

# Lindab **Atrium/Loggia**

Heating and cooling panels



# Heating and cooling panels

# Atrium / Loggia



## Use

Lindab's heating and cooling panels are mounted in the ceiling and primarily provide heating/cooling by radiation. The radiation share for the panels exceeds 50% to 60%, compared to approx. 5% for conventional finned products. Since the air velocities can be kept low, this results in a draught-free environment.

Radiant heating can also be used with high ceiling heights since the radiant heating, despite the high placement, heats the underlying surfaces directly without any losses to the air.

The lower temperature gradient and the increased radiation temperature also results in energy-efficient heating alternatives compared to other heating systems.

## Installation

The heating/cooling panels are installed either suspended or recessed into a suspended ceiling. The panels can be supplied with different connection alternatives, depending on whether they are to be mounted individually or in series.

## Worth noting

A high radiation quotient results in low air velocities and provides very good functioning, even with high installation heights. The low weight ensures quick installation. The weight for a panel, which is 6 m long and 87 cm wide, does not exceed 18 kg. These are by far the lightest heating and cooling panels available on the market. The cooling panels can also be supplied perforated, to ensure high sound absorption in office environments.

Lindab's radiant panels are tested according to EN-14037/ EN-14240 and are CE-marked.

## Key figures

Length:	1200 - 6000 mm (steps of 100 mm)
Width:	330, 600, 870 mm
Height:	60 mm
Capacity:	1610 W

## Calculation setup

Room temp: 21°C, Water temp: 55-45°C.

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## Function

### Heating (Atrium-H, Loggia)

When warm water passes through the copper pipe, heat is transferred to the aluminium plate, with very little temperature loss. The panel is warmed and it then radiates the heat into the room. The thermal radiation travels tens of metres through the air without any loss of output on its way to the floor and walls. In this way, you avoid heating a large air mass that, when warm, sticks to the ceiling. Instead, the heat goes where it is needed the most.

It is mainly the floor, walls, furniture and fittings in the room that are heated. The temperature of the room surfaces becomes higher than that of the room air and thus transfers its heat to the air. By heating primarily the room surfaces instead of the air, you can save a lot of energy.

A more detailed description of how ceiling heating works is available in Lindab's Ceiling Heating Guide.

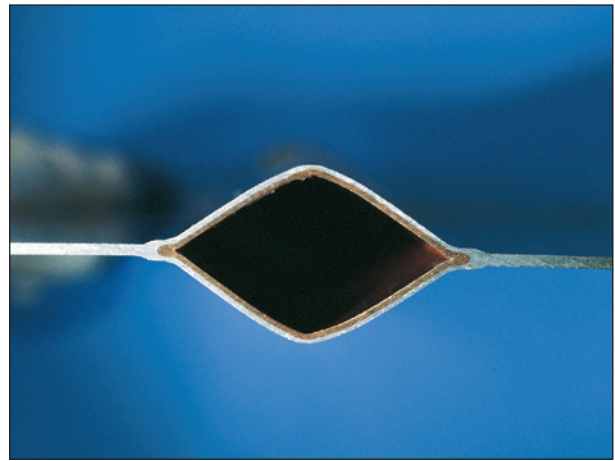
### Cooling feature (Atrium-C)

When cold water passes through the panel, the heat of the aluminium plate is transferred to the cold water, with very little temperature loss. The panel partly chills the warm room air on its cold surfaces and, partly absorbs heat from the room via low-temperature radiation. In this way, the room is chilled via both radiation (approx. 50%) and convection. The absorption of low-temperature radiation means that the surfaces of the room, and above all the floor, walls, furniture and fittings have a lower temperature than if then cooling was only convective. This means that storage of "cooling energy" is greater.

## Design

The design of the panels is based on a world-patented method of joining a copper pipe to an aluminium plate. The aluminium plate is metallurgically bonded with the copper pipe (the materials are partially fused together under very high pressure). Due to this, the energy transport between the pipe and the plate is very efficient. The copper pipe has a rhomboid shape (see Picture 1), which ensures that turbulent flows are obtained quicker than with a round pipe and guarantees very good heat transfer even at low flow rates.

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



Picture 1. Cross-section of the metallurgically bonded copper and aluminium plates and the rhomboid water duct.

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## Atrium

Atrium-H is a heating panel. It is equipped with end-pieces and can be installed recessed into a suspended ceiling (see picture 2). The top of the panel is insulated with extruded polystyrene foam and should not be placed in direct sunshine or underneath other heating- or ignition sources. Sparks and smoke must be avoided. The foamed plastic is manufactured without the addition of CFC or HCFC gas, i.e. Freons.

Atrium-C is a cooling panel. It is equipped with end-pieces and can be installed recessed into a suspended ceiling. The top of the Atrium-C is not insulated.

Atrium-H and C are available in a hygienic design with the top covered. The hygienic design is suitable for washing bays or suchlike.

Atrium-H should be used if the panel is to provide both cooling and heating with a so-called "Change-Over" system.



Picture 2. Atrium is equipped with end-pieces and can be installed recessed into a suspended ceiling.

## Loggia

Loggia is the brand name of Lindab's heating strips. What distinguishes Loggia from Atrium-H is that it does not have end-pieces on its short sides. Loggia is therefore not designed for installation in the supporting structure of a suspended ceiling (see picture 3). Loggia is suited for industrial premises, for example, warehouses, showrooms, etc. The top of the panel is insulated with extruded polystyrene foam and should not be placed in direct sunshine or underneath other heating- or ignition sources. Sparks and smoke must be avoided. The foamed plastic is manufactured without the addition of CFC or HCFC gas, i.e. Freons.



Picture 3. Loggia is suitable for suspended installation in industrial premises.

# Heating and cooling panels

# Atrium / Loggia

## Data

### Variants

**The panels are available in three different versions:** Loggia, Atrium-H and Atrium-C.

Loggia are heating strips without end-pieces for industrial use.

Atrium-H is equipped with end-pieces. Width 60 (600 mm) is adapted in size, -8 mm, so as to facilitate installation in a suspended ceiling using a standard T-profile with 600-mm module.

Atrium-C is a cooling panel and is supplied without insulation. Width 60 (600 mm) is adapted in size, -8 mm, so as to facilitate installation in a suspended ceiling using a standard T-profile with 600-mm module.

**The panels are available in three different widths:** 330 (width 33), 600 (width 60) and 870 mm (width 87). The height is always 60 mm.

**Lengths:** Available in lengths from 1.2 m to 6.0 m in steps of 0.1m.

**Water connection:** Available with four different connections, depending on the width of the product – 10, 12, 15 and 22 mm. This allows the pressure drop to be adjusted for different dimensioning cases.

**Insulation:** Atrium H- and Loggia panels are insulated with white extruded polystyrene foam and should not be placed in direct sunshine or underneath other heating- or ignition sources. Sparks and smoke must be avoided. Manufactured without the addition of CFC or HCFC gas i. e. freons.

For full technical data sheet please contact Lindab.

**Surface treatment:** The panels are powder-coated.

### Colour

The product is available as standard, in signal white RAL 9003 or in pure white RAL 9010, gloss value 30. Other RAL colours on request.

### Plus features

Factory preinstalled.

**Hygienic design:** For premises with very high hygiene requirements, Atrium is available with the top covered in aluminium and with the joints sealed with a white sealing compound. The panel can then be disinfected or rinsed. For this purpose hygienic cover suspension brackets are available in different standard colors and all different panel sizes.

For further detail please contact Lindab.

## Accessories

Delivered separately.

**Control:** Refer to the chapter Regula.

**Connection cover:** Conceals visible piping to a wall (ATR-CW; see figure 1) or in between panels (ATR-CC). Indicate the total length (in mm), between the objects, when you place your order.

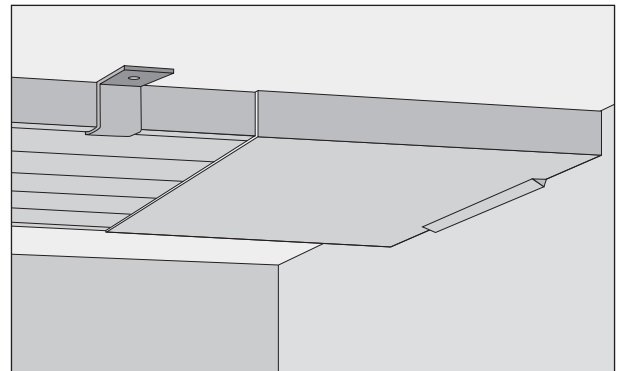


Figure 1. Atrium with connection cover (ATR-CW).

