KOOLANCEL

Technical Catalogue

Kool & Cel®

Evaporative Cooling

Evaporative cooling is the easiest and most efficient way to create cooling. Our body rejects heat using the same method and through sweating (moisture evaporation from the skin). Evaporative coolers use different evaporative media to cool the air, of which the cellulose pad is one of the most efficient.

The cellulose pad consists of regular and wavy thin sheets with high wettability and water absorption properties and is saturated by chemical materials to increase strength and durability. The uniform and dense structure of the pad causes the air–water interface in the cellulose pad to be more significant compared to the aspen pad and the airspeed to be more uniform.

These factors increase the cooling rate and prevent the entry of water droplets, dust and harmful respiratory bacteria into the airflow.

Cellulose Pad In Cooling Systems

Evaporative cooling systems with cellulose pads are the most efficient (Figure 1).

The performance of evaporative cooling systems depends on the efficiency of evaporation and the pressure drop of the evaporative media. High evaporation efficiency causes more cooling, and low–pressure drop causes the reduction of fan power consumption. Due to its dense and uniform structure the cellulose pad with a higher evaporative cooling efficiency than the aspen pad, has a low–pressure drop. Also, due to its high evaporation efficiency, the cellulose pad can create thermal comfort conditions on sweltering days of the year, while the aspen pad lacks this ability.

Figure 1: Cellulose pad in evaporative cooling systems

Advantages Of Cellulose Pad Compared To Aspen Pad

- **More cooling than the aspen pad;**
- **Less pressure drop than the aspen pad;**
- **Preventing the entry of dust, insects, and suspended particles**
- **Low scaling due to self–cleaning;**
- **Less fungus and algae growth and no transfer of harmful respiratory bacteria;**

The more extraordinary cooling of the cellulose pad compared to the aspen pad is due to the stable and rigid structure of the cellulose pad.

The dense and wavy form of the cellulose pad increases the water–air interface, distributes water evenly through the cellulose pad, and increases water absorption.

As a result, evaporation efficiency rises by an average of 30% during the season.

Advantages Of KOOLANCEL's Cellulose Pads

Long lifetime

KOOLANCEL Company is the only company manufacturing cellulose pads in Iran, which provides a 48 months guarantee against deformation and pulping. The service life of KOOLANCEL's cellulose pad is 4 to 6 times that of aspen pad.

More Cooling

- Higher cooling efficiency than other pads available in the market
- Providing engineering services to manufacture the optimal products

Export To Europe

KOOLANCEL Company has exported its products to different countries due to its deep knowledge and manufacturing the products that meet global standards. It is also the only exporter of cellulose pads from Iran to Europe.

Scandinavian Virgin Paper

Papers used in KOOLANCEL's cellulose pads are directly imported from Northern European countries. Due to the better raw materials, KOOLANCEL's cellulose pads have higher wettability and water absorption properties.

The Only Professional Manufacturer Of Cellulose Pad Resins In Iran

In recent years, KOOLANCEL Company, relying on the knowledge of Iranian experts, has taken steps towards the production of specialized resins for cellulose pad and has been able to supply top–quality products.


ITB® Instytut Techniki Budowlanej
GROUP OF TESTING LABORATORIES
LZF
Page 1 / 4

THERMAL PHYSICS, ACOUSTICS AND ENVIRONMENT DEPARTMENT
THERMAL PHYSICS, ACOUSTICS AND ENVIRONMENT LABORATORY

This report is a translation of the Polish report Nº LZF00-01770/22/Z00NZF of 06.07.2022

TEST REPORT Nº LZF00-01770/22/Z00NZF

This report was released in triplicate, two copies received the Client and one copy remained at ITB.

Client:	Sarmatia Sp. z o.o.
Client address:	Błaszów 1s 26-220 Stąporków, Poland
INFORMATION ABOUT PRODUCT	
Product:	**Cellulose cooling panel type 50 90**
Information about product, intended use, and the number of the applicable system of assessment and verification of constancy of performance	The cellulose panel is used as a cooling agent, used to cool the air by evaporating the water in the panel.
Unique identification code of the product-type:	Information about unique identification code of the product-type has not been provided by Client
Information about test item	
Test item: name, description, condition, identification	Two ready-made samples of cellulose panels with dimensions of 30 cm x 30 cm were received. From delivery to commencement of testing, the samples were stored under laboratory conditions. Information provided by Client: sampling data: 24.05.2022, manufacturing plant: Koolancel Company, Block No. 2439, 2nd GOLDIS, Western QAZALI Blvd, ESHTEHAR Industrial Town, ESHTEHARD, Alborz Province; batch identification: 159075036; production date: 22.08.2021.
Date of receipt:	27.05.2022
Nº of receipt protocol:	LZF00-01770/22/Z00NZF
Receipt procedure:	Receipt procedure according to PZ ZLB 18.

THERMAL PHYSICS, ACOUSTICS AND ENVIRONMENT LABORATORY


LABORATORY LZF TEST REPORT No LZF00-01770/22/Z00NZF Page 2 / 4

Information about tests:	
Test commencement date:	31.05.2022
Test completion date:	01.07.2022
Further information about tests:	Date of unpacking the sample: 21.06.2022 Date the sample was placed in test chamber: 21.06.2022 Laboratory chamber stainless steel cap. 0,225 m³ Product loading factor: 1 m²/m³ Air flow velocity at the sample surface: 0,2 m/s Temperature: (23±0,5)°C Relative humidity: (45±3)% Air change rate: 1 h⁻¹ Two samples of cellulose panels with dimensions of 0,28 m x 0,20 m were placed in the chamber. Part of the edges of the samples, 0,792 m long, was sealed with aluminum foil.

Figure 1. Samples of cellulose panels prepared for testing.

TEST METHODS

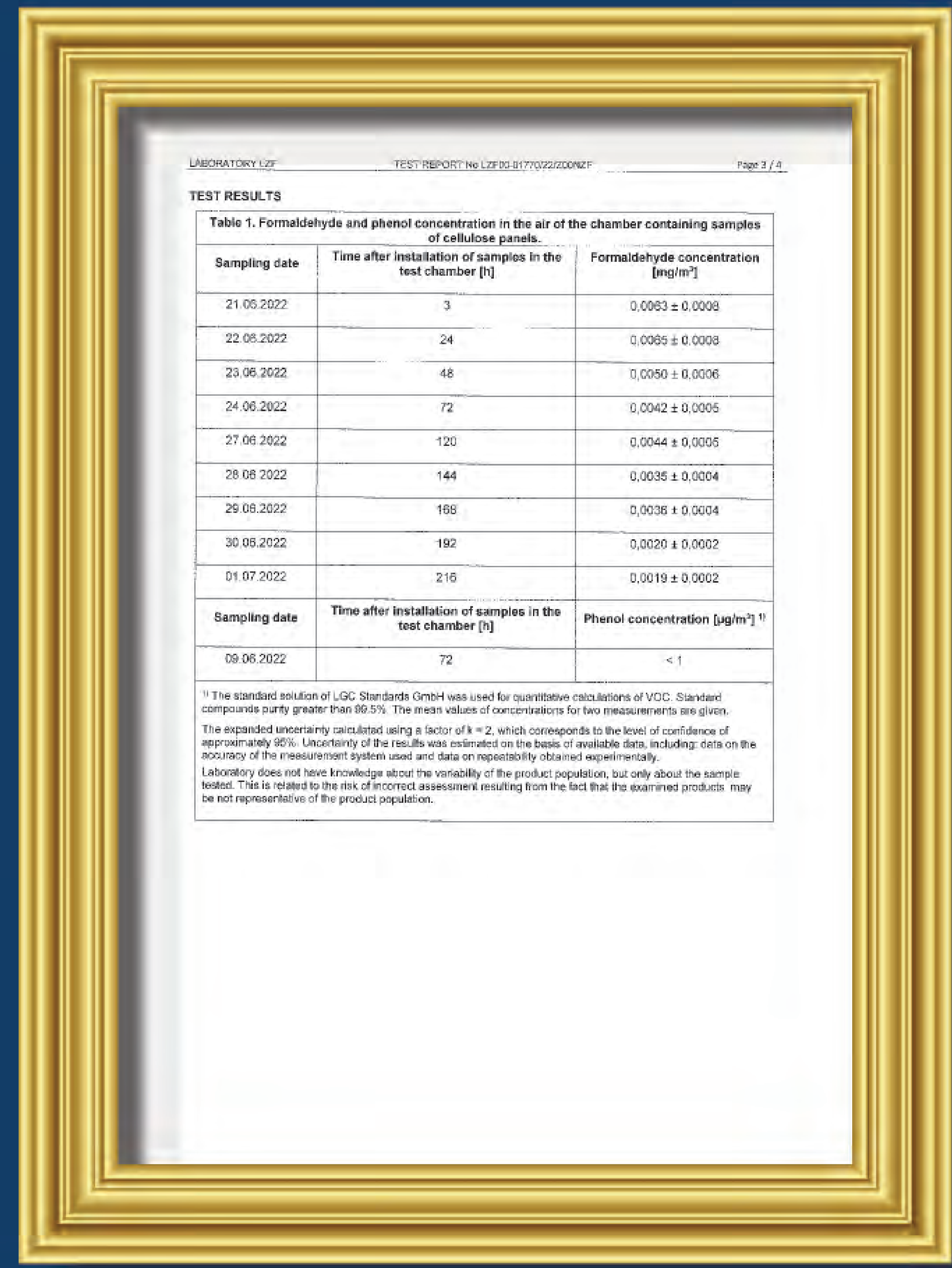
No 1) PN-EN ISO 16000-9: 2009 Indoor air – Part 9: Determination of the emission of volatile organic compounds from building products and furnishing – Emission test chamber method

