Cold Chain – Transportation Best Practices

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GLOBAL COLD CHAIN ALLIANCE®

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Disclaimer. While impossible to be all-encompassing, the goal of this updated *Best Practices Guide*, as prepared by industry experts, is to help companies across the food supply cold chain meet or exceed the ongoing food safety throughout the supply chain, and positively impact the sanitary transportation of food to consumers. Other scenarios, such as railcar loading and drop trailer loading, will have similar traits to this live truckload outline, with the most significant difference being the presence of the carrier personnel. Therefore, additional safety considerations and written communications should be taken into account.

The information the Global Cold Chain Alliance promulgated is intended to be a resource concerning the refrigerated warehousing industry. While the material has been compiled carefully, GCCA and the guide's authors do not assume any responsibility for its use, accuracy, or applicability. All users of the information unconditionally agree: (1) not to hold GCCA or the authors responsible in any manner or to any extent for the user's action(s) or the consequences of such action(s) relating to the use of the information provided and (2) to indemnify GCCA, and the authors for all expenses, fees, costs, damages, awards, or other amounts incurred related to or arising from the user's use of the information. As used above, GCCA shall mean the core partners of GCCA and each organization's directors, officers, employees, volunteers, members, and agents.

A unique alliance

The **Global Cold Chain Alliance (GCCA)** exists to help its members build and strengthen the temperature-controlled supply chain worldwide. We do this by bringing third-party warehouse and transportation business leaders together in events and networking activities, providing advisory and educational services, and being a voice of cold chain to government regulators and other influencers around the world.

The **Global Cold Chain Foundation's (GCCF)** mission is to strengthen the global cold chain through education, research, and international development. Cold Chain Institute trains industry practitioners in the best practices of temperature-controlled product storage, handling, and transportation. Research manuals developed by the foundation serve as the definitive guide for the proper handling, storage, and freezing of perishable products as well as energy and facility management.

International development projects engage industry professionals in the development of cold chain infrastructure in emerging markets.

And a key partner to GCCA is the **Controlled Environment Building Association (CEBA)**. CEBA's mission is to represent expert builders who specialise in designing and constructing controlled environment buildings, including cold storage warehouses, food processing facilities, clean rooms, pharmaceutical facilities, food service, and retail distribution centres. With a strong value proposition and growth momentum, industry participation in CEBA programs has doubled since pre-pandemic levels.

Together we are the cold chain.

GLOBAL COLD CHAIN ALLIANCE® | GLOBAL COLD CHAIN FOUNDATION | CEBA Controlled Environment Building Association

1500+
Member companies

91
Countries

1000+
Member facilities

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Introduction

The key driver to this best practice guide was the publication of the FSMA's final rule for the Sanitary Transportation of Human and Animal Food (STF). The rule, became effective in the USA on June 6, 2016, establishes requirements for **shippers, loaders, carriers by motor or rail vehicle, and receivers** involved in transporting human and animal food to use documented sanitary practices to ensure the safety of that food**.** The goal of the final STF is to prevent practices during transportation that pose food safety risks, such as failure to refrigerate food properly, inadequate cleaning of vehicles between loads, and failure to protect food adequately.

Why a Cold Chain – Transportation Best Practices?

Safe food transportation has been our food supply chain's quiet and dependable link for years. Due to world instability and questions about supply chain security, this industry has received growing attention. GCCA Transportation is well-positioned to represent the sector's best practices globally. The global cold chain logistics market was worth almost 248.4 billion U.S. dollars in 2020 and is expected to exceed 410 billion U.S. dollars by 2028.

Cold chain logistics involves transporting temperature-controlled products along a supply chain using refrigerated packaging solutions to preserve the quality of products such as fresh agricultural goods, seafood, frozen food, and pharmaceuticals.

The Cold Chain – Transportation Best Practices guide provides current safe food transportation best practices. It is focused on ensuring that persons engaged in the transportation of food at the most significant risk for contamination during transportation follow appropriate sanitary transportation practices. Within this guide are industry best practices concerning cleaning, inspection, maintenance, loading, and unloading of, as well as the operation of vehicles and transportation equipment to ensure that food is transported under the conditions and controls necessary to prevent adulteration linked to food safety.

Given the importance placed on safe food transport, the International Refrigerated Transportation Association decided in 2015 to create this Refrigerated Transportation Best Practice Guide with the support of stakeholders, shippers, loaders, carriers, and receivers in drafting industry best practices. Best practices are implemented to maintain the cold chain; therefore, for 2024, the title has changed to Cold Chain ¬– Transportation Best Practices.

Certifications play a crucial role in ensuring safe and high-quality food transportation and production. Each program has its unique focus, but all contribute to maintaining food safety standards. BRC (British Retail Consortium) and SQF (Safe Quality Food) Certifications are both benchmarked standards that are widely used by food manufacturers, retailers, and service providers globally to assess their food safety management systems. If you're involved in the cold chain or food industry, pursuing these certifications can enhance your organization's reputation and build trust with customers.

Additionally, The Global Cold Chain Alliance (GCCA) offers the Certified Cold Carrier Program, which recognizes asset-based carrier organizations committed to the sanitary and safe transportation of perishable products. This program provides independent, third-party assurance that your asset-based

carrier company adheres to industry-prescribed best practices for transporting food perishables safely and hygienically.

Temperature-controlled transport vehicle

Within this guide, best practices are discussed for food items moved using temperature-controlled transport vehicles, such as vans, semi-trailers, transport vehicles, and railcars, that have insolated and thermostatically controlled cargo compartments for transport of food and non-food items throughout the distribution network. This guide's term "transport vehicles" refers exclusively to temperature-controlled vehicles.

1. Pre-Requisite Programs and Written Specifications

The relationship between shippers, carriers, loaders, and receivers is critical to maintaining an uninterrupted cold chain and, more importantly, ensuring that expectations are clearly defined, communicated, and documented in appropriate written specifications and contracts. All parties should understand their roles and responsibilities in meeting the guidelines identified by the shipper to ensure food safety and protect liabilities, including lawsuits and claims due to failure to meet specifications.

Bills of Lading, waybills, or similar documentation of transport requirements should have clear and measurable requirements that eliminate the possibility of misinterpretations or legal disputes. For example, the temperature variables in the transport vehicle and the product are enormous; simply stating what the thermostat should be set at for a particular load and transport vehicle configuration will provide an attainable action.

Suggested communication points and essential pre-requisite items for shippers and carriers to consider when determining/negotiating transportation requirements. Processes will vary by business model and situation, but general prerequisites transcend most types of refrigerated trucking and effectively cover the basics. The goal is always to ensure a seamless cold chain and promote positive working partnerships that benefit all parties. **In the end, carriers, loaders, and receivers should verify that they have the final detailed instructions and requirements from the shippers in writing to ensure seamless and sanitary food transport.**

1.1. Appropriate Equipment Design and Maintenance

Proper design, performance, and maintenance of equipment used to handle, transport, and store perishable food are fundamental prerequisites of safe food handling and a core industry best practice. Selecting the proper equipment for food transportation is a management decision, and clear communication between the shipper, carrier, and receiver with the appropriate equipment supplier is recommended. Equipment should be capable of reaching and maintaining specified temperatures for sanitary food transport under usual and customary operating conditions. Equipment manufacturing design and performance specifications should be referenced, understood, and acceptable before selecting equipment for refrigerated food

Likewise, once the desired equipment has been identified and selected for the sanitary transport of food, the equipment should be properly and regularly maintained. Maintenance includes physical and sanitary conditions suitable for clean food transport. Equipment checklists and maintenance protocols are located elsewhere in this document and/or through GCCA core partners.

1.2. Vehicle and Equipment Storage

Vehicles and transportation equipment should be stored to prevent harboring pests or becoming contaminated in any other manner that could make food unsafe for human or animal consumption. This industry best practice applies not only to those vehicles and transportation equipment in service but to trucks, transport vehicles, and handling equipment not used. A good vehicle and equipment storage plan includes a monitored pest control program, secure storage areas, and sanitation records to support proper put-away and return-to-service sanitation and maintenance programs.

1.3. Written Specifications

Written specifications are an industry best practice that results in a cooperative effort between the shipper, loader, carrier, and receiver of perishable foods and should be coordinated such that food is transported in a sanitary manner. To accomplish this over-arching goal, clearly defined and written transportation procedures, specifically related to maintaining food safety, should be developed and shared with all parties transporting perishable foods. These specifications should include, at a minimum, specifications or parameters for packaging, stowage, temperature management, sanitation, and handling. Written specifications should be product-specific but can consist of general and specific instructions for maintaining product safety during transit. Facilities with regulatory plans in place (including but not limited to Hazard Analysis of Critical Control Points [HACCP], HARPC (Hazard Analysis and Risk-Based Preventive Controls) Good Manufacturing Practices [GMP], Standard Operating Procedures [SOP], Sanitation Standard Operating Procedures [SSOP], and CAPA (Corrective Action Preventive Action) or other certification programs [GFSI, BRCGS, SQF, ISO, etc.]) can reference those plans as part of a comprehensive set of written specifications for transport of perishable foods.

1.4. Temperature Requirements

Naturally, the type of goods being transported will determine the temperature requirements. The written specifications should include a specific numeric temperature or a range of temperatures in either Fahrenheit or Celsius to be maintained during transport with specified tolerances specified “not to exceed’ (also called Upper Control Limit, UCL) and “not below” (also called Lower Control Limit, LCL) margins. Plans that reference ‘frozen’ or ‘chilled’ as temperature requirements should not be accepted.

GCCA members may also access the Commodity Storage Manual [1], which explicitly details the storage and transportation conditions necessary to maintain food safety and ideal food quality. As the carrier/loader/receiver is liable for both food safety and cargo quality/condition during transport, understanding the distinct differences between the two and the impact of temperature on each is critical to successfully fulfilling the carriage contract.

If a temperature monitoring device is used during transport, the shipper and carrier should agree upon the parameters of use, including but not limited to:

- What frequency of data should be collected?
- What tolerances will be allowed?
- How should the data be collected and transmitted?

1.5. Time & Temperature Deviations and Corrective Actions

Shipper-specified transport temperatures, including set-point temperature as well as upper control limit (UCL) and lower control limit (LCL), are used to establish the desired temperature zone as well as minimum and maximum safe zones for the product. However, if the UCL is exceeded during transit for a specified cumulative exposure time, the deviation may result in unsafe food. Prior to creating written specifications for product types, a risk-based assessment of exposure times above the UCL should be undertaken. This will lead to guidelines for unsafe exposure during transit and potential corrective actions. Written specifications should clearly identify the procedures to be taken if cumulated time by temperature deviations occur in transit, including provisions for product inspection and the criteria for determining if food safety has been compromised. Corrective Actions for preventing further or repeat damage, as well as possible disposition of damaged goods, should be included.

1.6. Segregation of Goods

Shippers should provide clear instructions on the co-mingling of goods, including those items with allergens, and provide special instructions as desired. Carriers, especially ones engaged in mixed load, less than truckload ("LTL"), and/or multi-stop services, may be held liable for cross-contamination if they fail to follow shipper instructions. Remember that all practices should focus on reducing safety risks and allow shippers, carriers, loaders, and receivers to exercise best judgment in the development of written specifications and interpretation. Depending on the situation, it is recommended that the shipper include written exclusions or specific instructions when necessary. For example, list specific goods that should not be transported in the same transport vehicle (such as fresh produce in ventilated boxes alongside or under fresh poultry).

