

**Jactone**<sup>®</sup>

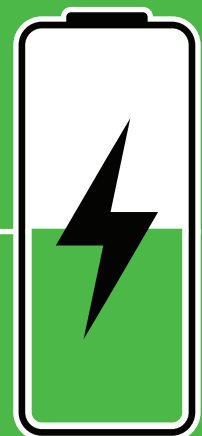


**FIREBLOCK**



# Jactone Lithium-ion Battery Fire Extinguishers

Incorporating  
**FIREBLOCK LITHIUM**



# Lithium-ion Batteries

## › What are they?

Lithium-ion battery packaging consists of the following generally recognised formats :



**Cylindrical**



**Prismatic**



**Pouch Cell**

Units of construction within lithium-ion batteries?

**The smallest unit is a Cell**



**Many Cells make a Module or String**



**Many Modules or Strings make a Battery Pack**

There are a variety of lithium-ion battery chemistries, including :

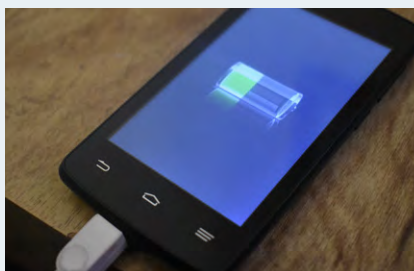
- Lithium Nickel Manganese Cobalt Oxide (NMC) • Lithium Iron Phosphate (LFP) • Lithium Nickel Cobalt Aluminium Oxide (NCA)
- Lithium Nickel Cobalt Manganese Aluminium Oxide (NCMA) • Lithium Cobalt Oxide (LCO) • Lithium Manganese Oxide (LMO)

## › Where are they?

Lithium-ion batteries are present in an extremely wide and diverse range of equipment, including :



**E-Cigarettes**



**Mobile Phones & Tablets**



**Laptops**



**Power Tools**



**E-Scooters**



**E-Bikes**

## Lithium-ion Battery Fires

### › How are they caused and what are the risks?

#### Causes

In a world where there is an increasing use of lithium-ion batteries for energy storage, it is clear that this has led to a corresponding increase in the specific fire risk from devices that contain them.

Fire risks from lithium-ion batteries can be the result of a variety of abuse events impacting on batteries, including :

- **Overheating**
- **Penetration / Mechanical damage**
- **Overcharging**

#### Risks

Fires involving lithium-ion batteries are caused by the release and subsequent ignition of flammable organic solvents / gases and plastic components contained in battery constructions.

In addition to the release of flammable materials, is the associated release of toxic compounds that, in themselves, present a significant risk, both during a fire and also during subsequent post-fire clean-up operations.

Such toxic compounds can include, but are not limited to : **Hydrogen Fluoride Hydrogen Cyanide, Hydrogen Chloride, Sulphur Dioxide and Nitrogen Oxides.**

The presence of such materials presents a significant personnel risk and risk assessments should consider best practice and safe clear-up methods after any toxic agent discharges.

### › How do they develop?

**Lithium-ion battery fires, once initiated by any of the abuse mechanisms often develop in several distinct phases. It is important in determining how we can tackle such fires to have a clear understanding of those phases, which will determine what is achievable in any extinguishing action.**

Lithium-ion battery fires often start at an individual cell level. Any abuse can lead to the **stable electrochemical processes** within a battery being replaced by **unstable chemical processes**.

It is those chemical processes that can lead to the instability of **'Thermal Runaway'**. Chemical processes generate gases and produce heat. Increased heat leads to a chemical process producing more heat and more off-gassing. When heat generation exceeds the ability to dissipate heat, this leads to thermal runaway.

Once individual cell thermal runaway is firmly established, it is often difficult to interrupt, but there is a window of opportunity where suitable agents can increase heat dissipation and arrest the process.

Should thermal runaway not be prevented or arrested at individual cell level, then the next opportunity for intervention is to prevent **'Thermal Propagation'** to adjacent cells.

By focusing on these two mechanisms of enhanced heat dissipation and prevention of thermal propagation, we can see that agents that have advanced performance in these two areas will provide an opportunity to tackle lithium-ion battery fires.

## What is it and how does it work?



**FIREBLOCK LITHIUM** is a specialised gel that is used to extinguish lithium battery fires with different chemistries and cell types.