**Suspension options:** Mounting equipment for suspended or direct-to-ceiling mounting are available as accessories.

Please refer to page 17 for further details or/and to "[Atrium Installation Instruction](#)".

For additional accessories please refer to the "[Accessories](#)" document on [www.lindQST.com](http://www.lindQST.com).

# Heating and cooling panels

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## Dimensioning of heating panels Atrium-H and Loggia heating strips.

Radiant heating is an excellent heating system with lots of advantages such as lower energy consumption, quick response and more uniform room temperature compared to other heating systems. Placement in the ceiling also means that the radiant heat directly affects all underlying exposed surfaces visible from the panel. Walls are free from radiators and allow a more flexible use of the room's surfaces. Lindab has produced a "[Ceiling heating guide](#)", with advice on how to achieve the best possible indoor climate and what to think about in connection with dimensioning and placement.

The heating capacity from the radiant panels depends on the temperature difference between the panel surface and the surfaces to be heated. The water flow and the turbulence of the water also affect the power output. For a correct dimensioning for your particular operating case, use our calculation program for [Atrium](#).

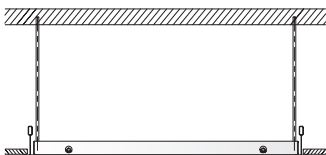
### Definitions:

- $P_a$  = Cooling capacity air [W]
- $P_w$  = Cooling capacity water [W]
- $P_{tot}$  = Cooling capacity total [W]
- $q_{ma}$  = Air mass flow rate [kg/s]
- $q_a$  = Primary air flow rate [l/s]
- $q_w$  = Water flow rate [l/s]
- $q_{wmin}$  = Minimal water flow rate [l/s]
- $q_{wnom}$  = Nominal water flow rate [l/s]
- $c_{pa}$  = Specific heat capacity air [1.004 kJ/kg K]
- $t_r$  = Room air temperature [°C]
- $t_{wi}$  = Water inlet temperature [°C]
- $t_{wo}$  = Water outlet temperature [°C]
- $\Delta t_{ra}$  = Temp. diff., room air and primary air temp. [K]
- $\Delta t_{rw}$  = Temp. diff., room air and mean water temp. [K]
- $\Delta t_w$  = Temp. diff. water circuit [K]
- $\epsilon_{\Delta tw}$  = Capacity correction for temperature
- $\epsilon_{gw}$  = Capacity correction for water flow
- $P_{Lt}$  = Specific heating/cooling capacity [W/m]
- $\zeta_{\Delta twio}$  = Pressure drop factor for temperature

## Installation types

1

Recessed in suspended ceiling



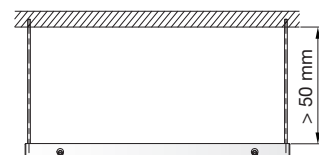
2

Exposed, sealed to ceiling



3

Exposed, free hanging



# Heating and cooling panels

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## Dimensioning

### Heating panels Atrium-H and Loggia heating strips

Follow the instructions below, to calculate the heating capacity  $P_w$  provided by the heating panel/heating strips.

1. Calculate  $\Delta t_{rw}$ .
2. Product length  $L$  minus 0.1 m, to obtain the active length  $L_{act}$ .
3. Find the specific heating capacity  $P_{Lt}$ , relative to  $\Delta t_{rw}$ , in diagram 1.
4. Multiply the specific heating capacity with the active length  $L_{act}$ .

### Example 1, Heating:

What is the heating capacity  $P_w$  of a 6.0 m free hanging Loggia 87?

The room's winter temperature is assumed to be 21°C.

The heating water temperature in/out is 56/46°C.

### Answer:

Temperature difference:

$$\Delta t_{rw} = (t_{wi} + t_{wo}) / 2 - t_r$$

$$\Delta t_{rw} = (56^\circ\text{C} + 46^\circ\text{C}) / 2 - 21^\circ\text{C} = 30 \text{ K.}$$

Active length:

$$L_{act} = 6.0 \text{ m} - 0.1 \text{ m} = 5.9 \text{ m.}$$

Read off from diagram 1.  $P_{LT} = 280 \text{ W/m.}$

The Heating capacity  $P_w$  is:

$$P_w = 280 \text{ W/m} \times 5.9 \text{ m} = 1652 \text{ W.}$$

**NB!** The capacity diagram applies at the nominal flow rate in one strip of  $q_{wnom} = 0.011 \text{ l/s}$ . Follow the steps in example 3 to obtain the right capacity at other flows.

## Atrium H/Loggia\*

Curve	Installation type	Perforation type	Insulation type	Related to
1	1, 2, 3	None, Acoustic	Standard	-
2	1, 2, 3	None, Acoustic	Additional 50 mm	EN 14037
3	3	None, Acoustic	All types	Radiation

Table 1. Curves legend for Diagram 1. \* Loggia for installation types 2 and 3 only!

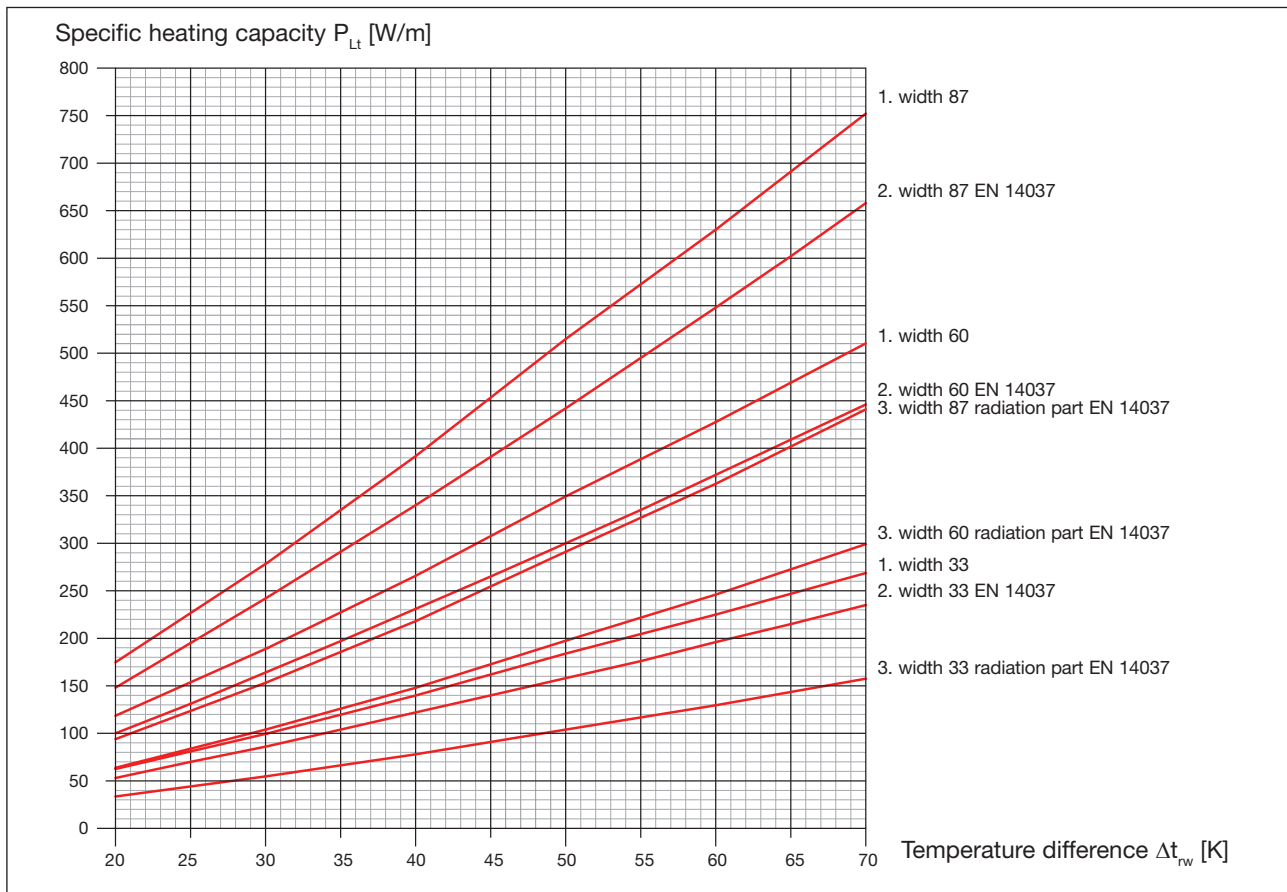


Diagram 1. Atrium-H and Loggia, specific heating capacity  $P_{Lt}$  per active length at nominal water flow in one strip  $q_{wnom} = 0.011 \text{ l/s}$  in relation to temperature difference  $\Delta t_{rw}$ .

