INTERNATIONAL SEVEN JOURNAL
OF MULTIDISCIPLINARY
ISSN: 2764-9547

Dangerous goods export procedures

Tramites de exportações de cargas perigosas

DOI: 10.56238/isevmjv2n6-008
Receipt of originals: 20/11/2023
Publication acceptance: 12/06/2023

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ABSTRACT

This work aims to know the process of exporting dangerous cargo, which tends to be somewhat cautious, since it is necessary to follow rules and regulations, being indispensable in this operation. The risk content of this segment is characterized as explosives, flammable liquids, oxidants, poisons, corrosives, and pollutants, as defined by Law 10.233/01. One of the main entities that regulate the export procedure is the IMDG (International Maritime Dangerous Goods). That it has all the means for conservation, packaging, labeling, documentation, ballast and all the steps up to the recipient, in relation to the goods, being a standard that is prepared to deal with emergencies during transport and ensuring the safety of all. The study in question aims to obtain information about the export process, highlighting its economic importance and the specific procedures in the Brazilian market, which steps to be followed. The research will address explore the challenges involved in this process, in summary, the study seeks to clarify the steps and obstacles required in the export of dangerous cargo.

Keywords: Export, Cargo, Dangerous, Standards.

1 INTRODUCTION

The evolution of society is closely linked to the transport and movement of cargo; either in the displacement of raw materials or in that of intermediate or finished products. In this sense, logistics has proven to be important for the movement of cargo and the growth of production in a region. In 2022, Brazil's trade flow abroad was US$ 606.7 billion, divided between exports of US$ 334.1 billion and imports of US$ 272.6 billion (MDIC, 2023).

This volume of trade makes it possible to deduct the share of cargo handling and the treatments given for each type of product transported, in addition to compliance with legal

requirements for packaging, volume, weight and type of vehicle suitable for this movement; including the documentary part to meet the needs of foreign trade in the export and import process.

According to Law 10.233/01 and the National Department of Transport Infrastructure (DNIT), the agency responsible for Transport Infrastructure in Brazil, in which dangerous cargo is characterized as cargo that has explosives, flammable liquids, oxidants, poisonous, corrosive and pollutants. Therefore, ANTT No. 5232/16 establishes what dangerous products are, defining their rules, identifying how to transport them.

When you intend to transport these cargoes to other countries, that is, to export, it is essential to know the rules of the countries, because when it comes to dangerous cargo, each country will have its own rules, requirements and necessary regulations, in addition to the fact that the IMDG (International Maritime Dangerous Goods) code establishes international standards that all countries must follow. In this code, the internationalization of these cargoes is specifically agreed, as they contribute with precise care and a low margin of risk of accidents to the cargo, in addition to having all the means for conservation, packaging, labeling, documentation, ballast and all the steps up to the recipient in relation to the goods.

> IMDG Code means the International Maritime Dangerous Goods Code (IMDG), adopted by the Maritime Safety Committee of the Organization by resolution MSC.122(75), as may be amended by the Organization, provided that such amendments are adopted, entered into force and take effect in accordance with the provisions of Article VIII of this Convention relating to the procedures for amendments applicable to the Annex, except for Chapter I. (INTERNATIONAL CODE OF DANGEROUS GOODS, BRAZILIAN NAVY WARNING, 2013)

In addition, the procedure of this export tends to require a delineation and compliance with international regulations and standards, intending to ensure environmental and personal safety. Therefore, the general objective of this study is to present information about the process of exporting dangerous cargo, showing its relevance in the economy and valuing the processes of the Brazilian market. This idea was defined with the purpose of facilitating access to information on the stages of the export of dangerous cargo, and clarifying the subject, in view of this, the justification of what dangerous cargo is will be presented, and explore the export procedures. So, what are the necessary obstacles in an export of dangerous goods?

2 THEORETICAL BACKGROUND

For the dissertation of the theme, it is of paramount importance to present what cargoes are, as well as to address the concept of export.

According to the Brazilian dictionary (2023) cargo is everything that is or can be transported or supported by a person, animal, vehicle, device and structure, while in logistics, cargo is something fundamental to the operating process of any company, the displacement of this cargo involves planning, control and organization, cargo is usually divided into several types, however, there are six categories that encompass them, namely: Containerized cargo, liquid cargo, chemical, hazardous and toxic cargo, refrigerated cargo and dry cargo.

