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OGNIOCHRON GBAM 2.00
new-generation truck



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Medium-sized, all-terrain rescue and fire-fighting truck with weight up to 16 T, for 6 persons crew, arrangement 1+1+4, 4x4 drive, class "M", category "2"

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Introduction

The presented truck is a tool for each fire fighting brigade, able to perform specific tasks. Due to its functions, it is mainly dedicated as so called **first action truck**, but it can be also used as the second action truck or as a component unit of various tactical compounds, such as e.g. platoons or supporting companies or temporary formations for fire fighting purposes, e.g. in forests or in case of other events, even outside of the territory of operation. While designing this **unique – from the point of view of technical solutions – truck** we have had in mind not only fulfilling of requirements of appropriate national and European Standards, but also requirements of standardization and other detailed requirements stated in various valid legal acts. This was the one direction, on which we put stress in design phase, the second one was to eliminate by means of innovative technical solutions various inconveniences for firemen performing many complex activities in various actions. In order to determine main directions of changes and to specify principal groups of problems requiring solution, many analyses have been performed, the input material of which were hundreds of discussions with firemen and rescuers participating in various actions. These information enabled us to classify problems into groups and to define matters regarding changes.

The major assumption we made is an urgent necessity of discharging the firemen from stresses connected with simple activities that must be performed during almost every action, to save their energy for performing of key tasks, i.e. rescue of life and property. And the other actions, to save their forces, can be mechanized or automatized!

There is no doubt at all that every firemen has only a specific capacity of energy, which he should use mainly for tasks having a priority meaning for the safety of rescued persons or property. And the other activities, though necessary, can be simplified or automatized by means of technical solutions in such way that they will not absorb the energy and that the fireman will not lose his forces for them. This is particularly important where during one shift the same brigades are setting out for action for several times.

Next issues which have considerable influence on the comfort of work of firemen is: assuring their safety on the action site, guaranteeing immediate trouble-free access to necessary information, eliminating necessity of remembering the algorithms of truck operation and its equipment, enabling intuitive operation of all these devices.

The entire truck with equipment must be ready for action in every time, must guarantee complete autonomy even during long-time actions and compatibility with other units. Moreover, the construction of the truck, implemented technical solutions should not only give the possibility of application of all known fire fighting methods, application of various means but also the automatic system must enable simple, intuitive operation and support the operator in performing of some activities and correct his possible errors, being simultaneously friendly and reliable. Except of this, the truck should have various universal couplings enabling connection of auxiliary equipment, such as among others: winches, ploughs, towing units and many other devices making the work of firemen easier and more convenient. To perform all these objectives, it was necessary to elaborate and implement completely new, innovative constructions and solutions and to modify and add some components specified in norms and standards belonging to a medium-sized, all-terrain rescue and fire-fighting truck with weight up to 16 T, for 6 persons crew, arrangement 1+1+4, 4x4 drive, class "M", category "2"

As a result of a profound analysis of chassis as a base for realization of our objectives, we have selected for the construction of our medium-size rescue and fire-fighting truck the brand Mercedes-Benz, model Atego, type1629 Af/4x4/3860-chassis for a fire-fighting truck.

Our decision was influenced mainly by following factors: **reliable, permanently modernized construction** with guaranteed development perspective, single-module cab for 6 people, **excellent traction properties and high off-road reliability, reliable engines**, available service, easy access to consumables and spare parts, reliable construction and an important fact that this chassis is dedicated by the manufacturer for assembly of special trucks of fire-fighting brigades. The proper solution is additionally witnessed by the fact that this model, Mercedes-Benz Atego, has obtained a prestige title **„International Truck of the Year 2011“**.



Underneath in the short abstract we will mention and illustrate innovative solutions which are making our proposal to **the first element of new generation of rescue and fire-fighting trucks**. Introducing this fighting truck on the market we are giving our firemen not only the most modern tool for fighting with elements, catastrophes and other random events, but also we are handing over friendly technical solutions, making the hard and dangerous work of firemen more comfortable and more satisfactory.

Detailed operating and technical parameters of this new generation truck are included in technical specification.



RCS – RESCUE COMMAND SUPPORT

Each commander immediately upon arrival on action site must make proper and quick decisions. Unfortunately, in many situations making decisions requires information that are difficult to obtain immediately, particularly on the action site, which makes the decision process longer, leading to protraction of operations, which is undesirable. In order to eliminate these problems and to make the work of commanders easier, we have equipped the truck with an innovative „RCS”system, i.e. **RESCUE COMMAND SUPPORT**.

In our opinion, the amount of information the commander needs to take proper decisions on action site is such extensive and diverse that it is practically not available nowadays. To change this state and to support the commander in his decision process we have designed and constructed an IT-tool and we gave it a name „RSC”. According to this principle we have firstly created a schematic diagram of the software with directories of demands and priorities and then we have commenced to elaborate an IT-tool and to make a database for the purposes of commanders operating directly on the action. In this way we have created „RCS”, which actually includes many applications enabling quick searching of:

- dangerous substances and their identification,
- hazard phrases and ID-numbers,
- names and synonyms,
- labels,
- Material Safety Data Sheets,
- evacuation plans, proper for a specific area,
- maps with building numbers,
- plans of objects with particular hazard for a specific region,
- medical procedures,
- procedures of co-operation with Helicopter Emergency Medical Service,
- procedures in case of radiation threat,
- maps of forest area,
- road maps,
- hydrant network
- and many others.

The principle of our solution consist in enabling to the commander an immediate access to the enormous – as for today – and interdisciplinary information database necessary for proper evaluation of situation without necessity of contacts with control stand and waiting for feedback information.

Except of this, the database is an active tool, in which he can make corrections, complete it and update it permanently from the point of view of own needs, using the resources of permanently updated information placed by the administrator on the server. **The program and database are developing tools, foreseen for permanent modification**, both on the level of administrator and on the level of users. Except of this, each unit can implement to the system data which are particularly proper for their local specific and needs. In this way the commander on the action site is equipped with a tool making him autonomic in the access to necessary data essential **to make immediately proper decisions**, and additionally it has a tool for versatile registration and multimedia communication. The offered solution has a ground-breaking character, not only because of its importance for the quality of performed rescue and fire-fighting operations, but also because of its development advantages, giving the users possibility of placing in a common database of essential information, which could be then, in similar circumstances, used by other commanders, on the basis of experience of his colleagues. Moreover, the database itself is a perfect didactic tool, which will be permanently verified by the environment.

