

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

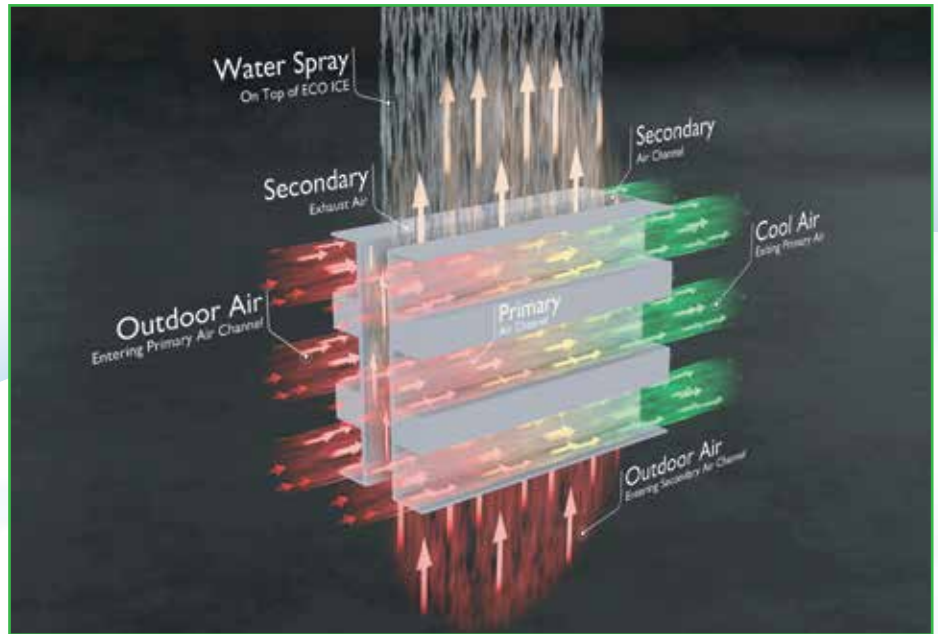
How DRI-IDEC Works

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

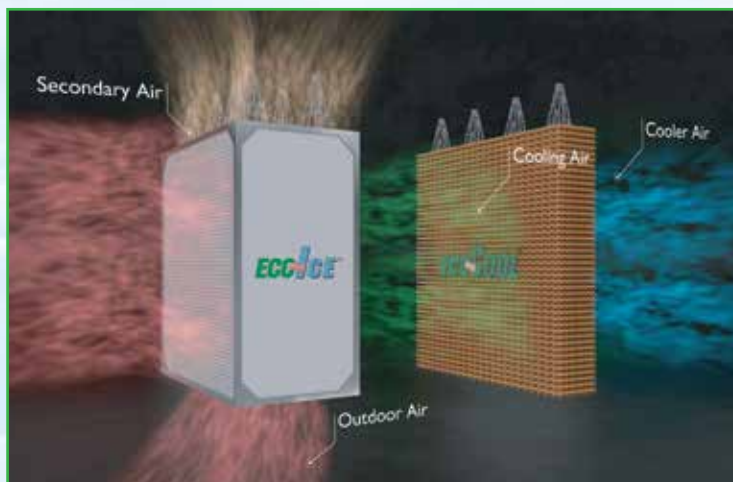
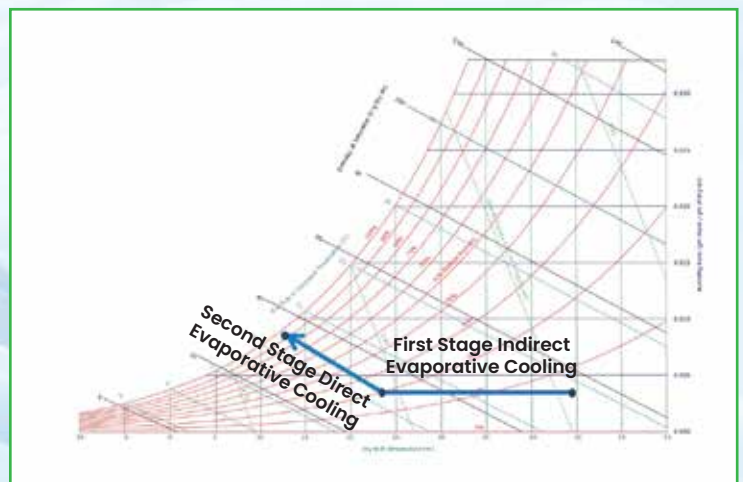


