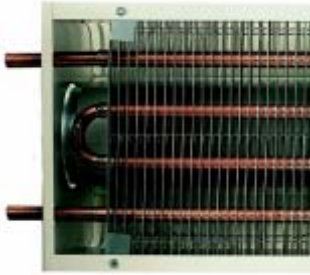


Why Choose Carat for Australia?

Frenger designed, supplied and installed the World's first chilled ceiling system in 1962; the 175,000 square metre Shell Centre in London. This installation is still operating after more than 40 years and is a testament to the integrity of the product and to Frenger's design capability.

The cooling approach employed by Carat for the Australian market is unique to Frenger and offers the client and the installer many benefits when compared with traditional technology. There are essentially two beam types of passive chilled beams available; a traditional finned-tube battery (or "battery" beam) and Frenger's Carat product.



Finned-Tube Battery

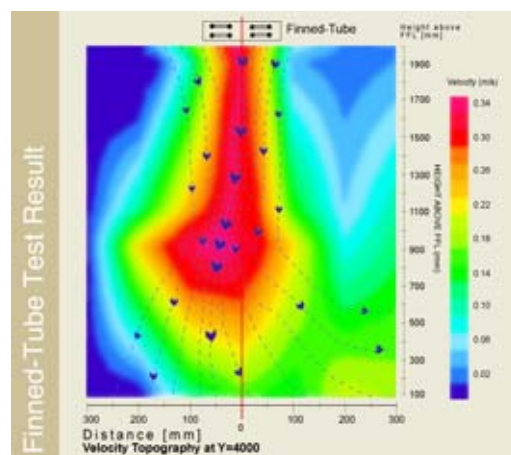
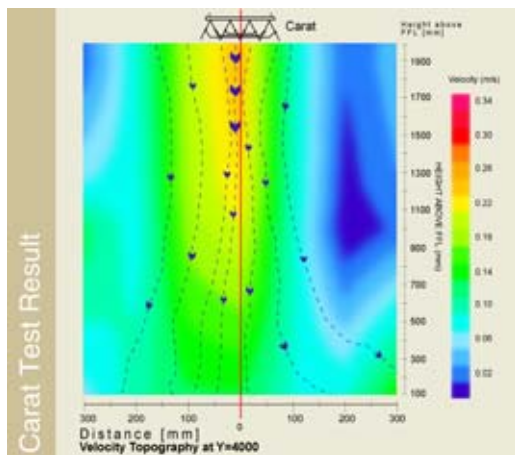


Carat

The summary below identifies why we believe that Carat should always be the obvious choice.

Carat can deliver more cooling capacity

The convective nature of a "battery" means that it delivers higher air velocities for the same cooling effect than would be realised by the radiant/convective Carat beam. Latest industry guidelines (rehva Guidebook No 5 – Chilled Beam Application Guidebook) recommend that the maximum cooling effect for a battery beam positioned in the occupied zone must never exceed 170 watts per metre. However, a Carat beam delivering more than 240 watts per metre will still provide a comfortable environment.



Comparative air velocity profile for Carat and Finned Tube Battery delivering 300 w/m above a 33% free area ceiling tile. It goes without saying that

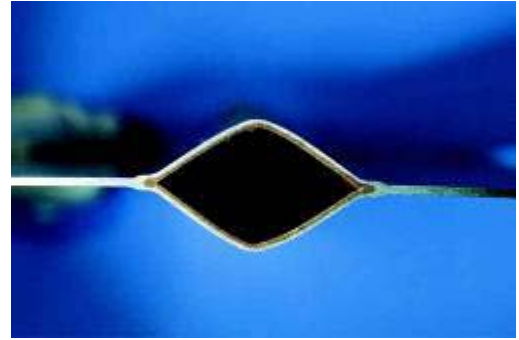
higher performance equates to fewer beams, meaning lower supply and installation costs.

