TECHNICAL SPECIFICATION - SSDD (SYSTEM/SUBSYSTEM DESIGN DESCRIPTION) – SPECIFICA TECNICA - DESCRIZIONE PROGETTUALE DEL SISTEMA/SOTTOSISTEMA

LMV2 AID ALBANIA

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1 Scope

1.1 System overview

The vehicle is a military truck protected against direct shooting, mines for the transport of personnel and various materials on the road and on various terrain. The vehicle is classified in the international category as N2G, with the transport capacity up to 5 men and / or materials, protection and weapon systems.

1.2 Document overview

The structure of the document is shown below:
Chapter 1: Scope of this document
Chapter 2: Reference, applicable or standard documents
Chapter 3: System-wide design decision
Chapter 4: Architectural design description
Chapter 5: Requirements traceability matrices
Chapter 6: Note with some information or notifications or abbreviations

The structure of this document follows the criteria defined by MIL-STD-498, with particular reference to the System/Subsystem Design Description (SSDD) referred to in the regulation with the identification number DI-IPSC-81432.
The above-mentioned MIL-STD constitutes the guideline for the drafting of the document, its paragraphs and the minimum contents to be developed.

2 Referenced documents

This paragraph contains references, applicable documents and standards.
All documents which form an integral part of this document or which define an extension of it will be considered applicable documents.
Reference documents shall be deemed to be all those expressly mentioned in this document, but which may also have been produced in other areas.
Norms and standards are all those documents that are available to the recipient of this document independently. Therefore, everything that is officially recognized and in the public domain or otherwise available through dedicated distribution channels is to be considered as standard or reference norm.

ID	Documento	Descrizione
1	STANAG 2895	Extreme climatic conditions and derived conditions for…
2	STANAG 4101	Towing attachment
3	STANAG 4007	Electrical connectors between prime movers, trailers…
4	STANAG 4019	Emergency towing facilities
5	STANAG 2604	Braking system between tractor…
6	STANAG 4381	Blackout lighting systems for tactical land vehicles
7	STANAG 4074	Auxiliary power unit connections for starting tactical…
8	MIL STD 461F	Requirement for the control of electromagnetic…
9	Finabel 20A.5 (ed. 1979)	Finabel Trial for Run-flat system
10	MIL STD 1275D	Characteristic of 28V DC electrical system in military…
11	STANAG 3212	Diameters for gravity filling orifices
12	EN 12195-1	Load restraint assemblies on road vehicles
13	STANAG 4062	Sling and tiedown facilities for lifting and tie…
14	STANAG 2832	Dimensional restrictions for the transport of military…
15	MIL STD 209K	Interface standard for lifting and tiedown provisions
16	STANAG 2601	Electrical system for military vehicles
17	STANAG 4569	Protection levels for occupants of armoured vehicles
18	MIL DTL 83054C	Baffle and inerting material, aircraft fuel tank
19	AEP 5	Engine laboratory test for diesel engines…
20	EN 590	Diesel for vehicles
21	MIL-DTL-83133	JP8 fuel
22	MIL STD 1472G	Human engineering
23	Reg. 51-02	Noise emission for vehicles
24	Reg. 34-02	Prevention of fire risks
25	EU 1003/2010	Registration plate
26	Reg. 79-01	Steering system
27	EU 130/2012	Access and manoeuvrability
28	Reg. 28-00	Acustic signal
29	Reg. 13-11	Braking system

30	Reg. 10-04	EMI/EMC
31	Reg. 39-00	Speedometer
32	EU 19/2011	Constructor plate
33	EU 1005/2010	Towing device
34	Reg. 121-00	Dashboard controls
35	Reg. 122-00	Heating system
36	EU 458/2011	Tyres installation
37	Reg. 89	Speed limiter
38	EU 1230/2012	Mass and dimension
39	Reg. 55	Mechanical coupling

3 System performance

3.1 Mass

3.1.1 Gross Vehicle Weight

The GVW of the vehicle is 8200kg.

3.1.2 Payload

The payload of the vehicle is 1500kg. It's considered in the payload all personnel (driver included), vehicle equipment (see Equipment paragraph), all customer equipment (radio, ammunition, rucksacks, weapons, etc.).

3.1.3 Curb weight

The vehicle curb weight is no more than 6700kg, vehicle liquid included (fuel included, personnel and Equipment excluded).

3.1.4 Max front axle weight

The max front axle weight is 4100kg.

3.1.5 Max rear axle weight

The max rear axle weight is 4500kg.

3.2 Dimension

3.2.1 Max length

Eye-to-eye length is 4850mm.

3.2.2 Max width

Mirror closed width is 2275mm.

3.2.3 Max height

Cabin roof height is less than 2200mm.

