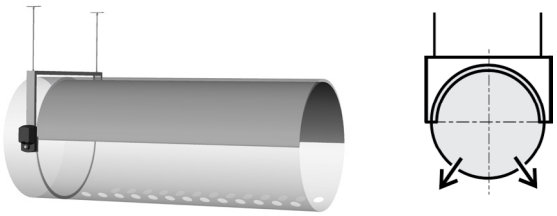
prīhoda®

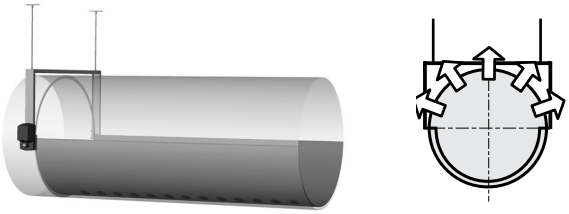
Why use the membrane diffuser?

Membrane Diffusers are used for efficient heating and draught free cooling where switching between these modes is automated. With traditional ducting it would be necessary to install two totally different diffusers to achieve the same air distribution and velocity profile.

Heating - membrane position
During heating the membrane blocks the cooling diffusers on the top half of the duct.

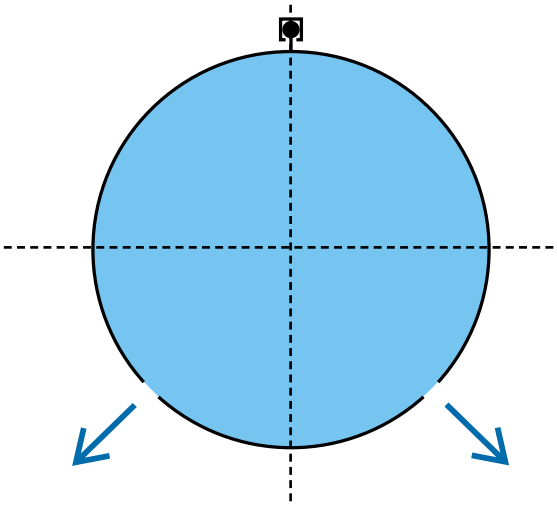


Cooling - membrane position
During cooling the membrane blocks the heating diffusers on the bottom half of the duct.

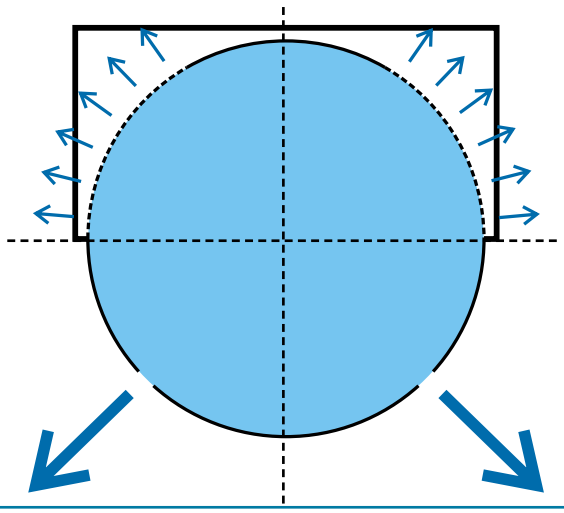


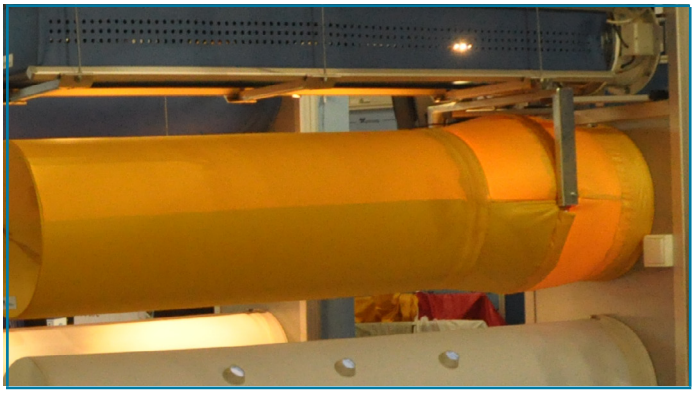
For any user benefits are important; especially cost saving. let's compare the existing alternatives in the most common situations i.e. heating and cooling.

