



Innovative Cooling Solutions For Industrial & Commercial Buildings



Indirect-Direct
(2 Stage)
Evaporative Cooling
(IDEC) System

*Natural Air Conditioning...
Powered by Natural Resources*



Economical/
Low Maintenance



Energy
Efficient



Reduced
Carbon Footprint

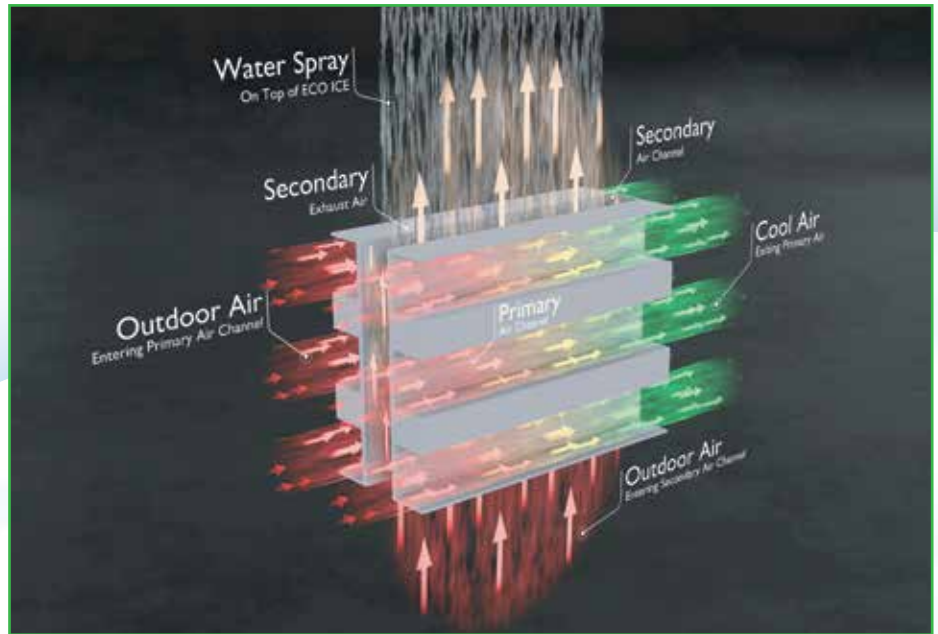
How DRI-IDEC Works

The Ecolce™ is an indirect evaporative counter-flow heat exchanger to produce 100% fresh, cool, outside air, with no added moisture.

The fresh cold air produced by DRI-IDEC System can be like that produced by refrigerated systems, with temperatures that are below wet bulb temperature of air entering the machine.

- Hot outside air enters the cooler via the inlet.
- A powerful, energy-efficient, electric fan moves the air towards the Ecolce™ heat exchanger.
- Hot air is divided into primary air stream and secondary air stream inside the machine and subsequently passes through the heat exchanger.
- The heat exchanger is an air-to-air heat exchanger consisting of alternating dry and wet channels.
- Primary air passes through the dry channels.
- Secondary air passes through the wet channels and becomes moist.
- The heat transfer takes place between primary and secondary air streams. No moisture is transferred across the membranes between the dry and wet channels; only heat is transferred.

Fig. 1: Indirect Evaporative Cooling Process



- The wet channels are continuously soaked with water to allow the evaporative cooling process along the entire length of the core. This moist, warm air is then exhausted outside.
- The air passing along the dry channels in the core is cooled, with no moisture added.
- This cooled primary air is now further cooled adiabatically in EcoCool Cellulose Pads further bringing the temperature of supply air down.
- The fresh cool supply air is sent to the building and cools the desired spaces.