1.7. Allergens

A food allergy is an immune system response to a food that the body mistakenly believes to be harmful. It is estimated that 2 percent of adults and about 5 percent of infants and young children in the United States suffer from food allergens. About 30,000 individuals require emergency room treatment per year, and approximately 150 individuals die annually due to allergic reactions to food.

Although an individual could be allergic to any food, nine (9) major foods or food groups account for 90 percent of food allergies. These foods are cow's milk, eggs, fish, Crustacean shellfish, tree nuts, peanuts, wheat, soybeans, and sesame seed. Regulators place the primary responsibility for control of allergens in the human diet on food processors through specific labeling procedures and rules. Furthermore, all parties should be aware of international regulations related to allergens. Shippers shall inform loaders and transporters of food items containing allergens, and the loader should

ensure that cross-contact between foods does not occur and practice proper hand washing after handling allergens.

1.8. Bulk Foods

Shippers of refrigerated Bulk Foods are required to ensure the safe transport of the commodity, including communication with others in the integrated supply chain (loaders, carriers and receivers). Written procedures for the cleaning, visual inspection, safe loading, storage and transport of the bulk food should be developed and implemented. These procedures should include the proper temperature parameters, including set-point temperatures as well as UCL and LCL temperatures.

Cleaning and sanitation of bulk food transport vehicles is a critical step in the food safety procedures, and should include proper cleaning and sanitation procedures as well as information about the most recent cleaning of the transport vehicle. The carrier should be prepared to provide information about the recent cargo shipments as well as cleaning and sanitation records for the bulk food transport vehicle upon request. For example, if "wash tickets" are issued at the time of cleaning, those should be retained as records and proof of cleaning. Maintenance of bulk transport vehicles is important, and the carrier should develop written procedures for maintaining the transport vehicle and be prepared to provide that information upon request.

1.9. Sanitation and Equipment Standards

The shipper's written specifications should clearly address sanitation and/or cleaning of transportation equipment. Moreover, cleaning methods, including the use of chemicals and frequency of cleaning, raise possible conflicts with environmental laws and local, state, and federal water use and water drainage/runoff issues. In many jurisdictions, carriers are prohibited from washing their trucks because of local regulations designed to protect them from water runoff and water quality issues. This places carriers in the position of having to choose which regulation to follow.

Examples of factors/Items to address in a written specification might include:

- Define "sanitized" versus "clean"
- Define specific action list – visual inspection, wash down, etc.
- Clarify equipment rejection and remedy standards
- What documents will be accepted as verification – wash tickets, records
- Responsibility of carrier, loader, etc.

Transport vehicle sanitation should be verified prior to loading as well as during transit. A transport vehicle Inspection Checklist has been provided in the Appendix of this document.

1.10. Cross-Contamination

Contamination of food can occur through biological, chemical, and physical hazards. Bacteria, toxins, and viruses are the most common biological threats. Chemical hazards include non-food

grade lubricants, insecticides other chemical compounds. Physical hazards are many and may include wood, metal, glass, plastic, and other foreign objects.

Cross-contamination is when "clean" products are contaminated by "unclean" or contaminated products. The three primary sources of cross-contamination are:

- Food-to-Food: The most common food-to-food cross-contamination is the introduction of bacteria or allergens from other foods. Improper cleaning of transport equipment and comingling of products are common causes.
- People-to-Food: Introduction or contamination can be accidental or intentional, but is one of the most common forms of cross-contamination. Poor personal hygiene, improper stacking and loading, and illness are the primary causes.
- Environment-to-Food: The world around us is unclean, and food that comes into contact with the environment can become contaminated. Placing food products directly on the ground or exposing packaged products to the environment are common causes.

1.11. Other Considerations

A solid written specification/pre-requisite transportation process should include other factors such as:

- Rates and terms
- Load configuration/dunnage
- Identification of other involved parties, such as brokers and agents
- Limits of liability
- Insurance requirements
- Authorized personnel and contacts

2. Refrigerated Transport Vehicle Sanitary and Condition Inspection

Equipment transporting human or animal food product items requires a higher level of inspection and maintenance. Equipment needs to be clean and otherwise suitable for the transport of food items or goods associated with the manufacture of food items. Improper or incomplete cleaning and/or sanitizing practices can allow contaminants to spread. Requirements for cleaning, sanitizing, and inspecting equipment should apply to all shippers, carriers, loaders, and receivers. However, shippers continue to hold primary responsibility for determining and specifying the sanitary conditions of transport – specifically in documenting the required procedures expected -- unless the carrier has entered into a written agreement with the shipper to assume this responsibility.

2.1. Cleaning and Sanitation

Cleanliness prevents bacterial, chemical, and odor contamination of food product loads. Remove all loose debris and wash or sweep the floors clean. The floor drains and grooves should be free of debris so drainage will not be blocked. Certain cleaning procedures may be required by law (for example: in cases where a meat product may become contaminated by direct or indirect contact with the interior surfaces of the vehicle) or due to specific and individual Food Safety Plan

requirements. When this is required, it is important to gather and have all the necessary applicable equipment and supplies available to assure that effective cleaning and sanitization occurs.

Certain food, such as fatty or oily goods such as butter, oleomargarine and meats, are highly susceptible to strong odor contamination. Fresh fruit, such as apples and bananas, are also susceptible to odor absorption. Thorough cleaning and air sanitation of boxes previously used for hauling odorous products such as fish, or cabbage is necessary to prevent contamination.

Corrosive chemicals and sanitizers are not recommended for equipment used to transport foods that require temperature controls for safety (TCS). Corrosive chemicals can pit metal surfaces and remove coatings designed to protect the metal from harboring contaminants.

2.2. Sanitation Standards

Shippers are encouraged to develop and implement procedures that specify their practices for cleaning, sanitizing, and inspecting their equipment. Factors that need to be considered include: 1) how the vehicle/equipment is being used; and 2) the production stage of the food being transported (raw vs. finished product; open vs. closed transport vehicle).

2.3. Transport Vehicle Condition Inspection Requirements

Equipment requirements vary for refrigerated transport vehicles and will be determined by cargo hauled along with applicable written specifications and requirements as deemed appropriate by the shipper. To guide you, see the Appendix for example checklists that represent common requirements for refrigerated transport vehicles and refrigeration units.

Note: Best Practice is for drivers to conduct physical inspections of their assigned vehicles prior to loading and stage pre-loaded transport vehicles prior to departure. Inspections and checklists will vary by location.

3. Refrigeration Unit Operating Procedures

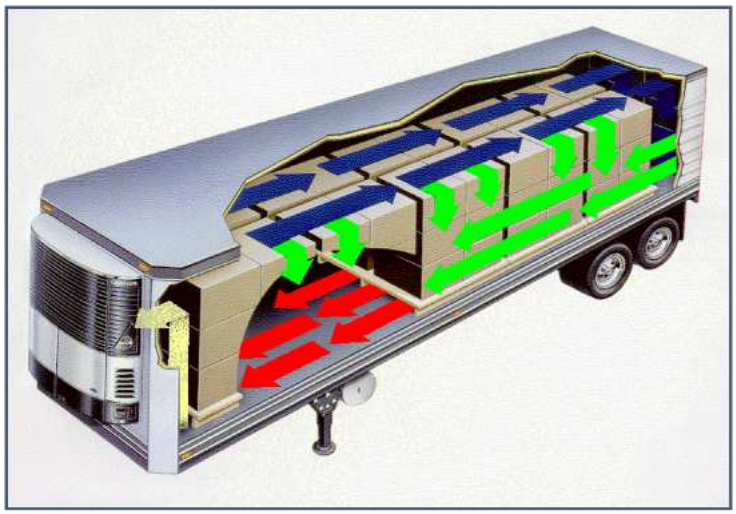
Most refrigeration units for trucks and transport vehicles, also known as Transportation Refrigeration Units (TRU), are equipped with computerized controls and Electronic Throttling Valves (ETV). These computerized refrigeration units offer significant benefits to transportation companies, drivers, shippers, and receivers. The refrigeration unit's computer system includes various levels of guarded access, thereby protecting the refrigeration unit from tampering and unwelcome changes.

The computerized system also permits the operator to set up pre-determined temperature management conditions, including critical control limits for perishable foods. Product storage guidelines can be utilized to help set up carrying temperature parameters for perishable and temperature-sensitive products transported in these refrigeration units. In this guide, we have selected some of the features from computerized truck and transport vehicle refrigeration units to demonstrate the uses and benefits of these technologies for food safety and carriage of perishable foods.

Important to note: Transport refrigeration units should always be operated in accordance with the manufacturer's refrigeration unit operating manual as settings and equipment performance characteristics may and do vary from manufacturer to manufacturer. It's imperative to follow specified refrigeration unit operating procedures when transporting refrigerated cargo, as well as the shipper's written specifications.

3.1 Airflow Management

Understanding airflow within refrigerated transport vehicles is the critical part of keeping refrigerated cargo in compliance with the shipper/receiver requirements. The conditioned delivery air from the refrigeration unit flows horizontally over the load and to the rear doors, then back through and around the load and along the floor, through an opening at the bottom of the Return Air Bulkhead, and back to the refrigeration unit. The placement of heat-generating cargo must permit the conditioned air to pass between the load, the walls, and the floor. Any obstruction of this airflow pattern can cause "hot spots" within the cargo area that can impact load integrity. The horizontal airflow system moves conditioned air passively while picking up heat along its way from the rear of the load to the front.



It is recommended by the manufacturers that there is 9 inches of clearance from the ceiling to the top of the load and 2 inches on the sides. If the load is palletized, then this will provide the recommended clearance of 4 inches at the bottom of the load for proper airflow throughout the transport vehicle. Transport vehicle floors that are corrugated or box floors can allow for direct floor loading or stacking, but flat floor transport vehicles will require pallet loading for proper airflow. Any disruption of the airflow will create an issue within the transport vehicles that can impact all or part of the load temperature management. More discussion on the importance of airflow is discussed within this document.

3.2 Pre-Loading

Before picking up a load, always run the refrigeration unit in high-speed cool for at least 20 minutes and perform an automatic Pre-Trip test. Pre-trip is a set of comprehensive tests run by the advanced

microprocessor system to check TRU operation that would indicate a failure of the TRU operation. The pre-trip tests could take approximately 15 minutes, or as applicable to complete and provide a PRETRIP PASS or PRETRIP FAIL indication on the TRU screen. The unit MUST pass the Pre-Trip test. If it doesn't, follow your companies or manufacturers prescribed procedures.

3.3 Identify and Program Unit Set-Point

Truck and transport vehicles refrigeration unit microprocessors, also known as data loggers, offer technological advances that can markedly reduce human errors, driver decision making and driver intervention. The computerized refrigeration unit takes complex commodity-related decision-making out of the hands of the driver and utilizes the expertise of commodity specialists and experts to assist the carrier in setting up custom-tailored computerized systems for their valued shippers and receivers. It should be noted that carriers using these computerized systems should seek guidance from subject matter experts in order to optimally set up shipper-derived and specified carrying conditions for the safe carriage of perishable cargo.

These technological advances, which are available with computerized refrigeration units, can be incorporated directly into quality control and food safety plans. The data logger provides the record-keeping and verification that shippers, receivers, and carriers can incorporate into their quality control and food safety plans. Data loggers store data and generate graphs, tables, and printouts for recording and verifying time and temperature in transit.

The benefit of these systems is that the driver now makes fewer decisions and fewer mistakes. Driver-related errors can be reduced because tasks like setting the thermostat, initiating the start of the trip, conducting a pre-trip, setting the mode, and initiating the defrost are made simpler.