3.2.4 Wheelbase

The wheelbase is 3230mm.

3.2.5 Vehicle track

The vehicle track is 1720mm.

3.2.6 Approach and departure angle without equipment

The approach angle is ≥45 °.
The departure angle is ≥45°.

3.2.7 Approach and departure angle with equipment

The approach angle with the winch is ≥35 °.
The departure angle with rear fording kit is ≥35°.

3.2.8 Ground clearance

The mid underbelly ground clearance in ≥400mm.

3.3 Mobility

3.3.1 Max speed

The max speed is 90km/h, unlockable to 110km/h.

3.3.2 Min speed

The min speed is about 3km/h.

3.3.3 Max longitudinal slope

The max longitudinal slope is 60%.

3.3.4 Max lateral slope

The max lateral slope is 30%.

3.3.5 Fording

The fording unprepared is 750mm and prepared 1100mm.

3.3.6 Turning radius

The curb-to-curb diameter is less than 14m.

3.3.7 Vertical step

The max vertical step is 350 mm.

3.4 Fuel

3.4.1 Autonomy

The vehicle autonomy is more than 600km at 60km/h.

3.4.2 Refilling

Fuel tank inlet according to STANAG 3212.

3.4.3 Fuel tank

The fuel tank has foams according to MIL-DTL-83054C.

3.4.4 Fuel

The vehicle is running with diesel according to EN590, or JP8/F-34 according to MIL-DTL-83133 tested 400h according to AEP 5.

3.5 Protection

3.5.1 Runflat

The runflat performance is according to Finabel 20A.5 (ed. 1979).

3.5.2 KE-threat

The personnel is protected at level 3 (tungsten carbide excluded) according to STANAG 4569 Ed. 1 KE-threat.

3.5.3 Mine protection

The personnel secured in the seat is protected against mine blast at level 2a according to STANAG 4569 Ed. 1.

3.6 Towing capability

3.6.1 Towing hook

The vehicle has towing front and rear devices according to STANAG 4101.

3.6.2 Recovery eyes

The vehicle has front and rear recovery eyes according to STANAG 4019. The vehicle can tow a same class vehicle as emergency operation with its own tow bar. The vehicle has air connection for trailer in the front for recovery.

3.6.3 Trailer

The vehicle can tow a 3500kg braked trailer on-road and a 2000kg braked trailer off-road. It is admitted towing a trailer with inertial brakes of maximum 750 kg weight.
The vehicle has a 12 pin (24V) plug for trailer according to STANAG 4007 (black out lights included).
The vehicle has a 7 pin plug for trailer according to commercial standard.
The vehicle has air connection for trailer in the front and rear according to STANAG 2604.
The vehicle has an ABS plug for trailer, without CAN connection.

3.6.4 Same class vehicle recovery

In case of emergency the vehicle can tow another same class vehicle over a short distance (<20 km) and at a speed of maximum 25 km/h with all four wheels on the ground. The two vehicles must be connected with a towing bar and possibly with air brake connection.

3.7 Transportability

3.7.1 By road

The vehicle can be transported by road according to EN 12195-1.

3.7.2 By rail

The vehicle can be transported by rail according to STANAG 2832.

3.7.3 By plane

The vehicle can be transported by plane according to STANAG 4062 (e.g. C130J).

3.7.4 By ship

The vehicle can be transported by ship according to STANAG 4062.

3.7.5 By lifting

The vehicle can be lifted according to MIL STD 209K.

3.8 Electrical system

3.8.1 Electrical system

The vehicle has an electrical system according to STANAG 2601 without insulated earth return.

3.8.2 EMI/EMC

The EMI/EMC performance of the base-vehicle is according to MIL STD 461G with some exceptions.

3.8.3 Black-out

The dashboard has a black out switch to control the black-out strategy of the lights. Lights are according to guidelines of STANAG 4381. Internal cab map reading light is (one) of the black-out type, changing it colour to red.

3.8.4 Slave start

The vehicle has a coaxial plug type 1 according to STANAG 4074 for slave start.

3.8.5 Power generation

The vehicle has a power generation is according to MIL STD 1275D.

3.9 Human engineering

3.9.1 Ergonomy

The vehicle design is based on the ergonomic dimension of the MIL STD 1472G for male 95%le and female 5%le.

3.9.2 Climatic range

The climatic range of the vehicle is from C1 (-32°C) to A1 (+49°C) according to STANAG 2895.

3.9.3 Walkable areas

The roof of the cabin and the roof of the cargo body are walkable.

3.10 Paint

3.10.1External body paint

External vehicle parts (e.g. cabin, bumper, bonnet, cargo body) can be in one of the following colour:

- Green RAL 6031 CARC IR

The thickness of paint system is > 110 µm.

