1 Introduction

Perishable foodstuffs are transported for short and long distances in the different climatic conditions. This transport is not only within the European Union, but it is also carried out by all modes of transport between the continents. Means of transport have to have the transport space with isothermal refrigerating or freezing equipment. It depends on the kind of freight that is transported.

Retention the quality of transported foods can be ensured only by respecting the conditions, which the relevant legislation determines. Also, it can be ensured quickly transit in the correct vehicles of transport that they monitor temperature inside the cargo space. Therefore, emphases should be placed on technical equipment of transport equipment. The safe and quickly international and national transportation of perishable foods is possible only when the same rules following. Therefore, this problem pays longer attention to the national and international levels. [3,5]

2 Legislation governing the transport of perishable foodstuffs

Transport of perishable foodstuffs are governed by ATP (Agreement on the International Carriage of Perishable Foodstuffs and on the Special Equipment to be Used for such Carriage). That agreement was concluded in Geneva 1.9 1970 and it entered into force on 21.11. 1976. If the traffic and transportation vehicles used for international transport of perishable foodstuffs are identified to as insulated, refrigerated, mechanically refrigerated or heated and they must comply with the definitions and standards, which are specified in agreement.

Agreement ATP includes:

- provision of specialized transportation and means of transport,
- the statutes on the use of specialized transportation and means of transport for the international carriage concrete of perishable foodstuffs,
- various and final provisions,
- definition of standards and specification specialized vehicles for the transport of perishable foodstuffs (annex 1),
• choice of means of transport and temperature conditions for the transport of deep-frozen and frozen food (annex 2),

• temperature conditions for the transport of certain types of foods that they aren’t frozen or deep-frozen (Annex 3).

Carriage of perishable foodstuffs governed by decree of the Minister of Foreign Affairs no. 61/1983 coll. about the Agreement on the International Carriage of Perishable Foodstuffs and on the Special Equipment to be used for such Carriage (ATP). [1,2]

2.1 The special Equipment

For the transport of perishable foodstuffs using different special equipment. The various types are described in the following sections of this article.

**Isothermal means of transport**

Isothermal means of transport have so called box. This box is constructed with insulating walls, door, floor and roof. A tank of means of transport has box, which is its own a custom tank. These boxes prevent heat exchange between the inside and the outside so that, under the overall heat transfer coefficient can be the means included in the following two categories:

- isothermal means of transport with normal insulation (IN),
- isothermal means of transport with heavy insulation (IR).

**Refrigerated means of transport**

This kind of mode of transport isn’t used as a source of cold engine or absorption unit, but natural ice with or without the addition of salt, dry ice with his control or not and so on. Such cooling of lowering the temperature inside the box. Such cooling keeps it at the required temperature even when outside the average temperature of +30 °C. In case the transport means comprises one or more chambers, tanks or containers for coolant they have to be designed so that they can fulfill respectively amended in the outdoors.

**Mechanically refrigerated means of transport**

These transport means are actually insulated transport means, except that they have their own cooling or the inclusion of a number of units may have a common cooling device (mechanical compressor unit, absorption equipment, and etc.). These devices have to an external temperature of 30 °C to lower the temperature inside the box and they took her to keep to the following:
• Class A - between 12 °C and 0 °C inclusive,
• Class B - between 12° C and -10 °C inclusive,
• Class C - between 12° C and 20° C inclusive,
• Class D - equal to or less than 0° C,
• Class E - equal to or lower than -10° C,
• Class F - equal to or lower than -20° C.

**Heated means of transport**

It is an isothermal means of transport, which has the effect scale up the internal temperature of the empty box and at least 12 hours to maintain the temperature, without further heat input. The temperature during these 12 hours should be stable for at least +12 °C. The average outdoor temperature may be doing so:

• - 10 °C for class A of the heating means of transport,
• - 20 °C for class B of the heating means of transport.

### 3 Requirements Transport of Perishable Foodstuff

The temperature during the transport of perishable foodstuffs is very important because a critical change in temperature may cause danger in safety food. When transporting frozen and deep-frozen foods should always be a means of transport or container pre-cooled sufficiently. That one uses a means of transport or container have to always provide:

• means of transport for transporting perishable foodstuffs weren´t marked as insulated, refrigerated, mechanically refrigerated or heated. So it can be marked only means of transport which suit to the definitions and standards laid down in the ATP Agreement,
• properly loading cargo in transport vehicles or containers so to cargo was safety by the instrumentality of the heat from the outside,
• correct operation of the cooling unit and the correct setting of the thermostat,
• appropriate method of unloading at the terminal site (especially the time and frequency of door opening)
• adequate maintenance of the insulated box and cooling system, thorough cleaning of transport vehicles or containers.

