Darshield[™] Rigid Enclosure Passive Fire Protection Systems

Darchem's Darshield[™] rigid Passive Fire Protection system is designed as a high performance solution to meet the most demanding requirements for protection of critical flow and process equipments from Hydrocarbon Pool Fire and Jet Fire conditions. Offering up to 120 minutes protection, Darshield[™] can be fitted to valves, actuators, air tanks, instrument panels and other safety critical equipment to enable a controlled shutdown in the event of a fire.

Darshield[™] PFP systems have been supplied extensively worldwide for both Onshore and Offshore Oil & Gas and Petrochemical installations.



Incorporating high performance thermal insulation materials encapsulated by stainless steel skins, Darshield[™] is supplied in pre-fabricated panel form for assembly and installation onsite or in the factory. Forming a rigid PFP enclosure, the panels are held together using bolts and captive nuts, with the final construction providing the necessary structural integrity to withstand the specified fire and blast conditions.

Where access to equipment control mechanisms is required, doors are designed within the appropriate panels; or alternatively the panels themselves can be fixed together with quick release clamps. The transition of services (electrical cables, hydraulic or pneumatic pipes etc) into the enclosure is achieved via the use of closure plates and seal bags.





Esterline

Each Darshield[™] system is engineered from equipment manufacturer drawings and checked against potential site conditions to take into account of possible space restrictions. Lloyds Type Approval certification ensures that each Darshield[™] installation, inclusive of access hatches and transition points, meets with customer fire specifications.

Darshield[™] Design Specification

- Fire Condition Hydrocarbon Pool Fire and Jet Fire up to 120 mins
- Blast Protection Up to 1.6 bar
- Limiting Temperatures As per project requirements, with Lloyds approved Offtranp software calculations to be issued to clients for each item of equipment protected.

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Optimisation of Insulation Thickness

Darshield[™] rigid enclosures are designed to limit the temperature rise of the protected equipment in the event of a fire and enable operation for a specified time period.

Lloyds approved thermal transient software called 'Offtranp' calculates the optimal insulation thickness for each PFP application; and ensures that the thickness of the insulation is kept to the absolute minimum while still protecting the equipment as per stipulated fire conditions.

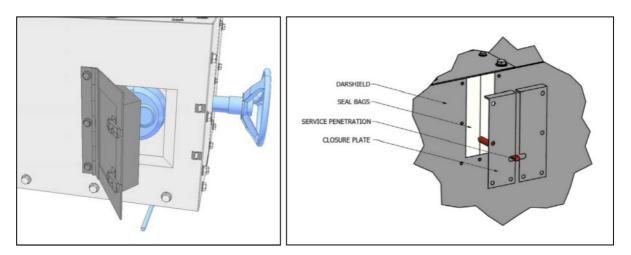
Optimisation of Darshield[™] enclosures utilising Offtranp takes into account the following criteria, specific to each item being protected:

- Type of fire
- Duration of Fire
- Limiting temperature rise
- Ambient and operating temperatures
- Mass of the equipment to be protected
- Exposed surface area

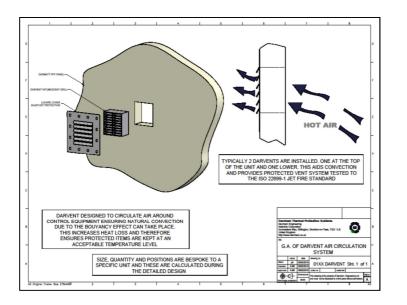
Hatches and Penetrations

Inspection hatches can be provided for each Darshield[™] PFP system to provide quick access to areas that require regular inspection or maintenance. It is important that the client identifies any requirements for hatches and penetrations as early as possible such that they can be incorporated into the PFP system's design.

Penetrations for operating mechanisms, hydraulic tubing and position indicators etc. can also be provided to facilitate problem-free operation and maintenance of equipment without the need to remove the enclosure. Incorporation of hatches and penetrations are approved within the Lloyds Type Approval certification for Darshield[™]. The system is designed such that installation at site can be achieved without disconnection of associated cables, piping etc.



