

the future of space conditioning

Frengerwarm

heating panel



Application

School gymnasiums and classrooms, hospitals wards, corridors, food industry, offices, etc.

Installation

Wall mounted, Free-hanging, Surface mounted or recessed into a suspended ceiling system.

Capacity

Up to 460 W/m² @ 55 dtk.

Features

Low construction depth
High capacity



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Product Description



Frengerwarm is a system of custom made, smooth faced aluminium or steel panels manufactured to any length to suit the application. Panels can be wall mounted, free - hanging, surface mounted or recessed into a suspended ceiling system. Copper pipes are fixed rigidly to the rear of the aluminium panels and heat transfer is enhanced by extruded aluminium pipes seats. Panels are backed with 60mm thick foil - backed 'O' insulation, and are finished with a polyester powdercoat white RAL9010 as standard.

Frengerwarm has been specifically developed for use in schools, sports halls, offices and healthcare environments, where a smooth faced panel with high heating capacity is the preferred solution. Frengerwarm is tested in accordance with the new harmonised European Standard EN 14037.

Standard Features

- Tested to EN 14037.
- Modular system or perimeter system.
- Smooth flat faced unobtrusive design.
- Upto 460 w/m² @ 55.5 dtK room (mwt - room temp).
- Standard polyester finish RAL 9010 (20% Gloss).

Optional Features

- Can be customised to suit environment.
- Additional colour options.
- Aluminium or Steel.
- Can be surface mounted.
- Can be wall mounted.

water connection: 15mm OD EN1057 : R250 Copper
weight: 37 kg/m²

Connection Possibilities

water: horizontal or vertical, same end or opposite.

Maintenance

The unit has no moving parts, and therefore maintenance requirement is limited to periodic cleaning of the surface of the panel.

Installation

Standard fixing arrangement from the structural soffit using M6 threaded rod or suitable wiring located at a maximum of 1.5m centres along the length of any run panel.

Other fixing methods are available dependent on project / application requirements.

For simplicity and flexibility we recommend that flexible stainless steel braided EPDM hoses are used to connect the Frengerwarm panel.

Delta T	48	50	52	54	56	58	60	62
W/m²	392	411	430	449	468	487	507	526

Function

Frengerwarm is a system of radiant panels custom made and mounted on columns, walls or ceiling, thus becoming an unobtrusive part of the decor, or an architectural features in its own right.

These custom made panels can be made any length / width / shape to suit the application, be it Wall Mounted, Free Hanging, Surface Mounted or recessed. Copper tubes are fixed rigidly to the rear of the panels and are backed with 60mm thick Class 'O' foil backed insulation. Panels are powdercoated RAL 9010 (matt white) as standard. However, other colours can be accommodated.

Panels are fabricated from steel or aluminium depending on how they will be used; steel panels being more resistant to damage. Thermostatic controls, connected to the Frengerwarm panel and arranged to control an area of panels, can be supplied for setting by the customer to allow area of a building to be heated as desired.

Extruded aluminium trim sections can be provided to give a clean finished effect and edge trim for ceiling panels can be either flush with the ceiling panels or recessed to give a shadow effect. The ceiling panels are held in to the edge trim with strong clips which give a positive and versatile means of fastening different thicknesses of panel materials.

Design Dimensions

Frengerwarm panels are individually designed for a specific installation and there are no standard sizes. Both aluminium and steel panels are available in widths from 100mm upwards with a maximum single panel length of 3000mm. Weight of the operating system is dependent on the design of the system but does not exceed 37 kg/m² and can be as low as 21 kg/m². It should be noted that single panels lengths can be designed as panel sections to allow interconnection by the site engineers to create continuous panel lengths up to 30 metres with only one pipework heating grid.

Lengths

Frengerwarm is available in widths of 100mm upwards with a maximum length of a single panel 3000mm

Water Connectoin

15mm OD EN1057:R250 Copper
Each panel has its own sinuous pipe coil or grid.

