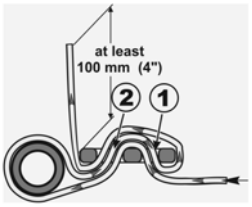


Figure 14

B. Where possible, lap belt, shoulder harness, and anti-submarine strap(s) should be mounted to the roll structure, or frame of the car. Where this is not possible, harness manufacturer provided backing plates or large diameter mounting washers or equivalent should be used to spread the load. Bolting through aluminum floor panels, etc., is not acceptable.

C. Straps utilizing a hook with a spring-loaded clip, which attaches to an eyebolt, must use a cotter pin, or safety wire, through the small hole that prevents the clip from opening.

Appendix C Fuel Cells (section 9 in Stock Class)

C. Fuel cells may be used. The stock tank may be retained or replaced so long as the location and installation requirements in paragraph C are met. For cars in which the factory stock tank is non-metallic, all factory-installed heat shields must remain intact. If a fuel cell is installed and the stock tank is also retained, only one of either the fuel cell or stock tank may provide fuel for combustion. In such cases the remaining storage source (cell or tank) must be empty of any and all substances, except that the fuel cell may retain the bladder and foam.

D. All safety fuel cells shall be constructed and certified in accordance with FIA FT-3 specifications. All safety fuel cells shall consist of a foam-filled fuel bladder enclosed in a metal container at a minimum.

1. At a minimum, all fuel bladders shall be constructed in accordance with the FIA FT-3 or higher (FT-3.5, FT-5, etc.) specifications. Foam internal baffling is required.

2. The bladder shall be installed in a container of .036 inch steel, .059 inch aluminum or .125 inch Marlex, fully surrounding the bladder.

3. Fuel cell bladders require recertification by the manufacturer after 5 years. Only one recertification good for 2 years is permitted, giving bladders a 7 year total life after which they must be replaced.

E. Fuel cells shall be located within twelve (12) inches of the original fuel tank location. (An exception to this location requirement is any model where the original fuel tank is located beneath the rear seats). Additional reinforcement may be added to support the fuel cell, but such reinforcement shall not be attached to the roll cage in stock and prepared classes. The floor pan may be modified for installation but not for aerodynamic benefit. There shall be a sealed metal bulkhead between the driver/passenger compartment and the compartment containing the fuel cell.

10. Electrical Fuel Pumps

F. A mechanical fuel pump may be replaced with an electrical fuel pump provided that it is wired so as to be controlled by the ignition system, to ensure shut down in the case of an accident requiring electrical cut-off.