3.10.2Internal body paint

Internal parts (cabin and rear trunk) can be in one of the following colours:

- Sand RAL 1002 CARC IR
- Green RAL 6031 CARC IR

The thickness of paint system is > 70 µm.

3.10.3Chassis paint

Chassis and paintable parts on chassis are in colour Black RAL 9021 CARC IR (e.g. chassis, mine kit, structural parts). The thickness of paint system is > 130 µm.

3.10.4Other

Plastic/rubber parts are unpainted matt black (e.g. gaskets, snorkel, mirrors, handles, fuel tank). Other small parts, or components installed in the cabin are in matt black using industrial standard (e.g. seats, dashboard brackets), or unpainted as industrial standard (e.g. gearbox, fuel filters).

3.11 Type approval

3.11.1Noise emission

The vehicle has noise emission according to Reg. 51-02.

3.11.2Fuel tank

The vehicle has 110 l nominal capacity fuel tank according to Reg. 34-02.

3.11.3Registration plate

The vehicle has the registration plate according to EU 1003/2010.

3.11.4Steering

The vehicle has a steering system according to Reg. 79-01.

3.11.5Access and manoeuvrability

The vehicle has an access and manoeuvrability according to EU 130/2012.

3.11.6Acoustic signal

The vehicle has an acoustic signal according to Reg. 28-00.

3.11.7Braking

The vehicle has a braking system according to Reg. 13-11.

3.11.8Constructor plate

The vehicle has a constructor plate according to EU 19/2011.

3.11.9Towing device

The vehicle has a towing device according to EU 1005/2010.

3.11.10 Tyres

The vehicle has tyres according to EU 458/2011.

3.11.11 Mechanical coupling components

The vehicle has a mechanical coupling according to Reg. 55.

4 System components

4.1 Cabin assembly

4.1.1 Body

The body is in steel on four rubber supports and predisposed for protection package. The body floor has a liner glued for protection purpose used as crew floor.

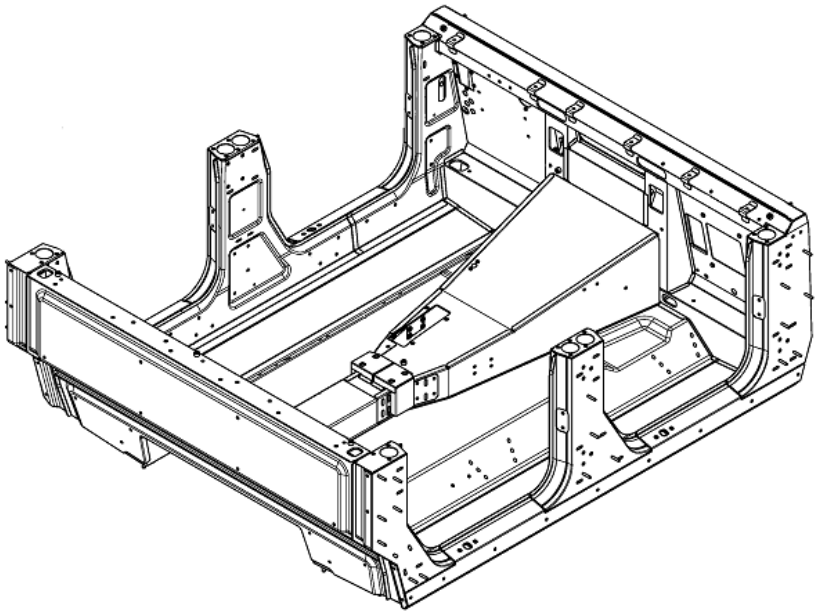

Figure 1- Body design

4.1.2 Hardtop

The hardtop is in ballistic steel with glued liner for protection purpose. The roof has one hatch and RWS. Predisposition. The roof has a hatch for emergency evacuation (front, right), a hatch for gunner's operations (rear, middle) and a mechanical predisposition for a RCWS (see 4.1.6 for details). The hatch for gunner's operations is fitted with a rotating ring (manual operation) and a weapon holder. In addition a gunner shield protection and three different interface mounting supports for MINIMI, MG and Browning weapons are provided.

Figure 2- Hardtop design

4.1.3 Doors

The cabin has four doors (two each side) with key lock mechanism and a metallic mine protection lock mechanism. Each door has three hinges, an external door grip handle on glass frame and two internal textile handles.