Start of Trip: The "start of trip" feature offered with computerized refrigeration units are simple to use and, importantly, it is a critical ingredient for establishing when the carrier started the trip and potentially when the carrier took custody of the cargo. Accordingly, it is crucial that the start of trip feature be initiated in order to ensure that the time and date of a trip is properly entered and documented for future reference. The "start of trip" is the beginning of a road map that can clearly help show when the accountability shifts from shipper to carrier to receiver.

Computerized Pre-trip: "Pre-tripping" the refrigeration unit and documenting the time and date of pre-trip is a key ingredient to assuring that the refrigeration unit is operating correctly and to preventing losses and mitigating claims and litigation. Pre-tripping the refrigeration unit should be accomplished before each line haul trip. It can be easily accomplished and recorded anytime. As part of the central nervous system of the refrigeration transport vehicle, the refrigeration unit can be automatically pre-tripped whenever the unit is running.

As a general rule, users should set the unit controller to the desired set-point temperature and other settings (such as OptiSet™ in Thermo King units or Intelliset™ in Carrier Transicold units), as determined by product and/or shipper requirements. Refer to the unit Operators Manual for instructions on how to operate your specific unit. Once the set-point and other key settings are

programmed, always double-check the settings to ensure there were set properly and to help prevent potential cargo damage that can result from an improperly set point temperature and/or other refrigeration unit settings

3.4 Select Mode of Operation

Select the proper operating mode as appropriate for the cargo being transported and/or per shipper requirements. Choose either the 'Continuous Run' or the CYCLE-SENTRY (also known as "START-STOP") mode appropriate for the cargo being transported. Operating a unit on CYCLE-SENTRY with cargo that requires tight temperature control or continuous airflow operation is not recommended and can result in product hot spots and/or top freezing. Refer to the most recent CYCLE-SENTRY/START-STOP Operation & Diagnosis manuals from your refrigeration unit manufacturer for additional details.

Before loading the product, pre-cool the trailer or transport vehicle to the desired carrying temperature unless otherwise specified by the shipper and carrier. Turn the refrigeration unit 'OFF' when the product is ready to be loaded and BEFORE doors are opened. Additional information about pre-cooling is provided elsewhere in this document.

After loading is complete, close the doors immediately, start the refrigeration unit, and re-confirm that the correct operating mode and settings have been selected.

Initiate a manual defrost cycle to remove any frost or ice from the evaporator coil and to help ensure maximum cooling performance after defrost is completed. When defrost is complete, the unit should return to normal operation. The box temperature should then begin to return toward the 'desired' cargo temperature.

3.5 Multi-Temperature Refrigerated Transport Vehicles

With the growth of the food service industry, the fleet of multi-temperature refrigerated transport vehicles has continued to increase in size and significance. Multi-temperature refrigerated transport vehicles are equipped with independent evaporators and unit controls that provide different temperatures in separate compartments by bulkheads and/or transport vehicle dividers. These units now feature microprocessors that control, monitor, pre-trip, and troubleshoot each temperature zone within the multi-temperature system.

Some of the features offered with single-temperature refrigeration units have been incorporated into multi-temperature refrigeration systems. Designing and using advanced multi-temperature technologies requires that users pay special attention to environmental conditions, commodity mixes, temperature control, airflow, bulkheads, driver access, side doors, walk ramps, and lighting. These transport vehicles have to work as a system that specifically meets the unique needs of shippers, drivers, and receivers.

Industry Best Practices should include a detailed and clearly defined written procedure created by the shipper, outlining the parameters and proper temperature management of multi-temperature transport vehicles. Additionally, while it is generally acceptable to transport chilled

and frozen products in the same multi-temperature transport vehicle, provided the aforementioned environmental conditions are met, it is not advisable to transport ambient (dry) and refrigerated (chilled and/or frozen) products in the same multi-temperature transport vehicle. Furthermore, it is recommended that hazardous cargo (i.e., chemicals and cleaning supplies) **never** be shipped with edible human and animal foodin the same transport vehicle.

4. Pre-Cooling Transport Vehicles

Pre-cooling transport vehicles is a crucial part of the refrigerated distribution process and represents an Industry Best Practice shippers and carriers. Pre-cooling the transport vehicle before the loading process begins to remove residual heat from the cargo area. Loading a warm transport vehicle with refrigerated product will result in a transfer of thermal energy from the product to the transport vehicle. The residual heat of the transport vehicle will draw the cold energy out of the product starting the process of thermal inertia and putting product safety and quality at risk.

Due to the radiant heat load of the sun (infrared light), heat is transferred into the transport vehicle when it is empty and not running. The air in the transport vehicle as well as the truck's structural members, interior skins and insulation absorb heat. Pre-cooling the transport vehicle removes this residual heat and protects the cargo from heat-related damages.

4.1. Transport vehicle Settings

Once a transport vehicle is assigned for a trip, it should be re-located to an area designated and cleared of any pallets, shipping materials or debris, and cleaned and sanitized per the shipper's specifications. If specified by the shipper, in writing, the transport vehicle should be pre-cooled prior to loading.

4.2. Pre-Cooling Settings

When pre-cooling the transport vehicle, the thermostat should be set to the desired carrying temperature for single temperature transport vehicle or to multiple set points for the host unit and remote evaporator unit. The refrigeration unit should run at the desired carrying temperature until the unit shifts to low-speed operation just before loading the cargo. Generally, pre-cooling a transport vehicle can be accomplished in less than two hours.

The transport vehicle refrigeration settings should be adjusted in accordance with shipper's requirements (i.e. fresh, frozen or multi-compartment). Pre-cool the entire transport vehicle as a single compartment.

For pre-cooling purposes, the transport vehicle should be pre-cooled to the coldest temperature required by the cargo being hauled. For example, if the route calls for a multi-temperature load of fresh and frozen, it should be pre-cooled to the designated frozen requirement.

Special Memo on Pre-Cooling Overseas Transport vehicles: When required by the shipper, international transportations companies have policies "AGAINST" pre-cooling refrigerated transport vehicles in a hot humid and open environment. Refrigerated loading docks with cold tunnels are

recommended. In many but certainly not all loading facilities, cold tunnels are situated tightly duct between the climate-controlled loading dock and the transport vehicle. The cold tunnels prevent outside ambient air from entering the refrigerated dock and the interior of pre-cooled transport vehicles. When perishable cargo is loaded in a hot humid ambient environment, moist air can enter the interior of the pre-cooled transport vehicles when the doors are opened. Using this scenario, the possibility exists that moisture can condense (dew point condition) on the interior surfaces of the pre-cooled transport vehicle. Under hot humid conditions, we have typically noted condensation at the rear of the pre-cooled transport vehicle/on the ceiling. The concern is that moisture on the ceiling might fall on the cartons. In open conditions with hot humid air, we also have witnessed condensation forming on the exposed cartons ("cargo sweat") when the supplier moves the refrigerated cargo from the cold room to a hot, humid dock or open space. Under hot, humid conditions, the problem of cargo sweat (moisture on the cartons) will likely persist even if the refrigerated transport vehicle is not pre-cooled.

4.3. Pre-Cooling Notifications

Pre-cooling transport vehicles may take up to two hours or possibly more based on ambient conditions to maintain stable temperatures. Transport vehicles outfitted with real-time telematics devices can automatically provide compartmental air temperature verification and notify personnel when the transport vehicle is ready for relocation to the appropriate dock door for loading.

For those transport vehicles not outfitted with real-time telematics, visual temperature readings from the TRU control screen or manual reading can to be taken by appropriate personnel to confirm that the transport vehicle has achieved the proper temperature levels. This Manual readings can be done with a handheld and properly calibrated temperature device.

Note: Remember to turn the refrigeration unit OFF after the transport vehicle/box reaches the desired pre-cooled temperature and during the loading process. This will minimize heat and humidity entering the box.

5. Loading Procedures

The way cargo is loaded into a refrigerated railcar or transport vehicle can have a significant effect on product safety and quality. Proper loading will help ensure cargo quality/condition is maintained throughout its journey and mitigate risks for shippers. Many factors and steps should be considered to ensure proper loading procedures, including choosing the proper trailer, product packaging, cargo temperature, refrigeration unit operating procedures, and airflow. Loaders, carriers, and receivers should always cross-check procedures with the shipper's written specifications to ensure requirements are met and actions are taken to ensure compliance.

Loaders play a crucial role in ensuring sanitary transportation operations, as they are the people on the docks who have eyes on the equipment and product before transport. Amongst its duties, it is the primary job of the loader to make sure that the shipper provided and the vehicle meets the necessary specifications, and is in adequate physical condition and free of visible evidence of pest infestation and previous cargo that could cause the food to become unsafe during transportation.

Likewise, before loading food for which the shipper requires temperature control, and especially for those foods requiring temperature control for safety (TCS), the loader should verify, according to the specifications provided by the shipper, that each mechanically refrigerated cold storage compartment or transport vehicle is adequately prepared for the transportation of such food, including that it has been properly pre-cooled, if specified, and meets other sanitary conditions for food transportation. The following steps are best practices for the predominant mode of refrigerated transportation, in which a loader is acting independently of the carrier. For the purposes of this best practices guide, the steps assume a scheduled live load scenario with a 3rd party trucking company as the carrier.

5.1. Staging the Product (Pallets) and Cargo Temperatures

Most products, with a few exceptions like bananas, which are loaded at ambient temperatures, should be at the specified shipping temperature at the time of loading. Always pre-cool and store the cargo at its desired temperature to remove any field heat from the cargo and packaging. Removing both heat sources before loading helps ensure the refrigeration unit can maintain the desired temperature during transit.

The product (palletized) should be staged in a loading zone near the loading dock and ideally pre-positioned in a "cool dock" in order to maximize transport vehicle-loading efficiency. The quicker the loading process, the quicker you can close the transport vehicle doors which will help reduce the thermal loss and the stabilization of consistent temperatures. If possible, use a thermometer to check the products internal (or pulp) temperature before loading. If the product is fully packaged or sealed, check the surface temperature by using an infrared (IR) thermometer, or by placing a thermometer between packages, as close to the product as possible without penetrating the packaging. There are various thermometer types available to choose from for these purposes.

Remember: With a few exceptions (like bananas), refrigeration units are designed to maintain product temperature, not change it. If the cargo is not at the desired temperature before loading, the refrigeration unit may not have enough time or capacity to achieve the desired product temperature pull-down during transit.

A sample Staging Checklist has been provided in the Appendix of this document.

5.2. Transport vehicle Assignment and Pre-Loading Safety Inspection

Once the correct transport vehicle is assigned, prepared and pre-cooled (if specified by the shipper), it should be moved to the designated dock door for loading. When the transport vehicle has been backed into place for loading, it must be properly secured.

Suggested steps include:

- Secure the Glad Hand Locks
- Secure the Wheel Chocks
- Ensure the transport vehicle is properly spotted in the Dock Door

- Ensure that the dock door is not opened until Transport vehicle is spotted and secured

Once the transport vehicle is physically secured and in position, warehouse personnel should:

- Secure the Dock Door Seals
- Raise the Dock Plate
- Ensure the Dock Light is "Green" before opening up the transport vehicle door

Next, check the condition of the transport vehicle compartments and components:

- Verify Operational Readiness of the Transport vehicle
    - No Debris or Obstructions
    - Infiltration Check (Free of pests, vermin or evidence)
    - Cleanliness Check (visual inspection)
    - Bulk Head(s) are functional (if installed)
    - Straps and Load bars (E-tracks) are functional

Finally, verify that the transport vehicle is properly pre-cooled (if specified) and operationally ready to be loaded. If not previously completed before the transport vehicle was positioned at the dock, transport vehicle air temperatures must be confirmed in in the forward (nose) section and the back (tail) section of the transport vehicle. ***Remember, checking the refrigeration set points is not enough to confirm whether or not a transport vehicle is pre-cooled***. See section 4.3 for information on Pre-Cooling Notifications.