Exporting is a process of selling, shipping, or donating goods, goods, and services from one country to another. According to the Comexvis portal, Brazil exported 334,136 million dollars in 2022, the operation is divided into two classes, direct export, which according to the Ministry of Foreign Affairs (2011) is an operation of which exported product is invoiced by the producer or importer himself. Indirect export, according to MRE (2011), is an operation carried out through a company already established in Brazil, which acquires goods to export them.

2.1 DANGEROUS GOODS

The term Dangerous Cargo is derived from any merchandise that can cause damage to the environment and the health of the population, it is classified by its main characteristics and divided into 9 classes that were defined by ANTT resolution No. 5.232/16 being class 1 - explosives, class 2 - gases, class 3 - flammable liquids, class 4 - flammable solids, class 5 - oxidizing substances, class 6 - toxic substances, class 7 - radioactive materials, class 8 - corrosive, class 9 - various hazardous substances, that is, everything that comes from substances that have physicochemical properties are considered dangerous products, considering their dangerousness care must be taken about some factors, such as the way of interaction with the air, the means of transport selected, the level of bodily contact it is possible to have with these substances, among others.

As classified by the National Land Transport Agency (ANTT), cargo is separated by classes, within which it has:

- CLASS 1- EXPLOSIVES

Explosives are a substance or a mixture of substances that have the power to produce with great velocity gases and release of heat and the sudden expansion of pressure, that is, it has the ability of great destruction with velocity, heat and pressure, explosives can be considered solid or liquid some products that fit into these classes are: Dynamite, grenades, lead azide, gunpowder, nitroglycerin, among others.

- CLASS 2 – GAUZE

Flammable gases are substances in which it is very easy to combust, depending on the type of gas, it is possible to explode when there is contact with oxygen, when having contact with some source of heat generated by flames or sparks. Describing this substance as something very dangerous, because by any carelessness, it can spread easily through the air, even if it has no smell. Examples: Cooking gas, chlorine, and ammonia.

- CLASS 3 - FLAMMABLE LIQUIDS

Flammable Liquids, everything that has liquids at the flash point, less than or equal to 60ºC, are equivalent to the flammable classes, being stored and transferred heated to a temperature equal to or higher. These liquids, when exposed to high temperatures in close proximity, can have a combustion reaction.

- CLASS 4 - FLAMMABLE SOLIDS

Flammable solids are a substance that has great ease of spontaneous combustion by direction or friction, tends to cause fire or contribute to it. Example: sulfur.

- CLASS 5 – OXIDIZING SUBSTANCES

They are thermally unstable substances that remove electrons from a reagent, that is, it is a matter that releases oxygen, which can cause fires when in contact with combustible products, although there is no source of ignition. Example: hydrogen peroxide.

- CLASS 6 – TOXIC AND INFECTIOUS SUBSTANCES

They are chemicals that are divided into subclasses, so toxic substances require greater care, as they can be transported in a solid, liquid or gaseous state, in any physical state or quantity can easily cause irreversible damage, and can lead to death. Example: atropine, thallium and ricin.

In question, infectious substances, damage to humans, animals and the environment can occur, usually this component brings with it some type of infectious pathology. Example: Medical waste, contaminated laboratory animals, and exams.

- CLASS 7- RADIOACTIVE MATERIALS

They are unstable substances that emit radioactive particles, which are atoms that decline spontaneously, releasing radiation, also defined in the law as radionuclide and in case any matter

has levels higher than the predetermined it will be classified as high risk content, especially for the health of the population, since radiation can be very harmful to the human body if exposed for a long period. Examples: uranium, thorium, plutonium, cesium, cobalt, among others.

- CLASS 8 - CORROSIVE

Substance that can cause chemical burns when it has contact with a living tissue, so even if it can not only burn but destroy or damage any tissue it comes into contact with, the substance can be liquid or solid, and in cases of leaks can cause damage both in transport and to the vehicle carrier. In addition, corrosive materials in contact with waterway sectors generate a great impact, killing fish and preventing people who live near rivers from consuming water, so greater care is necessary in these cases. Examples: sulfuric acid, hydrochloric acid, sodium hydroxide, and potassium hydroxide.

- CLASS 9 - MISCELLANEOUS HAZARDOUS SUBSTANCES

Among this class are all miscellaneous hazardous materials, which do not fall into classes 1-8, so they are substances that pose a risk during transport. Examples of products: fuel oils, dry ice, lithium batteries, capacitors, among others.

