Introduction.
HiPro Industries specialise in the development and manufacturing of products for high pressure mist systems used in the domestic and residential fire suppression market.

On-going we are developing a wider range of products with approvals for the global markets.

The iCO brand is manufactured by HiPro Industries.
Contents

• Statistics.
• Sprinklers.
• Water mist systems.
• How water mist works.
• System design and benefits.
• British Standards.
• What it does for you.
• Compliance with building regulations;
  • England
  • Scotland
  • Wales
• Phased installations.
Fire Statistics Overview


- In 2015/16 there were 303 fire related fatalities and 7,661 casualties in fires.

- In 2015/16, 76% (229) of fire-related fatalities occurred in dwellings.

- In 2015/16, 75% (5,761) of nonfatal casualties occurred in dwelling fires.
The Problem with Sprinklers -

- Space for pump and tanks
- Space in voids for CPVC Pipe
- Difficulties installing
- Cost
- Water Damage
  - Domestic - Approximately 100lpm for 10 mins (1000litre)
  - Residential – Approximately 240lpm for 30 mins (7,200litre)
Water Mist- Droplet size

A waterspray with 99% of droplets less than 1mm. (NFPA 750)

Sprinkler droplets 1200 microns
Spray droplets 100-700 microns
Low pressure Water mist 200-700 microns
High pressure Water Mist up to 200 microns

Benefits of smaller droplets-
Greater Surface Area- Greater Heat Absorption
  - More Effective Smoke Scrubbing
  - More Effective Heat Block
Lighter Droplets - Airborne Longer
  - More Three Dimensional Behaviour
Water Mist - The Benefits

Primary Benefits
- Cooling
- Three Dimensional Movement
- Oxygen Displacement (At the flame front)
- Blocking Radiant Heat Transfer
- Smoke Scrubbing

Water mist
Efficient Cooling

heat
fuel
oxygen

Water mist
Steam smothering at flame front
Water Mist – Commercial Systems

- Space for pump and tanks
- Unsightly Nozzles
- Very expensive
- Large space requirement
Disadvantages of other Water Mist Systems

- Unsightly nozzles
- Non compliant wall mounted nozzles
- Expensive when compared like for like
- Over sized pumps
- Very Industrial Visual
- iCO can be maintained by any installer which ensures competitive pricing
iCO Water Mist System

Design Intent -
To create a domestic fire suppression system at a cost that is accessible to everyone
System Layout.

- **230v 13amp Supply**: Fire rated cable direct from the board non-RCD side.
- **ICO Pump**: Control manifold.
- **Water Supply to property**: 230v 13amp Supply, Fire rated cable direct from the board non-RCD side.
- **Fire rated cable**: ICO Pump.
- **Water to other appliances in the property**: Priority demand valve.
Water Supplies

Where the mains water supply connection serves both the watermist system and the domestic or residential occupancy supply, the watermist system should be capable of providing the water demand at the pump/s by:

- **Domestic occupancies** = the flow rate at the pump + at least 25 L/min or have a priority demand valve installed.

- **Residential occupancies** = the flow rate at the pump + at least 50 L/min or have a priority demand valve installed.

**NOTE:** The water regulations might require a greater minimum flow rate depending on the design demand for the occupancy.
# iCO - Pump Unit

## Specifications

<table>
<thead>
<tr>
<th>Maintenance</th>
<th>Self Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions:</td>
<td>342mm x 342mm x 495mm</td>
</tr>
<tr>
<td>Voltage rating:</td>
<td>240V</td>
</tr>
<tr>
<td>Current rating:</td>
<td>13A</td>
</tr>
<tr>
<td>Fire relay contact rating:</td>
<td>30VDC, 1A max</td>
</tr>
</tbody>
</table>
Pipe and Fittings

Steel tube for surface mounted installations.

Flexible Tube – to be installed behind a fire rated barrier.
Our patented nozzle sits almost flush at 3mm.
Nozzle - Spacing

Flat Ceilings –

- 4x4m Grid (16M2)
- Max 2m from wall
- Minimum distance between nozzles =2m
Nozzle Orientation

The preferred nozzle outlet orientation is perpendicular to the walls.

The spray direction can be rotated 45 degrees to spray into the corners of the room to avoid the pendant light fitting. Nozzles should be at least 500mm away from a pendant light fitting.
Spray Pattern

Nozzles should be positioned away from obstructions to allow a 140 degree spray pattern.