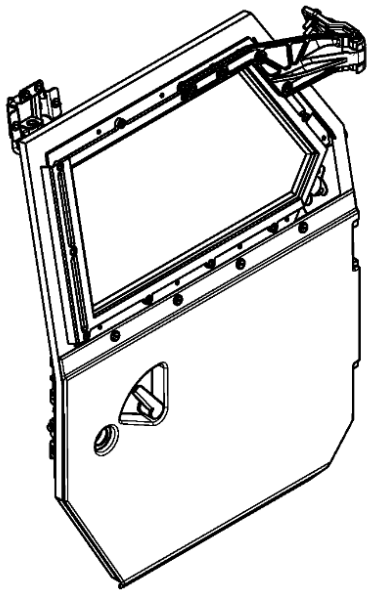

Figure 3- Door design

4.1.4 Seats

The cabin has five suspended seats at the rollbar structure. Front seats regulation of height and aft movement.
The passenger seats are foldable for the sitting component and have a bag under the sitting surface.
All seats are with anatomical headrest and with new tissue shoulder protection.

4.1.5 Rollbar

The cabin has an internal rollbar structure for rollover and protection purposes.

4.1.6 RWS mechanical predisposition

The roof has the mechanical predisposition of the RWS: two cables pass through, the fixing points plus plate on the roof.

4.2 Protection package

4.2.1 Protected doors

The doors protected panel is in ceramic composite. The doors have a third hinge for protection purpose.

4.2.2 Lateral add-on

The lateral add-on is in ceramic composite, the front add-on is in composite (steel plus liner).

4.2.3 Mine protection

The mine protection in ballistic steel under the vehicle.

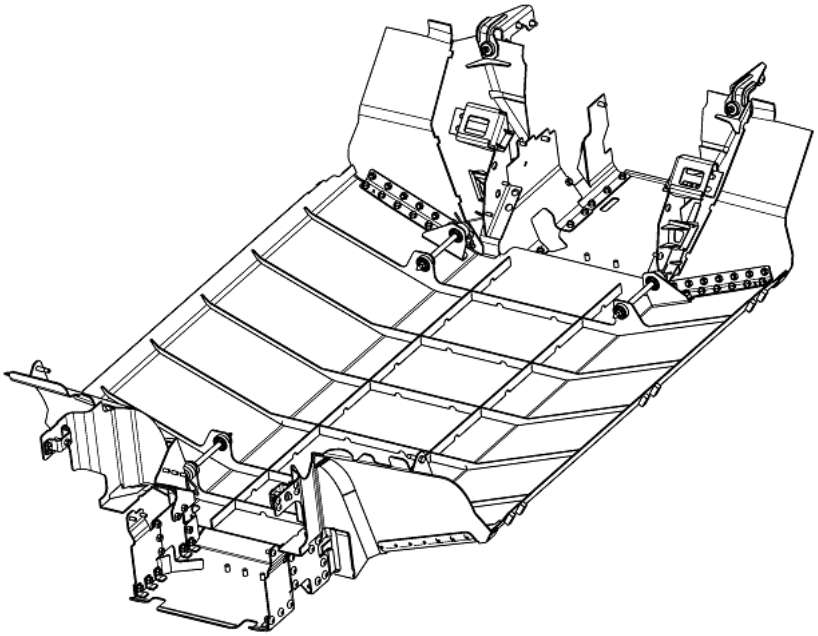

Figure 4- Mine plate design

4.2.4 Protected glasses

The door glasses and windscreen are protected, all three front glasses are heated.

4.2.5 Cable pass-through

The rear wall has a protected cable pass-through.

Figure 5- Cable pass-through

4.3 External assembly

4.3.1 Front bumper

New improved front bumper is tubular in steel and sustains the lights, with two antenna holders on sides.

Figure 6- Front bumper

4.3.2 Bonnet

The bonnet is unprotected not-walkable in composite with front cooling openings. The bonnet integrates in the front some lights and is provided with two antenna holders. The light position on bonnet is predisposed for grids.

4.3.3 Lateral steps

The lateral steps are in steel.

Figure 7- Lateral steps

4.3.4 Rear cargo

The rear cargo body is in aluminium with three doors, chocks holder.