Surface Finish

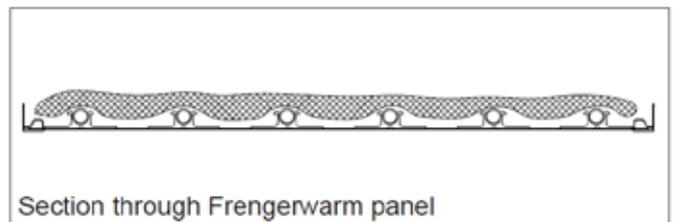
Frengerwarm is finished in RAL 9010 matt white powder coat as standard. Other colours can be arranged during manufacture.

Insulation

Frengerwarm is supplied with integrated 60mm thick mineral wool blankets backed with Class 'O' reinforced heat reflecting metal foil.

Application

Frengerwarm is particularly suited for use in hospitals wards and corridors, commercial office developments, schools, sports halls and large public areas.



Installation

Wall Mounted

Performance Features

The Wall Mounted Aluminium Frengerwarm Radiat Panel is designed to provide heat output in excess of 460 W/m^2 , (based on F & R $82/71^\circ\text{C}$, RT 21°C and 150mm tube centres), whilst maintaining its aesthetic qualities and strength as required for environments such as sports halls, assembly rooms and other large open plan areas.

Panel Dimensions

Panels are available between 400 - 1100mm high / wide mounted vertically off the wall utilizing purpose made wall mounting brackets and M8 adjustable tie rods at an angle variant of between $20 - 30^\circ$ (adjustable dependent on project requirements). Panel run lengths sized in order to meet heating requirements and space restrictions comprise dummy sections for access and main active section lengths.

Optional Extras

Purpose made top and end closure plates in order to deflect foreign objects from the reverse of the panels, painted to suit, available as required.



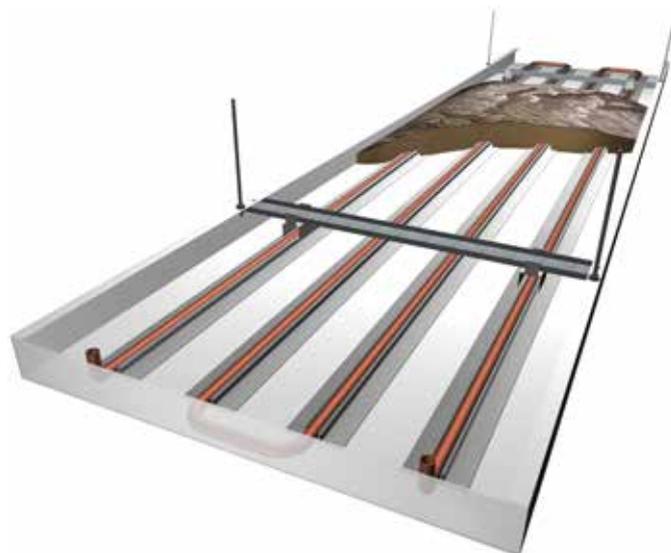
Free Hanging

Performance Features

The Free Hanging Aluminium Frengerwarm Radiant Panel is designed to provide heat output in excess of 450 W/m^2 , (based on F&R $82 / 71^\circ\text{C}$, RT 21°C and 150mm tube centres), whilst maintaining its aesthetic qualities and unobtrusive design as required for environments where wall space is at a premium.

Panel Dimensions

Panels available between 400 - 1100mm wide mounted horizontally using M8 expansion anchors, M8 threaded rod secured to the panel via 38 x 19mm suspension channel generally located at 1.5m centres. Panel run lengths sized in order to meet heating requirements and spce restrictions comprise main active section lengths with access plates concealing interconnections.



Installation

Surface Mounted Performance Features

The Ceiling Mounted / Recessed Aluminium Frengerwarm Radiant Panel is designed to provide heat output in excess of 450 W/m^2 , (based on F&R $82/71^\circ\text{C}$, RT 21°C and 150mm tube centres), whilst maintaining its aesthetic qualities and unobtrusive design as required for environments where wall space is at a premium.

Panel Dimensions

Panels between 400 - 1100mm wide mounted horizontally using 'Torx' head screws (or similar) fitted via M6 countersunk holes to pre-located angle iron. Panel run lengths sized in order to meet heating requirements and space restrictions comprise main active section lengths with access plates concealing interconnections.

Optional Extras

Purpose made top and end closure plates in order to deflect foreign objects from the reverse of the panels, painted to suit, available as required.