Standard fabric diffuser with two slots or rows of holes providing two airflows downwards.



Membrane diffuser providing different air outputs optimised for both cooling and heating .



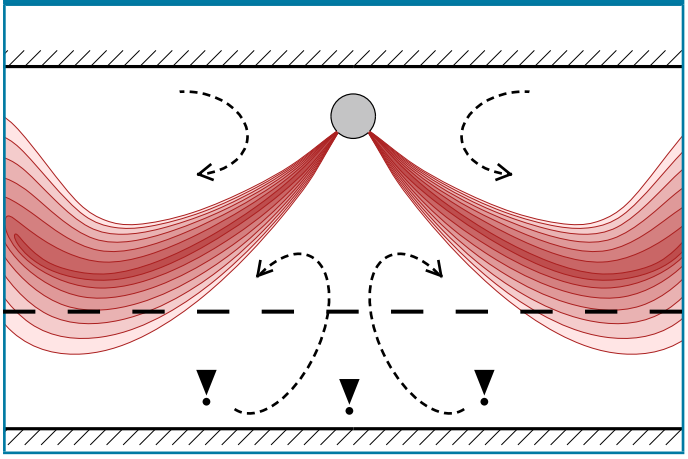


Membrane diffuser - smoke test -video

https://www.youtube.com/watch?v=86iRrLFu2cg

• Typical airflow patterns - heating

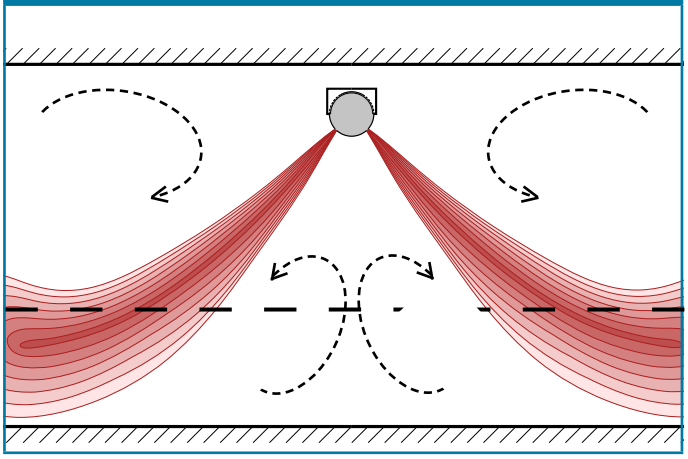
Standard fabric diffuser



❗ Warm air never reaches the occupied zone ❗

Because the duct is not optimised for only heating it must cool too.

Membrane diffuser

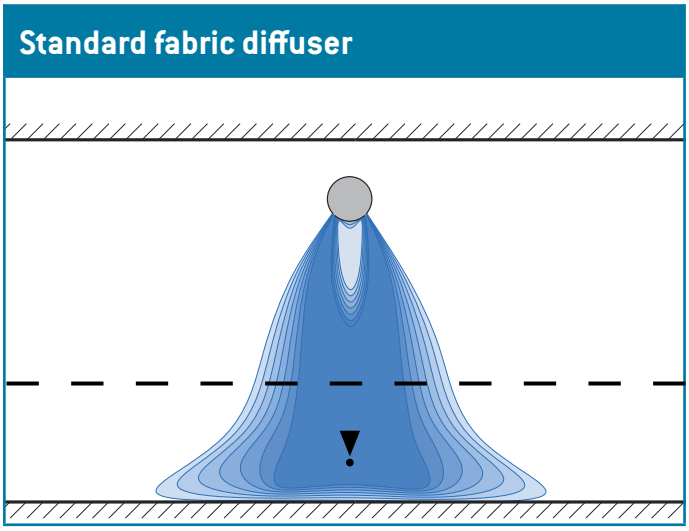


Warm air reaches the occupied zone.

