

# TECHNICAL REQUIREMENTS 2018

## Modified production vehicles – TR-2 Group

A vehicle considered unsafe by Technical Commissioners cannot be admitted for the competition by the Sports Commission.

If unit/part is not mandatory but is used, it must conform to the requirements.

### 1. DEFINITION

**1.1.** Stock off-road 4x4 vehicles produced in a quantity of not less than 1000 identical items and equipped with two seats minimum and built up for trophy-raid competitions.

**1.2.** Participants are responsible for proving that the car is stock as a whole and its separate parts and units. During the Technical Inspection parts and units of the car might be compared with stock parts physically or using the manufacturer's catalogue.

### 2. LIMITS OF ALLOWED CHANGES

**2.1.** Any changes not specified in the current requirements are forbidden.

**2.2.** Any worn out or damaged part can be replaced with an identical (completely interchangeable with the original) part only.

**2.3.** Out-of-production vehicles: it is allowed to install parts and units from next-generation cars of the same brand after a required approval by the Technical Commissioner.

### 3. REINFORCEMENT

Reinforcement is allowed unless otherwise specified in the current technical requirements, by sheet material for any part if the used material repeats the form of a part, which is being reinforced, and it contacts with the whole surface of a part without forming any box-like cavities. It is allowed to reinforce suspension parts by steel rods with a diameter of not more than 12 mm.

### 4. WEIGHT

**4.1.** Vehicle weight must be not less than 1200 kg and not more than 3500 kg. This weight is measured without luggage, tools, spare parts, food and means of survival.

**4.2.** When weighing, all tanks containing liquids (lubrication, cooling, braking, heating, etc.) must be filled to its normal level specified by the manufacturer except wiper and headlight wiper tanks, brake-cooling tanks, fuel tanks, and water injection tanks, which must be empty at the time of weighing.

The following should be removed from the car:

- Crew, their equipment and luggage;
- Tools, jack, sand tracks, spare parts, spare tire;
- Survival equipment;
- Food.

Weighting methodology. Weighing to be performed using industrial scale with not more than 25 kg error (passport and a valid calibration certificate should be provided in this case), or electronic sports scales with separate plates and +/- 0.5 kg per plate error, mounted on horizontal ground of at least 3x12m. Either the whole vehicle or its front and rear axles may be weighed. In the latter case, obtained results are summarized.

Scales errors to be taken in favor of the participant.

In order to take remainders of fuel in the tank and other consumables on-board into consideration, 50 kg is added to the minimal permitted vehicle weight. If the result of a weighing is less than the lowest permitted weight plus 50 kg, the remaining fuel must be drained from the tank, and weighing must be repeated.

Example: weighing for a vehicle with the minimum permitted weight of 1500kg was done on scales with separate plates; the result obtained is 1542 kg (846 kg + 696 kg / front axle + rear axle). This weight is 6 kg less than 1548 kg (1500 kg + 50 kg for fuel remainders – 2 kg for a possible error weights (2 (front and rear axles) X 0,5 kg X 2 plates)). In this case all the fuel must be drained and weighing procedure must be repeated.

#### **4.3. Dry load**

**4.3.1.** It is allowed to add dry load so that the vehicle meets the minimal permitted weight requirement. It should be a block weighing less than 25kg each and secured to the floor of the body or frame.

**4.3.2.** Each block must be fixed by at least two M8 bolts. Every attachment point to the vehicle body must be reinforced with a steel plate. Each plate must be at least 2 mm thick and its surface area must be at least 16 sq.cm. Each plate must be welded or riveted on the backside of the spot where dry load block is installed. It must be possible to seal the dry load blocks.

### **5. ENGINE**

**5.1.** It is allowed to use any gasoline or diesel engines, including those equipped with air-supply systems installed by the manufacturer on one of the vehicle's versions.

**5.1.1.** For UAZ cars 469 (3151 and their modifications): 3M3 402, 409,410  
YM3 414, 417, 421

**5.1.2.** It is allowed to change the location of engine in the engine compartment while maintaining its orientation. It is allowed to change/replace the engine mounting brackets.