Also, Darvent[™] intumescent grills can be incorporated at customers request to allow for ventilation and air circulation around the protected equipment.





Darshield[™] and Darmatt[™] Hybrid Systems

Darshield[™] and Darmatt[™] flexible jacket PFP systems can be combined to produce a Hybrid enclosure offering the benefits of both designs:









- Darshield[™] doors applied to regular access areas and enhance durability
- Darmatt[™] jackets used where access is not required and space is at a constraint
- Hybrid combination helps reduce material costs

Testing & Certification

Since its introduction the Darshield[™] PFP System has been tested repeatedly to prove its capability as a PFP system. As a minimum Darshield[™] enclosures are tested to the requirements of BS476 part 20 for UL 1709 for Hydrocarbon Pool Fires, and the OTI 95 634 standard for "Jet Fire Resistance Test of Passive Protection Materials".





Darchem Thermal Protection



Lloyds Type Approval Certificate for Darshields™



CERTIFICATE OF FIRE APPROVAL

This is to certify that

The product(s) detailed below will be accepted for compliance with the applicable Lloyd's Register Rules and Regulations for use on offshore and onshore installations classed with Lloyd's Register, and for use on offshore and onshore installations when authorised by contracting governments to issue the relevant certificates, licences, permits etc.

Manufacturer	Darchem Engineering Limited
Address	Ironmasters Way Stillington Stockton-on-Tees Cleveland, TS21 1LB United Kingdom (UK)
Туре	FIRE PROTECTION ENCLOSURE SYSTEM
Equipment Description	Fire Resisting Rigid Enclosure System – Type: "DARSHIELD" for Hydrocarbon and Jet Fire Exposures up to 120 minutes
Specified Standard	British Standard BS 476: Part 20, EN 1363-2 , AMD 6487 and UL1709 (Hydrocarbon Fire Exposures) and Large Scale Jet Fire Testing

The attached Design Appraisal Document forms part of this certificate. This certificate remains valid unless cancelled or revoked, provided the conditions in the attached Design Appraisal Document are complied with and the equipment remains satisfactory in service.

Date of issue	7 October 2011	Expiry dat	te 6 October 2016
Certificate No.	SAS F110391	Signed	Lloyd's Ragistar Elita Lloyd's Register
Sheet No	et No 1 of 5		M. Farrier Surveyor to Lloyd's Register EMEA A Member of the Lloyd's Register Group

Note:

This certificate is not valid for equipment, the design or manufacture of which has been varied or modified from the specimen tested. The manufacturer should notify Lloyd's Register of any modification or changes to the equipment in order to obtain a valid Certificate.

*Llovd's Register, its affiliates and subsidiaries and their respective officers, employees or agents are, individually and collectively, referred to in this clause as the 'Lloyd's Register Group'. The Lloyd's Register Group assumes no responsibility and shall not be liable to any person for any loss, damage or expense caused by reliance on the information or advice in this document or howscever provided, unless that person has gaped a contract with the relevant Lloyd's Register Group entity for the provision of this information or advice and in that case any responsibility or liability is exclusively on the terms and conditions set out in that contract."



Darshield applications include – protection of valves, actuators, control boxes and instrumentation











Protection of rigid risers - Darsplash™

Darsplash rigid riser fire protection is a development of Darshield. The Darsplash system is fully seal welded to prevent water ingress, with the completed units being protected using "Anti-Fouling" coats of paint. Designed for a life span of twenty plus years, it is constructed from a rigid Stainless steel 316 construction encapsulating ceramic fibre, and uses standard angle fixings bolting panel to panel together. Neoprene gasket can be incorporated between the riser and the inner skin of the Darsplash and also between bolted joints if required.

Darsplash is designed to withstand a hydrocarbon flame and Jet Fire temperatures in excess of 1200°C for periods up to 120 minutes, controlling the temperature rise of the protected equipment to below its limiting temperature.



Darsplash examples



Darchem Thermal Protection, Darchem Engineering Ltd, Stillington, Stockton-On-Tees, TS21 1LB, UK Tel +44 1740 630461 – Email <u>dtpsales@darchem.co.uk</u> – Website <u>www.darchem.co.uk</u>