



SPECIFICATION PREPARED FOR

(Base Panther 6x6 Stinger)

***PANTHER 6x6 3000 GALLON
WITH HIGH REACH EXTENDABLE TURRET***

***ROSENBAUER
AIRPORT - RESCUE and FIRE FIGHTING
RAPID INTERVENTION VEHICLE
"CLASS 5" 6x6 W/ HRET***



TABLE OF CONTENTS

1.0 DEFINITIONS..... 4

2.0 EXPECTED USE AND FIRE SUPPRESSION CHARACTERISTICS 5

3.0 CREW SPACE 5

 3.1 RADIO EQUIPMENT 6

 3.2 RIDE QUALITY 6

 3.3 CONTROLS 6

 3.4 SIREN/PUBLIC ADDRESS SYSTEM 7

 3.5 BACK-UP ALARM..... 7

 3.6 AIR HORN SYSTEM..... 7

 3.7 PERFORMANCE 7

 3.8 FLEXIBILITY 10

 3.9 MAINTAINABILITY 10

 3.10 COMPONENT PROTECTION..... 11

 3.11 PAINTING 11

 3.12 LETTERING 12

 3.13 STRIPING 12

 3.14 INSULATION AND WATERPROOFING 12

4.0 AUTOMOTIVE SYSTEM - FRAME 13

 4.1 MATERIALS..... 13

 4.2 BALANCE AND CLEARANCES 13

 4.3 DIMENSIONS 14

 4.4 LOAD RATING..... 14

 4.5 TOW EYES & SHACKLES..... 15

5.0 AUTOMOTIVE SYSTEM - BODY COMPONENTS..... 15

 5.1 COACH WORK..... 15

 5.2 BUMPER..... 15

 5.3 CAB DOORS 16

 5.4 ROOF ACCESS / EMERGENCY EXIT PROVISION 16

 5.5 WINDSHIELD WIPERS 16

 5.6 WINDSHIELD DELUGE SYSTEM 16

 5.7 COMPARTMENTS 16

 5.8 HANDRAILS 17

 5.9 RUNNING BOARDS, STEPS, AND WALKWAYS 18

6.0 AUTOMOTIVE SYSTEM – CONTROLS & INTERIOR CAB EQUIPMENT 18

 6.1 CONTROLS 18

 6.2 INTERIOR CAB EQUIPMENT 20

 6.3 INSTRUMENTS AND WARNING LIGHTS 22

 6.4 LATERAL ACCELERATION INDICATOR 22

 6.5 INFRARED CAMERA SYSTEM (FLIR) – PAN AND TILT 23



7.0	AUTOMOTIVE SYSTEM - DRIVE LINE AND CONTROLS	23
7.1	AXLES	23
7.2	BRAKE SYSTEM	25
7.3	STEERING	27
7.4	SUSPENSION	28
7.5	TRANSFER CASE	29
7.6	TRANSMISSION	30
7.7	WHEELS AND TIRE ASSEMBLY	31
7.8	SPARE WHEEL and TIRE ASSEMBLY	32
8.0	AUTOMOTIVE SYSTEM - ELECTRICAL SYSTEM	32
8.1	COOLANT HEATER	32
8.2	EMERGENCY WARNING LIGHT SYSTEM	32
8.3	VEHICLE D.O.T. LIGHT SYSTEM	33
8.4	COMPARTMENT LIGHTS	34
8.5	DECK and WORK LIGHTS	35
8.6	110V BATTERY CONDITIONER	35
8.7	110V AUTO-EJECT QUICK DISCONNECT	35
8.8	CHASSIS ELECTRICAL SYSTEM	35
8.9	WIRING	36
8.10	RADIO INTERFERENCE	36
9.0	AUTOMOTIVE SYSTEM - ENGINE and RELATED SYSTEMS	36
9.1	ENGINE	36
9.2	COOLING SYSTEM	37
9.2	EXHAUST SYSTEM	38
9.3	FUEL SYSTEM	38
9.4	GOVERNOR	39
9.5	HIGH IDLE SWITCH	39
9.6	LUBRICATION	39
10.0	COMPLIMENTARY AGENT SYSTEM(S)	39
10.1	DRY CHEMICAL COMPLIMENTARY EXTINGUISHING SYSTEM	39
10.3	PROPELLANT CYLINDER LIFTING SYSTEM	41
11.0	FIRE EXTINGUISHING SYSTEMS	41
11.1	HEAVY GAUGE CORROSION RESISTANT STEEL PIPING	41
12.0	FIRE EXTINGUISHING SYSTEM - FOAM CONCENTRATE SYSTEM	41
12.1	FOAM CONCENTRATE TANK, PIPING, and CONNECTIONS	43
12.4	FOAM CONCENTRATE	44
13.0	FIRE EXTINGUISHING SYSTEMS - WATER SYSTEM	44
13.1	FIRE PUMP	44
13.2	PRIMING DEVICE	45



13.3 STRUCTURAL CONTROL PANEL 46

13.4 SUCTIONS 46

13.4.3 ADAPTER 47

13.5 DISCHARGES 47

13.6 WATER TANK, PIPING, and CONNECTIONS 47

14.0 PRE-CONNECTS 49

14.1 LEFT SIDE PRE-CONNECTED SOFT JACKET HANDLINE 49

15.0 SECONDARY BUMPER TURRET (AKRON 3463) 50

16.0 PRIMARY HIGH-REACH EXTENDABLE TURRET 50

17.0 UNDER-TRUCK NOZZLES 58

18.0 WATER FOAM AGENT APPLICATORS 58

19.0 QUALITY ASSURANCE 59

20.0 DELIVERY 59

21.0 FAMILIARIZATION 59

22.0 WARRANTIES 60

23.0 TECHNICAL INFORMATION 60

24.0 PRE-CONSTRUCTION MEETING 61

25.0 FINAL INSPECTION TRIP 61

1.0 DEFINITIONS

The intent of these specifications is to describe the requirements necessary to supply a well-designed, self-contained, properly engineered diesel powered Aircraft Rescue and Fire Fighting (ARFF) vehicle. The unit shall be new and unused.

The ARFF vehicle shall consist of a crew cab on a 6x6, custom chassis with single tires. It is to be all-wheel drive, single engine diesel powered, with an automatic transmission.

The fire-fighting package shall include a water tank with a minimum capacity of 3000 gallons (11,356 liters) and a liquid foam agent concentrate tank of a minimum 400 gallons (1,514 liters) and a 500 lb (225 kg) auxiliary agent system.

The unit shall contain all component parts necessary for a water/foam proportioning system capable of expelling agent through a cab controlled High Reach Extendable Turret (HRET), a bumper turret, gated discharge(s), twin



agent hand line and preconnected handline(s) as detailed hereafter in these specifications.

The vehicle shall also be equipped with an auxiliary agent system. The system shall be operable from the cab and exterior of the vehicle.

Discharges shall meet all current applicable discharge rate requirements of FAA Advisory Circular #150-5220-10D and NFPA 414 standards in effect at time of bid.

This apparatus shall be equipped with various other components as called for in these specifications.

2.0 EXPECTED USE AND FIRE SUPPRESSION CHARACTERISTICS

The ARFF vehicle shall be designed for aircraft fire fighting with on/off road capabilities, which allow the vehicle to respond to aircraft accident sites across terrain otherwise inaccessible to standard highway equipment.

The vehicle shall be designed and constructed to facilitate operation by a single fire fighter if needed, when steering, operating the turret and pumping in the water/foam and dry chemical mode.

The vehicle shall be capable of discharging water only, proportioned water and foam, or auxiliary agent through the HRET, bumper turret or handline(s) as detailed hereafter in these specifications.

The vehicle shall be designed for maximum stability and maneuverability under all operating conditions and all conditions of loading.

The vehicle shall have all-wheel drive to permit the vehicle to perform both on and off road in all weather conditions.

Unit shall comply with all requirements of FAA Advisory Circular #150-5220-10D and NFPA 414 standards in effect at time of bid.

3.0 CREW SPACE

All crew space shall be restricted to the interior of a fully enclosed cab with approved, 3-point restraints.

Where practicable, instruments shall be used in preference to warning lights. If warning lights are used, a means to readily test the condition of all warning light bulbs shall be provided.



Instruments and warning lights shall be displayed so that they will be useful, convenient, and visible to the driver.

The instrument panel(s) shall either be easily removable as units or hinged for back access. Quick disconnect fittings shall be used for all electrical connections to the instrument panel. All instruments, except liquid filled gauges, shall be illuminated. Labels for control and instruments shall be backlit or illuminated.

All rotating or reciprocating parts, all parts with operating temperatures above 120° F (49° C), or that are electrically energized or are of such a nature or so located as to be a hazard to the safety of operating and maintenance personnel during their normal duties, shall be insulated, enclosed, or guarded as appropriate for the specific hazard and its location.

All space that is occupied or from which work is performed during operations, servicing, and maintenance of the vehicles shall be free from hazardous protrusions, sharp edges, cracks, or other elements that might reasonably be expected to cause injury to personnel.

3.1 RADIO EQUIPMENT

The following radios shall be supplied and installed in the vehicle center console:

No radios have been specified.

3.2 RIDE QUALITY

The vehicle shall be designed so that the ride quality permits the safe operation of the vehicle in on/off road conditions and in adverse terrain that may be encountered on the airfield. If the vehicle is used in an off road environment the vehicle shall be capable of traveling at speeds up to 35 mph (56 kph) without causing injury to the operating personnel who are properly seat belted in the vehicle and without causing damage to the vehicle itself.

3.3 CONTROLS

All the controls necessary for the full operation of the vehicle and for activating the fire fighting system shall be within reach of the driver.

Controls for the fire extinguishing system(s) shall also be within easy reach of a second crew station. All cab-mounted controls shall be identified by function and/or limitation with permanent backlit labels.



Fire fighting equipment and controls located on the vehicle exterior shall be placed between 24 inches (609 mm) and 72 inches (1,828 mm) above the ground, catwalks, or deck plates, as applicable.

All controls located on the exterior of the vehicle shall be labeled with an illuminated permanent label identifying function and/or limitation.

3.4 SIREN/PUBLIC ADDRESS SYSTEM

A Federal PA-300 multi-tone, multi-volume emergency vehicle warning siren/public address device w/ speaker and microphone shall be installed. The device shall produce a minimum sound level of 95 dB(A) at 100 feet (30m) directly in front of the vehicle and 90 dB(A) at 100 feet (30m) and 45 degrees left and right of front center. The control(s) shall be accessible to the front crew members.

The siren speaker shall be mounted on the front bumper or the turret mounting platform and shall be protected from firefighting agent dripping from the bumper turret and water splashed up by the tires.

3.5 BACK-UP ALARM

A “vehicle backing” warning device, audible up to 25 feet (7.6 m) behind the vehicle, shall be provided. Shifting the transmission into reverse shall activate the back-up alarm.

3.6 AIR HORN SYSTEM

Two (2) Air horns shall be provided and mounted in accordance with National Fire Protection Association (NFPA) 1901 so as to achieve optimum sound projection to the front of the vehicle. A control button or horn ring shall be located at the steering wheel. The horns shall be a Grover “Stutter-tone” model AL 1510.

3.7 PERFORMANCE

The design objective for the vehicle and the fire extinguishing system shall be performance in accordance with FAA Advisory Circular #150-5220-10D

Rosenbauer shall provide a data plate that contains all the information, at a minimum, presented in Figure 1-4.5 of NFPA 414, Standard for Aircraft Rescue and Fire-Fighting Vehicles, current edition. This data plate shall be installed in the cab of the vehicle and visible to the operator.

Acceleration from 0-50 mph: Less than 35 seconds



(0-80 kph)

Top speed: Approximately 75 mph (120 kph)

Braking from 60-0 mph:
(96 kph) Less than 235 feet (71.5 meters)

Engine performance: 665 HP at 2300 rpm

Side Slope Stability: 30° (58% grade)

Pump & Roll Discharge On Slope: 20°

Steering Max Cramp Stability: 12° (20%)

Dynamic Balance: 22 mph (35 kph) min.

