

Chilled beams

Carat

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Use

Lindab's chilled beam Carat supplies cooling with a low air velocity to the room below.

It offers many possibilities and great flexibility. For example, it is possible to paint Carat any color you want.

Installation

Carat is installed suspended or above a perforated suspended ceiling.

Carat can be supplied with different connection options, depending on whether the passive beam is to be installed individually or in series.

Worth noting

The radiation quotient of Carat is as high as 35%, which results in low air velocities when the beam is placed above a perforated suspended ceiling. A low air velocity ensures good indoor climate and eliminates the risk of draft problems.

Lindab's chilled beams are Eurovent-certified and tested according to EN-15116, EN-14518.



Key figures

| | |
|-----------------|---|
| Length: | 47.2" – 236.2" |
| Width: | 12.2"(31), 17.3"(44), 22.5"(58), 27.8"(71), and 33"(84) |
| Product height: | 5.8" |
| Capacity: | Cooling effect of 3,336 BTU |

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Radiation exchange in chilled beams creates no air movement

Function

As cold water passes through the chilled beam, the warm air from the room is cooled on the cold surface of the beam. The cooled air (which has a higher density) then streams through the chilled beam and down into the room (see Picture 2). This leads to air circulation in the room, where warm air from the room is continually replaced by cooled air. The cold surfaces of the beam also absorb heat radiation from warmer surrounding surfaces.

The high radiation quotient leads to direct heat exchange between the cold surfaces of the beam and the warm surfaces in the room. The radiation quotient for Carat is approximately 35% of the total emitted cooling effect. This is a high quotient compared to conventional finned battery beams which have a radiation quotient of approximately 5%.

Direct heat exchange, through a high quotient of radiation to the room surfaces, and a high cooling effect, even at lower room temperatures, allows a large amount of cold to be stored efficiently in the building structure during low-load periods. The overall result is that Carat gives off more cooling energy during a 24-hour period than a finned battery beam. This means that a lower room temperature can be achieved.

Optimal design

Construction

Carat is a chilled beam that absorbs heat by both radiation and convection. By optimizing the beam's radiation quotient, output has been increased by 50% compared to finned battery beams, without increasing the risk for drafts.

Carat is based on a method that is unique in the world: in a cold-rolling process, the copper pipe is connected by metallurgical bonding to a gilled aluminium sheet. The energy transfer between the cooling surface and the water circuit is made more efficient, which results in a high cooling effect per surface unit. The technology for the metallurgical bonding of copper and aluminium renders galvanic corrosion impossible.

Carat is available in widths from 12.2" to 33". The length can vary from 47.2" – 236.2" .

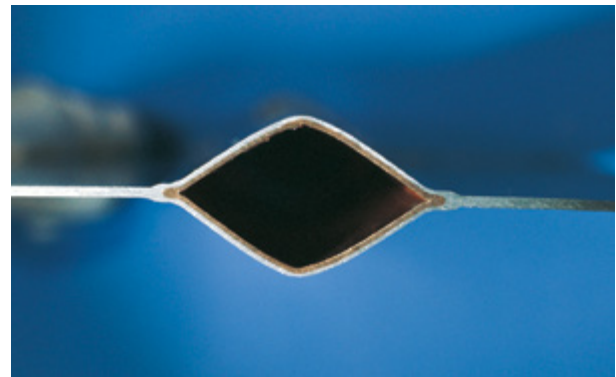
Carat provides a high cooling effect per surface unit, which leads to resource-efficiency and a low weight for the product. Carat is made of 100% recyclable materials.

The water pipes are made of copper. Nevertheless, the water should be oxygen-free to prevent corrosion.

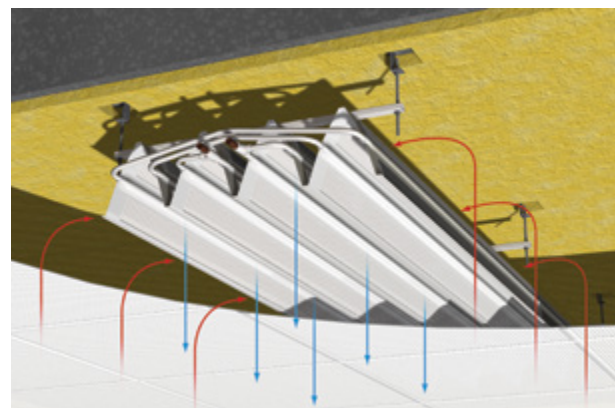
Easy to clean

Hygiene

Carat's surface area is four times smaller than that of a corresponding finned battery beam with the same performance. All parts of the product are accessible for cleaning and inspection. These qualities, together with the relatively strong aluminium plate, make Carat easy to wipe and clean.



