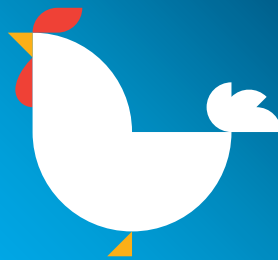
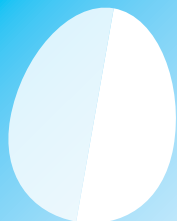


www.koolancel.com



**Poultry house
Catalogue**





“KOOLANCEL” company was established in 2008 as the first manufacturer of cellulose pads in the Middle East. In 2010, “KOOLANCEL” Company joined as a member of ENERGY Holding.

The result of this partnership and cooperation has been the increasing development and becoming the largest manufacturer of cellulose pads in the Middle East.

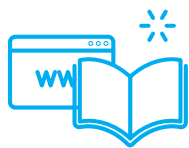
In 2017, KOOLANCEL Company developed the brand “NADPOLYMER” to manufacture unsaturated polyester, phenolic and acrylic resins per the customers’ needs.

KOOLANCEL’s approach has always been to manufacture high-quality products in line with the customers’ needs and provide a superior value proposition. KOOLANCEL is the pioneer of the evaporative cooling industry for various applications in Iran.

Geat weather, Great vibes ...

Koolancel Company (Public J.S.C.)

Evolution of KOOLANCEL



01

2005

Business plan development



02

2008

Obtaining the operating license



03

2009

Expanding the scope of activity to the HVAC industry and gas inlet air cooling



04

2010

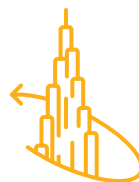
Membership in ENERGY Holding



05

2012

Development of the factory



06

2016

Export cellulose pads

07

2017

Manufacture industrial resins with “NADPOLYMER” brand

08

2020

Export cellulose pads to Europe

09

2022

Export cellulose pads to the UAE

10

2023

Starting to manufacture galvanized steel and aluminium frames

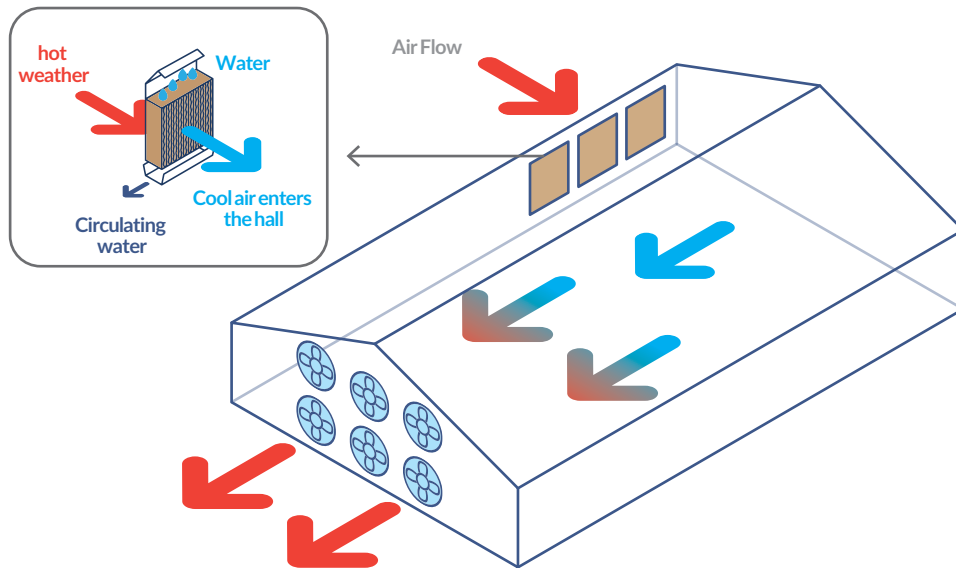
11

2026

IPO on Iran Fara Bourse

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. (Figure 1)



(Figure 1) Fan and Cooling pad in poultry house

The cellulose pad consists of regular and fluted 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.



Principles of Cooling and Ventilation of Poultry houses

Ventilation and cooling of the poultry houses are necessary to provide a favorable environment for poultry growth.

The poultry house is ventilated for the following reasons:

- 1. Control of humidity levels**
- 2. Provision of necessary oxygen for the poultry's respiration**
- 3. Maintaining bedding in suitable conditions**
- 4. Removal of harmful gases produced inside the house**
- 5. Providing optimal temperature**
- 6. Eliminating dust**

The amount of ventilation in poultry houses depends on the ambient temperature and the age of the flock. Based on these factors, ventilation is performed in three ways:

- 1. Minimal Ventilation (in cold environmental conditions or when the flock is young)**
- 2. Transitional Ventilation (in mild environmental conditions or for flocks of medium age)**
- 3. Tunnel Ventilation (in hot environmental conditions or for older flocks)**

KOOLANCEL Solutions

KOOLANCEL specializes in evaporative cooling for poultry houses, producing various types of cellulose cooling pads with different features as evaporative media. The brand also manufactures standard frames made from galvanized steel and aluminum, which are designed to supply water and provide drainage to moisten the walls of the cellulose pads in evaporative cooling systems.