No 2) ISO 16000-6: 2011 Determination of volatile organic compounds in indoor and test chamber air by active sampling on Tenax TA sorbent, thermal desorption and gas chromatography using MS/FID.

No 3) PN-EN 717-1:2006 Wood-based panels - Determination of formaldehyde release - Part 1: Formaldehyde emission by the chamber method

CHARACERISTICS EXAMINED

Formaldehyde and phenol emission from cellulose panels.


LABORATORY LZF TEST REPORT No LZF00-01770/22/Z00NZF Page 3 / 4

TEST RESULTS

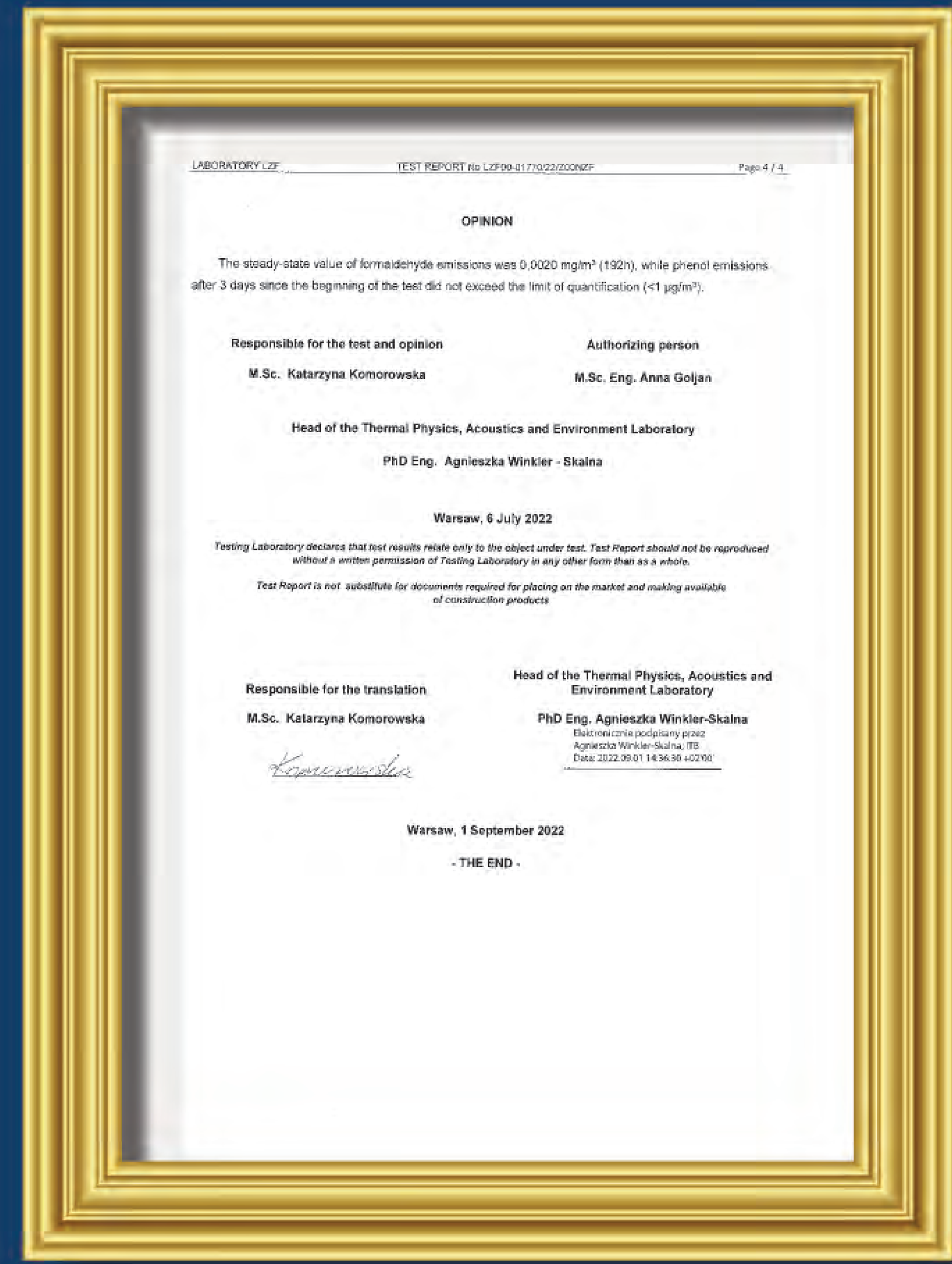
Table 1. Formaldehyde and phenol concentration in the air of the chamber containing samples of cellulose panels.

Sampling date	Time after installation of samples in the test chamber [h]	Formaldehyde concentration [mg/m³]
21.06.2022	3	0,0063 ± 0,0008
22.06.2022	24	0,0065 ± 0,0008
23.06.2022	48	0,0050 ± 0,0006
24.06.2022	72	0,0042 ± 0,0005
27.06.2022	120	0,0044 ± 0,0005
28.06.2022	144	0,0035 ± 0,0004
29.06.2022	168	0,0036 ± 0,0004
30.06.2022	192	0,0020 ± 0,0002
01.07.2022	216	0,0019 ± 0,0002
Sampling date	**Time after installation of samples in the test chamber [h]**	**Phenol concentration [μg/m³] 1)**
09.06.2022	72	< 1

1) The standard solution of LGC Standards GmbH was used for quantitative calculations of VOC. Standard compounds purity greater than 99.5%. The mean values of concentrations for two measurements are given.

The expanded uncertainty calculated using a factor of k = 2, which corresponds to the level of confidence of approximately 95%. Uncertainty of the results was estimated on the basis of available data, including: data on the accuracy of the measurement system used and data on repeatability obtained experimentally.

Laboratory does not have knowledge about the variability of the product population, but only about the sample tested. This is related to the risk of incorrect assessment resulting from the fact that the examined products may be not representative of the product population.


LABORATORY LZF TEST REPORT No LZF00-01770/22/Z00NZF Page 4 / 4

OPINION

The steady-state value of formaldehyde emissions was 0,0020 mg/m³ (192h), while phenol emissions after 3 days since the beginning of the test did not exceed the limit of quantification (<1 μg/m³).

Responsible for the test and opinion — M.Sc. Katarzyna Komorowska
Authorizing person — M.Sc. Eng. Anna Goljan

Head of the Thermal Physics, Acoustics and Environment Laboratory
PhD Eng. Agnieszka Winkler - Skalna

Warsaw, 6 July 2022

Testing Laboratory declares that test results relate only to the object under test. Test Report should not be reproduced without a written permission of Testing Laboratory in any other form than as a whole.

Test Report is not substitute for documents required for placing on the market and making available of construction products

Responsible for the translation — M.Sc. Katarzyna Komorowska
Head of the Thermal Physics, Acoustics and Environment Laboratory — PhD Eng. Agnieszka Winkler-Skalna

Warsaw, 1 September 2022

- THE END -

Cellulose pads of KOOLANCEL were investigated to evaluate the qualitative indicators in one of the accredited laboratories of the European Union, and the following results were obtained.

- The amount of free phenol in 72 hours was less than one microgram per cubic meter;
- The amount of free formaldehyde has been determined by performing tests in different intervals, which has stabilized at less than 0.002 mg/m3;
- The amount of free phenol and formaldehyde in KOOLANCEL's cellulose pads was within the standard range and had the standards required in the European Union.

