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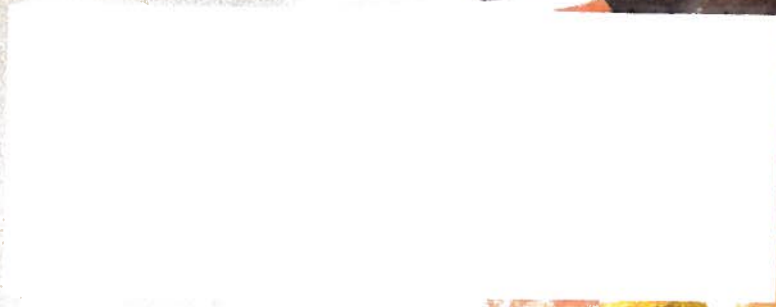
Science-Based Solutions for Food Safety and Quality Professionals Worldwide

## Maintaining the Cold Chain

**A Guide to Equipment  
Sanitary Design**

**The ABCs of GMPs**

**Ethnic Food Safety**





# FOODSERVICE DISTRIBUTION: Maintaining the Cold Chain

BY JORGE A. HERNANDEZ

**E**ach day, millions of cases of product are delivered to restaurants, hospitals, universities and other food-away-from-home destinations. Moving these food products safely and efficiently from farm to fork requires an elaborate, highly coordinated series of links in a long chain of trading partners. Distributors serve as the intermediary between manufacturers and foodservice operators, procuring palletized and bulk inventory items from manufacturers, then breaking them down to case and unit quantities for foodservice operators.

While distribution may be the least highlighted link in the food safety chain, the safety and quality measures taken by successful distribution centers are no less important than the Hazard Analysis and Critical Control Point (HACCP) plan at the supplier's facility or the careful handling and preparation by the operator.







## It's a Big, Big Distribution World

The U.S. distribution chain includes more than 15,000 companies operating thousands of warehouses and fleets of trucks. A typical broadline foodservice distributor may serve anywhere from 1,000 to 6,000 accounts from a single distribution center, and offer customers more than 10,000 food and non-food items. Other types include specialty distributors, which focus on specific product categories or customer segments; distribution systems, which serve large restaurant chains; and other businesses such as terminal markets and warehouse clubs.

In 2009, U.S. distributors' annual sales will be an estimated \$211 billion, down from \$217 billion in 2008 and \$216 billion in 2007, according to Technomic Inc., a foodservice research and consulting firm. "The commercial foodservice market, particularly restaurants, is in a major slump, and distributors are a reflection of what the end-market is doing," says Robert Goldin, executive vice president of Technomic.

The largest distribution companies are Sysco Corp., headquartered in Houston, TX; U.S. Foodservice, based in Rosemont, IL; and Performance Food Group in Richmond, VA. Other major players included in Technomic's 2008 Power Distributors List include (in order of size): Gordon Food Service, Grand Rapids, MI; Reinhart FoodService, LaCrosse, WI; Services Group of America, Scottsdale, AZ; Maines Paper & Food Service, Conklin, NY; Shamrock Foods Co., Phoenix, AZ; Ben E. Keith Foods, Fort Worth, TX; and Cheney Brothers, Riviera Beach, FL.

## It's All About Food Protection

Every distribution company has its own system for ensuring food protection, which includes food safety (protecting food from accidental contamination) and food defense (guarding food from intentional contamination).

"Best-in-class foodservice distributors go to great lengths and expense to protect the products they deliver," says Steve Potter, senior vice president of industry relations for the International Foodservice Distributors Association (IFDA), a trade association serving the foodservice distribution industry. Several federal agencies oversee food regulation and safety in America, including the U.S. Department of Agriculture (USDA), which regulates and monitors meat, poultry and egg products; the U.S. Food and Drug Administration (FDA), which ensures the safety of the production, processing, packaging and storing of domestic and imported foods; and the Centers for Disease Control and Prevention (CDC), which collaborates with USDA and FDA on disease surveillance and outbreak response.

Of the three, USDA and FDA interact most often with the foodservice supply chain. The "best practices" guidelines (more on these later) prepared by these agencies cover a multitude of processes, from general sanitation to packing and production to transportation and warehousing.