Pump performance: Up to 1850 gpm (7000 lpm)

Primary agent capacity: 3000 gallons water (11,356 liters)
385 gallons (1,457 liters) foam
concentrate

Auxiliary agent capacity: 500 lbs (225 kg) auxiliary agent

3.7.1 ENVIRONMENTAL

The vehicle shall be capable of withstanding the following conditions without detrimental effect to subsequent operation of the vehicle or any of the fire extinguishing systems:

- Dust particles, as encountered in desert areas.
- The corrosive effects of salt fog.
- Material decay from fungus and mildew.
- Relative humidity up to 100 percent, as well as wind driven snow, sleet, rain, and vehicle self splashing of water.
- Ambient temperature ranging from 32°F to 115°F (0°C to 43.5°C).

3.7.2 GRADABILITY

The vehicle shall be able to:



Ascend a smooth, dry, paved road having a 20-percent grade and maintain a speed of at least 8 mph (13 km/h).

Ascend, stop, start, and continue ascending and descend, stop, start, and continue descending on a 20-percent grade at a speed of at least 2 mph (3.2 km/h) with extinguishing agents being discharged at maximum-rated capacity from the primary turret(s).

Ascend and descend a dry, hard surface incline having a 50-percent grade at not less than 1 mph (1.6 km/h).

Climb a vertical wall at least 18 inches (45 cm) high and negotiate terrain that will deflect the opposite wheels of the truck in alternatively contrary directions at least 14 inches (36 cm) without the remaining wheels losing traction.

3.7.3 OPERATIONAL RANGE

The fully loaded vehicle shall be able to:

Operate continuously for 25 miles (40 km) at speeds up to 60 mph (96 km/h). The test route shall include agricultural lands, paved and unpaved roads, and grades typical of those encountered at the airport. During this performance evaluation, the vehicle shall operate in all-wheel drive. At least 5 miles (8 km) of this operation shall be off-road travel.

Operate on smooth, dry, level pavement through a range from 1 mph (1.6 km/h) to at least 10 mph (16 km/h) while discharging agents from the primary turret(s) at rated maximum capacity without interruption.

Negotiate pooled water to a depth of 2 inches (5 cm) for a distance of at least 150 feet (45 m) at a speed of at least 40 mph (65 km/h) without engine flooding/stalling, loss of directional control, loss of braking, or electrical system(s) shorting.

Operate for 10 minutes on dry, paved roadway at not more than 2 mph (3.2 km/h) at an engine speed that does not result in rough, irregular operation.

Ascend a dry, paved incline having an 8- percent grade for a distance of 0.25 mile (0.4 km) at a speed of not less than 20 mph (32 km/h).

Negotiate (J Turn) a 90-degree, 150 foot (45 meter) radius turn at 30 mph (48 km/h) on smooth, dry, level pavement without loss of directional control or stability.



3.7.4 TOP SPEED

The vehicle shall be able to consistently reach a top speed of 65 mph (104 km/h) and maintain a constant speed of at least 60 mph (96 km/h) on typical paved, level (grades of less than 1 percent) highway surfaces for a minimum distance of 20 miles (32 km) without showing overheat symptoms in any portion of the cooling system or power train.

3.8 FLEXIBILITY

The design objective for the vehicle frame, suspension, and mounting of major components shall be to provide the capability for diagonally opposite wheel motion up to 14 inches (355 mm) above the ground without raising the remaining wheels from the ground or causing interference or parts failure. The vehicle is designed in such a way as to exceed this requirement. The upper motion of the vehicle suspension is such that it will travel a minimum of 7 inches (177 mm) in an upward fashion and exceed the lower travel limit of 7 inches (177 mm) in such a way to maintain tractability and prevent “hanging” of the suspension when conditions exceed this parameter.

3.9 MAINTAINABILITY

The vehicle design shall be such that it:

- 3.9.1** Uses the fewest number of different parts consistent with the specified performance.
- 3.9.2** Permits maintenance with commercially available, general purpose mechanic tools and equipment. Rosenbauer shall provide and document in the maintenance manual introduction any special or nonstandard tools required and any unique test equipment required to perform operator/owner maintenance and service.
- 3.9.3** Limits the number of tools and the variety of spare parts required for maintenance by such design practices as reducing the variety of bolt sizes, light bulb sizes, wire gauges, tubing, and pipe sizes as consistent with safety and performance requirements.
- 3.9.4** The vehicle shall utilize disconnect plugs, receptacles, junction boxes, bus bars, multiple-line connectors in the electrical systems, and readily detachable fittings in hydraulic and pneumatic systems, as applicable. All disconnect points shall be clearly labeled. All hydraulic and pneumatic lines and electrical wires shall be color-, function, or number coded.



- 3.9.5** As applicable pilots, guides, slides, carriages, or other features shall be utilized if it adds to the ease of removal and installation or attachment of components.
- 3.9.6** The vehicle shall use a fastener system that is easily disassembled and reassembled for all cabinets and body-work that must be removed for access for maintenance and removal of components for repair or replacement. Uses fasteners not limited to brackets, nuts, bolts, washers, screws, and rivets of stainless steel or other materials resistant to corrosion.
- 3.9.7** Locates drains, filler plugs, grease fittings, hydraulic line-bleeders, and checkpoints so that they are readily accessible and do not require special tools for proper servicing.
- 3.9.8** The vehicle shall be designed and constructed so that the installation of each major subsystem or critical part can only be in its proper operating position.
- 3.9.9** Provides accessible connections, where needed, to attach troubleshooting, analytical, and diagnostic equipment to appropriate vehicle subsystems.
- 3.9.10** Operates with standard commercial lubricants. Grease and oil seals shall be of a design and located to provide accessibility for inspection, servicing, and replacement. Access to lubrication points shall be provided by means of an easy opening door or hinged panel. Lubrication fittings shall be located in accessible, protected positions. Parts or assemblies that are not readily accessible for direct lubrication, or are likely to be overlooked because of inaccessibility shall have extended fittings. A safety chain shall attach filler caps to lubrication fill points where practical.

3.10 COMPONENT PROTECTION

All oil, hydraulic, air, water, foam concentrate, and electrical system conduits, tubing, and hoses shall be located in protected positions. They shall be secured to the frame or body structure and, except where a through-frame connector is necessary, shall be fitted with protective looms or grommets at each point where these items pass through panels or structural members.

All radiator grills, louvers, lamps, tie rods, drive shafts, piping, and other vulnerable components shall be protected by component location or by guards adequate to prevent damage from brush, stones, logs, or any other debris likely to be encountered by the vehicle during off road performance.

3.11 PAINTING

The vehicle will be painted/striped in accordance with the FAA Advisory Circular #150-5210-5B and shall include the following:



Cab:	per the FAA specification (lime yellow)
Frame:	black
Rims:	black
Superstructure:	per the FAA specification (lime yellow)

All seams shall be caulked both inside and along the exterior edges with an automotive sealant to prevent moisture from entering between any body panels. All parts to be painted shall be thoroughly sanded, and washed with solvent.

Tacked free of any dust particles, the body and all parts shall be individually sprayed with a self etching primer and two coats urethane primer to inhibit rust and provide lasting adhesion, followed by three top coats of acrylic urethane paint.

3.12 LETTERING

Single color reflective lettering and numerals shall be applied per customer direction and sized appropriately to the vehicle design as space allows. Lettering information shall be discussed and designed during pre-construction.

3.13 STRIPING

An 8" reflective stripe shall be applied to the perimeter of the vehicle to meet the requirements as outlined in the FAA Advisory Circular #150-5220-10D. Striping information shall be discussed and designed during pre-construction.

3.14 INSULATION AND WATERPROOFING

Insulation shall be fire and water resistant and of a type that will not pack or settle. Provision shall be made to allow the drainage of water from between the walls by gravity flow. The average heat loss shall not exceed 0.24 BTU/ft² (0.76 W/m²) per degree Fahrenheit per hour. All insulation that could be exposed to abrasion or damage from equipment storage or operator activities shall be provided with a protective covering. All insulation that will be located on the exterior of the vehicle shall be protected from damage or exposure by a permanent cover to be constructed to match the vehicle exterior.

All components shall be designed, installed and/or protected so that their normal function will not be impaired by heavy rains, road splash, formation of condensation, or the spillage of extinguishing agents from nozzles and fittings, recharging operations, or leaks in the piping system.



The normal temperature design criteria shall be for vehicle use in a temperature range of 32°F (0°C) to 115°F (43.5°C).

The vehicle shall incorporate the use of air conditioning and the system shall meet current automotive/truck and environmental protection standards for vehicle air conditioning. The air conditioning system shall not change the acceptable pass/fail criteria for any of the performance tests of the vehicle or the fire fighting system.

4.0 AUTOMOTIVE SYSTEM - FRAME

4.1 MATERIALS

Materials not specifically covered by this specification or applicable referenced specifications or standards shall be of the best quality currently used in commercial practice for ARFF vehicle fabrication.

Dissimilar metals shall not be in contact with each other. Metal plating or metal spraying of dissimilar base metals to prevent electrolysis is acceptable. The use of dissimilar metals separated by suitable insulating material is permitted, except in systems where bridging of insulation materials by an electrically conductive fluid can occur.

Materials that deteriorate when exposed to sunlight, weather, or operational conditions normally encountered during service shall not be used. If these materials are used, a means of protection against deterioration that will not prevent compliance with performance requirements must be provided.

Protective coatings that chip, crack, or scale with age or extremes of climatic conditions or on exposure to heat shall not be used.

The use of proven, nonmetallic materials in lieu of metal is permitted if that use contributes to reduced weight, lower cost, or less maintenance and there is no degradation in performance or increase in long-term operations and maintenance costs.

4.2 BALANCE AND CLEARANCES

The weight shall be distributed as equally as practical over the axles and tires of the fully laden vehicle. The difference in tire load between tires on any axle shall not exceed 5 percent of the average tire load for that axle. The difference in load between axles shall not exceed 10 percent of the load on the heaviest axle. The front axle shall not be the most heavily loaded axle.



The fully loaded vehicle shall be able to meet the side slope stability performance requirements specified in FAA Advisory Circular #150-5220-10D.

Approach angle:	30°
Departure angle:	30°
Inter axle clearance angle:	12°
Gradient:	60 %
Side slope stability:	30°
Turn circle:	110 ft (33 m)
Under body clearance:	27" (685 mm)
Under axle clearance:	
Front Axle:	15.75" (400 mm)
1st Rear Axle:	15.75" (400 mm)
2nd Rear Axle:	15.75" (400 mm)

4.3 DIMENSIONS

The overall height, length, and width of the vehicle shall be the smallest dimensions consistent with the rated payload for its class and the operational performance requirements of the vehicle.

Overall length:	approx. 38'9" (11,836 mm)
Overall Width:	approx. 11' (3,352 mm) including mirrors
Overall Height:	approx. 11'10" (3,606 mm) to top of guard rails
Wheel Base:	15'8" (4800 mm) to 1ST intermediate axle + 5'3" (1600 mm) to 2nd intermediate axle

4.4 LOAD RATING

The functional load rating of the frame shall equal or exceed the actual gross vehicle weight (GVW). The GVW includes complete chassis; cab with attachments, accessories, and equipment; the body with rated agent payload, including a full complement of crew, fuel, lubricant, coolant, firefighter protective



clothing, equipment, and breathing apparatus in appropriate numbers; and fire fighting hand tools and appliances.

Weight ratings:

Front Axle:	26,430 lbs / 13,215 lbs per tire (12,000 kg / 6,000 kg)
1st Rear Axle:	26,430 lbs / 13,215 lbs per tire (12,000 kg / 6,000 kg)
2nd Rear Axle:	26,430 lbs / 13,215 lbs per tire (12,000 kg / 6,000 kg)
Total:	79,290 lbs (24,000 kg)

4.5 TOW EYES & SHACKLES

Two tow eyes shall be provided at the front and at the rear of the frame with a shackle for each tow eye.

