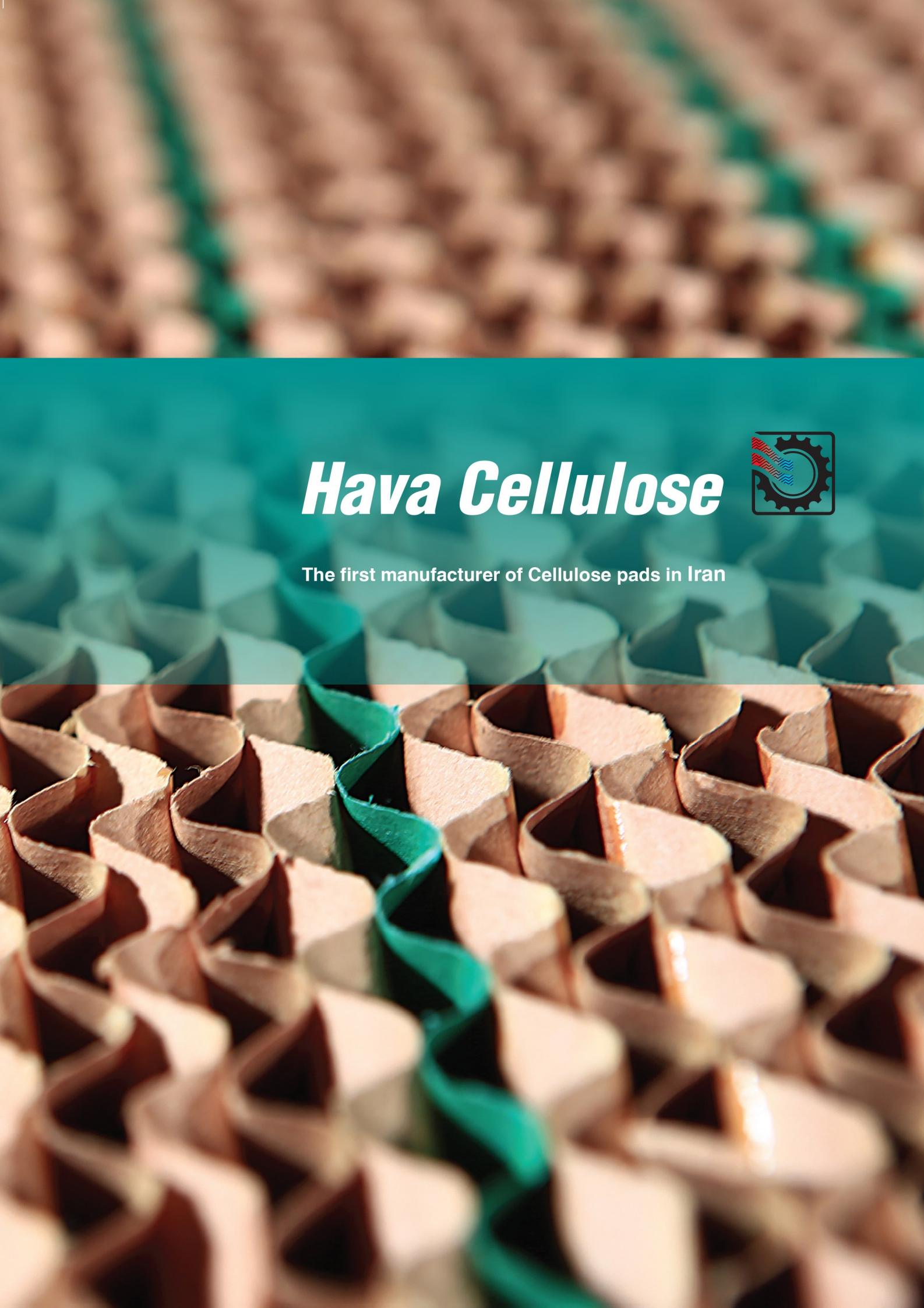
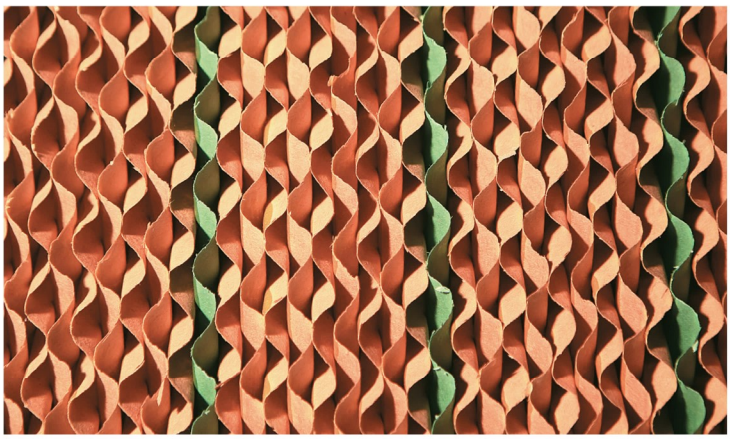