The common thread among best practices can be summed up in four words: "maintaining the cold-chain." A key part of every successful distributor's food safety program involves refrigerated docks, multiple refrigeration zones within distribution centers and multi-temperature trailers.

"In many ways, the transportation of food can be viewed as an extension of storage," writes Robert James Hart in his article "Food Science--The Transportation of Food," a scholarly examination of the chemical and molecular structure of foods and how they break down, for the book *Food Transportation*.<sup>1</sup> "A refrigerated [truck] is essentially a cold store on wheels. There may be additional engineering complications in designing and maintaining such a mobile storage facility, but the food science considerations are much the same."

## Problems and Vulnerabilities

While food safety is a priority for every reputable distributor, it's often taken for granted by customers. Maintaining the cold chain from farm to fork is challenging. The average shipment—both inbound, from supplier to distribution center, and especially outbound to customers—consists of less-than-truckload quantities of food products. The number of products delivered to a customer can be in the hundreds. Each of these products must be loaded correctly to prevent cross-contamination with raw product and damage by heavier items at the bottom of a stack. And they must be stored at the correct temperatures (frozen, refrigerated or dry) in the truck to maintain quality and safety. The food has to retain its chill throughout the multi-stop delivery process, especially in the heat of summer when the "reefers" (truck refrigeration units) have to work extra-hard to maintain temperature. In other words, there is plenty of opportunity for error.

Although food distribution companies must adhere to government regulations calling for greater food protection scrutiny (e.g., the Bioterrorism Act of 2002), enforcement is rare. On the supplier front, over-extended government food inspections run by FDA, USDA and state regulatory agencies continue to lag in both coverage and accuracy, as evidenced by the recent foodborne illness outbreak traced back to one less-than-scrupulous peanut processing company.

"Customers should be aware of the food safety differences between distributors, especially in a down economy when many are making choices based on price," says Greg Pallaske, director of regulatory compliance for food safety and quality assurance, U.S. Foodservice. "That's why it's so important to evaluate the food safety policies and procedures and operations of your foodservice distribution company."

Frank Ferko, U.S. Foodservice's head of distribution food safety and quality assurance, agrees. "Most people are inward-looking when it comes to food safety," says Ferko, who has more than 33 years of experience in the restaurant, food processing and distribution businesses. "If you're in manufacturing, you

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worry about food quality at your facility. If you're at a restaurant, you worry about your kitchen. That doesn't mean you can assume other areas are fully on target."

### Areas of Food Safety Risk

The major areas of concern for food distributors start with the cold chain and time/temperature control, and include sanitation, cross-contamination and shipping logistics such as merge-in-transit. At the warehouse, food safety hot-spots include damaged goods and will-call.

Maintaining control of the cold chain is one of the biggest challenges for food distributors. Take mixed loads, for example, in which a trailer carries frozen, refrigerated and dry items in sections ideally separated by moveable bulkheads. There should also be chutes blowing the appropriately tempered air into the chilled compartments.

That's not always the case in the real world. "Some companies don't see a problem with putting frozen and refrigerated items in a trailer set at 26 °F and shipping the food halfway across the country," Ferko says. "We saw a lot of that last summer when gas prices rose above \$4 per gallon, and companies were trying to cut corners."

Combining frozen and refrigerated products is usually more of a food quality issue than a food safety issue, but it still ends up affecting operators' bottom lines. "French fries, for example, that are held at 20 °F and then brought back down to 0 °F will have moisture build-up on the surface," Ferko says. "When you dump them into the fryer, the surface moisture will cause problems with the oil and the fries will come out too dry."

Frozen breaded chicken held at too high a temperature suffers too, when moisture from the meat gets into the breading, which causes it to brown unevenly or flake off, while reducing the useable life of the fryer oil. Quality also takes a hit when refrigerated items are stored at the wrong temperature, as with delicate leafy greens that will freeze or wilt.

Certain foods—particularly seafood, sensitive pre-cut produce and ready-to-eat products—can become unsafe if not held at appropriate temperatures. Safety-conscious companies require time and temperature recorders for shipment of these foods. If the time-to-result indicates the temperature has exceeded safe limits, the best practice is to refuse the shipment and discard the product.