5.0 AUTOMOTIVE SYSTEM - BODY COMPONENTS

5.1 COACH WORK

Parts shall be fabricated from materials that will provide the lightest weight consistent with the needs for strength, as well as heat and corrosion resistance. Safety of the crew shall be a primary consideration in coach work, especially the protection of occupants during a roll over.

A fully trimmed ROSENBAUER Panther ARFF two door cab providing forward left center driving position shall be provided. The cab is constructed of welded aluminum box sections with formed aluminum sheets. Large windows provide excellent all around and upward visibility through tinted safety glass and tempered side windows. Heavy duty light alloy extrusions provide front impact protection as well as a roll cage to protect the occupants.

5.2 BUMPER

A heavy duty bumper is provided to protect the lower cab section and provide an integrated mounting provision for the bumper turret.



5.3 CAB DOORS

Large safety doors are provided on both sides. The doors open 90° to provide maximum safety for crew members entering and exiting with SCBA. In addition, a true stair case, not a ladder type entry shall be provided.

5.3.1 CAB DOOR ELECTRIC WINDOWS

The cab door sliding window shall be electrically actuated. Window controls shall be mounted on the center dash and accessible for operation by both front crew members (driver and turret operator).

5.4 ROOF ACCESS / EMERGENCY EXIT PROVISION

A marine quality roof hatch shall be provided for roof access and as an emergency exit provision should such an exit be required.

5.5 WINDSHIELD WIPERS

Dual wet arm wipers with jet washers are provided including a 1.8 gal (6.75 liter) reservoir. The reservoir is mounted within the cab, easy visible and easy accessible.

5.6 WINDSHIELD DELUGE SYSTEM

A Windshield Deluge system shall be furnished and installed on the chassis cab. The windshield deluge system shall have four (4) nozzles mounted above the windshield and have a separate pump assembly with activation switch in the cab. Minimum pump output shall be 3 gpm (11 lpm). The windshield deluge system shall be plumbed to direct clear water onto the windshield. The system shall be provided with a screen to prevent debris from rendering any nozzles or the pump inoperable.

5.7 COMPARTMENTS

The compartments are well ventilated and weather proof.

Vents with a total of at least 10 squares inches (64.5 cm²) of ventilation shall be supplied where required.

Drains to allow collected water to run out under the vehicle shall be provided.

The floor of all compartments shall be lined with PVC matting (turtle tile).



All compartments shall be supplied a highly visible, permanently affixed label clearly stating the maximum weight that can be placed in the compartment based upon tilt table certification testing.

5.7.1 ROLL-UP COMPARTMENT DOORS

Primary access to vehicle compartments on the vehicle shall be via doors of a rollup design. Doors shall be aluminum rollup type with a bar latch mechanism to open/close the door. Secondary access to some vehicle storage areas will utilize a hinged panel door design. The vehicle compartment doors shall be locking and keyed alike.

5.7.2 OPEN COMPARTMENT DOOR WARNING SYSTEM

There shall be an indicator light mounted on the cab dash which will be highly visible during the day or night. This indicator light shall be wired to an audible signal to advise the operator when a compartment door is open. This warning indicator light shall be interlocked with the vehicle's parking brake and shall operate whenever the parking brake is released.

5.7.3 ADJUSTABLE SHELF

Undertank compartment shall be supplied with a height adjustable shelf. The shelf shall be lined with PVC matting (turtle tile).

ENGINEERING NOTE: Actual arrangement of the trays shall be determined by Rosenbauer to best suit the vehicles weight and balance performance requirements.

5.7.4 ROLL-OUT TRAY

Under-tank compartment shall be supplied with a roll-out tray. The roll-out tray shall be lined with PVC matting (turtle tile).

ENGINEERING NOTE: Actual arrangement of the trays shall be determined by Rosenbauer to best suit the vehicles weight and balance performance requirements.

5.8 HANDRAILS

Handrails or a guardrail shall be provided for personnel safety at all steps and walkways including along the top of the vehicle. The rail material shall be heat and corrosion-resistant and shall be provided with a low-maintenance, durable,



and sunlight, weather, heat, and corrosion resistant finish. The finish shall be slip resistant.

5.9 RUNNING BOARDS, STEPS, AND WALKWAYS

All step surfaces, ladder rungs, walkways, and catwalks shall be anti-skid. Anti-skid deck plating shall be provided on the top of the vehicle.

The height between steps shall be less than 20 inches (508 mm). The lower steps shall be 24 inches (609 mm) or less from the ground in the loaded condition. The tread of the bottom steps shall be at least 8 inches (203 mm) in width and succeeding steps at least 16 inches (406 mm) in width. The full width of all steps shall have at least 6 inches (152 mm) of unobstructed toe room or depth when measured from and perpendicular to the front edge of the weight-bearing surface of the step.

6.0 AUTOMOTIVE SYSTEM – CONTROLS & INTERIOR CAB EQUIPMENT

The following cab-mounted controls shall be provided for the safe and efficient operation of the vehicle:

6.1 CONTROLS

Ergonomically grouped around drivers and co-drivers seating position:

- a. Switch for emergency lights
- b. Lighting system controls
- c. Firefighting controls to include water, foam and auxiliary agent system activation switches, HRET controls and bumper turret controls
- d. Chassis controls
- e. Multifunction Switch for pump unit:

Following steps are performed automatically, when switched to Pump and Roll:

- a. PTO engaging
- b. Engine goes to preset pump rpm (1800 rpm)
- c. Foot throttle pedal switches to power divider
- d. Water tank suction valve opens
- e. Foam System engaging (RVMA-500)
- f. Priming pump starts working (till pump pressure reaches approx. 2 bar)



The firefighting system switch provides three positions and allows the vehicle to operate in Road (driving) mode, Pump and Roll (crash mode), and Stationery Pump (structural mode) which locks out the drivetrain and allows control of the vehicle firefighting system from the structural pump panel located in the pump compartment.

The following switches shall be supplied in the cab and shall be of a design that is one touch activated, backlit, color coded to function and containing an LED light to advise that the switch is energized. Some switches are programmed to contain multiple functions activated by "toggling" the switch through its function.

- Switch for Water Tank Suction Valve
- Switch for Foam Tank Suction Valve
- Switch for Water Pump Primer
- Switch for Foam Admixing Rate (i.e. 1%, 3%, 6%)
- Switch for Undertruck Nozzles (i.e. Self Protection Nozzles)
- Switch for Windshield Deluge System
- Switch for Auxiliary Agent Propellant Gas
- Switch for Auxiliary Scene Lighting (If specified.)
- Switch for Rear Scene Lights (If specified.)
- Switch for Windshield Wipers and Washer
- Switch for Dash Fans
- Switch for Emergency Lighting System
- Switch for Differential Locks
- Switch for Transmission Override
- Switch for Headlights/Marker Lights w/ Dimmer Control
- Switch for Engine High Idle
- Switch for Fog/Driving lights (If specified.)
- Switch for Turn Signals w/ Integrated High/Low Beam Headlight Control
- Switch for Hazard Markers
- Switch for Engine Start/Stop
- Horn Control
- Master Electrical Switch
- Park brake control
- Siren Controls w/ Microphone
- Electric Window controls (If specified.)
- Switch for Low Water Level Alarm Silence
- Switch for Low Foam Level Silence



6.2 INTERIOR CAB EQUIPMENT

A low floor and a wide door on each side of the cab allow rapid entry and exit. The ergonomically laid out instrument panel is equipped with a full set of instruments, weatherproof illuminated switches and a complete warning system with indicator lights and audible alarms. All substantial fire fighting functions including the turret controls are within reach of driver and co-driver on a center console.

- Heavy duty non-slip “diamond plate” flooring that meets NFPA 1901 shall be provided in the cab.
- Instrument panel, with integral dash mounted controls.
- Heater/defroster; fresh air and re-circulating type, outlets spread evenly across the dash.
- Two (2) grab handles for passenger entry assistance, on dash and door frame.
- Windshield, one piece, high visibility, shatter proof laminated safety glass.
- HRET viewing windows.

6.2.1 DRIVER’S SEAT

One (1) high back adjustable (fore, aft, up & down) driver’s seat with hard back, covered in grey Dura-Wear material and integrated seat belt system shall be installed. The integrated seat belt shall be red in color to provide contrast.

6.2.2 TURRET OPERATOR’S SEAT

One (1) high back adjustable (fore, aft, up & down) turret operator’s seat with integrated SCBA bracket, covered in grey Dura-Wear material and integrated seat belt system shall be installed. The integrated seat belt shall be red in color to provide contrast.

A removable insert to cover the SCBA unit when mounted in seat back shall be supplied.

6.2.3 LEFT SIDE CREW SEAT

One (1) high back adjustable fixed position fire-fighter crew seat with integrated SCBA bracket, covered in grey Dura-Wear material and integrated seat belt system shall be installed to the left and slightly aft of the driver’s position and shall egress directly out the left cab door. The integrated seat belt shall be red in color to provide contrast.



A removable insert to cover the SCBA unit when mounted in seat back shall be supplied.

6.2.5 AIR CONDITIONING

An air conditioning system shall be installed in the cab. The evaporator shall be integrally installed with the heater/defroster unit.

6.2.6 SOLAR CONTROL FILM

Solar control film shall be applied to the vehicle windshield to reduce the ratio of incident solar radiation that directly passes through the windshield to approximately 35 percent. All other windows shall be tinted to reduce solar heat gain inside the cab.

6.2.7 SUN VISORS

Two (2) interior sun visors of a roller type design shall be installed on the upper portion of the cab windshield.

6.2.8 POWER POINT – 12V

One (1) dash mounted 12V power point (cigarette lighter style) shall be installed

6.2.9 MAP LIGHTS

Two (2) dash mounted map lights shall be installed, one on each side of the cab dash.

6.2.10 MIRRORS

Large, heated, four-way power adjustable and remotely operated mirrors shall be mounted on the front of the cab, providing excellent visibility. Mirrors shall provide a minimum of 60 square inches (38,709 square mm) viewing and incorporate a wide angle convex mirror. The mirror controls shall be located on the left side for ease of use by the driver.

6.2.13 SCBA BRACKET ON REAR CAB WALL

One (1) NFPA 1901 compliant SCBA bracket mounted on the rear wall of the cab for driver's SCBA.



6.3 INSTRUMENTS AND WARNING LIGHTS

The following instruments and warning indicators shall be supplied: (note: some instruments and warning indicators may have been described in the above sections and may be duplicated here)

- Air Pressure (primary and secondary)
- Compartment Door Indicator
- Differential Lock Indicator
- Beacon/Strobe Indicator (s)
- Engine Coolant Temperature
- Engine Oil Pressure
- Engine Tachometer
- Foam Agent Tank Level Indicator
- Water Tank Level Indicator
- Fuel Level
- Headlight Beam Indicator
- Illuminated Side/Slope Inclinator
- Lateral Stability Indicator with visual and audible alarm
- Low Air Pressure Warning
- Low Oil Pressure/High Water Temperature Audible/Visual Alarm
- Low Engine Coolant Audible/Visual Alarm
- Speedometer/Odometer
- Voltmeter, digital
- Water Pump Pressure

The following gauges shall be on the center firefighting console:

- Water pump pressure gauge (digital)
- Water tank level gauge (Class One)
- Foam tank level gauge (Class One)
- Auxiliary agent propellant cylinder digital pressure indicator
- Auxiliary agent vessel digital pressure indicator

6.4 LATERAL ACCELERATION INDICATOR

A Stability Dynamics Model LG Alert shall be installed providing an in-cab vehicle operator training device inclusive of a lateral acceleration sensor and driver awareness/alarm system.

The system provides the ability to set an alarm threshold for the vehicle. The alarm includes an advisory light at each 10% of the threshold up to 70%, and



then increases the level of advising lights and audio alarms at the 80%, 90% and 100% levels.