5.3. Refrigeration Unit Operating Procedures – Pre-Loading

It's imperative to follow proper refrigeration unit operating procedures when transporting refrigerated cargo. Before picking up a load, always run the refrigeration unit in high speed cool for at least 20 minutes and perform an automatic Pre-Trip. The unit MUST pass the Pre-Trip test. If it doesn't, follow your companies prescribed procedures.

Set the unit controller to the desired set-point temperature, as determined by the shipper requirements. Refer to the unit Operators Manual for instructions on how to operate your specific unit. Once changed, always double check the setting to ensure it was set properly and to help prevent potential cargo damage that can result from an improperly set temperature.

Upper Control Limits (UCL) are critical for optimizing shelf life and for control of food spoilage organisms that can grow on frozen and chilled cargoes. Today's refrigeration units can be set up for Hazard Analysis of Critical Control Point (HAACP) plans targeted at establishing time-temperature critical limits. The critical limit is the point that if exceeded, the safety of the product may be questionable. In practice, the typical operating limit for a carrier would be more restrictive than the critical limit. If the operating limit is triggered, a carrier should take corrective action to fix a problem before it becomes "critical."

Select the proper operating mode as appropriate for the cargo being transported and/or per shipper requirements. Choose either the CONTINUOUS RUN or the CYCLE-SENTRY (also known as "START-

STOP") mode appropriate for the cargo being transported. Operating a unit on CYCLE-SENTRY with cargo that requires tight temperature control or continuous airflow operation is not recommended and can result in product hot spots and/or top freezing. Refer to the most recent CONTINUOUS RUN/CYCLE-SENTRY/START-STOP Operation & Diagnosis manuals from your refrigeration unit manufacturer for additional details.

Before loading and if specified by the shipper, pre-cool the transport vehicle box with the doors closed to remove residual heat from the walls, floor, and ceiling. This will increase the likelihood of successfully maintaining the desired temperature throughout the entire transit time. Turn the refrigeration unit 'OFF' when product is ready to be loaded and BEFORE box doors are opened.

It should be emphasized that best practices guidelines consistently indicate that the refrigeration unit should be turned off when the doors are open. During loading and off-loading (devanning), and at all times when the transport vehicle door is open, the refrigeration unit must be off to ensure optimum unit performance and cargo integrity.

Turning off the refrigeration unit when the doors are open prevents:

a. Moisture from accumulating on the evaporator coil
b. Ice accumulation on the coil
c. Poor refrigeration performance
d. Blockage of conditioned air movement to the cargo

Furthermore, running the reefer unit when the transport vehicle doors are open causes:

a. Hot ambient humid air to condense on cargo
b. Ice and hoarfrost accumulation on the cargo and interior of the transport vehicle (white frost that occurs when water vapor touches the surface of frozen cargo and the transport vehicle)
c. Wet cartons, cargo thawing, and temperature abuse

5.4. Loading the Transport vehicle

After all preliminary work has been completed, transport vehicle loading can begin. Loader(s) should only use approved pallet jacks and/or forklifts to load the transport vehicles. Pallets should be loaded in the proper sequence as defined in approved Load Diagrams (see examples elsewhere in this section).

Generally, in multi-temperature zone loads, frozen products are loaded first in the nose of the transport vehicle, followed by fresh products and then ambient products.

Bulkhead walls are commonly used to separate the compartments and seal off the different temperature zones within the transport vehicle. Industry Best Practices suggest using a bulkhead between the frozen and chilled zone. For extended transport times, carriers sometimes use a second bulkhead between the chilled and ambient (dry) sections. Temperature loss in the rear of the transport vehicle is common since the loading dock is typically a "cool dock" which is consistent for loading fresh products.

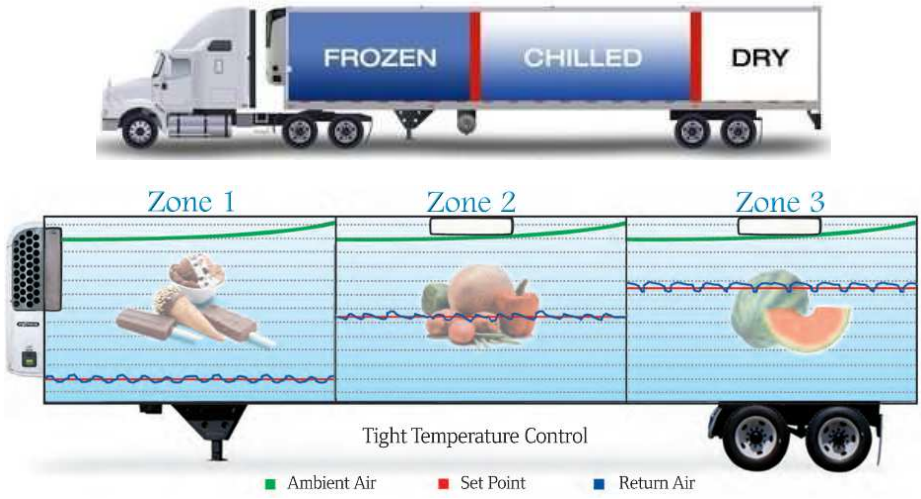


Figure 1: Courtesy of University of California Refrigerated Trailer Transport of Perishable Foods

Load the product quickly and efficiently and use loading patterns that maximize air circulation 'around' and 'through' the entire load for frozen cargo and chill cargoes, respectively. Frozen products should always be palletized and centerline-loaded in order to maintain a cold air envelope around all six sides of the load. Pallet placement must allow refrigerated air to pass between the load, the walls, and the floor. This is particularly important for transport vehicles with low insulation levels for loads shipped under extreme hot or cold weather conditions, for produce items that are extremely perishable, and for trips that last for more than a day or so.

The main objective is to develop a cold air envelope around freeze and non-respiring chilled cargoes (like chilled meat) and movement of conditioned air around and though the entire load for respiring cargoes like fruit and vegetables.

The pallet loading pattern (pallet placement) in a transport vehicle should allow conditioned air to pass between the load, walls, and the floor. Air flows between the walls and the load only if the pallets or cargo are not touching the walls. Additionally, cargo height should not extend high enough to touch the air chute because air space above the load and unrestricted air flow is needed to distribute the conditioned air to the walls, floor, cargo, and rear of the transport vehicle.

Centerline loading (see diagram below) is a preferred loading pattern since it permits airflow between the walls and the load and utilizes inflatable airbags, foam blocks or other materials to keep the pallets stabilized in the transport vehicle without touching the walls. Since a good deal of heat enters the transport vehicle from the floor, the load should have a bottom air path to prevent product heating. Do not block airflow underneath the load with boxes stowed on the floor or anything that covers pallet forklift openings will block airflow.

Consider the following when loading refrigerated transport vehicles:

- Limit access to the transport vehicle during loading to Loader(s) only to ensure safety
- Load product quickly and efficiently from staging area
- Reduce surface contact of product with storage area and loading equipment

- Loading placement should account for proper airflow around all product loaded
    - Refrigeration return air and discharge air openings should not be blocked
    - Pallets openings should not be obstructed (i.e., no shrink wrapping or slip sheets for respiring cargoes like fruit and vegetables)
- Pallet placements should re-enforce the stability of the load
    - Place pallets side by side to avoid tipping during transit
    - Spacer pallets should be used is an empty grid position
- Bulkheads should be properly secured between frozen and chilled compartment
    - Bulkheads must open for the load to be unloaded safely
    - Secure bulkhead securely into place with strap(s)
- Load bars and straps should be used to properly secure and stabilize the load
    - Lock and secure E-track connectors
    - Tighten straps and secure loose ends so they don't touch the floor

Important to note: Loading patterns will be different for refrigerated transport vehicles and railcars.

Pallet Arrangements and Load Length for 24 Standard Pallets in Five Loading Patterns

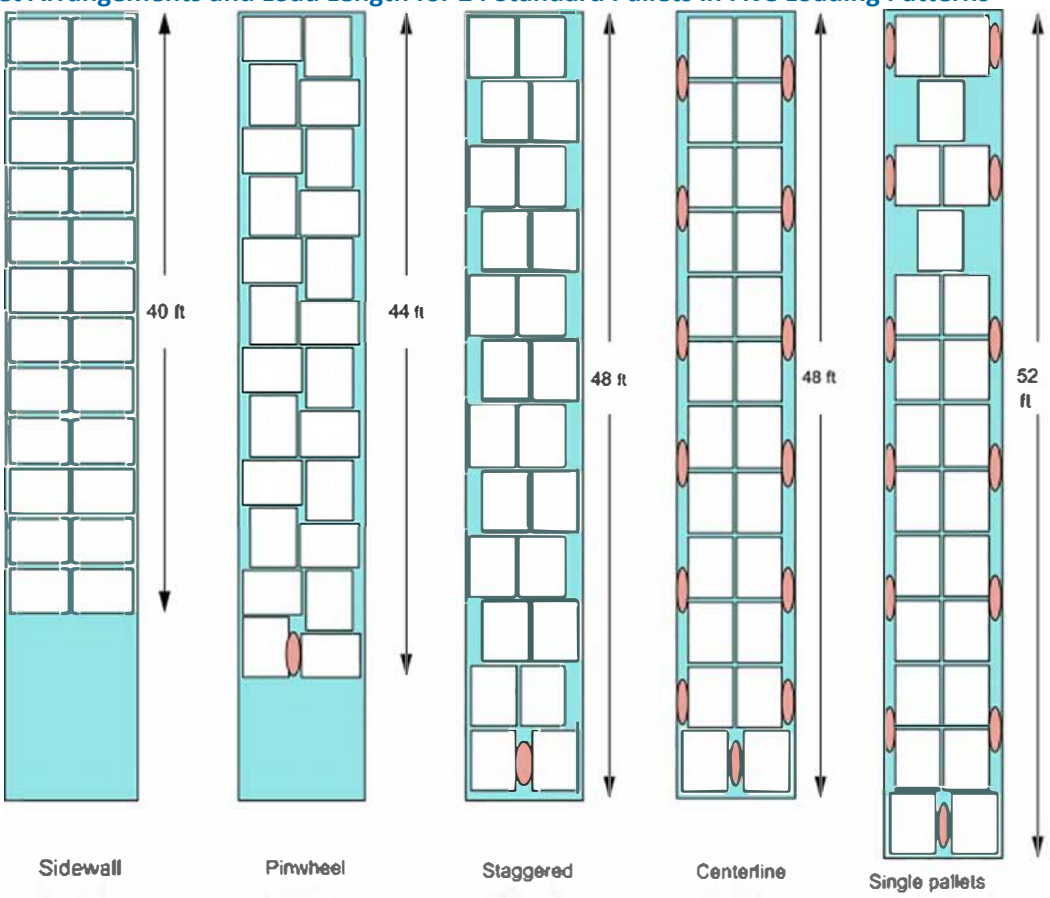


Figure 2: Courtesy of University of California Refrigerated Transport vehicle Transport of Perishable Foods

Once loaded, physically stabilize the load to help prevent potential cargo damage due to load shifts that may occur during transit.

