

## BRE Global Test Report

**Fire test to BS 8489-7 Category III Clause 7.7 with a Prevent low pressure water mist system incorporating Prev5exp20 nozzles**

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BRE Global Ltd  
Watford, Herts  
WD25 9XX

Customer Services 0333 321 8811

From outside the UK:  
T + 44 (0) 1923 664000  
F + 44 (0) 1923 664010  
E [enquiries@bre.co.uk](mailto:enquiries@bre.co.uk)  
[www.bre.co.uk](http://www.bre.co.uk)

Prepared for:  
Prevent Systems  
Fabergatta 128  
2615 Lillehammer  
Norway



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## Prepared by

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Name Kelvin Annable

Position Senior Consultant

Date 23 July 2018

Signature

A handwritten signature in black ink, appearing to read 'K. Annable'.

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## Authorised by

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Name Sarah Colwell

Position Director, Testing and Certification, Fire Suppression

Date 26 July 2018

Signature

A handwritten signature in black ink, appearing to read 'S. Colwell'.

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## 1 Introduction

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BRE Global was requested by Prevent Systems (hereafter referred to as the client) to undertake a series of test fires to British Standard 8489-7 'Fixed fire protection systems – Industrial and commercial watermist systems – Part 7: Fire performance tests and requirements for watermist systems for the protection of low hazard occupancies', 2016. This report summarises the findings from a test in the programme carried out and assesses the results against the fire performance requirements in Clause 8 f) of BS 8489-7.



## 2 Test programme

A fire test was conducted in accordance with BS 8489-7 Category III, using the system detailed in section 2.4, with the work station fuel arrangement positioned under one nozzle (Clause 7.7) and with a ceiling height of 3.7 m and a nozzle spacing of 4.5 m.

### 2.1 Test ceiling

The non-combustible 6 m by 6 m ceiling was installed for the fire test at a height of 3.7 m above ground level. A plan view schematic drawing of the test ceiling is shown in Figure 1.

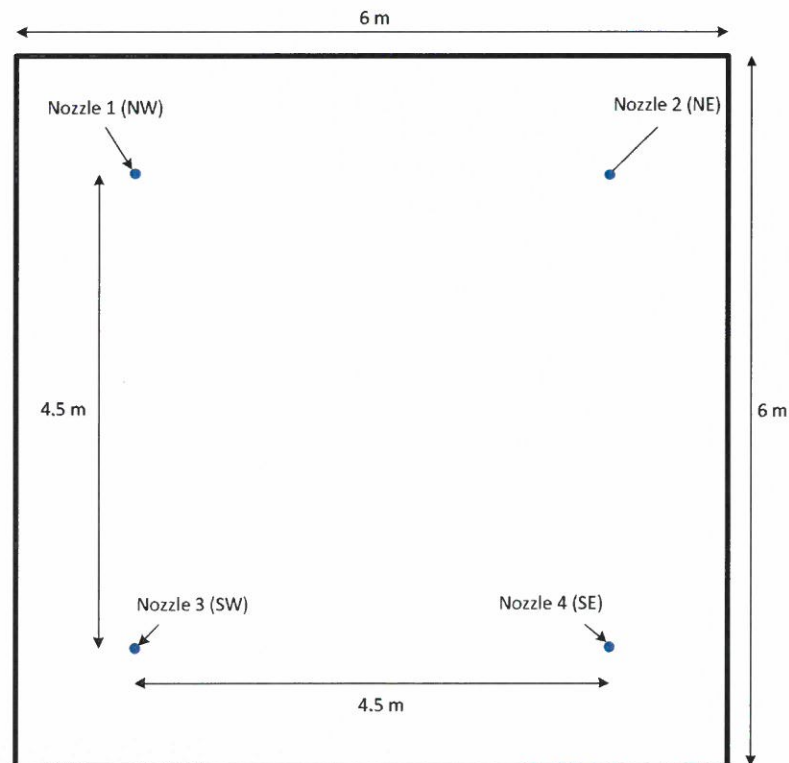


Figure 1 – Schematic plan view drawing of the test ceiling





## 2.2 Fuel package

The fuel package for the test was as described in BS 8489-7 Annex B.4 and the arrangement prior to the test is shown in Figure 2.



