Dry Chemical Powder Systems

Fire Protection Solutions

Dry Chemical Powder (DCP) Systems

Forward

Dry Chemical Powder systems are mostly used to suppress combustible liquid and gaseous hazards, they have proven to be very effective systems for inhibiting the fire growth.
Dry chemical systems use sodium, potassium bicarbonate or monoammonium phosphate particles as inhibitors for the combustion process. The dry chemical powder is transported in a flow of Nitrogen forming a bi-phase gas/

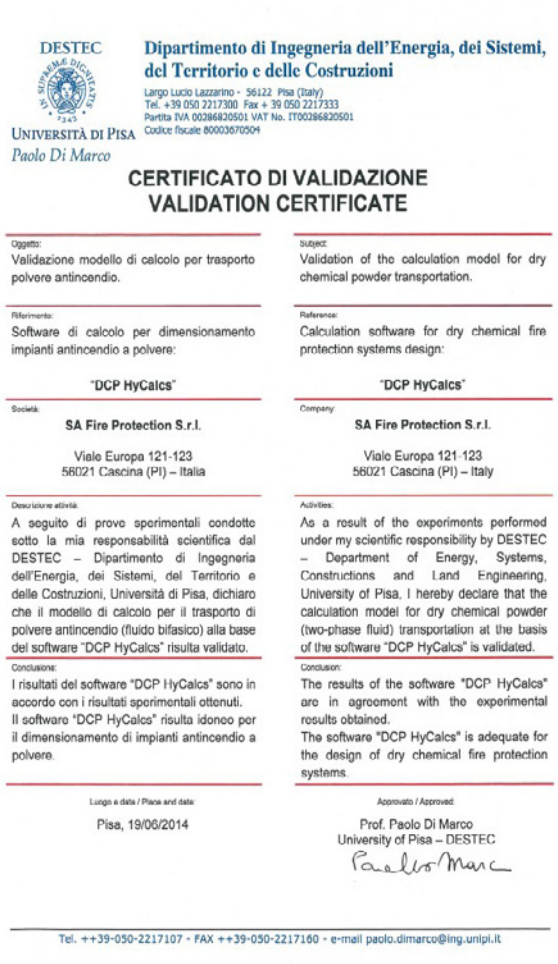
mass stream and is directed towards the burning surface of a protected target. Upon discharge on the fires, the particles penetrate and surround the fire atmosphere
which is causing the combustion reaction. The dry chemical particles, in contact with the fuel and the strong heat, interact with free radicals in place of the Oxygen resulting in the combustion chain being inhibited and therefore suppressing the fire.

System types & Calculation Methods

Dry chemical systems are available in different configurations and sizes depending on the application. SA Fire manufacture bespoke configurations tailored to meet industrial requirements for the Naval, Offshore and Petrochemical industry.
The packages can be for fixed installations (with a 100% twin back up system for single or multizone protection), or mobile on trailers for first attack and emergency response brigades.
Fixed type systems deliver the dry chemical through a piping system to discharge terminals such as fixed nozzles, monitors and hose reels.
Each system is Engineered according to:

- The project specification
- Type of protection
- Installation layout.

The distribution of dry chemical is in fact a bi-phasic solid-gas flow stream which requires complex mathematical modelling for the calculation of the residual pressure at the nozzles; therefore, determining the nozzle sizing.
In this respect, SA Fire has developed and validated a flow



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CERTIFICATO DI VALIDAZIONE
VALIDATION CERTIFICATE

Oggetto:
Validazione modello di calcolo per trasporto polvere antincendio.

Riferimento:
Software di calcolo per dimensionamento impianti antincendio a polvere:

"DCP HyCalcs"

Società:
SA Fire Protection S.r.l.
Viale Europa 121-123
56021 Cascina (PI) – Italia

Descrizione attività:
A seguito di prove sperimentali condotte sotto la mia responsabilità scientifica dal DESTEC – Dipartimento di Ingegneria dell'Energia, dei Sistemi, del Territorio e delle Costruzioni, Università di Pisa, dichiaro che il modello di calcolo per il trasporto di polvere antincendio (fluido bifasico) alla base del software "DCP HyCalcs" risulta validato.

Conclusione:
I risultati del software "DCP HyCalcs" sono in accordo con i risultati sperimentali ottenuti.
Il software "DCP HyCalcs" risulta idoneo per il dimensionamento di impianti antincendio a polvere.