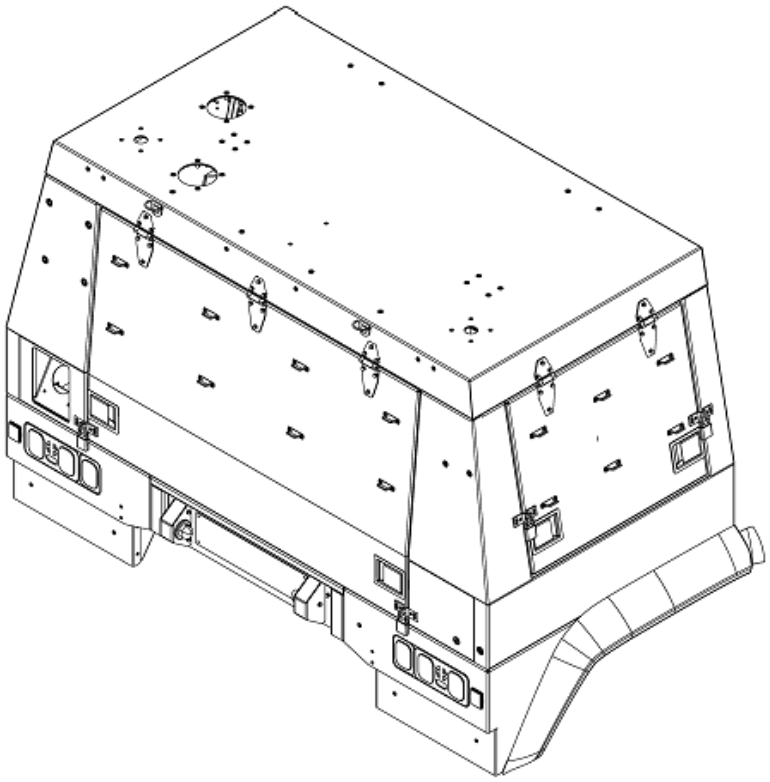

Figure 8- Rear cargo design

4.4 Crew accommodation

4.4.1 Weapon clamps

Weapon clamps are not supplied.

4.4.2 Storing areas

Each door has a storage area. The rear cargo body has storage fixing points.

4.4.3 Radio supports

Radio support are not supplied.

4.4.4 Antenna predisposition

The bonnet has the predisposition for two small antennas. The front bumper has the predisposition for two antennas. The cargo body has the predisposition for four antennas on a spoiler.

Figure 9- Rear spoiler

4.4.5 Antenna cabling

Antenna cabling are not supplied.

4.5 Chassis assembly

4.5.1 Chassis frame

The chassis frame is in high strength steel with cross members and STANAG eyes in the front and rear.

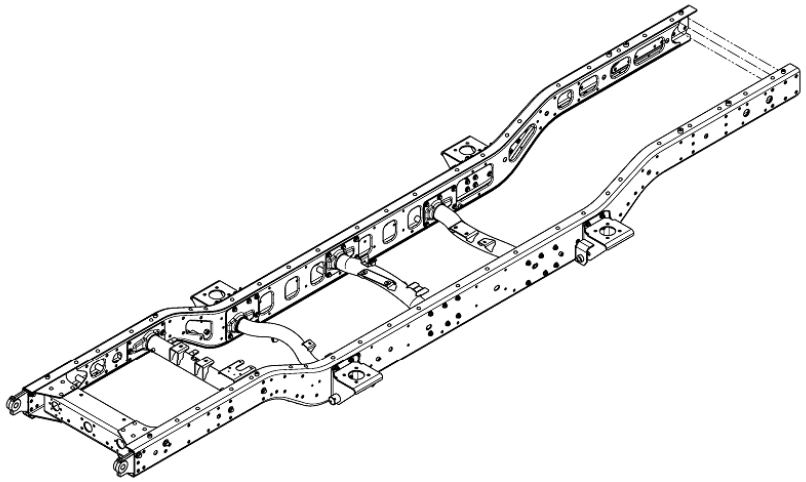

Figure 10- Chassis design

4.5.2 Towing hook

The vehicle has a military tow hook.

4.5.3 Lifting provision

The chassis has the predisposition for lifting protruding from the bonnet, the rear lifting predisposition are the rear eyes.

4.5.4 Front pintle

The vehicle has a front pintle for recovery.

4.6 Powertrain

4.6.1 Engine

The vehicle has an Iveco F1C Engine of 2998cm^3 displacement, with four cylinders, common rail and EIII. It has a max power (DIN) of 145kW (197hp) at 3400rpm and a max torque of 455Nm at 1800rpm.

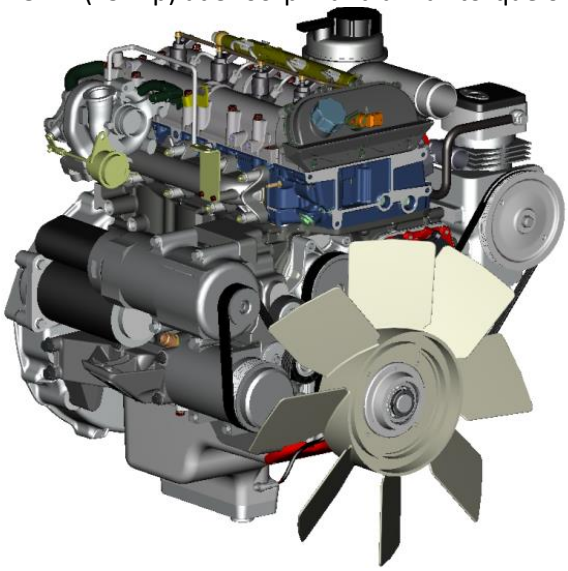

Figure 11- Engine design (for sample only)

4.6.2 Gearbox

The vehicle has a ZF 8HP90S automatic gearbox with eight gears and an electronic control and a mechanical lever. The lever has R reverse, N neutral, D drive and L (shift lock mode).