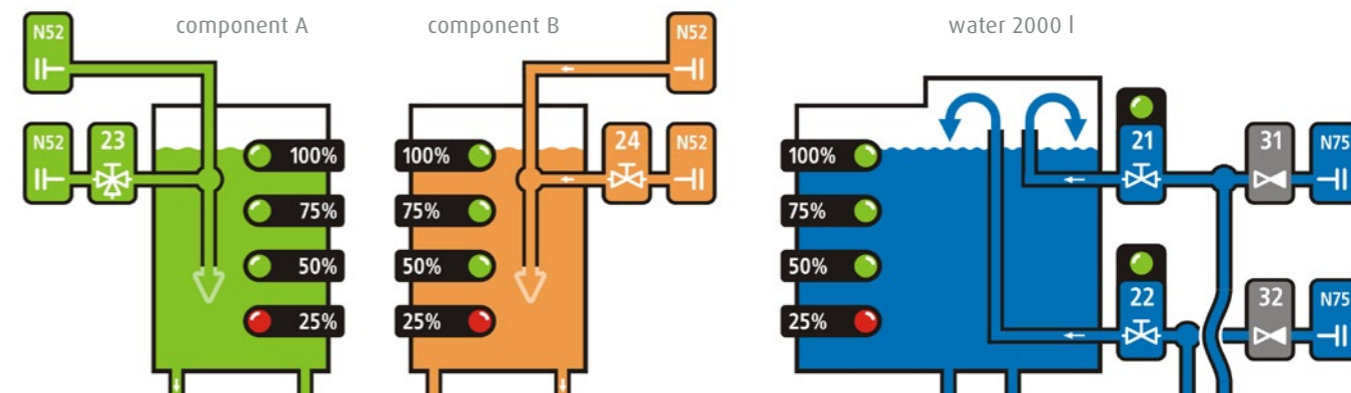


Container

On the main frame an integrated, three-chamber container has been assembled, made entirely of composite, of unique construction and shape, protected from inside by means of a frame construction on the body, for transportation of 2000 litres of fire extinguishing water, 200 litres of foaming agents and 200 litres of e.g. wetting agent or other means, dictated by local needs.

In this way, firemen – depending on situation – on the action site – can modify the parameters of extinguishing water, according to circumstances. Each chamber of container has an individual installation, enabling pumping its content directly by means of fire truck pump or by means of co-operating water and foam system, to create water solutions with appropriate content of foaming agent or wetting agent and to supply it to the fire. Moreover, the container chambers for agents for modification of extinguishing water parameters are equipped with installation for their filling in three various means each, i.e. by gravitation from above, with external pump or by means of own membrane pump, driven with electric engine with nominal capacity of 50 l/min, installed permanently in the water and foam system of the vehicle and supplied from the truck battery. Moreover, each chamber of the integrated, three-chamber container is equipped with an overflow and a bottom drain valve. Additionally, the chambers for agents have been interconnected in such way that after opening of the valve between them they can be united into one chamber of 400 litres volume and it is possible to draw from their summary volume. It must be stressed that both chambers must be then filled with the same agent. The water chamber can be filled from outside by means of two supply couplings of from the fire truck pump when it is drawing water from external source. For proper filling of water container responsible is the „Aqua Stop”, system, cooperating with integrated indicator system showing the actual level of liquids in individual chambers of container.

In case of strong frost, when the vehicle is subject to low temperatures, the content of water container is protected against freezing by means of two heaters being the part of „Full Power” system. To limit the negative influence of waving of liquids on the vehicle stability during dynamic drive to minimum, all chambers of container have been equipped with transverse



and longitudinal breakwaters. Particular attention should be paid to untypical shape of container, enabling **essential lowering of vehicle's centre of gravity**. Application of such lateral profile caused that not only the centre of gravity has been lowered, but also the distribution of loads during the drive is more convenient and can guarantee **considerable improvement of vehicle movement stability**.

Water-foam system and control system

The designed truck is equipped with a water-foam system, enabling supplying of water and its solutions in any configuration to main and extinguishing lines. The central controlling is performed from two places – driver's cab, from where all functions available during driving are controlled and from the fire truck pump compartment – for all tasks, for realization of which this type of fire-fighting truck has been designed. **To simplify the operation and to make contact with device more friendly, the control system has been grouped into two essential blocks: control with fire truck pump and its functions and control with water-foam system, which has been performed on the basic of scheme of entire installation.** In this way essential functions and condition of individual valves are shown by means of control lamps on a drawing, which makes orientation easier and helps during operation. Except of this, all valves controlled pneumatically can be in emergency situation opened or closed manually, by means of one wrench only.

Fire Guard System

Around the truck. i.e. crew cab and bodywork some pipelines and nozzles have been installed, which are forming – after switching on the fire truck pump and opening of valve of this system – **a protective water curtain protecting the crew inside as well as entire truck against thermal radiation and flames**, e.g. during fire in forest. Importance of this system for the safety of firemen can be shown on the example of experiences of firemen from Kuźnia Raciborska.

Full Power System, guaranteeing 100% readiness for action

Special truck for fire brigade and especially a rescue and fire fighting truck is a very specific device which must be in full readiness, **ready for immediate setting off to the action**. This condition applies not only for the truck itself, but also to entire equipment in the truck. There is no doubt that the time factor in rescue operations has a principal meaning and influences crucially the effectiveness and success of actions. These circumstances enforce application of specific technical solutions during construction of such type of trucks. To fulfil above mentioned requirements **our truck has been equipped in the „Full Power“ system, assuring the truck and its equipment 100% readiness for action in every time.**

The system consists in:

1 **Engine heating system** during standstill, enabling keeping its temperature on one of selected levels, i.e. 35°C or 45°C. It helps to protect the engine against premature wear caused by very large loads during dynamic drive to the fire, before reaching of proper temperature of this component.