**FIREBLOCK LITHIUM** is non-toxic and a 100 percent biodegradable.

**FIREBLOCK LITHIUM'S** unique composition has a tremendously strong flame knockdown and cooling effect.

**FIREBLOCK LITHIUM** has the ability to attach to surfaces with a low run off property.

**FIREBLOCK LITHIUM** reduces the temperature significantly of the battery pack.

Tests have shown that on all lithium-ion battery fire tests, where **FIREBLOCK LITHIUM** has been applied, the battery temperature has been reduced in under a minute.

After spraying a lithium cell / module / battery, it has been shown that thermal runaway can be arrested, and the temperature of the battery has been shown to cool dramatically.

**FIREBLOCK LITHIUM** can act as a 'fireblock' between adjacent cells in a battery pack preventing thermal propagation.

Runoff with **FIREBLOCK LITHIUM** is minimal with less than 10% runoff of the amount sprayed on a flat surface.

With such a small quantity of runoff there is less chance that the product will contaminate the surrounding environment with chemicals from the lithium batteries by running into drains and / or water sources.

The toxic smoke emitted, after applying **FIREBLOCK LITHIUM** on a lithium-ion battery fire, is reduced substantially to an amount that will not greatly affect the environment. Due to reduced off-gassing, **FIREBLOCK LITHIUM** will reduce the risk of explosion events, particularly in enclosed spaces.

### Visual Identification

**FIREBLOCK LITHIUM** can be identified by its colour and texture.

- It is green in colour
- High viscosity gel
- Odourless

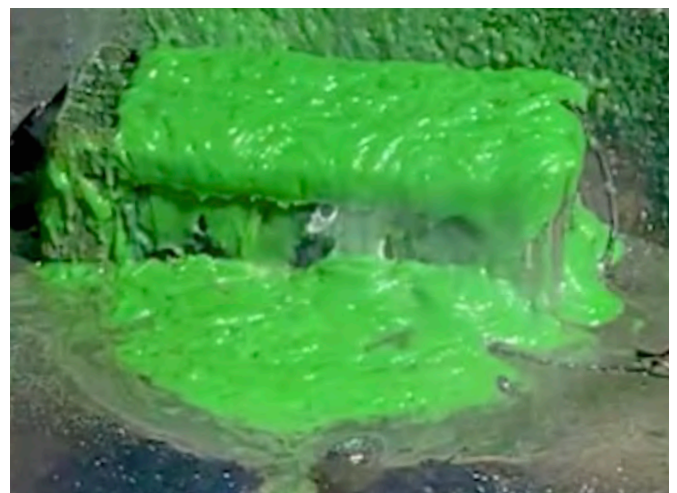
### Other Characteristics

pH level : 6.5 – 8.5

Flash Point : Non-flammable product

Freezing Point : 0 Degrees Celsius

See **Material Safety Data Sheet** - available separately



# Lithium-ion Battery Fire Extinguishers

The Jactone range of Lithium-ion Battery Fire Extinguishers incorporate **FIREBLOCK LITHIUM** gel, a unique agent with superb performance features to tackle lithium-ion battery fires.



All units are manufactured in the UK, and carry both the CE and UKCA marks.



	EGS2	EGS6	EGS9
▶ <b>PRODUCT CODE :</b>	EGS2	EGS6	EGS9
▶ <b>CAPACITY :</b>	2 Litres	6 Litres	9 Litres
▶ <b>MEDIUM :</b>	FIREBLOCK LITHIUM Gel	FIREBLOCK LITHIUM Gel	FIREBLOCK LITHIUM Gel
▶ <b>PROPELLANT :</b>	Nitrogen gas	Nitrogen gas	Nitrogen gas
▶ <b>FILLED &amp; EMPTY WEIGHTS :</b>	Filled 3.4kg   Empty 1.4kg	Filled 9.9kg   Empty 3.85kg	Filled 14kg   Empty 4.9kg
▶ <b>NOMINAL DISCHARGE TIME :</b>	9 seconds	42 seconds	49 seconds
▶ <b>OPERATING PRESSURE :</b>	15 bar at 20 °C	15 bar at 20 °C	15 bar at 20 °C
▶ <b>TEST PRESSURE :</b>	27 bar	27 bar	27 bar
▶ <b>OPERATING TEMP RANGE :</b>	+5°C to +60°C	+5°C to +60°C	+5°C to +60°C
▶ <b>PACKING SPEC (HxWxD) :</b>	460 x 160 x 108mm	529 x 177 x 177mm	552 x 205 x 205mm

# Performance

## > Fire Tests

The performance of the Lithium-ion Battery Fire Extinguisher range has been assessed in a comprehensive series of fire test scenarios, demonstrating the clear benefits of **FIREBLOCK LITHIUM** gel in operation.