Example of obstruction matrix use.

If obstruction fits wholly inside matrix, nozzle positioning is unaffected.
Where the pitch is below 30°, nozzles should be mounted at standard spacing’s when measured in line with the pitch of the ceiling.

Where the pitch is 30° and above, the first row of nozzles should be mounted within 300 mm radially from the apex of the ceiling.
Nozzle Void Requirement

- Our standard void depth requirement is 100mm. This gives an installer the required room for fixing and adjustments.
- Void depth can be reduced to 75mm in certain circumstances however this will not be possible for some installs.
Pipework Configurations

Total Pipe Lengths

Nozzle A = 3m + 2m + 2m + 1.9m = 8.9m
Nozzle B = 3m + 2m + 2m + 3m = 10m
Nozzle C = 3m + 2m + 1.9m = 6.9m
Nozzle D = 3m + 2m + 1.9m + 2m = 8.9m

In all cases the distance from the pump to the nozzle is less than 45m.
System Verification

Commissioning your system is easy.

A commissioning form is produced by the installer which details a list of things checked and testing criteria that was done before system sign off.
# iCO Vs Sprinklers

<table>
<thead>
<tr>
<th></th>
<th>Water Domestic</th>
<th>Water Residential</th>
<th>Fire Tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>iCO</td>
<td>12lpm</td>
<td>24lpm</td>
<td>BS 8458</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>BS 9252</td>
</tr>
<tr>
<td>Sprinklers</td>
<td>100lpm</td>
<td>240lpm</td>
<td>UL</td>
</tr>
</tbody>
</table>
Water Damage –
iCO vs Sprinklers

iCO –
(Volume of water after 10mins discharge)

Sprinklers Domestic –
(Volume of water after 10mins discharge)

Volume based on 120 litre wheelie bin
Water Damage – ICO vs Sprinklers

ICO –
(Volume of water after 30mins discharge – 360litre)

Sprinklers Residential –
(Volume of water after 30mins discharge, 7200 litre)

Volume based on 120 litre wheelie bin
Compliance with Building Regulations
Compliance with Building Regulations

• England

0.18 There are many alternative or innovative fire suppression system available. Where these are used it is necessary to ensure that such systems have been designed and tested for use in domestic buildings and are fit for their intended purpose.

• Scotland

Alternative suppression systems - there are many alternative or innovative fire suppression systems available including systems utilising domestic plumbing and watermist systems. Verifiers should satisfy themselves that such systems have been designed and tested for use in domestic buildings and are fit for their intended purpose (see Section 0).

Alternative approaches in a particular case may or may not be compensated by an automatic fire suppression system.
Compliance with Building Regulations

• Wales

2.5 There are many alternative or innovative fire suppression systems available. Where these are used it is necessary to ensure that such systems have been designed and tested for use in domestic buildings and are fit for their intended purpose.

Where an alternative technical standard (to BS 9251 or BS 9252) is used the guidance of Section 2.5 and Appendix A should be followed.

2.6 The recommendations of Section 1.23 also apply to residential automatic fire suppression systems. It is essential that automatic fire suppression systems are properly designed, installed and maintained. Where the automatic fire suppression system is installed, an installation and commissioning certificate should be provided. Third party certification schemes for fire protection products and related services are an effective means of providing the fullest possible assurances, offering a level of quality, reliability and safety.

Appendix A: Performance of materials, products and structures.

Much of the guidance in this document is given in terms of performance in relation to British or European Standards for products or methods of test or design or in terms of European Technical Approvals. In such cases the material, product or structure should:

1.a. be in accordance with a specification or design which has been shown by test to be capable of meeting that performance; or

Note: For this purpose, laboratories accredited by the United Kingdom Accreditation Service (UKAS) for conducting the relevant tests would be expected to have the necessary expertise.

b. have been assessed from test evidence against appropriate standards, or by using relevant design guides, as meeting that performance; or

Note: For this purpose, laboratories accredited by UKAS for conducting the relevant tests and suitably qualified fire safety engineers might be expected to have the necessary expertise.
Standards & Fire Testing

- BS 8458 - Fixed fire protection systems. Residential and domestic watermist systems. Code of practice for design and installation


- BS 9252 - Components for residential sprinkler systems. Specification and test methods for residential sprinklers.
5.6 Residential pattern sprinkler heads

Only sprinkler heads in accordance with BS 9252 (or other standard as agreed with the AHJ) with quick-response temperature-sensing elements should be used in the inhabited parts of the building.

