BMW Car Club
of America
North Star Chapter

# North Star BMW CCA Convertible Requirements, 2021

**North Star BMW CCA Convertible Requirements 2022**
**Excerpts from BMW CCA Driving Event Operations Manual – October 15, 2020**

**2.3.16 Convertibles.**

2.3.16.1 Convertibles are defined as cars with retractable tops, whether soft-top or folding hardtop.

2.3.16.2 Convertibles are not allowed to participate in sessions driven when helmets are required unless the car is equipped with the following minimum requirements:

- An aftermarket roll bar or roll cage meeting the requirements in Section **2.3.19, Roll bars for both hardtops & convertibles.**
- Arm restraints in soft-top vehicles.
- Five (or more)-point harnesses for both driver and passenger.

2.3.16.3 Cars with factory-installed, fixed rollover protection or removable roof sections ARE NOT allowed.

**2.3.19 Roll bars for both hardtops & convertibles.** These specifications are for inspecting aftermarket convertible roll bars and represent minimum requirements. Factory-installed roll bars are not allowed. The words "shall" and "shall not" indicate that the specification is mandatory. Convertible roll bars shall be inspected by, and are subject to approval by the chief technical inspector at each event.

**2.3.19.1 Basic Design Considerations.** The basic purpose of the roll bar is to assist in the protection of the driver and passenger if the car turns over or is involved in a collision. This purpose should not be forgotten.

2.3.19.1.1 With the driver and passenger seated normally and restrained by the seat belts/harnesses, a plane (the "Helmet Reference Plane") drawn from the top of the roll bar (excluding padding) to structural parts of the chassis in front of the base of the windshield (e.g., top of front suspension strut towers) shall pass at least two (2) inches above both the driver's and passenger's helmets. See Figure 1.

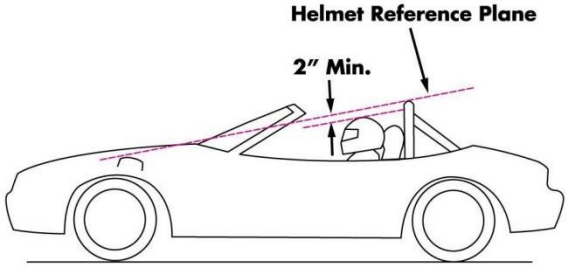


Figure 1. Helmet Reference Plane

2.3.19.1.2 The roll bar shall be designed to withstand compression forces resulting from the weight of the car coming down on the roll bar and to take fore, aft, and lateral loads resulting from the car skidding along the ground on the roll bar.

2.3.19.1.3 The roll bar shall extend the full width of the cockpit.

2.3.19.1.4 Any portion of the roll bar or bracing that might be contacted by any occupant's helmet shall be covered with a non-resilient material such as Ethafoam or Ensolite, or other similar material, with a minimum thickness of one-half inch (½"). The energy-absorbing material shall be firmly attached.

**2.3.19.2 Material.** The roll bar hoop and all braces shall be seamless ERW (Electric Resistance Welded) or DOM (Drawn Over Mandrel) mild-steel tubing (SAE 1010, 1020, 1025, or equivalent), or chrome molybdenum alloy steel tubing (SAE 4125, 4130, or equivalent). It is recommended that mild-steel tubing be used, as chromium alloys present difficulties in welding and must be normalized to relieve stress. Proof of the use of alloy steel shall be the responsibility of the participant.

2.3.19.2.1 The size of the tubing shall be determined based on the vehicle curb weight as follows:

| **Vehicle Curb Weight** | **Roll bar Mild Steel (Outside diameter x wall thickness in inches)** |
|---|---|
| Under 2,000 lbs. | 1.50x0.120 or 1.75x0.075 |
| 2,001 lbs.–3,500 lbs. | 1.75x0.120 or 2.00x0.075 |
| Over 3,500 lbs. | 2.00x0.120 |

2.3.19.2.2 The minus tolerance for tubing diameter and wall thickness shall not be less than 0.010 inches below the nominal value.

