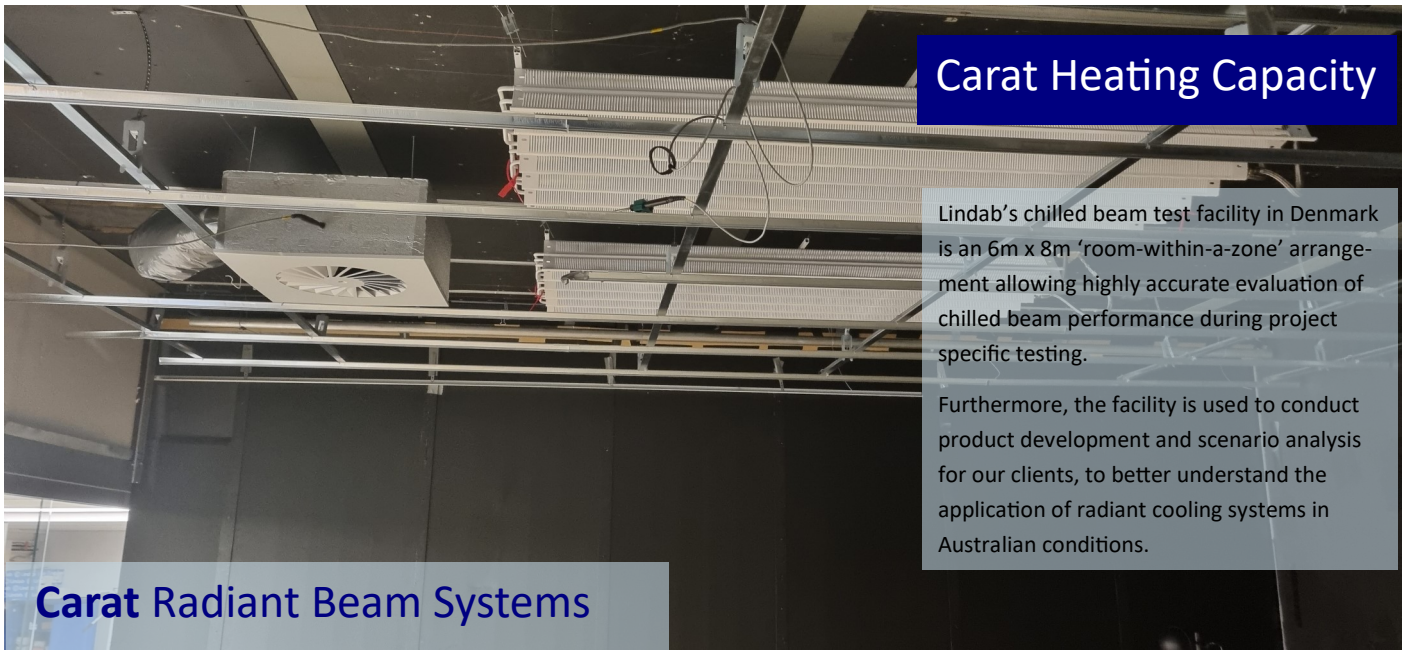


Carat Heating Capacity

Lindab's chilled beam test facility in Denmark is an 6m x 8m 'room-within-a-zone' arrangement allowing highly accurate evaluation of chilled beam performance during project specific testing.

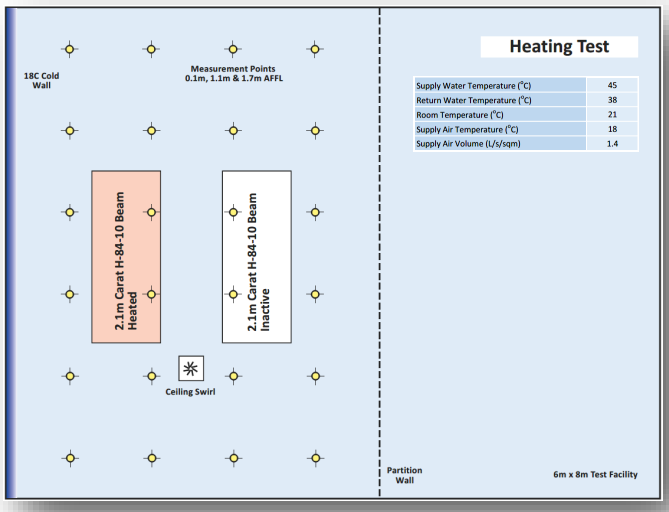
Furthermore, the facility is used to conduct product development and scenario analysis for our clients, to better understand the application of radiant cooling systems in Australian conditions.