The warning device filters out suspension and road 'noise' inputs higher than 1 Hz.

The LG Alert system has a rated input of 12 volts DC @ 2.0 amps.

6.5 INFRARED CAMERA SYSTEM (FLIR) – PAN AND TILT

6.5.1 A FLIR Systems PathFinderIR™ Vehicle Vision System shall be installed to provide enhanced visibility for low light or smoky conditions. Cold Start to video image shall be 30 seconds or less. A wide angle field of view shall be provided approximately 36° horizontal x 27° vertical. The camera shall be capable to operate in open ambient air temperatures from -40°C to 80°C.

6.5.2 The FLIR camera shall have pan and tilt capabilities. The FLIR system shall be capable of operation as a driver's aid during low visibility driving conditions (FLIR Systems PathFinderIR™ Vehicle Vision System or equal).

6.5.3 A 10.4" (264 mm) LCD 1042x768 resolution flat screen monitor shall be provided for the color camera. The viewing angle shall be 45° or more. The monitor case shall be durable aluminum construction capable of mounting on cab dash. This monitor shall be used to display the FLIR camera images and/or color camera images as specified elsewhere in these specifications.

7.0 AUTOMOTIVE SYSTEM - DRIVE LINE AND CONTROLS

7.1 AXLES

The axles shall be rated and certified as being suited for the intended use. The axle manufacturer's approved rating shall not be raised to conform to the requirements of this specification.

Front and rear axles shall have adequate capacity to carry the fully loaded vehicle under all intended operating conditions. The maximum variation in axle tread shall not exceed 20 percent of the tire(s) sectional width at rated load.

Tractive power at each wheel shall be achieved by use of torque proportioning differentials or other suitable automatic devices that will ensure that each wheel of the vehicle is driven independently of the other wheels.



Front axles shall be equipped with steering drive ends designed to eliminate fluctuations in angular velocity of the wheels when cramped either left or right at all normal operating speeds.

An all wheel drive axle system is provided. The well proven design is widely used in commercial and military applications. An extensive testing cycle applied to pre series vehicles ensures reliability and longevity in this specific ARFF application.

The usage of torque increasing planetary hub ends reduces the size of the differential housings and improves the ground clearance for extensive off road operation.

Front Axle

Type: The front axle is of the front driving/steer type with suitable reduction gearing via planetary gears at the hubs. A driver operated differential lock is provided.

Manufacturer:	Mercedes Benz
Model:	AL7
Capacity:	26,430 lbs (12,000 kg)
Differential ratio:	1.5 : 1
Hub end ratio:	4.0 : 1
Total axle ratio:	6.0 : 1
Steering Joint:	Cardan

Rear Axle

Type: Rear axle with suitable reduction gearing via planetary gears at the hubs. Driver operated differential lock is provided.

Manufacturer:	Mercedes Benz
Model:	HD/HL7
Capacity:	52,860 lbs (24,000 kg)
Differential ratio:	1.5 : 1
Hub end ratio:	4.0 : 1
Total axle ratio:	6.0 : 1



7.2 BRAKE SYSTEM

A pneumatically actuated brake system shall be provided that has been tested and certified. The system shall include an all-wheel, split-circuit, power-assisted service brake, a modulation capable emergency brake, a parking brake, and an engine brake (engine brake specifications are located in the engine section).

The braking system meets or exceeds FAA, NFPA, ICAO and the Federal Motor Vehicle Standard (FMVSS) 121 requirements. An ABS braking system is provided as standard for improved safety. Brake drums are directly mounted to hub and wheel. In case of a major drive shaft failure, the vehicle can still be stopped safely.

7.2.1 SERVICE BRAKES

Type:	Dual circuit brake system w/ABS meeting FMVSS 121, NFPA 414 and FAA Advisory Circular 150-5220-10D. ABS system shall include a self diagnostic system and warning indicator on the cab dash instrument cluster to advise the driver of operation or malfunction.
Actuation:	Floor mounted treadle foot valve for service brake. Dash mounted push-pull valve for parking brake
Compressor:	Capacity 28 cfm (792 lpm) direct drive engine mounted
Miscellaneous:	Push-lock color coded nylon tube throughout routed along chassis frame rail; air tanks equipped with heated automatic drain valves; air compressor discharge line stainless / Teflon; reservoir capacity approx. 80 l (4,950 in ³); air dryer w/heated element (Bendix ADIP).
External air supply:	A 110 VAC Kussmaul air compressor with quick disconnect shoreline electrical connection shall be mounted at the left rear of the vehicle in the engine module access compartment.
Rapid Build up:	A fast build up system is provided to permit release of spring brakes within 15 seconds of



engine start up based on empty air tanks.

External Air Tank drains:

Provisions for draining the air tanks from a centralized remote point on the vehicle shall be provided eliminating the need for a person to go under the vehicle. The drain points shall be labeled.

Performance:

Exceeds FAA, NFPA, ICAO and FMVSS requirements

20 - 0 mph (32-0 kph) in less than 26 ft. (7.92 m) Requirement is 35 ft. (10.6 m)

40 - 0 mph (64-0 kph) in less than 105 ft. Requirement is 131 ft. (40 m)

Holding Capacity:

min. 60% slope

Notes:

The pneumatically operated fire fighting functions are supplied from a separate dedicated, pressure protected accessory reservoir.

Front Brakes

Type:

Wedge-Type Drum Brakes

Dimensions:

16.14" x 7.08" (410 mm x 180 mm) with Type 24 Chambers

Rear Brakes

Type:

S-cam Drum Brakes

Dimensions:

16.14" x 8.66" (410 mm x 220 mm) Type 30/30 Chambers

7.2.2 PARKING BRAKE

Type:

Spring apply, pneumatically activated release



Location:	At rear axles, two (2) chambers per axle. Parking brake warning light indicator on cab dash board.
Performance:	Exceeds FAA, NFPA, ICAO and FMVSS requirements. 40 – 0 mph (64-0 kph) in less than 158 ft. (48 m) Requirement is 288 ft. (87 m).
Holding Capacity:	min. 30 % slope

7.2.5 110V AIR COMPRESSOR

An 110V AC Kussmaul air compressor shall be installed at the rear of the vehicle in the left engine access compartment. The 110 VAC air compressor shall be wired to the 110V shoreline connection. The air compressor shall maintain the air brake system at operating pressure to allow immediate start-up and operational readiness.

7.3 STEERING

The power assisted steering shall have sufficient capacity so no more than 15 pounds (6.8 kg) pull is necessary on the steering wheel rim to turn the vehicle wheels from lock to lock of the fully loaded vehicle when stationary.

The design of the steering mechanism shall permit manual steering to bring the fully loaded vehicle to a safe stop after power-assist failure.

The vehicle shall perform as follows when driven on a steering pad around a 100-foot (30 m) radius circle:

(1) With increasing speed, the steering angle shall increase; over steer shall not be acceptable.

(2) The vehicle shall remain on the prescribed path until achieving a speed at least equal to the standard specified in Table 2, Performance Parameter

The wall-to-wall turning diameter shall be no greater than three times the length of the vehicle.

A tilt/telescoping steering wheel/column shall be provided.



A left center, ram assisted power steering system is provided.

Steering Pump:	TRW Ross (gear driven)
Steering Gear:	TRW Ross TAS-85 with ram assist.
Steering Column:	TRW Ross Tilt-telescoping
Steering Wheel:	18" Four Spoke w/ integrated horn button.

7.4 SUSPENSION

The axles and suspension system shall be such that the total un-sprung weight of the vehicle will not be greater than 20 percent of the in-service GVW.

Double-acting hydraulic shock absorbers shall be provided for all axles or bogies, as applicable.

Energy absorbing stops shall be installed so as to prevent damage to axles, drive shafts, the engine oil pan, or any other portions of the chassis from bottoming.

The vehicle utilizes a high performance coil spring system (HPCSS). A variable rate coil spring in combination with a 4 link V-rod / trailing rod system w/ anti-roll bar over live rigid axle provides superior off/on road capabilities that comply with all current regulations including FAA, NFPA and ICAO. The system incorporates a high performance variable rate coil spring and dual acting shock absorber mounted on each wheel. The live rigid axle provides strength and is tied to a torsion bar and V-link rod allowing the rigid axle to move in an independent manner. Each wheel will be supplied with an energy absorbing bump stops to prevent the suspension from contacting the chassis. The system allows for a minimum of 16 inches of wheel travel with lower wheel travel exceeding all applicable standards to prevent the wheel from "carrying" in asymmetrical travel conditions. Wheel travel and tractability exceed all applicable standards. The HPCSS system shall provide ride capabilities that reduce road shock, protect the body and mounted components from damage and provide the operator positive feed back to during extreme vehicle maneuvering.

The progressive coil spring over live rigid axle system has by design a lower roll moment than a half shaft driven independent suspension system, and provides positive control in on road / high speed cornering situations and provides a safe controllable ride in off road conditions. The suspension system combines the best features of independent coil spring suspensions and rigid axle systems, allows for independent movement of the wheels, and has a minimum of moving parts, extreme strength and weight carrying capacity.



The suspension system is fully tested and is NFPA/FAA/ICAO compliant and meets all current requirements for an Off Road High Mobility Suspension System.

Front Suspension

Manufacturer: Rosenbauer Motors

Type: High Mobility On/Off Road Coil Spring Live Rigid Axle Suspension

Design: Variable rate coil spring suspension with heavy duty double acting shock absorbers, V-rod links, torsion bars and anti-roll stabilizer bar.

Rear Suspension

Manufacturer: Rosenbauer Motors

Type: High Mobility On/Off Road Coil Spring Live Rigid Axle Suspension

Design: Variable rate coil spring suspension with heavy duty double acting shock absorbers, live rigid axle, V-rod links, torsion bars and anti roll stabilizer bar.

7.5 TRANSFER CASE

The transfer case shall be certified as suitable for the intended service

The transfer case is incorporated in the main transmission. The combination of these two major power transfer components reduces the amount of maintenance items on the vehicle.

Manufacturer: Twin Disc

Model: Integral with TD 61-1180 Transmission

Type: A proportioning differential provides permanent drive to the front and rear axles via a torque divider, 30% to front axle and 70% to the rear axles with automatic lockup.



7.6 TRANSMISSION

A single source transmission system, consisting of power divider, torque converter, and six-speed automatic power shift transmission with integrated transfer case shall be provided to ensure perfect matching of these components. A single supplier allows easy service support for these major drive train components.

The main transmission is remotely mounted in the center of the chassis, low in the frame rails. The low mounting position while still providing excellent ground clearance allows for a lower center of gravity, thus increasing the dynamic stability of the vehicle.

The input section of the transmission consists of two gear-driven clutch shafts. Each shaft contains two 7-inch clutch packs of the orifice type. When the clutch is engaged, output is from gear and drive rings on the clutch shafts and through gears on the compound shaft. This shaft contains two 9-inch clutch packs equipped with individual feedback dump valves. The front 9-inch clutch is an LD type clutch and the rear is an S type clutch. A spline-connected output gear on the 9-inch clutch shaft is meshed with the input gear on the inter-axle differential. The differential includes two independent output shafts connected through the inter-axle differential. The differential has a clutch that when applied, locks up the differential providing a solid drive through the differential to the outputs .

Manufacturer:	Twin Disc
Model:	TD61-1180, 6-speed fully automatic power shift transmission with integral torque converter. Torque converter is coupled and mounted to the engine flywheel housing. Transmission remote mounted mid vehicle with integrated transfer case.
Net Input Power:	min. 600 hp (441 kW)
Gross Input Torque:	min. 1900 lb-ft. 92576 Nm)
Gear Ratios:	First 6.76 : 1 Second 4.39 : 1 Third 2.898 : 1 Fourth 1.893 : 1 Fifth 1.229 : 1 Sixth 0.811 : 1 Reverse 7.511 : 1



7.7 WHEELS AND TIRE ASSEMBLY

Single tires for optimal off road performance are provided on all axles. The tires have high mobility non-directional tread. All tires are interchangeable without restrictions.