Luogo e data / Place and date:
Pisa, 19/06/2014

Subject:
Validation of the calculation model for dry chemical powder transportation.

Reference:
Calculation software for dry chemical fire protection systems design:

"DCP HyCalcs"

Company:
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Activities:
As a result of the experiments performed under my scientific responsibility by DESTEC – Department of Energy, Systems, Constructions and Land Engineering, University of Pisa, I hereby declare that the calculation model for dry chemical powder (two-phase fluid) transportation at the basis of the software "DCP HyCalcs" is validated.

Conclusion:
The results of the software "DCP HyCalcs" are in agreement with the experimental results obtained.
The software "DCP HyCalcs" is adequate for the design of dry chemical fire protection systems.

Approvato / Approved:
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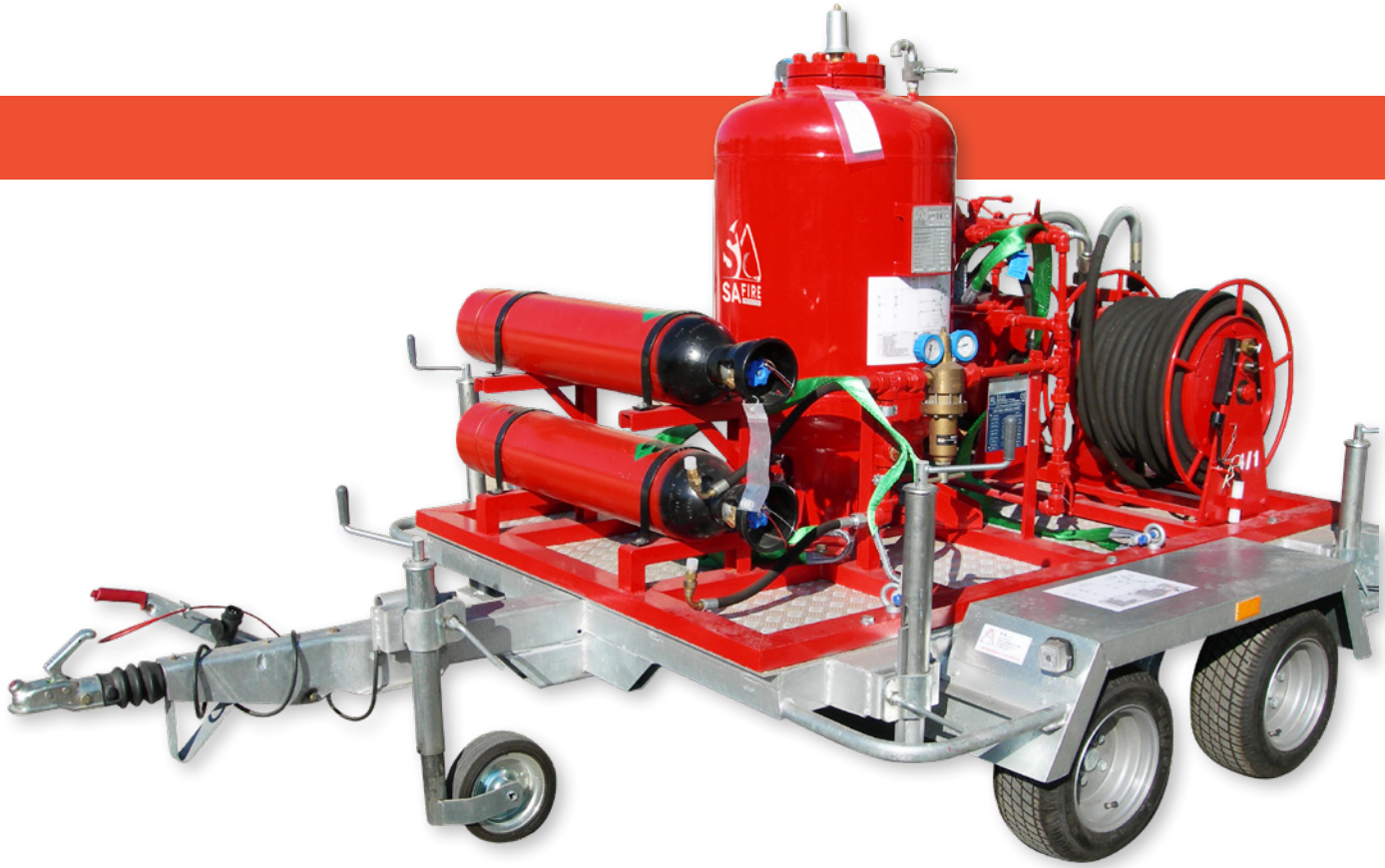
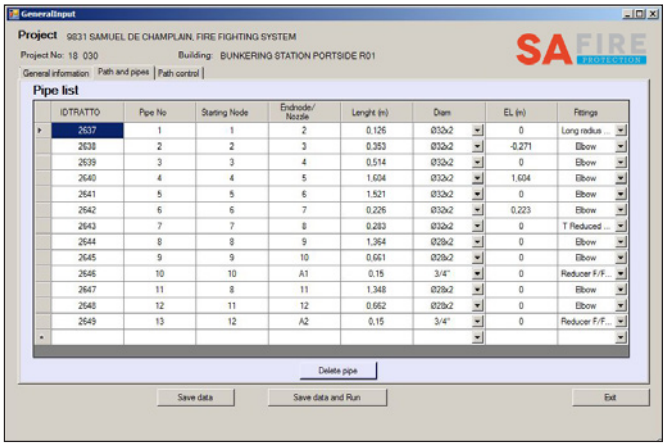
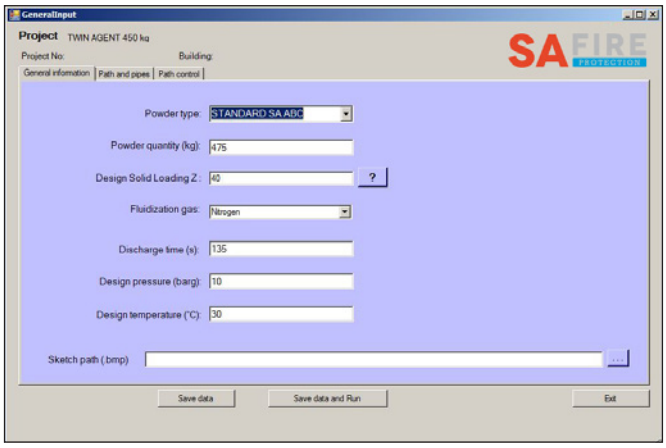
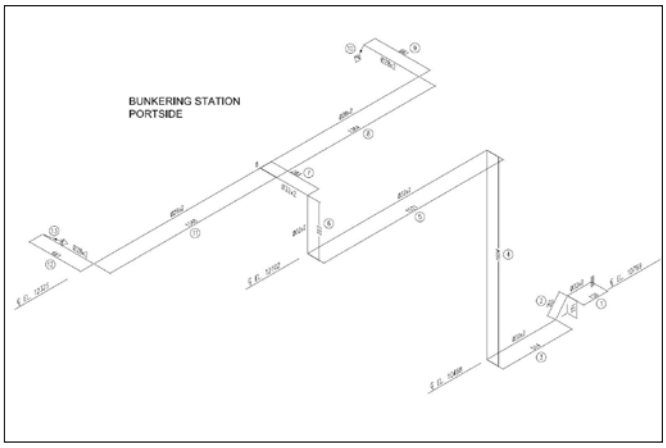