Fig. 2: Indirect + Direct Cooling Process

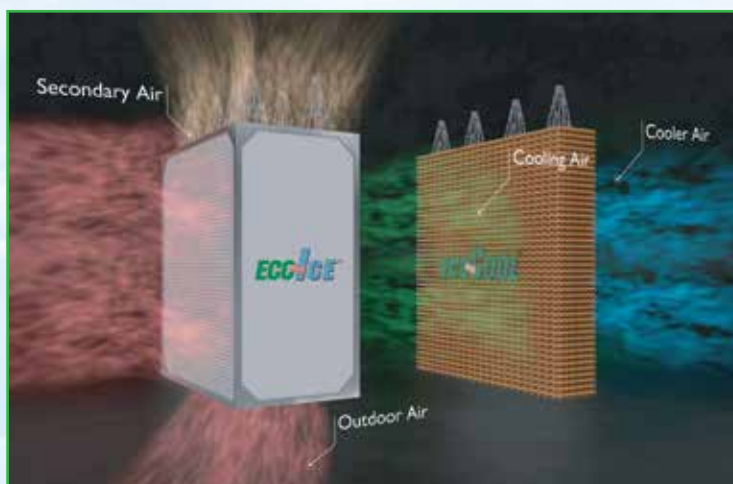
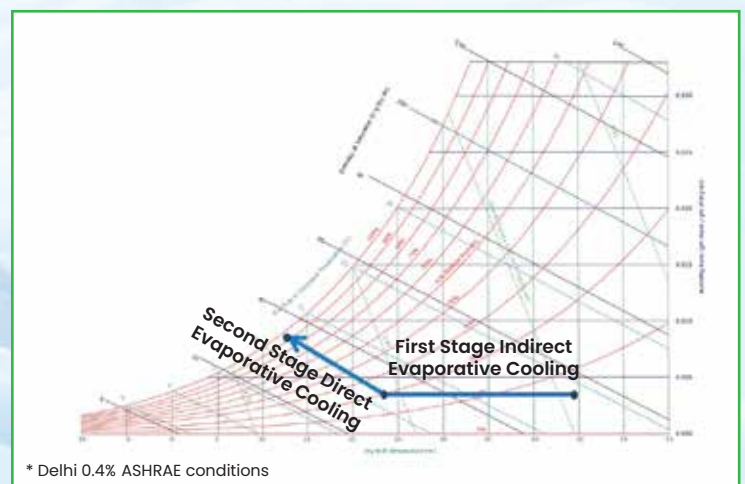


Fig. 3: Psychrometric Representation of DRI-IDEC



DRI-IDEC Performance in Different Cities of INDIA

Table A:

AHMEDABAD												
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ambient DB (°C)	32.0	36.1	41.8	43.9	45.2	44.2	39.0	35.8	38.0	39.1	36.0	33.0
Ambient WB (°C)	19.3	19.6	20.8	21.9	23.5	25.1	26.6	27.3	26.3	23.1	21.1	19.0
Unit Supply Air DB (°C)	17.1	16.6	17.0	18.1	20.1	22.3	25.0	26.3	21.8	20.6	18.6	16.5

BANGALORE												
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ambient DB (°C)	29.7	33.1	34.7	35.5	35.0	32.4	30.0	29.5	30.1	30.1	29.2	28.5
Ambient WB (°C)	17.2	17.4	18.4	20.4	21.0	22.5	21.2	21.4	21.1	19.5	18.4	17.2
Unit Supply Air DB (°C)	14.9	14.3	15.2	17.8	18.7	21.1	19.9	20.3	19.8	17.8	16.6	15.1

CHENNAI												
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ambient DB (°C)	31.2	33.9	36.1	38.4	41.3	40.1	38.1	37.1	36.2	35.1	32.9	31.1
Ambient WB (°C)	23.2	23.8	24.8	27.0	26.0	26.1	25.4	25.9	26.0	25.6	25.3	24.4
Unit Supply Air DB (°C)	22.1	22.4	23.3	25.6	23.9	24.2	23.7	24.4	24.7	24.4	24.4	23.6