#### **5.2. Air filter**

The design of the air filter, its case, tubes connecting the air filter with the atmosphere and the engine as well as their location in the engine compartment are not restricted. The snorkel cannot be mounted through the crew compartment under any circumstances.

#### **5.3. Cooling system, ventilation and interior heating**

**5.3.1.** Taking the location unchanged (for example, in the engine compartment), the radiator and its mounting (brackets, their location, shape, size, and number) are not restricted, as well as the main pipe connecting it to the engine. Screen installation in front of the radiator is allowed.

**5.3.2.** Thermostat unit is not restricted (i.e. it can be changed, replaced, added or removed).

**5.3.3.** The size, material and number of water pumps impellers are not restricted. It is allowed to install additional circulation pumps.

**5.3.4.** The radiator cap may be blocked.

**5.3.5.** The expansion chamber can be changed, but not removed; if it is not provided initially, it may be added.

**5.3.6.** The crew compartment heater can be modified or replaced, but it must remain within dimensions provided by the manufacturer.

**5.3.7.** The fan and its drive gear can be replaced or removed. It is allowed to install additional fans.

**5.3.8.** Air intake from the motor compartment used for the ventilation system and for interior heating is forbidden.

## **5.4. Exhaust system**

**5.4.1.** It is allowed to use any exhaust system ensuring that the noise level does not exceed 103 dB (A). Under no circumstances, exhaust system elements must not pass through the crew compartment.

Measurement technique. Measurements are carried out by a sound meter, in modes of "A", "slow". The microphone must be installed at an angle of 45° according to exhaust outlet, and at 500 mm height from the outlet center. If vehicle is located on the firm ground (concrete or asphalt), it is necessary to enclose a soft lining under the microphone.

**5.4.2.** In order to prevent burns from hot components of the system by people outside the vehicle the protection must be installed.

## **6. TRANSMISSION**

### **6.1. Gear box**

**6.1.1.** It is allowed to use any kind of gearboxes installed by manufacturer in one of vehicle modifications.

**6.1.2.** Internal construction modifications are not limited if the original appearance of the crankcase is maintained.

**6.1.3.** It is allowed to change/replace the transmission-mounting bracket.

### **6.2. Transfer box**

**6.2.1.** It is allowed to use any transfer box installed by manufacturer in one of vehicle modifications.

**6.2.2.** Internal construction modifications are not limited if the appearance of an original crankcase is maintained.

**6.2.2.** It is allowed to change/replace the transfer case mounting brackets.

### **6.3. Axles**

**6.3.1.** It is allowed to use axles with internal gear final drives serially mounted in one of vehicle modifications.

**6.3.2.** The use of blocked differentials is allowed. There are no restrictions on the block differential types, principles of work and their number.

**6.4. Shafts, axle shafts, universal joints.** Not limited.

## **7. SUSPENSION**

**7.1.** Active suspension systems (which allows the driver to change the ground clearance vehicle in motion) are forbidden, even if the vehicle is equipped with a standard suspension.

**7.2.** It is allowed to move the mounting of the suspension vertically according to the body, frame, or axles in order to accommodate larger wheels. Spacers, which have been used for this, must be secured (welding, bolts, etc.). It is allowed to change the travel of the suspension. If the manufacturer provided axel fastening over the springs, it is allowed to transfer the axel under the suspension.

### **7.3. Elastic elements**

#### **7.3.1. Screw springs**

**7.3.2.1.** The length is not limited as well as the number of coils, bar diameter, external diameter, spring type (progressive or not), and the shape of the spring.

**7.3.2.** Sheet springs:

**7.3.2.1.** The length, width, thickness and the vertical curvature is not limited. The

number of sheets is not limited.

**7.3.2.2.** Spring shackles are free.

**7.3.3.** Torsion bars: the diameter is not limited.

#### **7.4. Shock Absorbers**

**7.4.1.** You can install no more than two shock absorbers per wheel. It is allowed to replace shock absorbers without limitation. It is allowed to transfer shock absorber mounting points. When installing additional shock absorbers or changing the damper mounting points, it is allowed to perform small changes, including cutting holes in the interior body panels.

