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Shipment of Perishable Products and Dry Ice Usage

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Internet and mail order marketing strategies present individuals with value-added products an alternative avenue to target consumers across the United States and around the world. However, in some instances it is not a matter of selling the product but delivering it to the customer. This is especially true with perishable products like meat, fish, poultry, ice cream and other frozen or perishable products.

The purpose of this information sheet is to provide general information regarding the shipment of perishable products. The information sheet will provide an overview of the regulations of shipping perishable food goods, list the advantages and disadvantages of using dry ice to ship perishables and give possible alternatives to dry ice. The document will also provide an overview of the regulations that govern the shipment of dry ice and dry ice packaged goods. The Appendix to this information sheet will include distributors of dry ice in Tennessee and Northern Alabama and companies that sell insulated boxes used to ship products packaged with dry ice and other coolants.

Shipping Perishable Products

There are several federal rules that govern the shipment of perishable goods. These rules are set by the United States Department of Transportation (DOT) and the International Air Transport Association (IATA). It is extremely important that regulations for perishable products be followed to ensure that fresh products are delivered to the consumer. In order to ensure that all rules are being followed you should consult the package carrier **prior** to shipment of the goods to determine specific regulations they may require.

To understand whether or not the good you are shipping is perishable, you should refer to the definition set by the IATA. They define a shipment as perishable if its contents *deteriorate over a given period of time if exposed to harsh environmental conditions, such as excessive temperature or humidity*. Once it is established that the product you plan to ship is perishable, you will need to proceed with the recommended practices of the carrier. A method of shipping a perishable product would be to freeze the good or refrigerate the product in transit.

Dry Ice and Alternatives

Dry ice is the solid form of carbon dioxide and is extremely cold (-109.5°F). However, carbon dioxide is commonly found in the earth's atmosphere in its gaseous state. Dry ice will change directly from a solid to a gas at a rate of 5-10 pounds per 24 hours in a cooler. One of the most beneficial characteristics of dry ice is that it changes from liquid to gas during the thawing process, thus giving it the name of "dry ice." This is advantageous in comparison to water ice since there is not a liquid state and will not saturate the package and product with water. The biggest drawback to using dry ice is the level of regulations that govern its use. Specifically, the rules are based on the hazardous nature of dry ice. The potential hazards of dry ice during transportation include explosion, suffocation and contact hazards. However, the risks with each of these can be addressed with proper planning and preparation.

In his 2003 publication, Andy Glode, with the University of New Hampshire, outlined five basic requirements for shipping with dry ice. The requirements are presented below:

1. Gas venting: packages must allow for release of carbon dioxide gas. Dry ice must never be sealed in a container with an airtight seal such as a jar with a threaded lid or a plastic cooler.
2. Package integrity: a package containing dry ice must be of adequate strength for intended use. It must be strong enough to withstand the loading and unloading normally encountered in transport. It must also be constructed and closed in order to prevent any loss of contents that might be caused by vibration or by changes in temperature, humidity, or altitude.
3. Package materials: do not use plastics that can be rendered brittle or permeable by the temperature of dry ice. This problem can be avoided by using commercially available packages intended to contain dry ice.
4. It is possible that the carrier of the package will have specific labeling when using dry ice. It is important to consult the package carrier when you are shipping dry ice to determine their specific labeling requirements.
5. Labeling: the outermost container must be labeled with a hazard class 9 label, UN 1845, and total weight of dry ice in kilograms. (See sample dry ice label that follows) The label should be affixed to a vertical side of the box (not the top or bottom) and oriented as in the figure below. (Glode, 2003)



Dry Ice Label

In some cases, dry ice is made by the shipper of the perishable product from liquid CO₂. The resulting dry ice snow is packed in the top of a shipping container offering extended cooling without electrical refrigeration equipment and connections. When shipping with dry ice, it is important to determine the amount of dry ice needed to maintain the desired temperature of the product throughout transit. The following table will provide a general rule of thumb for shipping frozen goods with the assistance of dry ice. However, it is recommended that you consult a professional dry ice dealer to determine the exact amount of dry ice needed for your shipment.