2.2 MODES OF TRANSPORT

Since the beginning of society there were already ways of locomotion of cargo, starting with carts that appeared 3500 B.C and that with the help of animals took the goods to their destinations, however as society has evolved so have the means of locomotion as well as its concept, currently it operates with five types of modes or mode of transport, being air, pipeline, rail, waterway and road, which is the most used by Brazil today, according to the IBGE about 61.1% of the goods transported in 2009 were by road, it is also the modal in which the country invests the most, both in transport as well as in infrastructure. Despite this prominence that Brazil gives to the road modal, the most used mode of transport in the world is maritime due to its low cost and risk, in addition to being the modal that has no restrictions on the size of the cargo as well as being interconnected to all continents.

It should be noted that in cases of transportation of dangerous cargo, it tends to be necessary to analyze and check which mode will be safer for the goods that will be transported, especially the people who are moving the product to its destination must be trained to fulfill this function, regardless of the degree of risk of the cargo or classification to which it belongs.

And what is observed is that for the growth and development of the logistics area, it is necessary to know all the existing modes, both which modal is most appropriate for each selected commodity. According to KEEDI (2004), modal preference is analyzed through the speed of delivery; delivery security; possible deterioration in quality; Transportation costs and route flexibility. However, we must consider that each mode of transport has its pros and cons. Therefore, we will talk about the five modes used to move these loads:

- AIR MODE

The air modal appeared in mid-1906 when the airplane was created, but it was only in 1945 after World War II that the modal began to have a development, since there was a hearing in the city of Havana, which took place between airlines, with the goal of solving problems generated due to the rapid development of international civil aviation and within this meeting the IATA (International Air Transport Association) was created. It is important to note that IATA does not have a political character, but it does have a commercial character. According to KEEDI (2007) the association divides the global map into three areas, being area 1-Americas, including Hawaii, Greenland and adjacent islands; Area 2 - Europe and adjacent islands, Africa and West Asia and Area 3 - Asia, including adjacent islands, except those included in Area 2 and Oceania. IATA's main objectives are to expand and promote improvements to the air transport industry, protect the interests of global airlines. Among others.

As a result, air transport is any vehicle that uses air as a means of transportation for the movement of people or goods.

Still on dangerous cargo, as already mentioned, it is necessary to have some responsibilities since when it comes to dangerous items it ends up running risks, for this reason IATA has developed standards for the safety of both the environment as well as the transporters of these articles. According to the Resolution of ANAC National Civil Aviation Agency (2009) Art 5.5 On the Safety of Hazardous Articles, it is the duty of the company that the people who worked with the dangerous article are qualified for their function, as well as the storage and review of the operation, assessing its vulnerability, having a correct infrastructure, verifying the documentation, Have an effective process in place in cases of security threats and incidents.

- MODAL DUTOVIARIO

The pipeline modal, which uses hollow cylindrical tubes and pipes to transport goods, according to the location of the pipes, can be classified into 3 categories, such as underground,

where they are located underground; aerial, when pipelines are built in a suspended manner to cross a river or valley; When pipelines are submerged on the seabed, the transport of these products occurs by pressure or dragging by a carrier element, normally used in the transport of oil to offshore platforms. This modal appeared in Brazil in 1942 in the state of Bahia and was only used for experimental refineries to the port, the body that supervises this modal is ANTT, this was established in Law No. 10,233. Most of the products through the pipelines are transported by the Brazilian oil company, Petrobras. However, in the world there is a different perspective since pipelines are one of the most important means of transport, being used especially in the United States and Europe.

It should be noted that there are three types of goods that are usually transported by pipelines, which according to ANTT are gas pipelines, which is the transportation of natural gases, carbon dioxide, pipelines, which are substances derived from petroleum, such as gasoline, alcohol, and we contain pipelines that are transportation of ore, such as diesel, rock salt, iron ore and phosphate concentrates. It is soon observed that although some dangerous articles are transported via pipelines such as ethanol, diesel, gasoline among others.

- RAIL MODAL

Rail transport takes place by railways, being one of the oldest means of locomotion. The emergence and recognition of the modal was linked to the First Industrial Revolution, a historical environment where it took place in Europe at the end of the eighteenth century and the beginning of the nineteenth century.

According to ANTT, the common products that should be carried in this means of transport are cement, lime, limestone, iron mining, clinker cement, mineral coal, containers, petroleum products, steel products and grains.