KOOLANCEL is the first Iranian company to receive this certificate successfully.

> Testing the qualitative indices of the cellulosic pads in accordance with the **European Union Standard.**

Wet–bulb effectiveness

To demonstrate the cooling effectiveness of an evaporative media, the wet–bulb effectiveness is defined for various types of evaporative media, including cellulose pad, as follows:

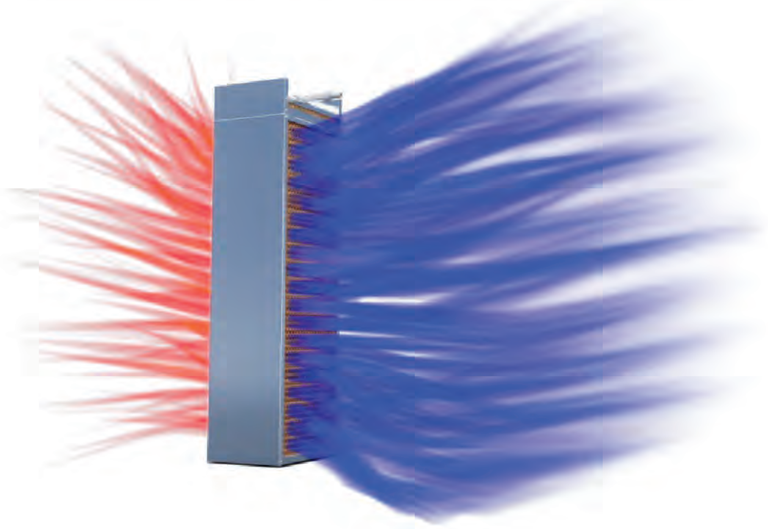
$$\epsilon_{wb} = \frac{T_{db,in} - T_{db,out}}{T_{db,in} - T_{wb,in}}$$

The parameters described in the aforementioned equation are:

Dry–bulb temperature of entering air $T_{db,in}$

Dry–bulb temperature of leaving air $T_{db,out}$

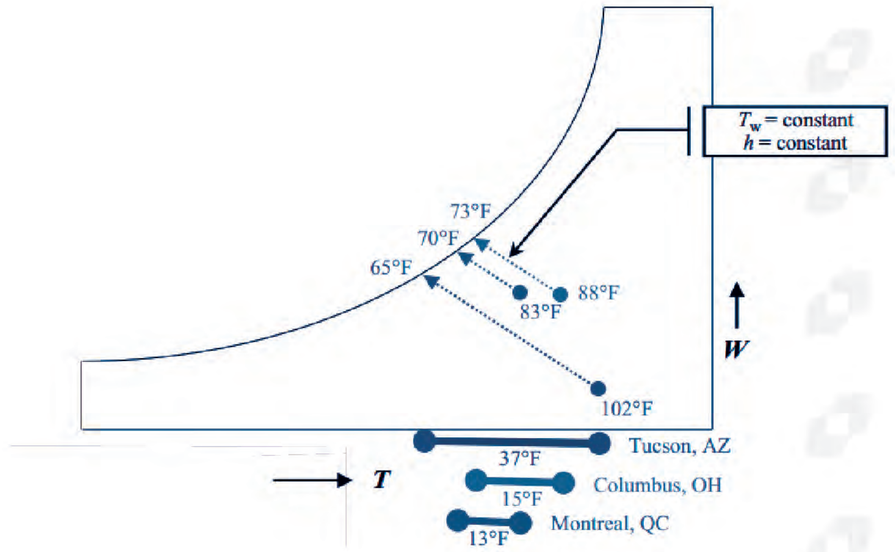
Wet–bulb temperature of entering air $T_{wb,in}$



Psychrometric chart

By understanding the wet–bubble effectiveness of the cellulose pad and utilizing the psychrometric chart, it is possible to determine the air temperature drop following its passage through the cellulose pad. For instance, considering an evaporative cooler equipped with a cellulose pad having an 80% wet–bubble effectiveness, the air temperature drops in three cities – Tucson, Columbus, and Montreal – can be determined using the climatic conditions depicted in the psychrometric chart. The expected temperature drops are 30°F, 12°F, and 10°F for the above–mentioned cities, respectively.

LOCATION		°C	°F	Wet-bulb Depression (°C)	Wet-bulb Depression (°F)
Tucson, AZ	Design Dry-bulb Temperature (T)	39	102	21	37
	Coincident Wet-bulb Temperature (T_w)	18	65		
Columbus, OH	Dry-bulb Temperature (T)	31	88	8	15
	Coincident Wet-bulb Temperature (T_w)	23	73		
Montreal, QC	Dry-bulb Temperature (T)	28	83	7	13
	Coincident Wet-bulb Temperature (T_w)	21	70		



Cellulose Pad Test Laboratory

To ensure and enhance product quality, Koolancel Company has established The country's inaugural cellulose pad test laboratory.
Only a few manufacturers worldwide possess the ability to present the characteristics of their cellulose pads, such as saturation efficiency and pressure drop at various air velocities. Koolancel Company utilizes precise and modern laboratory equipment to deliver accurate performance specifications to its customers. This enables the company to produce customized products and furnish the customers with test certificates.

KOOLANCEL Cellulose Pad Products Series

KOOLANCEL manufactures a variety of cellulose pads for various applications, including evaporative coolers, greenhouses, poultry houses, power plants and data centers.
KOOLANCEL brand, due to superior–quality products, has gained a unique Position in customers' mind.
The product series of KOOLANCEL's cellulose pads are presented in the table below.

Product Series	Applications
4090	Evaporative coolers
5090	
6090	
7090	Greenhouses Poultry Houses
8090	
7060	
7060	Power Plants

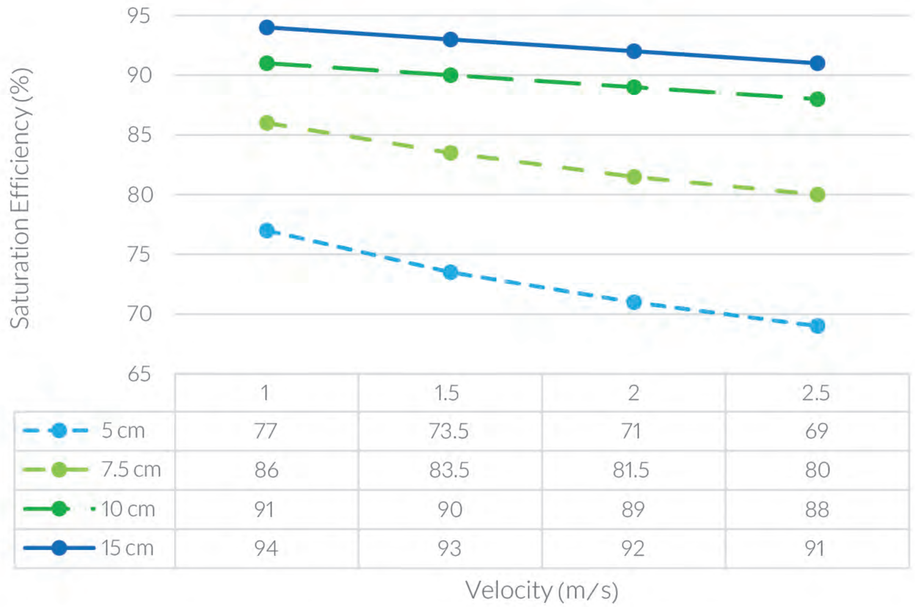
4090 Product Series

In the 4090 series, wavy cellulose sheets with a wave height of 4 mm are placed on top of each other, and the wave direction of the two adjacent sheets constitutes an angle of 90 degrees (45/45) to each other (Figure 2). Due to its high density, these series have the highest evaporation efficiency and pressure drop. It is recommended to use these series in cooling systems possessing limited space to install thick with high air face velocity through the cellulose pads. According to the customer's order and based on the required cooling capacity, these series can be provided in different sizes. 4090 Series has a water distributor so that the pad is evenly wet and maximum evaporation efficiency is achieved.