# Heating and cooling panels

# Atrium / Loggia

## Dimensioning

### Cooling panel Atrium-C

Follow the instructions below, to calculate the cooling capacity provided by the cooling panel.

1. Calculate  $\Delta t_{rw}$ .
2. Product length L minus 0.1 m, to obtain the active length  $L_{act}$ .
3. Find the specific cooling capacity  $P_{Lt}$ , relative to  $\Delta t_{rw}$ , for your installation type in diagram 2.
4. Multiply the specific heating capacity with the active length  $L_{act}$ .

### Example 2:

What is the cooling capacity  $P_w$  of a 5.4 m Atrium-C 60, with Ø10 water connection and exposed installation?

The room's summer temperature  $t_r$  is assumed to be 24.5°C. The cooling water temperature in /out of Atrium is 14/17°C.

### Answer:

Temperature difference:

$$\Delta t_{rw} = (t_{wi} + t_{wo}) / 2 - t_r$$

$$\Delta t_{rw} = (14^\circ\text{C} + 17^\circ\text{C}) / 2 - 24.5^\circ\text{C} = 9 \text{ K.}$$

Active length:

$$L_{act} = 5.4 \text{ m} - 0.1 \text{ m} = 5.3 \text{ m.}$$

Read off from diagram 2.  $P_{Lt} = 59 \text{ W/m.}$

Multiply the specific cooling capacity by the factor for exposed installation =>  $59 \text{ W} \times 1.1 = 64.9 \text{ W/m.}$

The cooling capacity  $P_w$  is:

$$P_w = 64.9 \text{ W/m} \times 5.3 \text{ m} = 344 \text{ W.}$$

**NB!** The capacity diagram applies at a nominal flow in one strip  $q_{wnom} = 0.025 \text{ l/s}$ . Follow the steps in example 4, to obtain the right capacity at other flows.

## Atrium C

Curve	Installation type	Perforation type	Insulation type	Related to
1	3	None, Acoustic	None	EN 14240
2	1, 2	None, Acoustic	None	-

Table 2. Curves legend for Diagram 2

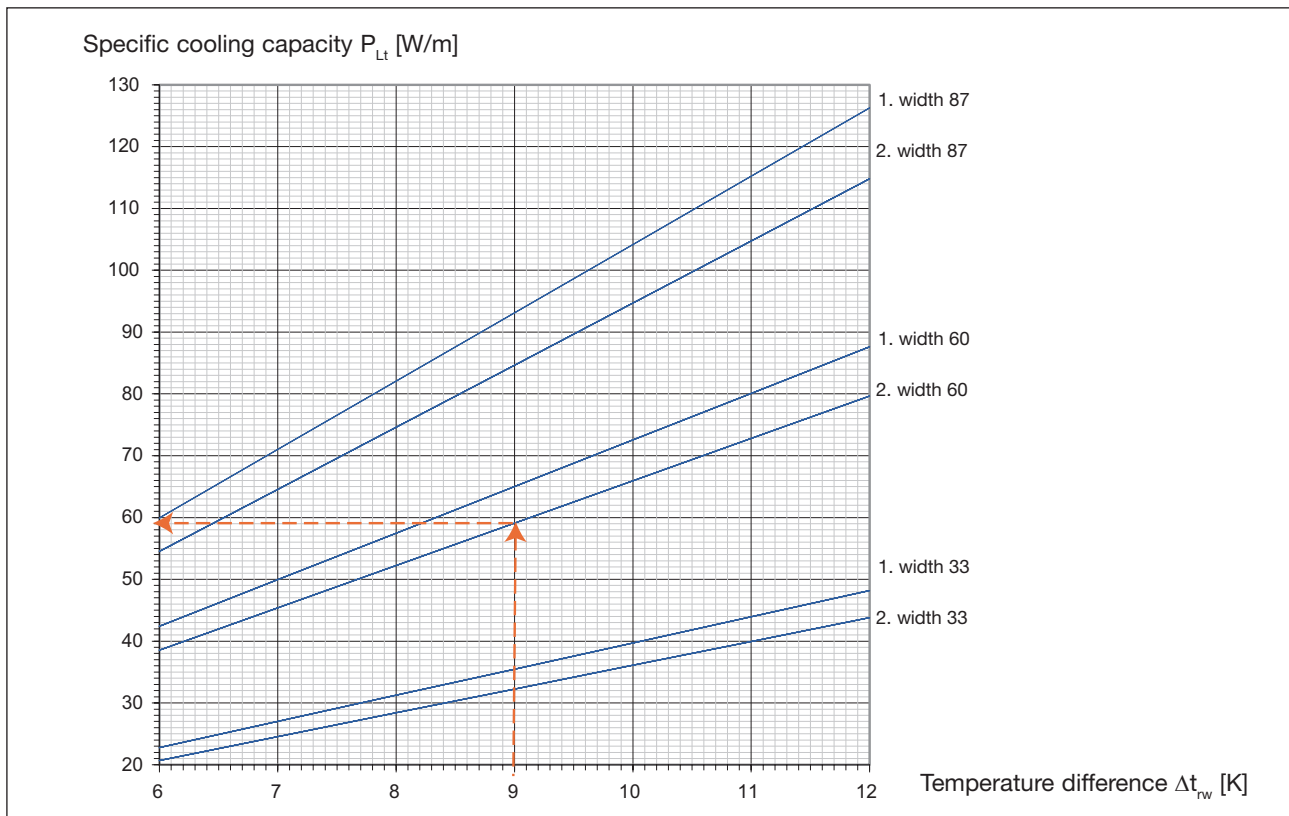


Diagram 2. Atrium-C specific cooling capacity  $P_{Lt}$  per active length at the nominal water flow in one strip  $q_{wnom} = 0.025 \text{ l/s}$ .



# Heating and cooling panels

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## Dimensioning

### Capacity correction for water flow $\varepsilon_{qw}$

#### Follow the steps below:

1. Calculate the water flow with the current capacity  $P_w$ .
2. Read off the number of parallel circuits in table 3.
3. Calculate the water flow in one strip.
4. Read off the capacity correction for waterflow  $\varepsilon_{qw}$  from diagram 3.
5. Multiply the capacity  $P_w$  by the capacity correction  $\varepsilon_{qw}$ .
6. Repeat steps 1 through 5 with the new capacity.

Size	Model		
	33	60	87
Ø10	1	1	1
Ø12	2	2	
Ø15		4	3
Ø22			6

Table 3. Number of parallel circuits for Atrium / Loggia depending on model and connection option.

#### Example 3 Heating:

Loggia 87 with Ø15 water connection gives:  
 $P_w = 1652 \text{ W}$  (From example 1).

Temperature difference was:  
 $\Delta t_w = 56^\circ\text{C} - 46^\circ\text{C} = 10 \text{ K}$ .

To calculate the water flow rate, use formula:  
 $q_w = P_w / (c_{pw} \times \Delta t_w)$   
 $q_w = 1652 \text{ W} / (4200 \text{ Ws}/(\text{kg K}) \times 10 \text{ K}) = 0.0393 \text{ l/s}$ .

In table 3, read off the number of parallel circuits for Loggia 87 Ø15. The value is 3. Calculate the water flow rate in one strip:  $q_w = 0.0393 \text{ l/s} / 3 = 0.0131 \text{ l/s}$ .

Read off the capacity correction  $\varepsilon_{qw}$  from diagram 3. The value is 1.008. Calculate the new capacity:  
 $P_w = 1652 \text{ W} \times 1.008 = 1665 \text{ W}$ .

Use the new capacity to calculate the water flow rate:  
 $q_w = 1665 \text{ W} / (4200 \text{ Ws}/(\text{kg K}) \times 10 \text{ K}) = 0.0396 \text{ l/s}$ .

Calculate the water flow rate in one strip:  
 $q_w = 0.0396 \text{ l/s} / 3 = 0.0132 \text{ l/s}$ .

The new capacity correction  $\varepsilon_{qw}$  will then be 1.01 and the new capacity is calculated to be:  
 $P_w = 1652 \text{ W} \times 1.01 = 1669 \text{ W}$ .

Using the new heating capacity, a new water flow is calculated:  
 $q_w = 1669 \text{ W} / (4200 \text{ Ws}/(\text{kg K}) \times 10 \text{ K}) = 0.0397 \text{ l/s}$ .  
 Seeing that the flow is near stabile at this point in the calculation, the heating capacity is calculated to be 1669 W.

#### Example 4 Cooling:

Atrium-C 60 5.4 with Ø10 water connection gives:  
 $P_w = 344 \text{ W}$  (From example 2).

