

Toyota Prado 150 Internal/External Roll Cage (T068) Fitting Instructions

Unwrap the roll cage and unpack the individual fitting kits. At this point it is recommended that all the main components are checked against the assembly drawing provided on page 19 of these instructions. Should any parts or fixings be missing at this stage, or during installation, please contact your stockist.

Throughout the assembly we shall use a variety of different fasteners; the torque setting for each different size is listed below:

M8 - 25Nm M10 - 45Nm M12 - 70Nm M14 - 95Nm 7/16th - 55Nm

The assembly process of this roll cage is separated into several different sections, each section having its own fitting kit containing all nuts, bolts, washers and fitting plates required:

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Section 1 – Front Under-wing Mount installation

- 1.1 Remove the bonnet and front wings - store safely for refitting later.
- 1.2 Ensure both doors are shut and locked to prevent them being opened during this stage of the installation. Remove the bolt from the top door hinge which is furthest forward on the vehicle on both sides.
- 1.3 To allow sufficient clearance for the under wing mount to fit, the outer edge of the inner wing will need to be dressed back with a hammer as shown.
- 1.4 The bonnet hinges can now be unbolted to expose the inner wing beneath.
- 1.5 The upper rear flange also needs to be dressed back with a hammer and chisel.



- 1.6 The replacement bonnet hinges supplied in the kit should be positioned over the existing holes in the inner wing to ensure correct alignment. The original hinge bolts can be reinserted and tightened to hold this position.



- 1.7 The bonnet can be fitted with the upper sections of the new bonnet hinges and can then be installed back into position using the M8x20 bolts, washers and nuts provided. The bolts in the lower bracket may need to be loosened to adjust the fit and close of the bonnet at this point.
- 1.8 There are 3 large bushes welded to the replacement hinge and these should be used as a guide for drilling through the inner wing at 11mm in these 3 locations.



- 1.9 The under wing mount can now be positioned over the new bonnet hinge and bolted into place through the top holes with 3 x M10x60 bolts and the upper door hinge bolt can be replaced.
- 1.10 There are 4 holes in the upper section of the under wing mount which face towards the centre of the car - these can now be drilled through to 11mm although some already have existing holes behind.



- 1.11 Once these holes have been drilled on both sides of the vehicle, they can be bolted through - ensuring that the backing plates are in position on the other side. There are 3 x M10x25 and 1 x M10 x 35 each side.
- 1.12 In the upper section there are 5 holes to be drilled, 3 facing the centre of the car and 2 facing rearwards.

- 1.13 Once drilled they can be bolted up with 3 x M10x25 and 2 x M10x35, again ensuring that the backing plates are in the correct location. The rear facing bolts require the nut plate to be put into position from inside the vehicle at the base of the A pillar.
- 1.14 Once all of the bolts are in position, refer to the beginning of these instructions and tighten all of the bolts up to 10Nm apart from the 3 x bolts in the top of the plates which will need to be removed at this stage and refitted during Section 2.4.