Because the bottom part of the duct is designed with only heating in mind.

• Typical airflow patterns - cooling

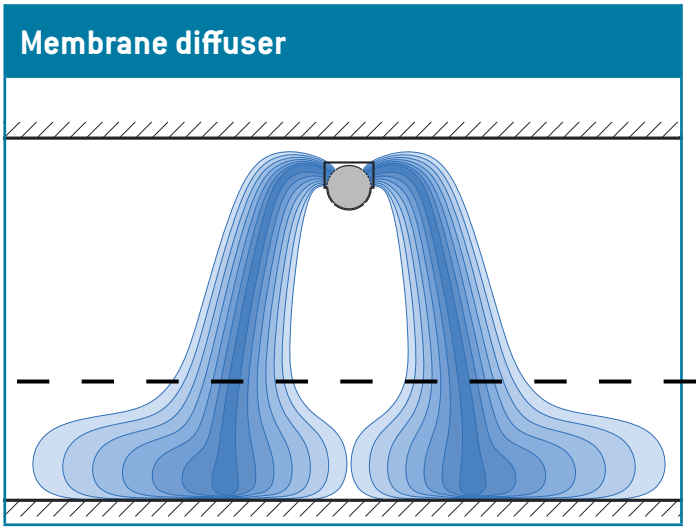
Standard fabric diffuser



❗ Too high velocities (draughts) ❗

Using the same holes for heating now the velocity is too high during cooling.

Membrane diffuser



Optimised velocities in the occupied zone.

The diffusers in the top half of the duct have been designed specifically for cooling only.

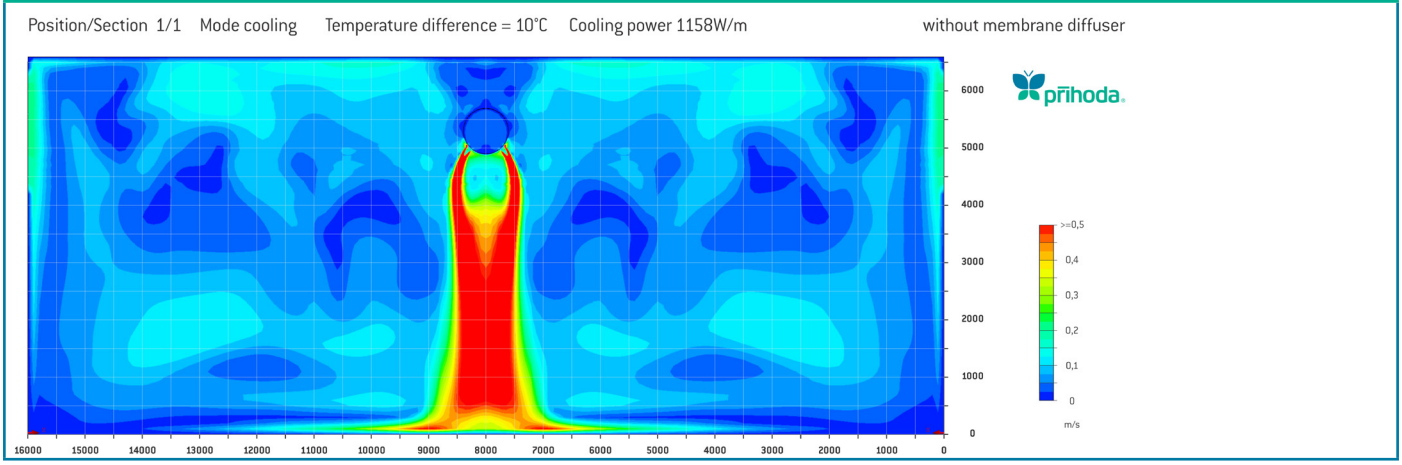
• Example

We have chosen one typical example for comparison. Here we are comparing the Membrane system and the standard fabric diffusers. Both are installed at a height of 5.3m located in the centre of a room 16.0m wide x 6,5m high.