"We sometimes find that refrigerated seafood product shipped by vendors has been above 41 °F in the mid- to high-40 °F range for too long," Ferko says. "This can occur when the product is unloaded for redistribution to another truck, or when it's part of a longer-than-usual delivery that caused the truck's refrigeration unit to be turned off too long. In this case, the product should be rejected as unacceptable."

The practice of on-the-dock redistribution from one truck to another, called merge-in-transit or cross-docking, offers plenty of chances for temperature mishaps where food is involved if the docks are not refrigerated or if product sits for too long at the wrong temperature. The system was developed by retailers that ship dry foods or consumer goods as a way to speed deliveries while reducing warehouse and handling costs.

Companies using merge-in-transit should have refrigerated distribution docks and undergo a rigorous inspection process before such a program is implemented. In fact, U.S. Foodservice recently launched a pilot cross-docking program at two facilities in Chicago and one in Atlanta, with plans to expand the program to up to eight facilities throughout the country by next summer.

### Returns and Will-Call

Returns and will-call areas, where customers can pick up product directly from the

"Food safety works best when it is built into the overall design of both the facility and the trucks."

warehouse to meet last-minute needs, carry significant potential for both food safety and food defense to be compromised if the cold chain is not maintained. With returned product, the key point is to make sure that potentially unsafe product (food that has been out of the distributor's control) does not reenter the stream of outgoing goods for delivery to another, unsuspecting customer.

Reputable distributors will have a designated returns area, where all products are held for evaluation. Depending on results of the investigation, products will either be returned to the vendor, returned to shelves, donated to a food bank or destroyed.

Whether buying from a distributor, a terminal market or a warehouse club, "customers who want to put frozen or refrigerated product into their trunks and drive an hour or so back to their restaurant are creating risk," Ferko says. "The challenge lies in educating customers about transporting product safely. That said, you can't manage their business for them." Distributors should, however, limit customer access to the facility for their will-call business.

### Food Defense Vulnerabilities

Protecting food from intentional contamination, a form of bioterrorism, is an issue that is sometimes overlooked.

"Anyone with bad intentions can easily contaminate food—a customer at the salad bar, a restaurant employee, and so on," says Ferko, who sits on the food defense committee of the Conference for Food Protection. "Food defense is primarily about limiting access to products. It's also about understanding what might happen and monitoring who has access to food. If your company is limiting access by locking trucks, sealing cases within trailers with tamperproof tape, restricting access to distribution facilities, and performing background checks on new hires, you're already making progress on the food defense front."

Food defense measures taken by food companies are voluntary rather than mandated by government regulations. They're also relatively minimal, considering the critical nature of the nation's food supply and the shock wave that would ensue if a successful bioterrorism



attack on the food supply occurred.

"You do the things that are reasonable to protect the product, employees and customers," Ferko says.

## A "Best Practices" Approach to Safe Food Distribution

For operators selecting a food distribution partner, or for distributors evaluating their own food safety operations,

# Food Defense in Your Distribution System

An important part of safeguarding the nation's food supply involves protecting food in transit—90% of which is shipped by truck. Because of globalization, the journey that food takes from field to table can be thousands of miles, with many stops along the way. Challenges include the vast size of the area covered, the broad number of food distributors and their varied levels of knowledge about food defense, the relative lack of government regulation, the potential for unobserved access to food products, and a less-controlled setting that makes safeguards more challenging to implement. In short, today's world calls for food defense plans just as much as food safety plans.

A successful food protection program must focus on two areas: food defense and food safety. "Food defense" means preventing *intentional adulteration* by biological, chemical, physical or radiological agents. "Food safety" refers to guarding food against *unintentional* contamination.

"The distribution of ingredients and products is a vital component of our food delivery system, which is why it's important for food distributors and companies to know their suppliers and understand the food protection measures being used," says Jon Woody, policy analyst for the U.S. Food and Drug Administration's (FDA's) Office of Food Defense, Communication and Emergency Response.

Three food categories are considered to be especially vulnerable to contamination. Perishable products, such as meat or dairy products, must be monitored closely because their relatively short shelf-lives place an additional burden on the industry's ability to respond in a timely manner. The second category includes products that require extensive human interaction to be ready for market, such as produce or nuts that can come from multiple suppliers and are mixed and repackaged multiple times. The category of secondary ingredients, such as seasonings, breadings and peanut butter, is also especially susceptible to contamination.