1° 4,696
2° 3,130
3° 2,104
4° 1,667
5° 1,285
6° 1,000
7° 0,839
8° 0,667
R -3,297

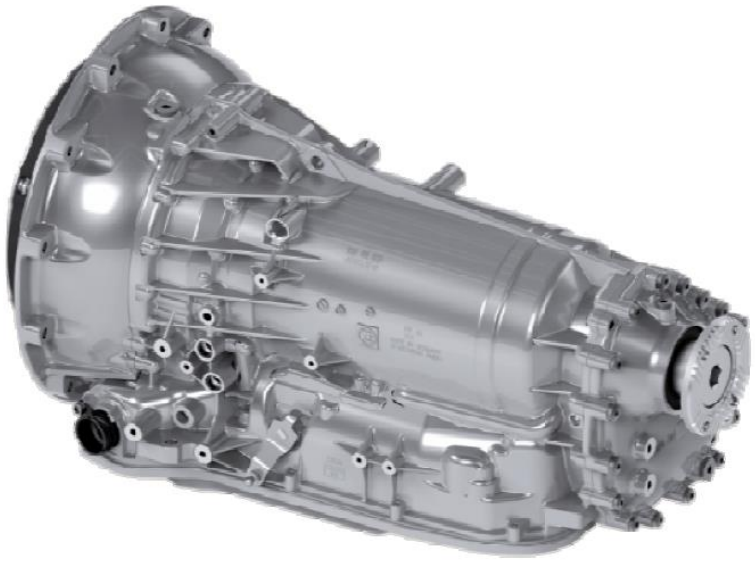

Figure 12- Gearbox

4.6.3 Fuel system

The vehicle has a plastic fuel tank (110l) with internal foams installed in the rear of the chassis. The fuel system has a heated pre-filter and a filter.

4.6.4 Cooling system

The vehicle has a front cooling radiator in modules: one for engine water, one for steering cooling, one for gearbox oil, one for air charge cooling. The gearbox has a second cooling radiator oil/water installed on the gearbox. The air compressor has also a cooling pipe.

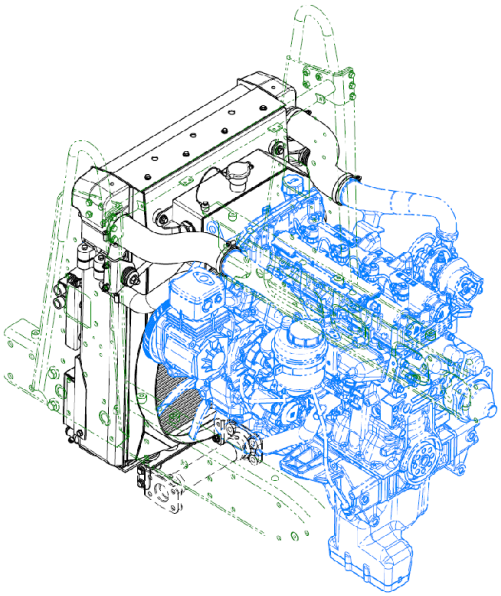

Figure 13- Cooling group design

4.6.5 Exhaust system

The vehicle has an exhaust system with two silencer box, and it's routed to the rear of the vehicle.

4.6.6 Air filter system

The vehicle has an air filter installed under the bonnet. The filter box is connected to a snorkel to remote the air inlet for fording and clean air purposes.