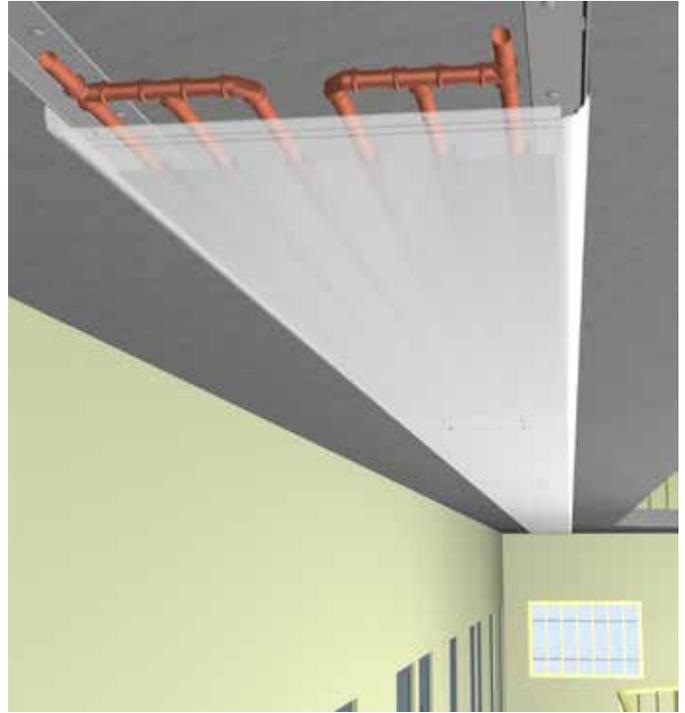
Recessed

Performance Features

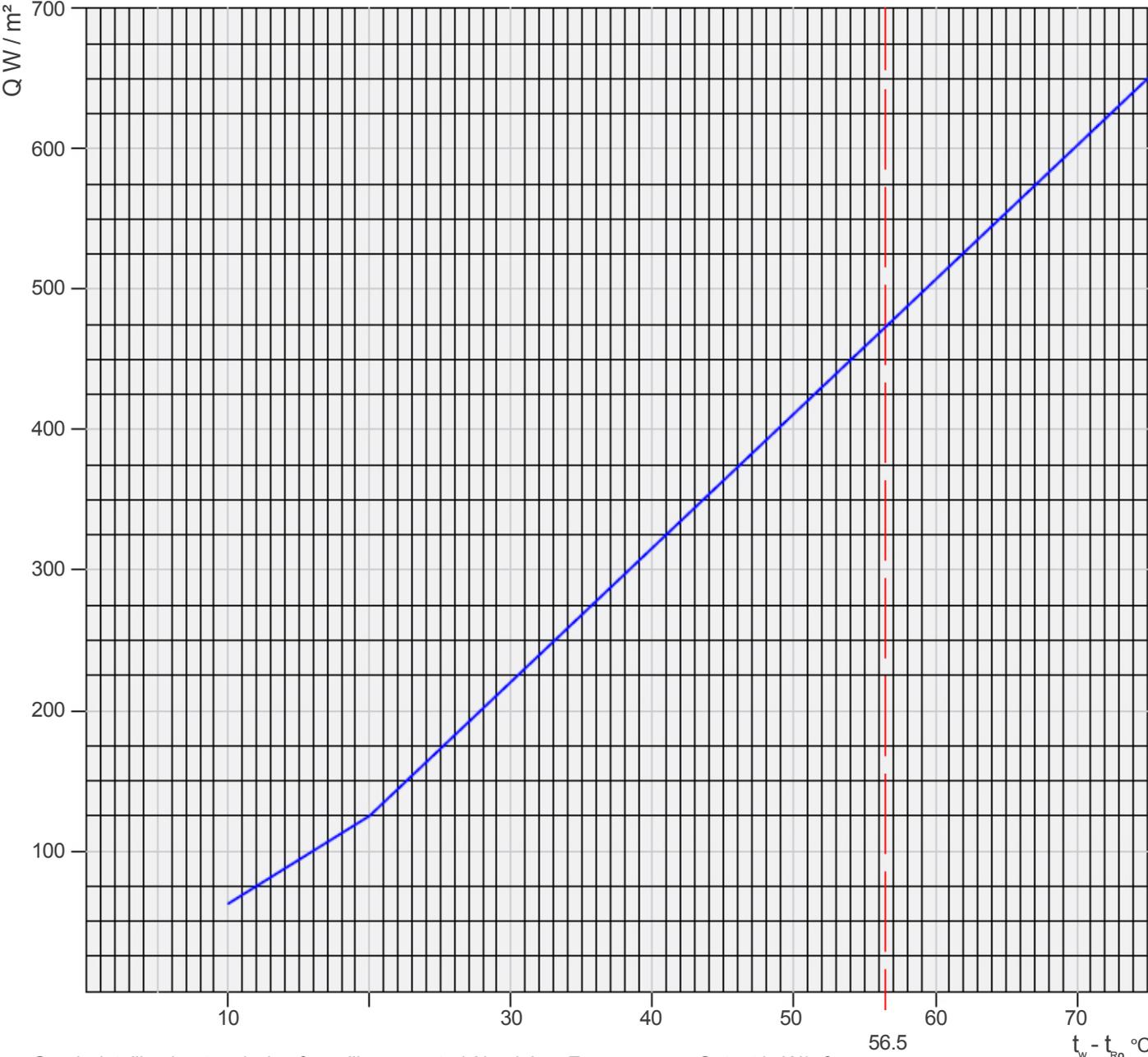
The Ceiling Mounted / Recessed Aluminium Frengerwarm Radiant Panel is designed to provide heat output in excess of 450 W/m^2 , (based on F&R 82°C , RT 21°C and 150mm tube centres), whilst maintaining its aesthetic qualities and unobtrusive design as required for environments where wall space is at a premium.