Fig. 3: Psychrometric Representation of DRI-IDEC



DRI-IDEC Performance in Different Cities of GCC

RIYADH

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ambient DB (°C)	27.9	31.8	35.6	40.1	43.8	45.2	46.1	45.8	43.3	39.0	33.6	28.8
Ambient WB (°C)	14.3	16.2	16.0	17.7	18.4	19.0	19.9	20.2	19.0	17.3	16.7	15.4
Unit Supply Air DB (°C)	11.3	12.9	11.5	12.8	12.8	13.3	14.5	15.1	13.9	12.5	13.1	12.6

JEDDAH

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ambient DB (°C)	32.2	34.0	36.8	39.1	42.1	43.8	42.1	41.2	40.2	40.7	36.2	33.2
Ambient WB (°C)	20.6	20.2	21.6	22.5	23.7	23.9	23.4	24.4	25.2	22.4	21.7	21.0
Unit Supply Air DB (°C)	18.7	17.9	19.1	19.8	20.8	20.9	20.5	21.9	23.0	19.4	19.4	19.0

KUWAIT

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ambient DB (°C)	24.1	27.9	35.7	40.0	45.2	48.9	49.5	49.1	47.0	42.0	34.2	26.6
Ambient WB (°C)	13.6	14.5	16.3	18.4	19.9	21.1	21.3	21.3	21.0	19.5	17.5	14.6
Unit Supply Air DB (°C)	11.4	11.6	12.0	14.0	14.8	15.7	15.8	15.9	16.1	15.1	14.1	12.1

DOHA

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ambient DB (°C)	27.1	30.0	34.7	39.2	44.1	46.1	46.1	45.2	42.9	39.9	34.2	29.1
Ambient WB (°C)	17.3	17.5	18.7	20.0	21.0	21.8	22.3	23.3	22.9	22.0	20.3	18.8
Unit Supply Air DB (°C)	15.6	15.1	15.6	16.5	16.8	17.5	18.3	19.8	19.7	19.0	18.0	17.1

MUSCAT

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ambient DB (°C)	28.1	31.8	35.2	40.3	44.8	44.9	43.1	42.1	39.9	38.6	33.3	29.9
Ambient WB (°C)	18.6	18.3	19.2	20.5	21.5	22.4	23.3	23.3	22.5	21.1	20.8	19.1
Unit Supply Air DB (°C)	17.1	15.8	16.2	17.0	17.4	18.6	20.2	20.4	19.7	18.1	18.8	17.3

DUBAI

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ambient DB (°C)	28.6	33.0	36.0	39.8	42.6	44.1	45.1	45.1	42.2	38.9	34.2	30.1
Ambient WB (°C)	17.7	17.9	18.3	19.9	21.0	22.5	23.6	23.2	22.7	21.4	19.3	18.7
Unit Supply Air DB (°C)	15.8	15.0	14.8	16.2	17.1	18.9	20.2	19.7	19.5	18.4	16.6	16.8