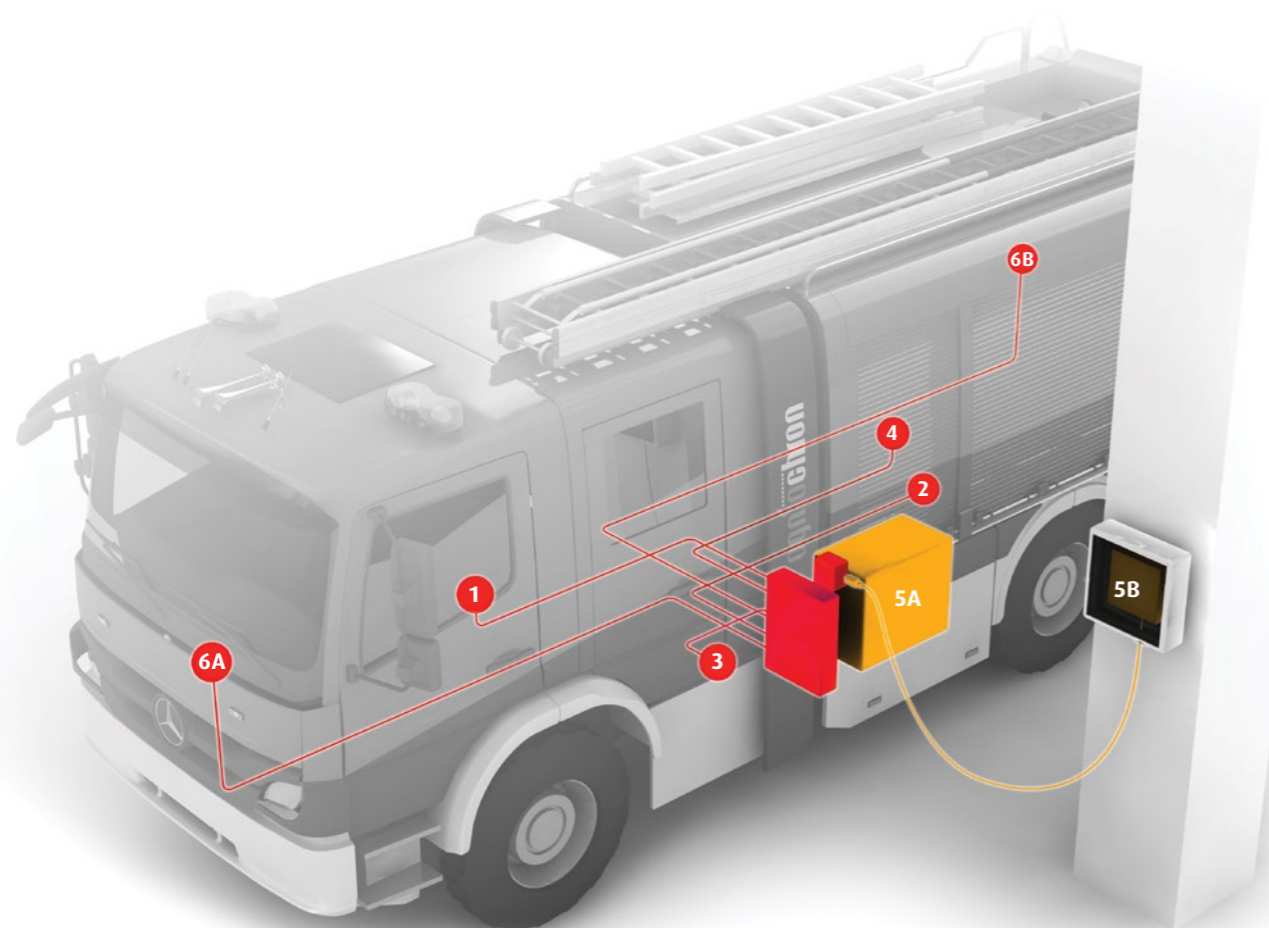
2 **System of permanent filling up the air in pneumatic installation** of the truck during standstill, enabling immediate setting off, without necessity of waiting for reaching the required air pressure in pneumatic system.

3 **System of permanent charging of vehicle batteries and all batteries installed in devices** of the truck, such as fire pump, torches, radio-telephones etc. which guarantees their 100% readiness in action.

4 **System for warming up of extinguishing water** in the truck container, to protect against its freezing on fittings during strong frost.

5 **Internal 5A (electric power generator) and external 5B supply system** guaranteeing supply of electric energy to the vehicle systems, both during standstill of the truck in garage and during action. The automatics in both systems excludes necessity of any intervention of the user in its operation and protects the vehicle systems against possible operation errors and shows to the operator the actual system condition.

6 Independent from the vehicle **heating system of the crew cab 6A and fire truck pump compartment 6B**. The first one protects firemen against low temperatures and the second one protects the water-foam system together with the fire truck pump against freezing.



Fire Drive System

At the moment of setting off and during the drive to the action, the driver – rescuer should be concentrated on driving to reach safely and without problems the place of event. **For this purpose we have elaborated a system for control of the truck components, connecting them in such way that the selection of all necessary functions could be done e.g. during change of service and at the moment of setting off all necessary functions could be switched on by means of one switch only and upon arrival on the site the devices of the truck could be switched by means of the same button to functions necessary during standstill on the action site.** Such solution eliminates the necessity of running analysis of device conditions and enables concentration on actions which are important for the course of action.

The components of this system are:

- All lighting signals of the privileged vehicle.
- Acoustic signals with audio system
- Wireless communication systems, i.e. radio-telephone operating in PSP network and CB-radio.
- External lighting of the site around the truck.
- Rear camera enabling to see the driver the area behind the truck, which is invisible in rear view mirrors.
- Third stop light in the beam of multifunctional rear bumper.

The proposed solution enables also to limit the energy consumption from the vehicle installation by the possibility of switching off the actually unnecessary devices.

System of automatic protection of the action site

Safety of firemen on the action site depends largely on very good visibility of the truck for other traffic participants, particularly when the action is performed on the roadway. For this reason we have equipped our vehicle with a specially configured set of lamps, enabling protection of the action site directly after stopping the vehicle and before leaving the cab by the crew. In this way the risk of knocking down the firemen by other vehicle has been reduced to minimum. **The system consists of: two yellow LED motorway lamps, diameter 230 mm, located in the rear corners of vehicle body, set of six red LED lamps, located in the rear bumper beam, the whole completed by standard hazard lights of the truck, additionally with repeated rear lamps.** All these lamps are emitting pulsating light with frequency in phase with hazard lights, which will guarantee spotting the truck from the distance of several hundred meters.

Lighting mast

The vehicle has been equipped with **pneumatic telescopic lighting mast Teklite type TF 440 XE/5**, enabling lifting of lamps on the height of **5,4 m** over the ground level, with rotary, remotely controlled head on top, to which two halogen sources with power of 1000W each, emitting in total a luminous flux of **44 000 lm**. The control of all functions of the mast takes place from the manual **portable desktop** and its retraction is fully automatic and after selecting this function (single button operation) the mast is retracting automatically to the transport position. For user's convenience, the same function is also available in the crew cab, from the main control desk. The mast is protected against unwanted operation by means of an emergency safety switch located in the fire truck pump compartment.

System of visual communication

In particular situations there is a strong necessity of: informing the surrounding about the character of performed operations, warning about dangers or passing a short message or command. For this purpose we have integrated in the designed truck a system of visual control with surrounding. It consists of a LED display located in the highest, central point back on the body, on which we can display, from a control device located in the crew cab, short messages, commands or warnings for people around the truck. Except of text informations, it is possible to generate on this display graphical symbols, helping in traffic regulation or showing e.g. the direction of evacuation, diversion etc. The memory of the device enables saving of sixty pieces of information, commands and standard characters and additionally, by means of external connection, it is possible to enter from the tablet keyboard any text, graphical signs or any combination of them, appropriately to the situation on the site, to pass quickly information to the surrounding.