Panel Dimensions

Panels available between 400 - 1100mm wide mounted horizontally using M8 expansion anchors, M8 threaded rod or 'Gripple' hang fast wiring secured to the panel via 38 x 19mm suspension channel generally located at 1.5m centres. Panel run lengths sized in order to meet heating requirements and space restrictions comprise main active section lengths with access plates concealing interconnections.



Heating Effect



Graph detailing heat emission for ceiling mounted Aluminium Frengerwarm. Output in W/m^2

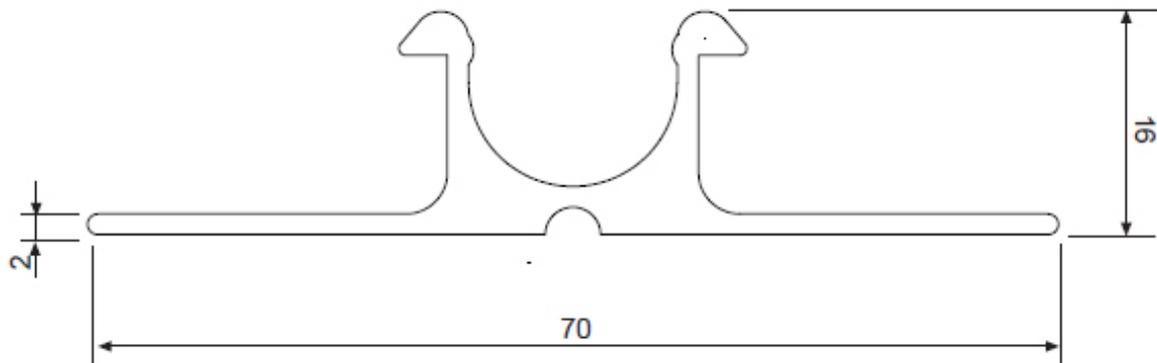
Coupling and Connection

Connection to the pipework should be diagonal corners of the panels or groups of panels, to ensure an even flow through the pipe system an allowance must be made in the interconnecting pipework for venting and draining if this is not designed into the panel pipe system.



Thermal Expansion

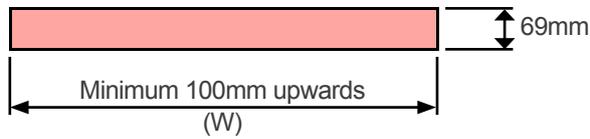
The panels will accommodate their own pipe system expansion but allowance should be made in the interconnecting pipework. The design of the installation will allow for expansion of the heated panels in relation to other parts of the building structure and either a small gap or cover strip is provided to accommodate the movement. The design of the system must give turbulent flow in the pipes.