- MODAL WATERWAY

The Waterway modal is any and all transport that uses waterways such as rivers, seas and lagoons to move products, in Brazil it emerged in the 80s, with the construction of waterways in the country and has been developing over time, currently according to ANTAQ, the waterway network moved more than 51.2 million tons of goods in 2023. This modal can be natural with rivers, lakes and seas that already exist in nature, or artificial with routes that have been placed in the region with the intention of promoting and connecting certain places, the modal is divided into three categories being: Maritime, Lake and Fluvial.

Maritime: this is the movement of goods or people by ocean and sea, they are used for locomotion over long distances that can take place within the limits of the same territory, such as a cabotage system that connects ports in the same country and regions. As well as being the most used transport for the movement of international cargo, it is a modal handled for large quantities or heavy goods.

Fluvial: refers to the locomotion of products or people that is done via rivers, it is a mode normally used in the interior, in the regions of the country, it is not widely used for international cargo transport, it is the oldest modal means, and it is very useful to reach more isolated places, in this mode there is a need to ascertain depth, adequate width, current, as well as obstacles such as rocks and the like.

Lacustrine: it is a displacement of articles or people via lagoons, it is a mode used for cargo from a region, modal there is a short distance between areas very close to each other.

- ROAD MODAL

The road modal is a method that carries out the transport of people, goods. Being a transportation system that uses the highways for the displacement of such.

This modal related to waterways and railways has a higher freight value, being suitable for short distance trips and for the transport of high value-added or perishable goods. Thus, the modal should be categorized as fast and versatile, although it is one of the most polluting and costly, among others.

In the road modal, we have several types of trucks, therefore having an extension in being able to choose the most appropriate, for greater safety of the driver and others involved, however we have the following types of vehicles such as, trunk, sider, tank, dumper, bitrain, container carrier

2.3 PRECAUTIONS REGARDING THE MOVEMENT OF DANGEROUS GOODS

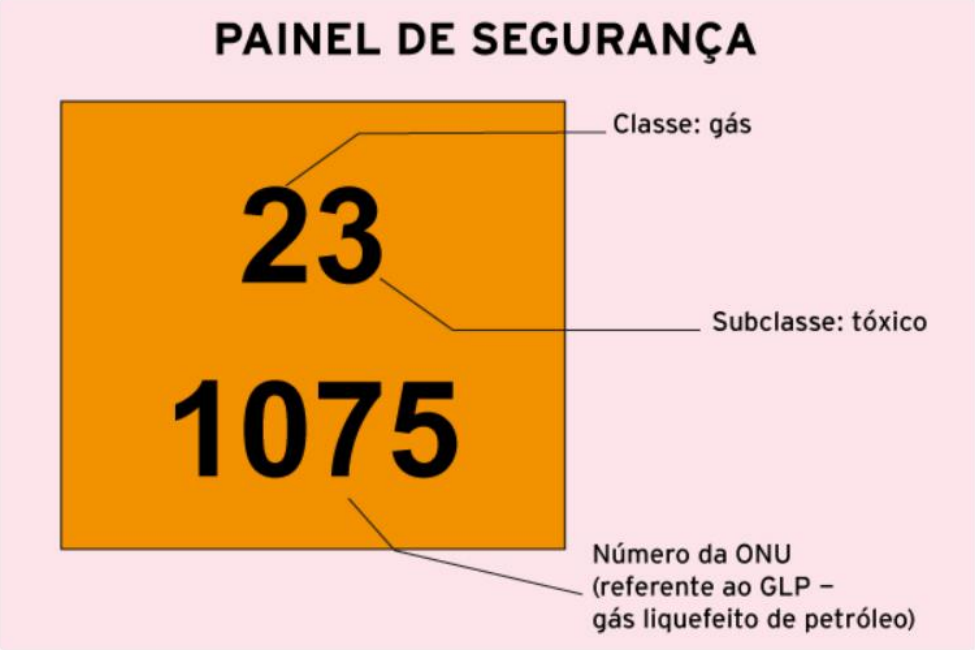
For a finalization in the route of the loads, it is necessary to analyze premises and avoid risks, such as the use of PPE known as Personal Protective Equipment, where the driver must use the equipment required for each type of load. According to Regulatory Standard No. 11, known as NR 11, this standard establishes the ways in which various materials must be conducted, stored and handled safely.

The Regulatory Standard, NR 16 and NR 19 dominate the transport of hazardous substances.