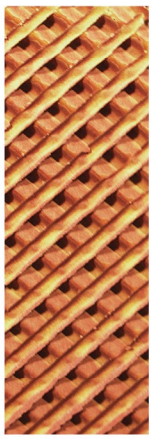
Hava Cellulose

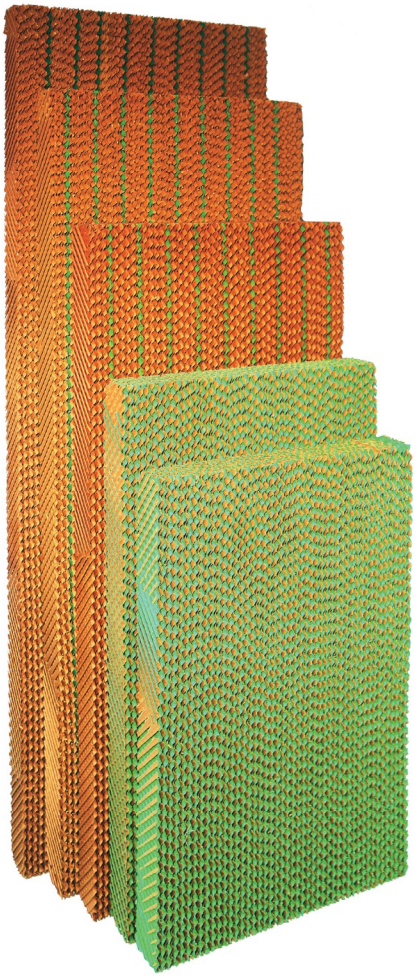
The first manufacturer of Cellulose pads in Iran

Havacell pads

Havacell pads are made of special KRAFT papers from completely natural hardwoods with long fibers.The coating resin on corrugated papers increases the physical resistance of pads. The advantages of this combination are good absorption rates, water proof, fast diffusion, anti-mildew and a prolonged service life.