Picture 1. Cross-section of Lindab's unique strips. The rhomboid shape provides an efficient heat-transfer surface.



Picture 2. How Carat works.

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Versions

Installation: Carat is mounted horizontally.

Lengths: Carat is available in lengths from 47.2" – 236.2", in steps of 4".

Water connection: Carat is available with a variety of connection sizes, 0.4", 0.5", 0.6", 0.9", and 1.1", depending on the product's width and connection options.

Surface treatment: Carat is powder-coated; the standard color is white, RAL 9010.

Color: Carat can be coated in a variety of special colors (see picture 3).



Picture 3. Carat with black coating, a plus feature.

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Versions



Picture 4. Carat -31



Picture 5. Carat -44



Picture 6. Carat -58



Picture 7. Carat -71




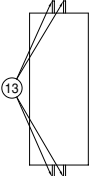
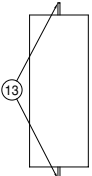
Picture 8. Carat -84

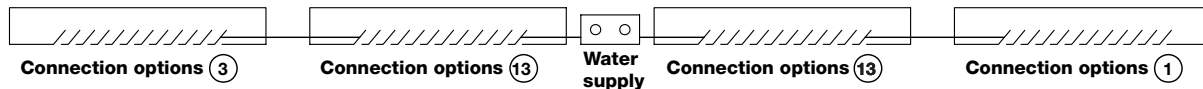
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Couplings & connections

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| Coupling options | Model | Nominal Diameter (in) | Minimum flow (gpm) | |
|---|---|--------------------------|------------------------------|------|
|  | Carat -31 | 0.4 0.5 | 0.24 0.48 | |
| | Carat -44 | 0.4 0.6 | 0.24 0.71 | |
| | Carat -58 | 0.4 0.5 0.6 | 0.24 0.48 0.95 | |
| | Carat -71 | 0.4 0.6 | 0.24 1.19 | |
| | Carat -84 | 0.4 0.5 0.6 0.9 | 0.24 0.48 0.71 1.43 | |
| |  | Carat -31 | 0.5 | 0.48 |
| | | Carat -44 | 0.6 | 0.71 |
| | | Carat -58 | 0.6 | 0.95 |
| | | Carat -71 | 0.6 | 1.19 |
| | | Carat -84 | 0.9 | 1.43 |
| |  | Carat -31 | 0.6 | 0.95 |
| | | Carat -44 | 0.9 | 1.43 |
| Carat -58 | | 0.9 | 1.90 | |
| Carat -71 | | 0.9 | 2.38 | |
| Carat -84 | | 1.1 | 2.85 | |



Due to of the beam's "gills", its surface structure looks different, depending on the direction from which it is viewed. If units connected in series are to have the same appearance, the connection point should be oriented in the same direction throughout the room. Note! Connection option 13 can be turned in both directions.

Table 3. Carat's couplings & connections.

Weight & water content

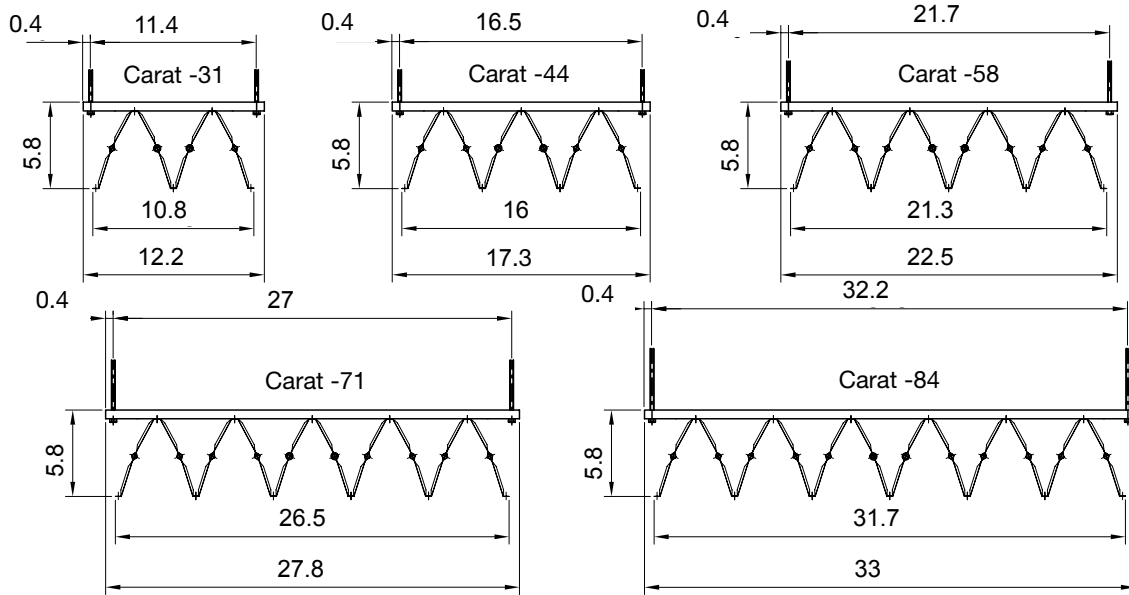
| | Carat 31 | Carat 44 | Carat 58 | Carat 71 | Carat 84 |
|-------------------------|----------|----------|----------|----------|----------|
| Weight, [lb/ft] | 1.2 | 1.8 | 2.3 | 3.0 | 3.5 |
| Water content, [gal/ft] | 0.096 | 0.036 | 0.06 | 0.07 | 0.08 |