The use of strip curtains is another way to minimize inside and outside air exchange and the resulting box temperature change during loading. Strip curtains help keep conditioned air 'In' and outside air 'Out.'

Note: Using strip curtains with perishable food that is not fully enclosed by a transport vehicle may pose a cross-contamination risk if the curtains are not cleaned and sanitized.

5.5. Transport vehicle Loading Best Practices

- Verify the product being loaded is within the appropriate temperature limits for the product type. The shipper of the product typically establishes these limits.
- Temperature verification of packaged/sealed products can usually be accomplished by placing a calibrated thermometer between two cases of product and recording the stabilized temperature. It is recommended to perform this verification for product being loaded in the nose, middle and tail of the transport vehicle.
- Temperature verification of exposed or unpackaged products can usually be accomplished by measuring the surface temperature by a certified thermometer recording the stabilized temperature. It is recommended to perform this verification for product being loaded in the nose, middle and tail of the transport vehicle.
- If a multi-delivery load, pallets to be delivered last will be loaded first (in the front of the transport vehicle).
- If the order does not completely fill the transport vehicle, a "Load Bar" should be used to stabilize the load. The load bar should be placed between the wall of the truck and the palletized products, directly behind the last pallets loaded onto the transport vehicle.
- Any product damaged during transport vehicle loading should be immediately addressed according to the customer's previously stated expectations.
- Care should be taken to ensure that the top cases in the transport vehicle do not inhibit airflow from the refrigeration unit in the transport vehicle. It is important to maintain proper and unobstructed airflow around the pallets in the transport vehicle to prevent temperature variations or abuse.
- Bulkheads should be used to separate refrigerated from frozen sections of the transport vehicle.
- Loading the transport vehicle should proceed in an expeditious manner to prevent product temperature abuse.
- After the load has been verified by all interested parties (including the driver), ensure the material handling equipment has been removed from the transport vehicle, raise the dock plate to its stored position, and release dock restraint.
- Place a unique security seal on the truck door and record the seal number on the shipping paperwork.
- After the transport vehicle has moved from the dock, close the dock door to prevent pest ingress.
- Appropriate records should be maintained for all activities for traceability/recall purposes (lot number and quantity shipped per item, shipping destinations, product temperatures, transport vehicle temperatures – set-point and actual, etc.)

A sample Loading Checklist has been provided in the Appendix of this document.

5.6. Transport vehicle Post-Load Verification and Inspection

Once the transport vehicle is loaded, a final review should be conducted before closing the transport vehicle doors, including but not limited to the following components:

- Verify Bill of Lading (BOL) paperwork
- Verify all pallets have been loaded
- Verify Load Diagram
- Check load for proper airflow
- Check that bulkheads, load bars and straps are properly secured
- Close Transport vehicle door, latch, lock and secure door seals
- Raise dock plate
- Close dock door
- Ensure the dock light turns “Red”
- Remove glad hand lock
- Remove wheel chocks
- Ensure any changes or special information for the driver is marked clearly on the load diagram
- Place load diagram into the route folder and turn-in to the supervisor
- Notify appropriate personnel that the transport vehicle is now ready to be moved to the staging area

5.7. Refrigeration Unit Operating Procedures – Post-Loading

Industry Best Practices are to follow proper refrigeration unit operating procedures when transporting refrigerated cargo.

After loading is complete, close the doors immediately, start the refrigeration unit and re-confirm the correct operating mode and set-point have been selected.

Initiate a manual defrost cycle to remove any frost or ice from the evaporator coil and to help ensure maximum cooling performance after defrost is completed. When defrost is complete, the unit should return to normal operation. The box temperature should then begin to return toward the ‘desired’ cargo temperature.

6. Staging Loaded Transport Vehicle Back On to the Yard

Next to the pre-cooling of transport vehicles, the staging of transport vehicles in the yard is of critical importance. The staging process allows for the transport vehicle to re-stabilize the internal transport vehicle temperature prior to delivery process. Stabilizing compartmental temperatures in the transport vehicle helps to defer the loss of product temperature that may occur during the delivery process. The staging process also ensures security measures are in place to protect the load.

Industry Best Practices are for the shipper to have specific requirements of the loaded transport vehicle staging process documented in their written specifications. Generally, the specific actions center on the following areas:

- Verify the Loaded Transport vehicle: Once the transport vehicle is ready for staging, verify that the transport vehicle is properly loaded, locked and assigned to a route and cross-check that steps reviewed in Section 5.9 were completed.
- Verify the Refrigeration Unit Status: Ensure that the refrigeration unit was turned on after loading and set to proper temperature requirements. Refer to the operating manual to ensure the set point, mode of operation, and modulation settings are correct and meet specific load and shipper written specifications. Also, check the fuel level on the tank to ensure adequacy.
- Securing the Transport vehicle: Install Door Seals, a commonly used tool to validate transport vehicle security, in accordance with security compliance. Door seals have unique serial numbers or ID numbers that should be registered on each load. The basic principle is that if a door seal is missing or broken there may have been a breach of security by an un-authorized person and the load could be subject to tampering and/or theft. Door Seals should be installed on each door of the transport vehicle.
- Moving the Transport vehicle to Staging Area: Once ready, the transport vehicle should be parked in its designated pick-up location so that the driver can easily pull-in, hook-up and drive off to begin the route. Its location should be reported to the Dispatch office as appropriate.

6.1. Monitoring of Staged Transport Vehicles

It is extremely important to monitor the transport vehicles in the staging area. Physical security should be provided in the form of gates or guards, and real-time transport vehicle monitoring is recommended.

Real-time telematics devices provide an excellent platform for monitoring transport vehicles throughout the distribution process, including staging.

During the staging process, real-time electronic checks continually check:

- Fuel Levels
- Refrigeration Unit Settings
- Location/Position (GPS)
- Door Seals

If the transport vehicle does not have real-time telematics devices installed, the security of the transport vehicle and yard personnel should manually check and, every three hours, record its contents until the transport vehicle is dispatched.

7. Departure and Arrival Process for Loaded Transport Vehicles

Departure and arrival procedures for loaded transport vehicles will vary by site and are dependent on factors such as the physical layout of the campus, use of guard services, staging capabilities, and company policy. Ultimately, each facility is responsible for documenting the specific practices and procedures required for departure and arrival procedures. The documentation should to be available and communicated with drivers/carriers and facility personnel to ensure compliance.

- Procedures should be documented and published in an approved facility document.
- Procedures should be reviewed regularly and updated as necessary to meet changing needs.
- Procedures should be made available to carriers prior to arrival to ensure a thorough understanding of requirements and to streamline processing time.

A sample Shipping Checklist has been provided in the Appendix of this document.

7.1. Centralized Check-In Location

The warehouse/facility should have a designated driver check-in location (sometimes an office or guard shack). In larger facilities, with more than one check-in location, care should be taken to provide sufficient signage that is visible, well-placed and offers clear instructions and guidance to assist drivers, ensure efficiency and mitigate security and safety concerns.

Arrival and departure procedures should be communicated to the driver/carrier prior to arrival to ensure all proper paperwork and required information is made available to prevent delays in the process. Notification of procedures can be accomplished through notes in EDI transmissions, via email confirmations, or through some other method during the load tender process.

All documentation such as Bills of Lading, Manifests, logs, etc. should be retained in accordance with local, company, and customer retention policies.

7.2. Arrival Procedures – Inbound, Outbound Carrier

Similarities may exist between arrival procedures of both inbound and outbound carriers at the site. While processes and procedures will vary from site to site, it is important that standardized procedures for inbound and outbound carriers be consistently followed. Copies of standardized documents should be provided to carriers in advance of arrival.

Sample Inbound and Outbound Arrival Procedure Checklists have been provided in the Appendix of this document.

7.3. Departure Procedures – Inbound Carrier

Verification of the transport vehicle being unloaded should be completed by facility personnel/management using documented on-site procedures. The carrier/driver should also verify that the load was properly unloaded and that only the freight destined for the site was processed (in the case of multi-stop loads).

Once verification of unload is complete, the driver is ready for release from the facility. The driver should proceed to the pre-determined check-out location. This is normally the same location as check-in, but if it is different, the driver should be made aware of this during the check-in process.

- The check-out personnel should retrieve any relevant and appropriate paperwork associated with the load during the check in procedure.
- The driver should sign any appropriate paperwork as necessary.
- Driver will be hand all appropriate paperwork, including a signed BOL, manifest, etc. as well as a gate pass if necessary.
- The driver is now clear for departure.
- The local site should update its logs and paperwork, note the time that unloading of the transport vehicle was completed, as well as the time the driver was cleared for departure.

7.4. Departure Procedures – Outbound Carrier

Verification of the transport vehicle being unloaded should be completed by facility personnel/management using documented on-site procedures. The carrier driver should also verify that the load was properly loaded and secured in accordance with carrier requirements and site procedures and protocol.

Once verification of the transport vehicle unload is complete, the driver is ready for release from the facility. The driver should proceed to the pre-determined check-out location. This is normally the same location as check-in, but if it is different, the driver should be made aware of this during the check-in process.

The check-out personnel should retrieve any relevant and appropriate paperwork associated with the load during the check in procedure. At a minimum, outbound paperwork should contain:

- Bill of Lading
- Loading Diagram
- Copy of Order
- Temperature Recorder Paperwork
- Any carrier control forms required

Before departing:

- The check-out personnel should validate that the paperwork is accurately and completely filled out.
- The driver will be handed all appropriate paperwork as well as a gate pass if necessary.
- The driver should sign any appropriate paperwork as necessary, including driver logs, bill(s) of lading, etc. and provided copies.
- The site will retain similar copies following corporate or local retention policies.
- The driver is now clear for departure.
- The local site should update its logs and paperwork, noting the time that unloading of the transport vehicle was completed as well as the time the driver was cleared for departure.

7.5. Post-Trip Inspection – End of Route

At the conclusion of the trip/route, drivers should conduct a post-trip inspection to verify the conditions of their vehicles. The standard Driver Vehicle Inspection Report (DVIR) for tractors and transport vehicles are a good guide for post-trip inspections:

- Vehicle Conditions
  - ✓ Brakes
  - ✓ Electrical
  - ✓ Emergency
  - ✓ Engine
  - ✓ Instrument Panel
  - ✓ Refrigeration
  - ✓ Rear Axle
  - ✓ Steering
  - ✓ Transmission
  - ✓ Tires

8. En-Route Requirements

Monitoring the transport vehicle while in transit provides the operator with valuable information about the quality and performance of the transport vehicle and the driver. Unless a shipper takes other measures to ensure that adequate temperature control is provided during the transportation of food that requires temperature control for safety (TCS) under the conditions of shipment, a shipper of such food should specify in writing to the carrier, and, when necessary, the loader, an operating temperature for the transportation operation. This includes the pre-cooling phase.

One-time notification should be sufficient unless a circumstance such as the conditions of shipment changes, necessitating a change in the operating temperature.

8.1. Temperature Monitoring Recommendations

Industry Best Practices suggest that effective measures should be taken to ensure that food that requires temperature control for safety is transported under adequate temperature control. The shipper of food that requires temperature control for safety under the conditions of shipment should develop and implement written procedures to ensure that the food is transported under adequate temperature control. Measures to ensure the safety of the food may be accomplished by the shipper or by the carrier or another party covered (as dictated by a written agreement). There should not be significant temperature deviations during transit such that TCS foods are subjected to food safety risk.

One method of verifying proper product temperatures of TCS foods during transit is to monitor the compartmental air temperatures on a real-time basis. If the air temperature is properly maintained, it is unlikely that the product temperature will go out of threshold specification. Other methods

include, but are not limited to, frequent temperature monitoring efforts and spot checks each time the doors are opened.