System of automatic unrolling of hose lines

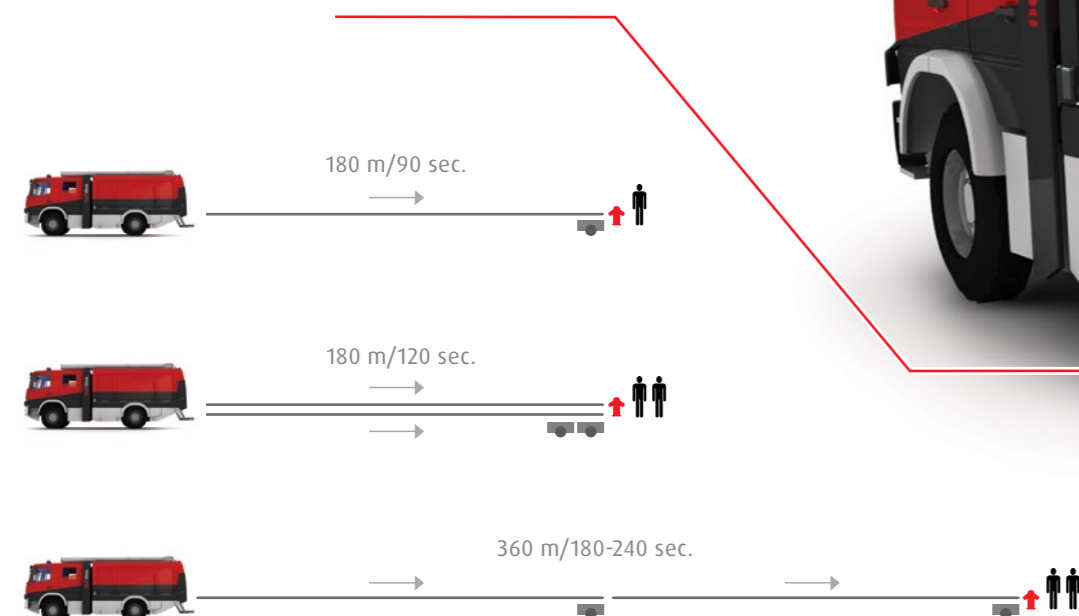
The nightmare of every fireman for dozens of years is unrolling of long hose lines, particularly in difficult terrain. The largest problem emerges, when it is necessary to perform quickly a supply line and the distance from the source of water is considerable. Unfortunately, water in the container is over soon and it is necessary to look for the closest hydrant (if available) or to find another source of water, which means the necessity of transportation of water on a large distance. Additional difficulty is lack of time for organizing the supply to avoid breaking of water supply to the fire. To eliminate this severe difficulty, we have implemented in the offered vehicle **a completely innovative system of automatic unrolling of hose line**. It is based upon especially constructed hose cassettes located in rear lower boxes closed by means of doors, lowered and lifted mechanically by means of remotely controlled cylinders. **Each cassette (of this model) has nine fire hoses W-75 with length of 20 meters, rolled into a double roll and appropriately connected, which gives together 180 meters of hose in one cassette. Both rolls have in total 360 meters of hose.**

Of course, unrolled is only required in individual case length of hose line and the other unrolled hoses still remain in the hose cassette. The cassette construction enables its taking out of the box and dragging behind as a two-wheeled trolley, from which hoses are unrolled not only in urbanized land, but also on forest roads and even off-roads. This is guaranteed by integral, swivel suspension with two pneumatic wheels on tyres, which after unlocking are diverging and retracting, enabling unrolling the hoses from cassette even on snow. A fireman drags it then behind as a sledge, on which appropriately connected unrolled hoses are located.

This solution is revolutionary for the work performed by firemen in connection with unrolling of hose lines, discharging them from a heavy work and shortening to a minimum the time of this operation and eliminating unnecessary fatigue.

Self-acting unrolling of hoses behind driving truck in following variants:

- one hose line with maximal length up to 360 meters
- two parallel hose lines (unrolled simultaneously) with maximum length of 180 meters.

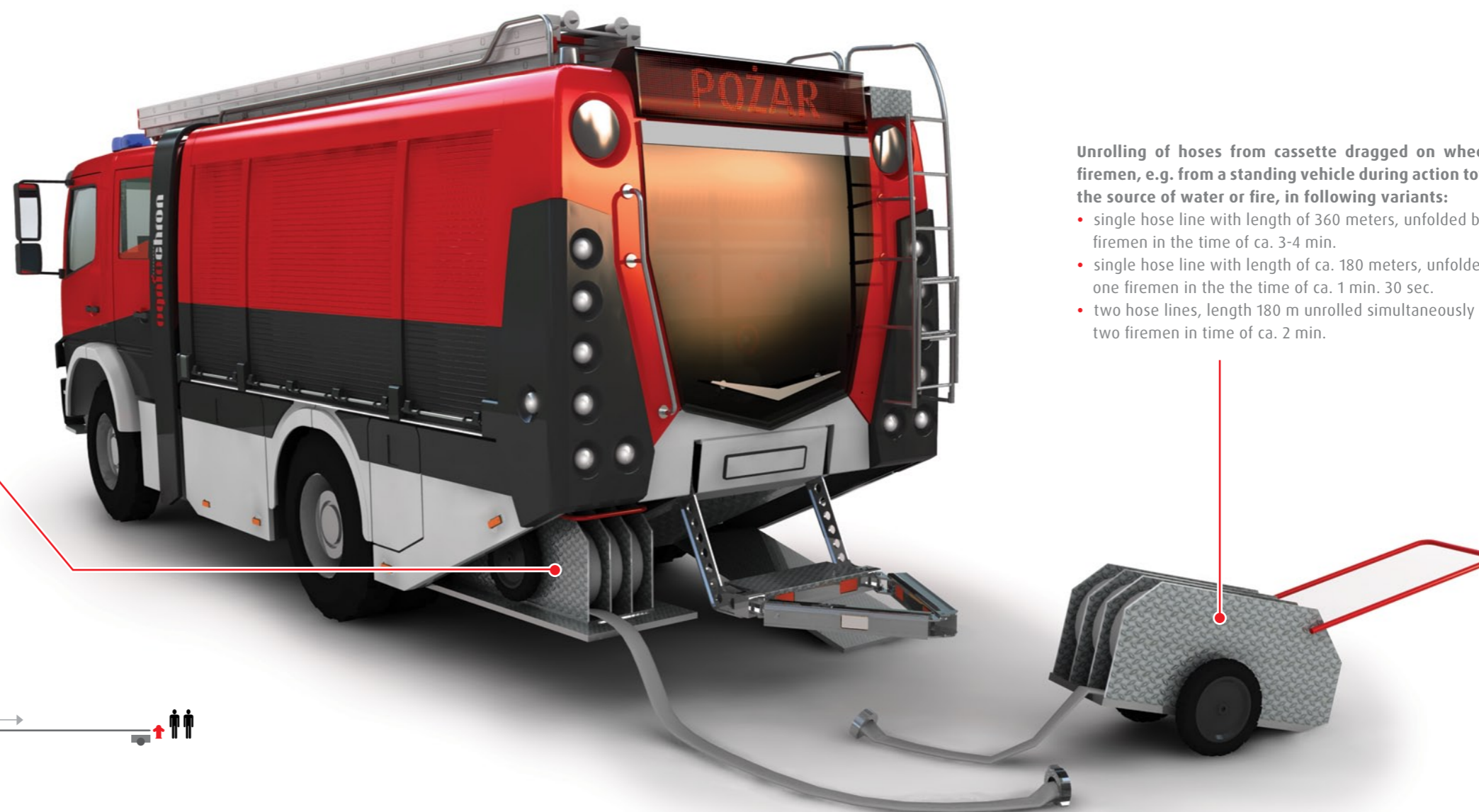


Mechanical reel for hoses integrated with high pressure cleaner

More burdensome and exhausting is rolling of hoses after the action. Except of so called emergency rolling, the time factor in this case is not determining and firemen can perform these operations without rush, which does not exclude considerable exertion. Bearing in mind the rule that a fire-fighting truck should be ready in every moment for further action, even during comeback to the base, the entire used equipment must be rolled, checked, placed in boxes, the container must be filled with water and then return to the base. And this means that all used hoses must be rolled. Bearing this in mind we have elaborated and equipped our medium-sized fire-fighting and rescue truck with mechanical reel for fire hoses, integrated with a high pressure cleaner.

