



Certificate of Conformity

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Product designation

Muster", M2SAG/M2SAG-M Series, pyrotechnically generated, aerosol fixed fire suppression system

(Refer to the Schedule/enclosures for further specified details)

Agent/distributor

JSG Industrial Systems Pty Ltd
U1 / 21 Amour Street, REVESBY, NSW, AUSTRALIA, 2212

Producer

Pyrogen Technologies (Aust) Pty Ltd
18 Barry Avenue, MORTDALE, NSW, AUSTRALIA, 2223

Conformance criteria and evaluation

The Muster", M2SAG/M2SAG-M Series, pyrotechnically generated, aerosol fixed fire suppression system has been evaluated and verified as conforming with the relevant requirements of the following criteria.

1. Australian Standard AS 4487-2013, 'Condensed aerosol fire extinguishing systems—Requirements for system design, installation and commissioning and test methods for components'.
2. International Standard ISO 15779:2011, 'Condensed aerosol fire extinguishing systems - Requirements and test methods for components and system design, installation and maintenance - General requirements'.
3. Australian Standard AS 1851-2012, 'Routine service of fire protection systems and equipment'.
4. NFPA Standard NFPA 2010-2006, 'Aerosol Fire Extinguishing Systems'.

This certification is issued within the scope of CSIRO Verification Services – Rules governing ActivFire Scheme and is valid only for the product(s) as submitted for evaluation and verification of conformity, subject to the following conditions.

- Reference to details, limitations and requirements, where documented as a schedule/enclosure with this certificate.
- The Registrant is responsible for their attestation of conformity and ensuring that on-going production complies with the conformance criteria defined in this certificate.
- This certificate will not be valid if any changes or modifications are made to the product which have not been notified and validated by CSIRO Verification Services.
- This certificate is subject to periodical re-validation upon verification that all requirements, as determined by the conformity assessment body, continue to be satisfactorily met by the Registrant.
- This certificate may only be reproduced in its published form, without modification and inclusive of all schedules/enclosures.
- Any changes, errors or omissions, must be submitted in writing and if necessary or requested, substantiated with relevant evidence.
- Any representations, such as advertising or other marketing related activities or articles shall reflect the correct contents of this certificate and conform with all relevant trade practices and consumer protection legislation and regulations.
- Any terms or conditions of use as applicable to content and documentation as published or accessed through web sites administered by the CSIRO Verification Services.

Issued by

David Whittaker
Executive Officer – ActivFire Scheme



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Limitations/conditions of conformance

Limitations/conditions of conformance, where identified on this certificate, are derived from qualifications from evaluation(s) for conformity and/or other related technical documentation. All details with respect to design, assembly and installation instructions and restrictions should be checked against the producer's current technical manual/data sheets and the requirements of the Authority having Jurisdiction.

Specified limitations/conditions, determined from the evaluation for conformity, include the following.

- i. This equipment is intended for use in normally unoccupied areas. Use in protected areas, which may be occupied, is subject to effective design strategies, requirements and measures for human evacuation which are determined and verified in accordance with the relevant requirements of the regulations, standards and criteria as accepted authorities having jurisdiction.
- ii. Ambient temperature of protected enclosure between -50°C and +65°C. (M2SAG models) and -50°C and +85°C (M2SAG-M models).
- iii. Design and installation shall be done in accordance with the Muster^{II} M2SAG & M2SAG-M Fire Suppression Technical Manual (M2SAGTM01).
- iv. Height limitations height to protected enclosure in accordance with following table.

General Series		M Series	
Generator	Max. enclosure height	Generator	Max. enclosure height
M2SAG-Z3	1 m	M2SAG-M-Z2	1 m
M2SAG-Z6	1.25 m	M2SAG-M-Z6	1.25 m
M2SAG-1	2.0 m	M2SAG-ML-1	2.0 m
M2SAG-2	2.5 m	M2SAG-MS-1	2.0 m
M2SAG-5	3.0 m	M2SAG-M-2	2.5 m
M2SAG-10	3.5 m	M2SAG-M-5	3.0 m
M2SAG-20	4.0 m	M2SAG-M-10	3.5 m
M2SAG-30	4.0 m	M2SAG-MB-10	3.5 m
M2SAG-30E	4.0 m		
M2SAG-50	4.5 m		
M2SAG-50E	4.5 m		

- v. Due to a potential hazard of high temperatures at the end-plate nozzle, the following minimum clearances from the discharge nozzle for each type of generator should be observed during installation

