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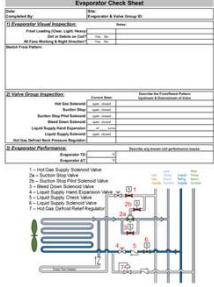
**REFRIGERATION SYSTEM
VIRTUAL IN-PLANT TRAINING**

SESSION 6 – NOV 12, 2020



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Evaporator Check Sheet Review




Evaporator Check Sheet

Completed by: _____ Date: _____



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Please email to tom.simenc@cascadeenergy.com



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Session 6: Defrost

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Defrost

Where does moisture come from?

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Where Does Your Frost Come From?

Take the Poll

- Dock Doors
- Freezer Doors
- Product
- Wall or Ceiling Penetrations
- Water Defrost
- People
- Other

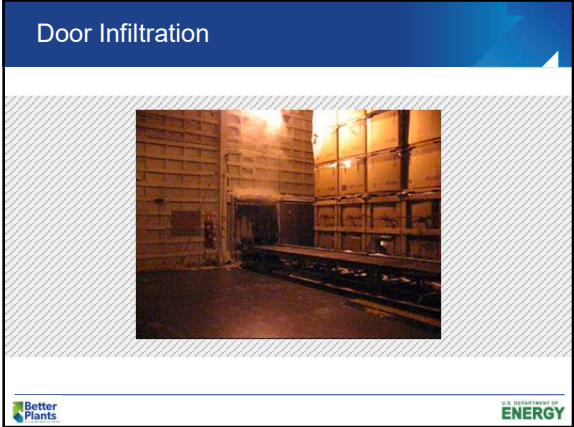
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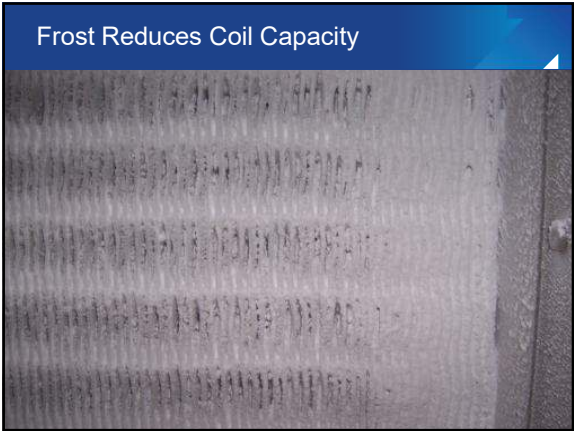
Door Infiltration

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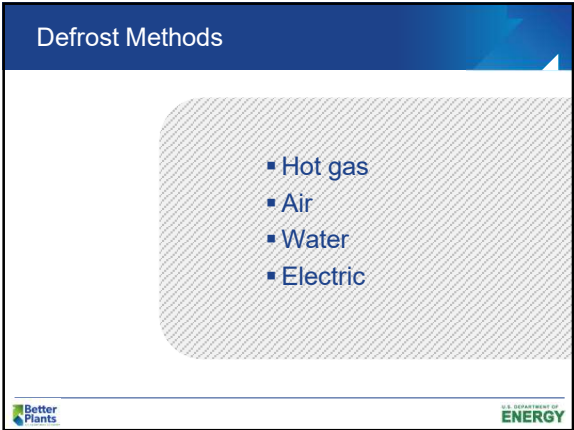
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Defrost Uses "Free" Heat



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Free Heat

One coil in defrost can bump the head pressure for the entire system.



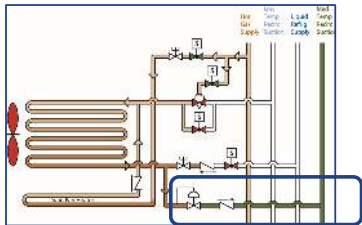
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Free Heat

Defrost can also false-load compressors

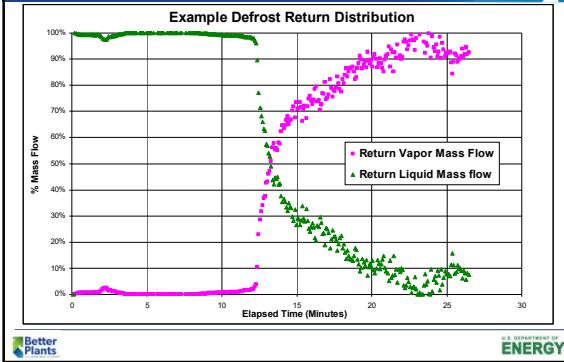


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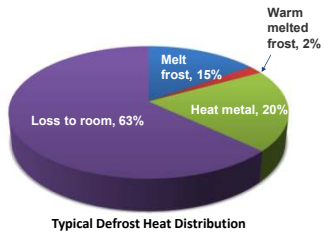
Compressor False Loading