This tool with a unique construction enables rolling in a double or single roll and simultaneous washing of single hoses, in the size 25, 52, 75 i 110, according to user's choice. All you need to do is to unfasten the hose line and put individual hoses to the reel and then, by means of electric motor driving the reel the hoses are rolled and automatically cleaned with water supplied under pressure from the fire truck pump. Controlling of the reel drive and water cut-off valve is performed by means of a pedal, so the fireman has free hands and can freely operate with them at the device. After rolling he takes out the cleaned and evenly rolled into a double roll hose from the reel, which he can directly put into a proper compartment in the vehicle box. Of course, there is also an option of reeling the hoses without washing, if this is unnecessary or unwanted, e.g. during strong frost.

This device discharges firemen from exhausting manual rolling of hoses, saving their time and forces.



Unrolling of hoses from cassette dragged on wheels by firemen, e.g. from a standing vehicle during action towards the source of water or fire, in following variants:

- single hose line with length of 360 meters, unfolded by two firemen in the time of ca. 3-4 min.
- single hose line with length of ca. 180 meters, unfolded by one firemen in the the time of ca. 1 min. 30 sec.
- two hose lines, length 180 m unrolled simultaneously by two firemen in time of ca. 2 min.

Fire-fighting body

When designing the special truck on the off-road chassis we have separated the fire-fighting body from the chassis, connecting both these elements in a flexible manner. **Firstly, on a frame side member the auxiliary frame has been assembled in a rigid manner, then on this auxiliary frame the main body frame has been assembled in a flexible manner, to which underneath and above the skeleton modules are attached, creating the body.** External skin plating has been made of a composite and the internal plating of aluminium sheets. Side boxes over the framework have been closed with shutters and underneath with flaps, which after opening fulfil the role of platforms, the edges of which, for the safety of operators, have been illuminated and the corners have been equipped with flashing ramp lights. The rear box – fire truck pump section is closed by polycarbonate door, opened upwards. Important is that in the lower flaps sharp edges have been removed and replaced with rounded pads made of flexible plastic to eliminate the possibility of injuries. The style of the body forms together with the cab a uniform, aesthetic form with consistent lines and shapes, including simultaneously all modern functional solutions implemented in this project.

Universal front coupling

In the front, there is an universal coupling, by means of which it is possible to equip the vehicle in additional tooling, such as: **winch, shackles, snow plough** – helpful e.g. in reaching the injured persons on a road covered with snow or enabling the access of ambulance and helping seriously ill persons. Except of this, the construction of the coupling is integrated in the front bumper in such way that it is safe for other traffic participants in case of a possible collision.

Multifunctional rear coupling with terminal panel

At the rear of the truck, directly on the frame side member a tool has been assembled, enabling mechanical coupling of all components necessary in action, such as: **winch, towing bar, shackles for attaching of cables, basket for transportation of hoses reeled after action in figure-eight fake** etc. Additionally, on the integrated terminal panel there are terminals for connecting of electric, pneumatic and hydraulic installations, co-operating with rear coupling of the components. On this coupling there are also movable arms of multifunctional rear bumper.

Multifunctional rear bumper

This unique tool not only guarantees the firemen comfort and safe work, but also performing of tasks which were earlier impossible in trucks of this class.

The bumper, except of its obvious purpose, fulfils also many other very interesting functions, which are very helpful in rescue and fire-fighting operations. It is made as a steel beam, folded on both sides to the inside. In the rear wall of each component located are two red lamps, fulfilling after spreading of the beam three functions: third brake light, if the vehicle is driving to the fire, hazard lights, when it is standing during action on the road, protecting lights, co-operating with yellow motorway lamps. Accordingly, in the front wall there are white, angled lamps, so that they can illuminate the base around the beam when it works as a platform for operators. The platform has several configurations, depending on the needs and activities performed by the vehicle. When the hose lines are unrolled from cassettes, then the the beam arms are extended – one, if we are using only one cassette or both, when we are using both cassettes simultaneously. In the first instance the arms create a rectangular platform, in the second one – triangular one. A fireman present on the platform, when unrolling the hose line from cassettes during drive, has „STOP“ buttons on hand-rails, enabling him contact with the driver, who can observe it permanently on the screen in the cab, where the image from the rear cabin is sent. On the beam shaped in the triangular form a platform made of tear plate is placed, enabling the fireman comfortable and safe standing during drive, e.g. when he must supply neutralizing agents from the „Eco-Spray“ system, e.g. on chemicals or oil derivatives spilled on a long section of road. Except of this, when the beam is composed into triangle, it is possible to assemble on it one of two special attachment. The first one is a typical towing beam for towing of cars, the second one – a rotary hook for lifting and attaching of damaged cars. Because the arms on which the beam in truck has been seated are movable, they can be lowered on the ground by means of hydraulic cylinders in such way that – according