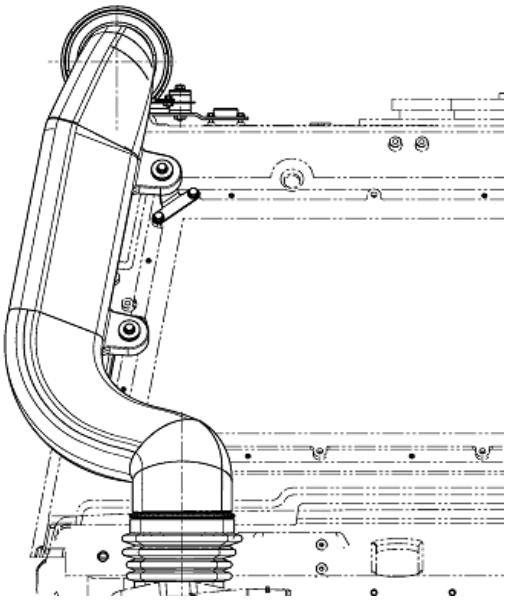

Figure 14- Snorkel design

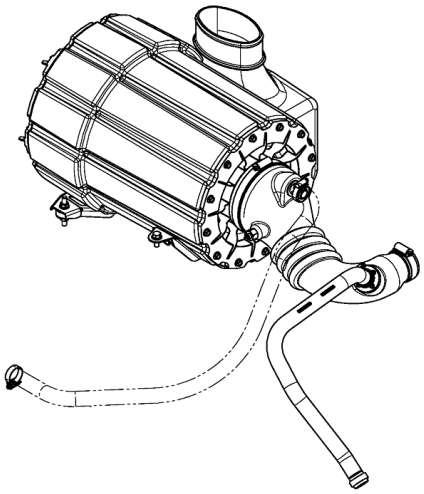

Figure 15- Air filter design

4.7 Drivetrain

The vehicle is a permanent all-wheel drive with a manual differential lock system.

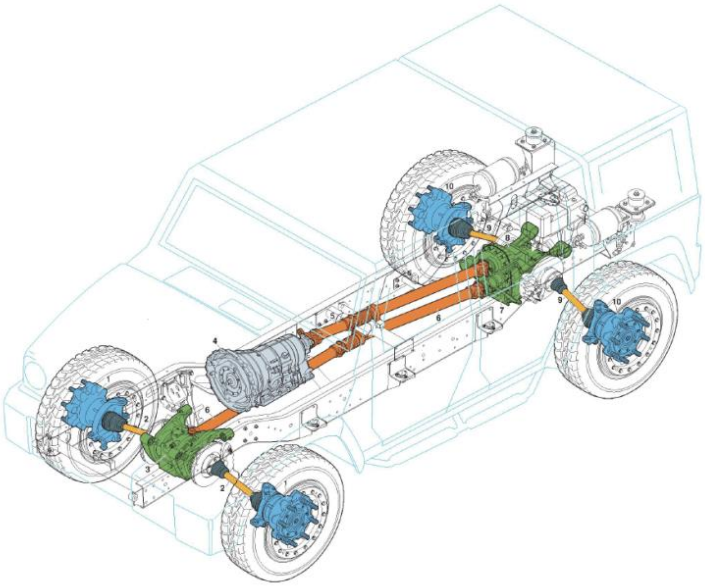

Figure 16- Driveline design

4.7.1 Front differential

The vehicle has an Iveco front differential, electro-pneumatic lockable with ratio 1:1,72.

4.7.2 Rear differential

The vehicle has an Iveco rear differential, electro-pneumatic lockable with ratio 1:1,72.

4.7.3 Transfer case

The vehicle has an Iveco transfer case flanged with rear differential, electro-pneumatic lockable and shifting with two gears 1:1,06 and 1:2,12.

4.7.4 Final hub reduction

The vehicle has a final hub reduction with ratio 1:4,52.

4.7.5 Brake system

The brake system is air-over-hydraulic system with disc and calliper front and rear, with parking brake is mechanical acting on the rear. The system has an ABS system.

4.7.6 Suspension system

The vehicle has front and rear independent, double wishbone suspension. Each suspension has one helical spring with co-axial shock absorber. Front and rear stabilizer bars are mounted.

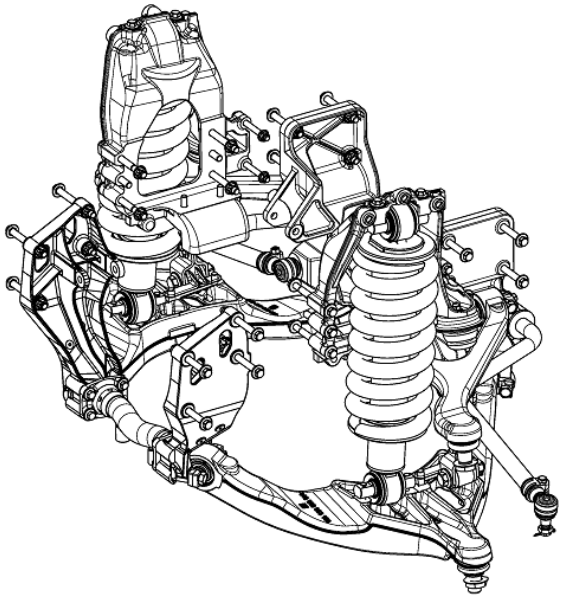

Figure 17- Rear suspension design

4.7.7 Steering system

The vehicle has a rack and pinion power steering acting on the front axle.