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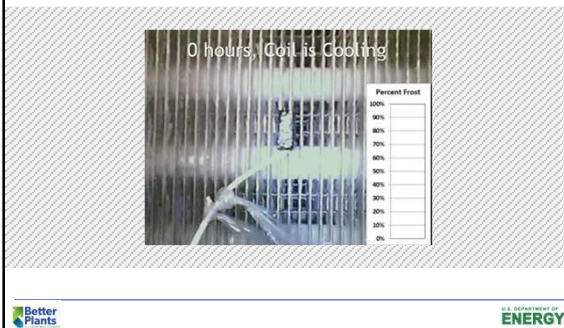
Defrost Heat

- Heat Metal
- Melt Frost
- Warm Melted Frost
- Loss to Room

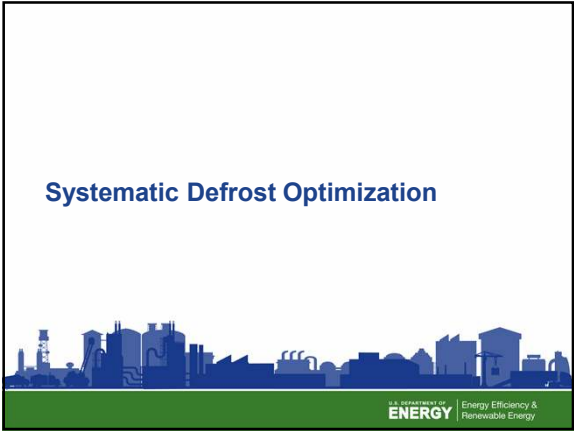


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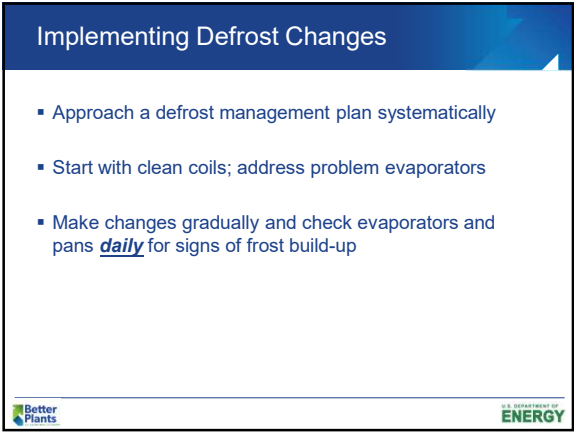
Defrost Sensor



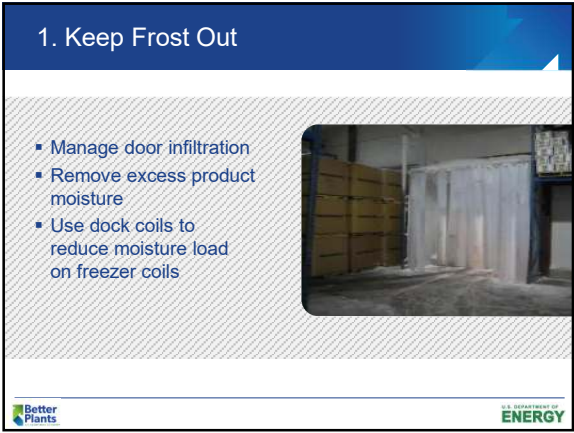
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2. Use the Cheapest Form of Defrost

Electric, Hot Gas, or Air?

- **Electric** is almost always more expensive than hot gas or air
- **Hot gas** isn't necessarily free heat
 - Defrost head pressure bump
 - Compressor false loading
- **Air defrost** can be used at room temperatures at, or above 40°F
 - Recommended using 70-80% fan speed during air defrost



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3. Start With Clean Coils

Address Problem Evaporators



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4. Optimize Defrost Frequency

- Defrost when frost obscures ~20% of fin spacing
- Scheduled
- Liquid runtime
- Defrost initiation



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When is Your Frost Load Heaviest?



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4. Optimize Defrost Frequency

This coil looks just about right for defrost.