However, NR 04 and NR 09 directly mention the duty on the mandatory use of equipment, as PPE is necessary because the movement of dangerous cargo can bring reversible risks in the life of the driver, and people who pass near the cargo. Therefore, professionals must be warned about carrying out the mandatory procedures, always in the safest and most appropriate way to the risks of the goods being transported. EPCs, Collective Protective Equipment equipment that must be provided together with PPE, in order to protect around, the main ones are: fire extinguishers; chemical chapel; kit for cleaning in case of biological, chemical or radioactive spillage, among others.

Signage in transport: It is necessary to have signs to identify which class is being transported. Signage is mandatory, after all, it makes it easier in cases of accidents, claims, leaks, for the authorities to be able to act in the most appropriate way so as not to cause damage, also for the knowledge of other drivers.

Figure 1- Security Dashboard



Source: Fetcesp (2019)

According to NR 26 establishes the work safety signs, they impose that several signs must be made in order to indicate such risks existing in the place.

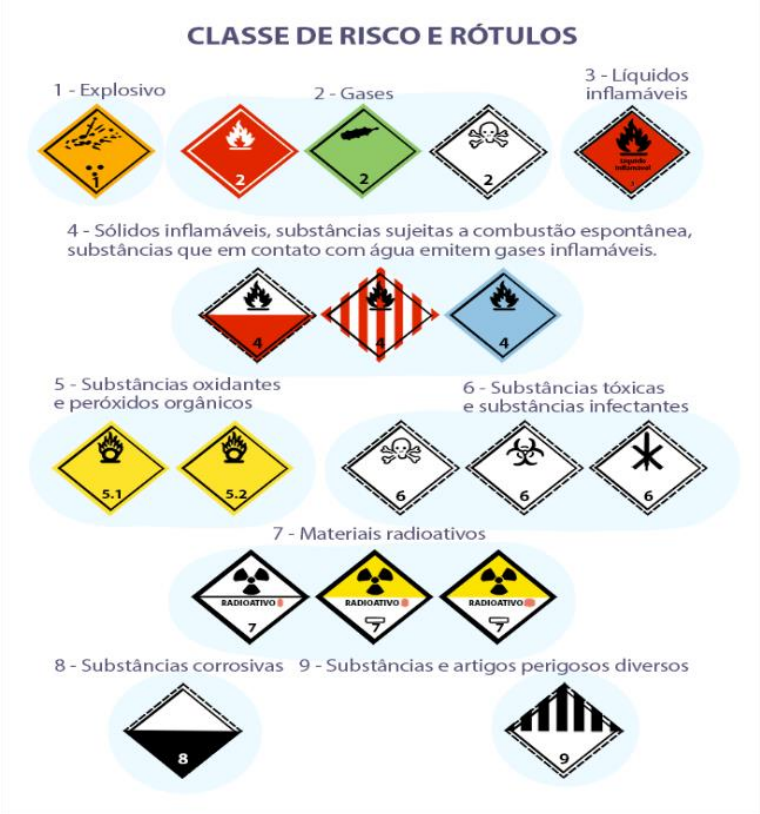
Security panel – The panel is characterized in orange, being divided into two parts, the upper and lower part. At the top we have the first number that classifies the risk it has, therefore, it can contain two to three digits, the first being the risk class of 1-9, if it has the X in front of the class it means that the product reacts dangerously with water. The second digit, if it is zero, means

that it does not carry any secondary risk beyond the first number. If the first number repeats it means that the risk is increased, if the number is tripled it means that the risk is highly dangerous. At the bottom we have the UN number, a model of ID, this number is an international mold and was established by the United Nations, these four numbers point and distinguish the products.

Risk label – It has colors, symbols, numbers and varied texts, which refer to the nature and handling and definition of the product. On the risk label, each color has a meaning, as shown in the image below, with a design called a pictogram that symbolizes the risk in question and the number indicating the class and subclass.

According to ANTT Resolution No. 5232/16, below is an illustration of the classes of dangerous goods and labels:

Figure 2- Risk class and labels



source: Aprovadetran (2023)

The Brazilian standard NBR 11564/2002, established by the Brazilian Association of Technical Standards (ABNT), is the standard that inspects the packaging of dangerous products. The update to NBR 11564/2021 is being released.

For the movement of the goods, it is necessary that it has all the necessary types of packaging and that it can meet all the risks, and that it is able to keep the cargo in its normal state.

The image below shows numerous examples of packaging used for the function of fractional transport of dangerous goods to be completed in the best and safest way possible.