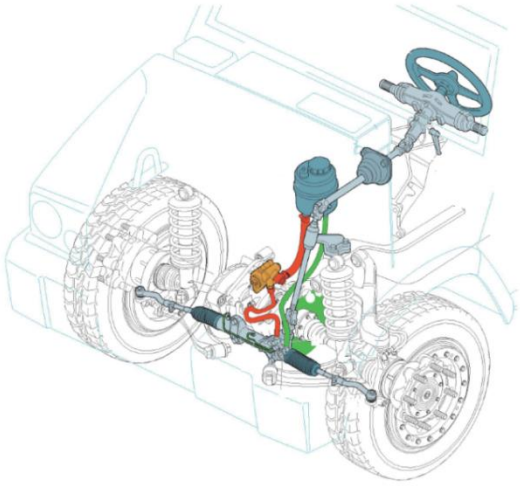

Figure 18- Power steering design

4.7.8 Wheels

The wheels have R16 aluminium rim, with runflat and CTIS valve. The tyre is Michelin X Force 325/85R16.

Figure 19- Wheel

4.8 Electrical system

4.8.1 Power generator

The vehicle has a 240A@28V power generator.

4.8.2 Batteries

The vehicle has two 12V 120Ah AGM batteries.

4.8.3 Auxiliary battery

The vehicle has two 12V 120Ah AGM auxiliary batteries installed in the rear cargo body. The 24V plugs are on the Battery Management System installed in the cabin.

4.8.4 Lights

The vehicle has front and rear vehicle lights, front IR lights, front and rear blackout lights.

Figure 20- Rear lights

4.8.5 Cluster

The vehicle has a cluster to read the vehicle (if the info is not already present on dashboard): status, functionalities, or warning:

- Power Pack
  - Engine Speed
  - Engine Air Filter
  - Engine Oil Pressure
  - Engine Water Temperature
  - Engine Pre-heating
  - Engine Control Unit
  - Alternator
  - Transmission
- Drive Train
  - Differential lock
  - Transfer Case
  - ABS
  - Parking Brake
  - Air Pressure
- Lighting
  - Direction Lights
  - High Beam
  - Position Light
  - Reverse light
- Other
  - Cruise Speed Control
  - Vehicle Speed
  - Odometer
  - Fuel Filter and pre-filter
  - Fuel Level
  - Vehicle battery
  - Trailer ABS

4.8.6 Dashboard

The dashboard has button controls of the vehicle for lights, blackout, CTIS, differential locks, engine start, power on. Odometer data is availability through a plug.

Figure 21- Dashboard controls (for sample only)

4.8.7 Cruise Control

The vehicle has a cruise control system that permits to keep constant a steady speed, or a certain engine speed when the vehicle is stationary (gear in neutral position).

4.8.8 CTIS

The vehicle has a central tyre inflation system to control different vehicle tyre pressures on dashboard. There are 4 pressure levels and 2 weight conditions selectable from dashboard by the driver while driving.

4.8.9 AC system

The vehicle has a manual air-conditioning system with external air inlet and air distribution for personnel.

4.8.10Auxiliary heater

The vehicle has an auxiliary engine water heater for cold start. The system ca also be used for crew cab heating.

4.8.11C4I Predisposition

The vehicle is provided with the predisposition for the CONAD (MOTOROLA) radio and Mercury EOD Jammer limited to the power cable.

4.9 Equipment

4.9.1 On-board tools

Basic tools, spare bulbs and fuses box, emergency triangle, emergency vest, complete jack kit, chocks, delivered not installed.

4.9.2 Fire extinguisher

One man-portable fire extinguisher, delivered not installed.

4.9.3 Transportation kit

Rings and eyes to tie down and lift the vehicle, delivered not installed.

4.9.4 User manual

Vehicle user manual delivered not installed.

4.9.5 Snow chains

Four snow chains delivered not installed.

4.9.6 Tow bar

One two eyes tow bar for recovery the system, delivered not installed.

4.9.7 Slave start cable

Slave start cable to start a different system and to power the winch.

4.9.8 Winch system

Electrical winch with a pull force of 5400kg ±10%, 24m of rope, installable in front or rear of the vehicle, delivered installed.

4.9.9 Anti-riot system

Protection grids on glasses, delivered not installed.

4.9.10 Brush guard

Brush guard, delivered installed

4.9.11 Spare wheel

Spare wheel delivered not installed.

4.9.12 Spare wheel holder

Spare wheel holder delivered not installed.

4.9.13 Rear snorkel

Rear snorkel for high fording, delivered not installed.

4.9.14 Air filter cap

Air filter cap, when the snorkel is not mounted, delivered not installed.

5 Notes

5.1 Acronyms

Acronym	Description