Perishable foodstuffs are divided into two groups in agreement with ATP. The division is in the table the number 1. [1]
3.1 Choosing a suitable means of transport for transporting frozen or deep-frozen foods

When we choosing a means of transport frozen or quick-frozen foods, we should keep following points:

- we need to choose the suitable means and we apply it so to the highest temperature of food during transport doesn’t exceed a specific temperature,
- from 01.01 2006, all measuring instruments used to monitor temperature have to satisfy the requirements of EN 12830, EN 13485 and EN 13486,
- during the regional distribution of the ambient air temperature measured by means of transport at least one easily visible thermometer,
- food temperature during loading, during transport and unloading shall be equal to a specified temperature or be lower,
- if it is necessary to open during carriage means of transport have to be ensured in order to meet the objectives of the International Convention on the Harmonization of input goods of border controls.

3.2 Choosing a suitable means of transport for transporting refrigerated food

When we choosing a means of transport refrigerated foods, we should keep following points:

- we need to choose the suitable means and we apply it so to the highest temperature of food during transport doesn’t exceed a specific temperature,
- food temperature during loading, during transport and unloading shall be equal to a specified temperature or be lower,
• if it is necessary to open during carriage means of transport have to be ensured in order to meet the objectives of the International Convention on the Harmonization of input goods of border controls,
• temperature control of foods shouldn’t cause them to freeze these foods.

3.3 Distinctive marks placed on the means of transport

Every means of transport that meets the requirements of ATP has certificate and the certification label. As well it has also assigned a distinctive mark that determines the temperature ranges for the resource to be sustained during transport. Distinctive marks consist of big Latin letters in dark blue on a white background. The letters shall be not less than 100 mm for the distinctive marks and at least 50 mm for the expiry date. Distinctive marks and symbols expiry shall be fixed at least from the outside on both sides in the upper corners near the front. [1]

Tab. 2 Distinctive marks means of transport

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Distinguishing mark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normally insulated equipment</td>
<td>IN</td>
</tr>
<tr>
<td>Heavily insulated equipment</td>
<td>IR</td>
</tr>
<tr>
<td>Class A refrigerated equipment with normal insulation</td>
<td>RNA</td>
</tr>
<tr>
<td>Class A refrigerated equipment with heavy insulation</td>
<td>RRA</td>
</tr>
<tr>
<td>Class B refrigerated equipment with heavy insulation</td>
<td>RRB</td>
</tr>
<tr>
<td>Class C refrigerated equipment with heavy insulation</td>
<td>RRC</td>
</tr>
<tr>
<td>Class D refrigerated equipment with normal insulation</td>
<td>RND</td>
</tr>
<tr>
<td>Class D refrigerated equipment with heavy insulation</td>
<td>RRD</td>
</tr>
<tr>
<td>Class A mechanically refrigerated equipment with normal insulation</td>
<td>FNA</td>
</tr>
<tr>
<td>Class A mechanically refrigerated equipment with heavy insulation</td>
<td>FRA</td>
</tr>
<tr>
<td>Class B mechanically refrigerated equipment with heavy insulation</td>
<td>FRB</td>
</tr>
<tr>
<td>Class C mechanically refrigerated equipment with heavy insulation</td>
<td>FRC</td>
</tr>
<tr>
<td>Class D mechanically refrigerated equipment with normal insulation</td>
<td>FND</td>
</tr>
<tr>
<td>Class D mechanically refrigerated equipment with heavy insulation</td>
<td>FRD</td>
</tr>
<tr>
<td>Class E mechanically refrigerated equipment with heavy insulation</td>
<td>FRE</td>
</tr>
</tbody>
</table>
In the picture number 1 we can see a pattern of distinctive mark. FRC us indicates that it is a mechanically refrigerated means of transport with heavy insulation class C. The numbers indicate the completion of the certificate. We number 02 indicates that the month it is (February) and 2011 for which expiration year.

**Fig. 1 Pattern distinctive mark**

![Distinctive mark](source)

### 4 Conclusion

The article was about transport of perishable foodstuffs. In the first part of this article was mentioned legislation, which directs the transport of perishable foodstuffs. It is international agreement ATP or decree of the Minister of Foreign Affairs no. 61/1983 Coll .. Agreement ATP distributes special means of transport in four classes, which were described in the article. For the transport of perishable foodstuffs are various requirements that have to be met to avoid damage.

It is therefore necessary to choose the appropriate means of transport for the transport of deep-frozen or frozen foods and refrigerated foods. When choosing, it is necessary to fulfill some necessary points that were mentioned in the article. Each one means of transport that meets the requirements of ATP have to be certified, the certification label and distinctive mark. The distinctive marks are written in the table, which can also be found how the transport or the transport vehicle in question.
References


[7] VEGA No. 1/0331/14: Modelling of Distribution Logistics System with Using Software Solutions. Faculty of Operation and Economics of Transport and Communications, University of Zilina

Resume

This article is about transport of perishable cargo, specifically foodstuffs. There are also mentioned legislative conditions, which have to be respected during transport. We can find information about special means of transport, which are applied for transport and specific requirements for transport of deep-frozen, frozen and chilled foods. In this article are also mentioned distinguishing marks, which determine the temperature range during transport of food.

Key words

Perishable foodstuffs, ATP agreement, means of transport.
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