Section 2 – Legs and Roof Assembly installation

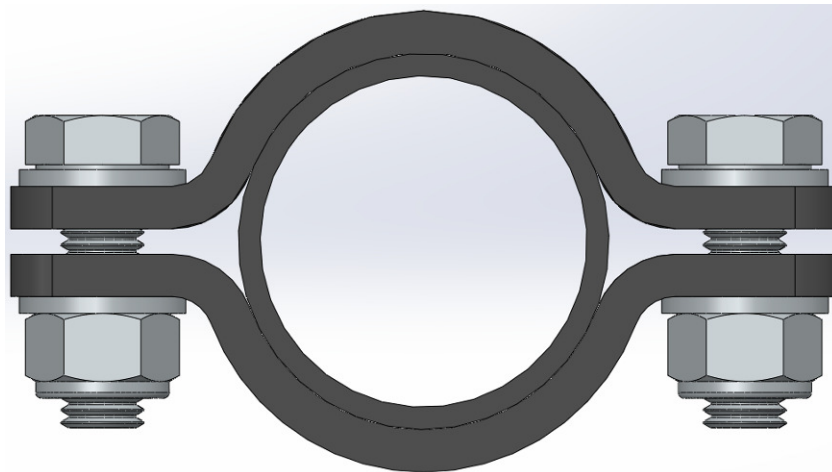
- 2.1 Before positioning any of the ROPS parts on the roof it is recommended to lay some cardboard over the entire roof surface to prevent any damage from scratches.
- 2.2 Bring the first leg to the vehicle and lay the rear end of the leg onto the cardboard on the roof of the vehicle.
- 2.3 At the front of the vehicle, place the leg foot plate on top of the under-wing.
- 2.4 Ensure that the holes are aligned through the foot plate to the under wing mount. Pass an M10x60 bolt through a washer into each of the 3 holes in the leg foot plate. This will go through the foot plate, through the under wing mount and into a void behind the inner wing.
- 2.5 There is a fitting plate supplied in the kit which can be positioned below these 3 bolts and the nuts added to hold it in place. Do not tighten fully at this stage.
- 2.6 This leg is now sufficiently held in place to continue with installing the other external elements of the ROPS.

- 2.7 Bring the top rail assembly of the ROPS onto the vehicle and align the two saddle brackets with the corresponding other half on the leg.
- 2.8 Ensure that the holes in the saddle bracket are aligned, and then place an M10x25 through an M10 flat washer and through both halves of the saddle bracket. On the underside of the saddle bracket, place another M10 flat washer onto the thread followed by loosely applying an M10 nyloc nut, again not tightening. Repeat for the other hole in the saddle bracket with another M10 bolt sequence.
- 2.9 Repeat the bolt process for the other saddle bracket on the leg ensuring that the front roof section is loosely bolted to the leg with the saddle brackets.
- 2.10 Bring the rear section of roof of the ROPS onto the vehicle and slot the squashed ends into the double ear bracket located on the cross rail of the front section. Place the saddle brackets underneath their other half to ensure the rear section is in the correct location.
- 2.11 Ensure that the holes in the saddle bracket are aligned, and then place an M10x25 through an M10 flat washer and through both halves of the saddle bracket. On the underside of the saddle bracket, place another M10 flat washer onto the thread followed by loosely applying an M10 nyloc nut, again not tightening. Repeat for the other hole in the saddle bracket with another M10 bolt sequence.
- 2.12 Repeat the bolt process for the other saddle bracket on the leg ensuring that the rear roof section is loosely bolted to the leg with the saddle brackets.
- 2.13 Pass an M12 bolt through a washer and into each of the holes in the double ear bracket and through the squashed ends on the tubes. On the underside, place a washer and an M12 nyloc nut but do not tighten at this stage.



- 2.14 Bring the second leg to the vehicle and lay the rear end of the leg onto the cardboard on the roof of the vehicle.

- 2.15 At the front of the vehicle, place the leg foot plate on top of the under-wing.
- 2.16 Ensure that the holes are aligned through the foot plate to the under wing mount. Pass an M10x60 bolt through a washer into each of the 3 holes in the leg foot plate. This will go through the foot plate, through the under wing mount and into a void behind the inner wing.
- 2.17 There is another fitting plate supplied in the kit which can be positioned below these 3 bolts and the nuts added to hold it in place. Do not tighten fully at this stage.
- 2.18 Ensure that the holes in the saddle brackets are aligned, and then place an M10x25 through an M10 flat washer and through both halves of the saddle bracket. On the underside of the saddle bracket, place another M10 flat washer onto the thread followed by loosely applying an M10 nyloc nut, again not tightening. Repeat for the other hole in the first saddle bracket with another M10 bolt sequence.
- 2.19 Repeat the bolt process for the other saddle brackets along the leg ensuring that the roof sections are now loosely bolted to both legs using the saddle brackets.
- 2.20 Go around all of the bolts that have just been put into the roof and leg sections and tighten them all to 10Nm to ensure the roll cage is in a rigid position and cannot float. When tightening the saddle brackets, ensure this is done evenly as shown in Figure 7.