Product Series 4090

nominal saturation efficiency	90%
nominal pressure drops	73 Pa
number of corrugated sheets in unit length (1m)	235
density	40/44 kg/m^3
water absorption	%140

Nominal saturation efficiency and pressure drop are calculated at 1.5 m/s air velocity for a 10 cm thick pad



	1	1.5	2	2.5
5 cm	77	73.5	71	69
7.5 cm	86	83.5	81.5	80
10 cm	91	90	89	88
15 cm	94	93	92	91

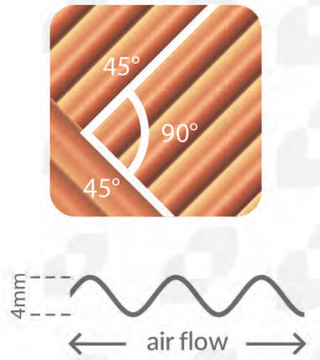
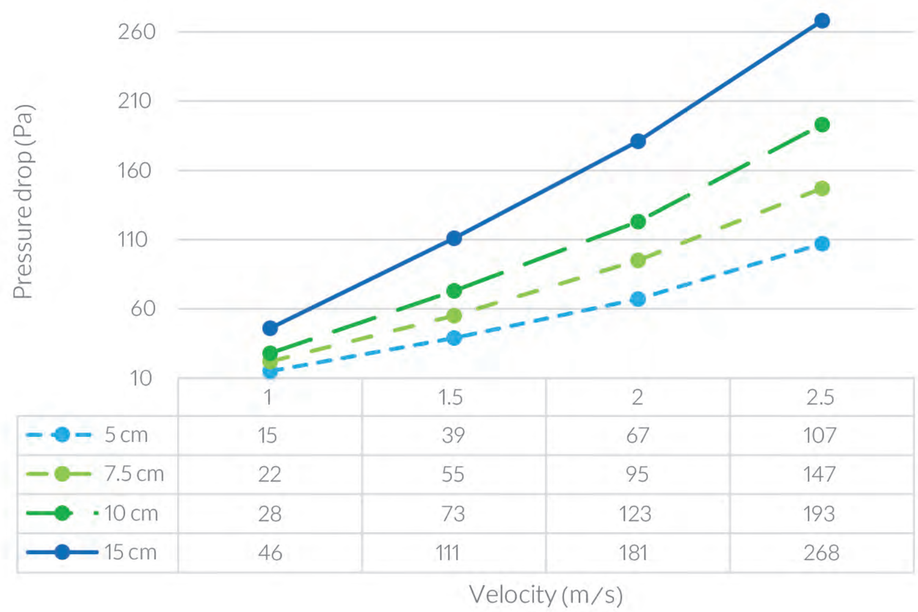
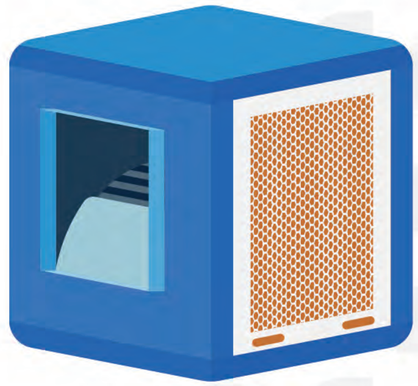


Figure 2 Specifications of 4090 series



	1	1.5	2	2.5
5 cm	15	39	67	107
7.5 cm	22	55	95	147
10 cm	28	73	123	193
15 cm	46	111	181	268



Product Series 5090

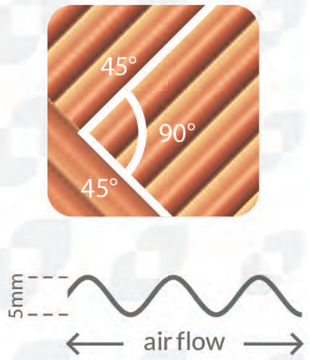
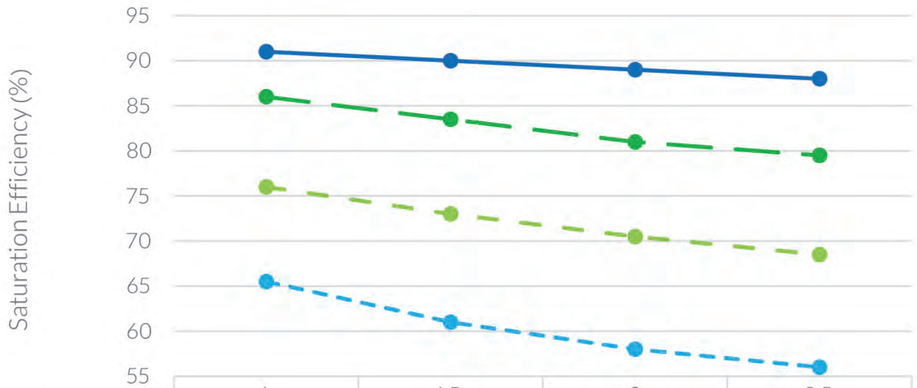
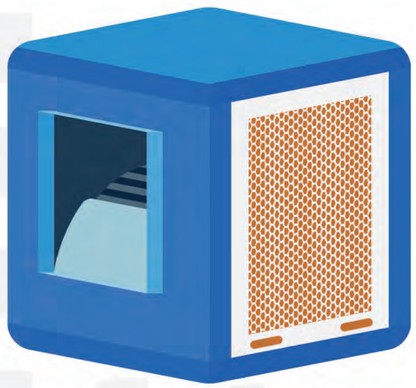


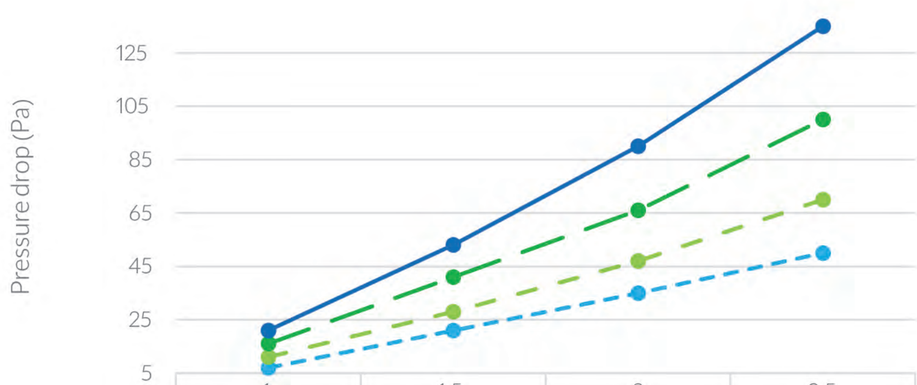
Figure 3 Specifications of 5090 series



	1	1.5	2	2.5
5 cm	65.5	61	58	56
7.5 cm	76	73	70.5	68.5
10 cm	86	83.5	81	79.5
15 cm	91	90	89	88

Velocity (m/s)





	1	1.5	2	2.5
5 cm	7	21	35	50
7.5 cm	11	28	47	70
10 cm	16	41	66	100
15 cm	21	53	90	135

Velocity (m/s)

In the 5090 series, wavy cellulose sheets with a wave height of 5 mm are placed on top of each other, and the wave direction of the two adjacent sheets form an angle of 90 degrees (45/45) to each other (Figure 3). Due to its medium density, these series have established a balance between evaporation efficiency and pressure drop with a high evaporation efficiency; it still has an acceptable pressure drop.

These series can be used in most cooling systems and is presented in different dimensions according to the customer's order and based on the required cooling capacity. 5090 Series has a water distributor to wet the pad uniformly and achieve maximum evaporation efficiency.

Product Series 5090

nominal saturation efficiency	% 83/5
nominal pressure drops	41 Pa
number of corrugated sheets in unit length (1m)	190
density	33/44 kg/m^3
water absorption	%140

Nominal saturation efficiency and pressure drop are calculated at 1.5 m/s air velocity for a 10 cm thick pad

6090 Product Series

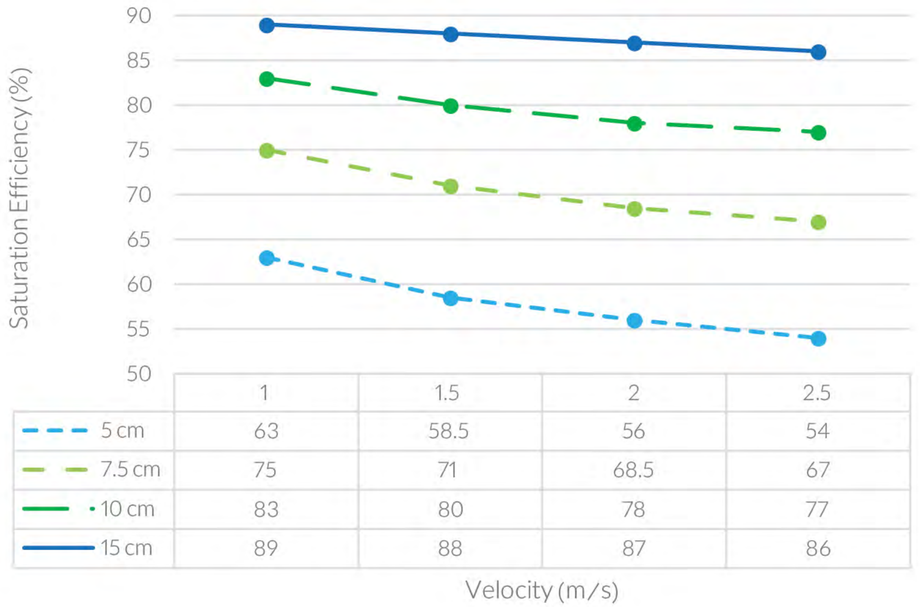
In the 6090 series, wavy cellulose sheets with a wave height of 6 mm are placed on top of each other, and the wave direction of the two adjacent sheets forms an angle of 90 degrees (45/45) to each other (Figure 4).