Woody says food suppliers and distributors should have food defense plans in place that restrict access to facilities, and call for padlocks on truck trailers and regular, company-wide vulnerability assessments.

FDA's Center for Food Safety and Applied Nutrition (CFSAN) has released a number of initiatives designed to help suppliers, distributors and operators on the food defense front. Those initiatives are: ALERT (targeting foodservice managers), FIRST (aimed at employees, the first line of defense) and CARVER+Shock, a comprehensive online planning tool to help companies set food defense priorities. Information about all of them can be downloaded from the CFSAN Web site.

One other useful tool comes from the U.S. Department of Agriculture's Food Safety and Inspection Service (FSIS). The FSIS *Guide to Developing a Food Defense Plan for Warehouse and Distribution Centers* is a 15-page, step-by-step document that includes evaluation forms covering everything from outside security to personnel to developing and implementing the overall plan.

The bottom line is that having a food defense plan helps suppliers, distributors and operators maintain the safety of the food products they handle—and most of all, helps protect everyone's business.

below is a series of questions followed by best practices suggested by regulatory agencies and the industry.

### *In the Distribution Center*

*What are some food safety aspects built into your distribution facility?*

Food safety works best when it is built into the overall design of both the facility and the trucks. This includes having sufficient capacity for dry and refrigerated food products (chilled and frozen), providing easy access to all areas for cleaning, adequate insulation and temperature-control capacity. For facilities, it is important to restrict access by unauthorized entry through use of fences and locks, and of course, to have programs to prevent environmental contamination and infestation by insects or vermin.

*How many temperature zones are in the distribution facility? How are they monitored?*

A foodservice distribution warehouse typically has three temperature zones—ambient, cooler and frozen. Temperature ranges in the cooler area should properly protect meat, dairy and produce. The freezer should be at 0 °F or below. Larger facilities will have both an ambient and a refrigerated receiving dock area.

Best-in-class facilities are equipped with monitoring systems that track temperatures within each zone around the clock. Should a temperature go above or below the target range, the system sends a message (via email, text, fax or phone) to the warehouse manager so the situation can be corrected.

*How do you ensure proper first-in, first-out product rotation at the warehouse?*

Product rotation at distribution facilities is tracked and carefully managed. As each pallet of product is received on the dock, it is assigned a "license plate"—a bar code and a unique ID number that describes the contents. The product is then taken to the aisle and slot in which it will be stored, and the location number is entered into the system. Received product typically is placed into "reserve" slots. When the "pick" slot for that product becomes empty, warehouse staff will be directed by computer as to which pallet to insert next to ensure first-in, first-out accuracy.

*How is food safety addressed in the picking process?*

The slotting system at the warehouse is laid out in a manner that lets pickers assemble orders as they pass through the warehouse. As pickers move through aisles to fill food orders, they put the heaviest items on the bottom of the pallet for stability and to prevent damage. Typically, ambient products are placed with other ambient products, cooler with cooler and frozen with

frozen to protect product integrity. Chemicals and cleaning products are segregated and placed separately on the delivery truck.

*Who inspects incoming product for quality?*

Distributors should have trained personnel inspecting the quality, condition and temperature of inbound products—especially perishable items. An in-house quality assurance program should include daily in-slot inspections of perishable products.

*What happens to products that don't pass the quality test?*

Products close to their expiration date or damaged while at the facility should be logged, segregated from other products for further inspection and returned to the supplier or dumped, if necessary.

*Who inspects the facility? How often, and is it on a pre-determined schedule or by surprise?*

Warehouse sanitation requires continuous effort at multiple levels. Supervisors should ensure floor and in-slot cleanliness on an ongoing basis. Audits should be regularly conducted by management. Many distributors contract with independent, third-party audit companies that conduct inspections at least once a year. Best-in-class companies hold inspections twice a year to identify and correct any food safety and sanitation issues. Distributors should be able to show you records of recent audit results.