- 2.21 Measure from the outside of the roof plate to the edge of the vehicle on both sides. These need to be equal so if they are not, carefully manoeuvre the roof section across the vehicle until they are equal both sides without scratching the roof of the vehicle.
- 2.22 Moving to the rear of the vehicle, inside the rear door, drop the headlining the whole way across the vehicle to provide access to the inner roof skin.

- 2.23 On the roof of the vehicle, mark the centre of each of the three holes in each of the roof mount plates at the rear of the vehicle and indent the centre using a centre punch.
- 2.24 Drill a 5mm pilot hole through the centre of each marked holes ensuring the drill passes through both layers of roof skin but does not damage the headlining of the vehicle.
- 2.25 Using a 10mm drill bit, drill all of the way through the pilot holes to enlarge them in both roof skins. Do not insert any bolts at this stage.
- 2.26 Starting at the front of the vehicle, tighten all of these bolts up to 10Nm, referring back to Section 2.21 when tightening the saddle bracket bolts up.
- 2.27 Ensure that the roll cage is in the correct position on the roof of the vehicle. Gently lift the rear end of the cage, enough to remove the cardboard from underneath lower the entire roof section back down carefully into the correct position.
- 2.28 At the rear of each leg, the foremost hole on each side should be fitted with an M10x40 bolt and the rearmost two holes each side with M10x50 bolts along with washers and nuts. There are also 3 bushes that need to be inserted on each side.



Section 3 – Internal 'B' Hoop installation

- 3.1 Remove the seats, upper and lower front seat belt mounting bolts, lift the carpet and fold over centre console.
- 3.2 Drop the headlining across the whole width of the vehicle where the B hoop will sit and remove the sound deadening inside this section of the roof. Replace the headlining into its original position once completed ensuring it is tight to the roof of the vehicle.
- 3.3 Place the B hoop into the vehicle so that the foot plates go onto the metal of the vehicle floor. Settle the B hoop inside the vehicle so that the foot plates sit around the contours of the chassis in the correct locations. It may be necessary to remove some of the sound deadening material from the floor to allow the hoop to sit down fully.

- 3.4 Mark through all 3 holes in each footplate before removing the hoop from the vehicle again.



- 3.5 Drill through all 6 holes with a 5mm pilot, followed by an 11mm drill. On the outer bolts there are 2 floor skins that need to be penetrated with the pilot, but not with the 11mm.
- 3.6 Working under the car, drill out the 2 outer pilot holes with a 19mm hole saw to allow fitment of the under body spacer assembly.
- 3.7 The B hoop can be refitted into the vehicle and bolted through the floor using M10x110 on the outer holes (through the spacer bushes) and M10x30 on the inner holes - which also have a backing plate.



- 3.8 Place the Y brace into the vehicle and fasten to the hoop using the lap joints and M10 shoulder bolts provided in the fitting kit and tighten to their final torque setting. Pierce through each of the 7 holes in the B hoop V brace foot plates to make a centre hole in the carpet.
- 3.9 Through each of the 7 locations pierced through the Y brace foot plate, centre punch each location to give a centre for the holes. Using a 5mm drill bit, pilot drill each of the 7 locations.



- 3.10 With the internal B hoop secure inside the vehicle, move to the outside. Mark the centre of one of the B hoop roof bracket holes and centre punch.
- 3.11 Using a 5mm drill bit, drill a pilot hole through the centre of the bracket, through the roof, the headlining and finally through the centre of the slotted bracket.
- 3.12 Move to the inside of the vehicle and check the alignment of the hole from the external ROPS to the slotted bracket on the internal hoop. Adjust the hoop if there are any discrepancies in the centres of the drilled hole to the brackets.
- 3.13 Move back to the outside of the vehicle and mark, centre punch then pilot drill the seven remaining B hoop roof bracket holes with the 5mm pilot drill bit.
- 3.14 Remove the lap joint bolts and take the cross brace out of the vehicle. Remove the floor fixings again and remove the hoop totally from the vehicle and store safely to avoid damaging the powder coat.
- 3.15 Ensure that the pilot holes through the headlining are clear, use a 19mm hole saw from inside to open out the holes in the roof. Only go through the headlining and metal work underneath until you reach the outer roof skin, do not drill through this.