These series have a low–pressure drop due to its lower density compared to other series, but at the same time, its evaporation efficiency is acceptable. It is recommended to use these series in cooling systems whose fans cannot overcome high–pressure drops. These series can be offered in different sizes according to the customer's order and based on the required cooling capacity.

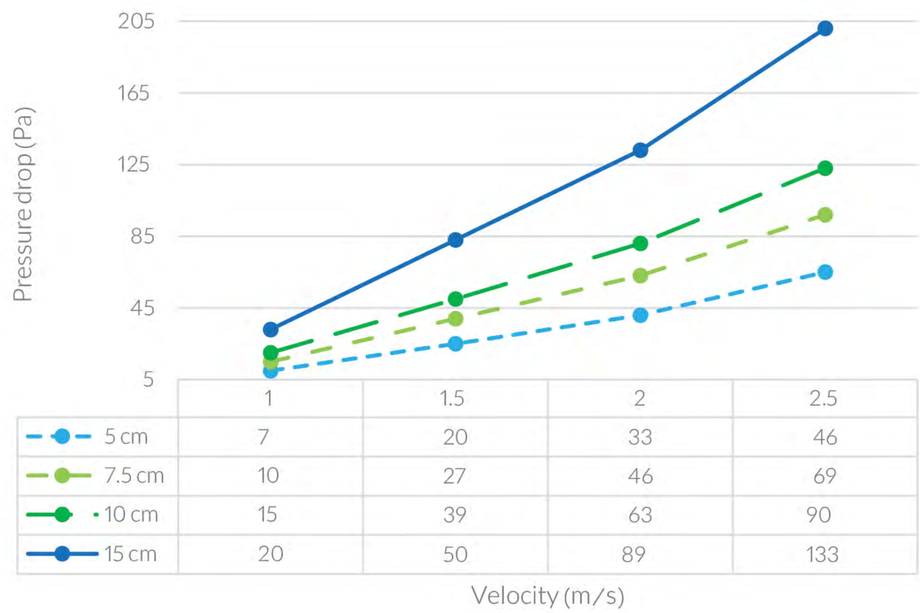
Product Series 6090

nominal saturation efficiency	% 80
nominal pressure drops	39 Pa
number of corrugated sheets in unit length (1m)	164
density	28/95 kg/m^3
water absorption	%140

Nominal saturation efficiency and pressure drop are calculated at 1.5 m/s air velocity for a 10 cm thick pad



	1	1.5	2	2.5
5 cm	63	58.5	56	54
7.5 cm	75	71	68.5	67
10 cm	83	80	78	77
15 cm	89	88	87	86



	1	1.5	2	2.5
5 cm	7	20	33	46
7.5 cm	10	27	46	69
10 cm	15	39	63	90
15 cm	20	50	89	133

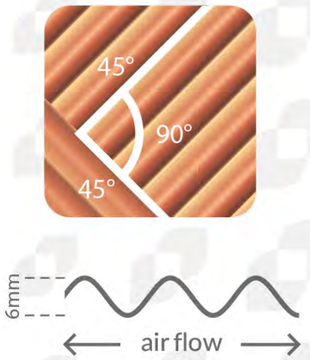
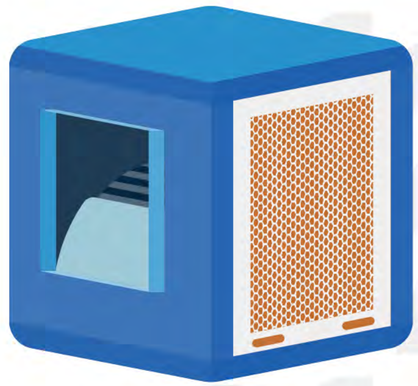


Figure 4 Specifications of 6090 series



Product Series 7090

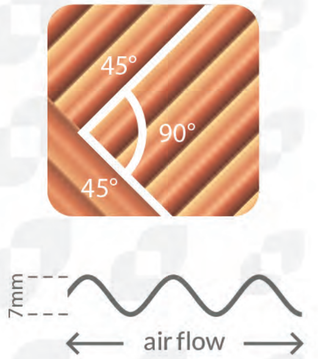
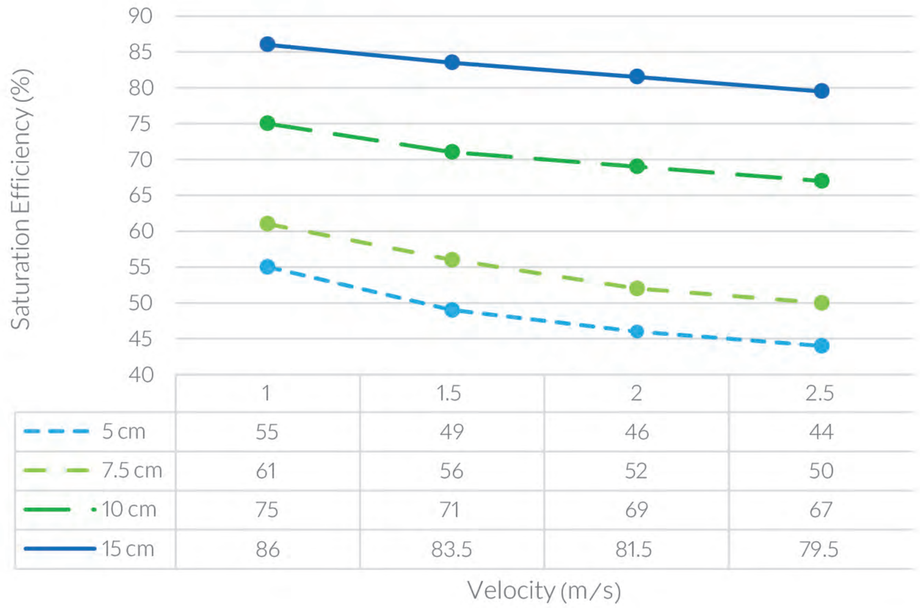
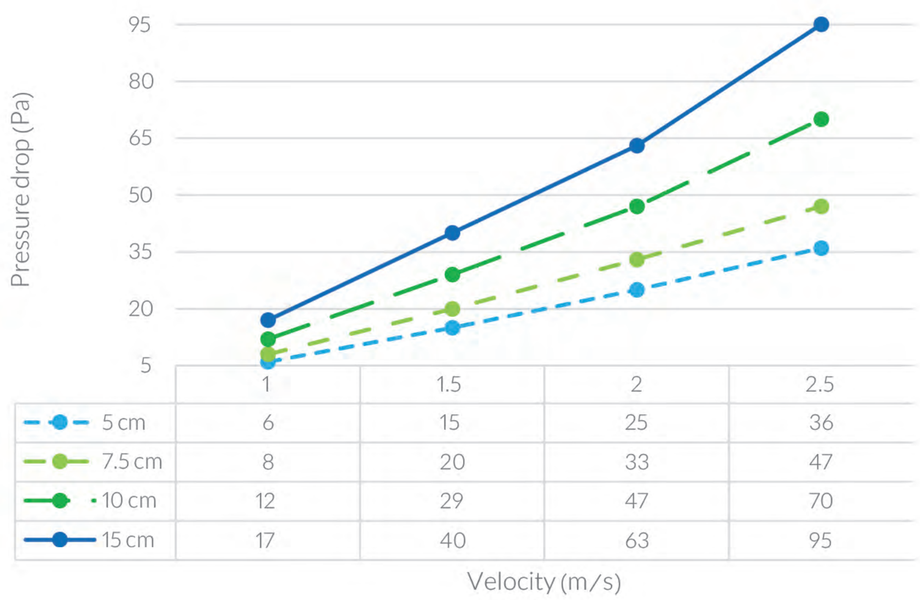


Figure 5 Specifications of 7090 series



	1	1.5	2	2.5
5 cm	55	49	46	44
7.5 cm	61	56	52	50
10 cm	75	71	69	67
15 cm	86	83.5	81.5	79.5



	1	1.5	2	2.5
5 cm	6	15	25	36
7.5 cm	8	20	33	47
10 cm	12	29	47	70
15 cm	17	40	63	95

In the 7090 series, wavy cellulose sheets with a wave height of 7 mm are placed on top of each other, and the wave direction of the two adjacent sheets forms an angle of 90 degrees (45/45) to each other (Figure 5). These series are specifically used in the walls of greenhouses and poultry farms along with the frame set, water supply system (tank, pump, and pipe) and fan. These series is offered in different dimensions according to the customer's order and based on the required cooling capacity. It is also possible to provide these series with a water distributor.