Table 4. Carat's weight & water content.

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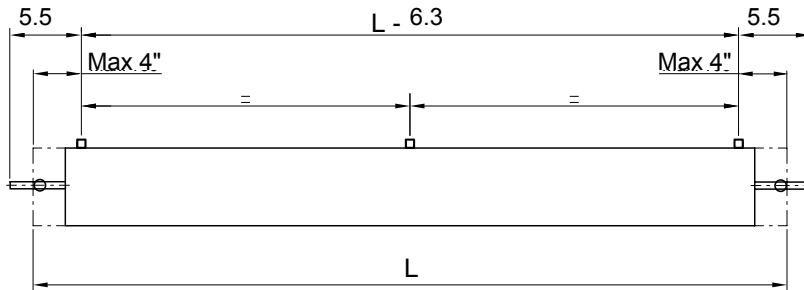
Carat's width & height, (in)



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Length, (in)

As standard, Carat is available in lengths from 70" – 236", in steps of 4".



3 × 2 suspension points for lengths > 120".

Connection dimensions, (in)

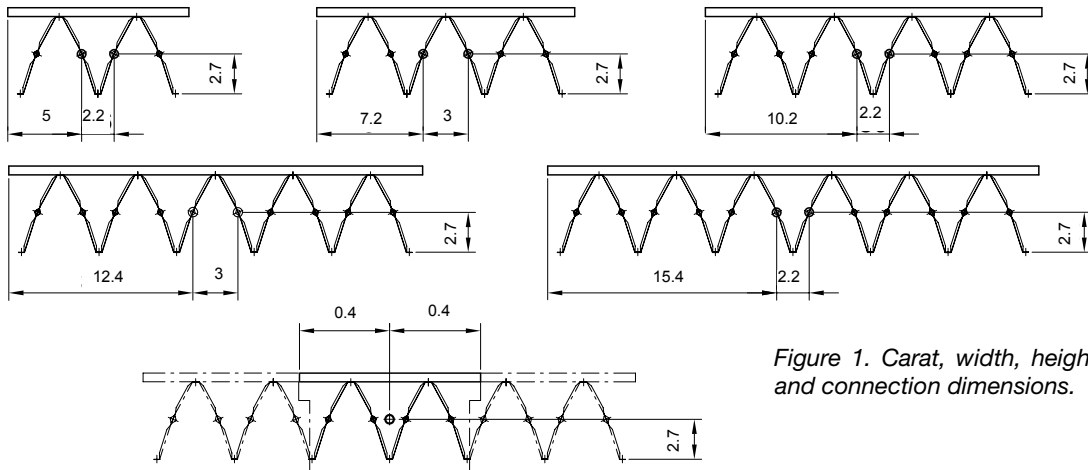


Figure 1. Carat, width, height, length and connection dimensions.

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Installation examples

Carat has a wide range of applications and can be installed in offices, exhibition halls and industrial premises or warehouses. Carat is suitable for both visible and hidden installation. Hidden installation above a perforated suspended ceiling is the most common in an office environment. During installation, it is important that the separation between the unit and the ceiling be large enough. Otherwise, the output can be reduced because of insufficient air intake. The minimum acceptable distance varies depending on the width of the unit. Table 5 and figures 2 to 4 list the minimum installation dimensions that are required for each model so as to avoid a reduction in Carat's efficiency. If the minimum installation dimensions are not met, the cooling effect of Carat must be reduced in accordance with diagram 4.