- 3.16 Moving to the roof of the vehicle, use an 11mm drill bit to drill through all of the 8 holes in the B hoop roof brackets. Ensure that the drill bit passes all of the way through the outer roof skin and enter the open section underneath.
- 3.17 Obtain the four roof spacer plates from the fitting kit. Ensure that there is two stamped 'BH OUT' and two stamped 'BH IN'.
- 3.18 Position the two BH OUT roof spacer plates into the two outer pairs of holes in the roof from the inside. Push them up inside the holes until it will rise no further. Repeat this with the two BH IN spacer plates in the inner two pairs of holes so that all four roof spacer plates are sitting in the holes in the roof.
- 3.19 Bring the B hoop back to the vehicle and reposition in the same location. Ensure when sliding the hoop underneath the roof spacers to tilt and move the hoop slowly to avoid damaging the finish.
- 3.20 By making slight adjustments to the hoops position, ensure that all of the holes in the hoop base plates align with the holes in the vehicle and that all of the holes in the in the roof spacer plates align with the slots in the brackets on the hoop.
- 3.21 Bring the Y brace back into position in the centre of the vehicle. Ensure that the Y brace is sitting on top of the carpet and aligned with all of the holes.
- 3.22 With the holes in the lap joints aligned, use the four M10 shoulder bolts to attach the cross brace to the hoop. Tighten these to their final torque setting.



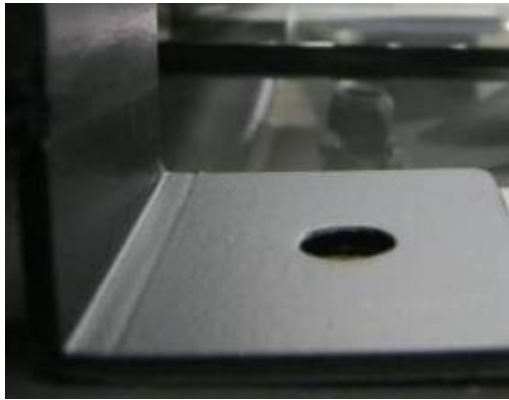
- 3.23 Obtain the M10 bolts, washers and nyloc nuts from the B hoop fitting kit for the through-roof mounting (M10x55 and M10x70).
- 3.24 Pass one of the bolts through a washer and through the hole in the roof bracket. The bolt will then pass through the roof spacer and the thread will be visible on the inside of the vehicle. On this, place another washer and a nyloc nut. Ensure the nut is on the thread but do not tighten at this stage.

- 3.25 Repeat this for all of the other 7 roof bolts until the B hoop is attached to the external roll cage through the roof. The M10x55 are fitted to the inner 4 holes and the M10x70 to the outer 4 holes. Leave all nuts threaded but loose.
- 3.26 Moving to the centre of the vehicle, ensure that the holes on the Y brace base plate are aligned with the holes drilled in the vehicle.
- 3.27 Through all 7 holes of the Y brace base plate, pass M10x35 bolts through a washer and into the floor ensuring that the 3 nut plates are in place.



Section 4 - Internal 'C' Hoop and Backstays installation

- 4.1 Remove the rear seats, all sections of the rear trim and the rear carpet and store safely.
- 4.2 Drop the headlining across the whole width of the vehicle where the C hoop will sit and remove the sound deadening inside this section of the roof. Replace the headlining into its original position once completed ensuring it is tight to the roof of the vehicle.
- 4.3 On the outside of the vehicle, mark in the centre of each of the C hoop roof brackets. Make an indentation in this centre position using a centre punch.
- 4.4 Using a 5mm drill bit, drill a pilot hole through the centre of each of the brackets (Figure 28), through the roof and finally through the headlining. Make sure the centre through the headlining is clearly visible inside the vehicle.
- 4.5 Inside the vehicle, use a 19mm hole saw to open out the holes in the roof (Figure 29). Only go through the headlining and metal work underneath until you reach the outer roof skin, do not drill through this.



