



Closing the Gap⁸

Blast Chillers/Shock Freezers

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New food code requirements have stimulated profit opportunities for commercial foodservice refrigeration equipment manufacturers. One opportunity relates to buffet tables and preparation tables. Another relates to a type of powerful refrigerator known as a blast chiller. Many food service operators have procedures where turkey, roast beef or other food items are cooked/roasted and then placed into the walk-in or reach-in refrigerator for cooling. The performance criteria of the code forbids this practice for larger, more dense food items. The food code has specific requirements for cooling times and temperatures.

An excerpt from the model FDA Food Code:

3-501.15 Cooling Methods.

(A) Cooling shall be accomplished in accordance with the time and temperature criteria specified under § 3-501.14 by using one or more of the following methods based on the type of FOOD being cooled:

- (1) Placing the FOOD in shallow pans;
- (2) Separating the FOOD into smaller or thinner portions;
- (3) Using rapid cooling EQUIPMENT;**
- (4) Stirring the FOOD in a container placed in an ice water bath;
- (5) Using containers that facilitate heat transfer;
- (6) Adding ice as an ingredient; or
- (7) Other effective methods.

(B) When placed in cooling or cold holding EQUIPMENT, FOOD containers in which FOOD is being cooled shall be:

- (1) Arranged in the EQUIPMENT to provide maximum heat transfer through the container walls; and
- (2) Loosely covered, or uncovered if protected from overhead contamination as specified under [Subparagraph 3-305.11\(A\)\(2\)](#), during the cooling period to facilitate heat transfer from the surface of the FOOD.

Item 3 in the above referenced code section identifies a class of refrigeration set for a boon. To blast chill is to rapidly and thoroughly reduce internal food temperatures down through the hazardous temperature range to a safe holding temperature. Once the food item is cooled, it is transferred to standard storage refrigeration until needed again for preparation. Blast chillers are really process food equipment as opposed to storage equipment. It is best to think of it as you would a piece of cooking equipment, where the food items are typically loaded for only as long as it takes to get the desired bake or "cook", and increase in food temperature. Blast chillers take considerably more watts per cubic foot of interior than standard refrigeration. The (7) cooling methods described above are based upon increasing the surface area of food exposed to ambient air, and the use of more conductive containers or agitation. There are many variables associated with determining how long it takes to cool, or heat a food item for that matter. Some of the food variables that relate to time and temperature change include:

1. Product weight
2. Product density
3. Specific gravity (moisture/water)
4. Surface area
5. Uniformity
6. Temperature



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Since the blast chiller is a piece of process equipment, and given that the products processed in the unit have different characteristics, there may be an advantage to changing the daily production schedule. Heavy, dense food items take considerably longer to cool than lighter, dryer and/or smaller menu items that have more surface area per ounce. In order to maximize productivity, the heavier items should be done at the end of the day, so that once they have been cooled, they are held until the next morning or the next shift.

3-501.14 Cooling.*

(A) Cooked POTENTIALLY HAZARDOUS FOOD shall be cooled:

- (1) Within 2 hours, from 60C (140F) to 21C (70F); and
- (2) Within 4 hours, from 21C (70F) to 5C (41F) or less, or to 7C (45F) as specified under ¶ 3-501.16(C).

(B) POTENTIALLY HAZARDOUS FOOD shall be cooled within 4 hours to 5C (41F) or less, or to 7C (45F) as specified under ¶ 3-501.16(C) if prepared from ingredients at ambient temperature, such as reconstituted FOODS and canned tuna.

(C) Except as specified in ¶ (D) of this section, a POTENTIALLY HAZARDOUS FOOD received in compliance with LAWS allowing a temperature above 5C (41F) during shipment from the supplier as specified in ¶ 3-202.11(B), shall be cooled within 4 hours to 5C (41F) or less, or 7C (45F) or less as specified under ¶ 3-501.16(C).