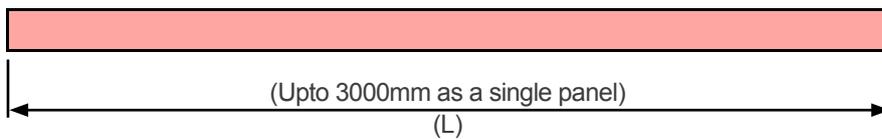
Typical section through Frengerwarm extrusion

Dimensions

Width, Depth mm



Lengths mm



Weight & Water Volume

Weight of the operating system is dependent on the design of the system but does not exceed 37 kg / m² and can be as low as 21 kg / m².

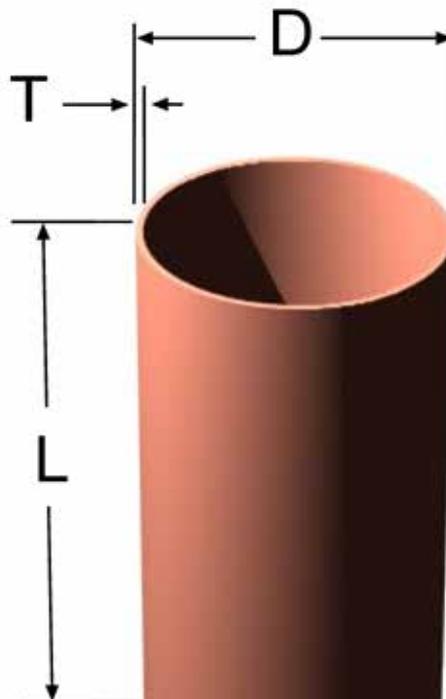
Panel Weight, kg / linear metre	N/A
Water content, litres / linear metre	Dependent on size and design
Expansion at 55°C above ambient	Approx 1.5mm

Copper pipe specification

The copper pipe used in the manufacture of the Frengerwarm heating panel is compatible with EN1057:R250.

The dimensional specification are as follows:

Outside Diameter (D) : 15mm
Wall Thickness (T): 0.7mm
Minimum Straight Length (L): 40mm



Testing Protocols

Testing Protocols

All pipework manufactured on Frengerwarm panels are pressure tested to 7 bar.

Thermal Insulation

Frengerwarm is supplied as standard with 60mm thick Mineral Wool blankets backed with Class 'O' reinforced heat reflecting metal foil.

Panels

Material depends on the application.
Aluminium - 1.5 - 2.0mm thick NS3 / H4 aluminium sheet.
The radiating panel can be supplied with edges formed to suit the individual application. Non radiating 'in fill' panels can be supplied to form a continuous covering for the wall, column or ceiling. Access panels with 'secret' fixings are a standard part of the range.

Pipework attachment system

Aluminium Frengerwarm - the copper tube coil is inserted within a patented extruded aluminium heat carrier. The aluminium heat carrier is bonded to the panel. Heat transfer paste is used at all interfaces for both types of Frengerwarm.



Fixing

Fixing

An installation service is provided by Frenger. However, supply only can be accommodated. The following notes are provided so that during design of the heating system for the building, due account can be taken of the various requirements for fixing Frengerwarm.

Frengerwarm is wall, column or ceiling mounted and individually tailored for the installation.

Attachment

As each Frengerwarm installation is individually designed, the means of attachment will be engineered for the specific situation. Frengerwarm may therefore be attached to any substantial building structure.