### **On the Trucks**

*What are basic requirements for trucks to meet food safety standards?*

Delivery vehicles should be of sturdy construction so as to permit easy rear- and side-door locking and sealing. Trucks should be sufficiently insulated and refrigerated so as to protect cargo against damage. Interior walls and floors should be clean and free of cracks or holes that could allow the entry of pests, vermin or dust, or negatively impact temperature control. As with the facility, the truck design should permit effective inspection, cleaning, disinfection and temperature control. Ideally, interior surfaces should be made of materials suitable for direct food contact, such as stainless steel or food-grade epoxy resins.

Regular cleaning programs are needed to keep the container interior free of dirt and debris. Equal attention to cleanliness is required for cargo pallets, load-securing devices and loading equipment such as hand trucks, forklifts and conveyors. When possible, transport vehicles should be reserved for "food use only" to reduce risks of cross-contamination.

*What are your pre-loading procedures?*

The pre-loading check should make sure that any residues from previous cargo have been removed. The cooling unit should be checked to make sure it's in good repair and operational. Portable bulkheads should be in good condition, free from tears or holes, and form a tight seal when in use. Air chutes (if present) should be properly in place for effective air circulation. Trailers should be pre-cooled at least an hour before loading to chill insulation and air.

*How does a distributor handle loads that include both frozen and refrigerated products?*

The optimum transport method for mixed loads is to use trailers with compartments set at different temperatures. These compartments are created through the use of portable, insulated bulkheads. Typically, frozen products are in the forward compartment at 0 °F or below, and cooler/dry product is in the rear at 41 °F or below. The practice of transporting frozen and refrigerated mixed loads in one compartment set at an intermediate temperature is not advisable for times longer than a few hours.

### **Cold Chain Assurance**

*How is the cold chain maintained during loading?*

### **Useful links:**

- International Foodservice Distributors Association, [www.ifdaonline.org](http://www.ifdaonline.org)
- Center For Food Safety & Applied Nutrition, [www.foodsafety.gov/list](http://www.foodsafety.gov/list)
- Conference For Food Protection, [www.foodprotect.org](http://www.foodprotect.org)
- Food Politics Blog, [www.foodpolitics.com](http://www.foodpolitics.com)

Product is typically brought to the dock in a sequence that minimizes the amount of time spent on the dock during loading and unloading. Best-in-class companies go to great lengths to ensure that product temperatures for meat, poultry and eggs do not exceed 40 °F before loading. Most larger distributors do their loading and unloading from refrigerated docks.

*How is the product integrity maintained while in transit?*

Once the truck pulls away from the dock, the product's safety and integrity becomes the responsibility of the driver. Leading companies have in-transit checks on temperature and refrigeration units. Some have implemented automatic time/temperature recording devices. Many also require warehouses to maintain log books documenting product condition upon arrival and during storage. A few companies have outfitted trucks with onboard computers and GPS systems so as to track location of product at all times.

*What about unloading procedures? How is food safety ensured?*

Product should be inspected for quality, damage and temperature (if appropriate) before being accepted at any point during the delivery process. Proper documentation is crucial to maintain records of product condition and packaging upon receipt. The documentation should also record temperature readings and note whether there was any sign of spillage, damage or pests. Perishable product should be moved immediately from the loading dock into the appropriate temperature zone in the warehouse or at the foodservice operation.

*How are contaminated or returned products handled?*

The distributor should have procedures for contaminated products to ensure they are separated from safe product. The procedures should cover products brought back by drivers upon their return to the warehouse. A monitoring plan and record-keeping system should document all steps taken. For food safety and food defense reasons, best-in-class companies would never sell a returned refrigerated/ready-to-eat product to another customer.

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## A Matter of Balance

All of the food safety measures recommended by regulatory agencies and industry organizations—from a well-maintained refrigerated fleet to staff and driver training to inbound and outbound shipping standards—cost distributors both money and time.

“Food distribution is not just drayage—moving items from one point to another,” Ferko says. “There’s so much extra effort that we put into controlling the process to make sure product is safe.”

Perhaps the most difficult question is, how do you put a value on doing the right thing? “What we do on the food safety front costs us time and money every day of the week,” Ferko notes. “But it’s all about delivering quality. The challenge is in choosing the right people and the right processes for the best reliability and safety, and negotiating a fair price that’s acceptable to us and our customers. It’s all about finding the right balance.”

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