### **8. STEERING**

**8.1.** It is allowed to perform small and necessary changes of steering trapezoid body in the lift/ suspension.

**8.2.** An antitheft device can be removed.

**8.3.** It is allowed to replace the steering wheel.

**8.4.** Installation of the steering wheel booster is allowed if it was installed in one of the serial versions of the vehicle.

**8.5.** It is allowed to install a steering damper.

### **9. WHEELS AND TIRES**

#### **9.1. Tires diameter**

It is allowed to use pneumatic road tires only with an outer diameter not exceeding 895 mm. Measurement technique: Measurements are carried out on tires pumped to a pressure of 1,5 atm on a straight line passing through the center of the tire, but not vertical according to the ground (during the measurements you should not consider the natural indenting of the tire).

Measurements are carried out on all tires (spare, replaceable, etc.), used throughout the competition.

#### **9.2. Tires width**

Tire width depends on the vehicle weight and must be:

<b>Vehicle weight, kg</b>	<b>Tire width</b>
From 1200 to 1500	9.5 " (242 mm)
From 1501 to 1800	11 " (280 mm)
From 1801 to 2100	12 " (305 mm)
From 2101 to 2300	13.6 " (345 mm)
From 2301 to 3500	15.2 " (385 mm)

Values in mm stated above are rounded according to mathematical rules.

**Measurement technique:** Measurements are taken on the tires inflated to a pressure of 1.5 atm, in a horizontal surface through the wheel hub. The maximum width of a rubber part is taken into consideration.

**9.3.** It is allowed to use special mud tires (mud terrain) and tires with tread terrain that have a minimal residual thread height - 5 mm.

**9.4.** Wheel bolts can be replaced by fastening bolts and nuts if the quantity of anchorage points and the diameter of the thread remain.

**9.5.** It is not allowed to change the tread pattern of the tires by cutting them. The cord cannot be damaged under any circumstances.

**9.6.** It is allowed to use systems that change the tire pressure.

**9.7.** It is allowed to perform any additional fixing of sidewall tires on the disk (bead locks, air locks, change the height of the disk and so on).

## **10. BRAKES**

**10.1.** It is allowed to change the position of the brake highways and improve their protection.

## **11. ELECTRICAL EQUIPMENT**

**11.1.** It is allowed to replace the regular wiring and include additional elements.

**11.2.** Electrical cables are not restricted.

**11.3.** When changing the wiring, all sockets and joints should be isolated.

### **11.4. Battery**

**11.4.1.** It is not allowed to install more than 2 batteries that are connected to the electric system of the vehicle.

**11.4.2.** Types, capacity of any battery, and cables for their connection are not limited.

Location of the battery (s) is not restricted, but if it was changed, then:

- Safety conditions must be observed;
- The battery (s) must be placed behind the front seats only.

**11.4.3.** The battery as viewed from the above (as well as its plugs in case of a side contact) must be covered with a solid dielectric (rubber or plastic) cover.

### **11.5. Alternator**

**11.5.1.** Alternator brand and capacity are not restricted as well as its position in the engine compartment, however the drive gear system (belt, chain etc.) cannot be modified.

### **11.6. Lighting equipment**

**11.6.1.** Headlights can be replaced by others, by any size and form provided that the panel, on which they are mounted, will block the original bore completely. It is allowed to cut or change the external body panels for this purpose. Any kind of glass of headlights, deflectors and lamps is allowed.

**11.6.2.** The location of the indicators, lamps and stop lamps may be changed, but the original mounting holes must be closed (at least with a tape).

**11.6.3.** Basic lighting equipment (lights, sidelights, direction indicators (but not repeaters), marker lights, brake lights, reversing lights, number plate lighting) must be in working condition during pre-start Technical Inspection.

**11.6.4.** The additional lighting equipment is not limited.

## **12. FUEL SYSTEM**

### **12.1. Fuel tank**

**12.1.1.** Replacement of original fuel tanks and their relocation is allowed. Fuel tanks must be separated

from the crew compartment by continuous fireproof (metal) and, whenever possible, sealed partition. Additionally, pipes should have a sealed protection that are suitable for fuel tank.

**12.1.2.** If tanks and fillers are located inside the body, there must be holes in the floor of the body to drain spilled fuel into the space outside the vehicle.