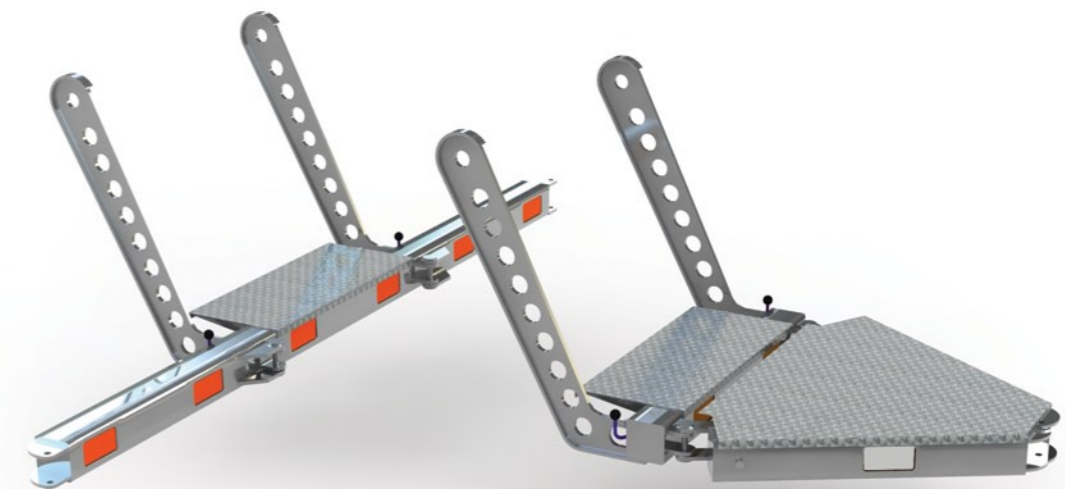
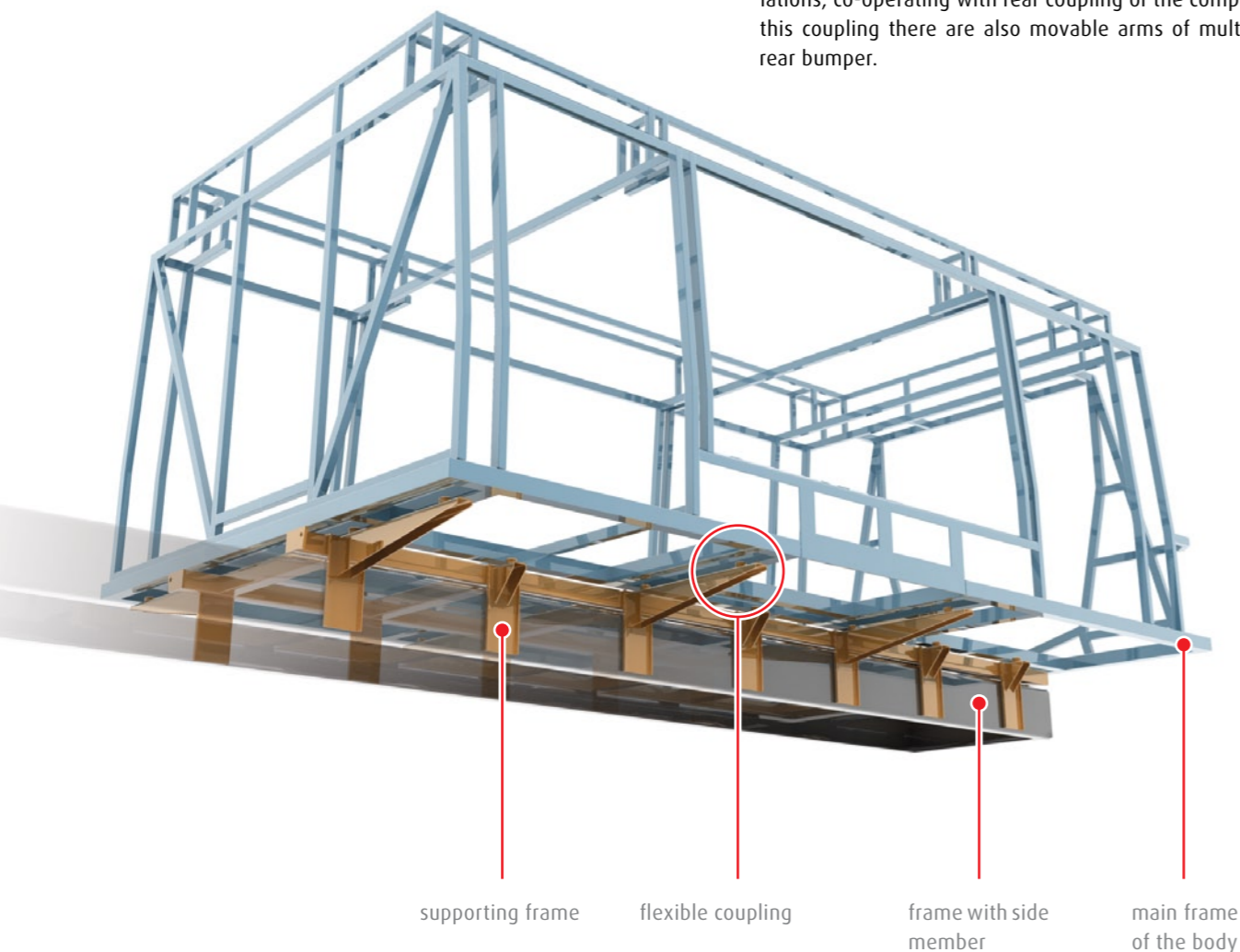
to the needs- the towing beam or the rotary hook would be located on the ground level, in order to attach, raise and tow a damaged car from a roadway to the closest bay or car park on the road. This function allows to shorten the time of clearing away of communication runs after traffic incidents and to bring back regular traffic.

Basket for transportation of emergency rolled hoses in so called figure-eight fake.

In case if the hoses are rolled in figure-eight fake or if they will be transported in such condition to the unit or to the next action, for the convenience of user we have equipped our vehicle in a specially designed, unfolded basket for transportation of dirty, used pressure hoses. It is hanged on the rear on the bumper's beam and is attached to the truck by means of universal rear coupling. **This basket is transported in folded condition in the box and in case of necessity it is taken out and attached on the rear of the truck.** Its construction and dimensions enable placing of hoses rolled in figure-eight fake which after securing with tapes can be safely transported.

Eco-Spray System

Frequent participation of fire brigades in actions connected with removal of impurities degrading the natural environment requires supplying to firemen an appropriate tool for neutralization of leaks. For this purpose we have elaborated a device, by means of which easy and without effort a neutralizing agent can be added, what in connection with the system of nozzles in the front and on sides of the truck creates a complete system of neutralizing and removal of leaks, mainly of oil derivatives such as fuels and oils.



Fire pump

After many years of absence we have implemented a fire pump with nominal parameters in compliance with parameters of fire truck pump, which makes our proposal a well-known and appreciated by specialists vehicle of type GBAM. Such fighting vehicle is fully autonomous and in connection with our unique system of automatic unrolling of hose line enables firemen unlimited unsupported fire fighting operations if only in the tactical reach of the vehicle there is an artificial or natural source of water intake. In the offered version we have applied the fire pump M-16/8 made by company Tohatsu model VC 82 ASE. **The fire pump increases the reliability of the special truck, making it an exceptionally reliable fire-fighting tool.** And because of its location in the box next to the drain valve of the water container, all you need to do is sliding out the pallet with the fire pump and without taking it out connecting it to this valve to continue performing fire-fighting operations, substituting the fire truck pump with the fire pump. This action is performed by one person only and without any effort, which increases additionally the comfort of work of the section, without disturbing the rest of the crew performing their tasks.



Mobile winch

To increase the operating possibilities, the designed truck has been equipped with a mobile winch. **It can be assembled both at the front and at rear of the truck, according to the situation during the action.** This solution makes the action easier, because when the winch is used, there is no need to change the truck position, but only to connect it to the electric current supplied to sockets at both couplings.