Product Series 7090

nominal saturation efficiency	% 71
nominal pressure drops	29 Pa
number of corrugated sheets in unit length (1m)	143
density	23/66 kg/m^3
water absorption	%140

Nominal saturation efficiency and pressure drop are calculated at 1.5 m/s air velocity for a 10 cm thick pad

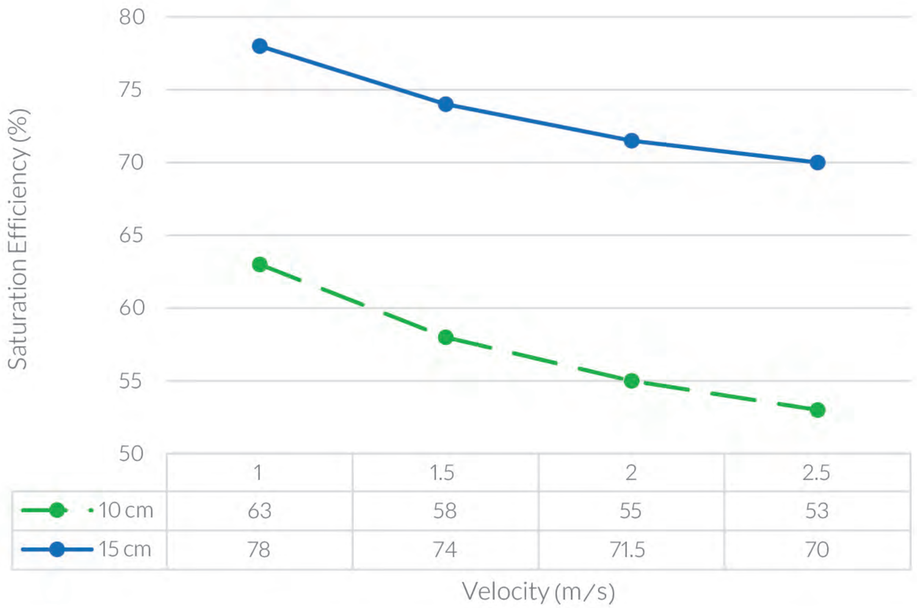
8090 Product Series

In the 8090 series, wavy cellulose sheets with a wave height of 8 mm are placed on top of each other, and the wave direction of the two adjacent sheets constitutes an angle of 90 degrees (45/45) to each other (Figure 6). These series are specifically used in the walls of greenhouses and poultry farms along with the frame set, water supply system (tank, pump, and pipe) and fan. The elevated wave height of this model diminishes the likelihood of pad openings becoming blocked, making it a suitable option for regions with high water hardness and no available means to soften and purify the water. Given its lower saturation efficiency compared to the 7090 model, it is advisable to employ thicker pad when using this model. These series are offered in different dimensions according to the customer's order and based on the required cooling capacity. It is also possible to provide these series with a water distributor.

Product Series 8090

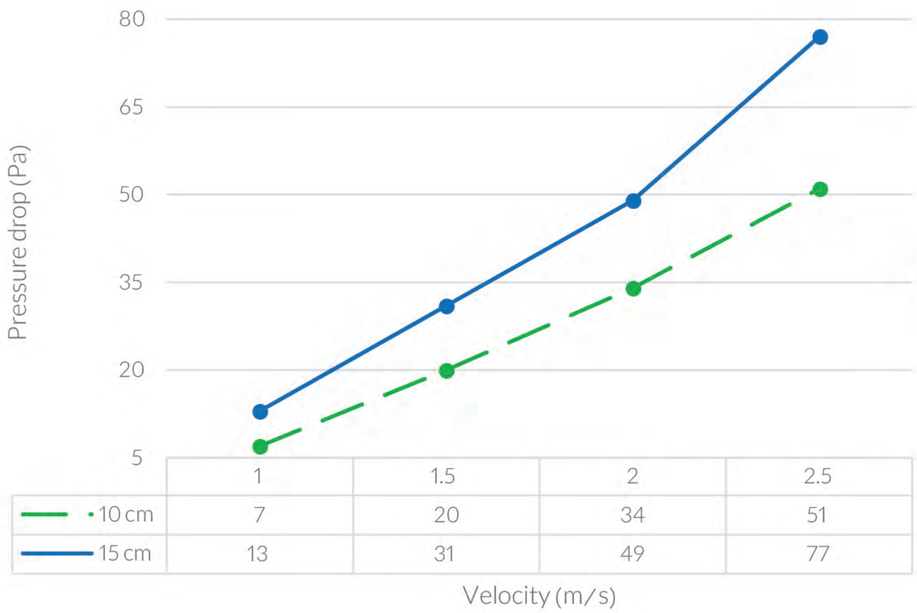
nominal saturation efficiency	% 74
nominal pressure drops	31 Pa
number of corrugated sheets in unit length (1m)	125
density	21/70 kg/m^3
water absorption	%140

Nominal saturation efficiency and pressure drop are calculated at 1.5 m/s air velocity for a 15 cm thick pad



	1	1.5	2	2.5
10 cm	63	58	55	53
15 cm	78	74	71.5	70

Figure 6: Specifications of 8090 series



	1	1.5	2	2.5
10 cm	7	20	34	51
15 cm	13	31	49	77

Product Series 7060

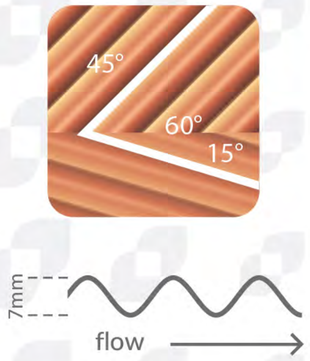
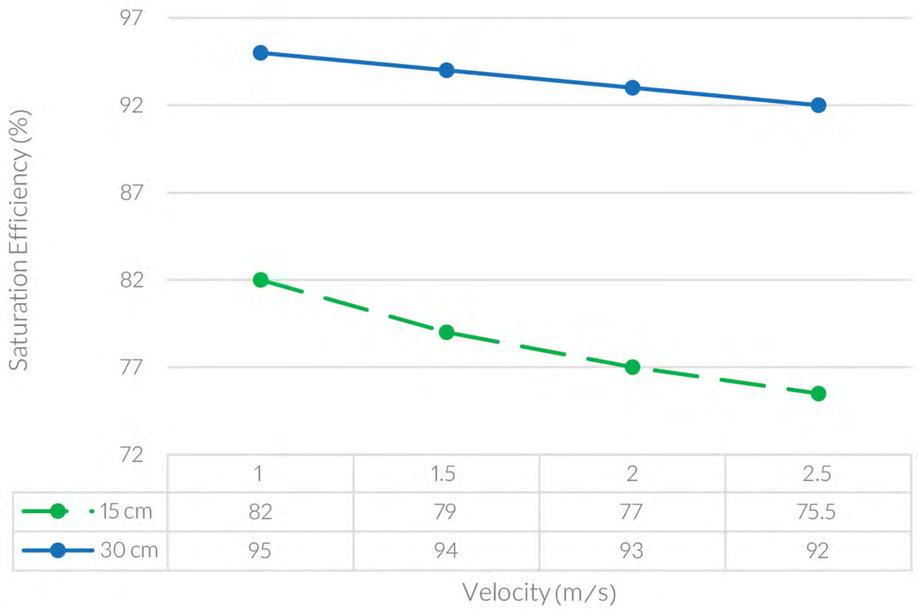
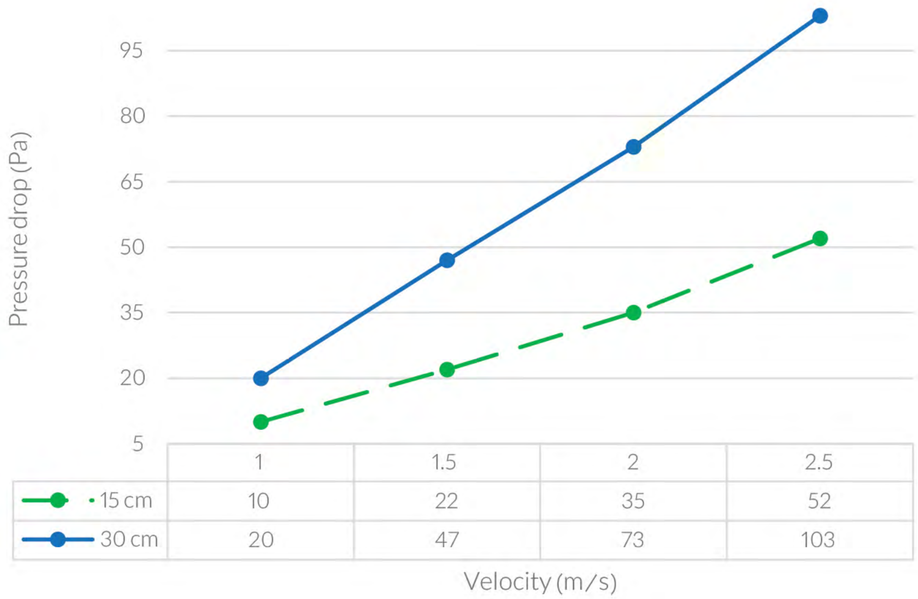