Figure 3- Example of packages used for breakbulk transport

Fonts: Air sea

2.4 DOCUMENTATION REQUIRED FOR EXPORT

As with any export procedures, when it comes to exporting dangerous cargo, a series of documentation is required for shipment, both for inspection purposes and for the safety of both the country and the companies involved in the negotiation, so that there is no loss or theft of it.

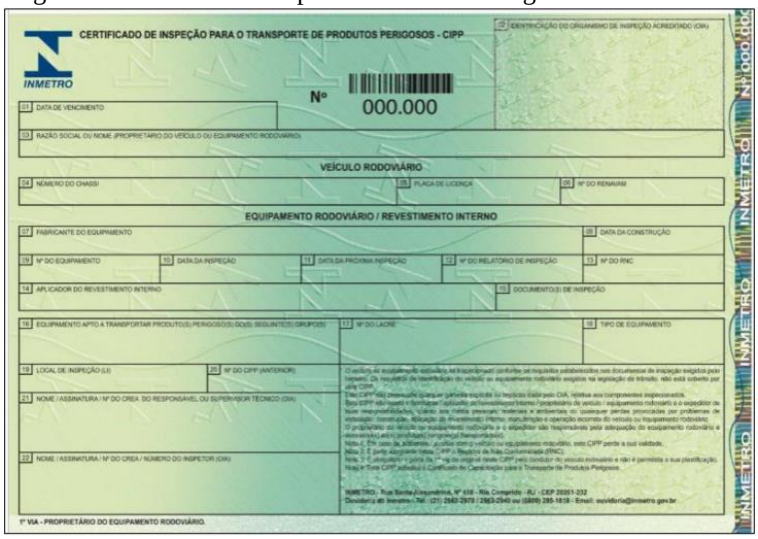
Therefore, according to ANTT Resolution No. 5,947/21, there are some documents that are necessary for the transportation of these cargoes, they are:

To drivers: must carry personal documents, cargo and vehicle, personal documentation if the Driver's License (National Driver's License) is required; Identity card; certificate of the MOPP course, which is the course for drivers of road vehicles transport of dangerous goods - CVTPP, which is only necessary in case the driver's license still has the information "Transport of dangerous cargo", in order to prove the driver's aptitude for the function. In aviation, according to ANAC's supplementary instruction (2015), the air transport operator must carry a physical and/or electronic copy of IATA's technical instructions or dangerous goods regulations

Vehicle documentation: the vehicle must have the following documentation up to date: IPVA- motor vehicle property tax; the CTPP - Certificate of Inspection for the Transport of

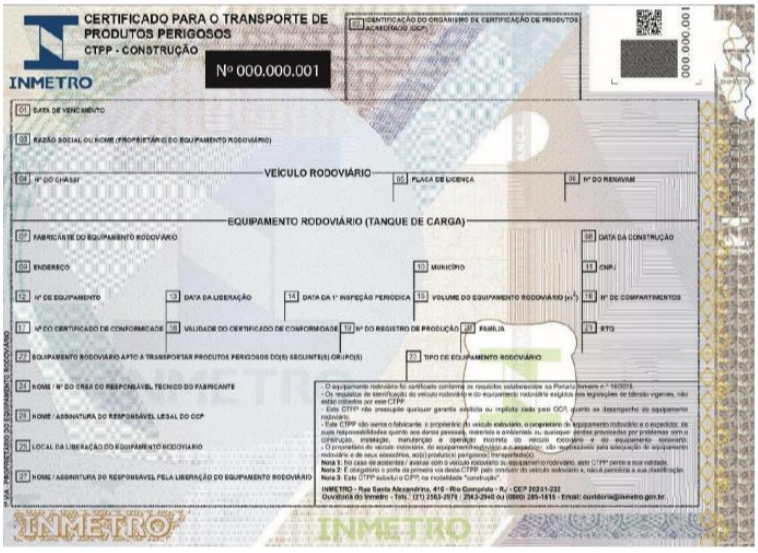
Dangerous Goods or CIPP (which has been replaced by the CTPP since 2018) whose validity will depend on the type of risk article being transported; The CIV- Vehicle Inspection Certificate, in case of bulk transport, is usually valid for up to 1 year, depending on the time of manufacture of the vehicle, the three documents, both the CIPP and the CTPP are issued by INMETRO.