Temperature difference was:  
 $\Delta t_w = 17^\circ\text{C} - 14^\circ\text{C} = 3 \text{ K}$ .

To calculate the water flow rate, use formula:  
 $q_w = P_w / (c_{pw} \times \Delta t_w)$   
 $q_w = 344 \text{ W} / (4200 \text{ Ws}/(\text{kg K}) \times 3 \text{ K}) = 0.0273 \text{ l/s}$

In table 3, read off the number of parallel circuits for Atrium-C 60 with Ø10 connection. The value is 1. Calculate the water flow rate in one strip:  
 $q_w = 0.0273 \text{ l/s} / 1 = 0.0273 \text{ l/s}$ .

Read off the capacity correction  $\varepsilon_{qw}$  from diagram 3. The value is 1.011. Calculate the new capacity:  
 $P_w = 344 \text{ W} \times 1.011 = 348 \text{ W}$ .

Use the new capacity to calculate the water flow rate:  
 $q_w = 348 \text{ W} / (4200 \text{ Ws}/(\text{kg K}) \times 3 \text{ K}) = 0.0276 \text{ l/s}$ .

Read off the capacity correction  $\varepsilon_{qw}$  from diagram 3. The value is 1.013. Calculate the new capacity:  
 $P_w = 344 \text{ W} \times 1.013 = 348 \text{ W}$ .

Using the new heating capacity a new water flow is calculated:  
 $q_w = 348 \text{ W} / (4200 \text{ Ws}/(\text{kg K}) \times 3 \text{ K}) = 0.0276 \text{ l/s}$

Seeing that the flow is near stabile at this point in the calculation, the cooling capacity is calculated to be 348W.

#### Dimensioning

For dimensioning of radiant panels please refer to our waterborne calculator on [www.lindqst.com](http://www.lindqst.com).

# Heating and cooling panels

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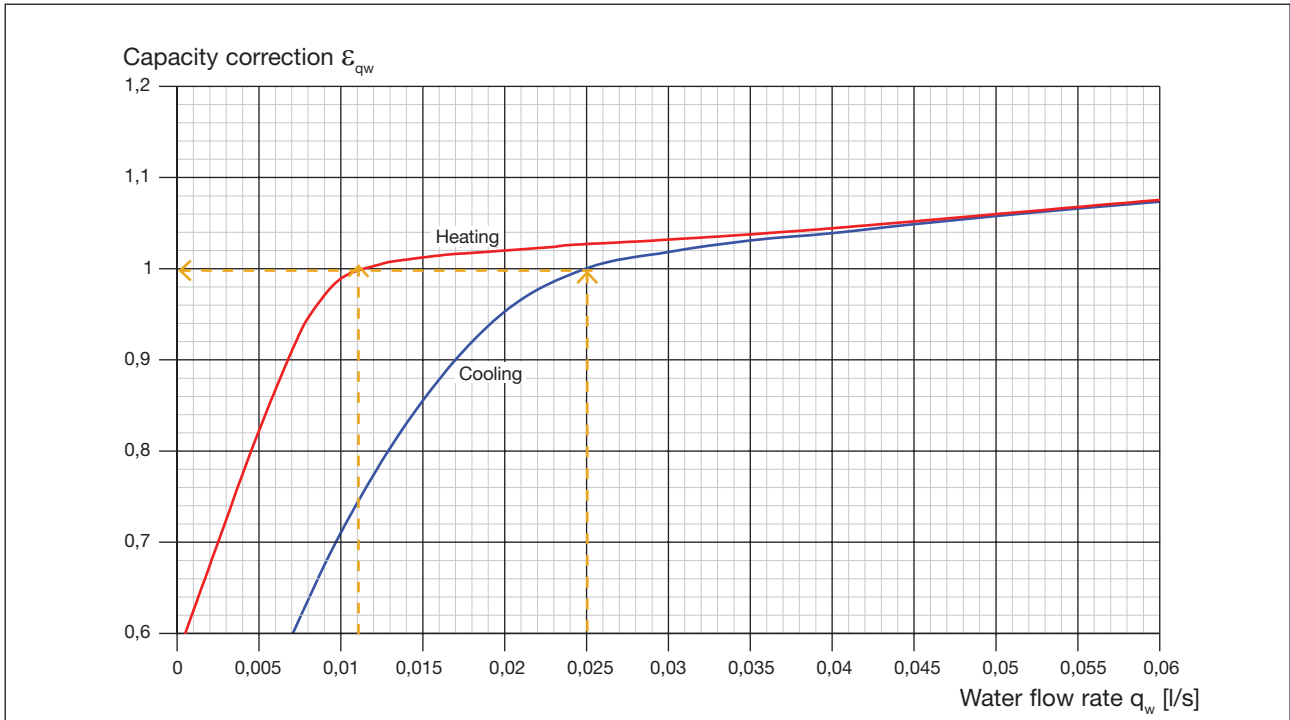


Diagram 3. Capacity correction  $\epsilon_{q_w}$  as a function of water flow rate  $q_w$ .

# Heating and cooling panels

# Atrium / Loggia

## Flow – pressure drop for coupling 1

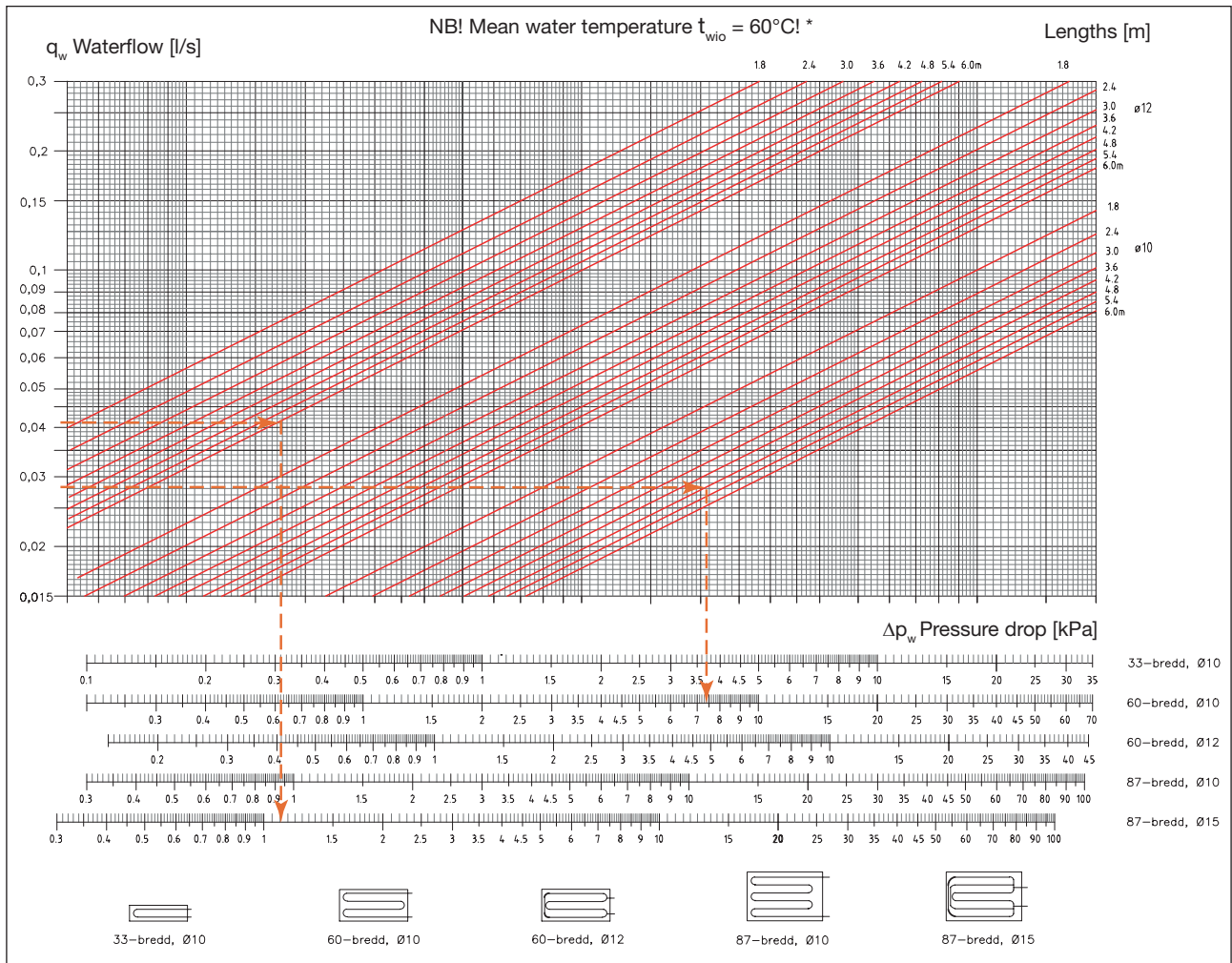


Diagram 4. Panels, pressure drop at 60°C. For pressure drops at temperatures other than 60°C, the pressure drop is multiplied by the pressure drop factor (see diagram 7).