• Cooling – air velocities

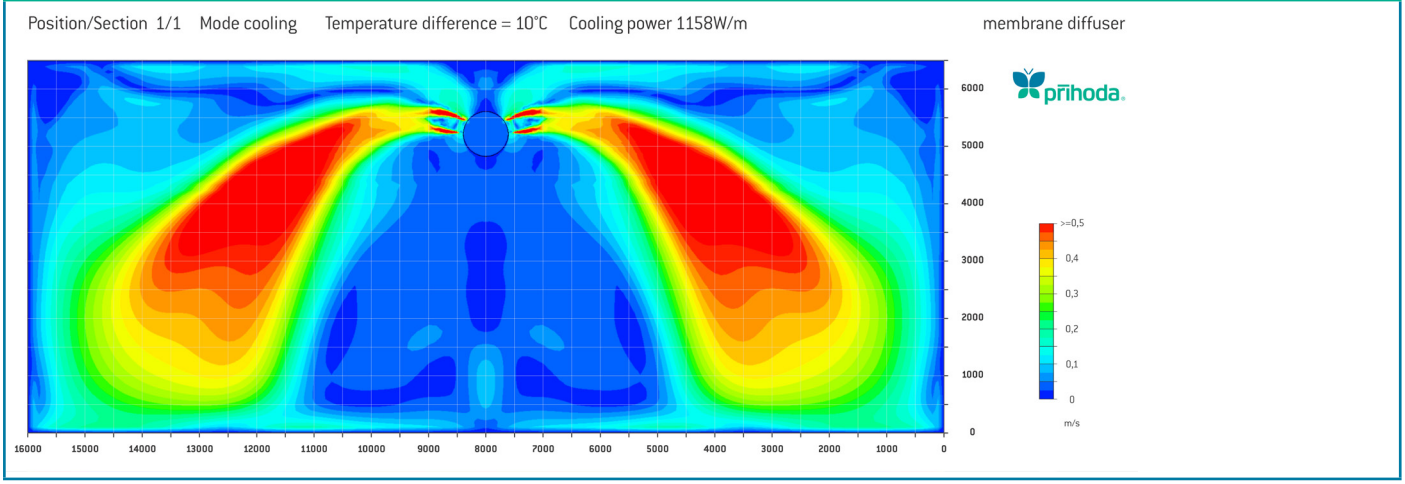
Standard

The cold air reaches the occupied zone with too high velocities about 0,7 m/s! It cannot be better, because the diffuser must work for heating too!



Membrane

The cold air arrives down with an acceptable velocity under 0,35 m/s. It can be optimised according the cooling capacity, because the design focuses on the cooling only.