Figure 5- Certificate of Inspection for Bulk Dangerous Goods - CIPP



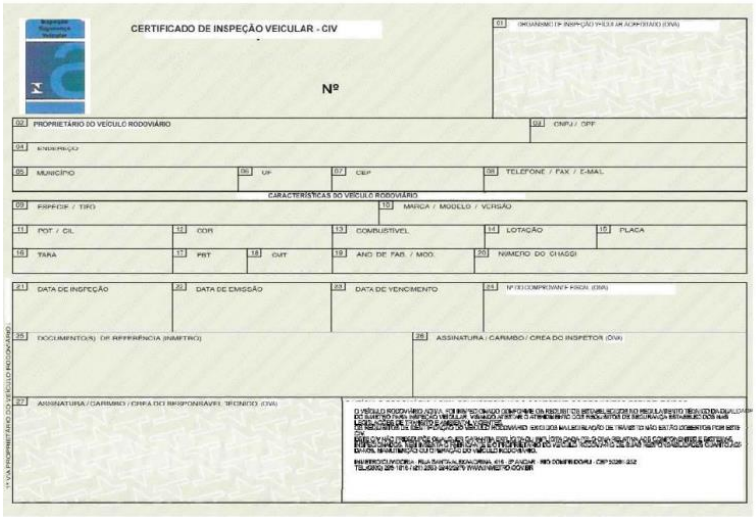
Source: Inmetro Ordinance No. 204/11

Figure 6- Inspection Certificate for Transportation of Dangerous Goods



Source: Inmetro Ordinance No. 38/2018

Figure 7- Vehicle Inspection Certificate – CIV

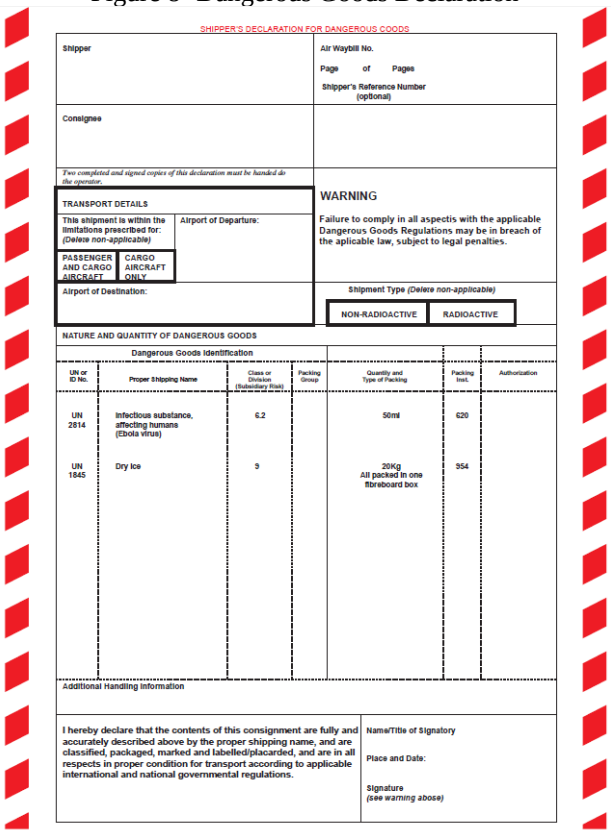


Source: Inmetro Ordinance No. 457/08

To the environment: there are some necessary documentation for preservation, mainly dealing with dangerous cargo that is at risk of leakage, the main one is the Environmental License that was established in law 6.938/81, and which is divided into three stages, LP- Preliminary License being the first phase, of which the suggested area for the installation of the company or certain Activities is checked, LI- Installation License, the second phase, which is the authorization of the installation of the company or certain activities, according to the specifications contained in the approved plans, projects or programs, meeting the environmental control, LO- Operating License, the third and last stage, which is the authorization or disapproval of the performance of a certain enterprise or certain practices, according to the verification of compliance with the other licenses, all of them issued by IBAMA, In view of this, we also have the environmental authorization for the transport of dangerous products, which is also issued by IBAMA, it works for the exercise of the activity of maritime transport and interstate transport (land and river), within this we also have the federal technical register of potentially polluting activities, it is a mandatory bookkeeping for individuals and legal entities that carry out activities of commercialization and transportation of products With this in mind, the annual report on potentially polluting activities and users of environmental resources (RAPP) was also created, from which information is collected in order to collaborate with environmental inspection. In addition, we have the TFCA - environmental inspection control tariff, which is defined by the crossing of the degree of pollution.

It is also necessary to make a declaration of dangerous goods consists of documenting the articles of risk transported by air, the document contains information of which a dangerous material needs to follow such as labeling, packaging and regulation and serves for inspection and safety in transport.