**Definitions:**

- $q_w$  = Water flow rate [l/s]
- $P_w$  = Cooling capacity water [W]
- $c_{pw}$  = Specific heat capacity water [4200 Ws/(kg K)]
- $\Delta t_w$  = Temperature difference water circuit [K]
- $t_{wio}$  = Mean water temperature [°C]
- $\Delta p_w$  = Pressure loss water circuit [kPa]

\* Diagrams are for a certain mean water temperature  $t_{wio}$ . For other temperatures please do your calculations in our waterborne calculator in [www.lindQST.com](http://www.lindQST.com)!

**Example 5:**

Loggia-87 6 m with Ø15 water connection provides a heating capacity from:  
 $P_w = 1669 \text{ W}$  at  $\Delta t_w = 10 \text{ K}$  (from Example 3 Heating)  
 $t_{wio} = 0.5 \times (t_{wo} + t_{wi}) = 0.5 \times (56^\circ\text{C} + 46^\circ\text{C}) = 51^\circ\text{C}$   
 $q_w = P_w / (c_{pw} \times \Delta t_w)$   
 $q_w = 1669 \text{ W} / (4200 \text{ Ws/ (kg K)} \times 10 \text{ K}) = 0.0397 \text{ l/s}$

The pressure drop  $\Delta p_w$  in the water circuit is read off at 1.1 kPa from diagram 4. Read off the pressure drop factor at 51°C from diagram 7. The value is 1.04.

Calculate the new pressure drop:  
 $\Delta p_w = 1.1 \text{ kPa} \times 1.04 = 1.14 \text{ kPa}$ .

**Example 6:**

Atrium-C 60 4.8 m with Ø10 water connection provides a cooling capacity from:  
 $P_w = 348 \text{ W}$  at  $\Delta t_w = 3 \text{ K}$ ,  $t_{wio} = 15^\circ\text{C}$   
 $q_w = P_w / (c_{pw} \times \Delta t_w)$   
 $q_w = 348 \text{ W} / (4200 \text{ Ws/ (kg K)} \times 3 \text{ K}) = 0.0276 \text{ l/s}$

The pressure drop  $\Delta p_w$  in the water circuit is read off as 7.4 kPa from diagram 4. Read off the pressure drop factor at 15°C from diagram 7. The value is 1.27.

Calculate the new pressure drop:  
 $\Delta p_w = 7.4 \text{ kPa} \times 1.27 = 9.4 \text{ kPa}$ .

## Flow – pressure drop for coupling 13

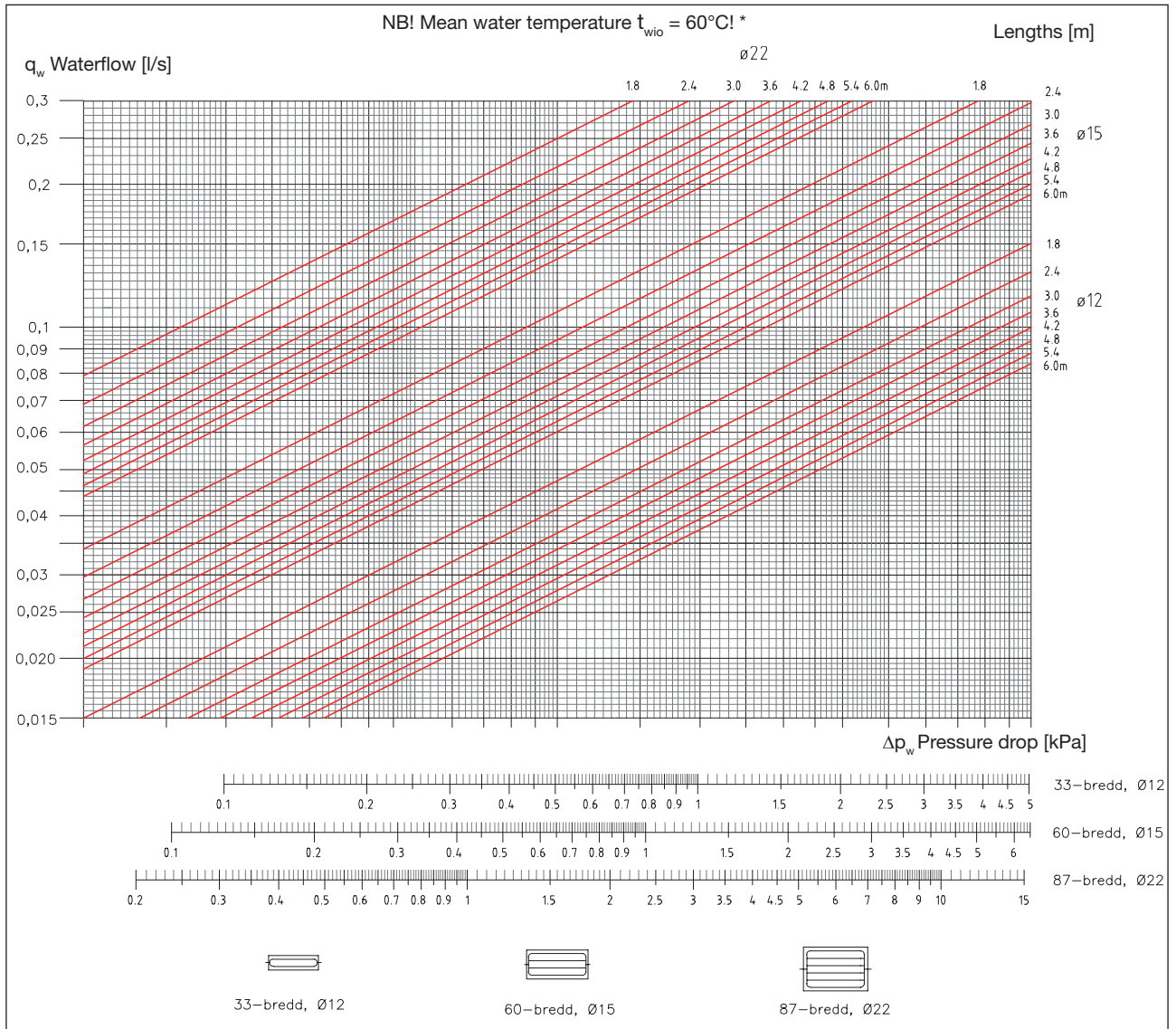


Diagram 5. Panels, pressure drop at 60°C. For pressure drops at temperatures other than 60°C, the pressure drop is multiplied by the pressure drop factor (see diagram 7).