**12.1.3.** Fuel tanks ventilation must be installed outside of the vehicle body.

**12.1.4.** Liquid necks and caps should not extend beyond the perimeter of the vehicle when viewed from above. Any lock system can be used for the lid eliminating incomplete lock or accidental opening at impact.

## **12.2. Fuel lines**

**12.2.1.** It is allowed to change, transfer and protect fuel lines of the vehicle.

**12.2.2.** Only fully metal lines are allowed in fuel lines that pass through the car cabin. Any kinds of fuel lines joints are not allowed in the cabin, where it passes through the floor or other body panels.

## **13. BODY AND FRAME**

**13.1.** It is allowed to install additional fastenings between vehicle chassis and body.

**13.2.** The change of the distance between the body and the car frame (the body lift) is allowed if it does not exceed 76 mm.

**13.3.** It is allowed to have minimal and necessary changes for winch installations and/or transfer of the front and rear cross-members, as well as minimal necessary changes in body panels (false radiator lattice, rear doors (board) floor of the trunk).

**13.4.** It is allowed to uninstall any unused brackets on the body or frame.

**13.5.** It is allowed to lighten the frame using the method bores drilling.

## **13.6. Exterior**

**13.6.1.** It is allowed to change the form and material of a false radiator lattice.

**13.6.2.** Installation of the top luggage compartments for fastening of the additional equipment is allowed.

**13.6.3.** In the case of using a soft awning on the car, it is allowed to remove its sides. Removed awning and details of its fastening do not require transportation in the vehicle during the competition; however, the vehicle weight thus must correspond to p. 4.1.

## **13.7. Side panels and wheel arches**

**13.7.1.** Minimal changes of wheel arches for installation of wheels with a bigger diameter are allowed.

**13.7.2.** Complete wheels (tires with wheel rims, as seen from above, must be covered by wings or fender extensions along their entire width and length. Fender extensions must be collapsible.

## **13.8. Hood catches**

**13.8.1.** The hood must have at least two additional external catches preventing spontaneous opening of a hood during driving.

## **13.9. Body protection**

**13.9.1.** It is allowed to install additional protection below the body to ensure protection of the following parts: engine, radiator, suspension bracket, transmission, transfer case, tank, transmission, system of production of exhaust gases.

**13.9.2.** It is allowed to use any bulbar. It must not perform any other function but vehicle front part protection and additional headlights and winch installation. It must be mounted on the bumper or the front part of the frame.

**13.9.3.** It is allowed to install detachable side protectors (sills).

**13.9.4.** It is allowed to install bush wires. The only function they must perform is protection.

### **13.10. Bumper and external additional protection devices**

Without restrictions. However they should be safely installed (i.e. without acute angles, edges etc.).

### **13.11. Doors**

**13.11.1.** It is allowed to modify (cut) the inner door panels, if the outer shape of the door is preserved.

**13.11.2.** For UAZ cars 469, 3151 and their version, it is allowed to cut the doors until the bottom loops of the original door.

**13.11.3.** If door windows are equipped with a mechanical or electric window regulator, the mechanism should be separated from the crew by a protective panel (application of aluminum or non-flammable plastic is recommended).

**13.11.4.** If the design of the original car door is not provided or does not have a rigid structure, it is a must to install doors with rigid structure with locks preventing spontaneous opening. The distance from the level of a seat cushion to the level of the hard part of the door should not be less than 300mm. Each cabin door must have an opening window in which you can put a parallelogram with horizontal sides measuring at least 400mm. Window height should not be smaller than 250mm when it is measured perpendicular to the horizontal sides. Corners of the parallelogram can be rounded with a maximum radius of 50 mm.

**13.11.5.** If folding side doors are used in the car, it is allowed to remove the top half of them. The removed details do not need to be transported in the car during the competition; however the vehicle weight thus must correspond to p. 4.1.

### **13.12. Windows**

**13.12.1.** It is allowed to use multi-layered windshields of triplex type only.

**13.12.2.** It is allowed to change, replace or remove the front door window regulators.

**13.12.3.** It is allowed to replace or remove the glass of the front doors or replace it with a transparent plastic that is not pricked with thickness that is no less than 4 mm. Possibility of its full opening has to be provided. The opening mechanism is not limited.