Fire testing has been performed on all cell types, **Cylindrical**, **Prismatic** and **Pouch**. We provide a series of links below to videos, which detail the cell types and total energy capacity of cells / modules used in each test.

### Cylindrical

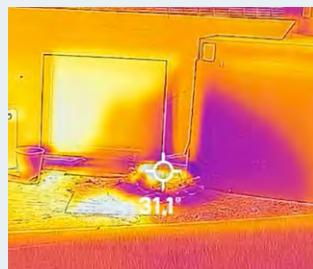
Small Cluster | 150wh | 2 litre Fire Extinguisher



Battery and Temperature



Quick Flame Knockdown



Immediate Cooling Effect



Outcome

### Prismatic

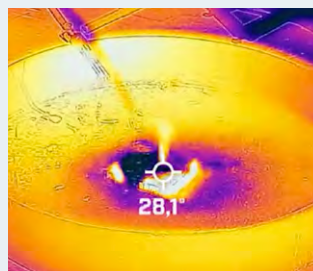
320wh | 6 litre Fire Extinguisher



Battery and Temperature



Quick Flame Knockdown



Immediate Cooling Effect



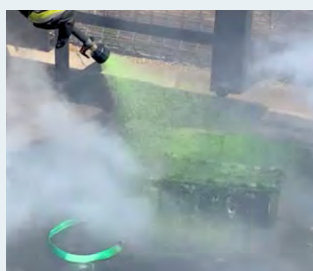
Outcome

### Cylindrical

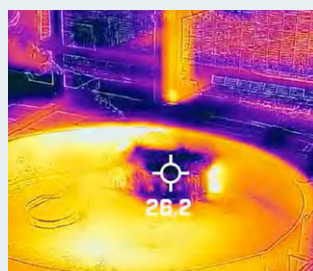
Large Cluster | 2000wh | 9 litre Fire Extinguisher



Battery and Temperature



Quick Flame Knockdown



Immediate Cooling Effect



Outcome

# Performance

## Applications

With the capacity data from each fire test, it is important to quantify the type and equivalent size of batteries in typical equipment that utilise lithium-ion batteries.

Please use the below as a guide for selecting the appropriate unit for your protection.

EGS2 - 2 litre	EGS6 - 6 litre	EGS9 - 9 litre
		
<p><b>Typical Risks</b></p>	<p><b>Typical Risks</b></p>	<p><b>Typical Risks</b></p>
<div> <p>Mobile phones and tablets</p> </div> <div>  </div> <hr/> <div> <p>Laptops</p> </div> <div>  </div> <hr/> <div> <p>Small power tools</p> </div> <div>  </div> <div> <p>Typical Battery Capacity Ranges: Up to 150wh</p> </div>	<div> <p>Power tools</p> </div> <div>  </div> <hr/> <div> <p>Some E-scooters and E-bikes</p> </div> <div>  </div> <div> <p>Typical Battery Capacity Ranges: Up to 500wh</p> </div>	<div> <p>Large E-scooters</p> </div> <div>  </div> <hr/> <div> <p>Large E-bikes</p> </div> <div>  </div> <div> <p>Typical Battery Capacity Ranges: Up to 1000wh</p> </div>

**NOTE :**

Battery capacity above is given as a guide. The ability to extinguish any fire will be impacted by battery configuration and cell exposure to the cooling capacity and thermal insulation properties of the **FIREBLOCK LITHIUM** gel. However, we let the videos provide evidence and indications of such performance.



**A SPECIALISED GEL  
USED TO EXTINGUISH  
LITHIUM BATTERY FIRES**

**NON-TOXIC AND 100%  
BIODEGRADABLE**

**COOLS BATTERY  
TEMPERATURE  
WITHIN SECONDS**

**CAN ARREST AND PREVENT  
THERMAL RUNAWAY AND  
THERMAL PROPAGATION**

**REDUCES EMISSIONS OF  
TOXIC SMOKE, LOWERING  
EXPLOSION RISKS**



**FIREBLOCK**

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