Advantages of KOOLANCEL Cellulose Pads

Long Lifetime

KOOLANCEL is the only company manufacturing cellulose pads in Iran, which provides **36-month guarantee** against deformation and pulping.

More Cooling

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

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.

Fast Delivery

On-time Order Delivery

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.

KOOLANCEL's Frame Advantages

- **State-of-the-art engineering design;**
- **Uniform water distribution;**
Enhances efficiency and extends the service life of the pad.
- **High water storage capacity;**
The design of the lower gutter, results in a large water storage volume, reducing the number of water drains.
- **Easy and precise installation;**
- **Easy inspection and maintenance;**
The water distribution pipe is easily visible and accessible for inspection and maintenance.
- **Highly robust with appropriate thickness.**



Testing the Qualitative Indices of the Cellulose Pads in Accordance With the European Union Standard.

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.

Note: In the home appliance industry, the quality indicators of cellulose pads are more sensitive than other industries such as poultry and greenhouse, so having these quality indicators indicates the high quality of the products.

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

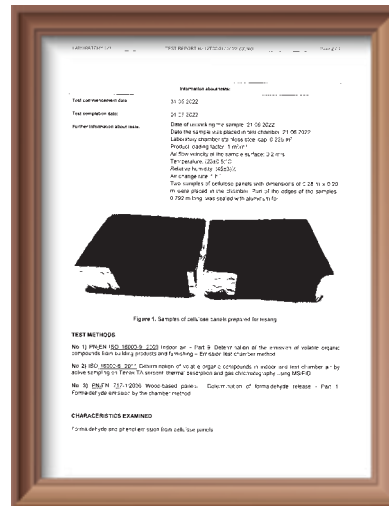
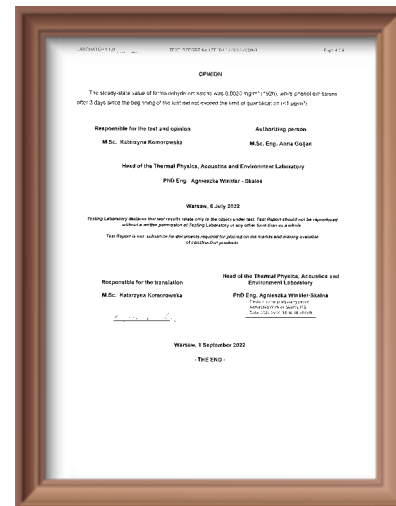
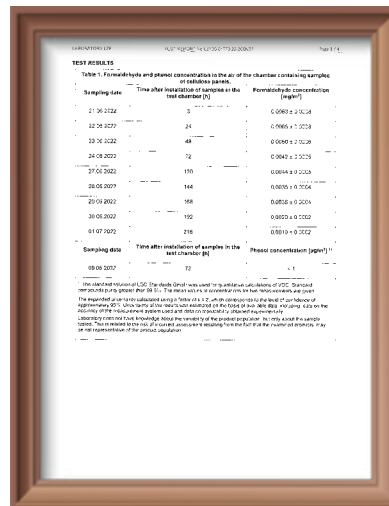


Figure 1. Samples of cells, see cells prepared for testing



Factors Influencing the Performance and Application of Cellulose Pads:

1. Flute Height:

Flute height is a key factor affecting both the saturation efficiency and pressure drop in cellulose pads. These two factors are considered the primary criteria for evaluating pad quality and performance. For the naming system of KOOLANCEL pads, the first two digits indicate the flute height. For example:

KOOLANCEL 4090 Series Cellulose Pad: Flute height is 4 mm.



As the flute height increases in cellulose pads, the number of layers (sheets), and consequently the structural density, decreases. This reduction in density leads to a smaller contact area between the airflow and the wet surface of the pad, thereby reducing evaporative efficiency and cooling performance.

On the other hand, increasing the flute height creates wider air channels, which results in less resistance to airflow. This, in turn, leads to a lower system pressure drop.

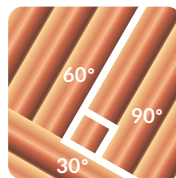
Therefore, the lower the flute height of the cellulose pad, the higher the cooling efficiency and the greater the pressure drop. Conversely, as the flute height increases, efficiency decreases and the pressure drop is reduced.