2.3.19.2.3 An inspection hole of at least 3/16-inch diameter shall be drilled in a non-critical area of the roll bar hoop to facilitate verification of tubing wall thickness.

2.3.19.2.4 Where bolts and nuts are used, the bolts shall be at least ⅜-inch diameter SAE Grade 5 or equivalent.

**2.3.19.3 Welding.** Welding shall conform to American Welding Society D1.1, Structural Welding Code, Chapter 10, Tubular Structures. Welds shall be visually inspected and shall be acceptable if the following conditions are satisfied:

- The weld shall have no cracks and shall go all the way around joining pieces.
- Thorough fusion shall exist between weld metal and base metal.
- All craters shall be filled to the cross-section of the weld.
- Undercut shall be no more than 0.01-inch deep.

**2.3.19.4 Roll-bar hoop.** One (1) continuous length of tubing shall be used for the roll-bar hoop with smooth, continuous bends and no evidence of crimping or wall failure. The radius of the bends in the roll-bar hoop (measured at the centerline of tubing) shall not be less than three (3) times the diameter of the tubing. The roll-bar hoop shall have a maximum of four (4) bends totaling 180 degrees, ± 10 degrees. Whenever possible, the roll bar hoop should start from the floor of the car.

**2.3.19.5 Bracing.** Roll bar hoops shall have two (2) fore/aft braces with tubing diameter and wall thickness as listed in the table above. The fore/aft braces shall be attached as close as possible to the top of, but not more than six (6) inches below, the roll bar hoop. The included angle between the fore-and-aft brace and the vertical part of the roll bar hoop shall be no less than 30 degrees. The fore-and-aft braces shall have no bends.

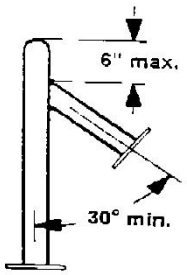


Figure 2. Bracing

**2.3.19.6** Roll bar hoops shall have a diagonal brace with tubing diameter and wall thickness as listed in Section 2 to prevent lateral distortion of the hoop. The diagonal brace shall be attached at the bottom corner of the roll bar hoop on one side and the top corner of the roll bar hoop on the other side. The diagonal brace shall have no bends.

**2.3.19.7 Mounting plates.**

2.3.19.7.1 Roll bar hoops and fore/aft braces shall be attached to the chassis of the car with mounting plates that are at least 3/16-inch thick.

2.3.19.7.2 Carpet/padding/insulation shall be removed under the mounting plates.

2.3.19.7.3 Mounting plates shall be either welded or bolted to the chassis.

2.3.19.7.4 Mounting plates bolted to the chassis shall have a back-up plate of equal size and thickness on the opposite side of the chassis with the plates through-bolted together. Whenever possible, the mounting plate should extend onto a vertical section of the chassis panel.

2.3.19.7.5 If welded, mounting plates must have full welds along the entire plate.

2.3.19.7.6 If bolted, there shall be a minimum of three (3) bolts per mounting plate.

2.3.19.7.7 The through holes for the bolts shall be a minimum of ⅜-inch from the edge of the mounting plate.

2.3.19.7.8 Each mounting plate shall be no more than 100 square inches in area and shall be no greater than 12 inches, nor less than 2.5 inches, on a side.

2.3.19.7.9 The mounting plate may be multi-angled.

**2.3.19.8 Other roll bar designs.** Any roll bar design that does not comply with the specifications in this appendix shall be accompanied by engineering specifications signed by a registered Professional Engineer (PE), which attest that the installation can withstand the following stress loading applied simultaneously to the top of the bar: 1.5X laterally, 5.5X longitudinally (fore/aft) in either direction, 7.5X vertically, where X= Curb weight of the vehicle, with no permanent deformation to any part of the roll bar or the chassis, and with no greater than ½-inch deflection of any part of the roll bar or the chassis as referenced to the unstressed condition. The induced loads must be carried over into the primary structure of the chassis.