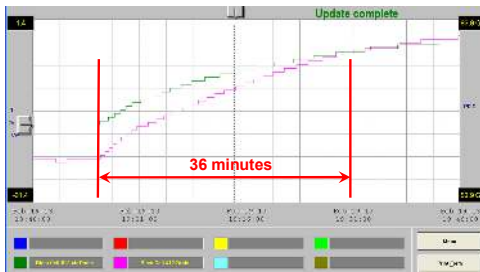


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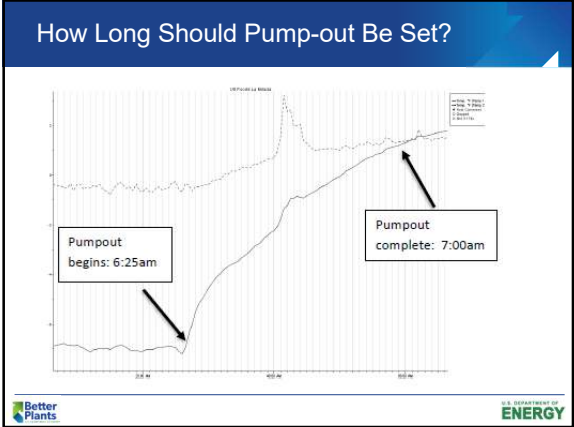
5. Optimize Pump Down Settings



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6. Optimize Defrost Hot Gas Pressure

- Defrost at the lowest possible head pressure, even if it requires a longer defrost duration
- If defrost head pressure bump is necessary, only bump for the zones that need it

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6. Optimize Defrost Hot Gas Pressure— Defrost BPR Setting

- Set defrost BPR to maximize defrost effectiveness, minimize steaming and minimize hot gas bypass
- Head pressure needs to be 15-30 psi above BPR setting for valve to work properly
- Typically factory set at 70 or 75 psi

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Evaporator Fogging



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7. Optimize Defrost Duration

Take the Poll

How is defrost duration determined?

- Hot gas times should be set based on coil and pan being cleared
- Incomplete defrosts can result in poor evaporator performance

Observe and Document!

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Defrost Upgrades

- Use frost sensor initiation
- Use defrost termination control
- Use liquid drains
- Use defrost hoods and socks
- Return freezer condensate to intermediate suction



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Recap

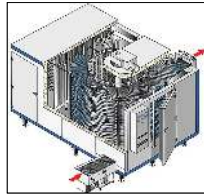
1. Keep frost out
2. Use the cheapest form of defrost
3. Start with clean coils & address problem evaporators
4. Optimize defrost frequency
5. Optimize pump down settings
6. Optimize defrost hot gas pressure
7. Optimize defrost duration



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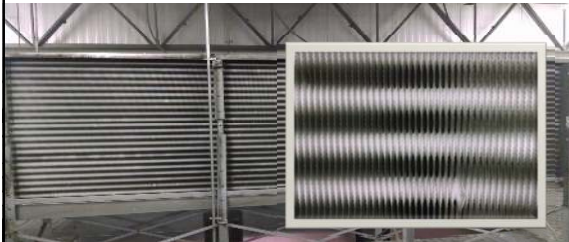
Production Equipment

How is production equipment different?



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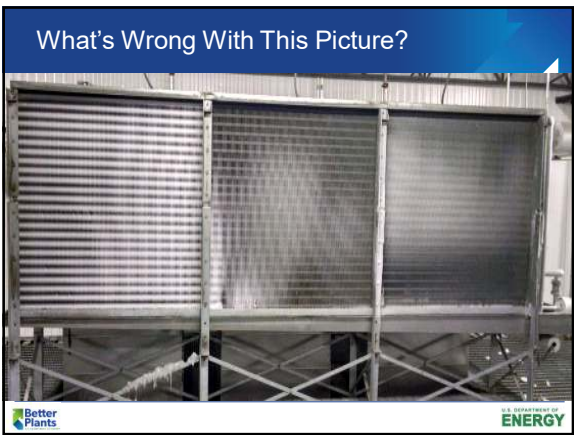
Ready for Defrost?



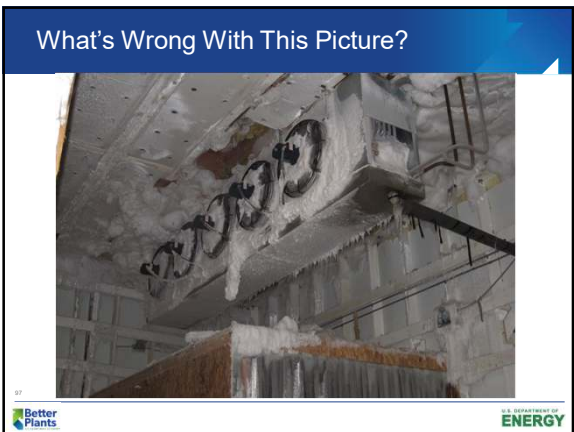
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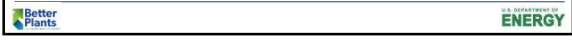
97

What's Wrong With This Picture?



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What's Wrong With These Pictures?



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What's Wrong With This Picture?



100

What's Wrong With This Picture?



101

What's Wrong With This Picture?



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Defrost Matrix

Defrost Optimization Troubleshooting Matrix

Defrost Area	Identification	Defrost Area	Defrost Area	Defrost Area	Notes
...
...
...