- 4.6 Moving again to the outside of the vehicle, drill through each of the roof brackets with an 11mm drill bit, ensuring that it passes through the roof skin and into the cavity below.
- 4.7 Obtain the 4 roof spacer plates from the C hoop fitting kit. Place the four holed spacer plate marked 'CH IN' into the centre four holes in the roof, ensuring that the plate is pushed up as far as possible against the headlining. Place the two spacer plates marked 'CH OUT' into the outer pairs of holes and again, ensure that the plate is pushed up against the headlining.
- 4.8 Obtain the two C hoop base plates from the kit. Bolt these to the bottom of the C hoop using the lap joints and lap joint shoulder bolts provided.
- 4.9 Place the C hoop into the vehicle, taking care not to damage any of the finish on the hoop. Align the slots on the hoop brackets with the holes in the roof spacers so that the feet are resting on the wheel arch of the vehicle.
- 4.10 From the outside of the vehicle, pass an M10x65 bolt through a washer and through one of the inner roof brackets. For the outer locations M10x80 bolts should be used. On the inside of the vehicle, place a washer and M10 nyloc nut onto the end of the visible thread through the roof.
- 4.11 Repeat the process of passing the M10 bolt through a washer and through the roof for each of the remaining holes on the roof of the vehicle. Place a washer and M10 nyloc nut onto the end of the visible threads through the roof. Tighten all of these bolts to 10Nm to ensure that the C hoop is correctly located in the vehicle.
- 4.12 Obtain the two backstays from the kit. Place the first backstay into the vehicle through the back door and align the lap joints correctly. Pass an M10 shoulder bolt into each of the holes, manipulating the backstay if necessary. Tighten these to the final torque setting.
- 4.13 Place the second backstay into the vehicle, align the lap joint holes and place an M10 shoulder bolt into each of the holes.



- 4.14 Mark through the centre of each of the holes in the C hoop base plates and the backstay foot plates. Using a centre punch, make an indentation in the centre of all of the locations.
- 4.15 Unbolt the backstays from the C hoop and remove from the vehicle. Unbolt the C hoop base plates from the hoop and remove it from the vehicle. Store all of these components safely to protect the finish.
- 4.16 Remove the remaining section of the C hoop from the vehicle and store safely. Use an 11mm drill bit to drill through each of the locations marked in 4.15. When drilling through the surfaces, ensure the drill remains perpendicular to the surface being drilled and that the drill bit passes all of the way through to the underside of the vehicle.
- 4.17 Bring the C hoop base plates back into the vehicle. Pass an M10 bolt through a washer and through each of the holes in the base plate.
- 4.18 Obtain the two backing plates from the C hoop fitting kit and place one of these backing plates onto the exposed threads.
- 4.19 Once the plate is correctly positioned, pass a washer onto each of the exposed threads followed by an M10 nyloc nut onto each.
- 4.20 Repeat this process for the C hoop base plate and backing plate on the other side of the vehicle. Tighten all 8 of these bolts up to their final torque setting as suggested at the beginning of these instructions.
- 4.21 Bring the backstays back into the vehicle and align them with the holes drilled in the base of the vehicle.
- 4.22 From the backstay fitting kit, obtain the two backing plates which match the foot plates on the backstays. Place them on the underside of the vehicle in the same orientation that the backstay foot plates are inside the vehicle.
- 4.23 Pass a M10x30 bolt through each of the three holes drilled in the floor pan of the vehicle. Slide the first backing plate onto these bolts on the underside of the vehicle and secure in position using a washer and a nyloc nut. The third hole has a captive nut attached.

- 4.24 Repeat this process for all of the other bolts and then the other backstay so that all bolts are in position. Ensure that all bolts are securely in position. Referring to the beginning of these instructions, tighten all of the bolts in the backstay bases up to their final torque settings.
- 4.25 Bring both large sections of the rear trim back to the vehicle. Create templates to mark through where the tube of the hoop and the backstay are going to pass through each section. Mark through each hole onto the trim below.



