

Fan integrity Testing is NOT APPLICABLE to Aerosol Fire Systems

There is no general method to evaluate Duration of Protection with Aerosol compounds – **as such fan integrity testing is not applicable** to Aerosol Fire Systems. Each manufacturer is to **specify Maximum leakage** allowed in the design calculations for each risk area.

Extract from AS4487-2013 Clause 7.6 – Duration of Protection

“Due to the specific characteristics of the extinction process of condensed aerosols that primarily produce particulates, **no method is known to evaluate the hold time in real installations**, other than real discharge which is not practical. For this reason, a specific test is required for each aerosol formulation to determine the maximum leakage area to volume ratio that provides for the minimum hold time declared by the manufacturer. The approach for determining hold time is detailed in Appendix E, Paragraph E7.”

Background - The board of experts at the ISO TC21 SC8 (Gaseous Media and Fire Fighting Systems Using Gas) and the working group in charge to develop the ISO 15779 Standard for condensed aerosol extinguishing systems, after a long debate recognized the impossibility to measure accurately the resulting aerosol agent density generated by the solid compound reaction, due to the aerosol extinguishing agent specific characteristics (micro solid particles, the active agent, carried by a gas), thus the impossibility to derive a formula of leakage compensation.

The door fan test applied for gas agents, which is linked to a formula correlating the pressure upon discharge and the quantity of gas escaped as per leakage area, it is only applicable for measurable gaseous agents.

Aerosol agents' density is not measurable.

The only way to address this issue is to run experimental tests (for the specific aerosol technology) and derive the leakage compensation ratio versus different leakage areas. ISO 15779 Standard defines the test protocol at Section D7: Test of the determination of the maximum leakage area/volume ratio.

FirePro have applied a leakage area after a number of tests with different fire scenarios, especially the ones run for the UL listing test program, witnessed by UL. The standard sealed test room of 100 m³ volume had a venting opening of 0.3m x 0.2m (one way flap) and the measured pressure was equivalent to 174 Pa, or 0.025 psi or 0.0017 bar.

The tests run with the opening were using the extinguishing application density but in the real projects the design application density is applied (which is 30 % higher than the extinguishing density), the additional safety factor ensures that the leakage area indicated will not affect the extinguishing performance.

For existing installations using Aerosol Systems **leakage areas should be reviewed against the Maximum Leakage Allowance** as disclosed on the Design Calculations. Any changes or modifications to the risk area should be analysed to determine if the system will perform as designed.

CERTIFICATION	GENERAL APPLICATION				
CLIENT NAME					
Risk Description					
Constructed from					
Classes of Fire	<input checked="" type="checkbox"/> Class A <input checked="" type="checkbox"/> Class B <input checked="" type="checkbox"/> Class E <input type="checkbox"/> Class D <input type="checkbox"/> Class F				
STREAM (m)					
GROSS DIMENSIONS (All in Meters)	Length	Width	Height	Enter VOLUME	Not Used
	10.00	5.00	2.00	=	m ³
	Actual Leakage Measurement - m ²				= m ²
	Leakage Allowance without additional Agent				= 0.20 m ²
	GROSS Volume used for Calculation				= 100.00 m ³
	PRIMARY AGENT DISCHARGE				10,920 g
	Secondary Agent Discharge				- g




Fan Integrity Testing Software – where a fan integrity test is completed on a risk, and a report is generated, this report should be heavily scrutinised, before sending to the client.

A recent review of a Report Generated by "Retrotec Fantestic Integrity"– Software Version 5.11.80, revealed a number of issues and incorrect statements:

- The initial reference from the report is to ISO 15779:2010, this standard does not exist – the relevant ISO standard should be ISO 15779:2011. In Australia all installations are done in accordance with AS 4487. **The report also states that Test is required by ISO15779** – this is incorrect the standard says the opposite.
- The Agent identifiers show Aerosol – Does not identify the Manufacturer, and each Aerosol has different characteristics with reference to Hold times and leakage, and discharge pressure.
- Application Density numbers in the report are completely wrong. Min Application Density is shown at 84g/m³ which is incorrect AS and ISO both stipulate that a safety factor of 30% is added so the Min Application Density should be 109.2g/m³, and the initial application density should come from the actual design calculations for the risk area – not sure if this is accurate.
- Enclosed Pressure limit of 500pa on this basis the report is saying "Calculations predict a maximum positive peak pressure of **2,252 Pa**. The enclosure **FAILS** this acceptance procedure because this predicted pressure is greater than the specified maximum enclosure pressure limit of 500 Pa." And then in the next statement **"No data is available to calculate peak pressure for Aerosol agents. Unable to calculate peak pressure result"**
- Temperature and altitude considerations and comments in the Fan Test report are both irrelevant as again both standards state "...Temperature, as with altitude, has no effect on condensed aerosol design application density calculations"

EXTRACT from REPORT

		FanTestic Integrity ver: 5.11.80	
Test date:	2021-02-24	By: XXXXXX	Certification: X
Enclosure conditions prior to discharge		Extinguishing agent details	
Net protected volume, V [m ³]	78	Agent	Aerosol
Max flooded height, H _o [m]	3.0	Quantity [kg]	8.7
Protected height, H _p [m]	2.3	Type	Aerosol
Design temp, T [C]	20.0	Discharge time, [s]	60
Enclosure pressure limit, [Pa]	500	Mixing during hold time	Yes
Specified Hold Time, [min]	10	Initial application density, [kg/m ³]	0.1115
Elevation, [m]	0	Minimum density, [kg/m ³]	0.084

Hold Time compliance – Aerosol – required by ISO 15779 - Equations based on AS - ISO 14520 (2009)

Calculations predict that the extinguishing agent concentration will fall from the Initial density of 0.1115 kg/m³ to the minimum of 0.084 kg/m³ in **10.8 minutes**. The enclosure **PASSES** this acceptance procedure because this hold time is greater than the specified minimum of 10 minutes. Results were calculated based on a user-entered protected height rather than the Standard specified calculated H_e. Protected height was entered by user instead of using the Standard specified 90% of flooded height. Minimum concentration was entered by user instead of using the Standard specified 85% of Design concentration.

Peak Pressure compliance using VdS equations

No data is available to calculate peak pressure for Aerosol agents. Unable to calculate peak pressure result. Calculations predict a maximum positive peak pressure of 2,252 Pa. The enclosure **FAILS** this acceptance procedure because this predicted pressure is greater than the specified maximum enclosure pressure limit of 500 Pa.

It is expected that future releases of the Software will address these issues