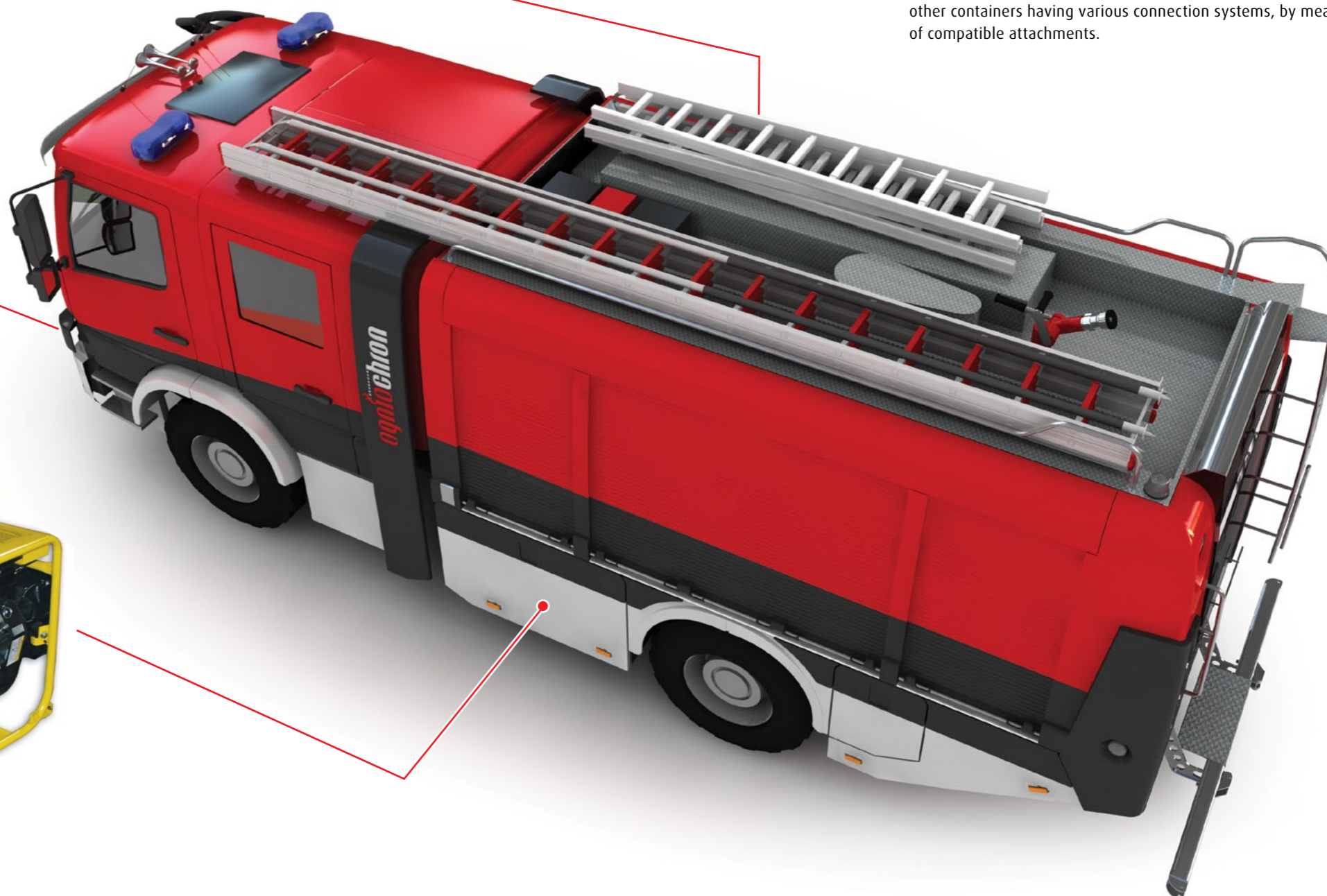


Electric power generating unit

For supplying of devices installed in the vehicle with electric energy, an electric power generating unit with combustion engine drive with power of 5,2 kW (at 3~) and voltage 1~/3~ 230/400V as well as protection class IP54, type BSKA 6,5 V of company Eiseman has been used, which has been located in the box on a telescopic pallet. To enable the possibility of operation without necessity of taking out of the box, the exhaust pipe of the aggregate has been equipped with an attachment and the box has been equipped with co-operating coupling and own exhaust pipe, which will guarantee removal of exhaust fumes to the outside of vehicle. In this way the working electric power generating unit not only does not obstruct the access of the crew to other equipment, but also is ready for immediate operation during action, without necessity of its taking out and moving or connecting the pipe for exhaust gas removal and only one person is required for operation.

Fire truck pump

On the supporting frame, in a flexible manner a **double-segment fire truck pump, type FPN 10-1500-2 HHL+FPH 40-250-3 HH i.e. A-16/8+A-2,5/40**, made by Ziegler, has been assembled, eliminating in this way transfer of vibrations on entire body and all equipment located in it. In this way we have obtained a unique culture of operation of the pumps system and entire water-foam system. On the suction side of the fire truck pump there is a quick connection of large mechanical resistance, enabling co-operation with many various attachments. One of them enables lowering of the suction coupling far below the fire truck pump axis, making the connection of the suction line easy and not burdensome. Moreover, it is possible to lower entire suction line horizontally on the coupling with this attachment, e.g. from a bridge to the river or into a well, without fear of breaking the suction hose or fire truck pump body. The universal coupling has an additional advantage, that by means of it it is possible to change quickly the attachments and use other systems of couplings than Storz. This gives the possibility of drawing the water e.g. from railway or truck cisterns and other containers having various connection systems, by means of compatible attachments.



Basic technical objectives

BASIC CHASSIS

- **Model** – Mercedes Benz Atego 1629AF
- **Drive** – 4x4
- **MTW** – 16.000 kg
- **Engine** – R60M906LA, EURO V
- **Power** – 210 kW (286 KM) at 2200 rpm
- **Engine capacity** – 6374 dm³
- **Cab** – 1+1+4
- **Frame** – monolithic, with frame side member

BODYWORK

Modular bodywork made of corrosion resistant materials, seated in a flexible manner on a supporting frame. The body consists of five welded modules, welded and bolted to the main frame of the body made of stainless steel. Steel sheets of internal skin plating, connected with the skeleton in the technology of gluing, riveting and bolting. External skin plating has been made in elements made of polyester and glass composite composite and has been connected with the skeleton by means of screws.

CONTAINER

Integrated, three-chamber, single-body water container and two containers for agents for modification of its extinguishing parameters, made of polyester and glass composite, with installations placed.

- **Water chamber volume** – 2000 dm³
- **Volume of chamber for foaming agent** – 200 dm³
- **Volume of chamber for wetting agent** – 200 dm³