Front Wheels

Wheel type:	Bolted Steel Wheel
Wheel size:	18.00 x 21
Tire type:	Michelin XZL, High Mobility Tires
Tire size:	24R x 21
Rating:	13,215 lbs (6,000 kg) at 85 psi each

Wheels and tires are interchangeable with rear axle.

Rear Wheels

Wheel type:	Bolted Steel Wheel
Wheel size:	18.00 x 21
Tire type:	Michelin XZL, High Mobility Tires
Tire size:	24R x 21
Rating:	13,215 lbs (6,000 kg) at 85 psi each

Wheels and tires are interchangeable with front axle.

7.7.1 MUD FLAPS

Mud Flaps shall be installed behind each wheel well to reduce damage from stones, brush etc. being thrown off the tires.

7.7.2 BEAD LOCKS

Each wheel will be supplied with a bead lock to allow for operation of the tire at low pressure without separation from the wheel assembly.



7.8 SPARE WHEEL and TIRE ASSEMBLY

One (1) spare wheel and tire assembly interchangeable with front or rear axle shall be provided.

8.0 AUTOMOTIVE SYSTEM - ELECTRICAL SYSTEM

8.1 COOLANT HEATER

The engine will be provided with an AC 115 V block heater. The engine heater will keep the cooling water preheated to enable full engine power immediately after startup.

8.2 EMERGENCY WARNING LIGHT SYSTEM

The vehicle shall have a custom integrated warning light system that conforms to the parameters of NFPA 414 section B.10, NFPA 1901, FAA Advisory Circular #150-5220-10D and shall consist of the following:

Rosenbauer will provide an upper and lower emergency lighting system custom designed for the vehicle that is integrated into the body structure to provide illumination in a 360° pattern around the vehicle. The lighting system shall consist of high intensity LED flashers set in a varying flashing pattern. The lighting system shall be red in color.

Integrating the lighting system into the body structure eliminates the need to position varying styles of light bars on the vehicle and the utilization of LED flashing units assures high visibility, minimal maintenance and long bulb life.

The emergency warning light system shall be controlled from a single switch on the cab dash and shall function as follows:

- On power up of the vehicle the system shall “default” to the amber strobe light “ON” position automatically.
- If the emergency lighting is desired the operator depresses the switch one time and the upper and lower systems become active.
- Pressing the switch a second time shall turn off the upper and lower emergency lighting system.
- Pressing the switch a third time shall return the system to the amber “default” ON.



- If the vehicle is powered down the system shall default to the amber ON position.

8.2.1 UPPER FRONT & SIDE WARNING LIGHTS

Four (4) Whelen rectangular, red LED high intensity flashers shall be mounted an integrated panel mounted on top of the cab of the vehicle. Two (2) shall face forward and one (1) facing each right and left side. Lights shall be programmed to provide maximum flashing effect.

8.2.3 LOWER REAR WARNING LIGHTS

Two (2) Whelen rectangular, red LED lights with clear lens shall be mounted in the lower rear bumper area of the vehicle.

8.2.5 LOWER FRONT WARNING LIGHTS

Two (2) Whelen rectangular, red LED lights with clear lens shall be mounted on the front bumper.

8.2.6 AIR TRAFFIC WARNING LIGHTS

Two (2) Whelen amber strobe lights shall be mounted on top of the vehicle, one (1) at the left front and one (1) at the right rear.

8.3 VEHICLE D.O.T. LIGHT SYSTEM

Vehicle clearance marker lights, with reflectors, mounted in accordance with highway safety standards shall be furnished and installed.

8.3.1 HEADLIGHTS

Four (4) Front high intensity head lamps (Hella Brand) w/ high/low beam (two pairs).



8.3.2 DRIVING LIGHTS

Two (2) high intensity marine quality driving lights shall be supplied and mounted in a protected position below the front bumper.

8.3.3 CAB INTERIOR LIGHTS

Two (2) interior cab dome lights selectable between red and white lens illumination and capable of manual or automatic operation shall be installed.

8.3.4 BRAKE/TAIL LIGHTS

Two (2) red LED lights with reflector shall be installed. These lights shall function as stop lights and tail lights.

8.3.5 HIGH MOUNTED BRAKE/TAIL LIGHTS

Four (4) additional high mounted red LED lights and shall be installed for safety. Two (2) shall function solely as stop lights and Two (2) shall function solely as tail lights.

8.3.6 REVERSE LIGHTS

Two (2) LED white, reversing lights shall be installed. These lights shall illuminate when the vehicle transmission is placed in reverse.

8.3.7 DIRECTION INDICATING LIGHTS

Six (6) LED directional (signal) indicators front, mid and rear shall be installed. These lights shall also function as road hazard warning lights.

8.4 COMPARTMENT LIGHTS

Each compartment will be supplied with weather proof LED lights that are switched to automatically light when compartment doors are opened and the vehicle master switch is in the "on" position. This includes pump, undertank, and engine compartments.



8.5 DECK and WORK LIGHTS

Upper deck and work surface lighting around the doors and compartments shall be provided. The system shall be wired to the vehicle's parking brake to activate whenever the parking brake is set.

8.6 110V BATTERY CONDITIONER

A 110 VAC Kussmaul Model 12DV battery conditioner shall be furnished and installed on the vehicle. The battery conditioner shall be wired to maintain the chassis battery system when the vehicle is parked.

8.7 110V AUTO-EJECT QUICK DISCONNECT

One (1) 30 amp Kussmaul Super 30 Auto-Eject quick disconnect plug/socket for the required on-board electrical components shall be installed at the rear left side of the vehicle.

8.7.1 The engine coolant heater and transmission oil pre-heater shall be wired to the auto-eject plug/socket.

8.7.2 The vehicle's on-board air compressor shall be wired to the auto-eject plug/socket.

8.7.3 The vehicle's on-board battery charger shall be wired to the auto-eject plug/socket.

8.8 CHASSIS ELECTRICAL SYSTEM

Starter: 12 Volt DC starting

Chassis lighting: 12 Volt DC lighting

Alternator: 300 amp alternator, high capacity producing 200 amps at idle.

Batteries: Four (4) 12 volt Group 31, 3700 total CCA maintenance-free batteries with frame rail mounted carrier on right rear side of vehicle. The system shall have sufficient cold cranking battery capacity that meets the engine manufacturer's recommendation for the lowest ambient starting temperature.



Maintenance Switch: A battery disconnect-isolator switch is provided and shall be mounted near the batteries. The switch will prevent starting of the vehicle during maintenance and will be wire so as to not interrupt the major power supply to the vehicles starter.

8.9 WIRING

All wiring shall be numbered or color- or function-coded for proper identification. Wiring shall be of stranded conductors and of a wire gauge commensurate with the anticipated maximum electrical load of the circuit.

Wires shall be insulated in accordance with the applicable standards of the Society of Automotive Engineers (SAE).

All connections shall be made with lugs or terminals mechanically secured to the conductors.

Wiring shall be secured in place and protected from heat, oil, lubricants, fire fighting agents, and physical damage. Appropriate circuit breakers shall be provided. Circuit breaker panels shall be easily accessible for service. A copy of this diagram shall also be included in the maintenance manual.

Where wiring passes through sheet metal or structural components, rubber grommets shall be used to protect wiring and wiring looms. Precaution must be taken in all areas to guard against chafing or excessive strain.

8.10 RADIO INTERFERENCE

The vehicle shall be provided with radio interference protection in accordance with SAE J551/4, Test Limits and Methods of Measurement of Radio Disturbance Characteristics of Vehicles and Devices, Broadband and Narrowband, 150kHz to 1000MHz, or an equivalent radio interference suppression standard.

9.0 AUTOMOTIVE SYSTEM - ENGINE and RELATED SYSTEMS

9.1 ENGINE

A high performance diesel engine with electronically controlled fuel injection system and modern, fuel efficient 4-cyle design compliant with applicable U.S. EPA emission standards shall be supplied as follows:



Manufacturer:	Detroit Diesel Corporation
Model:	Series 60 DDEC V / 14.0 Liter
No. of Cylinders:	6, in line
Aspiration:	Turbocharger, charge air cooling 4-cycle
Brake Horsepower:	665 HP (495 kW) at 2300 rpm
Maximum Torque:	1900 lb-ft. (2576 Nm) at 1200 rpm
Displacement:	854 cu. in. (14 liter)
Engine Brake:	Detroit Diesel DDEC Engine Brake

9.2 COOLING SYSTEM

Type:	Water-ethylene/glycol cooling
Performance:	System shall have the capability to stabilize the vehicles engine temperature within the limits specified by the engine manufacturer under all operational conditions encountered by the vehicle.
Construction:	Heavy duty type, bolted construction modular design that includes the transmission oil cooler, remote mounted, semi transparent reservoir tank for easy fill access, reservoir is visible from an access door at rear side of vehicle. Drain cocks shall be provided on the low points of the system to aid in draining the system completely if needed.
Air flow:	Thermostatically clutch controlled pusher fan shall provide fresh air to the radiator by means of an air duct. Air is ingested through the top of the vehicle and exhausted out the rear. Hot air from the engine compartment is never directed across the radiator cooling fins and provides excellent engine temperature control.
Hoses and Connectors:	All hoses associated with the coolant system (radiator and heater) shall be made of a silicone material and shall be secured with constant torque clamps.



Coolant Filter: The coolant system shall be provide with a coolant filter (Perry or equal) and shall be of a spin on cartridge type.

9.2 EXHAUST SYSTEM

The vehicle will be supplied with a stainless steel pipe and muffler. The muffler shall be mounted on top of engine compartment. The exhaust is terminated in such a way as to minimize noise on the interior and exterior of the vehicle.

9.2.1 EXHAUST TERMINATION

The exhaust shall terminate with a straight (horizontal) chrome exhaust tip that directs all exhaust away from the vehicle.

9.3 FUEL SYSTEM

Capacity: One (1) nominal 70 (67 useable) gallon (264 liter fuel tank shall be supplied. The fuel tank supplied meets the performance requirements as outlined in FAA Advisory Circular #150-5220-10D which states that the vehicle fuel tank shall have sufficient capacity to provide for a minimum of 30 miles of highway travel at 55 mph (88.5 kph) average plus 2 hours of pumping at the full-rated discharge. Additional fuel capacity shall be provided for a minimum of four (4) hours of operation of each accessory item (such as a generator or fuel-fired heater(s)) that uses the common fuel tank as a source.

Location: Left hand side of frame, behind rear axle

Fuel Filter: Two (2) parallel piped filter elements

Fuel/Water separator: A thermostatically controlled heated fuel/water separator shall be supplied

Fuel Re-prime switch: An electric in-line aux fuel pump shall be supplied to prevent loss of prime to the engine and aid in the replacement of fuel filters during routine maintenance



9.4 GOVERNOR

An engine governor that will not adversely affect the automotive or extinguishing agent system performance shall be provided. The governor shall be set to limit engine speed so that it cannot exceed the maximum rpm recommended by the engine and driveline component manufacturers.

9.5 HIGH IDLE SWITCH

An engine high idle switch shall be supplied and shall maintain the engine idle at approximately 1200 rpm when engaged. The switch will be tied to activate only when the transmission is placed in neutral and the park brake is set.

9.6 LUBRICATION

The engine and transmission shall operate efficiently and without detrimental effect to any drive train components when lubricated with standard, commercially available lubricants in accordance with the recommendations of the engine and transmission manufacturers.

The engine oil and transmission fluid filters shall be of the full-flow type with a replaceable spin-on element.

All moving parts requiring lubrication shall have a means of providing for such lubrication. There shall be no pressure lubrication fittings where their normal use would damage grease seals or other parts.

The vehicle shall be serviced prior to delivery with lubricants, brake and hydraulic fluids, and a cooling system fluid suitable for use in the temperature range expected at the airport.