The specific transport temperature requirements will vary by load and shipper, as per the approved written specifications. It is imperative for carriers to review shipper requirements and ensure they are attainable and that the necessary technology is available to deliver.

Note: Industry Best Practices suggest that ANY time temperatures are measured that they are recorded. Taking temperatures without recording the results is a waste of time and resources.

8.2. Real-Time Data Collection

Data collection of real-time transit information requires the use of a Telematics device. Telematics devices in the cold chain industry will have GPS; GSM/GPRS; temperature and door sensors.

Depending upon the environment, the telematics units can be set to report every 5, 15, 30, 60 minutes or at any custom setting. Due to the importance of this data, it is recommended that data transmissions should be every 5 minutes but no longer than 15 minutes. Communications costs continue to come down each year and having access to more granular data allows for more frequent data, which provides more time to initiate potential corrective actions.

During transit, a Telematics unit will provide a host of information on regular intervals. Today's technology allows many options and customized settings to secure the data and information desired. Examples of the types of data that can be collected, saved and communicated real-time include:

- GPS location
- Reporting Time
- Compartmental Temperatures
- Product Temperatures
- Door Status (for security)
- Fuel Status
- Event Notifications
    - Temperature violations
    - Late Arrival violations
    - Out of Territory violations
    - Un-authorized Access

8.3. Temperature Monitoring & Reporting

The results of each route/trip should be properly documented, saved electronically and available for online access. This data should be integrated into the traditional route/trip report; however, other reports could be generated such as a:

- Trip Report
- Temperature Management Report
- Route Event Report
- Out of Territory Report

- Any many other customized reports

Note: Reporting requirements should be part of the shipper's written specifications.

8.4. Food Defense Regulations.

Carriers are encouraged to become familiar with regulator's food defense and traceability initiatives of the food industry as it works to shape regulations that adds value and reduce risk exposure for all participants throughout the distribution network. Federal government agencies, working with state, local, tribal, and territorial governments and the private sector, collaborate to ensure the nation's food and agricultural sectors are secure and resilient against domestic and global threats. These include intentional adulteration, catastrophic events, such as pandemics that impact critical infrastructure and essential workforce, consequences of climate change, and those in the cyber domain due to interconnected cyber-physical systems and intellectual property theft.

9. Receiving Loads

The criteria and procedures for receiving temperature-controlled loads should be written into the shipper's specifications.

Actions that should be specifically documented and need to be met by the carrier will ideally include:

- Visible assessment
  - Odors, product leakage, damage to transport vehicles, etc.
- Temperature requirements
  - What are the acceptable maximum/minimum temperature ranges of the particular load?
  - Was it maintained throughout transport? – View required documentation/reports as dictated by shipper written specifications
  - Is product in acceptable range at offload?
- The speed and efficiency of product unloading
  - How quickly does the unloaded product need to be placed into an equivalent temperature controlled area?
  - What timeframe is required to be met?

Receivers of perishable foods are actively engaged in transportation operations, and as such have certain responsibilities to ensure the sanitary transport of food. Specifically, upon receipt of food that requires temperature control for safety (TCS) under the conditions of shipment, the receiver should take steps to **adequately assess** that the food was not subjected to significant temperature abuse such that a food safety risk occurs. This assessment could include acts such as determining the food's temperature, the ambient temperature of the vehicle and its temperature setting, and conducting a visual inspection of the cargo for physical, biological or chemical risk (off-odors, leakage, or damaged packaging).

The carrier should, once the transportation operation is complete -- and if requested by the receiver or shipper -- provide the operating temperature specified by the shipper. The carrier should also be prepared to, if requested by the shipper or receiver, demonstrate that the correct, shipper-requested temperature conditions were maintained during the transportation operation. Such demonstration may be accomplished by any appropriate means agreeable to the carrier and shipper, such as the carrier presenting measurements of the ambient temperature upon loading and unloading or time/temperature data taken during the shipment.

Receivers should work in cooperation with carriers and shippers to ensure that potentially unsafe products do not enter commerce until deemed safe. Disposition of potentially unsafe loads may involve an independent or expert analysis by food safety experts.

A sample Receiving Checklist has been provided in the Appendix of this document.

10. Records Retention

The shipper and carrier should agree to a temperature monitoring mechanism for foods that require temperature control for safety (TCS). Carriers should only have to demonstrate that the requested temperature conditions were maintained upon request rather than for every shipment.

There are several effective ways to ensure temperature control, including a thermometer, temperature-measuring device, or temperature-recording device. The demonstration should only be made if the shipper or receiver requests it, which is consistent with Industry Best Practices and would likely only be done in situations in which there is suspected of a material failure of temperature control.

Shippers should retain records that demonstrate that they provide written specifications and operating temperatures to carriers as a regular part of their transportation operations for 12 months beyond the termination of the agreements with the carriers. They should also retain records of written contracts and the procedures required for 12 months beyond when the arrangements and procedures are used in their transportation operations.

Carriers should retain records of the written procedures for 12 months beyond when the agreements and policies are in use in their transportation operations. They should also retain driver training records for 12 months beyond when the person identified in any such records stops performing the duties for which the training was provided.

Written agreements for any tasks assigned between the shipper and carrier should be retained for 12 months beyond the termination of the contracts by all parties. Shippers, receivers, loaders, and carriers should make all records available to duly authorized individuals when requested. The records should be kept as original records, true copies (such as photocopies, pictures, scanned documents, microfilm, microfiche, or other accurate reproductions of the original records), or electronic records.

11. Conclusion

Written specifications are an Industry Best Practice to ensure the sanitary transportation of perishable food products and constitute a shipper's documentation of safe and sanitary transportation of human and animal food. Carriers, loaders, and receivers should fully understand the requirements of the Shipper's written specifications and their responsibilities and be able to comply.

Important Note: The shipper has the authority to delegate some of the parameters and expectations of the sanitary transportation of perishable food to others in the integrated distribution chain, including loaders, carriers, and receivers. However, these delegated expectations or specifications should be in writing.

Maintaining pre-requisite process documentation will enable the carrier to support its position should claims or lawsuits arise from the act of carriage. However, maintenance of records alone may not be enough to defend against all claims and suits. It is recommended that the carrier seek legal and risk management counsel before commencement of business to limit its exposure. It is also recommended that the carrier conduct periodic reviews of contracts and prerequisites to ensure that the company complies with the latest regulations and good business practices.

12. Terms, Definitions & Acronyms

Allergens – An allergen is a type of antigen that produces an abnormally vigorous immune response, commonly called an allergy. There are 8 major groups of food allergens.

Bulk Foods – Food products that are transported without the benefit of packaging.

Bulkhead - a dividing wall or barrier between compartments in the cargo area of a food transportation vehicle.

Carrier – The one who physically moves the food by motor or rail transport.

Cold Air Envelope – The area around refrigerated cargo that protects it from temperature fluctuations. Proper spacing from walls, floors and other cargo is needed to ensure a good Cold Air Envelope.

Continuous Run Setting – A setting on the Temperature Refrigeration Unit (TRU) whereby the unit is constantly running during transit, and does not have a "satisfy" setting. This setting is recommended for cargo that is very sensitive to temperature fluctuations and/or needs tight temperature controls.

Cross-Contamination – The act whereby contaminated food comes in to contact with food that is not contaminated. Common types of cross-contamination include food-to-food, people-to-food, and environment-to-food.

Cycle Sentry Setting – A setting on the Temperature Refrigeration Unit (TRU) whereby the unit is programmed to "satisfy" itself upon reaching a set temperature during transit and then shut off. Cycle Sentry is sometimes called "Stop/Start."

Data Logger – A record keeping device that records temperatures in the cargo area.

EDI – XXX

ETV – Electronic Throttling Valve, the computer controller on the Transportation Refrigeration Unit (TRU)

FDA – Food and Drug Administration

FSMA – Food Safety Modernization Act, effective 2011

GCCA – Global Cold Chain Alliance

GMP – Good Manufacturing Practice, a pre-requisite program of HACCP

HACCP – Hazard Analysis and Critical Control Points

Hot Spots – Areas within the refrigerated cargo area that are warmer than the set point for the area. These areas may present food safety risk for perishable cargo.

LCL- Lower Control Limit, the recommended lowest storage temperature for a perishable food

Loader – The one who prepares for transport and loads the transport vehicle or vessel.

Motor Carrier – A person or group who transport food in trucks over the road.

Multi-Temperature Transport vehicles – A multi-temp refrigerated vehicle can be subdivided into three temperature-controlled compartments that are ideal for transporting frozen, refrigerated or dry products.

Pre-Cooling – The act of cooling the cargo area of a transport vessel prior to loading.

Pre-Trip Test – The act of testing the Temperature Refrigeration Unit's (TRU) ability to cool the cargo area.

Rail Carrier – A group who transport food on railroad lines.

Receiver – The one who receives the food load after transport.

Return Air Temperature – The reading on the Temperature Refrigeration Unit when measuring the temperature inside the cargo area. The Return Air Temperature is not necessarily the same as the product temperature or the overall temperature of the cargo area, since Return Air Temperature sensors are generally located along the floor of the cargo area.

USDA – United States Department of Agriculture

Set Point – The temperature setting on the Temperature Refrigeration Unit (TRU) that establishes the desired temperature of the cargo area.

Shipper – The one who arranges a shipment of food by a motor or rail vehicle.

Short-Cycling – The act whereby a Transportation Refrigeration Unit (TRU) is falsely "satisfied" by cold air in the cargo area, but actual temperature in the area are not at the set point temperature. Short-Cycling is generally caused by obstructions in the cargo area that force cold air back to the TRU before the entire cargo area is at the set point, creating "hot spots" in the cargo area.

SOP – Standard Operating Procedure, a pre-requisite program of HACCP

SSOP - Sanitary Standard Operating Procedure, a pre-requisite program of HACCP

Strip Curtains – Plastic or rubber strips that can be installed inside the cargo area to restrict cold air egress or warm air ingress when doors are opened.

TCS – Temperature Controlled for Safety, a food group that is susceptible to unsafe temperature conditions and requires refrigerated transport for safety

Telematics – Real time monitoring systems for refrigerated cargo spaces. Telematic systems can monitor and report temperatures in pre-programmed increments of 5, 15, 30 and 60 minute intervals.

Temperature-controlled transport vehicles: Such as vans, semi-transport cars, transport vehicles, and railcars that have insolated and thermostatically controlled cargo compartments for transport of food and non-food items throughout the distribution network.

TRU – Transportation Refrigeration Unit, the operating unit on a transport vehicle, sometimes called the "reefer."

UCL – Upper Control Limit, the maximum safe temperature for a perishable food

Wash Ticket – A voucher issued to carriers as proof of cleaning.

13. Appendix

13.1. Airflow Considerations

Today's refrigeration units generally have plenty of cooling capacity to remove heat from pre-cooled cargo and its surroundings. However, because of poor loading, packaging, and unitizing practices, the refrigerated air delivered to the cargo space from the refrigeration unit cannot remove the heat from the perishable cargo and all sides of the load and then return the heat back to the refrigeration unit.

Proper airflow throughout the refrigerated box is critical in maintaining product quality. Poor air distribution is one of the primary causes of product deterioration. This is the case even when the refrigeration unit capacity is more than adequate.