Figure 7: Specifications of 7060 series



	1	1.5	2	2.5
15 cm	82	79	77	75.5
30 cm	95	94	93	92



	1	1.5	2	2.5
15 cm	10	22	35	52
30 cm	20	47	73	103

In the 7060 series, wavy cellulose sheets with a wave height of 7 mm are placed on top of each other, and the wave direction of the two adjacent sheets constitutes an angle of 60 degrees (45/15) to each other (Figure 7).

Because of its minimal pressure drop, this model is well–suited for applications that involve a high ventilation rate or airflow through the pad, such as gas turbine inlet air cooling. Given the lower saturation efficiency of this model compared to the 7090 model, it is recommended to use thicker pad when employing this model. These series are offered in different dimensions according to the customer's order and based on the required cooling capacity. It is also possible to provide these series with a water distributor.

Product Series 7060

nominal saturation efficiency	% 79
nominal pressure drops	22 Pa
number of corrugated sheets in unit length (1m)	143
density	23/66 kg/m^3
water absorption	%140

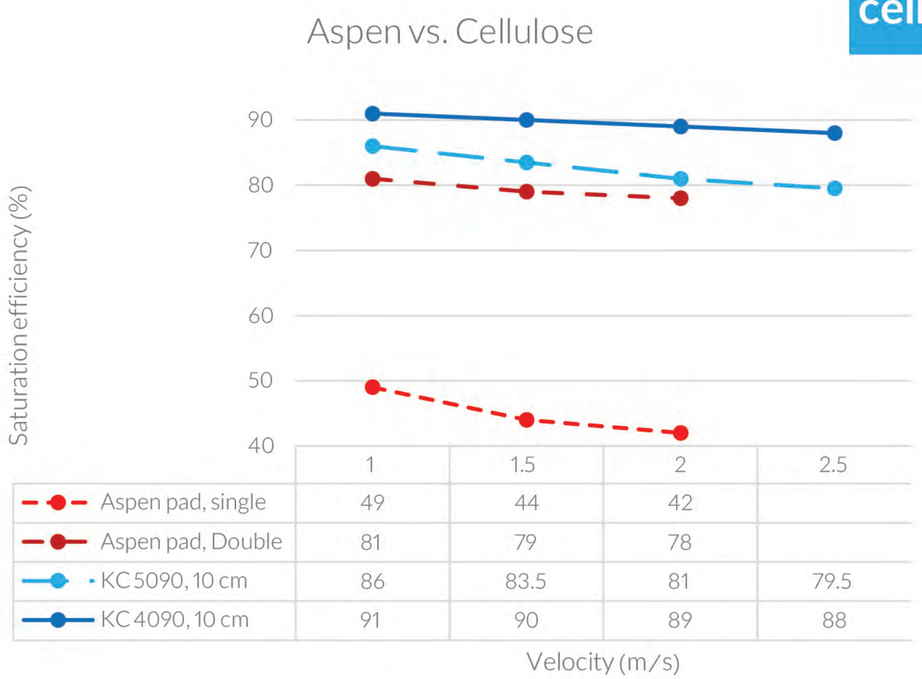
Nominal saturation efficiency and pressure drop are calculated at 1.5 m/s air velocity for a 15 cm thick pad

Comparison of aspen with cellulose pad 4090 and 5090

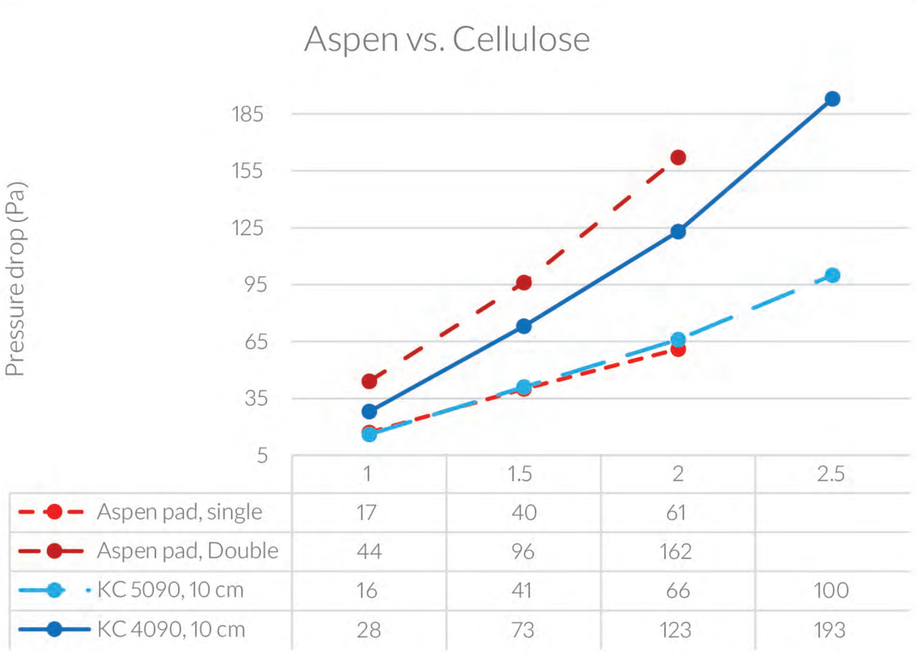
To illustrate the advantages of the cellulose pad over the aspen pad, a comparison of the saturation efficiency and pressure drop is presented for both the cellulose pad models 4090 and 5090 (with a thickness of 10 cm) and one or two layers of aspen pad.

As evident from the data, the 5090 pad, with a 10 cm thickness, exhibits a pressure drop equivalent to that of a single layer of aspen pad, while its saturation efficiency is approximately twice higher. Likewise, the 4090 pad, also with a 10 cm thickness, demonstrates a 10% greater saturation efficiency compared to a two–layer pad, while maintaining a 25% lower pressure drop.

It is important to note that when the air velocity exceeds 2 m/s through the aspen pad, the presence of water droplets entering the airflow (carry–over) makes it difficult to accurately measure the saturation efficiency. As a result, the data for aspen pad is provided only up to the mentioned velocity (due to the uniform and dense structure of cellulose pad, water carry–over in cellulose pad occurs at air velocity greater than 3 m/s).