# Heating and cooling panels

# Atrium / Loggia

## Flow – pressure drop for coupling 1 + 13

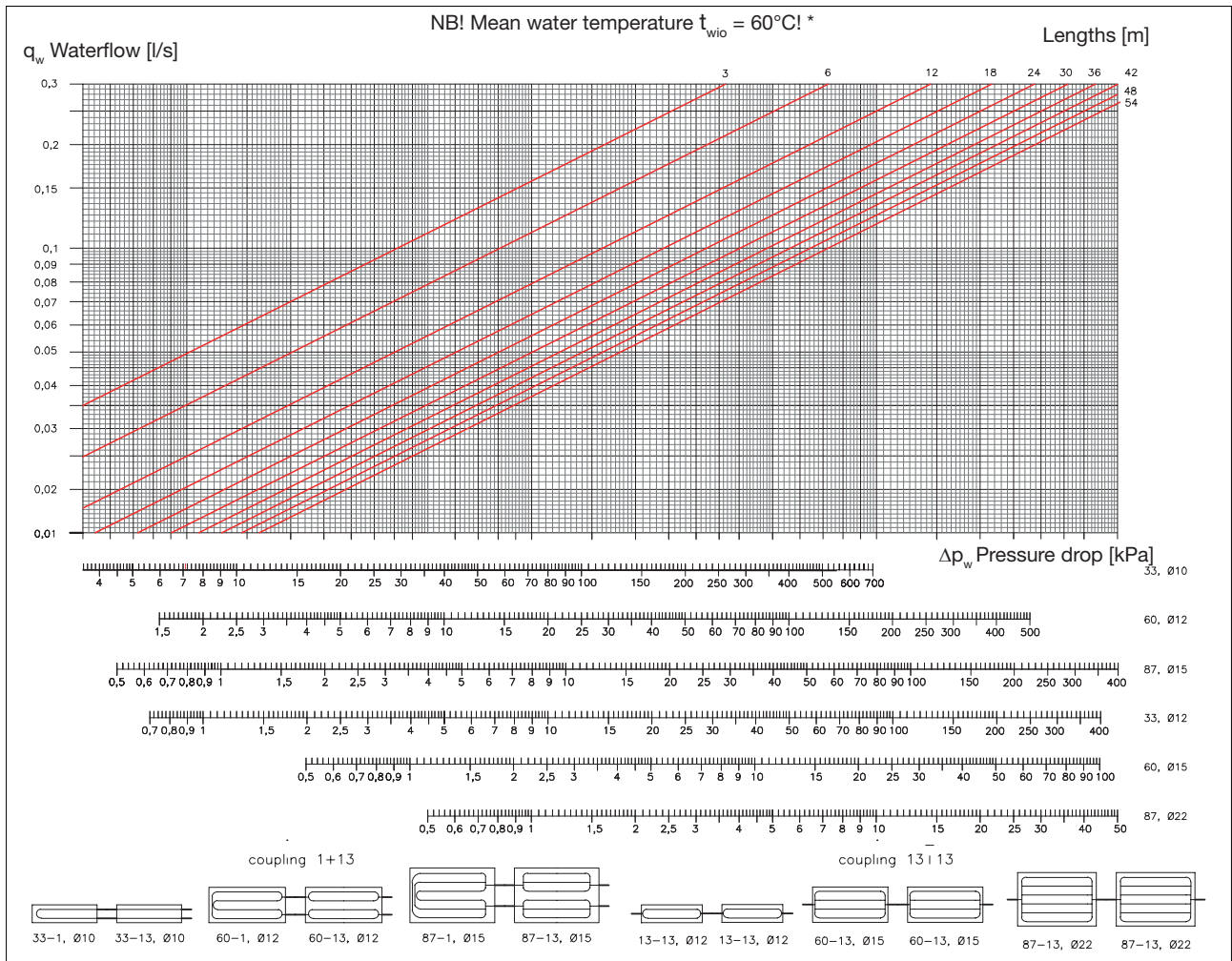


Diagram 6. Panels, pressure drop at 60°C. For pressure drops at temperatures other than 60°C, the pressure drop is multiplied by the pressure drop factor (see diagram 7).

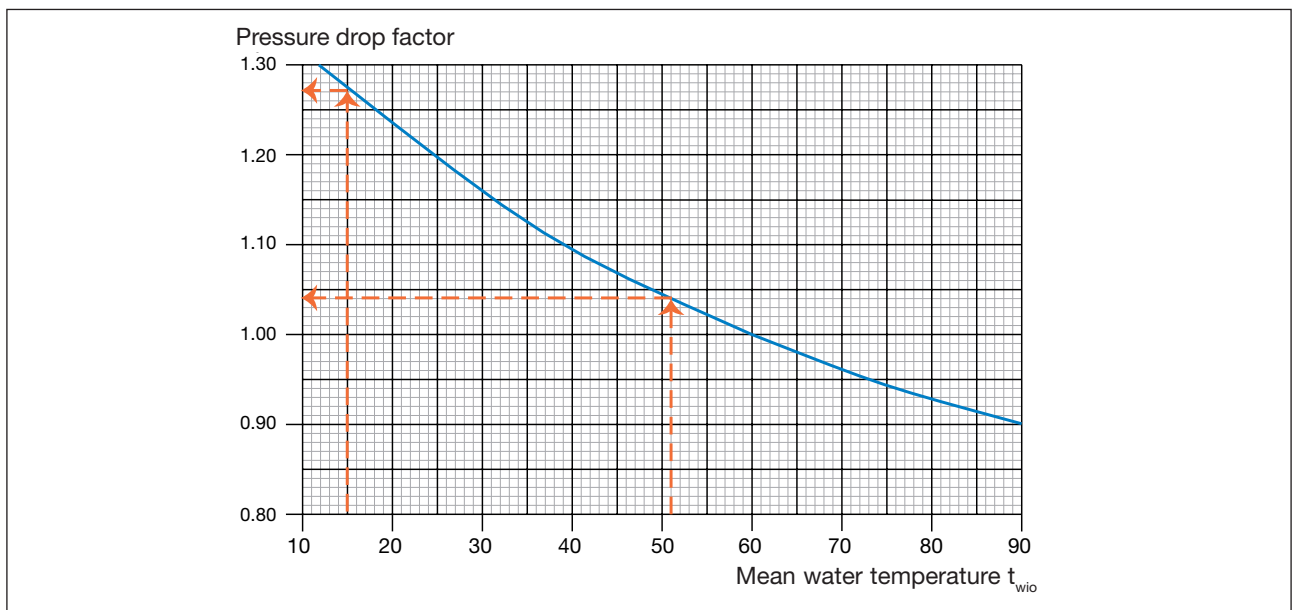


Diagram 7. Temperature adjusted pressure drop factor.

# Heating and cooling panels

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## Coupling & connection

Atrium / Loggia are supplied in lengths of up to 6 metres. When the required length is longer than 6 metres, panels can be coupled in series.

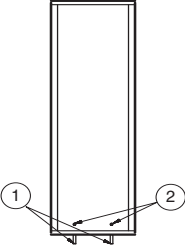
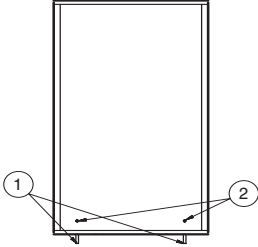
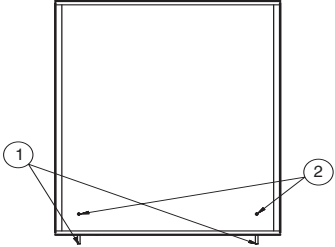
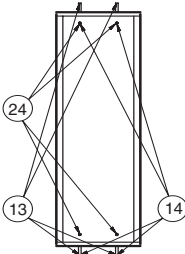
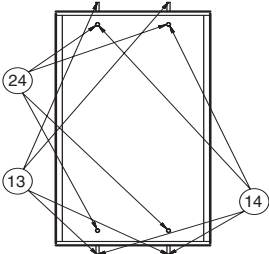
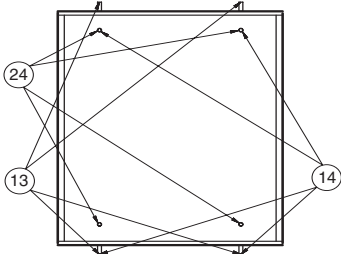
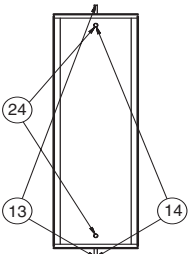
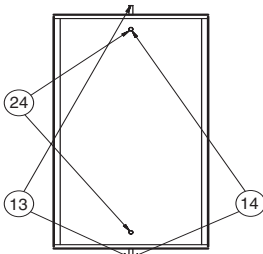
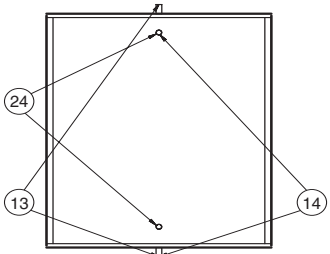
Width 33		Width 60		Width 87	
					
Coupling options	Connection (mm)	Coupling options	Connection (mm)	Coupling options	Connection (mm)
1	10	1	10, 12	1	10, 15
2	10	2	10, 12	2	10, 15
					
Coupling options	Connection (mm)	Coupling options	Connection (mm)	Coupling options	Connection (mm)
13	10	13	12	13	15
14	10	14	12	14	15
24	10	24	12	24	15
					
Coupling options	Connection (mm)	Coupling options	Connection (mm)	Coupling options	Connection (mm)
13	12	13	15	13	22
14	12	14	15	14	22
24	12	24	15	24	22

Table 4. Atrium / Loggia, coupling and connection options.

**NB!** Connections should be made with compression couplings, press couplings or Tectite.

When applying the Atrium beam into a false ceiling, Coupling option 2 should always be used to clear the pipes from the supporting frames of the ceiling (T-bar).