calculation model which is capable of predicting pressure loss in pipes and fittings, as well as calculating DCP nozzle orifices according to the required discharge flow rate.
This computerised model named “HyCalcs” allows fire engineers to engineer a DCP system to real and their specific hazard conditions. The calculation software is able to determine pressure loss and also to modulate the optimum mass ratio of Nitrogen and DCP particles to travel distances into impervious piping systems.





Overview & Operational Principle

Dry chemical systems can be manually or automatically operated. The automatic system is connected to a Fire & Gas detection panel which is interconnected with field detectors and upon confirmed fire will activate the DCP discharge. DCP Skids can be equipped with SIL 2 actuation units or SIL 2 actuators for selector valves to form SIL 2 compliant fire suppression packages.

The manual system instead is equipped with pneumatic pilot cylinders which activate the propellant nitrogen and the required selector valve pneumatically.

For both DCP units the propellant gas is injected into the DCP tank through a sophisticated injection system. Once the units reach the pressure setting, the main discharge opens and the dry chemical is discharged into the distribution system to the discharge terminals.

Application

Dry chemical systems and hardware can be used for a number of petrochemical applications (such as loading decks and docks, offshore loading platforms, machinery spaces and process areas), for LNG and LPG applications (spherical tanks, FPSOs, vent valves), as well as utility applications (oil filled transformers, lubricant pumps and tank, etc).