5.8.2 Types of supply

Sprinkler systems should be connected to a reliable and sustainable supply, for example:

- mains water supply:
- mains pressure only;
- mains water supply boosted by a pump;
- stored water supply:
- pump supplied from a water tank;
- regulated pressurized vessel;
- gravity-fed stored water system
5.8.3.2 Design flow rate for mains water supply connections
Where the mains water supply connection serves only the sprinkler system, the system should be capable of providing flow rates at the sprinkler heads as determined by 5.3.3.

Where the mains water supply connection serves both the sprinkler system and the domestic or residential occupancy supply, the sprinkler system should be capable of providing flow rates at the sprinkler heads by:
a) the operation of an automatic priority demand valve; or
Water Mist as a Compensatory Feature
“0.16 Sprinkler protection can also sometimes be used as a compensatory feature where the provisions of this Approved Document are varied in some way.”

Approved Document B1.
Compensatory Measure
- Open Plan

The National House-Building Council (NHBC) Foundation commissioned a study by BRE (Open plan flat layouts – NF 19) that has produced a set of templates for designers of open-plan flats to follow. It tackles key areas including layout, enhanced detection options, room size, travel distances, the use of fire sprinklers, and even occupant behaviour.
Compensatory Measure
Loft Conversions

Without the iCO system, this would not be possible. Walls to ceiling and fire doors would be required.
Compensatory Measure
45m Fire Service Access

• Providing compensatory protection when fire service access is difficult.

• Approved Document B proposes that fire service vehicle access should be achieved to within 45m of the furthest point in the dwelling when measured from the fire appliance's parking position. When this guidance cannot be achieved there is the potential for debate over the most appropriate and practical solutions. Approved Document B would suggest that dry rising water mains be provided where basic vehicle access is achieved, however this is often disputed by fire services on grounds of travel distance, availability of water supplies and additional time prior to commencing fire fighting. It is not uncommon on compact developments for ideal access to be impossible to achieve and therefore water mist offers reasonable and cost effective alternative solutions.
Below are some of the main clauses in BS 9991 which are an advantage to us, it states sprinklers but this also applies to mist systems.
BS 9991:

• **Dwelling houses with one or more storey greater than 4.5m in height (three storeys) 6.3(c)** Open plan arrangements on the ground floor can be achieved on condition that sprinklers are installed throughout the property in addition to a fire rated partition and door at first floor level.

• **Dwelling houses with one or more storey greater than 7.5m in height (four storeys) 6.4.(b)** A second, separate protected stairwell is not required if sprinklers are fitted throughout.

**Loft conversions**

• **6.5.** Open plan arrangements on the ground floor are permissible should sprinkler be installed throughout, in conjunction with a fire resisting partition and door at first floor level.

**Travel distances**

• **11.2** If sprinklers are fitted throughout a block of flats then travel distances can be doubled on common escape from 7.5m to 15m and 30m to 60m
BS 9991 - Continued

**Extra care housing**

- **9.7** Extra care housing must be fully sprinklered. **Open Plan Layouts**

- **9.7** Open planned flats are permissible with a fully fitted fire sprinkler system. **Masionettes with floors greater than 4.5m**

- **9.5.2** No requirement to provide a separate means of escape if the maisonette has a protected stairwell and a fully fitted fire sprinkler system.

**Vehicular Access**

- **50.1.2** Access can be increased significantly if a sprinkler system is installed and where the arrival time for the fire service is not more than ten minutes:
  - 90m for houses less than 4.5m in height.
  - 75m for houses/flats not more than one floor above 4.5m.