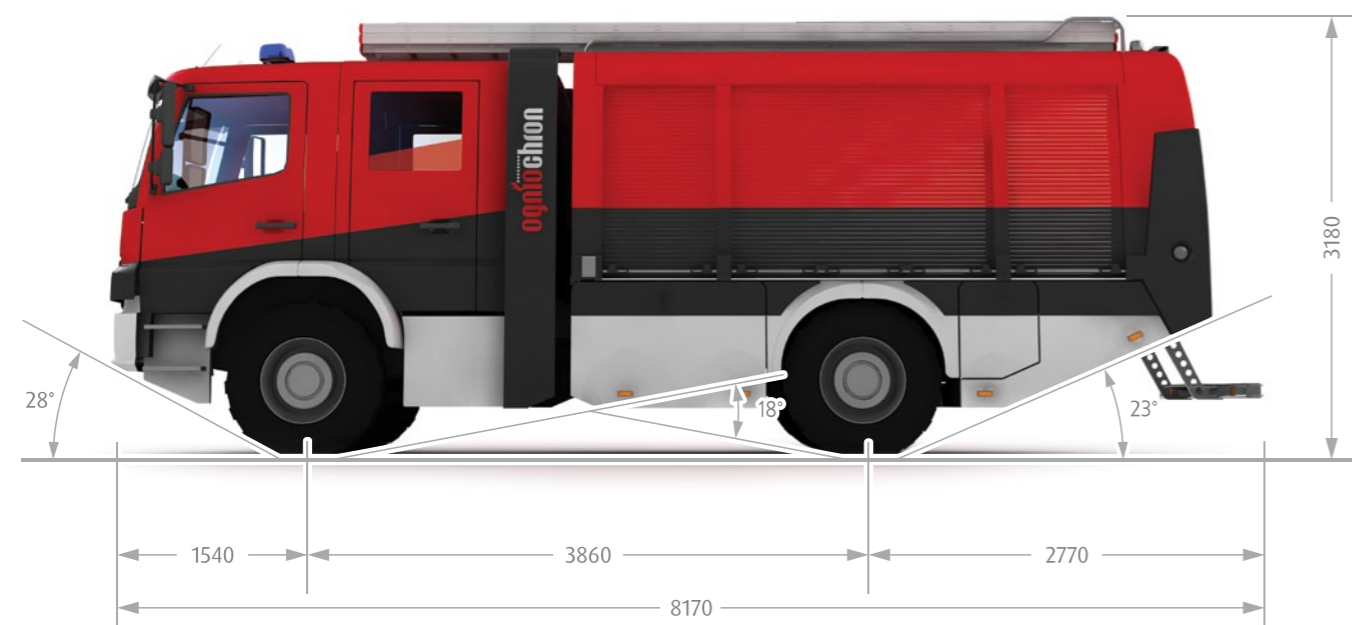
FIRE TRUCK PUMP

Double-segment, consisting of medium-pressure, double-stage impeller pump and connected in series high pressure, three-stage impeller pump, connected by means of electromagnetic coupling.

- **Model** – Ziegler type FPN 10-1500-2 HHL+FPH 40-250-3 i.e. A-16/8+A-2,5/40
- **Capacity FPN 10-1500-2 HHL** => A-16/8 nominal capacity 1600 dm³/min. at 8 bar and geometric suction depth of 3,0 m
- **Maximum geometric suction depth** – 7,5 m
- **Capacity FPH 40-250-3HH** => A-2,5/40 nominal capacity 250 dm³/min. at 40 bar
- **Suction device** – automatic, type Trokomat
- **Dosing unit** – manual, scope from 3% to 6%
- **Couplings:** suction 1 × N110, pressure 2 × N75 and 1 × N25

FIRE PUMP

- **Model** – Tohatsu type VC82ASE i.e. A-16/8
- **Capacity** – 1600 dm³/min. at 8 bar and geometric suction depth 3 m
- **Maximum geometric suction depth** – 7,5 m
- **Suction device** – rotational vacuum vane pump, connected in case of necessity manually by means of a lever
- **Weight of fire pump with fuel** – 120 kg
- **Start-up** – electric and emergency manual
- **Engine** – with spark ignition, two-stroke, two-cylinder, cooled with water, power 40,5 kW and volume 746 cm³
- **Pump** – impeller type
- **Couplings:** suction 1 × N110, pressure 2 × N75



ELECTRIC POWER GENERATING UNIT

- **Model** – Eiseman, type BSKA 6,5 V
- **Drive** – combustion engine with spark ignition, four-stroke, Briggs&Stratton Vanguard type 295447, 2-cylinders, power 8,8 kW
- **Electric generator** – synchronous + AVR
- **Protection class** – IP54
- **Electric power** – 3~ (cosφ = 0,8) 6500 VA; 1~ (cosφ = 1,0) 5000 VA
- **Electric power** – 1~/3~ => 5,0/5,2 kW
- **Voltage** – 1~/3~ => 230/400 V; frequency 50 Hz

LIGHTING MAST

- **Model** – Teklite, type TF 440 XE/5
- **Pneumatic, telescopic**, lifting the head to the height of 5,4 m over the base level
- **Source of light** – halogen lamps 2 × 1000 W (44.000 lm)
- **Control** – of rotary head – remote from the remote controller
- **Retracting** – automatic

WINCH

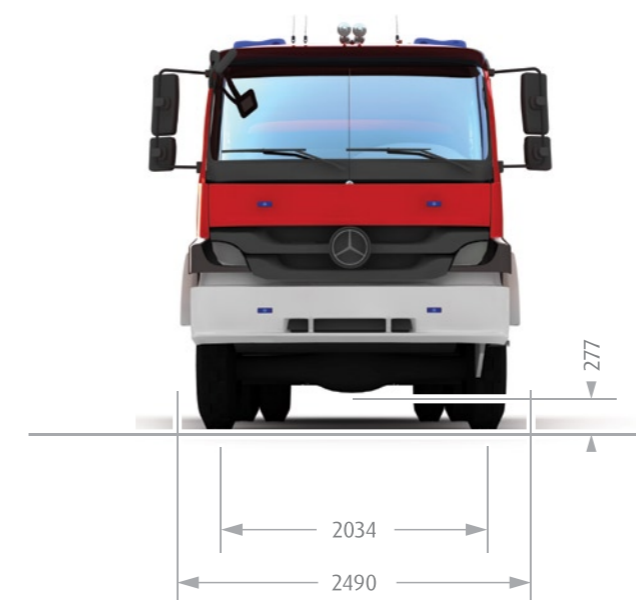
- **Model** – Dragon Wintch DWT 16800
- **Supply** – 24V DC
- **Power** – 7,8 HP
- **Towing power** – 7.620 kg
- **Cable** – length 26 m
- **Transmission** – three-stage planetary transmission with automatic brake

OTHER COMPONENTS OF THE CHASSIS

- Independent heating system of the crew cab and fire truck pump heating
- Anti blocking system ABS
- Air conditioned crew cab
- Steering system – power steering gear
- Brakes – drum brakes front and rear, 2-circuits, pneumatic
- Axes: front rigid driving axle, rear rigid driving axle
- Suspension – front and rear, parabolic springs
- Transmission – manual, 6 gear
- Clutch – single-plate, dry
- Electric installation – 24V DC, batteries 2 × 12V/115 Ah, alternator 28V/100A

OTHER COMPONENTS OF THE BODYWORK

- LED type bodywork lighting
- Aluminium shelves with flexible height regulation
- Telescopic pallets with power generating units
- System of automatic unrolling of the hose line
- Mechanical reel for pressure hoses, integrated with high pressure cleaner
- Rescue command support system RCS
- Warming up of engine during standstill
- Warming up of water in container
- Permanent charging of vehicle batteries and equipment
- Lifted base of water-foam gun
- Device for neutralisation of contaminations
- Rinsing nozzles in front and sides
- Universal front coupling
- Multifunctional rear coupling
- Multifunctional rear beam with vehicle towing option
- Third stop light
- Basket for transportation of hoses
- Lowering of pallet with equipment
- Water curtain around the vehicle
- High pressure quick attack line with multifunctional water-foam water jet with blow-off function, rolled mechanically
- External safety system.



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