Carat Radiant Beam Systems

Lindab Carat radiant passive beams are proven to offer high cooling capacities of up to 300 W/m, whist delivering excellent levels of comfort to the occupied zone.

The question then arises, if the beams are supplied with low-temperature hot water (LTHW), then **what levels of heating** can be provided by the beams and will **comfort** in the space remain excellent?

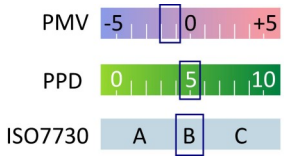
Tests were conducted at Lindab test facilities in 2021 to investigate and the sketch below shows the test arrangement. One wall of the test rig was cooled to represent façade heat loss, a Carat H-84 radiant beam was installed at 2.85m and supplied with LTHW at 45°C, and a high-level swirl diffuser delivered 18°C air at the rate of 1.4 L/s/sqm. Capacity and comfort measurements were taken over a number of test scenarios, including at higher air rates and with a perforated ceiling below.



What **heating capacities** can be delivered by Carat radiant beams and are comfort levels acceptable?

Tests demonstrated that Carat delivers high levels of effective heating into the space; in excess of **400 W/m** at the default design conditions.

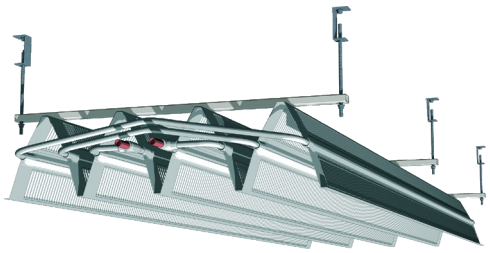
Resultant comfort remained excellent; Class B to ISO7730, Percentage People Dissatisfied (PPD) was just 5% and Predicted Mean Vote (PMV) was -0.14 to -0.15



It was established that Carat is a very effective heating product, delivering excellent capacities and comfort. A summary of test results is presented below.

Scenario 1

Exposed Carat, 1.4 L/s/m2 air supply



Carat H-84-10	
Beam Length (m)	2.1
Supply Water Temperature (°C)	45
Return Water Temperature (°C)	38
Water Flow (L/s)*	0.032
Room Temperature (°C)	21
Supply Air Temperature (°C)	18
Supply Air Volume (L/s/sqm)	1.4
Carat Heating Capacity (W)	**931**
Carat Heating Capacity (W/m)	***443***

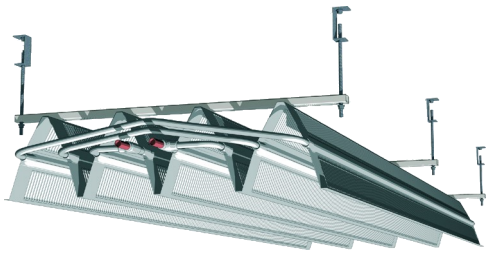
Scenario 2

Carat above metal ceiling perforated to 50% free area, 1.4 L/s/m2 air supply

Carat H-84-10	
Beam Length (m)	2.1
Supply Water Temperature (°C)	45
Return Water Temperature (°C)	38
Water Flow (L/s)*	0.030
Room Temperature (°C)	21
Supply Air Temperature (°C)	18
Supply Air Volume (L/s/sqm)	1.4
Carat Heating Capacity (W)	**887**
Carat Heating Capacity (W/m)	***422***

Scenario 3

Exposed Carat, 2.8 L/s/m2 air supply



Carat H-84-10	
Beam Length (m)	2.1
Supply Water Temperature (°C)	45
Return Water Temperature (°C)	38
Water Flow (L/s)*	0.036
Room Temperature (°C)	21
Supply Air Temperature (°C)	18
Supply Air Volume (L/s/sqm)	2.8
Carat Heating Capacity (W)	**1066**
Carat Heating Capacity (W/m)	***508***

** water flow to be maintained above minimum levels, dependent on product width and manifold arrangement, contact for further details*