When loaded correctly, there should be sufficient airflow to maintain cargo temperature throughout the entire cargo space. Physical obstructions or restrictions within the box can cause poor airflow and result in product 'hot spots.' Moreover, short cycling of conditioned air due to poor stowage can lead to hot spots in the load, which in turn causes many types of cargo losses. Improper stowage is a leading cause of poor temperature management and cargo losses. Inadequate airflow resulting from poor cargo stowage can also be a root cause of food quality and safety problems.

Computerized refrigeration units that sense and record short-cycling of improperly loaded transport vehicles have immediate practical applications by protecting carriers from high cargo temperature-related food safety and quality problems and unnecessary claims and litigation.

The refrigeration unit delivers conditioned air that either adds or removes heat from the air in the cargo space of the transport vehicle. The process of supplying conditioned air is called air distribution. The time to achieve the desired cargo temperature, called pull-down, depends on uniformly distributing the conditioned air to the cargo. Inadequate air distribution is a significant cause of perishable cargo losses, even with optimally designed refrigerated units and transport vehicles. Proper air distribution is essential to optimize temperature reduction (pull-down) and uniformly manage temperature throughout the load.

Good airflow management aims to circulate air around each chilled, perishable item and surround the entire load with conditioned air. The key to success is to avoid short-cycling of conditioned air and to permit conditioned air to flow unrestricted around the perishable items and to all six sides of the load.

Short-cycling is typically due to missing or damaged bulkheads and air ducts and/or vertical channels in the stowage of the cargo. Short-cycling permits conditioned air from the refrigeration unit to return prematurely to the refrigeration unit without adequately circulating the cargo. The refrigeration unit's performance is based on the air temperature that returns to the refrigeration unit's thermostat sensors. When the shipment is loaded correctly, the refrigeration unit's thermostat senses the temperature of air returning from the entire load. In contrast, when short-cycling occurs, the refrigeration unit may not operate at the desired performance level because the thermostat senses air that has bypassed some or most of the cargo.

Another leading cause of poor air distribution with tight loads is blockage of air by plastic wraps, slip-sheets, and two-way pallets or pallets with inadequate forklift pocket openings. Cargo should always be stacked on double-faced pallets with sufficient forklift openings on all four sides (four-way pallets). Moreover, plastic should not be wrapped around the unitized palletized loads of respiring cargo because

refrigerated air is needed to remove the heat of respiration. Using slip sheets positioned directly on flat surfaces or diamond plate floors is not recommended because conditioned air cannot flow under the cargo.

Stacking cargo directly on the floor or against the sidewalls can cause product warming or chilling. With palletized centerline loads, the shipment is held away from the sidewall and floor surfaces; there is no warming or cooling of the cargo due to contact with the sidewall or floor surface.

The majority of temperature management problems are preventable. Proper loading practices and airflow distribution are essential for maintaining desired temperature management. All those involved in handling perishable cargo can help improve temperature management and fewer cargo losses by ensuring a stowage checklist is followed. A sample Stowage Checklist has been provided in the Appendix of this document.

To create proper air circulation, adequate 'air' space around all six sides of the load is required. Every effort should be made to minimize airflow restrictions.

There are four (4) key factors to consider in achieving proper airflow:

- Floor Design and Cargo Placement: Minimizing airflow restrictions throughout the entire box is critical regardless of the floor design used. This ensures that air can reach the cargo quickly and efficiently. When using pallets, be sure they have open ends and sides that will allow unrestricted airflow both 'under and through' the slats from the front to the rear of the box. If using plastic wrap, do not install it below the top surface of the pallet. Using slip sheets and hand-stacking cargo is NOT recommended and is not optimal for cargo temperature management.
- Cleanliness: The inside of the box must be clean to prevent contamination hazards, and the floor channels and refrigeration unit return air stream must be free of obstructions and airflow restrictions. Loose debris, such as shrink wrap, paper, cardboard, or any other waste, can be pulled into the unit evaporator, resulting in insufficient airflow and potential cargo damage.
- Cargo Loading Patterns: Select a loading pattern that will provide sufficient airflow around and through the entire load. This ensures the refrigeration unit's conditioned air can reach all the cargo. Always leave adequate space between the top of the shipment and the ceiling. Too little space can cause the discharge air to 'short cycle' in the front of the box, resulting in 'too little' airflow in the rear. The result: the cargo in front will be too cold, and the cargo in the back will be too warm. Do not place cargo directly in front of or tightly against the refrigeration unit, walls, or doors. This will only prevent conditioned air from reaching portions of the cargo, inhibiting proper temperature.
- Blockage of Unit Evaporator Inlet and outlets (supply and return air registers): Ensure that the refrigeration unit evaporator inlet and outlet air paths are not obscured. If blocked, airflow and unit capacity will be reduced, making it difficult (perhaps impossible) for the unit to maintain cargo temperature.

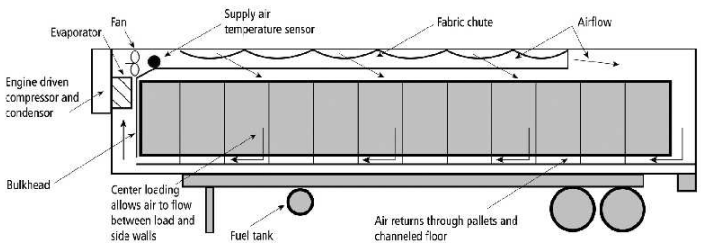


Figure 3. Courtesy of University of California Refrigerated Trailer Transport of Perishable Foods

13.2. Transport Vehicle Inspection Checklist

CRITICAL INFORMATION:		
Facility Information:	Shipper:	
	Bill of Lading Number:	
	Unit Number:	
	Ship Date:	
	Ship To:	
	Inspector:	
	Today's Date:	
Vehicle Information:	Trucking Line:	
	Driver's Name (Optional):	
	Transport vehicle License Number (Optional):	
	Transport vehicle Number:	
	License Plate (State):	

TRANSPORT VEHICLE OR TRANSPORT VEHICLE INSPECTION CHECK LIST:			
AREA	**ITEM**	**SATISFACTORY CONDITION**	
		YES	**NO**
Refrigeration Unit	Refrigerator Thermostat Properly Set		
	Refrigerator Unit Temperature Setting (Degree F):		Degrees
	Refrigerator Unit Operational		
	Vents Closed/Open		
Cleanliness	Overall Transport vehicle Condition		
	Floors Free of Rubbish, Product Residue or Insects		
	Walls Free of Product Residue and Tape		
	Drains Open & Unobstructed (Free Flowing)		
	Absence of Odor(s)		
Condition	Ceiling Undamaged		
	Air Delivery Chute Intact & Functional		
	Door Seals Intact & in Good Repair		
	Door Undamaged		
	Walls & Wall Insulation Undamaged		
	Floors in Good Repair		
FINAL RESULT:	**SATISFACTORY FOR LOADING**		
COMMENTS:			

13.3. Checklist for Properly Staging Products for Loading

- [ ] Verify Jacks and Forklifts are operational
    - [ ] Use approved equipment types for loading
    - [ ] Battery and/or fuel levels
- [ ] Verify Temperatures with properly calibrated devices
    - [ ] Cool Dock environment
    - [ ] Product pulping temperatures
- [ ] Verify Load and Pallet integrity
- [ ] Ensure BOL and shipper requirements and confirm load
    - [ ] Ensure that pallets are at proper height and will not block normal airflow
    - [ ] Ensure appropriate packaging of products to be transported before loading
    - [ ] Identify potential cross-contamination issues
    - [ ] Stabilize pallets
    - [ ] Shrink-wrap pallets
- [ ] Pre-position refrigerated products (pallets) near the dock door
    - [ ] Arrange pallets in accordance of loading sequence based on product mix, delivery schedule, or shipper requirements

Suggested steps include:

- [ ] Secure the Glad Hand Locks
- [ ] Secure the Wheel Chocks
- [ ] Ensure the transport vehicle is properly spotted in the Dock Door
- [ ] Ensure that the dock door is not opened until Transport vehicle is spotted and secured

Once the transport vehicle is physically secured and in position, warehouse personnel should:

- [ ] Secure the Dock Door Seals
- [ ] Raise the Dock Plate
- [ ] Ensure the Dock Light is “Green” before opening up the transport vehicle door

Next, check the condition of the transport vehicle compartments and components:

- [ ] Verify Operational Readiness of the Transport vehicle
    - [ ] No Debris/ Obstructions
    - [ ] Cleanliness Check (Free of pest, microbes, etc.)
    - [ ] Bulk Head(s) are functional
    - [ ] Straps and Load bars (E-tracks) are functional

13.4. Transport Vehicle Loading Checklist

- ☐ Verification of Product packaging
  - ☐ Crush proof
  - ☐ Non-vented for frozen products or chilled meat
  - ☐ Vented for fresh products
- ☐ Pre-cool and store cargo at desired temperature ‘Before’ loading
- ☐ Run Unit 20 minutes in High-Speed Cool and perform an Auto Pre-Trip to confirm proper operation
- ☐ Verify Set-Point temperature to ensure that it is set correctly
- ☐ Ensure correct selection of Continuous Run or CYCLE-SENTRY operating mode to prevent hot spots and top freezing
- ☐ Pre-cool transport vehicle/body to desired temperature
- ☐ Verify product temperature to confirm it is at the desired temperature
- ☐ Turn unit ‘OFF’ while loading to minimize inside and outside air exchange
- ☐ Air circulation is unobstructed around ALL six sides of load
- ☐ Stabilize the load to minimize ‘Load Shift’ risk and resulting cargo physical damage
- ☐ Initiate Defrost Cycle to clear evaporator coil and ensure maximum cooling performance

13.5. Stowage Checklist

- ☐ The floor is clean and free of debris and off-odors
- ☐ Transport vehicle interior is free from damage
- ☐ Door seals are in good repair and floor drains are open
- ☐ Transport vehicle is pre-cooled to the desired loading temperature
- ☐ The bulkhead is snug up against the ceiling, floor and sidewalls
- ☐ Palletized cargo is stowed on clean, four-way pallets with openings on all four sides
- ☐ Cargo does not block the evaporator discharge outlet or return air inlet
- ☐ Cargo is stowed without chimneys or vertical air paths to avoid short cycling of cold air
- ☐ Chilled cargo is stowed loosely (not tightly block stowed) with specified spacing between the load and the evaporator inlet and outlet, ceiling, sidewalls, floor, and rear divider
- ☐ Freeze cargo is block stored (solid stow) with specified spacing between the load and the evaporator inlet and outlet, ceiling, sidewalls, floor and rear divider
- ☐ Cargo is stowed with spacer of at least 3” between the bag and the side walls
- ☐ Cargo is stowed 3” between the rear of the load and the divider bulkhead (multi-temp)
- ☐ Cargo is stowed at least 9” between the top of the load and the ceiling
- ☐ Warmer dry or refrigerated cargoes are separated from cooler chilled cargoes by a space to avoid unwanted heat transfer
- ☐ Airflow is not blocked by ice, slip sheets, dunnage or plastic wraps
- ☐ Packaged iced cargo is not stowed on top of other cargo
- ☐ Cargoes stowed in the same transport vehicle are compatible with regard to temperature, humidity, ethylene, atmosphere and odors
- ☐ Portable temperature recorders are positioned to sense cargo air temperatures (generally on the top of load about 1/3 to 2/3 of the way to the rear of the load)

13.6. Shipping Checklist

CRITICAL INFORMATION:		
Customer Name:		
Customer Contact:		
Customer Phone:		
Customer Fax:		
Load Information:	Purchase Order or Release Number:	
	Number of Cases or Units:	
	Number of Different Items in Load:	
	Type of Loading (pallet, floor, slip sheets):	
	Temperature of Load (chilled or frozen):	
	Estimated Arrival Time at Facility:	
	Participating Pallet Exchange Program?	
	Name of Carrier:	

