

DRY CLOUD –

(Basics - technical info)

Effective-Predicative-Lower Cost! International Patent pending – IP family in Germany (DPMA) granted. German engineering. Developed in Germany.

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- Developed as the effective **DryCloud** fire protection solution for the regenerative based society and electro mobility, suitable especially for Li-Ion or Lithium batteries or others related, large format type,
- German engineering using components made by the global leaders,
- Acts iterative and predictable & predicative, for instance so far only if a corrosive material leakage will happen, ...

- **DryCloud** solution: resources saving (reducing the costs and safety-risk in significant matter in case of fire Li-Ion-Batteries or other high fire loads involved),
- Operates in one option under use of highly effective fire suppression tools in open and indoor spaces. The agent typically will expand at high ratios, between preferred 400:1 and 1000:1 depending on the type of generator and operating pressure. This rapidly forms voluminous foam to suppress fires and vapors by submerging the fire and cutting off the oxygen supply. The solution is well documented and supported by the leading global vendor.
- Can completely flood large rooms and enclosures to effectively suppress three-dimensional fires while reducing water usage and minimizing damage.
- Foam option can also effectively reduce vapor concentrations downwind from hazardous low boiling point gaseous products.

- **DryCloud** can (fast) suppress strong and normally long lasting fires involving combustible solids. Usable with most conventional high expansion foam equipment.
- Removal of Oxygen and strong stick effect, cooling and longer adhesive, will, depending from the design-in of the energy storage solution, stop fire propagation effect.

- **DryCloud**- lower cost in comparison to light foam, sprinkler and conventional firefighting system.
- Lower Capex and TCO-rate,
- Will protect our environment (full smoke absorption almost near),
- No structural invention in buildings necessary, no pressure build up,

DryCloud- typical, exemplary appearance foam option.



Source: right Li-Ion-Battery covered in Nordhausen –Envites Energy

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Innovative Process Dry Cloud: EN Norm or NFPA compliance
(DIN EN13565-2 as example)

Dry Cloud

DryCloud: Spray cans fire extinguished – freight compartment

Hazardous heat core covered, Infrared, temperature above the DryCloud ca. 20 °C possible only!

Dry Cloud Smoke-filled air turns into Smoke-filled foam without pressure buildup!

DryCloud system can be used in:

- Li-Ion Batteries, other Energy systems, Engine rooms ...
- Warehouses, Transformer buildings,
- Production, Testing, R&D, Energy Systems (IV and HV)
- Underground storage facilities, Basements, Hangars...

Product Features

- Stainless steel body and bronze nozzles
- Low weight
- Easy to install
- Large area coverage
- Suitable for indoor and outdoor use
- 1" mounting flange included



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Specific Risk/Hazard	Dry Cloud
Jet flames	Strong suppression - no longer perceptible.
Fire & Propagation	Strong suppression and cooling. stop the propagation effect, reduce the event on minimum: fast and efficient.
Smoke & Pressure	Since smoke is transferred into dry cloud material (solid), sustainable foam. No pressure!
HF- H2 – others , Breathing possible?	Tbd one step to neutralize /inhibitor- no danger! No restriction on breathing, no dangerous heat (outside DryCloud).
Ignition of explosive gas mixtures / Backfire in the flue gas/Explosion	No free Gas. not possible. No open fire.
Environmental hazard in cleaning or disposal	Material itself is not environmentally dangerous. after the event some used material shall be special waste, in the EU regs no problem to handle.
How long does it work?	It is an engineered solution, for certain application you find normal inspection regime for. durable and returnable for many years. Dry Cloud is stable still Happy Landing (9 hours).

SPECIFIC HAZARD VS. DRY CLOUD

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S4 – Neutralizing HF and comprehensive integration of respiratory toxins, no propagation.

S5 - Dry Cloud itself. -1400°C.

S4 + S5 Again S4 + Reaction Accelerator + Inhibitor option.

S6 – Jet Flames, dangerous heat: Dry Cloud stable buffering, long lasting (reaction time of event could be significant)

S4 - Immediate measure to address & to eliminate residual hazard

Dry cloud will react to an event redundant, predicative and on the principle of safety first.

DRY CLOUD - PREDICATIVE DRY CLOUD - WILL FLEXIBLE RESPOND

- The solution includes the highly effective insulation against harmful heat sources, will significantly curb the fire following the description and the invented solution.
- The material and the system could be arranged excellent and are easy to operate and to remove. When an event occurs, only a small part is damaged.
- Furthermore, electrical insulation properties through the material will be increased or restored, esp. in case of an event.
- It is a reusable solution specifically designed for the transport, storage and battery assemblies, thus it is indeed a reusable solution specifically suited for transport of for instance also normal and regular shipping of Li-Ion, Li-Polymer, Li-Metal (class 9 hazmat) in larger quantity by CAO (Cargo Aircraft Only (and PAX)).
- Besides, almost all inflammable fluids were smothered due to the secured by three times the capacity of the material (option of handling for defective or suspicious ESS).