General Series		M Series	
Generator	Minimum clearance	Generator	Minimum clearance
M2SAG-Z3	200 mm	M2SAG-M-Z2	150 mm
M2SAG-Z6	300 mm	M2SAG-M-Z6	300 mm
M2SAG-1	400 mm	M2SAG-ML-1	400 mm
M2SAG-2	700 mm	M2SAG-MS-1	400 mm
M2SAG-5	700 mm	M2SAG-M-2	700 mm
M2SAG-10	1000 mm	M2SAG-M-5	700 mm
M2SAG-20	1,500 to 2,000 mm	M2SAG-M-10	1,000 mm
M2SAG-30	1,500 to 2,000 mm	M2SAG-MB-10 (at each end)	700 mm
M2SAG-30E	1,500 to 2,000 mm		
M2SAG-50	1,500 to 2,000 mm		
M2SAG-50E	1,500 to 2,000 mm		

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Producer's description

The Muster[®], M2SAG/M2SAG-M Series, pyrotechnically generated, aerosol fixed fire suppression system is a pre engineered compact, non-stored pressure, electrically-actuated fixed fire protection system which extinguishes fire by using an extremely fine low settling-rate chemical dry-powder plus inert gases. The powder particles are induced into the fire and quickly cause complete chemical inhibition of the fire's radical-forming chain reactions. This, together with the oxygen dilution and cooling produced by the inert gases, rapidly extinguishes the flaming combustion of most fuels. The chemical dry-powder and inert gases are produced by a rapid but non-explosive exothermic reaction, of a patented "aerosol-forming substance", which commences within the shell of each Muster[®] "generator" immediately after electric initiation. During the reaction, the inert gases and "micron-sized" particles of powdered chemical extinguishant are forcefully ejected from the nozzle holes of the generator and thereby thoroughly mixed with the atmosphere within the protected area. The inert gases emitted by the generator are predominantly nitrogen, carbon dioxide, and water vapour. At a specified minimum clearance from a nozzle opening the aerosol temperature shall not exceed 200°C (CEN, ISO) when in contact with combustible materials and 400°C (CEN, ISO) when in contact with non-combustible materials.

The initiation of the M2SAG/M2SAG-M Series generators is by means of an electrical activation ignition device located inside the generator. Any extinguishing system control panel is likely to be capable of activating one or several generators simultaneously. A suitable panel should be chosen by reference to the Muster[®] Solid Aerosol Generator Fire Suppression Systems Technical Manual (M2SAGTM01) or by consultation with JSG Industrial Technical Team..

The supplied equipment of a Muster[®], M2SAG/M2SAG-M Series, pyrotechnically generated, aerosol fixed fire suppression system includes, mounting brackets, and all necessary fasteners to attach these to the generator. A weather and vibration resistant electrical connector with a plug or a junction box with electrical terminals is furnished with all generators.

The Muster[®], M2SAG/M2SAG-M Series, pyrotechnically generated, aerosol fixed fire suppression system is suitable for use in marine or tropical environments, as evidenced by results of its testing for resistance to vibration, salt-spray corrosion, and moisture ingress. Accidental and deliberate releases of aerosol does not contribute to global atmospheric warming or ozone depletion.

Technical specification

The following details are a representative extract of the technical specification for the Muster[®], M2SAG/M2SAG-M Series, pyrotechnically generated, aerosol fixed fire suppression system and may be subject to change. Complete and current details should be determined from the designated producer's technical manual/data sheets.

Schedule of variant designations

The following is a schedule of validated variant designations of the certified/listed equipment.

Generator	Mass of generator	Mass of aerosol forming composition	Max. protected volume @ 100 g/m ³	Nozzle outlet	Length	Diameter	Discharge times
M2SAG-Z3	360 g	30 g	0.3 m ³	Mono	101 mm	38 mm	20 s
M2SAG-Z6	650 g	60 g	0.6 m ³	Mono	121 mm	51 mm	25 s
M2SAG-1	940 g	100 g	1 m ³	Mono	122 mm	64 mm	30 s
M2SAG-2	1,700 g	200 g	2 m ³	Mono	200 mm	76.2 mm	30 s
M2SAG-5	3,100 g	500 g	5 m ³	Mono	215 mm	89 mm	30 s
M2SAG-10	9,000 g	1,000 g	10 m ³	Mono/Radial	200 mm	220 mm	30 s
M2SAG-20	11,500 g	2,000 g	20 m ³	Mono	254 mm	220 mm	30 s
M2SAG-30	23,500 g	3,000 g	30 m ³	Mono	342 mm	310 mm	35 s
M2SAG-30E	22,000 g	3,000 g	30 m ³	Mono	310 mm	265 mm	35 s
M2SAG-50	27,500 g	5,000 g	50 m ³	Mono	450 mm	310 mm	35 s
M2SAG-50E	26,500 g	5,000 g	50 m ³	Mono	353 mm	265 mm	35 s
M2SAG-M-Z2	300 g	20 g	0.2 m ³	Mono	80 mm	40 mm	5 s
M2SAG-M-Z6	650 g	60 g	0.6 m ³	Mono	160 mm	40 mm	10 s
M2SAG-ML-1	800 g	100 g	1 m ³	Mono	240 mm	40 mm	15 s
M2SAG-MS-1	800 g	100 g	1 m ³	Mono	105 mm	70 mm	15 s
M2SAG-M-2	1,200 g	200 g	2 m ³	Mono	162 mm	70 mm	15 s
M2SAG-M-5	2,300 g	500 g	5 m ³	Mono	242 mm	113 mm	15 s
M2SAG-M-10	8,500 g	1,000 g	10 m ³	Mono	434 mm	113 mm	20 s
M2SAG-MB-10	8,500 g	1,000 g	10 m ³	Bi	434 mm	113 mm	20 s

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Schedule of components and/or assemblies

The following is a schedule of validated components of the certified/listed equipment.