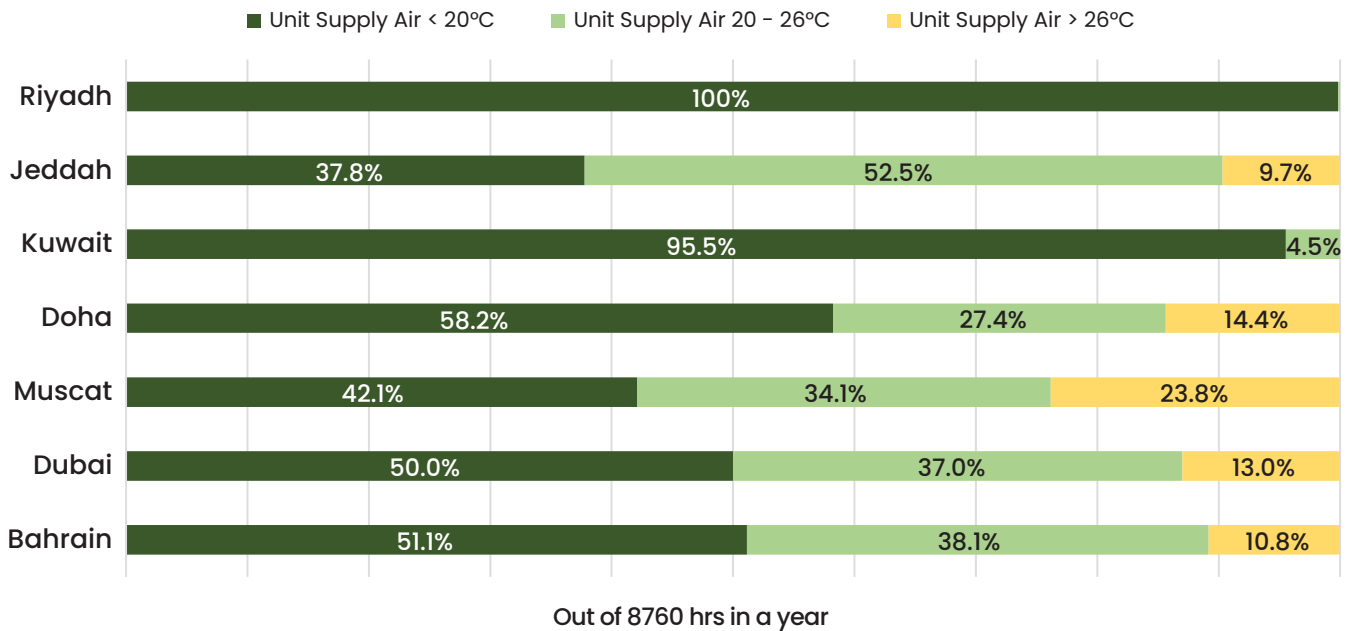
BAHRAIN

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ambient DB (°C)	24.0	26.0	29.9	35.8	40.0	41.0	42.0	41.6	39.4	37.1	31.6	27.1
Ambient WB (°C)	17.5	17.8	19.0	21.3	22.1	22.4	23.3	26.5	25.3	24.1	22.1	20.1
Unit Supply Air DB (°C)	16.5	16.5	17.2	18.9	19.2	19.4	20.4	24.4	23.3	22.3	20.8	19.1

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

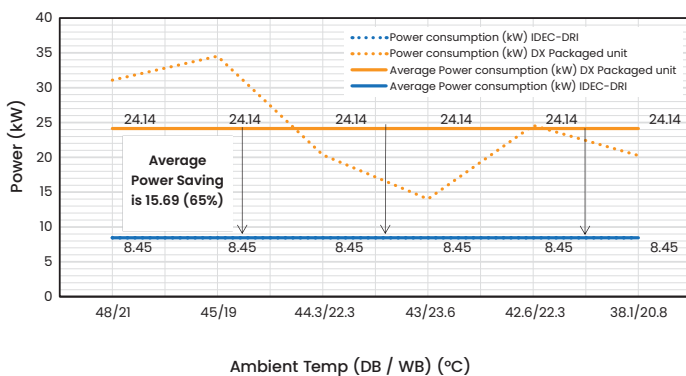
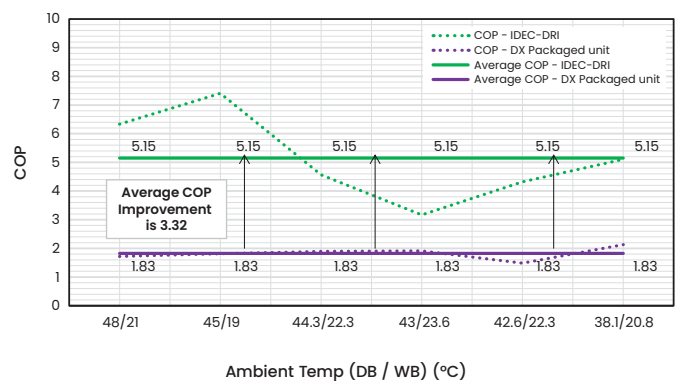


Fig. 6:
Increase in Energy efficiency (COP) with DRI-IDEC



- 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



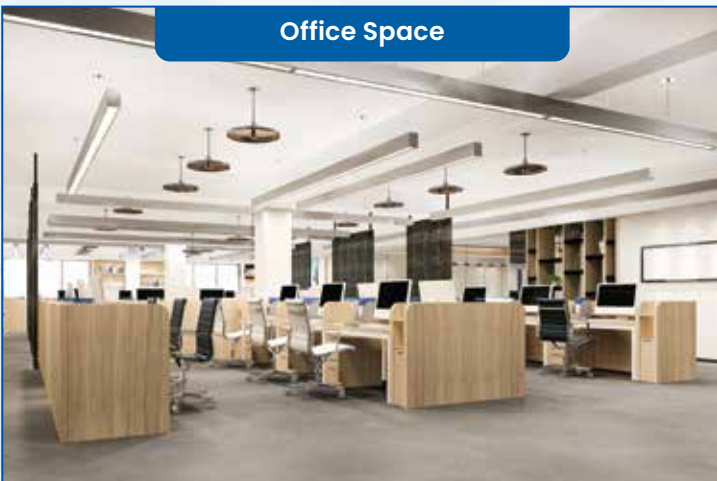
Indoor Stadiums



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



Certifications



Software Tool



Fig. 9: IDEC Software Dashboard

Our Global Customers



DRI **DESICCANT ROTORS INTERNATIONAL Pvt. Ltd.**
Innovative Air Solutions

PAHWA **GROUP**
Innovation is life

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