**13.12.4.** Windows located behind the doors of the driver and the front passenger, can be replaced with the panels made from:

- steel plate, minimum 0,8 mm-thick;
- aluminum, minimum 1,5 mm-thick;
- non-cracking plastic, minimum 3 mm-thick.

Several transparent panels installed in one window aperture can be replaced with one panel. Mounting method is not restricted. None of the body elements or body contours must not be changed due to these replacements.

### **13.13. Body sills**

**13.13.1.** It is allowed to cut body sills off.

### **13.14. Interior**

**13.14.1.** It is allowed to use extra elements and drill interior and exterior panels to fasten additional equipment to a body.

**13.14.2.** Carpets and sound insulation materials can be removed.

**13.14.3.** The decorative panel of the ceiling can be removed.

**13.14.4.** The doors upholstery can be replaced with inflammable material. Application of composite materials or aluminum is recommended.

**13.14.5.** It is allowed to change/remove the armrests and doors handles.

**13.14.6.** It is allowed to remove the decorative sill moldings.

**13.14.7.** In order to reach the effective installation of a safety cage, the original interior can be modified around assembly points of a safety cage with minimum trimming or a bending. However, these versions do not allow removing an upholstery part completely.

**13.14.8.** The rear demountable shelf in two-volume cars can be removed. It is also allowed to remove its fastenings.

**13.14.9.** The meter panel can be changed, but not removed.

**13.14.10.** The instrument cluster is free.

**13.14.11.** It is allowed to use any additional control and measuring and navigating devices if they are installed safely.

**13.14.12.** It is allowed to modify all means of controls to increase their usability (gearboxes lever lengthening, transfer box and a parking brake, installation of additional moldings on a pedal etc.).

**13.14.13.** Any equipment which might be dangerous should be protected, isolated and reliably fixed.

### **13.15. Seats**

**13.15.1.** It is allowed to remove all seats except the driver's and the front passengers.

**13.15.2.** It is allowed to replace the front seats to any other automobile seats. Seats must be securely mounted.

### **13.16. Spare wheel**

**13.16.1.** Spare wheels can be kept in the body if they are securely fixed. It is forbidden to fix spare wheels to elements of the safety framework.

**13.16.2.** If a spare wheel is moved into the car body, its case can be removed.

### **13.17. High Lift Jack**

Jack and points of a jacking are not limited.

### **13.18. Safety cage**

#### **13.18.1. Design**

**13.18.1.1.** The main safety arch with rear props and a diagonal element must be installed in a vehicle. The possible arrangement of the diagonal an element is represented on fig. 1-3.

The recommended necessary scheme, on fig. 4-6.



Fig. 1

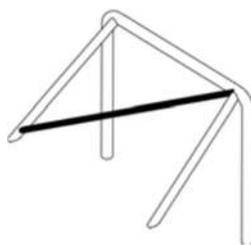


Fig. 2

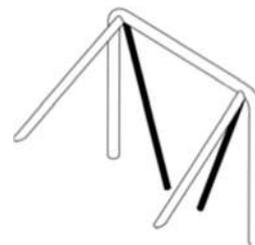


Fig. 3

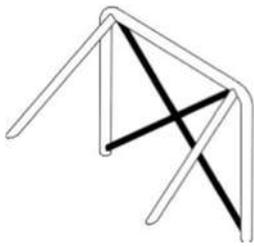


Fig. 4

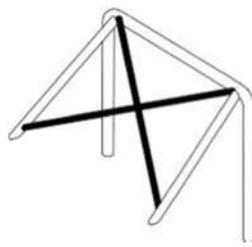


Fig. 5

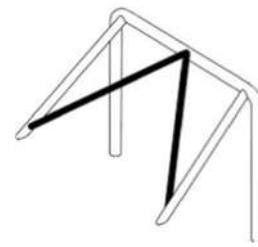


Fig. 6

**13.18.1.2.** For TR2 vehicles, having a spatial frame it is mandatory to have a full safety cage, see fig. 7. Vehicles are allowed to participate with a safety arch presented on fig. 1-5, if the arch was made, and the vehicle took part in the competitions until 12/31/2009 (having a corresponding mark in STP RAF)