Note: The appropriate flute height should be selected as per system requirements (e.g., high cooling efficiency or low pressure drop) and operational conditions.

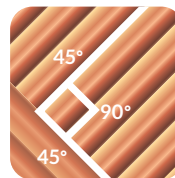
2. Corrugation Angle Configuration in KOOLANCEL Cellulose Pads:

In various series of KOOLANCEL cellulose pads, the angle between the corrugation directions of adjacent paper sheets differs. For example, in series 7090 or 7060, the corrugation directions of two adjacent sheets form angles of 90 and 60 degrees with each other, respectively. In the 90-degree corrugation configuration used in KOOLANCEL cellulose pads, there are two different structural arrangements:

1. 30/60 Configuration: Alternating arrangement of sheets with corrugation angles of 30 and 60 degrees.
2. 45/45 Configuration: Sequential arrangement of sheets, all with a corrugation angle of 45 degrees.



(30/60) Configuration



(45/45) Configuration

In The Following Section, We Will Examine The Differences Between Each of These Configurations:

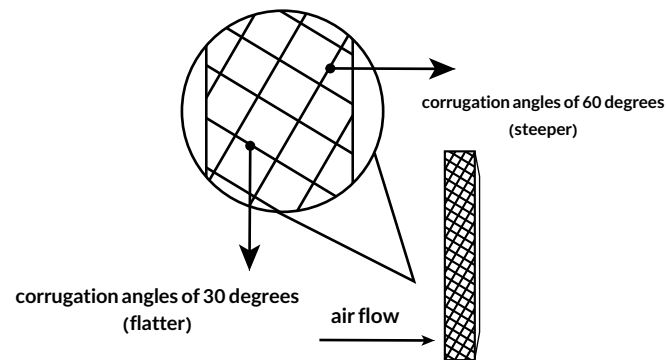
A. Air Flow Direction

Pad with 45/45 Configuration

The incoming airflow can enter from both sides of the pad.

Pad with 30/60 Configuration

To achieve optimal performance, the 60 degree angle should face the air intake side.



B. Water Droplet Carry over

Pad with 45/45 Configuration

Due to the symmetric 45-degree angle, the 45/45 pad tends to have higher carry over.

Pad with 30/60 Configuration

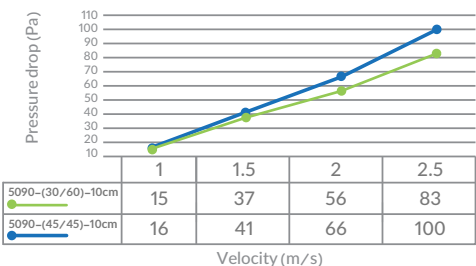
Due to the steeper 60-degree angle on one side of the pad, more water flows toward the air inlet. As a result, this configuration exhibits lower carry over.

C. Pressure Drop

- The pressure drop across the pad with a 30/60 configuration is lower compared to the 45/45 configuration.

This lower pressure drop is due to the reduced resistance to airflow created by the 30-degree wave angle.

Suitable for cooling systems capable of handling moderate pressure drop.

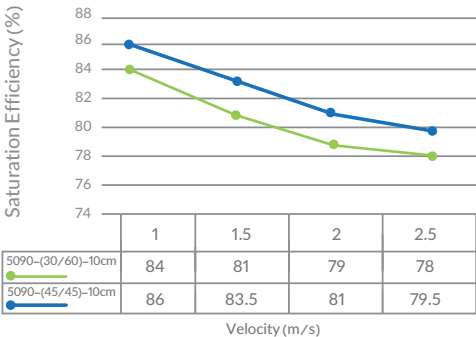


D. Saturation Efficiency

- The efficiency of the 45/45 pad is higher than that of the 30/60 configuration.

The reason for this higher efficiency is the longer air passage channels in this type of pad.

A longer channel increases both the contact time and surface area between the air and the water-saturated pad, thereby enhancing heat transfer and cooling performance.



E. Applications

Cellulose Pad with the configuration 45/45

(Maximum Cooling Efficiency and Moderate Pressure Drop)

- Provides the highest evaporation efficiency and therefore the greatest cooling capacity.
- Suitable for cooling systems capable of handling moderate pressure drop.

Cellulose Pad 30/60

(Adequate Cooling Efficiency and Minimal Pressure Drop)

- Suitable for applications with high air exchange rates or cooling systems with high volumetric airflow.
- No water droplet carry over even at high air velocities.
- The 5090 pad with a 30/60 angle, due to its higher evaporation efficiency compared to the 7090 pad with a 45/45 angle and nearly equal pressure drop, can serve as a substitute in greenhouses, poultry houses, and also in portable evaporative coolers with axial fans.

