Solving Product Frost Problems

By Carl Roberts

Overview

The air inside a freezer is frigid and virtually incapable of holding any moisture. The ambient store air outside the freezer is always excessively moist compared to the frigid, dry air inside the freezer. Therefore, some product frost forms every time a freezer door is opened. Conversely, the frigid, dry air inside the freezer is capable of slowly removing slight product frost as this air washes over the product.

Slight product frost is normal, but excessive product frost often occurs when the product is excessively exposed to moist air. The moisture condenses on the surface of the product as fluffy frost. Product frost is formed from moisture contained in the air outside the case, or in some instances from moist air generated by the defrost cycle.

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To eliminate a product frost problem, you must eliminate the product's excessive exposure to moisture. That is why it is important to identify the path of the moisture.

Many possible paths exist, but your diagnosis should begin with a close look at where the frost is accumulating and where the frost is heaviest. This provides clues regarding the source of the moisture from which the frost originates and how the moisture reaches the product.

Sometimes, product frost is caused by a combination of factors. If so, you may wish to address the most easily corrected sources of frost first. By doing so, you may be able to quickly make a noticeable improvement. On the other hand, it is advantageous to (at least) identify all the contributing factors. Then your diagnosis can be most accurate.

The table on the following page of this document describes each possible cause of product frost, plus the resulting frost observed and the needed correction.

Other Technical Assistance Available

If you have addressed all of the items from the table and you still have product frost accumulating, consider installing a temperature chart recorder at the back of a top shelf. This allows you to evaluate case temperature, defrost performance and stocking habits over a whole week of operation. This is usually worthwhile for tough frost problems. Disposable, self-contained chart recorders are available for about $25.

It is Zero Zone's top priority to help you operate profitably. We have a commitment to participating in the solution of your technical challenges. If you require further technical assistance, check with your Zero Zone installer or local Zero Zone dealer. Further assistance is also available from Zero Zone at 800/247-4496. Thank you.

Table of causes, resulting frost patterns and corrections on the following page.

Cause of product frost	Resulting frost pattern	Correction
Excessively cold product temperatures (lower than -10°F for frozen food or -15°F for ice cream).	May be heaviest at the front center of shelf. Diagnose by measuring temperature at or near product.	Raise temperature control to maintain product temperatures listed at left, if end user wants less frost.
Excessively humid store (higher than 55% relative humidity or higher than 58°F dewpoint in store). **Is possible in A/C'd store.**	Worst frost during humid (possibly cool) weather. Frost heaviest at front center of shelf. Possible sweating on case exterior.	Control store humidity independently of store temperature, to maintain humidity levels listed at left, if end user wants less frost.
Door ajar (when not in use) or store stockers leaving doors open too long.	Frost heaviest at front center of shelf, possibly heavier on underside of top shelves.	Adjust door closers to close door from 2" ajar. Advise end user regarding leaving door open during stocking.
Poor sealing door gaskets (visually inspect: try "dollar bill" test or "flashlight test" to check gasket contact).	Frost (or ice) just inside door opening or door frame, possibly at the corners of the gaskets.	'Fluff up" gasket by hand, or carefully heat gasket to soften and form. Replace gasket if torn or deformed.
Poor sealing door frames or air infiltration between door frame and case opening.	Frost (or ice) just inside door frame or mullions, possibly at the perimeter of the doorset.	Carefully "read" frost. Smoke test frame or disassemble and inspect. Seal with caulk or putty.
Poorly sealed case joints, refrigeration exits or wiring exits.	Varies. Inspect joints or exits for local frost, ice or water. Attempt to shine a light through joint or exits.	Recaulk or foam-in joints or exits as needed to form an airtight seal. Do not rely on adhesion of permagum.
Poorly trapped drain.	Varies. Inspect drain system for coolness on surface of trap and drain.	Install or modify trap so that air is not allowed to flow out through drain system.
Delayed defrost termination (defrost cycle too long) causing warm, moist air to settle as product frost.	Heaviest toward back wall and back of top shelf. May see icing at ceiling, back wall or back of drain pan.	Set defrost termination to 50°F using a thermocouple to measure temperature at sensing bulb of thermostat.
Defrost termination thermostat stuck open (or drifting away from proper calibration).	Heaviest toward back wall and back of top shelf. May see icing at ceiling, back wall or back of drain pan.	Test by measuring termination temperature. Replace thermostat if not closing at proper time.
Time-only defrost cycle (an installation choice strongly not recommended).	Heaviest toward back wall and back of top shelf. May see icing at ceiling or back.	Install defrost temperature terminating thermostat if end user wants less frost.
Too many defrost cycles.	Heaviest toward back wall.	Use one defrost per day.
Residual ice on evaporator coil, causing delayed defrost termination.	Heaviest toward back wall and back of top shelf. May see icing at ceiling, back wall or back of drain pan.	Correct source of excessive coil frosting to prevent residual ice. Set defrost clock to 60 minute fail-safe.