Carat is light, and this makes the unit easy to handle during installation. There are two suspension options for Carat. Carat can be installed using either a suspended wire or a threaded rod. Both the suspended wire and the threaded rod are easy to adjust, so as to achieve the necessary measurement between the product and the ceiling.

| Model | A (in) | B (in) | C (in) |
|-----------|--------|--------|--------|
| Carat -31 | 1.8 | 7.6 | 9.1 |
| Carat -44 | 2.2 | 8.0 | 9.9 |
| Carat -58 | 2.8 | 8.5 | 10.5 |
| Carat -71 | 3.3 | 9.1 | 11.9 |
| Carat -84 | 4.1 | 9.9 | 12.7 |

Table 5. Minimum installation dimensions, required by the respective models, to avoid a reduction in Carat's efficiency.

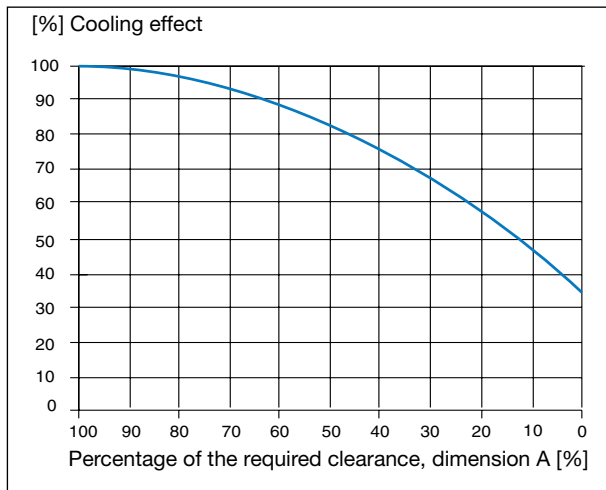
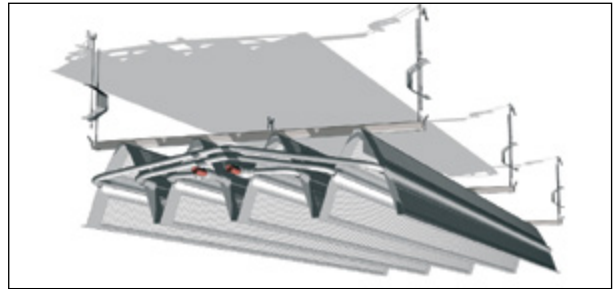
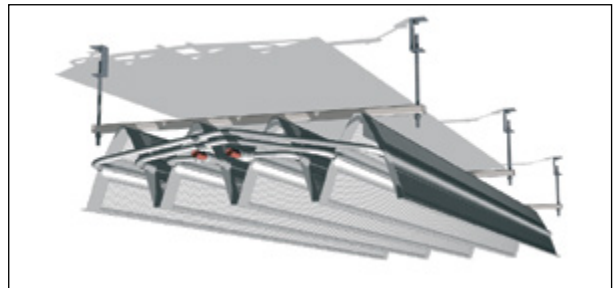


Diagram 4. Reduction of the cooling effect when dimension A is reduced.



Picture 8. Installation of Carat with a suspended wire.



Picture 9. Installation of Carat with a threaded rod.

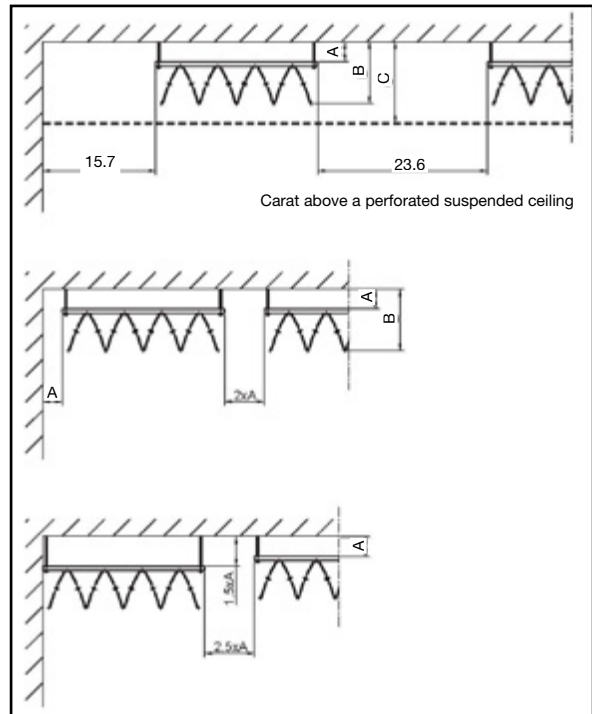


Figure 2-4. Installation dimensions for Carat.

Note: To achieve low air velocities as per diagram 3, the distance between the beams should be at least 23.6".