DELHI												
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ambient DB (°C)	26.0	31.0	38.0	43.1	45.2	45.8	40.9	38.1	38.0	37.0	32.9	27.0
Ambient WB (°C)	16.5	18.3	19.1	21.1	21.7	24.0	25.6	24.6	24.2	21.0	18.9	15.9
Unit Supply Air DB (°C)	14.8	16.0	15.5	17.2	17.6	20.6	23.4	22.7	22.2	18.2	16.4	13.8

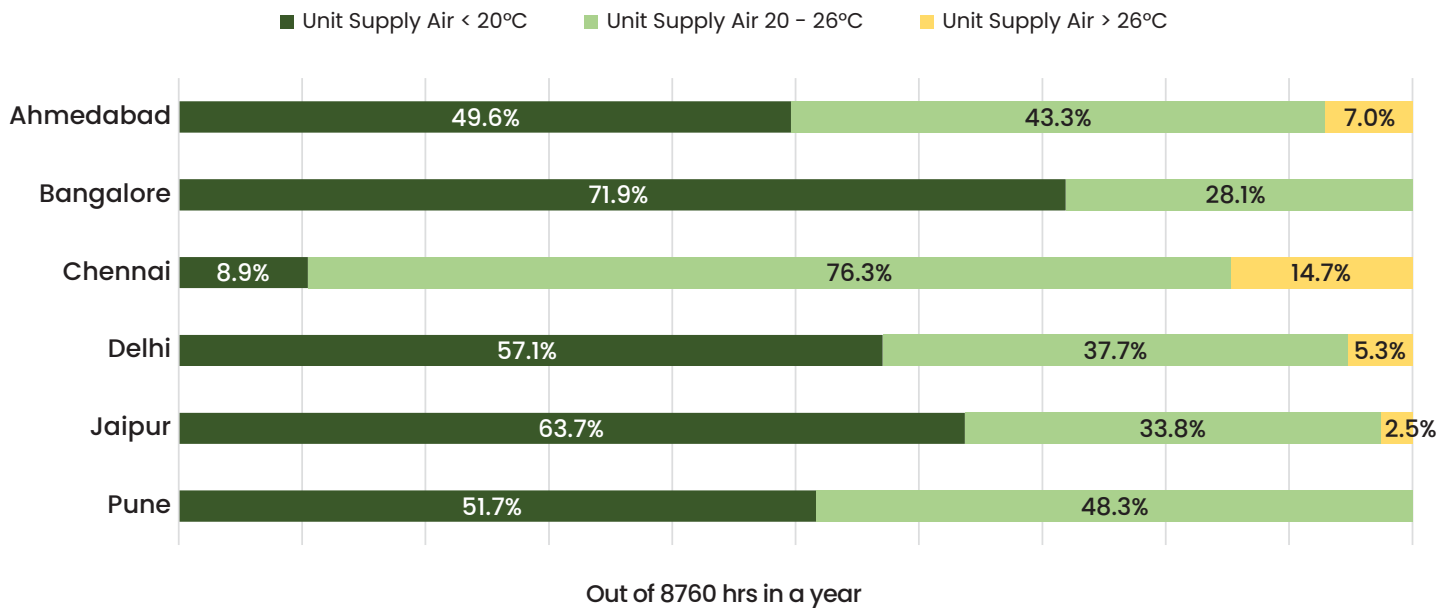
JAIPUR												
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ambient DB (°C)	27.1	32.1	38.5	42.0	44.1	44.1	40.1	36.2	37.9	37.1	32.9	28.4
Ambient WB (°C)	15.2	16.6	17.3	19.0	21.1	21.1	24.1	24.8	22.0	19.4	17.9	16.1
Unit Supply Air DB (°C)	12.8	13.4	12.7	14.3	17.0	16.9	21.7	23.2	19.4	16.1	15.0	13.7