TABLE OF AVERAGE AMOUNTS OF DRY ICE FOR PACKING FROZEN GOODS IN A SINGLE CONTAINER

Weight of Frozen Good	Time In Transit			
	4 Hours	12 Hours	24 Hours	2 Days
2 LB	2 LB Dry Ice	4 LB Dry Ice	8 LB Dry Ice	16 LB Dry Ice
5 LB	3 LB Dry Ice	6 LB Dry Ice	10 LB Dry Ice	18 LB Dry Ice
10 LB	4 LB Dry Ice	8 LB Dry Ice	14 LB Dry Ice	24 LB Dry Ice
20 LB	5 LB Dry Ice	10 LB Dry Ice	20 LB Dry Ice	30 LB Dry Ice
50 LB	10 LB Dry Ice	20 LB Dry Ice	35 LB Dry Ice	50 LB Dry Ice
For each additional day add 8 to 15 pounds.				

Source: <http://www.dryiceinfo.com/shipping.htm>

Since dry ice is extremely regulated by the DOT and IATA, it is sometimes preferred to ship using alternative cooling products. These products include but are not limited to self-contained gel coolants. This type of product is commonly used in children’s lunch boxes to keep the contents cool. This is an alternative that is less regulated than dry ice. Other alternatives exist, but it is imperative to consult your package carrier prior to using them for shipping regulations.

Conclusion and Dry Ice Suppliers

Dry ice is an acceptable coolant to use when shipping perishable products. However, it has several potential hazards that should be addressed in order to insure safe handling and arrival of your perishable product. Potential limits to using it are the availability of dry ice and secure shipping containers. The Appendix includes a list of dry ice suppliers in Tennessee and dry ice container supplier. Before using dry ice as a coolant when shipping a perishable product, it is important to consult the package carrier and the dry ice supplier. For further information, the list of additional resources and references provides several websites concerning package carrier’s stipulations and dry ice safety when shipping perishable products and or using dry ice.

Additional Resources and References

DryIceInfo.com “The Worlds Leading source of Information about Dry Ice” <http://www.dryiceinfo.com/>

Glode, Andy; “UNH Guide to Shipping with Dry Ice” University of New Hampshire
<http://www.unh.edu/ehs> ; June 9, 2003.

“Packaging Pointers: Perishable Shipment” Federal Express;
http://www.fedex.com/us/services/pdf/PKG_Pointers_Perishable.pdf?link=4

“Perishables – C022.3.2” United States Postal Service;
<http://pe.usps.gov/cpim/ftp/manuals/dmm/C022.pdf>

Appendix

Dry Ice Suppliers in Tennessee and Northern Alabama

Company Name	City	State	Telephone Number
Cope Carbonic	Nashville	TN	615-255-2011
Continental Carbonic Products	Nashville	TN	615-333-3433
Reddy Ice Co.	Nashville	TN	615-350-8800
Advantage Dry Ice	Hendersonville	TN	615-338-4505
Paine Distributor	Nashville	TN	615-248-2888
Airgas Dry Ice	Memphis	TN	901-345-3234
NexAir	Memphis	TN	901-794-8037
NexAir	Memphis	TN	901-523-6888
Continental Carbonic Products	Loudon	TN	865-458-7196
Fire Extinguisher Co.	Knoxville	TN	865-523-7710
Continental Carbonic Products	Chattanooga	TN	423-622-6408
Dry Ice Sales	Chattanooga	TN	423-622-6408
East Tennessee Dry Ice	Greeneville	TN	423-638-1020
C.A.M. INE	Huntsville	AL	256-534-1008
Shaw Ice Co.	Athens	AL	256-729-1020
Home Ice Co.	Decatur	AL	256-353-4234
Airgas Carbonic	Decatur	AL	256-355-7095
Reddy Ice Co.	Huntsville	AL	256-533-0214

<http://www.dryicedirectory.com/>

Shipping Container Information

R.N.C. Industries has containers that can be used to ship perishable goods in dry ice through a carrier. For specific information contact them at the below information:

R.N.C. Industries
Norcross, GA
888-844-3864
FAX 770-368-8490

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