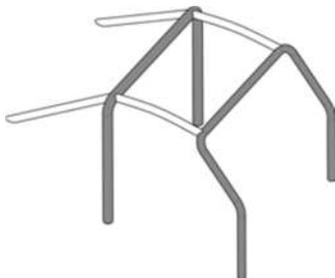


Fig. 7A

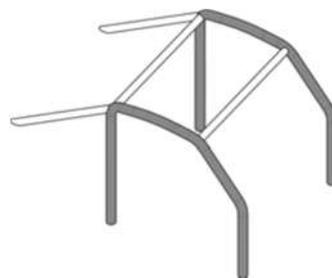


Fig. 7B

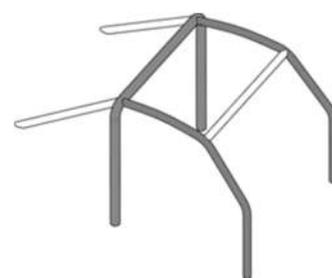


Fig. 7B

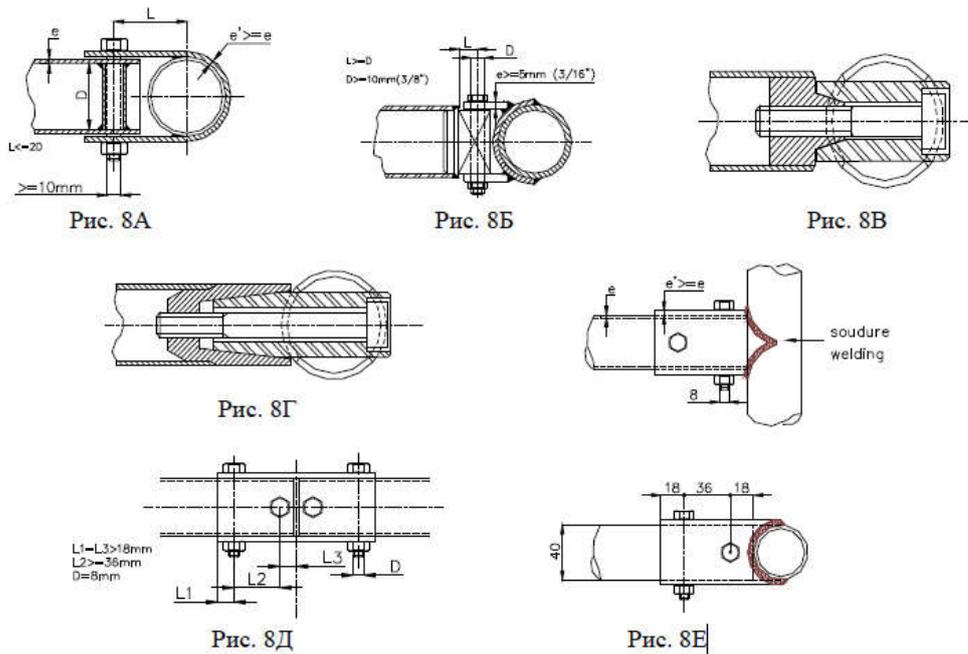
**13.18.1.3.** The cage can consist of:

- 1 main arch, 1 front arch, the 2nd longitudinal elements, the 2nd rear props (fig. 7A);
- 2 lateral arches, the 2nd cross-section elements, the 2nd rear props (fig. 7B);
- 1 main arch, the 2nd lateral semi-arches, 1 cross-section element, the 2nd rear props (fig. 7B).

Presence of diagonal elements located according to fig. 1-6 is a must. Each element of the cage should be made from a continuous uniform tube. Separate elements of the cage can be attached together through welding or demountable joints.

**13.18.2. Demountable elements**

If removable elements use plug connections, then these connections must belong to one of the following types (Fig. 8 - 8E):



Plug connections must be placed strictly on the axis of the pipe.  
 They should not be welded after the connection.  
 Bolts and nuts should have the minimum quality of 8.8 (ISO standard).