Figure 8- Dangerous Goods Declaration



SHIPPER'S DECLARATION FOR DANGEROUS GOODS

Shipper	Air Waybill No. Page of Pages Shipper's Reference Number (optional)
Consignee	
Two completed and signed copies of this declaration must be handed do the operator.	
TRANSPORT DETAILS This shipment is within the limitations prescribed for: *(Delete non-applicable)* PASSENGER AND CARGO AIRCRAFT / CARGO AIRCRAFT ONLY Airport of Departure: Airport of Destination:	WARNING Failure to comply in all aspectis with the applicable Dangerous Goods Regulations may be in breach of the aplicable law, subject to legal penalties. Shipment Type *(Delete non-applicable)* NON-RADIOACTIVE / RADIOACTIVE

NATURE AND QUANTITY OF DANGEROUS GOODS

Dangerous Goods Identification						
UN or ID No.	Proper Shipping Name	Class or Division (Subsidiary Risk)	Packing Group	Quantity and Type of Packing	Packing Inst.	Authorization
UN 2814	Infectious substance, affecting humans (Ebola virus)	6.2		50ml	620	
UN 1845	Dry Ice	9		20Kg All packed in one fibreboard box	954	

Additional Handling Information

I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labelled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations.	Name/Title of Signatory Place and Date: Signature *(See warning above)*

Source: Anac (2015)

And for export purposes, the documentation is: invoice, which contains the information of the cargoes, what is being exported, who is buying, who is exporting, what is the value of the goods, we also have a packing list, which is a document containing the net and gross weight, and the type of packaging. and the amount of material that is being shipped, in addition to having the Bill oflading or Air Waybill which is a document that shows exactly which ship or plane is transporting the cargo, to which port/airport the cargo is going, and in which it was loaded, the weight, the coloder or international agent among other information,

3 MATERIALS AND METHODS

In order to achieve the results and obtain the necessary information in the bookkeeping of this article, qualitative methods and bibliographic review methodology were used, and recent content related to the theme presented in websites, articles and books was explored.

Qualitative research is researchers who analyze scenarios in their nature, and try to understand cases in terms of the meanings that people give to them (DENZIN LINCOLN 2006)

The study of this work will be built on ideas and assumptions of researchers and theorists that are important in the definition and structuring of the themes discussed in this analysis: export,

cargo, dangerous goods. In addition to the chosen method, it favors a freedom in the analysis of knowledge opportunities, bringing contributions and innovations to the explored area.

4 RESULTS AND DISCUSSION

Based on the studies and research carried out, it was established to have a deeper knowledge about the developments of the process of exporting dangerous goods, and to understand what are the standards and legislation established for the completion of the transport of products highly harmful to the population and environment. On the cargoes that are made within 9 classes that require the correct classification of the hazardous substance, regulated in ANTT Resolution No. 5,232/16. The regulations also include the appropriate packaging, labelling and documentation required.

The essential documentation for the export of dangerous goods includes the Declaration of Dangerous Goods, which details each cargo, associated risks and precautions to be applied. It is also essential to have your own licenses and permits, varying from country to country and destination.

It is important to mention that safety is paramount in this execution, as numerous accidents occur during the handling of these loads and there can be irreversible consequences for the population and the environment. It is essential to follow the safety standards for the process to take place safely.

In summary, the procedures for exporting dangerous goods involve the correct classification, proper packaging, accurate documentation, and hiring specialized carriers. Safety is a top priority, and all regulations must be followed to ensure the safe transportation of these cargoes.

5 CONCLUSION

Given the facts exposed and analyzed, we conclude that the export process is a long process of identification, documentation and labeling for the movement of dangerous articles, of which there are many rules and regulations governing, it is essential in the case of risk cargo that there is a very analytical observation in the safety of which, requires equipment to be used, as well as safety labeling both on the packaging and the chosen mode, in addition to providing preservation purposes to the environment and the population. Emphasizing that there are 9 classes of products, all of them distinct, with different packaging, handling and documentation, there are also several

modes to be chosen, however in this choice of modal it is important to analyze which one fits properly and offering the least risk to the environment.

ACKNOWLEDGMENT

First, let us thank God for having given us the ability to carry out this study. Then, we cite our family members for having understood this absence and having supported us emotionally and kept us moving forward in our goals. Finally, I would like to thank our advisor for his guidance, patience, and shared knowledge throughout the development.

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