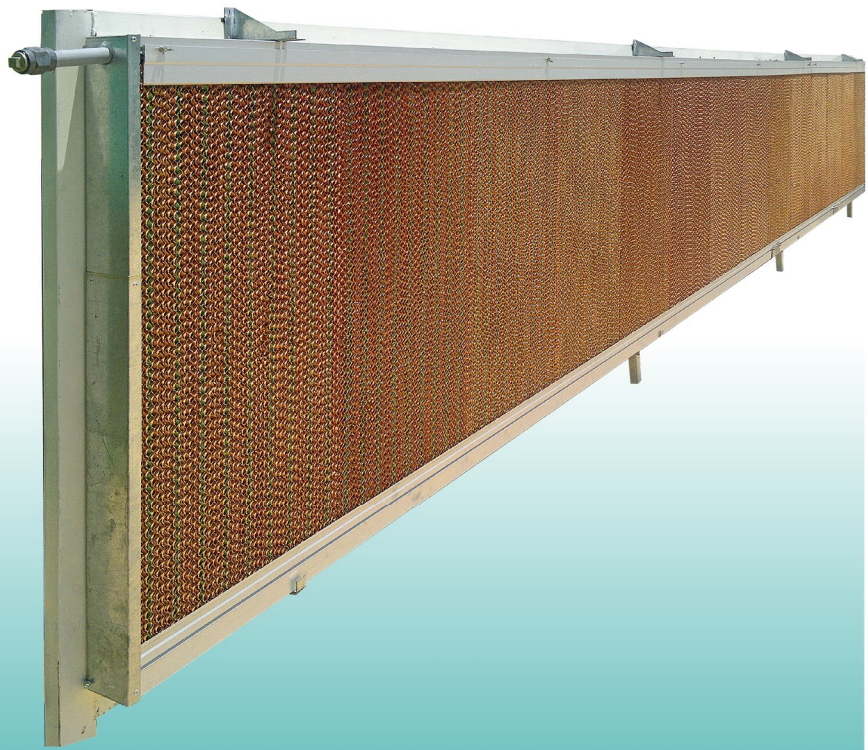






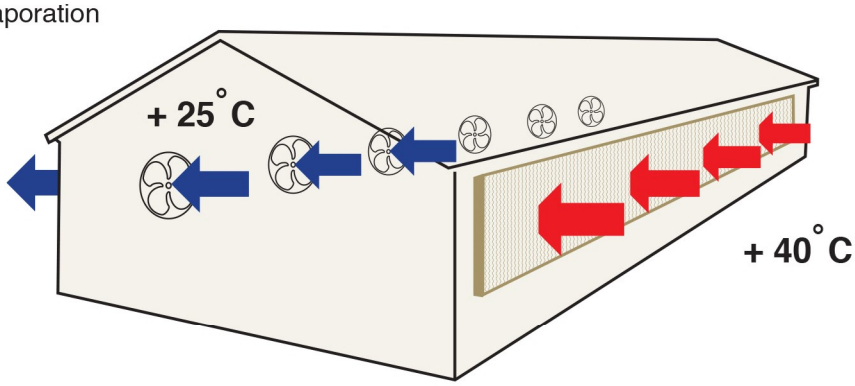
The advantages of using an evaporative cooling pad system

- High evaporation efficiency
- Reduces heat stress
- Reproducing wet and cool conditions
- Self-cleaning
- Reduced operating costs
- Easy to install
- Environmentally friendly



Mode of operation

Water is circulated through a pump station and supplied to the top of the cooling pads via a distribution manifold. The perforated pipe distributes water down the pads. Water flows down the corrugated surface of the pads. Negative pressure ventilation inside the installation (greenhouse, poultry farm, etc…) sucks the warm air into the installation through the moist pads. This way the air becomes humidified and cools down. Excess water assists in washing the pads and is collected in the water reservoir to be cycled through the system again. The heat that is needed for the evaporation is taken from the air itself. The air that leaves the pad is therefor cooled and humidified simultaneously without any external energy evaporation process.



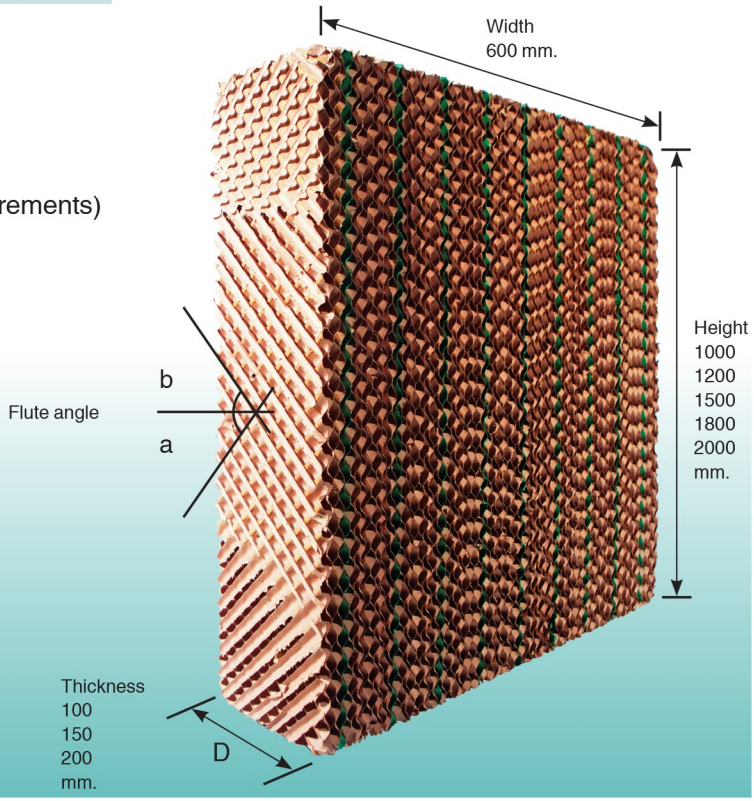
Havacell how to order

Available in different sizes and thicknesses in three types (7090, 7060, 5090) indicated in the following table and photo illustration:

Type	7090		7060	5090
hp (mm)	7		7	5
a	45	60	45	45
b	45	30	15	45

a.b. flute angle

havacell 5090 (custom made according to clients' requirements)



Performance and efficiency of Havacell pads (7090-45˚ 45˚)

Cooling efficiency %

PANEL THICKNESS	AIR SPEED M/s				
	0.5 M/s	1 M/s	1.5 M/s	2 M/s	2.5 M/s
100 mm.	72.3 %	71.5 %	70.2 %	68.1 %	66.0 %
150 mm.	83.2 %	82.5 %	80.0 %	78.5 %	77.0 %
200 mm.	92.2 %	90.5 %	87.1 %	85.0 %	84.0 %

Pressure Drop (pa)

PANEL THICKNESS	AIR SPEED M/s				
	0.5 M/s	1 M/s	1.5 M/s	2 M/s	2.5 M/s
100 mm.	0.5 %	7.3	11.3	17.9	21.3
150 mm.	1.7	8.4	13.5	19.5	26.5
200 mm.	3.4	10.3	21.3	35.5	45.6

The house temperature will change based on the regions climate as follow:

As a reference example (type 7090-45˚45˚ / 10 cm thickness) air velocity through the pad (1/5 m/s)

Out side relative humidity (%)

Out side temperature	10	20	30	40	50	60	70	80	90
	temperature C˚ / after pad								
21.10 c	11.45	11.27	13.99	15.27	16.49	17.33	18.16	19.44	20.27
23.86 c	14.78	14.77	16.16	17.60	18.88	19.95	20.95	21.99	23.05
26.65 c	16.83	16.83	18.33	19.99	21.22	22.50	23.72	24.55	25.83
29.40 c	18.85	18.83	20.49	22.16	23.61	24.83	26.33	27.33	
32.20 c	20.88	20.88	22.61	24.27	25.94	27.22	28.88		
34.96 c	22.88	22.88	24.77	26.66	28.33	29.77			
37.74 c	24.83	24.83	26.94	28.99	30.66				
40.51 c	26.77	26.77	29.27	31.38					
43.30 c	28.88	28.88	31.66						

Gutter frames for evaporative cooling pad systems

Havacellulose provides gutter frames and accessories for easy installation and superb operation of the evaporative cooling pad system.

Havacellulose gutter frames are available in two types:

Aluminum frames

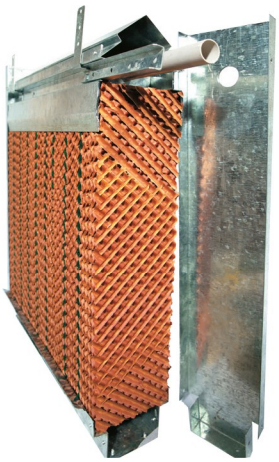
Aluminum frames made at 3-6 m long for gutters of special aluminum alloy for 10cm thickness pads.

bottom frame

top frame

Galvanized (stainless steel) frames

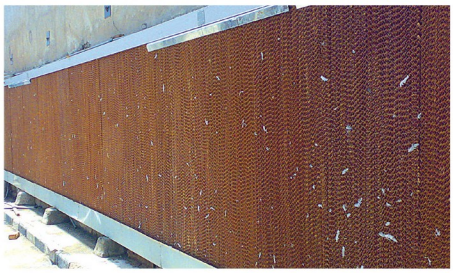
Galvanized frames 3 m long gutters made for 10 cm or 15 cm thickness pads.
(stainless steel frames made according to clients requirements)



bottom frame

top frame

Cooling pads main fields of application and usage



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