3. Thickness of the Cellulose Pad:

In various series of cellulose pads, as thickness increases, both efficiency and pressure drop increase. The rise in efficiency is due to the greater contact surface area between the passing air and the wet cellulose pad. The increased pressure drop, on the other hand, results from the longer airflow channels in thicker pads.

4. Paper Material:

Kraft paper is the primary raw material used in the production of cellulose pads, and undoubtedly the quality of this material directly impacts the quality of the final product. The quality of the kraft paper affects water absorption and capillarity, both of which play a crucial role in the efficiency of the final product.

5. Resin Quality:

Various types of resins are used both as a coating and as an adhesive in the production of cellulose pads. High-quality resins increase the durability and service life of the pads. KOOLANCELL cellulose pads are manufactured using high-grade NadPolymer-manufactured resins and are offered with **36-month guarantee** against deformation and pulping.



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 cellulose pads are presented in the table below.

Series	Configuration	Applications
4090	(45/45)	Evaporative coolers
5090	(45/45)	
6090	(45/45)	
7090	(45/45)	Greenhouses Poultry houses Data centers
	(30/60)	
5090	(30/60)	
8090	(45/45)	
7060	(45/15)	Power Plants
7060	(45/15)	

Table 1: All Types Of Koolancel Cooling Pads Series

Information Poultry House Series	Height (cm)	Width (cm)	Thickness (cm)
5090 (30/60) 7090 (45/45) 7090 (30/60) 8090 (45/45) 7060 (45/15)	200	60	10- 15
	180	60	10- 15
	150	60	10- 15
	120	60	10- 15
	100	60	10- 15

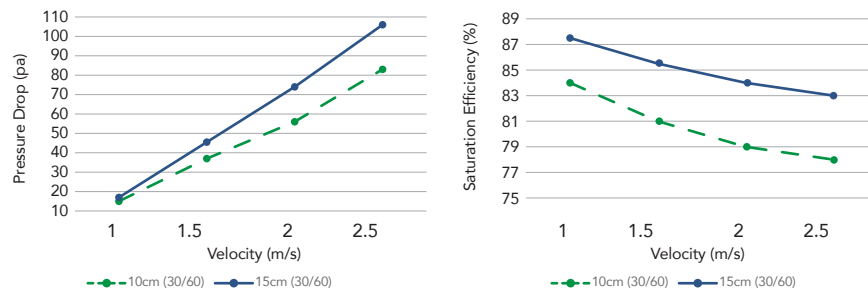
Table 2: The Dimensions Of Common Poultry Series

Series and Dimensions of Cooling Pads in the Poultry house

5090 Series

In the 5090 series, fluted cellulose sheets with a flute height of 5 mm are placed on top of each other, and the corrugation direction of the two adjacent sheets form an angle of 90 degrees (30/60) to each other (Figure 2).

The 5090 series with configuration (30/60), due to its higher saturation efficiency compared to the 7090 series with configuration (45/45) and nearly equal pressure drop, can serve as a replacement in greenhouses, poultry houses and also in portable evaporative coolers with axial fans.



Saturation efficiency and Praessure drop diagram 5090 (30/60) series

5090 Series With (30/60) Configuration	
Nominal Saturation Efficiency	81%
Nominal Pressure Drops	37 Pa
Number Of Corrugated Sheets In Unit Length (1 m)	190
Density	33/44 Kg/m ³
Water Absorption	140%

Table 3: Nominal saturation efficiency and pressure drop are calculated at 1.5 m/s air velocity for a 10 cm thick pad.

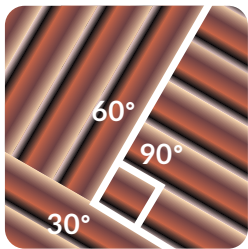
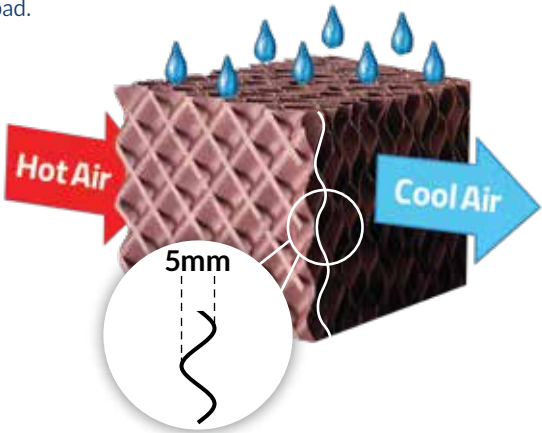