10.0 COMPLIMENTARY AGENT SYSTEM(S)

10.1 DRY CHEMICAL COMPLIMENTARY EXTINGUISHING SYSTEM

10.1.1 SYSTEM DESCRIPTION and CAPACITY

A Fire Combat 500 lb (225 kg) Dry Chemical system shall be furnished and installed on the vehicle complete with nitrogen cylinder(s), dry chemical reservoir, hose reel and all necessary plumbing components. Controls for the charging of the dry chemical system shall be located in the cab and shall incorporate gauges to indicate nitrogen vessel storage pressure and system charged pressure. Blow-down and re-servicing valves shall be supplied and incorporated in the system plumbing. A fill opening shall be supplied on the top of the vehicle



allowing the dry chemical reservoir to be filled without the need to remove any piping or accessory.

10.1.2 HOSE REEL DISCHARGE

A “twinned” dual agent hose reel capable of simultaneously discharging dry chemical and water or water/foam solution shall be provided in a compartment on the right side of the vehicle. The reel shall have a capacity of 100’ of “twinned” 1” rubber “booster” type hose and shall be equipped with a nozzle capable of discharging dry chemical at a rate of 7.5 lbs. (3.4 kg) per second. The reel shall be supplied with a 12 VDC electric rewind. Once the dry chemical system has been charged with the in-cab controls, controls for the operation of the dry chemical system shall be located near the “twinned” dual agent hose reel. Controls for the charging of the dry chemical system shall be located at the reel.

10.1.4 HOSE REEL DISCHARGE HYDROCHEM™

The dry chemical hose reel discharge shall be supplied with a Williams HYDROCHEM hand-line nozzle capable of discharging chemical agent concentrically entrained with-in the water or water/foam solution.

10.1.5 HIGH REACH EXTENDABLE TURRET (HRET) DISCHARGE

The HRET shall have the capability to discharge dry chemical through the HRET nozzle and shall be plumbed to meet this requirement. Controls for operating this part of the dry chemical system shall be located in the cab, accessible to the driver and turret operator positions.

10.1.7 NAMEPLATE

A nameplate, clearly indicating extinguishing agent, capacity, weight full, weight empty, operating pressure and hydrostatic test data (month-day-year) shall be provided in a highly visible location near the dry chemical system. Blow-down and Re-servicing instructions shall be mounted in the compartment adjacent to the system.

10.1.8 CHARGING CYLINDERS

Two (2) fully charged nitrogen cylinders shall be supplied with integral pressure gauges. One (1) nitrogen cylinder shall be mounted in the pump compartment and allow for servicing by a single firefighter standing on the ground. One (1) nitrogen cylinder shall be a spare and supplied with the vehicle.

10.1.9 DRY CHEMICAL AGENT

Five hundred pounds (500 lbs) (226 kg) of Chem-Guard Purple K potassium based dry chemical shall be provided with the vehicle.



10.3 PROPELLANT CYLINDER LIFTING SYSTEM

A hydraulic lift table system shall be provided to assist in installation and change of the agent propellant cylinder. The lift table shall have a bracket to hold one full cylinder or one empty cylinder. The lift table shall be equipped with a fold-down ramp to aid in placing the agent propellant cylinder onto table and into vehicle compartment. There shall be a lock system to connect the lift table to the vehicle when agent propellant cylinder is being loaded into vehicle compartment.

11.0 FIRE EXTINGUISHING SYSTEMS

A ROSENBAUER water/foam fire fighting system will be provided. Most major components are designed and fabricated by Rosenbauer unless otherwise specified to assure component compatibility. The complete pump unit is tested before mounting on the vehicle to ensure proper quality and function. This modular approach ensures easy accessibility for service and maintenance.

The equipment is to be suitable for operation with all current foam concentrates including AFFF.

11.1 HEAVY GAUGE CORROSION RESISTANT STEEL PIPING

All pipe work is manufactured from heavy gauge corrosion resistant (galvanized) steel pipe and tubing to minimize corrosion. Each pipe is pressure tested prior to assembly and the complete system is pressure tested during pumping tests.

12.0 FIRE EXTINGUISHING SYSTEM - FOAM CONCENTRATE SYSTEM

A fully automatic ROSENBAUER RVMA 500 FOAMATIC foam admixing system is provided. The system is completely pre-calibrated at the factory during the initial test procedure. A test report shall be provided. The metering rate can be changed during operation of the foam system without interruption or recalibration by operating a switch in the cab or on the exterior pump panel.

Manufacturer:	ROSENBAUER
Model:	RVMA 500 FOAMATIC
Type:	Around-the-Pump Automatic Foam Proportioner w/ selectable variable rate proportioning (1%, 3%, 6%)



Rating:	100 – 1850 gpm (378-7,000 lpm)
Foam delivery:	3 – 150 gpm (11-567 lpm)
Usability:	For all types of Class B - foam concentrate including AFFF
Admixing rate:	Between 0% and 6% adjustable
Standard setup:	0%, 1%, 3% and 6%

Depending on the rate of discharge (GPM) from the water pump, the check valve in the control unit is activated and transfer rods adjust the metering valve to deliver foam concentrate to the eductor on the intake side of the water pump.

The metering valve regulates the exact quantity of foam concentrate to be added. During all stages of operation, a non-return valve in the foam concentrate suction line prevents water from entering into the foam concentrate tank.

The unit operates within pump output ranges from 100 – 1850 gpm (378-7,000 lpm). The water jet is not diverted. The system works with high precision and a minimum of pressure loss.

The FOAMATIC RVMA 500 is equipped with control discs for admixing rates of 1%, 3% and 6%. Other percentage rates between 1% and 8% are available at no extra cost. A maximum of three (3) different discs can be combined. Customer shall specify at pre-construction meeting the percentage discs desired.

The system is designed for use of protein and synthetic foam concentrates as well as AFFF.

In addition to the foam main line from the foam tank there is an outside source connection, which can be used to draft foam concentrate from a container, directly into the proportioning system bypassing and preserving the onboard foam tank if needed.

Foam concentrate metering is fully automatic. The system induces a pre-selected percentage of concentrate constantly depending on the GPM flowed through the discharge side of the water pump. Change in agent discharge and agent pressures will not affect the pre-selected percentage on proportioning.

If the vehicle is re-circulating water back to the tank and the foam system is activated, the recirculation valve automatically closes to prevent foam concentrate from entering the water tank.



A system flushing mode is provided in order to clean foam concentrate from the fire fighting piping system by means of inducing clean water downstream of the foam tank suction valve and discharging through the monitor or other discharge lines. An interlock system is incorporated to ensure that the flushing valve is in the closed position when the main foam valve is open.

The ROSENBAUER FOAMATIC RVMA 500 works fully mechanically, is maintenance-free, requires no adjustment to the system and does not make use of any electronic or electric components for unmatched reliability.

12.1 FOAM CONCENTRATE TANK, PIPING, and CONNECTIONS

Capacity:	400 gallons (1,514 liters)
Manufacturer:	UPF Poly-Tank
Construction:	Heavy duty polypropylene integrated in main water tank
Fill Tower:	Quick-Opening Lid w/ T-Handle Rubber Bungees
Filling/Draining connection:	One (1) 1½" (38 mm) fill connection with manually operated ball valve and internal strainer shall be located on the driver's side. Fill connection shall have 1 ½" (38 mm) NSTM fitting unless otherwise specified.
Tank level indicator:	Foam tank level indicators shall be installed: One (1) inside the cab One (1) at the structural panel
Overflow Vent:	Venting for both pressure and vacuum. Protection against excessive suction-pressure during pump output Protection against excess overpressure during filling up to rates of 105 gpm (400 lpm)



The foam tank drain system terminates at a height that allows the foam concentrate to be drained into a barrel, fitted with a control valve.

The foam suction line leading to the FOAMATIC RVMA 500 foam proportioning system is designed to prevent sludge and foreign matters entering the pump, without reducing the useable foam concentrate flow.

Design features:

- Structural integrity to withstand internal and external loads.
- Best utilization of space for keeping vehicle's dimensions compact, and center of gravity as low as possible.
- Excellent strength to weight ratio
- Corrosion resistance to all known foam concentrates

12.4 FOAM CONCENTRATE

Four hundred gallons (400 gallons) (1514 liters) of Chem-Guard 3% AFFF Mil-F-24385 shipped in 5 gallon pails shall be provided with the vehicle.

13.0 FIRE EXTINGUISHING SYSTEMS - WATER SYSTEM

13.1 FIRE PUMP

The ROSENBAUER R600 fire pump meets and exceeds the stringent requirements of NFPA and is listed by Underwriters Laboratories (UL).

Make:	ROSENBAUER
Model:	R 600
Material:	high strength corrosion resistant light alloy impeller and housing. Pump shaft to be stainless steel. Pump is mechanically sealed.
Drive:	By power divider
Rated capacity:	1850 gpm (7,000 lpm)
Number of stages:	2
Location:	In pump compartment. Pump is mounted lower than the water tank to assure gravity



priming. A priming pump is supplied as standard to assist pump priming if needed

Suction line to tank: Pneumatic actuated butterfly valve

Automatic Overheat Protection: The pump shall be equipped with an automatic overheat protection device to prevent the pump from overheating when running the pump without discharging water (dead heading). The automatic overheat system shall monitor the water temperature inside the pump and automatically open a valve to discharge water and cool the pump. The overheat protection system will automatically reset after the water temperature has reached normal operating temperature. A water pump temperature gauge and warning light/buzzer are provided in the cab.

13.2 PRIMING DEVICE

The fire pump is equipped with a ROSENBAUER KAP priming device as a standard. This allows to air evacuate the piping system quickly and also provides excellent drafting capabilities. The priming device is capable of automatic operation if the water pump requires it or can be manually operated if needed. Controls are provided in the cab and on the structural panel for manual operation.

Make: ROSENBAUER

Model: KAP

Type: High speed, double piston priming pump,

Actuation: By electro-magnetic clutch

Drive: Via tooth belt from main pump shaft

Suction performance: Up to 24 ft. (7.3 m), attainable vacuum up to 96%



13.3 STRUCTURAL CONTROL PANEL

A structural package is standard on all Rosenbauer vehicles. The fully operational structural panel is located on the left-hand side of the vehicle and shall be mounted in the vehicle pump compartment and shall be provided with:

- a. Switch for water tank suction valve
- b. Switch for foam tank suction valve
- c. Switch for foam proportioning rate
- d. Electronic discharge pressure gauge (Pressure Governor System)
- e. Electronic intake pressure / vacuum gauge (Pressure Governor System)
- f. Indicator lamp for water tank suction valve open
- g. Indicator lamp for foam tank suction valve open
- h. Indicator lamp for priming pump operating
- i. High water temperature warning light
- j. Low oil pressure warning light
- k. Control lamp for PTO
- l. Switch for flushing
- m. Switch for priming pump
- n. Electronic Pressure Governor Control System with the following:
 - OK to Pump indicator
 - Electronic tachometer
 - Electronic Intake Pressure Gauge
 - Electronic Discharge Pressure Gauge
 - Idle button
 - Preset pressure
 - RPM/Pressure Mode Switch
 - Engine Oil Temperature Gauge
 - Engine Coolant Temperature Gauge
 - Transmission Oil Temperature Gauge
 - Engine Oil Pressure gauge
 - Transmission Oil Pressure Gauge

13.4 SUCTIONS

13.4.1 MAIN SUCTION INLET – UN-GATED 5” (1.25 mm) NST

One (1) 5” (125 mm) NSTM un-gated suction inlet on the left side with 5” (125 mm) NST rocker lug cap shall be installed.



13.4.3 ADAPTER

The main suction intake shall be provided with a 5" x 2 ½" female swivel NST adapter complete with cap and chain to be used as an auxiliary inlet.

13.5 DISCHARGES

13.5.1 LEFT SIDE DISCHARGE

One (1) 2 ½" (65 mm) NSTM discharge shall be installed on the left side.