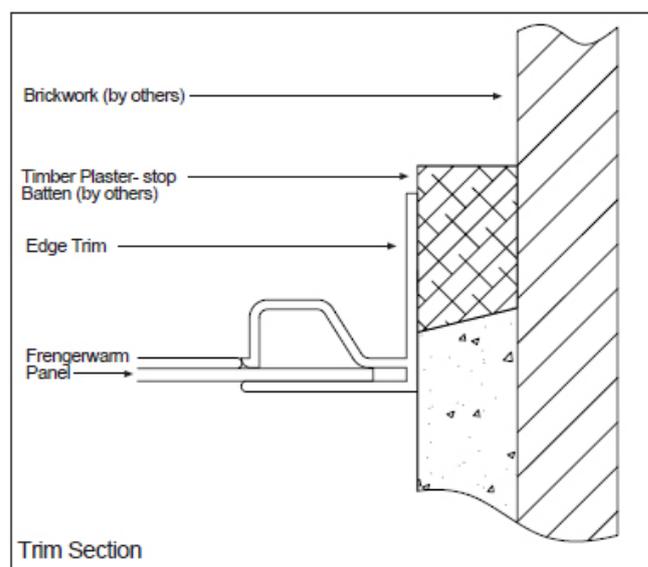
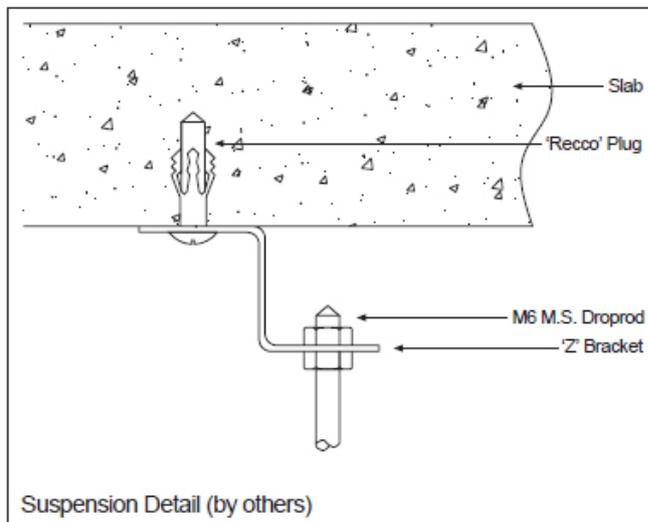
Pipework

Connection to the pipework should be at diagonal corners of the panels or groups of panels, to ensure an even flow through the pipe system an allowance must be made in the interconnecting pipework for venting and draining if this is not designed into the panel pipe system.

Expansion: The panels will accommodate their own pipe system expansion but allowance should be made in the interconnecting pipework. The design of the installation will allow for expansion of the heated panels in relation to other parts of the building structure and either a small gap or cover strip is provided to accommodate the movement. The design of the system must give turbulent flow in the pipes.

Installation of panels and insulation

Frengerwarm is supplied as completed panels with the pipework and insulation attached, it is therefore important to protect the surface of the panel from damage during construction or to schedule the fixing of Frengerwarm as one of the final constructing operations. All the necessary water piping can be installed at an earlier date as this is normally hidden behind the Frengerwarm panels.



Optional Extras

The following optional extras are available for Frengerwarm.

Panels

Unheated 'dummy' panels and cover strips. A range of extruded aluminium edge and tee trims. Radius Edges (Bullnosed).

Pipework

EN1057:R250 copper. Final flow and return connections to suit customer's requirements. Thermostatic controls and air vents.

Colours

RAL 9019 Matt White powdercoat as standard. However other RAL colours are available.

Operations and maintenance

Frengerwam is incorporated into a building's heating / cooling system and is completely trouble free, however a few simple precautions should be taken and inspections made during start up and maintenance.

Operations

There will be no problems when starting up the system on hot or cold water if the drain valves are shut and any air has been vented from the system.

Any thermostatic controls on the panels should be set to the required temperature.