Carat delivers a more comfortable environment

The radiant cooling properties of Carat provides significant advantage when it comes to occupancy comfort. Carat is, in effect, a hybrid between a radiant chilled ceiling and a convective "battery" beam. Cooling by radiation is generally considered to be preferable to cooling by convection alone; perceived temperatures will be lower and air velocities will also be lower. Carat delivers the comfort levels associated with chilled ceilings at the lower cost of chilled beams.

25-Year Life Expectancy

The patented technologies employed in the manufacture of Carat were originally developed for ultra-efficient solar collectors. The technology has proven extremely durable in this highly aggressive application, and as a consequence Frenger has no hesitation in advising a technical life for the Carat product in excess of 25 years (minimum water quality applies).



Carat is easier and cheaper to install

The “heaviest” Carat beam weighs just 5 kg/m, whereas a comparable “battery” beam will most likely weigh over 17 kg/m. The fact that the product is so much lighter means that it is easier and safer to transport, to distribute around site and to install.

Furthermore, Carat can be installed with simple suspension wires (the type used to fix suspended ceilings) whereas a “battery” beam will require heavy-duty threaded rod hangers. It is estimated that, metre for metre, Carat will cost less than half the cost of installing a comparable “battery” beam.



*Handling with ease a 3m long Carat H-84
Try this with a “battery” beam!*



Hanging Carat with adjustable suspension wire

Carat provides more architectural choice

Carat can be concealed above a suspended ceiling or can be left exposed as an architectural feature. Exposing the Carat beam means that it will deliver maximum cooling and also provides the occupant with an insight into the comfort cooling system that is being used.

When positioned above a perforated metal ceiling Carat is usually finished with black powder-coat paint, meaning that the product is virtually invisible to the occupants. A “battery” beam, on the other hand, cannot be painted without a significant drop-off in performance and hence the highly reflective aluminum fins will be visible through the ceiling perforations.



Another important fact is that Carat can be used with ceilings that are perforated to far smaller perforation hole sizes and free areas. Carat can be used effectively with perforations as small as 2.4mm and with a



free area of just 28%, whereas a “battery” beam is usually suspended above a ceiling perforated to 50% free area with a hole size of 5mm or larger - necessitating the “blacking out” of the ceiling void and service items.

Carat can be positioned directly over light fittings

Unlike a “battery” beam, Carat does not lose performance when placed above a ceiling-mounted luminaire. This means that the occupier or prospective tenant has maximum flexibility in terms of partition and luminaire location.



No need for “skirts”

In an attempt to squeeze the maximum cooling capacity from a battery product it is often necessary to fit air-deflecting “skirts” from the sides of the chilled beam down to the rear of the ceiling tiles. These are unsightly, costly to install and a risk to system performance if they are not fitted exactly as required. This is not necessary with Carat; the product is designed for optimal performance without any additional skirts.

Carat suspension components are included in the price

It is not necessary to use threaded rod hangers to suspend Carat. As standard, Carat is supplied with lightweight adjustable suspension hangers; 4 pieces for beams below 3m long and 6 pieces for beams of 3m or longer. The suspension hanger is 3.2mm in diameter and is adjustable from 0.6m to 1m via a sprung “butterfly” clip. Cropping back the rod on site can accommodate shorter drops. Alternative hangers are available for suspension drops of 1.75m to 2m at a small additional charge. One pre-bent end of the rod is to be fed through a top fixing bracket and the other end through pre-punched holes in the Carat support bars. Top fixing brackets and fixings are not included as these are often project-specific.