The discharge shall be equipped with a chrome 2 ½" (65 mm) NST 30° elbow.

The discharge shall be equipped with a chrome 2 ½" (65 mm) NST cap.

The discharge shall be equipped with a liquid filled 2 ½" (65 mm) gauge installed adjacent to the discharge or discharge control.

A drain for bleeding air and water from the lines shall be installed

Foam metering for this discharge shall be provided by the RVMA 500 around the pump foam proportioner.

13.5.2 RIGHT SIDE DISCHARGE

One (1) 2 ½" (65 mm) NSTM discharge shall be installed on the right side.

The discharge shall be equipped with a chrome 2 ½" (65 mm) NST 30° elbow.

The discharge shall be equipped with a chrome 2 ½" (65 mm) NST cap.

The discharge shall be equipped with a liquid filled 2 ½" (65 mm) gauge installed adjacent to the discharge or discharge control.

A drain for bleeding air and water from the lines shall be installed.

Foam metering for this discharge shall be provided by the RVMA 500 around the pump foam proportioner

13.6 WATER TANK, PIPING, and CONNECTIONS

Capacity: 3000 usable gallons (11,356 usable liters)

Manufacturer: UPF Poly-tank



Construction:	Heavy-Duty polypropylene
Baffle plates:	Longitudinal, horizontal plus transversal. Baffling is provided to compartmentalize the tank minimizing "sloshing" of the tank in less than full conditions allowing for increased vehicle stability.
Fill Tower:	Hinged, Quick Opening Lid
Overflow Vent:	Provided
Over pressure safety device:	Built into the fill tower cover.
Drain cock:	2" (50 mm) actuation from the side of the vehicle.
Tank sump:	Of sufficient size to minimize swirl.
Tank level indicator:	Tank level indicators shall be installed: One (1) inside the cab One (1) mounted at the structural panel
Design features:	Structural integrity to withstand internal and external loads. Best utilization of space for keeping vehicle's dimensions compact, and center of gravity as low as possible Excellent strength to weight ratio
Direct tank fill:	One (1) 4" gated tank fill located within the left side of the pump module next to the main pump intake with 4" (100 mm) NST male by 5" (125 mm) STORZ adapters reduced to 2 ½" male NST with cap and chain.



All connections are factory angled to prevent kinking of hose lines connected to the vehicle eliminating the need for elbow adapters.

The water tank assembly shall be directly attached to the chassis with flexible rubber-steel elements. Bending and torsion loads transmitted from the vehicle frame are absorbed in those rubber steel elements.

The tank is mounted with stress isolating rubber cone bearings on the chassis frame rails. It provides optimum weight distribution on the axles assuring the required soft soil mobility and maximum traction for cross-country travel.

An NFPA 1901 compliant non-slip polished aluminum treadplate (diamond plate) walkway is fitted on top of the vehicle on all walkways.

14.0 PRE-CONNECTS

14.1 LEFT SIDE PRE-CONNECTED SOFT JACKET HANDLINE

One (1) 200' (60 m) 1 $\frac{3}{4}$ " (44 mm) quick attack, pre-connected soft jacketed handline shall be provided. Handline shall be capable of flowing a minimum of 125gpm (475 lpm).

The handline shall be installed on the left side of the vehicle in an enclosed compartment for easy access.

The handline shall be equipped with an adjustable gallonage Task Force Tips QUADRAFOG nozzle (Model #FQS-125PF).

200 ft (60 m) of rubber-lined, soft, double-jacketed hose shall be supplied with the vehicle in 50 foot (15 m) lengths.

The handline will be equipped with an "auto-charge" device that will allow a single firefighter to safely deploy the handline without needing to return to the vehicle to charge the handline.

The vehicle will not be equipped with an Auto throttle device as the operation of the Rosenbauer Panther fire-fighting system does not warrant this application.

Pre-connected handline shall be capable of flowing 125 gpm (475 lpm) minimum.



15.0 SECONDARY BUMPER TURRET (AKRON 3463)

An AKRON 3463 FireFox Electric Remote Controlled Bumper Turret with AKRON 3293 FireFox Electric Nozzle shall be provided as the secondary turret. The turret shall meet the discharge requirements of the FAA circular.

Make:	AKRON
Model:	3463 FireFox Bumper Turret
Type:	Bumper Mounted Electric Remote Controlled Turret
Actuation:	Single Power Joystick Control w/ Trigger and Switches
Discharge rating:	300 gpm (1,135 lpm)
Tactical use:	Straight Stream or Flat Pattern with water only or water/ foam with auto-oscillation and stow capability.

The turret is to be an all electric single waterway turret constructed of lightweight Pyrolite with a 2" (50 mm) NPT quick disconnect inlet. The turret shall have a 1 ½" (38 mm) outlet with cast-in turning vanes in each elbow. The turret shall have fully enclosed 12 volt motor and gears with manual overrides for both horizontal and vertical rotation and may be operated simultaneously. The vertical travel shall be from 45° below to 90° above horizontal with adjustable stops at -20° and +45°. The horizontal rotation shall be 320° with adjustable stops at plus or minus 90°. The logic box shall include coated, solid state components to resist water corrosion. The control box shall control the vertical and horizontal rotation of the turret and the pattern of the nozzle. The nozzle shall have a fixed gallonage baffle. A 2" (50 mm) electric valve shall supply water or water/foam solution to the turret. The 2" (50 mm) electric valve control shall be integrated into the joystick.

16.0 PRIMARY HIGH-REACH EXTENDABLE TURRET

The primary turret shall be an HRET, High Reach Extendable Turret elevated waterway device. HRET will be a Rosenbauer "Stinger".



STINGER SPECIFICATION

An articulating, telescoping aerial device with elevated turret shall be installed behind the cab on a pedestal above the frame rails mounted for maximum stability and best weight distribution. Elevation of the turret shall be approximately 54 feet [16.5m], measured from ground level (subject to mounting base height on vehicle). Maximum horizontal reach shall be approximately 37.5 feet [11.4m], measured from the center of turntable rotation. The turret shall be capable of being positioned within 2 feet [.6m] of ground level in front of the vehicle. The design of the boom shall not allow the boom to come into contact with the cab without the use of any electronic safety devices.

LOWER MAST SECTION

The lower mast shall be a ladder structure made from 6" x 4" x ¼" [152.4 mm x 101.6 mm x 6.35 mm] high-strength steel tubing. The lower mast shall be elevated by two 4" [101.6 mm] bore x 30" [762 mm] stroke hydraulic cylinders.

BOOM SECTIONS

The telescopic boom sections shall consist of two extruded aluminum-alloy, heat-treated rectangular tubes. The size of the larger upper boom shall be 13¼" x 9¼" [336.6 mm x 235 mm] and the smaller (inner) upper boom shall be 10" x 7¾" [254 mm x 196.9 mm]. The booms shall be aluminum alloy 6061-T6. The upper boom shall be elevated by one 6" [152.4 mm] bore x 30" [762 mm] stroke hydraulic cylinder. The upper boom internal hydraulic extension cylinder shall be 3" [76.2 mm] bore x 142½" [3619.5 mm] stroke.

OPERATION TRAINING MANUALS

There shall be two (2) manuals and one (1) CD consisting of the basic operating instructions. These shall be provided in the cab.

OVERALL 1 YEAR WARRANTY

RK Aerials, LLC shall provide a one (1) year or 100,000 miles overall parts and labor warranty as follows:

The aerial manufacturer shall warrant to the purchaser that the complete Stinger device and system was manufactured to comply with the manufacturer's bid specifications and free in all respects from any defects in materials or workmanship.

The warranty shall expire on the earlier of one (1) year or 100,000 miles from the date of delivery or acceptance of the apparatus. This warranty shall include all parts and labor. The cost of transportation of vehicle to the warranty location shall be provided by the purchaser.



The obligations of the aerial manufacturer, pursuant to the foregoing warranty, with respect to the Stinger shall be limited to the cost of bringing such Stinger into compliance with the specifications or of removing any defects in materials or workmanship.

All warranty work performed must be completed at the Rosenbauer facility or a Rosenbauer approved service center.

Any work or alterations on or misuse of the Stinger performed by anyone other than the aerial manufacturer's designated personnel, either before or after delivery to the purchaser, shall not be warranted by the manufacturer and shall cause to make this warranty invalid.

This warranty shall not apply to those items which are usually considered normal maintenance and upkeep services, including, but not limited to electrical lamps, valve seals, normal lubrication and/or proper adjustment of minor items.

This warranty is in lieu of all other warranties, expressed or implied, and all other obligations or liabilities on our part. We neither assume nor authorize any person to assume for us any liability in connection with the sales of our apparatus unless made in writing by R K Aerials LLC.

STINGER BOOM WHITE

Booms, mast and pedestal assemblies shall be pre-cleaned, chemically etched, primed with PPG #F3980 primer and finished with PPG #FDG2185 white high-quality automotive finish.

TURNTABLE / ROTATION SYSTEM

The turntable bearing shall be 23½" [596.9 mm] minimum outside diameter with a minimum rating of 130,000 lbs.-ft. [176.3 kN-m] overturning moment.. The rotation drive shall utilize a spur gear running on the exterior of the rotation bearing. The spur gear shall be on the output of a planetary reduction gearbox assembly. This planetary gear box shall have a spring-applied, hydraulically-released brake and is to be internally driven by a reversible high torque, low speed hydraulic motor. The gearbox design shall prevent drifting of the turntable. The rotation system shall include a 4" diameter water swivel mounted directly to the base super structure and shall rotate with the turntable assembly. The rotation system also includes a Can-BUS controlled encoder that monitors the rotation and bedding of the boom device.

The turntable is bolted to the bearing and provides the pivot and cylinder mount for the lower mast of the elevating boom.



4" WATERWAY SWIVEL 60 DEGREES

There shall be a 4" waterway swivel. It shall be installed on the pedestal and rotate with the turntable 30 degrees to the left and 30 degrees to the right.

MULTI-FUNCTION JOYSTICK CONTROLLER

The elevated turret and its nozzle (and optional piercing device) shall be controlled by the single multi-function joystick. In nozzle control mode, the multi-function joystick controller shall have dual axis function plus additional control switches for the operator to perform all nozzle operations. Left and right motion shall control horizontal sweep. Forward and back motion shall control vertical sweep. A thumb button shall control straight stream/fog patterns. The multi-function joystick control shall include LED indicators relating to nozzle functions. When a function has been activated, the indicator shall illuminate. Additional joystick functions shall include but not be limited to the following:

- **Water/Foam Discharge**
- **High/Low Flow Selection**

When in boom mode a single palm grip joystick shall provide for elevation, extension and turntable rotation operations. The joystick shall have two axis. Left and right motion shall proportionally control turntable rotation. Forward and back motion shall proportionally control lower mast elevation until the lower mast is fully elevated. When lower mast is fully elevated, the forward motion shall proportionally control the upper boom down and the back motion shall proportionally control the upper boom up with pre-programmed coordinated motion of the boom. A pair of thumb buttons shall provide for upper boom out and upper boom in. The thumb buttons signal the electronic PLC which in turn provides automated ramping and proportional extension/retraction of the boom.

A fully proportional boom control valve shall be included which is controlled by the single multi-function joystick when in boom mode. The boom control valve shall be equipped with manual override feature to use in the case of electrical failure to the valve. Upstream of the boom control valve shall be a pressure filter with a differential pressure switch to illuminate a light to indicate a dirty element.

An automated programmable logic controller shall be provided for standard operations of hydraulic controls. The automated controller shall accept input from sensors and the single multi-function joystick and direct these inputs to the hydraulic valves. Joystick motion shall be "ramped" so that slow precise boom and piercing device positioning can be achieved, with operating speed increasing as the joystick is moved to its travel limit. Cushioned stops shall be programmed to automatically slow down boom motion as



cylinders reach end of stroke.

STOW FEATURE

The "STOW" feature shall be activate from any boom position when the operator is ready to bed the unit. When activated, the "STOW" operation shall rotate, retract and lower the upper boom and lower mast to the bedded position in the proper sequence under programmed control.