**Figure 2 – Fuel package**



### 2.3 Instrumentation

Instrumentation was installed, as detailed in Table 1. A Graphtec GL800 data logger (fire temperatures, water flow and pressure) and an Agilent 34980A data logger (ceiling temperatures) were used for data acquisition at a sample rate of 1 Hz.

| Location                                                  | Instrumentation                                                                              |
|-----------------------------------------------------------|----------------------------------------------------------------------------------------------|
| Next to all four nozzle frangible bulb positions          | 1.5 mm k-type thermocouples                                                                  |
| 100 mm above each wood crib, centrally                    | 1.5 mm k-type thermocouples                                                                  |
| 100 mm above corner box file arrangement, centrally       | 1.5 mm k-type thermocouples                                                                  |
| 2.5 m above the floor at the ends and corner of the walls | 1.5 mm k-type thermocouples                                                                  |
| Water supply pipe                                         | 1½" Barton turbine flow meter, 0 – 280 l/min. Druck PMP 4070 0 – 16 bar pressure transducer. |

**Table 1 – Summary of installed instrumentation**

### 2.4 Low pressure water mist system

For the test the client installed their automatically operating low pressure water mist system fitted with a pump skid supplied by:

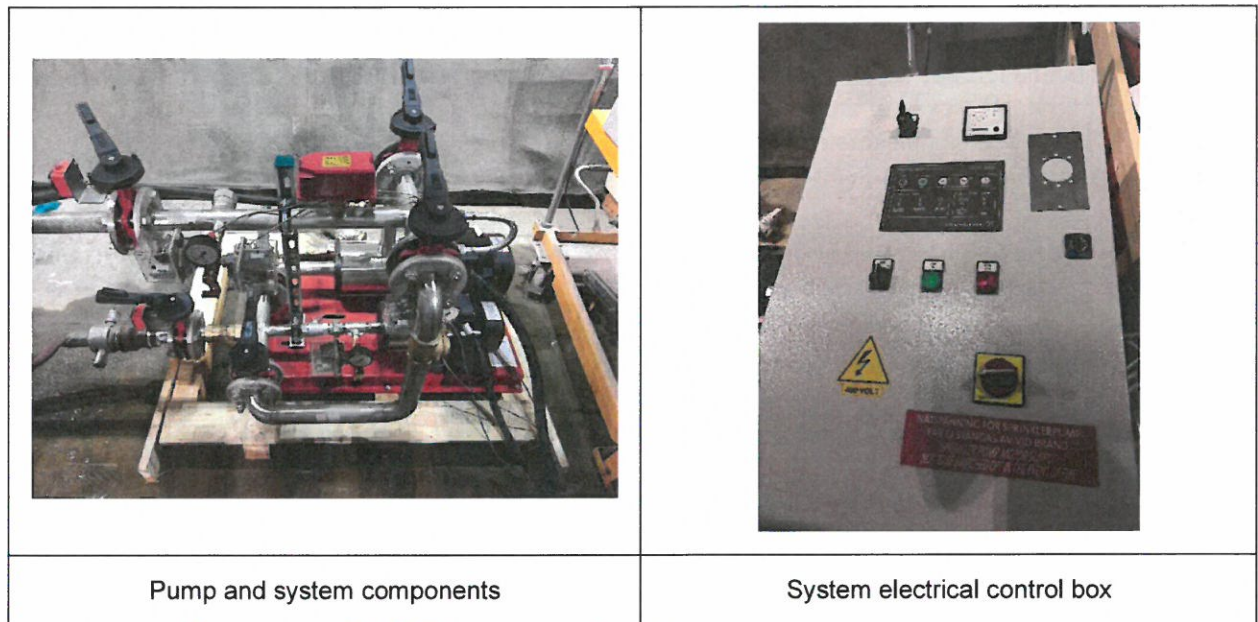
Grundfos, Poul Due Jensens Vej 7, DK - 8850 Bjerringbro, Denmark.

Further information on the Grundfos pump used in the testing was supplied by the client to BRE Global, see also Appendix A. A photograph of the pump set and electrical control box are shown in Figure 3.

The nozzles used during the test (nozzle designation – Prev5exp20) were of the pendent type with a vertically mounted 57 °C frangible 3 mm F3 Job™ glass bulb. A datasheet and general assembly drawing for the nozzle was supplied to BRE Global by the client. The nozzles used during the fire test were stated to have a nominal k-factor of 29 by the client. BRE Global did not confirm the k-factor as part of this project.

The system was coupled to the BRE Global water supply flow meter and a pressure transducer was installed 1 m downstream of the flow meter.

BRE Global was not involved in the specification or selection of the products tested.



**Figure 3 – Water mist system components**

For the test, four nozzles were installed into the test ceiling on a 4.5 metre spacing. Each nozzle therefore protected a theoretical plan area of 20.25 m<sup>2</sup>. The nozzles were mounted such that the centre of the 57 °C frangible bulb was 30 mm below the ceiling, see Figure 4.