ACTION ITEM:		RESPONSIBLE PARTY:	COMPLETED BY:	DATE & TIME:
Assign or record PO or Release Number				
Obtain loading diagram from customer				
Notify shipping dock of truck arrival				
Collect appropriate paperwork from driver				
Collect appropriate I.D. from driver (photo or copy of Driver's License)				
Document truck arrival time at plant				
Verify customer data from table above				
Resolve any discrepancies in paperwork, notify customer of any changes				
Assign shipping door for loading				
Send appropriate paperwork to shipping dock supervisor				
Enter data into database (if appropriate)				
Verify the condition (cleanliness and odor) of the transport vehicle. If dirty, have driver take appropriate cleaning action(s) or contact the customer for additional direction				
Ensure proper transport vehicle position at dock, verify that safety procedures have been followed (wheel chocks, ICC bars, dock plate, etc.)				
Document any transport vehicle damage (insulation or door closures and seals)				
Verify that floor drains are closed				
Verify that transport vehicle refrigeration unit is running and that the transport vehicle is pre-cooled				
Collect Appropriate Loading Data:	Load Pick Up or PO number			
	Arrival time at dock			
	Start time of loading			

Collect Appropriate Loading Data:	End time of loading			
	Thermostat setting			
	Number of pallets in the truck at arrival (for pallet exchange programs)			
Obtain proper product for shipment from warehouse or staging area				
Cross-Check Loading Process:	Verify case counts			
	Cross-check item codes (SKU)			
	Cross-check lot numbers			
	Cross-check delivery and pick tickets			
	Collect “catch” or “take” weights, if required by the customer			
Cross reference load information with Purchase Order (PO), correct any discrepancies				
Request that the driver count the products submitted for shipment (Optional, if the driver is allowed on the dock)				
Have the driver sign the delivery ticket				
Close the transport vehicle doors upon completion of loading and verification. If the transport vehicle is sealed, record the seal number				
Verify that all information on this form is correct, signatures and date/time is entered.				

13.7. Arrival Procedures – Inbound Carrier

Processes and procedures will vary from site to site; the following list is an example of commonly seen procedures.

- ☐ Upon arrival, driver proceeds to the pre-designated check-in location (Guard Shack, Office or Welcome Center)
- ☐ Check-In personnel obtains appointment number and the Bill of Lading (BOL) from driver
- ☐ Check-In personnel verifies that the driver is at the correct location
  - If not, driver advised to contact his/her dispatch
  - If so, procedure to check in procedure
- ☐ Driver is "logged" into facility (electronic or paper/manual process).
- ☐ Collect Information:
  - ☐ Carrier Name
  - ☐ Driver Name
  - ☐ Arrival Time
  - ☐ Transport vehicle/Cab Numbers
  - ☐ DL/Identification Number
- ☐ Verify if a seal is required and present
  - ☐ Inspect the transport vehicle for seal
  - ☐ Verify seal number against paperwork for match

    Note: If a seal is required but not present you should document exceptions on internal documentation (transport vehicle inspection logs or other forms) and BOL (i.e. Broken, Missing, Invalid/No Match). Company, or Customer Specific procedures should be followed for dealing with exception, including but not limited to:

    - Contact the customer to determine handling requirements
    - Determine if load should be accepted:
      - If accepted, follow remaining arrival procedures
      - If rejected, notify carrier/carrier dispatch and document accordingly
- ☐ If the site is an appointment-only site, then the check-in personnel should validate the driver's appointment
- ☐ If an appointment is verified, then driver should be assigned staging location (Dock Door, Drop Lot or Sit-Lot)
- ☐ If no appointment, then the driver should contact their dispatcher to verify
- ☐ Non-Appointment sites will follow similar procedures as above, but likely on a first-come/first-serve basis
- ☐ Any discrepancies or variations to expectations on the inbounding of the carrier should be noted with detail in the event of need for further follow-up
- ☐ Upon completion of arrival process, staging and/or unloading procedures will be followed.

13.8. Arrival Procedures – Outbound Carrier

Processes and procedures will vary from site to site; the following list is an example of commonly seen procedures.

- ☐ Upon arrival, driver proceeds to the pre-designated check-in location (Guard Shack, Office, Welcome Center)
- ☐ Driver provides appointment number and any other appropriate or required documentation to the check-in personnel
- ☐ Driver verification is determined
    a. Correct location, destination, and consignee
    b. Appointment-only site; verify appointment
    c. Non-appointment site; first come, first served
    d. Discrepancies should be noted
- ☐ Driver is "logged" into facility via established process (electronic or paper/manual):
- ☐ Collect Information:
    - ☐ Carrier Name
    - ☐ Driver Name
    - ☐ Arrival Time
    - ☐ Transport vehicle/Cab Numbers
    - ☐ DL/Identification Number
- ☐ Once verified and logged in, drivers are directed to appropriate staging location and load (Dock Door, Drop Lot or Sit-Lot).

13.9. Receiving Checklist

CRITICAL INFORMATION:		
Customer Name:		
Customer Contact:		
Customer Phone:		
Customer Fax:		
Load Information:	Purchase Order or Release Number:	
	Number of Cases or Units:	
	Number of Different Items in Load:	
	Type of Loading (pallet, floor, slip sheets):	
	Temperature of Load (chilled or frozen):	
	Estimated Arrival Time at Facility:	
	Participating Pallet Exchange Program?	
	Name of Carrier:	

ACTION ITEM:		RESPONSIBLE PARTY:	COMPLETED BY:	DATE & TIME:
Assign or record PO or Release Number				
Obtain loading diagram from customer				
Notify shipping dock of truck arrival				
Collect appropriate paperwork from driver				
Collect appropriate I.D. from driver (photo or copy of Driver's License)				
Document truck arrival time at plant				
Verify customer data from table above				
Resolve any discrepancies in paperwork, notify customer of any changes				
Assign shipping door for loading				
Send appropriate paperwork to shipping dock supervisor				
Enter data into database (if appropriate)				
Verify the condition (cleanliness and odor) of the transport vehicle. If dirty, have driver take appropriate cleaning action(s) or contact the customer for additional direction				
Ensure proper transport vehicle position at dock, verify that safety procedures have been followed (wheel chocks, ICC bars, dock plate, etc.)				
Document any transport vehicle damage (insulation or door closures and seals)				
Verify that floor drains are closed				
Verify that transport vehicle refrigeration unit is running and that the transport vehicle is pre-cooled				
Collect Appropriate Loading Data:	Load Pick Up or PO number			
	Arrival time at dock			
	Start time of loading			

	End time of loading			
	Thermostat setting			
	Number of pallets in the truck at arrival (for pallet exchange programs)			
Obtain proper product for shipment from warehouse or staging area				
Cross-Check Loading Process:	Verify case counts			
	Cross-check item codes (SKU)			
	Cross-check lot numbers			
	Cross-check delivery and pick tickets			
	Collect “catch” or “take” weights, if required by the customer			
Cross reference load information with Purchase Order (PO), correct any discrepancies				
Request that the driver count the products submitted for shipment (Optional, if the driver is allowed on the dock)				
Have the driver sign the delivery ticket				
Close the transport vehicle doors upon completion of loading and verification. If the transport vehicle is sealed, record the seal number				
Verify that all information on this form is correct, signatures and date/time is entered.				

14 Certified Cold Carrier Program

The Certified Cold Carrier is a formal program aligning asset-based carriers and personnel with The Global Cold Chain Alliance's (GCCA) "Cold Chain – Transportation Best Practices Guide." This program has two tangible benefits to stakeholders: 1) it will recognize carrier organizations for their commitment to the sanitary and safe transportation of perishable products, and 2) it will assist shippers in identifying certified carriers in the industry.

GCCA created the Certified Cold Carrier program with industry experts to ensure the highest quality and safety standards in transporting temperature-sensitive goods. This program provides carriers with the necessary tools and resources to handle, store properly, and transport perishable products, such as food, pharmaceuticals, and other temperature-sensitive items.

The Certified Cold Carrier program is not only beneficial for carriers but also for shippers and consumers. Shippers can have peace of mind knowing that their products are being transported by carriers who have undergone rigorous training and are held to the highest standards. Consumers can trust that their products have been safely transported and maintained at the proper temperature throughout the supply chain.

By implementing the Certified Cold Carrier program, GCCA is working towards creating a more efficient and reliable cold chain system. Furthermore, it positively impacts the global economy and the health and well-being of consumers worldwide. The Cold Carrier program provides independent, third-party assurance that your asset-based carrier company is aligned with industry-prescribed best practices for the safe and sanitary transport of food perishables. These best practices are published in GCCAs and are based on the Sanitary Transportation of Human and Animal Food (STF) rule of the U.S. Food Safety Modernization Act (FSMA).

The Certified Cold Carrier has two major components: 1) Carrier conformance with the STF by adopting the GCCA Best Practices Guide and 2) Carrier proof of knowledge for management personnel on specific Best Practice Guide requirements. For the program to be successful, carriers provide proof of conformance for each fleet to the Best Practice Guide and proof of knowledge of carrier management personnel.

- Detailed information and application materials are found at: https://www.gcca.org/about/cold-chain/certified-cold-carrier-program/
- An example application can be found at https://www.gcca.org/wp-content/uploads/2023/02/sample-CCC-application-with-attachments-2021.pdf.

Example Specification; Certified Cold Carrier: [Company] uses its best efforts to provide transportation services in conformance with Federal and State rules governing the safe transport of food. [Company] also prioritizes using partner terminals [or appropriate description] knowledgeable of safe transport food rules and best practices. Therefore, notwithstanding the other provisions of this agreement, the partner terminals shall demonstrate knowledge of the safe transport of food by successful recognition

as a Certified Cold Carrier (CCC) within six months of this agreement. The Certified Cold Carrier is an independent, third-party certification administrated by the Global Cold Chain Alliance, and information about the CCC is provided upon request or at the Global Cold Chain Alliance website.

The partner terminal will be considered non-compliant with contract terms if it does not receive CCC certification within six months of the contract date. The time of compliance for the CCC award can be extended beyond six months only if the partner terminal provides a pending CCC application.

15. Legacy Publication

In April 2016, the U.S. Food and Drug Administration (FDA) published its Final Rule for the Sanitary Transportation of Human and Animal Food (STF). Effective June 6, 2016, the rule established requirements for shippers, loaders, carriers (by motor or rail), and receivers to implement documented sanitary practices ensuring the safety of human and animal food during transport.

The rule was part of the FDA's broader initiative to prevent food safety risks throughout the supply chain, fulfilling mandates under the Sanitary Food Transportation Act of 2005 (SFTA) and the Food Safety Modernization Act of 2011 (FSMA). The STF seeks explicitly to prevent unsafe practices such as failure to refrigerate food properly, inadequate cleaning of vehicles between loads, and improper food protection during transport.

Recognizing the importance of these new requirements, the International Refrigerated Transportation Association (IRTA) developed the Refrigerated Transportation Best Practices Guide to help industry members comply with or exceed STF expectations. The Guide provides practical guidance for maintaining food safety and quality throughout transportation and distribution, reinforcing the cold chain industry's commitment to consumer protection.

The first edition of the Guide was published in 2016, following extensive input from a multidisciplinary Task Force of industry experts representing transportation companies, academia, warehouse operators, and equipment suppliers. The authors and Task Force members are below:

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