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Efficient Evaporator Operation—
The Big Picture

Keep Coils Clean
Keep Valves Working
Use Fan Cycling or VFDs
Minimize Defrost

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Keep The Coils Clean

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Keep Valves Working

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Use Fan Cycling or VFDs

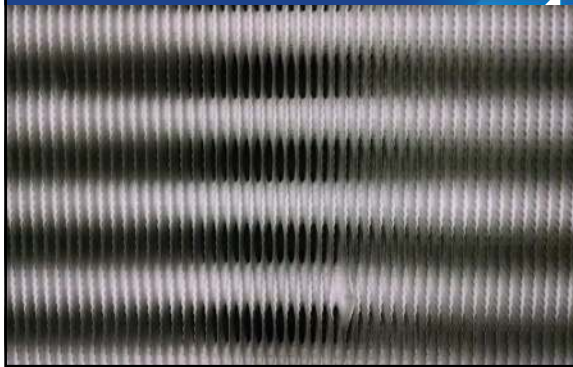


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Minimize Defrost



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Defrost Check Sheet

Defrost Check		
Checked By:	DATE:	
1. Defrost Settings:		
Purge System	_____	
Fan Speed	_____	
Blow	_____	
Fan Cycling	_____	
2. Pre-Defrost Observations:		
Purge Line (on right, good, not frozen)		
No Ice Present		
3. Defrost Observations:		
Event	Time	Notes
Purge System		
Fan Speed		
Blow		
Fan Cycling		
Curtain Position		
Defrost Pressure		
Defrost Observations:		
Warning Alarm		
Post-Defrost Observations:		
Water Regain Filling		
Water Level in Tank		
Water in Drain		

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Top Evaporator Action Items

1. Use fan cycling or VFDs
2. Minimize defrost
3. Clean evaporator coils
4. Resolve fan, motor, VFD issues
5. Use BPRs appropriately
6. Re-commission valves and regulators
7. Check water and oil contamination
8. Verify, increase temperature set-points
9. Calibrate temperature probes

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Start/Stop/Continue 

Link to Survey


<https://bit.ly/evaps2020>

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Next Steps

- Continue developing your list of energy saving opportunities!
- Talk with your team about what to focus on first.
 - Any top priorities? What can you get done now?

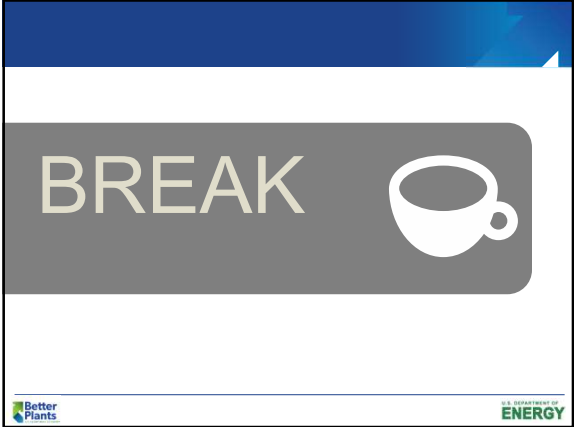
Stick around after this to ask questions.

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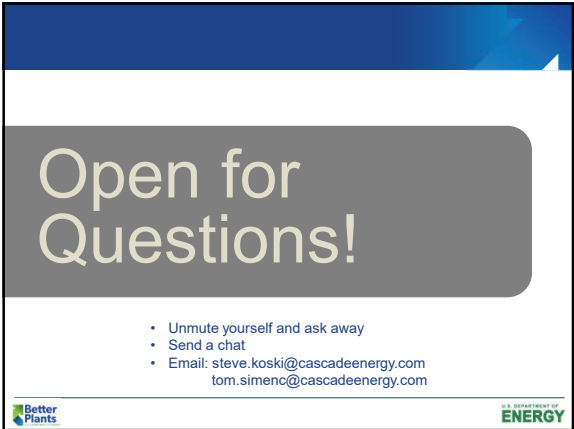
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Slide 111

- MK5** [@Kim Reed] Can you build a simple survey with the following in MSForms?
Name
Michael Koch, 11/10/2020
- KR1** [@Michael Koch] That link does not work for me. Does the survey have the content? The comment only shows Name.
Kim Reed, 11/11/2020
- MK7** [@Kim Reed] that link was a placeholder. Can you create a MSForms survey per the ROS?
Michael Koch, 11/11/2020
- KR2** [@Michael Koch] Ahhh, I love it when the light bulb comes on. LOL Doh!
Kim Reed, 11/11/2020
- KR3** [@Michael Koch] Let me know if you need me to make any changes to the form.
Kim Reed, 11/11/2020
- MK8** looks good! made 1 minor change to the link
Michael Koch, 11/11/2020



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