ARID-Ice®
TECH BITS

My Ceiling Still Drips!

(a) "Something is wrong with the dehumidifier you sold me. Come and fix it!"
(b) "It's not big enough for my arena!"

Indoor ice arenas present several special problems that might not be obvious to arena operators, mechanical engineers, building designers and architects. These unrecognized issues can result in less than satisfactory results from the dehumidification system. Because the large, cold ice sheet influences the temperature of the air and the building structure, it is important that the envelope be designed and constructed adequately as a system so that these commonand troubling issues can be avoided. They are costly and difficult to correct after the building is completed.

All ice arenas suffer from voids in the building envelope that allow water vapor to enter the building during humid weather. Within reason, as long as this vapor can pass unhindered to the dry environment within the arena, it will dissipate and present no issues as long as the desiccant dehumidification system is adequately sized and operating correctly. This assumes that the building vapor barrier is outside of the insulation.

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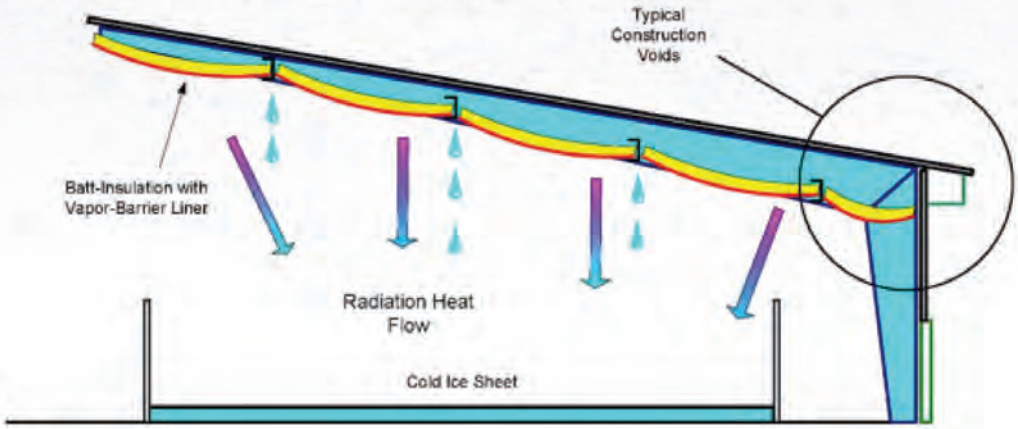
Unfortunately, many existing arenas and even new arenas employ permeable fiberglass batt-style insulation that is contained by an impermeable membrane below. This membrane impedes vapor from dissipating so the humidity above it is too high. Because the cold ice surface chills down the structure above, condensation results above this membrane and ultimately drips out onto the ice.

Additionally, this insulation system typically leaves much metal structure exposed which also gets cold. The parts of this structure which penetrate through the insulation can also condense water which rolls down the structure and drips onto the ice.

It is important to note that neither of these scenarios can be corrected with a dehumidifier since the areas where condensation occurs are isolated from the dry arena.

Additionally, it is unreasonable to assume that the building construction can be good enough to stop moisture vapor from migrating into the building, especially at the wall to ceiling joint.

Typical Arena Construction Errors



Recommendations to Architects:

1) Avoid batt-style (permeable) insulation, especially in the ceiling.
2) Avoid any de facto vapor barrier between the ice sheet and the insulation.
3) Design if possible for an easily sealed ceiling to wall joint to minimize vapor loads.
   Once the soffit or fascia is installed, any inadequacies will be very difficult to discover or correct.
4) Demising walls still need vapor integrity! Seal joints as if they were exterior walls.
5) Sheet-rock is not an adequate moisture barrier.
6) Acoustic tiles are not moisture barriers.

Recommendations for Existing Arenas with Poor Building Construction:

Unfortunately, if your arena already has some or all of the flaws described above, your available solutions are limited to:

1) Remove existing insulation system and replace with non-permeable insulation system. This is very expensive and difficult.
2) Install a "Low Emissivity" ceiling above the ice sheet to interrupt the heat transfer pathway from the ceiling to the ice. This might be adequate to reduce dripping to an acceptable level, assuming the arena is not too cold and a desiccant dehumidifier is installed. A "Low-E" ceiling only needs to be above the ice sheet plus some margin. In no case should it be installed wall to wall as this can become another de facto vapor barrier. Any moisture that gets into the arena above the low-e ceiling needs to breath to the dry arena below it.
3) Cut away the existing insulation and liner for a margin of one to two feet away from all arena perimeter walls (including demising walls). A non-permeable insulation can be used on these areas to preserve the arena's sensible heat integrity. This scheme assumes that the source of moisture infiltration occurs at the wall to ceiling juncture. Be sure to investigate the possibility that other contributors exist, such as ridge vents, exhaust fans or any other existing or abandoned mechanical equipment.

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Recommendations to Mechanical Engineers:

1.

2.

3.

1) Avoid locating ANY mechanical equipment above the ice sheet. *(see photo 1)*

2) Avoid unsealed electrical conduits between the arena and any adjacent or outdoor areas. Open electrical conduits or equipment flus become condensers in humid weather and will drip. *(see photos 2 & 3)*

3) Furnish winter heat for the arena! Cold arenas mean colder structure. This exacerbates condensation which might then occur as frost which melts on the first warm day to create a rain-event! 45˚F MINIMUM temperature in the arena. *Note: desiccant dehumidifiers are not heaters. A separate winter heating system is needed. This is an optional accessory for CDI ARID-Ice units.*

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CDI builds high quality industrial and commercial desiccant dehumidification systems for ice arenas and other specialty applications.

This information is advisory in nature. Your arena might involve several of the above scenarios and issues.
Please consult a professional engineer to confirm your best course of action.