- 4.26 Using a drill and an air saw, cut away the sections marked so that each section of trim has holes to accept the backstay and the C hoop bases.
- 4.27 Once both sections of trim have been cut, slide one section into the vehicle and over the two sections of tube which are bolted into the vehicle on that side.
- 4.28 Repeat for the trim on the other side of the vehicle so that both sections are back in but do not fasten into position at this stage.



- 4.29 Return the C hoop to the vehicle and align the lap joints with their other halves, located on the backstays and C hoop bases.
- 4.30 Place an M10 shoulder bolt into each of these lap joint holes. Once all have been correctly located, tighten each of the bolts to 10Nm to ensure the C hoop is positioned in the vehicle correctly.

4.31 Do not pass any bolts through the roof for the C hoop at this stage.

Section 5 – Completing the installation

- 5.1 Remove the bolts that are passed through the roof above the B hoop and store these appropriately to ensure their original locations will be maintained. Ensure all backing plates are also securely stored to avoid losing them. Ensure that the front leg to underwing mount upper bolts are all loosened off also.
- 5.2 Raise the rear section of the ROPS just off of the roof of the vehicle and using a block of wood across the width of the vehicle, rest the roof section of the ROPS in this elevated position.
- 5.3 Apply a layer of polyurethane sealant around the hole in the roof brackets on top of the vehicle (Figure 36), a layer underneath the roof mountings at the rear and a layer of the same polyurethane sealant underneath the head of each of the bolts.



- 5.4 Ensuring that all of the holes are now generously layered with sealant, raise the rear of the ROPS and remove the wood from the roof. Slowly lower the ROPS back down onto the roof and align appropriately.
- 5.5 Repeat the previous steps of passing the bolts through the roof of the vehicle and using the appropriate washer and nuts, locate the ROPS back into position, aligning with the fitted internal B and C hoop.
- 5.6 Ensure that the backing plates at the rear of the vehicle return to their original locations using the bolts removed from these rear through-roof mountings.
- 5.7 Go around the whole vehicle and check that all of the bolts have now been installed into the vehicle. With a torque wrench set to 10Nm, tighten every bolt on the vehicle to ensure they are all started. It is critical that the saddle brackets are tightened evenly on both sides so that the gap between the two is the same.

- 5.8 Once all of the nut and bolt assemblies around the vehicle are tightened to 10Nm, refer to the torque settings at the beginning of these fitting instructions and evenly tighten the all of the bolts up to their final specific torque values.
- 5.9 Within each fitting kit, there will be nut caps. Go round the vehicle and where there is a nut and/or bolt exposed, place a nut cap over the end, black nut caps on the outside of the vehicle and grey on the inside of the vehicle. Nut caps do not go underneath the vehicle.
- 5.10 Refit all parts removed from the front of the vehicle at the beginning of the installation apart from the front wings.
- 5.11 Print out the front wing template, located at the end of these fitting instructions. Place the template onto the first front wing ensuring all edges are aligned and mark the shape to be cut out onto the wing.
- 5.12 Using a pair of tin snips or an air saw, carefully cut inside the marked shape. Do not cut all the way to the edges of the shape in one go to begin with as there may be slight variance in the wing between vehicles.