# Heating and cooling panels

# Atrium / Loggia

## Coupling & Connection

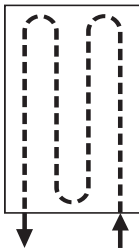
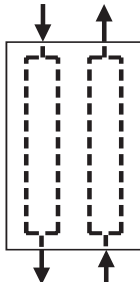
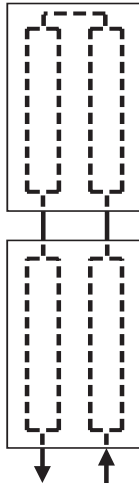
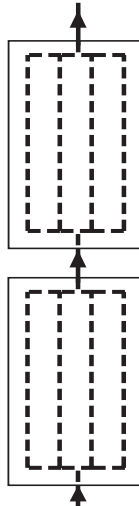
			
<p>1 ( 1 connected )</p> <p>The supply and return for this model are located in the same end-piece.</p> <p>This coupling is only available with one pipe dimension per panel width.</p> <p>Width 33: Ø10 mm Width 60: Ø10 + Ø12 mm Width 87: Ø10 + Ø15 mm</p>	<p>13 (double circuit )</p> <p>This model has the supply in one end-piece and the return in the other one.</p> <p>This coupling is only available with one pipe dimension per panel width.</p> <p>Width 33: Ø10 mm Width 60: Ø12 mm Width 87: Ø15 mm</p>	<p>1+13 (1 connected + double circuit)</p> <p>This model is a combination of 1 connected panel + 1 double circuit.</p> <p>This coupling is available with only one pipe dimension per panel width.</p> <p>Width 33: Ø10 mm Width 60: Ø12 mm Width 87: Ø15 mm</p>	<p>13+13 (straight through)</p> <p>This model has the supply in one end-piece and the return in the other one.</p> <p>This coupling is only available with one pipe dimension per panel width.</p> <p>Width 33: Ø12 mm Width 60: Ø15 mm Width 87: Ø22 mm</p>

Table 5. Atrium and Loggia coupling & connection.

Minimum permitted flow, non-horizonta l mounting $q_{wmin}$ (l/s)	Width 33 Cooling Heating		Width 60 Cooling Heating		Width 87 Cooling Heating	
	dim Ø10	0.013	0.015	0.013	0.015	0.013
dim Ø12	0.026	0.030	0.026	0.030	-	-
dim Ø15	-	-	0.052	0.060	0.039	0.045
dim Ø22	-	-	-	-	0.078	0.090
Max. working pressure (bar)	10					
Max. test pressure (bar)	16					

Table 6. Atrium and Loggia, recommended minimal water flow rates  $q_{wmin}$ .

**NB!** If the panel is not mounted in a horizontal plane, the recommended minimal water flow rates  $q_{wmin}$  should be maintained, to avoid air build up. No separate air release valve is then required for the panel.

# Heating and cooling panels

# Atrium / Loggia

## Width and height, cm



Figure 2. Atrium and Loggia are manufactured as standard in three widths, 33, 60\* and 87 cm, and one height, 6 cm. Actual width dimension is -8 mm.

## Length, m

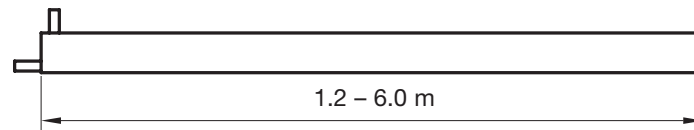


Figure 3. Atrium and Loggia are manufactured as standard in lengths from 1.2 m to 6.0 m in steps of 0.1 m. Actual length dimension is -12 mm.

## Dimensions, mm

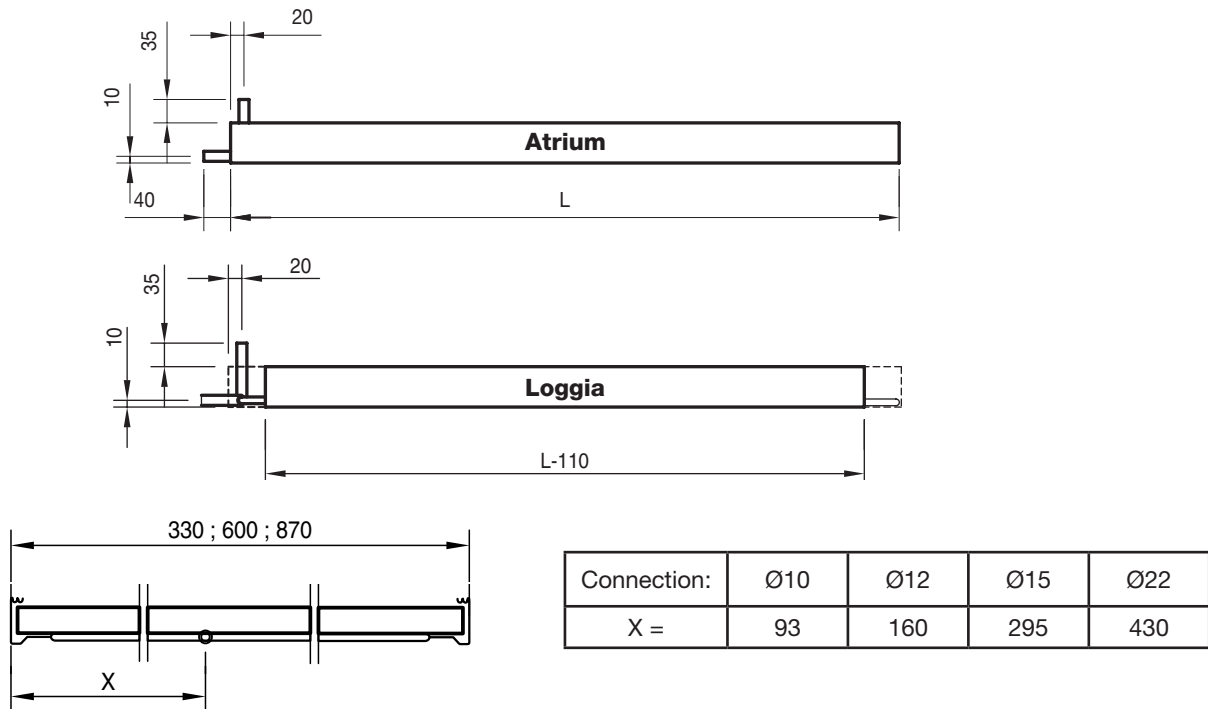


Figure 4. Atrium and Loggia dimension, water connection and connection.

## Weight and water volume

	Atrium / Loggia 33	Atrium / Loggia 60	Atrium / Loggia 87
Dry weight, [kg/m]	1.3	2.2	3.1
Water content, [l/m]	0.18	0.35	0.53
Copper pipes, quality	EN 12735-2 CU-DHP		
Pressure class	PN10		
Expansion at HW**: + 55/45°C	0.7 mm/m		
Expansion at HW**: + 80/60°C	1.2 mm/m		

Table 7. Atrium and Loggia, weight and water volume.

\* The width fits a standard T support (600 mm modules)

HW\*\* - Hot Water



# Heating and cooling panels

# Atrium / Loggia

## Installation examples

Atrium can be installed in three different ways: exposed, sealed to the ceiling (see figures 5 to 6), exposed, free hanging (see figures 7 to 8) or recessed into a suspended ceiling (see figures 9 to 10). Securing plates are used for installation sealed to the ceiling and support rods for installation recessed in a suspended ceiling. Loggia is available for exposed, free hanging installation and installation exposed sealed to the ceiling.

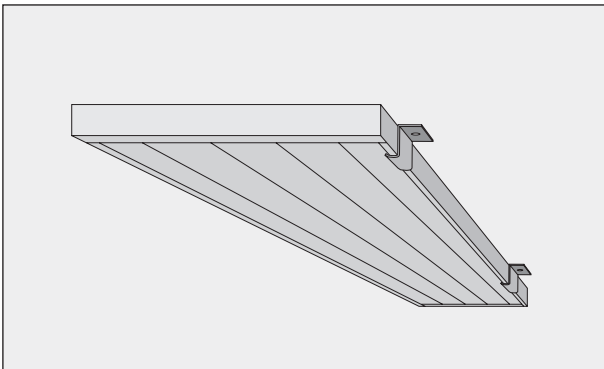


Figure 5. Atrium installed directly on ceiling with Atrium mounting brackets.

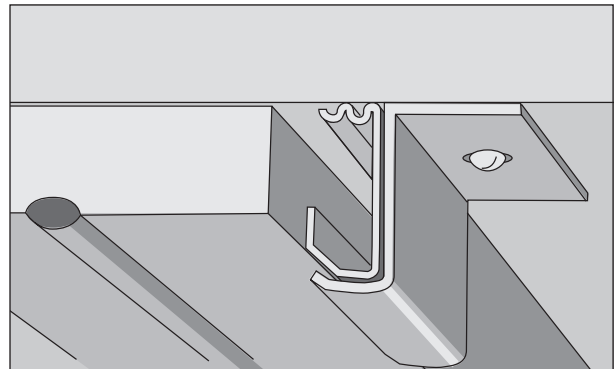


Figure 6. Atrium securing hanger for Sport halls (can be used for exposed free hanging in combination with threaded rods also).