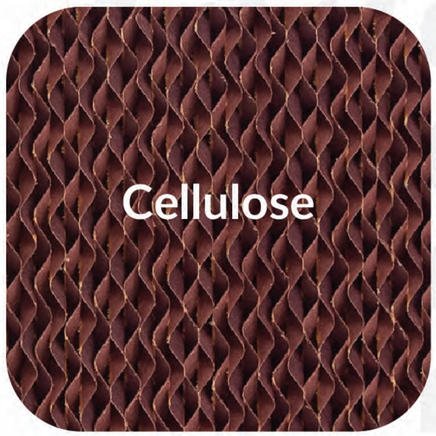


	1	1.5	2	2.5
Aspen pad, single	49	44	42	
Aspen pad, Double	81	79	78	
KC 5090, 10 cm	86	83.5	81	79.5
KC 4090, 10 cm	91	90	89	88



	1	1.5	2	2.5
Aspen pad, single	17	40	61	
Aspen pad, Double	44	96	162	
KC 5090, 10 cm	16	41	66	100
KC 4090, 10 cm	28	73	123	193

Cooling Pads



Conversion Factors

Length

1 ft = 30.48 cm
1 in = 2.54 cm
1 m = 39.37 in.
1 micron = 10^{-6} m = 3.281 x 10^{-6} ft
1 mile = 5280 ft

Area

1 m^2 = 1550.1472 $in.^2$
1 m^2 = 10.76392 ft^2

Volume

1 ft^3 = 7.48 U.S. gallons = 1728 $in.^3$
1 m^3 = 6.1 x 10^4 $in.^3$
1 m^3 = 35.3147 ft^3
1 m^3 = 264.154 U.S. gallons

Mass

1 kg = 2.20462 lbm
1 lbm = 7000 grams = 453.5924 g

Force

1 N = 0.224809 lbf
1 lbf = 4.44822 N

Energy

1 Btu = 778.28 ft-lbf
1 Kilocalorie = 10^3 calories = 3.968 Btu
1 J = 9.48 x 10^{-4} Btu = 0.73756 ft-lbf
1 kW-hr = 3412 Btu = 2.6552 x 10^6 ft-lbf

Power

1 hp = 33.000 (ft-lbf)/min
1 hp = 745.7 W
1 W = 3.412 Btu/hr = 0.001341 hp = 0.0002843 tons of refrigeration

Pressure

1 atm = 14.6959 psia = 2116 lbf/ft^2 = 101325 N/m^2
1 in. wg = 249.08 Pa
1 in. of mercury = 3376.85 Pa
1 $lbf/in.^2$ = 6894.76 Pa
1 Pa = 1 N/m^2 = 1.4504 x 10^{-4} $lbf/in.^2$

Temperature

1 degree R difference = 1 degree F difference = $\frac{5}{9}$ degree C difference
= $\frac{5}{9}$ degree K difference

degrees F = $\frac{9}{5}$ (degrees C) + 32

degrees C = $\frac{5}{9}$ (degrees F – 32)

Thermal Conductivity

$1 \frac{Btu}{hr\text{-}ft\text{-}F} = 0.004134 \frac{calorie}{s\text{-}cm\text{-}C} = 1.7307 \frac{W}{m\text{-}C}$

$1 \frac{W}{m\text{-}C} = 0.5778 \frac{Btu}{hr\text{-}ft\text{-}F}$

$1 \frac{Btu\text{-}in}{hr\text{-}ft^2\text{-}F} = 0.1442 \frac{W}{m\text{-}C}$

$1 \frac{W}{m\text{-}C} = 6.933 \frac{Btu\text{-}in}{hr\text{-}ft^2\text{-}F}$

Heat Transfer Coefficient

$1 \frac{Btu}{hr\text{-}ft^2\text{-}F} = 5.678 \frac{W}{m^2\text{-}C}$

$1 \frac{W}{m^2\text{-}C} = 0.1761 \frac{Btu}{hr\text{-}ft^2\text{-}F}$

Viscosity Absolute

1 poise = 100 centipoises

$1 \frac{lbm}{sec\text{-}ft} = 1490 \text{ centipoises} = 1.49 \frac{N\text{-}s}{m^2}$

$1 \frac{lbf\text{-}sec}{ft^2} = 47{,}800 \text{ centipoises}$

$1 \text{ centipoise} = 0.001 \frac{N\text{-}s}{m^2}$

Viscosity Kinematic

1 ft^2/sec = 0.0929 m^2/s
1 m^2/s = 10.764 ft^2/sec

Specific Heat

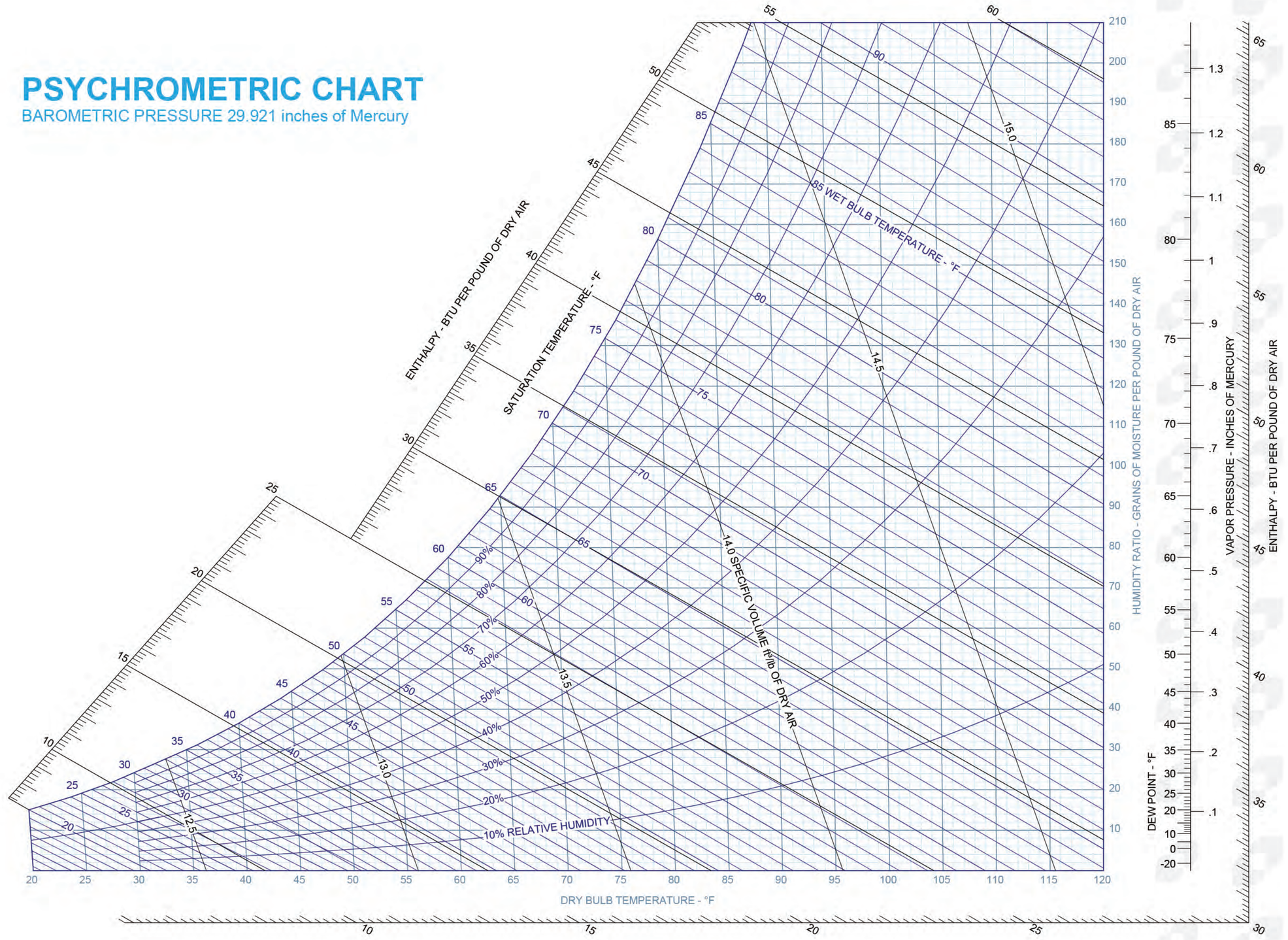
$1 \frac{calorie}{g\text{-}C} = 1 \frac{Btu}{lbm\text{-}F}$

$1 \frac{Btu}{lbm\text{-}F} = 4486.8 \frac{J}{kg\text{-}C}$

$1 \frac{J}{kg\text{-}C} = 0.2388 \frac{Btu}{lbm\text{-}F}$

PSYCHROMETRIC CHART

BAROMETRIC PRESSURE 29.921 inches of Mercury



KOOLANCEL Technical Catalogue

VER.01 | **2025**

www.koolancel.com