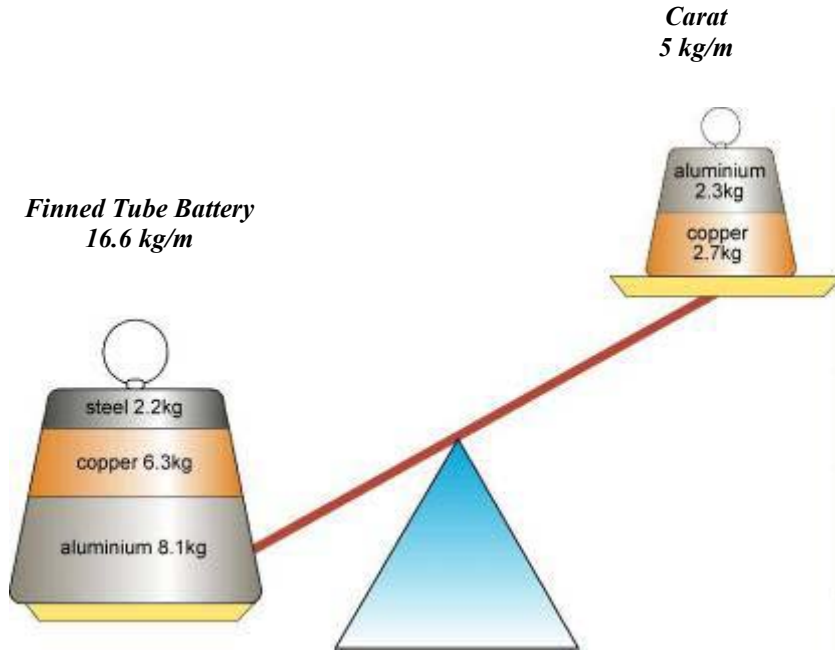
Carat is far easier to clean

Albeit passive beam systems do not require regular cleaning, cleaning of the beams will need to take place from time to time to prevent performance reduction. smooth painted surfaces of Carat mean that it is many times easier, cheaper and safer to clean than a comparable “battery” product. Carat can be wiped off with a damp cloth in a matter of seconds, whereas a “battery” beam will require careful cleaning with a vacuum and brush attachment, taking care not to damage the fragile aluminum fins.



Carat is kinder to the Environment

A Carat beam, when compared to an equivalent “battery” beam, will typically use 70% less aluminum, 60% less copper and none of the steel. Carat uses less energy to manufacture and uses less fuel to transport. The nett effect is significantly lower embodied energy and a product that is far more environmentally “friendly”.



The relative weight of Carat H-84 and a typical 400mm x 120mm finned tube battery.

Carat is safer and easier to transport and distribute on site

The “w” shaped profile of Carat means that it is usually packed in pairs – one piece turned upside down and placed inside another, then wrapped in protective polythene. This means that two units will fit into a 180mm packing depth, so increasing transport utilization. The product is contained within a purpose-designed crate (made from sustainable timber and fumigated to meet Australian regulations) and the crates and product have clear identification labels. Crates can be lifted by crane or forklift, although it is not possible to crane from a container. It is a simple process to remove the product from the crate and distribute around site – the beams are lightweight, robust and can be handled without fear of injury (unlike battery products!).



Complete Support Service

For all of Frenger's Australian projects the Company a full support service – from system design, architectural integration and prototype testing to on-site assistance during the installation and commissioning phases.



Appraisal of Canberra project prototype test

Carat has proven itself in Australia

Frenger has supplied chilled beams to the following major projects in Australia.

30 The Bond, Sydney, 2004

Client	Bovis Lend Lease
Consultant	Lincolne Scott
	18,000m ²
	\$1 Million



City Central Tower, Adelaide, 2005

Client	Baulderstone Hornibrook
Consultant	Lincolne Scott
	25,000m ²
	\$1.3 Million



500 Collins Street, Melbourne, 2005

Client	Kador
Mechanical Consultant	Umow Lai
Scale	23,000m ²
Value	\$1.4 Million



Parramatta Justice Prescient, 2006

Client	Licolne Scott
Mechanical Consultant	Hastie-Triple M JVP
Scale	16,000m ²
Value	\$1.4 Million



London Circuit, Canberra, 2006

Client	Licolne Scott
Mechanical Consultant	Benmax
Scale	11,000m ²
Value	\$1.4 Million



For all of the above projects we have conducted representative in-house testing of a typical building zone to determine comfort levels, air velocities, reaction times etc. This information enables us to provide solutions for Australian projects with a level of confidence unrivalled in our industry.



500 Collins Street under test



City Central Tower under test



The Bond under test



Paramatta under test



London Circuit under test