• Cooling – temperatures

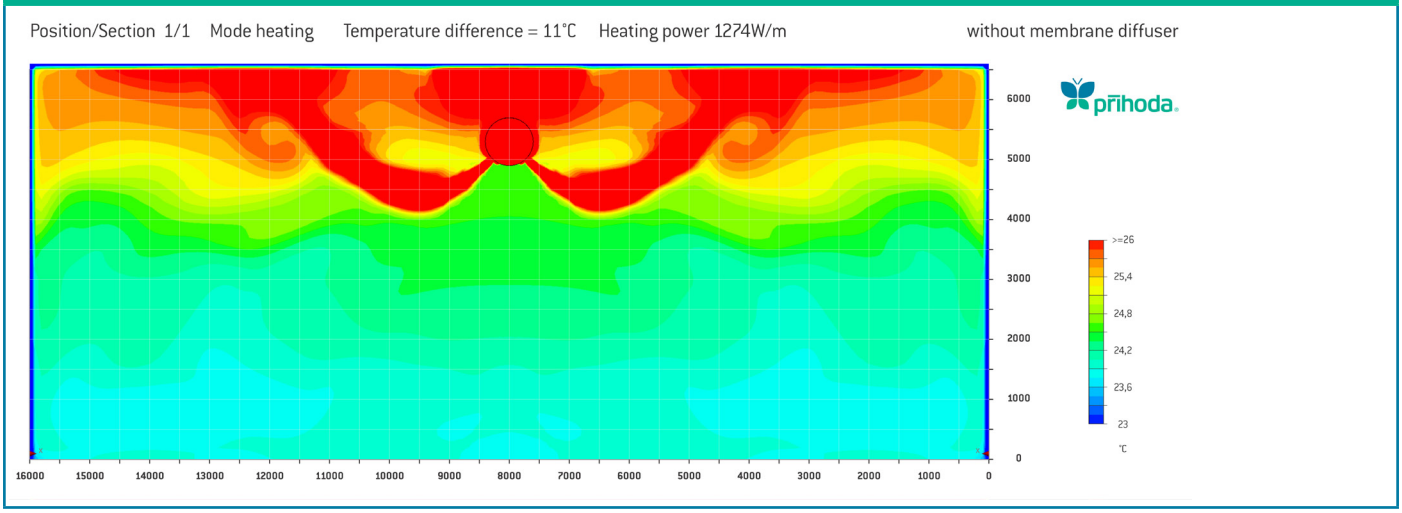
Standard + Membrane

For the temperatures in the occupied zone both systems are about equal. Both systems cool the space in an efficient way but there is a huge diference in the air velocities as described above.