PUNE												
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ambient DB (°C)	31.7	35.0	38.1	39.9	39.8	36.6	31.0	30.0	32.0	33.4	32.0	31.1
Ambient WB (°C)	18.1	17.8	18.5	19.3	20.7	23.3	23.5	23.7	23.0	21.1	20.1	19.1
Unit Supply Air DB (°C)	15.6	14.3	14.6	15.3	17.3	21.3	22.5	22.9	21.7	19.1	18.2	17.0

Ambient conditions taken from ASHRAE Handbook Fundamentals – Weather data 2021 edition – Monthly climatic design condition

Comfortable Conditions All Year Round with DRI-IDEC

Fig. 4: Comfortable Conditions All Year Round with DRI-IDEC



Yearly weather data/profile taken from Energy plus data base

Comparing DRI-IDEC with DX Packaged Unit System

Fig. 5:

Saving in Power with DRI-IDEC system

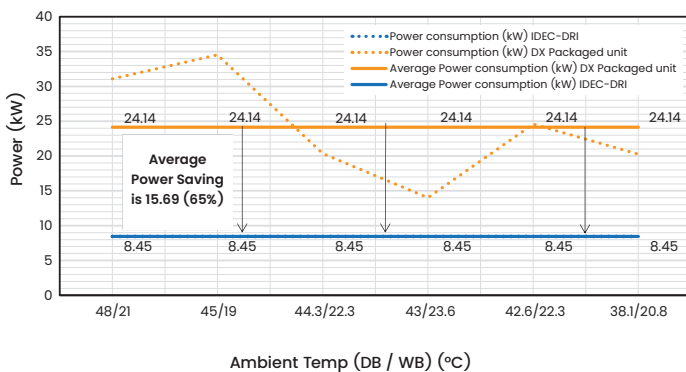
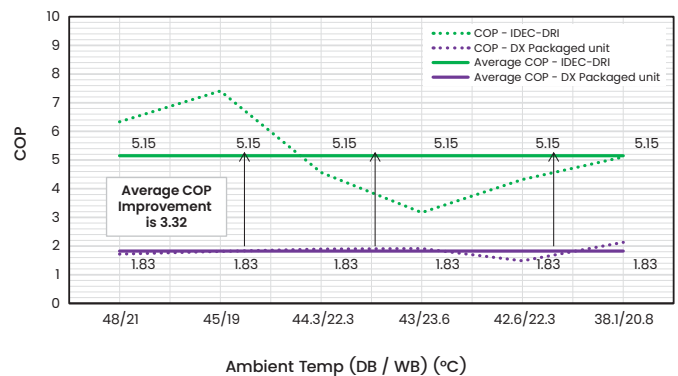


Fig. 6:

Increase in Energy efficiency (COP) with DRI-IDEC



- For packaged unit, the return air is assumed as 90% and Fresh air as 10%.
- The room sensible load and inside temperature (25°C) are same in IDEC and DX system.

DRI-IDEC Applications

Manufacturing Industries



Warehouses



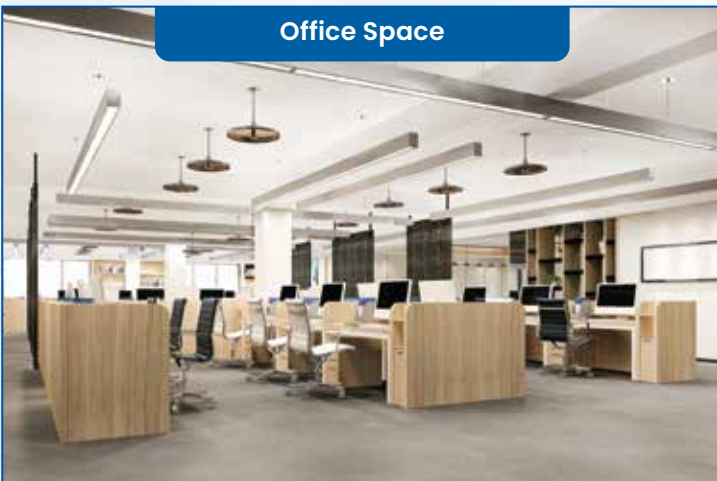
Indoor Stadiums



Schools/Classrooms



Office Space



Religious Centers



DRI Two Stage Indirect-Direct Evaporative Cooling (IDEC) System

Fig. 7: Indirect-Direct Evaporative Cooling (IDEC) System Internal View



DRI-IDEC Features:

- Double skin construction with PUF Insulation of 40 kg/m³ density.
- AHRI certified (as per AHRI 1350) casing for the following parameters:
 - Casing Deflection Rating Class (+/- CD4/CD4)
 - Thermal Transmittance Class Leakage (with/without CT2/CT2)
 - Casing Air Leakage Class (+/- CL1/CL1)
 - Thermal Bridging Class CB2.
- Available in blow through arrangement.
- Outer skin (PPGI). Inner skin & wet section in complete SS 304 finish.
- Blow through single fan design with Plug Fans. EC & EC plus fans option also available.
- **Ecolce™** - High Efficiency air to air heat exchanger in engineered polymer construction (RoHS Applied).
- **EcoCool** - High Efficiency long life antibacterial cellulose construction heat exchanger (RoHS Certified).
- Water tank in SS 304 construction with epoxy coating.
- Plug & Play type complete with electrical control panel with RH/Temp. sensors and PLC controller. Touch screen Interface.
- Complete water management system with UV arrangement, Auto Drain, Bleed off arrangement, and TDS sensor.
- Available in standard sizes from 3000 CFM upto 100000+ CFM.
- Unit available in customized sizes and specification with cooling/ heating Cu coil for special applications.
- **DRI has supplied world's largest single evaporative cooling system of 1.2 million CFM in GCC.**

World-Class R&D and Testing Facilities



Fig. 8: An exclusive state of the art Laboratory to simulate weather conditions (Dry bulb temperature & RH) & to showcase the performance of the Evaporative cooling system in each stage.

Over 700,000 Square Feet of State-of-the-Art Manufacturing Facilities



Fully Integrated World-Class Manufacturing & Testing Facilities

Certifications



Software Tool



Fig. 9: IDEC Software Dashboard

Our Global Customers



Indian Offices

Gurugram: 100-101, Udyog Vihar, Phase-IV, Gurugram 122015, India Phone: +91-124-4010189 E-mail: drimarketing@pahwa.com	Mumbai: 319 - T.V.Tower, Inds. Estate, Worli-Mumbai 400030, India Phone: +91-22-24935155 E-mail: drimumbai@pahwa.com	Kolkata: 168, Linton Street Near Linton Post Office, 2 nd Floor Kolkata 7000014, India Phone: +91-33-64570568 E-mail: drikolkata@pahwa.com	Chennai: New #5 (old #20), 2nd Street, E Block, Anna Nagar-East, Chennai 600102, India Phone: +91-44-42693761 E-mail: drichennai@pahwa.com
---	---	---	--

International Offices

COUNTRY MALAYSIA CHINA PHILIPPINES BRAZIL INDONESIA VIETNAM CANADA NIGERIA SWITZERLAND BANGLADESH	Phone +60-3-89256622 +86-21-34126537 +63-2-88078435/6/7 +55-41-36982222 +62-21-79199023 +84-8-39956498 +514-299-1131 +234-9117341410 +41-91-6830971 +880-1819409100	Email bam@bryair.com.my info@bryair.com.cn mail@bryair.com.ph contacto@bryair.com.br indomark@bryair.com.my vietmarketing@bryair.com.my vyerman@diaramica.com bryairnigeria@pahwa.com info@bryairprokon.ch bryairbangladesh@pahwa.com	Website www.bryair.com.my www.bryair.com.cn www.bryair.com www.bryair.com.br www.bryair.com.my www.bryair.com.my www.drirotor.com www.bryairprokon.ch www.bryairprokon.ch www.bryair.com
--	--	--	---