**Figure 4 – Installed pendent nozzle**





### 3.2 Conclusion

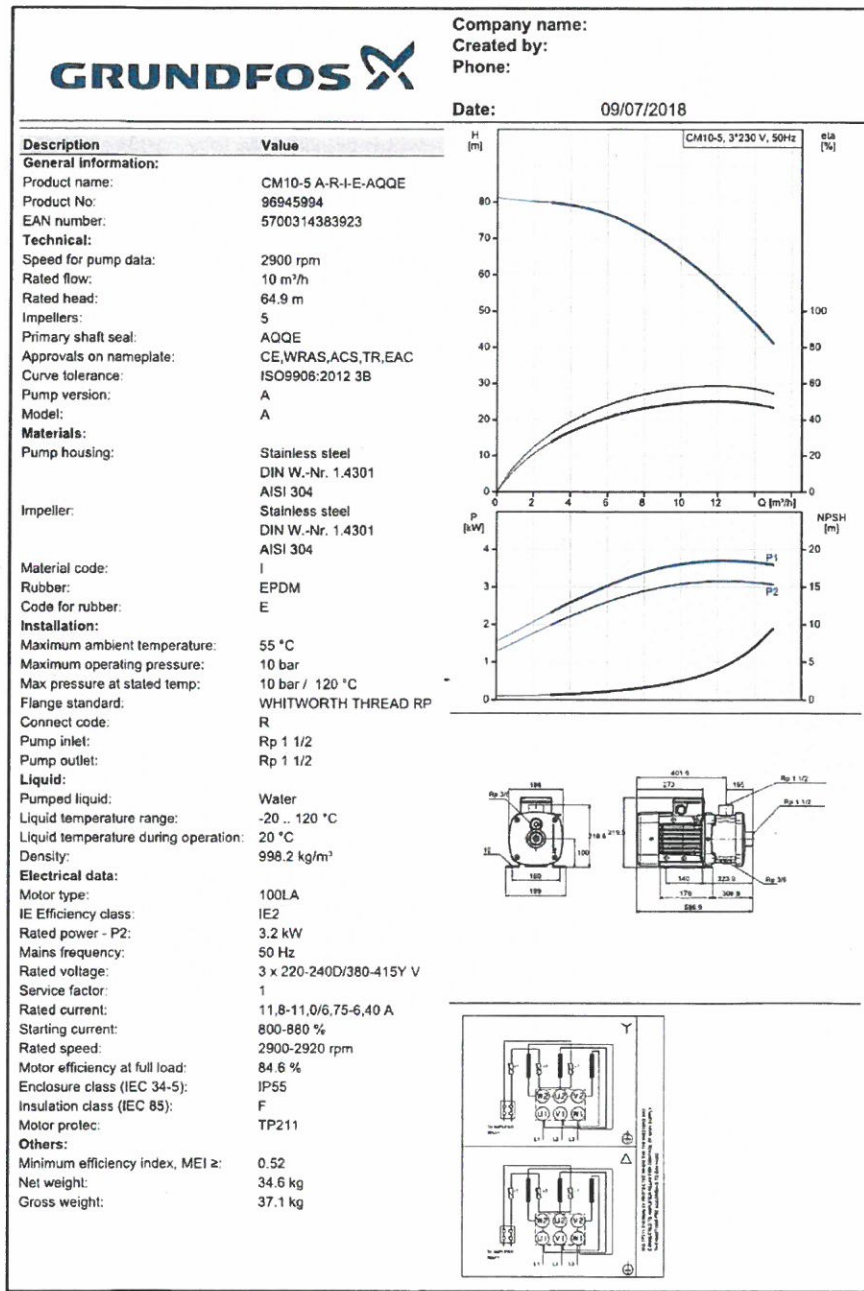
The water mist system, as detailed in this report, when tested in accordance with clause 7.7 of BS 8489-7:2016 '*Fixed fire protection systems – Industrial and commercial watermist systems – Part 7: Tests and requirements for watermist systems for the protection of low hazard occupancies*', and assessed against the pass/fail criteria specified in clause 8 (f) of the standard achieved the results as shown in Table 5.

| BS 8489-7 Pass/fail criteria                                                                                                                                                                       | Clause 8 f)  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| The maximum gas temperature in the centre of the ceiling, 76 mm below the ceiling does not exceed 80 °C, for a duration longer than 3 minutes for the 30 minute system discharge.                  | Criteria met |
| After 5 minutes (from the start of system operation or ignition of both wood cribs, whichever takes the longer) the mean ceiling temperatures remain steady or decrease until the end of the test. | Criteria met |
| Damage to the plywood walls does not extend to the full height at the ends of the walls.                                                                                                           | Criteria met |
| Damage to the foam and box files does not extend to all areas.                                                                                                                                     | Criteria met |

**Table 5 – Summary of BS 8489-7 Clause 8 f) criteria for the test**



## Appendix A Grundfos system pump set



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