Accessories	Part number
Thermal activation device T-start-45C	M2SAGT-45
Thermal activation device T-start-72C	M2SAGT-72
Thermal activation device T-start-110C	M2SAGT-110
Activation device T-start Manual	M2SAGT-MAN
Detection circuit junction box for T-start/ TAD	M2SAGT-DCJB
Protective cup	M2SAGT-PCUP
High lithium power accelerator for T-start/ TAD with isolation switch	M2SAGT-HLPAIS
Solid electrolyte power accelerator for T-start/ TAD with isolation switch	M2SAGT-SEPAIS
Back up rechargeable power accelerator For T-start/ TAD with isolation switch	M2SAGT-BUPAIS
Thermal activation device TAD-45	M2SAGTAD-45
Thermal activation device TAD-72	M2SAGTAD-72
Thermal activation device TAD-110	M2SAGTAD-110
Thermal activation device TAD-P (manual operation)	M2SAGTAD-RA
Activation device TAD-manual	M2SAGTADTM
FireChase Detection and Actuation System With Isolation Switch	M2SAGFC-DAIS
FireChase Detection and Actuation System	M2SAGFC-DA
FireChase Detection system two circuit	M2SAGFC-D2
FireChase Detection system four circuit	M2SAGFC-D4
FireChase CNC Detection and Actuation System	M2SAGFC-CNCDA
Dual-Output Booster (fully monitored) to increase number of connected canisters or use high current output for ancillaries up to 5Amp	M2SAG-DOB
Junction Box for Monitoring 1 Discharge Line (metal case for industrial panel)	M2SAG-JB1
Junction Box for Monitoring 2(3) Discharge Lines (plastic case for marine & automotive applications)	M2SAG-JB2
Junction Box for Monitoring 4(5) Discharge Lines (plastic case for marine & automotive applications)	M2SAG-JB4
Flush-mounting Plate for Detection and Activation System	M2SAG-FMP
Igniter Interface Unit (IIU) to monitor Discharge line through SFM (1 IIU per canister)	M2SAG-IIU
Supervision Firing Module (SFM) -universal interface to monitor & discharge (up to 10) canisters by any type of Detection and Activation Systems	M2SAG-SFM
Junction Box for Monitoring 2(3) Discharge Lines (aluminum casting case suitable for aggressive environment in marine & automotive applications)	M2SAG-JB2A
Junction Box for Monitoring 4(5) Discharge Lines (aluminum casting case suitable for aggressive environment in marine & automotive applications)	M2SAG-JB4A
Power pack input 240 VAC output 12 VDC 7.2A/h Battery in a box	M2SAG-PP12
Power pack input 240 VAC output 24 VDC 7.2A/h Battery in a box	M2SAG-PP24
12VDC 7.2A/h Back up battery in a box with isolation switch for vehicle and marine applications	M2SAG-BU12
24VDC 7.2A/h Back up battery in a box with isolation switch for vehicle and marine applications	M2SAG-BU24
Sign Illuminated with Sounder EVAC	M2SAG-EVAC
Sign Illuminated with Sounder DNE	M2SAG-DNE

Classifications:

Suitable for fire

Class A – combustible solids
Class B – flammable liquids
Class C – flammable gases
Class E – electrically energised fires

Handling and transport:

In accordance with the requirements for goods classification as U.N. num. 3178
Dangerous Goods Class 4.1, Category C, Hazchem Code 1[T]

Minimum design factor:

Class B and surface Class A fires: 100 g/m³
Dense cable fires: 200 g/m³

Canister characteristics:

Material:

Stainless steel (M2SAG models)
Stainless or galvanised mild steel (M2SAG-M models)

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Temperature range:	-50° to +65°C (M2SAG models); -50° to +85°C (M2SAG-M models)
Humidity range of application:	0 - 98%, non-condensing
Shock:	Tested at 10g for >13,000 impacts
Vibration:	5g @ 50 - 250Hz
Corrosion resistance:	Exceeds UL 1058 requirements
Aerosol characteristics:	
Minimum particle size:	1 micron
Oxygen level:	17% to 20% (typical)
Electrical activation:	
Nominal resistance:	0.6 - 5.0 Ohms (depends on model)
Activation current:	100 - 1500 mA (depends on model)
Actuation time:	2 -10 milliseconds
Service Life:	5 - 10 years