Figure 2: (30/60) Configuration



Series and Dimensions of Cooling Pads in the Poultry house

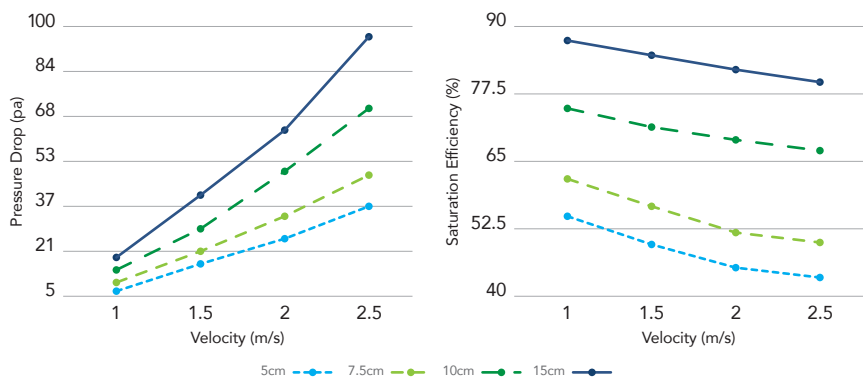
7090 series

In the 7090 series, wavy cellulose sheets with a flute height of 7 mm are placed on top of each other, and the corrugation direction of the two adjacent sheets forms an angle of 90 degrees (45/45) to each other (Figure 3).

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 configuration (30/60) of this series is suitable for applications requiring low pressure drop or high air exchange rates.

Considering the lower saturation efficiency of the configuration (30/60) compared to the configuration (45/45), The use of it is recommended in greater thicknesses.

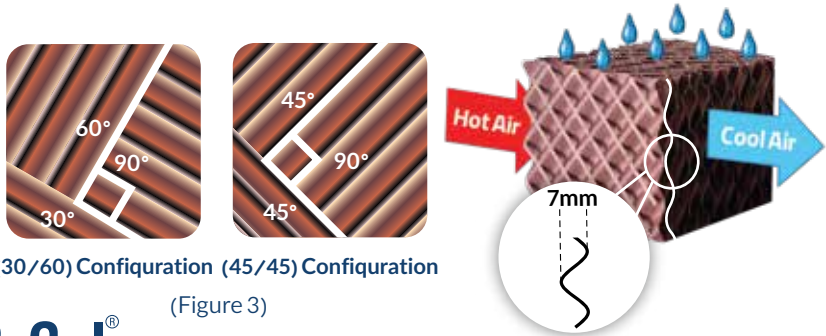


Saturation efficiency and Praessure drop diagram 7090 (45/45) series

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. 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.

7090 Series With (45/45) Configuration	
Nominal Saturation Efficiency	71%
Nominal Pressure Drops	29 Pa
Number Of Corrugated Sheets In Unit Length (1 m)	143
Density	23/66 Kg/m ³
Water Absorption	140%

Table 4: Nominal saturation efficiency and pressure drop are calculated at 1.5 m/s air velocity for a 10 cm thick pad.

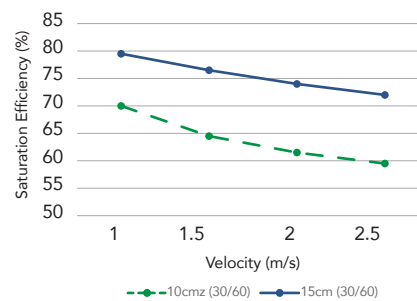
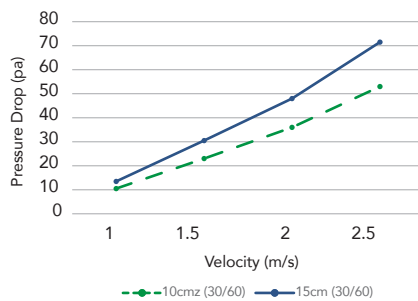




7090 Series With (30/60) Configuration

Nominal Saturation Efficiency	64.5%
Nominal Pressure Drops	16.9 Pa
Number Of Corrugated Sheets In Unit Length (1 m)	143
Density	23/66 Kg/m ³
Water Absorption	140%

Table 5: Nominal saturation efficiency and pressure drop are calculated at 1.5 m/s air velocity for a 10 cm thick pad.