- **Heating – temperatures**

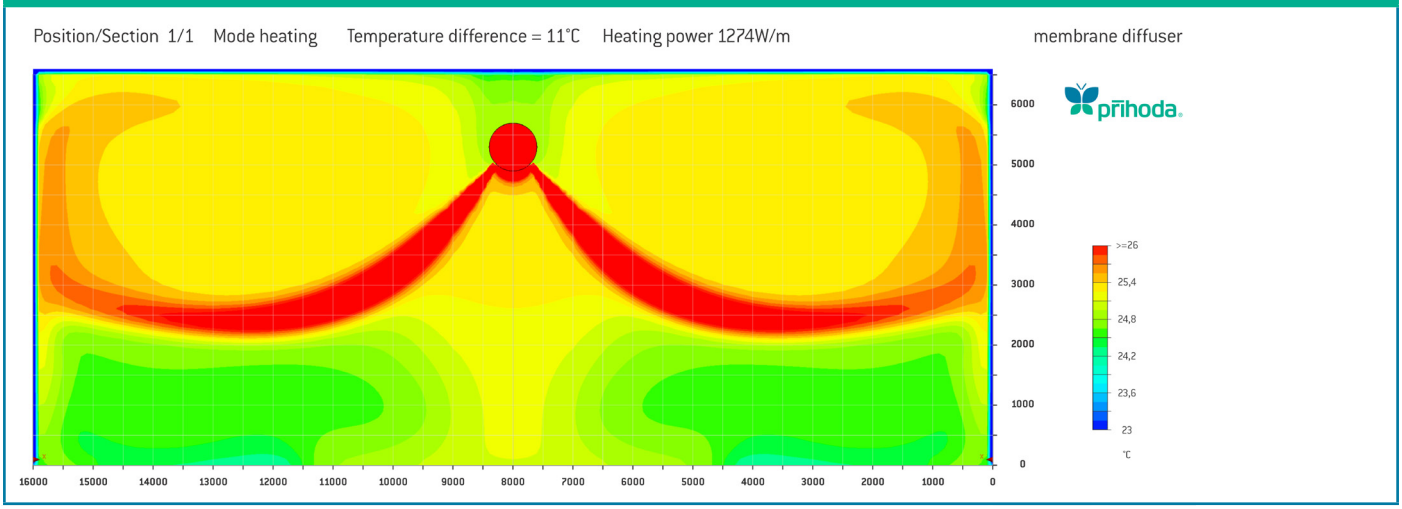
Standard

The warm air cannot reach the occupied zone and its energy is lost above the diffuser. This cannot be improved because the diffuser must be designed for cooling too.



Membrane

The warm air arrives down and heats the area efficiently. In comparison with the standard diffuser 8 % of heating capacity is saved!



- **Heating – air velocities**

Standard

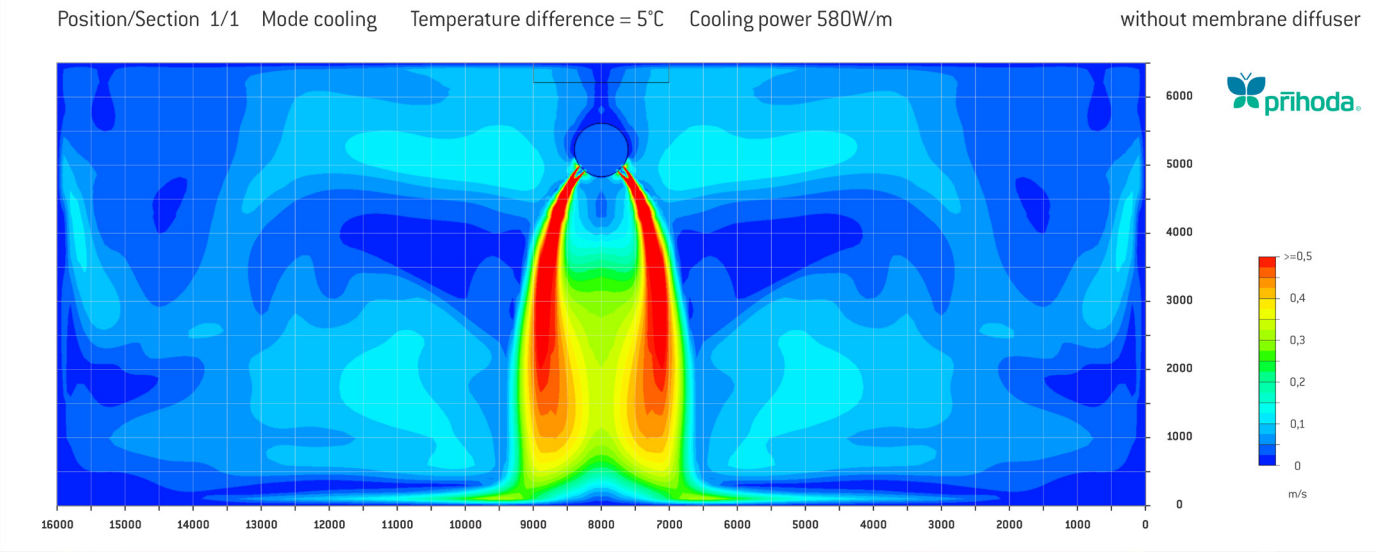
The flows of the warm air deflect upwards never reaching the occupied zone which is heated only by secondary air flows.

Membrane

The flows are optimised to reach to the occupied zone with a velocity about 0,25 m/s.

Cooling – air velocities, standard

Even during cooling with ΔT 5 K the cold air reaches the occupied zone with velocities about 0,4 m/s!



Benefits of the membrane diffuser

1. Half number of diffusers, smaller ducting and AC units! Higher temperature difference for cooling and thereby up to 50 % lower air volume.
2. No draughts during cooling reducing complaints and discomfort.
3. 8-10 % energy saving during heating mode!