Fire & Safety Systems Ltd.

Technical Bulletin 021 – Fire Eater Armoured Systems

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Lifeline military systems represent the result of 20 years of development in motorsport from a company whose products are used to protect occupants and vehicles in every global category of the sport from club racer through touring cars, endurance, F1 and rally racing. The core motorsport drivers of high performance, light weight and speed are embedded into every area of everything we do. To us a military vehicle is as much a performance vehicle as a Le Mans prototype, WRC or F1 car; the only difference is size.

Our system will begin discharging almost instantaneously after a fire is detected and will typically have a fire out in less than 2 seconds. All in system weight can be reduced to as little as 8kg. We have transferred all that we've learnt in motorsport into our military systems, developed it further and ruggedized it for increased durability. What we've learnt from the military is now being transferred back to motorsport. We believe we have the best tested, fastest and most effective multi-occupant vehicle fire suppression system available globally.

We remain a motorsport company that provides products to the military. We have built our reputation not only on the performance of our products, but on our attitude to problem solving, flexibility, honesty and willingness to take on what others will not. Our system and work ethic is so significantly more effective than others that it received a BAE Chairman's award for the Warrior UOR project.

System Specification

No military vehicle is the same in configuration, architecture or conditions of deployment. As a result, we start our process by asking some simple questions; area to be protected (crew, engine), Volume to be protected (occupied, unoccupied, partial occupied), fuel type, risk points (induction, exhaust, fuel pumping, etc.), automatic or manual activation, temperature range… While we can adapt most components to suit each platform and variant to ensure best performance, we always try to design a vehicle system from standard parts ensuring commonality.

System Components

Piston Extinguisher

The core of the system; used on Foxhound and Warrior platforms and in-process of being specified on several other UK MOD platforms. The compression discharge cylinder, which can be mounted in any orientation, can be filled with Novec 1230 clean agent suppressant and uses a remote cartridge to provide super-pressurisation only when required at point of use.

Item	Description
Extinguisher	100% machined from 6082 T6; PTFE anodised and powder coated; temperature range -30oC - +80oC (exact range depends on specification); 1.5/2.0/2.25/3.0kg capacity to suit high and normal temperature applications; Maximum 10-year life and 2-year service interval; total discharge time of all sizes <1sec
Remote Charge	100% machined from 6082 T6; Anodised finish, pyro mechanical actuator activation
Nozzle	6082 T6; direct mounted to cylinder or via -10 braided hose to remote nozzle for integration flexibility
Link Hose	-4 braided PTFE lined hose
Bracket	3mm Domex 700; wet paint or powder coat; fitted with AV mounts, 1.56mm stainless steel straps and anti-torpedo strap

Land Cruiser/Defender Extinguisher

Designed to meet the requirement of the smaller variant of Armoured vehicle, the system is designed to be as minimally intrusive into the engine bay, the core of the of the system is a stored pressure electric extinguisher, using clean agent Novec 1230 suppressant.

The extinguisher kit comes with one high discharge nozzle and a remote hose to enable the pipework to be installed through the chassis and into the engine bay.

Toxicity

Systems use clean agent suppressants in a variety of cylinder sizes to suit the application. Once the crew area volume is known Lifeline will specify the cylinder size to give maximum fire protection without exceeding NOAEL and LOAEL values specified in JSP418. In unoccupied areas, such as the engine bay, more suppressant can be used to help account for any losses through panel gaps, service tubes etc.

Suppressant Mass	Volume protected	Concentration at 20ºC
5kg	8m3	8.7%
4kg	6.5m3	8.6%
3kg	5m3	8.4%

Detection

High speed UVIR^2 detectors in the crew area detect a fire in 27ms and have advanced processing algorithms to distinguish between a real fire and a false alarm. To provide greater protection against false alarms we always recommend the use of two detectors connected in a double knock configuration. Engine bay detection is provided by Protectowire, in a range of temperatures.