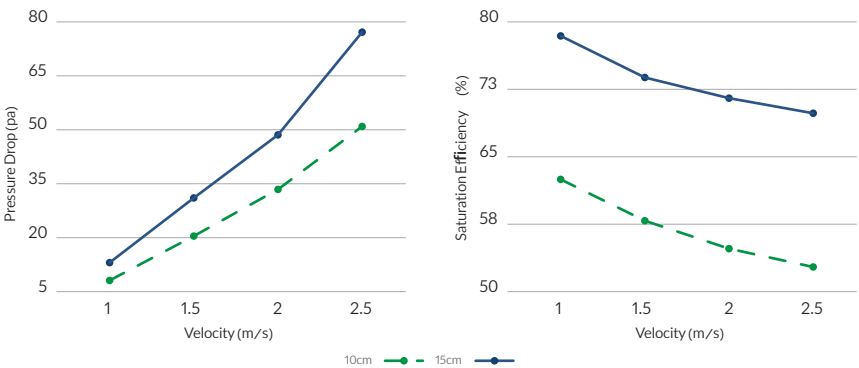
Saturation efficiency and Praessure drop diagram 7090 (30/60) series

Series and Dimensions of Cooling Pads in the Poultry house

8090 series

In the 8090 series, wavy cellulose sheets with a flute height of 8 mm are placed on top of each other, and the corrugation direction of the two adjacent sheets constitutes an angle of 90 degrees (45/45) to each other (Figure 4). 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 flute height of this series 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 8090 series, it is advisable to employ thicker pad when using this series.



Saturation efficiency and Praessure drop diagram 8090 (45/45) series

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.

8090 Series With (45/45) Configuration	
Nominal Saturation Efficiency	74%
Nominal Pressure Drops	31 Pa
Number Of Corrugated Sheets In Unit Length (1 m)	125
Density	21/70 Kg/m ³
Water Absorption	140%

Table 6: Nominal saturation efficiency and pressure drop are calculated at 1.5 m/s air velocity for a 15 cm thick pad.

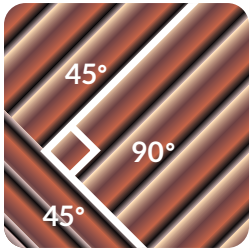
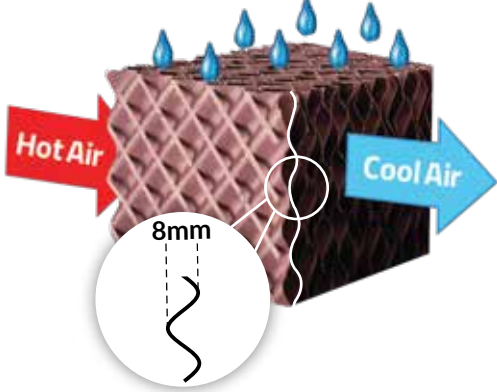


Figure 4: (45/45) Configuration

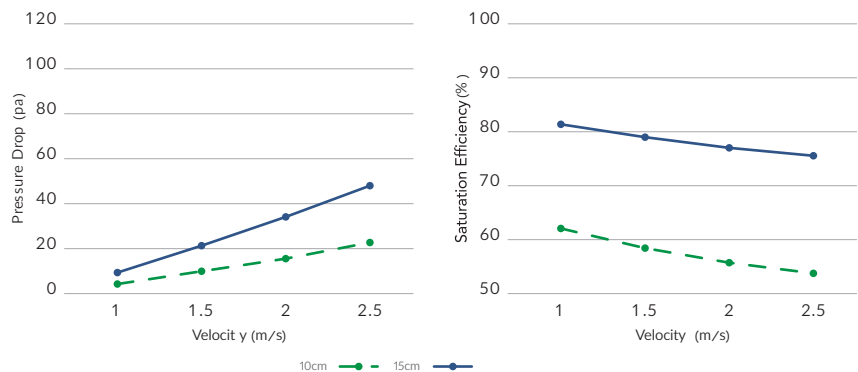


Series and Dimensions of Cooling Pads in the Poultry house

7060 series

In the 7060 series, wavy cellulose sheets with a flute height of 7 mm are placed on top of each other, and the corrugation direction of the two adjacent sheets constitutes an angle of 60 degrees (45/15) to each other (Figure 5).

Because of its minimal pressure drop, this series is well-suited for applications that involve a high ventilation rate or airflow through the pad. Given the lower saturation efficiency of this series compared to the 7090 series, it is recommended to use thicker pad when employing this series.



Saturation efficiency and Praessure drop diagram 7060 (45/15) series

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.

7060 Series With (45/15) Configuration	
Nominal Saturation Efficiency	79%
Nominal Pressure Drops	22 Pa
Number Of Corrugated Sheets In Unit Length (1 m)	143
Density	22/66 Kg/m ³
Water Absorption	140%

Table 7: Nominal saturation efficiency and pressure drop are calculated at 1.5 m/s air velocity for a 15 cm thick pad.