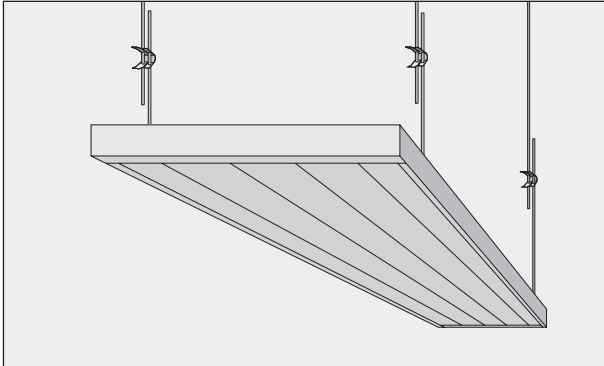


Figure 7. Atrium suspended on adjustable pendulum hangers.



Figure 8. Atrium suspended on adjustable pendulum hangers in combination with Atrium panel hook.

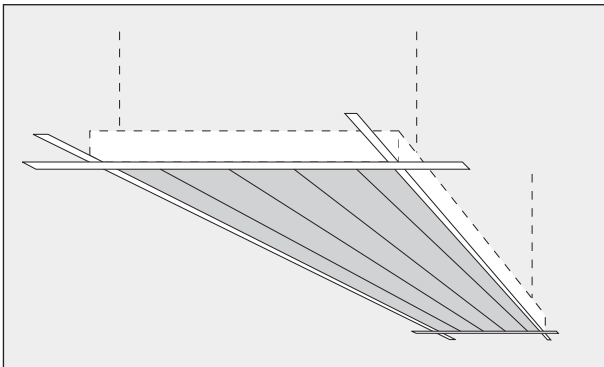


Figure 9. Atrium integrated into a suspended ceiling (always use own, separate hangers for the panel). Atrium ceiling clips are recommended.

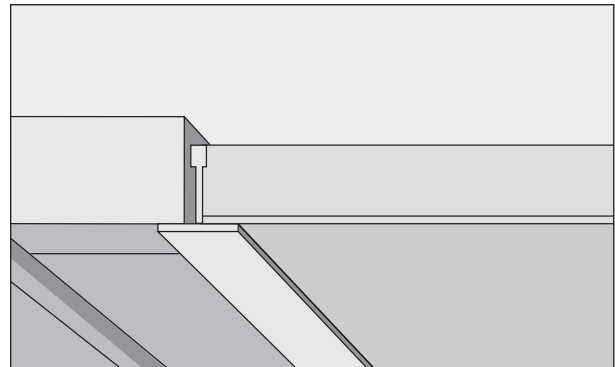


Figure 10. Atrium integrated in a suspended ceiling (always use own, separate hangers for the panel as shown in Figure 9).

**NB!** Make sure that expansion factors are taken into consideration when the panels are mounted recessed in the suspended ceiling, for example, pipes between panels or pipes with fixed connections should be fitted with an extension loop.

## LindQST - just a click away

The Lindab Quick Selection Tool, [LindQST®](#), is a very fast, easy-to-use and flexible online tool for your daily work.

[Calculate the Atrium Loggia here](#)



Picture 4. LindQST - Indoor Climate Designer.

LindQST® helps you select the right waterborne products, e. g. active chilled beams, passive radiant chilled beams, radiant cooling- and heating panels and facade units and quickly finds the corresponding documentation.

In *Waterborne Documentation* you can easily find all available product documentation. Always in the latest version.

In *Waterborne Calculator* you can do a professional calculation based on your specific input data to finetune your choice or calculate different variants of the product. Smart warnings point out if a set-up will not work.

In *Waterborne Selector* you can compare the proposed products according to your specific requirements and select the one which fits best to your needs.

Not enough? With *Indoor Climate Designer* you can insert your selected waterborne product into your room and simulate the actual air distribution, optimize the placing in the ceiling taking into account the calculated air velocities and sound levels.

You can at anytime display your selection and calculations graphically. In addition, you can print or save all results and related documents for your documentation (incl. data sheets, dxf-files and room books).

With LindQST® you will easily find the most suitable product for your project.

It provides an easy and quick access to the latest product information, technical specifications and assembly instructions on the Internet, making it the ideal tool installers, consultants and architects alike.

[www.lindQST.com](http://www.lindQST.com)

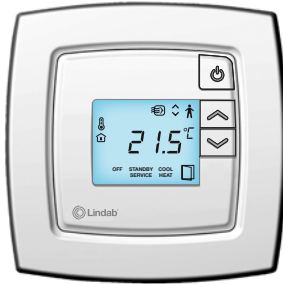
- Fast product selection waterborne products in accordance to Eurovent (chilled beams and facade units).
- Easy access to all current documentation.
- Fast design of waterborne products.
- Indoor Climate Designer: Graphical representation of the spatial situation in 2D / 3D and floor plans from AutoCAD®.
- Calculation of capacities, sound power levels, pressure losses and flow conditions.
- 3D particles or smoke show the air distribution in the room.
- Diagram showing the time course of the CO<sub>2</sub> concentration in the room.
- Room book generation and data sheet for individual rooms and outlets or entire projects.
- Project can be saved and exchanged in its own project area.

# Heating and cooling panels

# Atrium / Loggia

## Control

Lindab offers control equipment that is very simple to use. To avoid heating and cooling being activated at the same time, the systems are controlled sequentially (Regula Combi). For the technical data, refer to a separate brochure, Regula.



## Designations

<b>Product:</b>	<b>Atrium C, Atrium H, Loggia</b>
<b>Width, cm:</b>	33, 60, 87
<b>Connection dim. Water, mm:</b>	10, 12, 15, 22
<b>Coupling options:</b>	1, 2, 13, 14, 23, 24
<b>Length, m:</b>	1.2 – 6.0
<b>Plus features:</b>	See page 5

## Order code

### Atrium cover

Order code for single order

<b>Product</b>	<b>ATR</b>	<b>CC</b>	<b>XX</b>	<b>1200</b>	<b>9003</b>
ATR	_____	_____	_____	_____	_____
Type	_____	_____	_____	_____	_____
CC, CW	_____	_____	_____	_____	_____
Width	_____	_____	_____	_____	_____
33, 60, 87	_____	_____	_____	_____	_____
Cover length	_____	_____	_____	_____	_____
200 mm - 1200 mm (stepless = 1 mm)	_____	_____	_____	_____	_____
RAL Colour	_____	_____	_____	_____	_____
9003, 9010, other colours	_____	_____	_____	_____	_____

Example: ATR-CC-60-800-9003

## Programme text

<b>Panels from Lindab</b>	<b>Qty</b>
<b>Product</b>	
Atrium H - 60 - 10 - 1 - 4.8 m	10
<b>Plus features:</b>	
Hygienic design	
<b>Accessories:</b>	
Connection cover, length = 300 mm:	10
<b>Product</b>	
Atrium C - 87 - 15 - 1 - 6.0 m	30
<b>Plus features:</b>	
Colour, RAL 9005 (black)	
Perforation	
<b>Accessories:</b>	
Regula Combi	30
Regula Secura	30
Control valve, cooling	30
Actuator, cooling	30

## Order code

<b>Product</b>	<b>Atrium H</b>	<b>60</b>	<b>10</b>	<b>1</b>	<b>4.8m</b>
Type	_____	_____	_____	_____	_____
Atrium H, Atrium C	_____	_____	_____	_____	_____
Loggia	_____	_____	_____	_____	_____
Width	_____	_____	_____	_____	_____
33 - 60 - 87 cm	_____	_____	_____	_____	_____
Water connection	_____	_____	_____	_____	_____
10 - 12 - 15 - 22 mm	_____	_____	_____	_____	_____
Coupling option	_____	_____	_____	_____	_____
1 - 2 - 13 - 14 - 23 - 24	_____	_____	_____	_____	_____
Length	_____	_____	_____	_____	_____
1.2 m - 6.0 m ( In steps of 0.1 m )	_____	_____	_____	_____	_____

Example: Atrium-H-60-10-1-4.8m



Most of us spend the majority of our time indoors. Indoor climate is crucial to how we feel, how productive we are and if we stay healthy.

We at Lindab have therefore made it our most important objective to contribute to an indoor climate that improves people's lives. We do this by developing energy-efficient ventilation solutions and durable building products. We also aim to contribute to a better climate for our planet by working in a way that is sustainable for both people and the environment.

[Lindab | For a better climate](#)