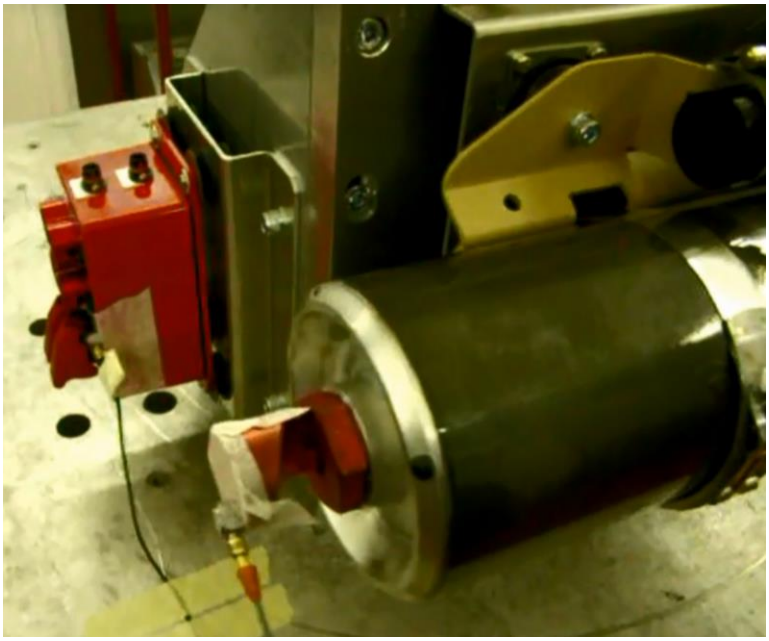
Item	Description
Housing	316 Stainless Steel
Weight	2.0kg (+bracket)
Cable Entries	6-way connector, M20 plug
Supply Voltage	14 to 30Vdc
Field of View	90º min. cone
Range	0.1m^2 n-heptane 25m, 0.2m^2 n-heptane 35m, 0.4m^2 n-heptane 45m
Sensitivity (EN54-10)	High = Class 1 Low = Bunsen flame 3.2m
Spectral Response	UV 185 to 260nm, IR 1.6 to 2.7µm
Operating Temp.	-10oC to 75oC
Storage Temp.	-20oC to 60oC
IP Rating	IP65
EMC Immunity	EN61000-6-1, EN61000-6-2, EN61000-6-3, EN61000-6-4, EN50130-4, EN55022
Response Time	Slowest setting ≈ 380ms Very Fast setting ≈ 27ms
Capacitor Power Backup	≈ 10 minutes
Bracket	3mm Domex 700; wet paint or powder coat; fitted with AV mounts

Control

Our control box is a simple unit housed in a cast aluminium case. The unit is powered independently of the vehicle electrics ensuring that it is still possible to fire the extinguishers should there be a loss of power. All connectors are high quality sub-miniature Deutsch ASU type; used extensively in motorsport these connectors are environmentally protected, tough and well proven. Push-to-Test switches are provided to check the wiring to the extinguisher and battery and a key switch disarms the system for maintenance.

Item	Description
Housing	Die-cast aluminium, IP54
Weight	0.5kg (+bracket)
Cable Entries	Deutsch ASU / Binder / 620 Binder
Switches	System check for battery and circuit, protected manual fire, key disarm switch
Bracket	3mm Domex 700; wet paint or powder coat; fitted with AV mounts

Testing & Validation



Individual assemblies of the systems have been subjected to a battery of tests both in-house and externally during our work with the MOD including; low and high temperature extremes, drop testing for function after an IED blast, battle field simulations, EMC and vibration testing. Systems have been constantly fielded in Iraq and Afghanistan since 2009 providing assurance that laboratory testing translates to reality.

Servicing

Servicing of cylinders is required every two years and cylinders have a maximum service life of 10 years. Acceptance of a cylinder for service is subject to the condition of the cylinder; a strip and survey report is produced for all service cylinders and a notification provided if the cylinder is BER. Provided significant damage has not occurred to multiple components or sub-assemblies a cylinder can normally be economically returned to service; this is due to the modular construction of the cylinders allowing for replacement of individual components economically.