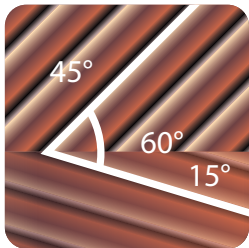
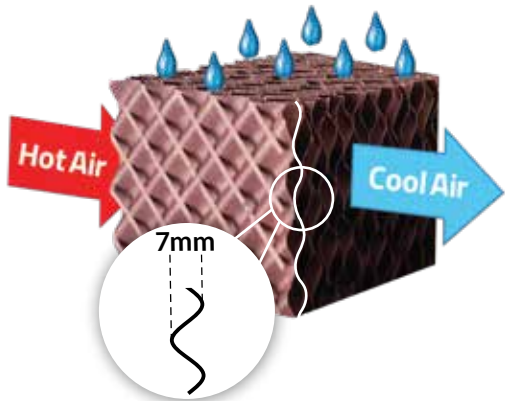


Figure 5: (45/15) Configuration



KOOLANCEL Cellulose Pads and Frames Features

Evaporative cooling using cellulose pads is considered the most effective and widely-used cooling method.

The advantages of using KOOLANCEL cellulose pads in poultry houses include:

- **High strength and durability** (36 months guarantee against deformation and rotting);
- **High cooling efficiency** (up to 30% more than aspen pad during the season);
- **Longer life time**; (4 to 6 times longer than aspen pad);
- **Higher wetting properties and water absorption** due to better raw materials;
- **Low scaling** due to self-cleaning;
- **Removal of dust and insects**;
- **Less fungus and algae growth**, and no transmission of harmful respiratory bacteria.

Aluminium Frame features:

- **Anodized aluminium** with a higher corrosion resistance;
- **Highly robust and lightweight**;
- **Recyclable and environment-friendly**.

Colored Galvanized Steel Frame features:

- Environment-friendly (non-absorbent by humans and the environment)
Hot-dip galvanized;
- Eye-catching organic color coating;
- 3 to 5 times increased corrosion resistance in the Salt Spray Test compared to regular galvanization. The coating provides heightened corrosion resistance.



To ensure proper ventilation and cooling of poultry houses, the following guidelines are recommended:

- At temperatures below 28°C, evaporative cooling pads (cellulose pads) should not be used, as excessive use of evaporative cooling can affect the humidity content of the bedding.
- The humidity level in the house should not exceed 85%.
- Generally, due to the daily humidity cycle, the pads are used from 9 AM to 6 PM. Cooling at night can increase heat stress.
- Evaporative cooling should not be used before the chicks are 25 days old. Only in extremely hot conditions may the pads be used to cool chicks during the first two weeks.
- The tunnel ventilation rate should be such that the airflow speed along the length of the house is 2.5 meters per second (500 feet per minute).
- The capacity of tunnel fans or the air exchange rate should ensure that the maximum temperature difference between the front and back of the house does not exceed 2.8°C (5°F).
- The PH level of the circulating water should be maintained between 6 and 9.

Sales Engineering Services

The required ventilation rates for each of the three methods minimal, transitional, and tunnel ventilation are approximately provided in Table 8.

Note: Exact ventilation calculations should consider all influencing factors and be conducted by qualified experts.

Minimal Ventilation	$1-2 \left(\frac{\text{cfm}}{\text{ft}^2} \right)$
Transitional Ventilation	$5-6 \left(\frac{\text{cfm}}{\text{ft}^2} \right)$
Tunnel Ventilation	$9-11 \left(\frac{\text{cfm}}{\text{ft}^2} \right)$

Table 8: The amount of ventilation required for the Poultry House

Once the required ventilation is determined, the surface area of the necessary cooling pad can be calculated using Table 9. This table also allows you to determine the required circulating water flow rate, the capacity of the water storage tank, and the appropriate water discharge rate to prevent sediment buildup on the pads.

Descriptions	10 cm thick		15 cm thick	
Face Air Velocity (fpm)	250		350	
Circulating water flow rate (gpm/ft)	0,5		0,8	
Tank Volume (gal/ft ²)	0,8		1,0	
Water distribution pipe diameter (in) (The distance between the water distribution holes is 3 inches and their diameter is 3 mm)	Up to 50 feet	50-60 feet	Up to 30 feet	30-50 feet
	1 $\frac{1}{4}$	1 $\frac{1}{2}$	1 $\frac{1}{4}$	1 $\frac{1}{2}$
Water bleed-off rate (%)	2 - 5		2 - 5	

Table 9: Specifications of the cooling system for pads with a thickness of 10 and 15 cm

For precise calculations of cooling pads, frames, fans, and other equipment for your poultry house, please contact the KOOLANCEL company sales engineering team at +9826 34055145.

Example

Consider a poultry house with a length of 500 ft (152.4 m), a width of 46 ft (14.0208 m), and an average height of 9.25 ft (2.82 m), as shown in the figure below. Determine the ventilation rate and the required pad area needed to provide cooling for this poultry house. Additionally, assuming the use of 6 ft high pads (1.88 m), calculate the water flow rate and the volume of the water storage tank. (Note: 1 ft = 0.3048 m).