(D) Shell eggs need not comply with ¶ (C) of this section if the eggs are placed immediately upon their receipt in refrigerated EQUIPMENT that is capable of maintaining FOOD at 5C (41F) or less, or 7C

(45F) or less as specified under ¶ 3-501.16(C).

3-501.16 Potentially Hazardous Food, Hot and Cold Holding.*

Except during preparation, cooking, or cooling, or when time is used as the public health control as specified under § 3-501.19, POTENTIALLY HAZARDOUS FOOD shall be maintained:

(A) At 60C (140F) or above, except that roasts cooked to a

temperature and for a time specified under ¶ 3-401.11(B) or reheated as specified in ¶ 3-403.11(E) may be held at a temperature of 54C (130F); or

(B) At 5C (41F) or less, except as specified under ¶ (C) of this section and §§ 3-501.17, 3-501.18, and 4-204.111.

(C) At 7C (45F) or between 7C (45F) and 5C (41F) in existing refrigeration EQUIPMENT that is not capable of maintaining the FOOD at 5C (41F) or less if:

- (1) The EQUIPMENT is in place and in use in the FOOD ESTABLISHMENT; and
- (2) Within 5 years of the REGULATORY AUTHORITY'S adoption of this Code, the EQUIPMENT is upgraded or replaced to maintain FOOD at a temperature of 5C (41F) or less.

The code is a bit difficult to read due to the many cross references to other sections and codes. Basically, food must be cooled to 41 degrees or less in (6) hours or less. One of the safety considerations for blast chillers is its cleaning and sanitizing after use. Exposed food items release heat, moisture and some organic compounds as they cool, which collect on . Even if food items are in covered pans, moisture forms on the interior surfaces in a blast chiller. Unlike ovens that sanitize themselves as do their job, a blast chiller needs separate sanitizing.



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Most require manual cleaning though there are some with some handy clean in place (CIP) features. One brand, Irinox from Servolift includes a couple of UV lamps and mirrored SS interior surfaces to automatically sanitize the interior after use. Like anything else, there are price and feature trade-offs from manufacturer to manufacturer. For example, all a blast chiller has to do to be sold as a “blast chiller” is meet NSF standards and be capable of reducing temperatures for a given amount of product from a cooking temp to a safe holding temp, period. Some manufacturers models will do that, but not much more. And for some operators, that will be enough. But for those that need greater production and throughput, and more clean in place type features, they are available for a few dollars more. Another feature of the higher end blast chillers is multiple temperature probes. In some cases a probe may be placed in each pan but in other unit, probes are placed at different depths of the same product. Couple this with programmability and data logging functions, and the operator can preprogram the initial air temp in the blast chiller down to -40⁰F and then switch to -10⁰F air when the surface temp of the product approaches freezing, and then switch to 28⁰F air when the core temp reaches 45⁰F or some other another programmable set point. The datalogger prints a local log of the cooling curve showing the time temp curves for each probe. One of the most cost effective approaches to blast chilling may involve an existing walk-in cooler. Converta is a turn key conversion package for an existing walk-in cooler that converts a portion of the walk-in to a blast chiller. It. The package includes the fan rack and the controls. In addition to the Converta package, the owner simply installs a couple of new interior panels in the walk-in and installs the system. Depending upon the existing system, a larger or additional remote compressor and condensing unit may also be needed. The system is available with optional software that enables programming and real time monitoring and logging of everything from food and ambient air temps to energy usage. Once installed, racks with hot food are rolled into the forward section where the food items are rapidly cooled. Once cooled they are moved into the storage section and the next racks of hot food are loaded.

In summary,

blast chillers are here to stay. Already there are over a dozen manufacturers of these units and more are expected to join the fray at any time. With all of this activity, prices will begin to fall. Each commercially available blast chiller will enable cooling within the six hours specified in code. Things to look for are pan capacities, spacing between pans, the number of fans, the compressor hp, production claims, total watt capacity, size, clean in place convenience, warranty and of course price.

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