**Boundary Distance**

- **18.4.** Boundary distances can be reduced by 50% with a fitted fire sprinkler system.
Fire statistics and what we can learn from them.
Fire Statistics
Maximise returns from investment
Fatalities by age

Figure 3.1. Fatality rate (fatalities per million people) for all ages and selected age bands, England; 2009/10 to 2015/16

Source: Table FIRE0503a
Fatalities by sources of ignition

Figure 4.1. Percentage of incidents and fatalities by selected sources of ignition in accidental dwelling fires, England; 2015/16
Casualties and Fatalities By Location

FIRE STATISTICS TABLE 0505a: Fatalities in accidental dwelling fires by use of room where fire started, location of casualty and source of ignition, England

Select a year and source of ignition from the drop-down lists in the orange boxes below:

<table>
<thead>
<tr>
<th>Location</th>
<th>Total</th>
<th>Kitchen</th>
<th>Bedroom or bedsit room</th>
<th>Living / Dining room</th>
<th>Bathroom / Toilet</th>
<th>Corridor / Hall or stairs</th>
<th>Utility room</th>
<th>Airing / Drying cupboard</th>
<th>Storage areas</th>
<th>Roof, Roof spaces and Chimneys</th>
<th>Other</th>
<th>Unspecified</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>191</td>
<td>29</td>
<td>59</td>
<td>84</td>
<td>4</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>8</td>
<td>3</td>
</tr>
<tr>
<td>In room of origin</td>
<td>100</td>
<td>10</td>
<td>35</td>
<td>51</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Not in room of origin</td>
<td>91</td>
<td>19</td>
<td>24</td>
<td>33</td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
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<td>5</td>
<td>3</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

FIRE STATISTICS TABLE 0505b: Non-fatal casualties in accidental dwelling fires by use of room where fire started, location of casualty and source of ignition, England

Select a year and source of ignition from the drop-down lists in the orange boxes below:

<table>
<thead>
<tr>
<th>Location</th>
<th>Total</th>
<th>Kitchen</th>
<th>Bedroom or bedsit room</th>
<th>Living / Dining room</th>
<th>Bathroom / Toilet</th>
<th>Corridor / Hall or stairs</th>
<th>Utility room</th>
<th>Airing / Drying cupboard</th>
<th>Storage areas</th>
<th>Roof, Roof spaces and Chimneys</th>
<th>Other</th>
<th>Unspecified</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>5,176</td>
<td>3,081</td>
<td>801</td>
<td>640</td>
<td>77</td>
<td>100</td>
<td>71</td>
<td>30</td>
<td>44</td>
<td>80</td>
<td>236</td>
<td>16</td>
</tr>
<tr>
<td>In room of origin</td>
<td>647</td>
<td>359</td>
<td>98</td>
<td>137</td>
<td>7</td>
<td>13</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>7</td>
<td>18</td>
<td>0</td>
</tr>
<tr>
<td>Not in room of origin</td>
<td>4,370</td>
<td>2,624</td>
<td>688</td>
<td>490</td>
<td>70</td>
<td>82</td>
<td>65</td>
<td>27</td>
<td>43</td>
<td>71</td>
<td>200</td>
<td>10</td>
</tr>
<tr>
<td>Unknown</td>
<td>159</td>
<td>98</td>
<td>15</td>
<td>13</td>
<td>0</td>
<td>5</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>18</td>
<td>6</td>
</tr>
</tbody>
</table>
Statistics

AGE - 52% of all fire-related fatalities in dwelling fires were people 65 years old or older.

KITCHENS - Cooking appliances were the source of ignition. Making up 50 per cent of accidental dwelling fires and 52 per cent of non-fatal casualties in dwelling fires and was by far the largest ignition category.

In contrast, there were only 12 per cent of accidental dwelling fire fatalities where the source of ignition was cooking appliances in 2015/16.

SMOKING - Smokers' materials were the source of ignition in 7 per cent of accidental dwelling fires however made up 36 per cent of fatalities and only 9 per cent of dwelling fire nonfatal casualties.

Smoking was by far the largest ignition category involved in accidental dwelling fire-related fatalities.
iCO - Advantages

• Third party tested to BS 8458:2015
• Option for phased installation to prioritise the most vulnerable
• Easy to install, compact pump
• No storage tank requirement
• Low flow system 12lpm
• Pump self tests
• Easy to Retrofit
• Discrete flush nozzle
iCO – PUMP 2020

• Multiple Fire Relay for connection to 3rd party equipment
• Multiple fault relays for connection to 3rd party equipment
• Full steel construction enclosure
• Lower system standing pressure
• Automatic valve shut off
• Remote GSM SMS monitoring
• 12v power supply connection.
• Switchable 30 min & 10 min run time
• Serviceability in the field
Any questions?

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