Poultry house Area = $500 \text{ ft} \times 46 \text{ ft} = 23,000 \text{ ft}^2$ (2136.7699 m²)

The Required Ventilation Rate = $23,000 \text{ ft}^2 \times 11 \text{ cfm/ft}^2 = 253,000 \text{ cfm}$

Control of Airflow Rate = $253,000 \text{ cfm} \div (46 \times 9.25) \text{ ft}^2 = 594 \text{ fpm}$

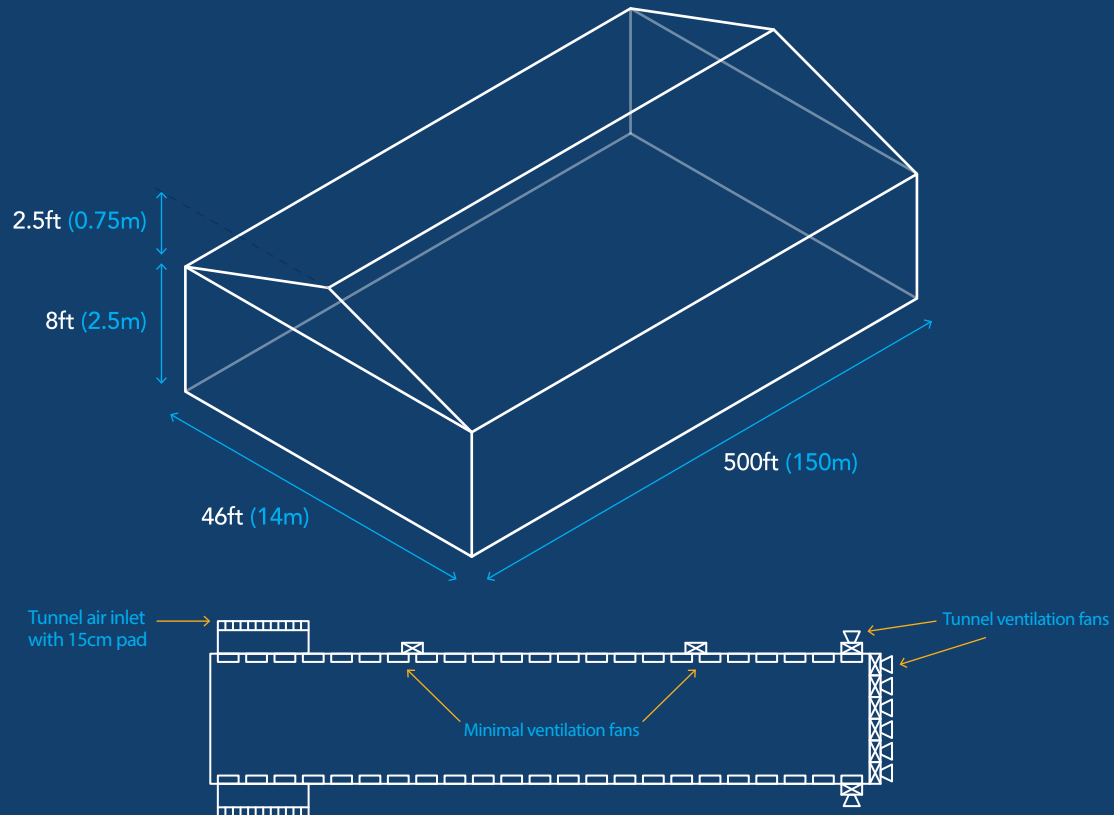
Control of Air Exchange Rate = $(500 \times 46 \times 9.25) \text{ ft}^3 \div 253,000 \text{ cfm} = 0.8 \text{ min} = 50 \text{ sec}$

The Area Of The Pad Required With The Thickness Of 15 Cm = $253,600 \text{ cfm} \div 350 \text{ fpm} = 723 \text{ ft}^2$ (67.1689 m²)

Length of the Pad on Each Side of the poultry house = $723 \text{ ft}^2 \div 6 \text{ ft} \div 2 = 60 \text{ ft}$ (18.288 m)

Water Flow Rate in Each Side of the poultry house = $60 \text{ ft} \times 0.8 \text{ gpm/ft} = 48 \text{ gpm}$

Volume of the Water Storage Tank on Each Side of the poultry house = $(6 \times 60) \text{ ft}^2 \times 1 \text{ gal/ft}^2 = 360 \text{ gal}$







Factory address: 1st Golrizan ALY, 2nd Goldis ST., Qazali Blvd,
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