The programmed logic control system (PLC) shall operate as a distributed control system with Controller Area Network (CAN) type communications bus per ISO standards. The PLC shall provide overall system management and communication. Boom tip and mast positions shall be sensed with encoder type devices to assure maximum reliability and repeatability.

When the aerial is power up, it will be in **STOWED ATTACK** position. Cab-mounted switches and indicator lights shall be provided to allow the operator to select the following boom positions:

- **BOOM STOWED**
- **HIGH ATTACK**
- **MID ATTACK**
- **LOW ATTACK**

CAB & BODY PROTECTION

Cab and body protection shall be incorporated into the auto control system. The protection system shall be designed to prevent the boom from accidentally contacting the tanks, body roof, cab roof or other vehicle components.

Limited rotation shall be provided for the Stinger turntable. Rotation shall be a minimum of 30° either side of centerline. Outriggers shall not be allowed to meet this requirement.

PEDESTAL

The Stinger shall set on top of a pedestal that is a tubular structure in the lower half to leave as much open space as possible to accommodate pump piping. Each of the four tubular structures shall be bolted for easy removal and access to the main pump. The four legs shall be bolted directly to a base plate mounted directly to the frame.

PERFORMANCE CAPABILITIES

The water discharge piping system shall be capable of flowing up to 1,500 GPM [5,677



LPM] with

the boom stowed or 1,000 GPM [3,785 LPM] with the boom elevated while creating minimum friction loss. It shall meet all discharge performance requirements set forth in FAA Advisory Circular #150/5220-10D or latest standard.

WATERWAY

A waterway shall be provided from the pedestal to the tip of the boom. The telescoping aluminum waterway shall be fabricated of aluminum and shall have four (4) tubes as follows:

1. Lower Mast 4-1/2" to 4" O.D.
2. Extending Boom 4-1/2" to 4" O.D.

TURRET MONITOR

The extendable turret shall not interfere with access or functions of fire fighting equipment, water/foam tanks, and normal maintenance items. Due to the "Pump-and-Roll" requirement, the articulating and telescoping boom sections shall have limited rotation. The use of outriggers or stabilizing jacks is not permitted. However, the nozzle must operate over a minimum 180° horizontal sweep (90° right to 90° left) and 215° vertical range (80° up to 135° down).

The turret assembly shall consist of a double swivel unit allowing the nozzle to sweep in both horizontal and vertical planes. The swivels shall be a large diameter long radius type for maximum flow with minimum friction loss. The assembly shall be constructed of stainless steel or high strength aluminum alloy to resist corrosion.

The turret assembly shall be adequately reinforced to sustain all anticipated loads and reaction force of the volume nozzle.

STYLE 5177 AKROMATIC 1250 ELECTRIC MASTER STREAM NOZZLE

An Akron Brass item 51770001 Akromatic 1000 electric combination fog and straight stream master stream nozzle with automatic flow mechanism shall be installed on the Akron monitor. The nozzle shall be constructed of durable, lightweight Pyrolite and shall have electric pattern section from

straight stream to wide fog controlled by a 12 volt motor and linear ball screw, a manual override pattern control knob, built-in stream shaper, and 3.5" NH swivel.



AUTO STOW

The turret shall be stowed in a forward position, directly over and in front of the vehicle cab. The turret shall be capable of full operation in either the stowed or elevated position as the vehicle approaches the fire. The operation of the Stinger turret will replace the typical fixed turret mounted on the cab roof.

DRY CHEMICAL NOZZLE

For dry chemicals, a telescoping line shall be installed on the boom opposite the waterway. The base chemical line shall be 3" [76.2 mm] O.D. while the telescoping section shall be 2½" [63.5 mm] O.D. At the tip of the boom, a 1" [25.4 mm] hose shall connect to the chemical nozzle in the volume nozzle so it moves with the volume nozzle. At the lower mast end of the telescoping chemical line, there shall be a 1½" [38.1 mm] hose routed down the lower mast and through the turntable to the pedestal area.

PIERCING NOZZLE

An independent auxiliary nozzle with a piercing applicator shall attach to the telescoping boom to provide remote controlled penetrating capability. A high tensile steel tip shall provide a spray pattern with 250 GPM [950 LPM] or more flow. The piercing nozzle shall have the capability to provide a separate water/foam discharge with selector switch labeled "Pierce/Volume". The tip shall be removable. The piercing lance shall be retracted inside a tube when not in use to protect the piercing tip. The lance shall be hydraulically fired with amplified hydraulic flow from three 3,000 PSI (210 bar) hydraulic accumulators for maximum piercing velocity and impact.

The piercing nozzle shall be controlled by switching the single multi-function joystick to piercing mode. Moving the joystick forward lowers piercing tip and pulling back raises the tip. Rotation up and down of the piercing device is accomplished with an enclosed hydraulic helical rotator with counterbalance valves to protect against accidental rotation.

When pierce mode is selected, the volume nozzle shall automatically rotate to a park position to provide maximum piercing depth.

VALVE & PIPING

Piping and hydraulic valving to the HRET piercing device shall be provided. The piping and hydraulic valving will be capable of operating the pericing device rotation, piercing and reloading functions.

An additional 2" ball valve shall be provided to allow flow to the piercing device.



OVERLOAD WARNING LIGHT

One (1) amber Tomar strobe marker light, model # 470S-1280-A, shall be installed at the tip of the boom.

TIP MARKER LIGHTS

One (1) JW Speaker HID, model 9710, light shall be installed at the tip of the boom near the turret nozzle. These HID work lights are completely sealed against water, dust and corrosion. Other features include stainless steel hardware, high-impact/chemical-resistant housing and extreme resistance to shock and vibration.

HYDRAULIC PUMP

The hydraulic pump and reservoir shall be a separate system independent of other vehicle functions. The pump shall be load sense type that will react to demand of the aerial boom mode and piercing mode controls without imposing unnecessary horsepower demands on the engine.

The lift, extension and tilt cylinders shall include holding valves for maximum safety in the event of pressure loss or hydraulic line failure. Flow control shall be electric, remote controlled, proportional type installed to insure smooth operation of the boom assembly. All hydraulic valves shall be equipped with manual toggle switch overrides for emergency operation and/or manual push button mechanical overrides in event of electrical failure.

The hydraulic reservoir shall be a minimum of 25 gallons [94 liters] capacity, clearly marked "Hydraulic Oil Only" and located to provide maximum heat dissipation and prevent contamination by water or foam. The system shall include a return hydraulic spin on filter at the reservoir with a pressure switch to illuminate a light in the cab to indicate a dirty element.

The hydraulic pumping system shall be capable of providing full performance at any engine speed.

The system shall not exceed 3,000 psi [207 bar].

The telescoping boom shall be equipped with an internal cable carrier system to permit routing electrical wires and video cables to the end of the boom.

HYDRAULIC HIGH PRESSURE OIL FILTER

The hydraulic system shall be equipped with a 'high pressure' hydraulic oil filter between the pump and the control valve designed to meet the flow requirements of the system.



The high pressure filter will have a dirty element light on the outrigger panel for the convenience of the mechanic.

HYDRALIC OIL RETURN LINE FILTER WITH LIGHT

A 10 micron low pressure return line filter element shall be connected to the hydraulic reservoir. The 10 micron return line replaceable filter element with a dirty filter indicator light shall be located on the outrigger control panel.

HYDRAULIC SYSTEM

A self-contained hydraulic power unit consisting of an integral pump and direct current motor shall be provided as an alternative power source in event of engine-driven hydraulic pump failure. The unit shall be capable of returning the booms to a bedded position.

MAIN HYDRAULIC PUMP RIGHT ROTATION

The hydraulic pump right rotation shall have a displacement of 33cc/rev with an SAE "B" 2-bolt flange and the shaft size shall be 7/8" B 13 Tooth SAE Spline Shaft. The pump shall rotate right /CW (clockwise).

17.0 UNDER-TRUCK NOZZLES

For ground fire control system under-truck nozzles are fitted on the vehicle. The water/foam under-truck nozzles shall be provided so that the combined spray pattern will cover the total under-truck area as well as the inner sides of the wheels and tires.

Discharge:	Approximately 19 gpm (72 lpm) each
Pattern:	Conical dispersed
Location:	Three (3) in front of front axle Two (2) in front of first rear axle One (1) in front of second rear axle One (1) behind second rear axle
Control:	Switch on dashboard inside the cab.

18.0 WATER FOAM AGENT APPLICATORS

Per the FAA circular



Each water/foam agent handline shall be capable of delivering a finished foam solution that meets the applicable rate, range, and pattern standards of Table 3, Performance Parameters 3 or 4.

Each water/foam agent handline shall deliver finished foam of a quality that meets the applicable standards of Table 4.

Each water/foam agent turret shall be capable of delivering a finished foam solution that meets the applicable rate, range, and pattern standards of Table 3, Performance Parameters 5 or 6, as applicable.

Each water/foam agent turret shall deliver finished foam of a quality that meets the applicable standards of Table 4.

All water/foam applicator performance requirements are based on the assumption that foam used to perform the tests is an approved foam concentrate; e.g., will pass the military AFFF foam specification 50 ft² fire test and the burn back resistance test.

19.0 QUALITY ASSURANCE

Rosenbauer will fully comply with all items regarding quality assurance, test and technical service and training as defined in NFPA 414 2007 edition.

20.0 DELIVERY

The completed vehicle shall be delivered by flat bed truck to a location designated by the customer. Upon delivery Rosenbauer shall supply a qualified technician to inspect the vehicle, perform any final adjustments to the vehicle and make the vehicle ready for service.

21.0 FAMILIARIZATION

Rosenbauer shall provide a qualified technician after delivery and acceptance by the purchaser to acquaint fire department personnel in the proper use and application of the ARFF unit as necessary to accommodate staffing

Familiarization for fire fighters shall consist of the following:

- Classroom instruction on proper operation and maintenance of this ARFF vehicle to include visual inspection of vehicle, indicating various controls and instruction in proper operation of the unit.



- Actual operation/driving of the ARFF vehicle to include instructions in proper driving of the vehicle, foam and water discharge, pump operation, and familiarity with all necessary fire fighting functions.
- Familiarization will include the use of computer aided programs, manuals and hands-on familiarization.
- Rosenbauer will provide familiarization for department maintenance personnel on the vehicles major systems and lubrication points.

22.0 WARRANTIES

As a minimum the following warranties shall be provided:

- Base vehicle: One (1) Year
- Engine: Five (5) Years
- Transmission: Two (2) Years
- Water Pump: Five (5) Years
- Water/Foam Tank: Lifetime
- Paint: Five (5) Years

Rosenbauer shall supply a warranty statement that will include the following as a minimum:

- Manufacturer's obligations
- Duration of warranty period for vehicle, engine, transmission, and water/foam tanks
- Warranty procedure
- Disclaimers

Rosenbauer shall support the vehicle with factory trained technicians to perform warranty repairs during the warranty period

23.0 TECHNICAL INFORMATION

Rosenbauer will furnish the following publications in accordance with standard commercial practices applicable to the vehicle, including body and special fire suppression equipment with the vehicle. The manuals shall be supplied in CD ROM format and shall consist of:

- Operator's manual with lubrication charts.
- Parts manual
- Electrical schematics



- Maintenance and Service manual.

These manuals will cover the complete vehicle.

24.0 PRE-CONSTRUCTION MEETING

In order to insure compliance with the contract specifications, Rosenbauer shall provide a factory representative to travel to the purchaser's location, to participate in a pre-construction conference within 30 days after receipt of order.

25.0 FINAL INSPECTION TRIP

A final inspection of the completed vehicle at the manufacturer shall be provided at no cost to the purchaser. The final inspection trip shall include associated airfare, meals and lodging expenses for two (2) purchaser representatives. The visit shall include a final vehicle acceptance inspection, vehicle testing and witnessing the tilt table certification of the completed vehicle.