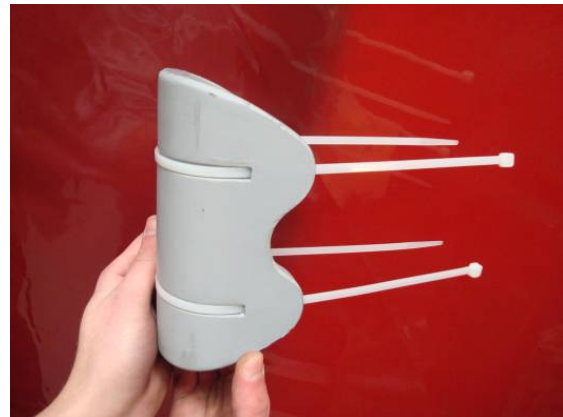
- 5.13 Apply a layer of masking tape to the roll over protection system to avoid damaging the finish when the wing is offered up to the vehicle.
- 5.14 Offer the wing up to the vehicle to check fitment of first cut. Ideally there should be a 2-3mm gap all of the way around between the cut edge and the roll over protection system.
- 5.15 Remove the wing again and take away all of the masking tape placed on the roll over protection system. Primer and paint the edge of the cut wing before applying the edging material onto the cut edges.
- 5.16 Repeat for the wing on the other side, turning the template over for the other side of the vehicle and refit the front wings to the vehicle.
- 5.17 The interior of the vehicle can now be re-assembled and fastened back into position securely ensuring that all trim misses the hoop and roof linings are fastened back into position where dropped previously.

Section 6 - Padding Installation (if purchased)

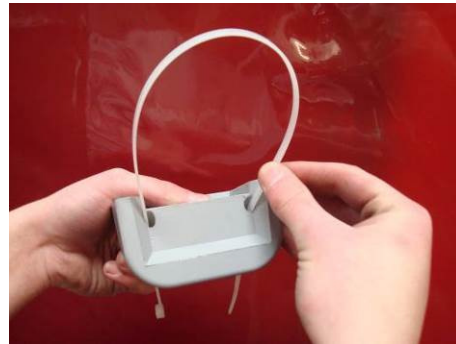
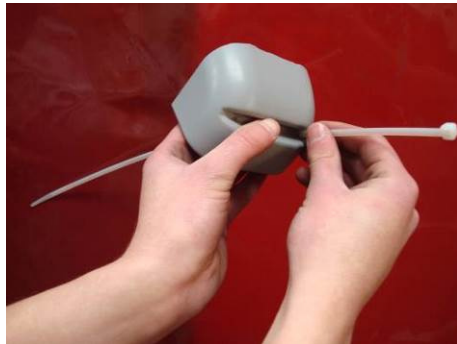
Padding lengths should be fitted to the roll cage using Sikaflex or a similar strength adhesive. The starting point is normally a single length applied in the centre of the B hoop (behind the driver/passenger) and then work down the hoop in both directions towards the floor. The X brace (if present) also needs to be padded along its full length.



Saddle bracket covers should be fitted over any internal tubes joining together using 2 cable ties as shown in the diagram below. Ensure that the padding lengths are fitted as close to the joint as possible before installing the covers - this will ensure maximum protection.



Roof blocks come in both single and double sizes as they are designed to fit two different types of roof mounting brackets that may be found on your roll cage. Both of them attach in the same way utilising a single cable tie through the holes provided and then around the roof bracket itself. Please remove any nut caps (if fitted) before fitting these roof blocks.



Once installed into position, the cable tie should be tightened fully to one side and then trimmed as shown in the photos below.



Section 7 – Roll Cage maintenance

The roll cage should be kept clean and the fasteners checked regularly - if this is not carried out then you may find it difficult to remove the roll cage from the vehicle if required at some point. The roll cage should also be inspected for damage if in regular use.

Industrial coatings are no different to the paint on your car – they need cleaning and maintaining. Accumulated dirt may affect the design life of the system, and any mechanical damage almost certainly will. Therefore regular inspections should take place and minor damage must be touched up. The roll cage is powder coated with zinc primer followed by a topcoat so does provide a hardwearing surface. Should you damage the surface and expose bare metal this needs to be repaired to prevent rust spreading under the powder coat.

Damaged areas must be clean and free of grease or rust. Dry sand the area with 600-grade paper until the metal is exposed. The area must be completely free of dust and cleaned with a non-aggressive solvent before proceeding. Spray zinc based primer onto the area and allow it to dry fully. An acrylic or polyurethane topcoat of matching colour (RAL9005 Black Satin) should then be applied and allowed to dry.

The installation of your Safety Devices roll cage is now complete.

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