Maintenance

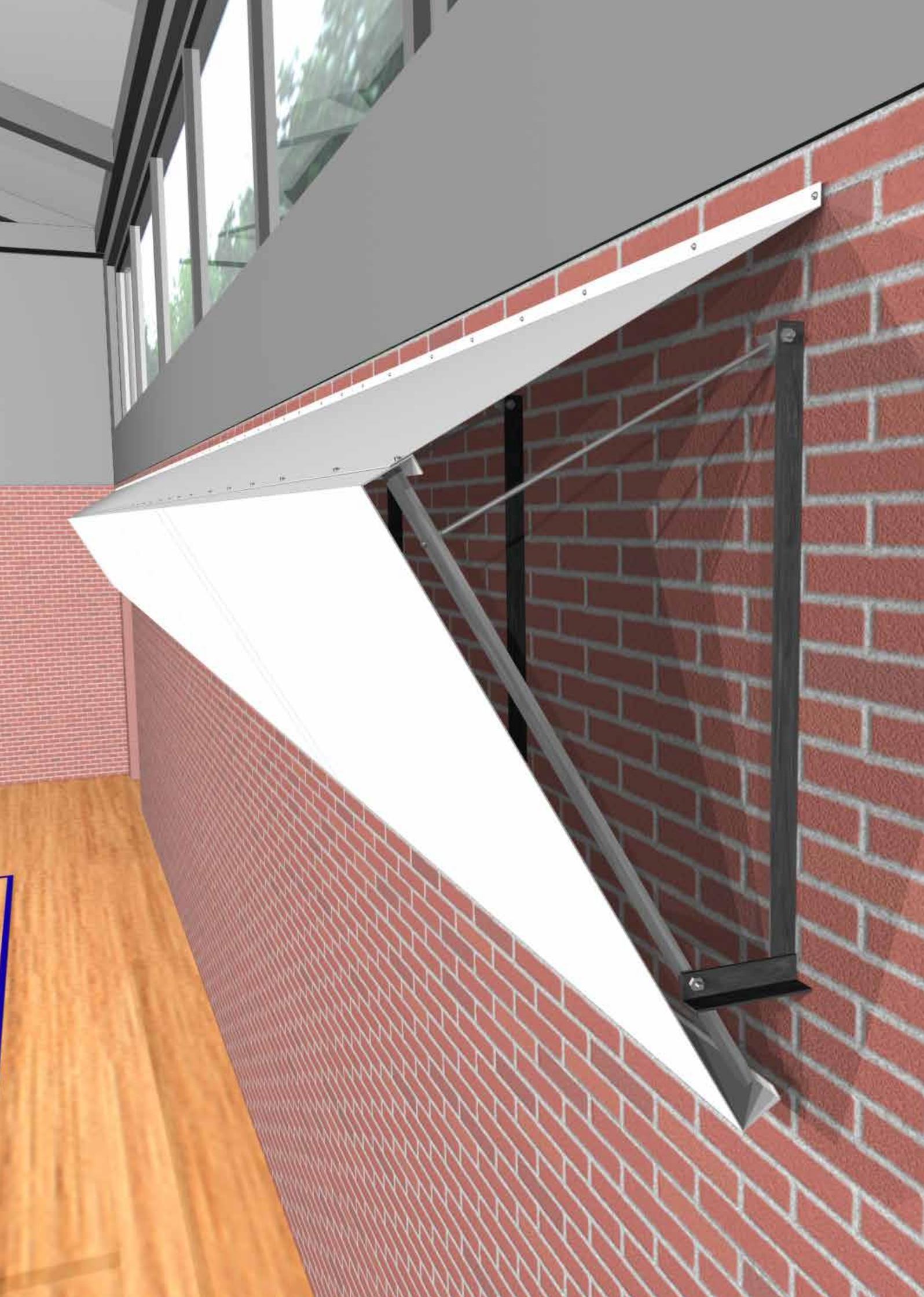
Apart from cleaning any strainers no maintenance should be required on the pipework system. Any descaling of pipework should be carried out in the same way as for normal heating systems,

Operation of the thermostatic controls should be checked periodically.

During a period when the heating / cooling system is not in use the opportunity should be taken to inspect any damaged panels. Damage to a panel may cause the water pipes to become detached and hence reduce their heating effect.

Cleaning the panels

The outside of the panels may be cleaned using a damp cloth and mild detergent if they have become soiled.





UK Head Office

Frenger System Ltd
Riverside Road
Pride Park
Derby
DE24 8HY

tel: +44 0 1332 295 678
fax: +44 0 1332 381 054
sales@frenger.co.uk
www.frenger.co.uk

Australian Office

Frenger
Level 20
Tower 2
201 Sussex Street
Sydney
NSW 2000
Australia

tel: +61 2 9006 1147
fax: +61 2 9006 1010
sales@frenger.org.au
www.frenger.org.au

American Office

FTF Group Climate
1501 Broadway, Times Square
12th Floor
New York
NY 10036
United States of America

tel: +00 1 646 571 2151
fax: +00 1 646 571 2001
sales@ftfgroup.us
www.ftfgroup.us



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www.frenger.co.uk