### 13.18.3. Installation

**13.18.3.1.** Each bearing part should include an intensifying plate the thickness of which is at least, 3mm.

**13.18.3.2.** Each bearing part should be attached by at least three bolts to a steel intensifying plate with the minimal thickness of 3mm, and to the area of at least 120 sq. cm, which is welded on a body.

Recommended: - The Corner between the 2 bolts (measured from the tube shaft at the level of the arc beginning, see 9) should not be less than 60 degrees.

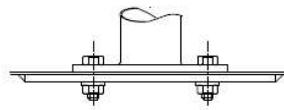


Рис. 9

**13.18.3.3.** These are the minimal requirements.

In addition, many mounts can be used, mounting plate supports can be welded with reinforcement plates, and the safety cage can be welded to the body / chassis.

### 13.18.4. Tubes size and materials

Material	Min. strength of the material	Size (mm)	Use
Cold drawn seamless carbon steel pipe with a maximum content of	350 kg-f/mm <sup>2</sup>	45x2.5 or 50x2.0	The main arch or lateral arches as well as the joints according to the

0.3% carbon			design.
		38x2.5 or 40x2.0	Other elements of a framework safety.

### 13.18.5. The control bore

On a straight section of the main arc that is easily accessible, a hole should be placed with a diameter that is not less than 4.5 mm, designed to control the thickness of the pipe.

**13.18.6.** In places where the bodies of the driver and the navigator or their protective helmets can touch the safety cage, installation of protective cases made of an elastic inflammable material is recommended.

## 14. Winch and additional equipment

**14.1.** The current requirements define a "winch" as a device consisting of the following elements (not more than one from each category):

- power drive gear (including an electric motor)
- reducer
- drum
- case or frame
- brake gear
- cable

**14.2.** It is allowed to install not more than two winches with the power drive gear which traction parameters should exceed a minimum of 1,4 times of the vehicle weight. Using winches with mechanical, hydraulic or electric drive gear is allowed.

**14.3.** The winch motor voltage input must not exceed 27 V under any circumstances.

**14.4.** Winch cable, extension cable, tree protector, shackles and blocks used in conjunction with a winch must withstand the tensile strength equal to doubling the maximum winch line pull.

**14.5.** The vehicle must be equipped with a tree protector with a minimum width of 90mm.

**14.6.** Wheel self-extracting devices are forbidden.

## 15. Safety

### 15.1. Seat belts

The vehicle must be equipped with at least three-point factory-made seat belts. The seat belts must be mounted on the body or chassis of the vehicle. Using regular seat belt mounting points is recommended.

### 15.2. Helmets:

Using helmets by all crewmembers is a must. Helmets used at all official trophy-raid competitions must have a rigid external shell, shock-absorbing internal insert being an integral part of a helmets design, and ventilation holes. The use of helmets for rafting of EN 1078, EN 1077 (Europe) or ASTM of 2040 (USA) standards is recommended; for mountain bike - Snell B 90 (USA) standard (the standard mark is located on an inner helmet surface), mountain skiing or hockey. The use of automobile or motorcycle helmets, of E22 and above standards is allowed. The use of building helmets, helmets for road bicycles, tanker's or other soft-top helmets is not allowed.

### **15.3. Fire extinguisher**

**15.3.1.** Vehicles must be equipped with factory-made fire extinguishers containing not less than 4 kg of fire extinguishing substance, concentrated in one or two cylinders.

**15.3.2.** Using foamy and aerosol fire extinguisher cylinders is not allowed.

**15.3.3.** Fire extinguisher cylinders must be located in easily reachable places for both driver and the co-driver. Fire extinguisher fastening must be reliable, but should be easy removable barehanded in case of fire. Fire extinguishers must have an easily readable label containing its weight, fully loaded weight in the equipped condition, weight of an empty cylinder and production date (the date of recharge).

### **15.4. First-aid kit**

Vehicles must be equipped with a first aid kit. All kit components must have a valid expiration date and have no visible package damage. First aid kit must be waterproof-packed and located in an easily reachable place.

### **15.5. Means of communication:**

To ensure safety and in-time medical assistance it is recommended to equip the vehicles with a Civil Band radio station (frequencies to be agreed with the organizers of the event). Crewmembers must be equipped with cellular or satellite phones.