# StopLoss

## Classification of Dangerous Goods

A 'first principles' guide in accordance with the IMDG Code

TT CLUB
IS MANAGED
BY THOMAS
MILLER

UKP&I

Brookes Bell

NCB

TT

# Contents




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**StopLoss series**

StopLoss briefings are developed on a broad range of topics that give rise to recurring problems. They seek to provide a straightforward summary of an issue, essential good practice advice and, where applicable, sources of further information. The complete series and further information is available at www.ttclub.com/lossprevention and printed copies are available from the TT Club's Regional Centres.

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## Abstract

This new guidance document focuses exclusively on packaged dangerous goods—covering all forms of packaging, including portable tanks and freight containers used for bulk liquids and solids under the IMDG Code (recognising that there are regional variances such as CFR49)—and does not address bulk cargoes that may be classified as dangerous under other provisions. The term dangerous goods is used extensively throughout this document and is intended to include reference to hazardous materials and "hazmat".


## Who is this for?

- Consignees
- Consignors
- Cargo owners
- Freight forwarders
- Ship charterers
- Ship operators
- Ship owners
- Shippers
- Transport and logistics operators
- Warehouse operators

# 1

# Introduction

## In this section:

- Identifying the hazards by classification
- UN Model Regulations
- UN Globally Harmonized System
- Focus of this guide

Classified dangerous goods can present a wide range of hazards, including fire, explosion, corrosion, and toxicity. Safely handling and transporting these commodities around the world requires everyone in the transport and logistics supply chain to fully understand the specific risks each type of dangerous good presents.

This guide introduces the globally accepted international (United Nations, UN) classification system for dangerous goods. It is estimated that up to 10% of all cargo transported is classified as dangerous, it is estimated that a further 5% is mis-declared or incorrectly classified. This puts people, assets and the environment at risk.

It is therefore vital to check and double check the information provided for any cargo to make sure it is accurately and consistently classified. This guide outlines the steps that anyone in the transport and logistics sector or involved in the movement of cargo nationally and internationally can take to help ensure all dangerous goods are identified and properly classified.

Throughout this document the term 'commodity' is used, meaning any chemical, article, product, substance or organism being transported on a cargo ship. The term commodity is also used to highlight that everything must be considered as dangerous goods until proven otherwise. An article is any device, machinery or apparatus containing one or more dangerous goods that is an integral element of the article, and which cannot be removed for transport. An example of an article would be UN 3480, Lithium Ion Batteries. A substance is any material or chemical classified as hazardous due to its potential to pose a risk to health, safety, property or the environment during transportation.

**In most cases, shippers are not required to begin the classification process from first principles, as many commodities are already clearly listed and classified within the IMDG Code Dangerous Goods List. Through appropriate due diligence—such as checking existing IMDG entries, reviewing Safety Data Sheets, or verifying classifications previously established by reputable manufacturers or other companies—shippers can often rely on established hazard determinations rather than undertaking new testing.**

It is fundamental for safety in the transport chain that detailed information on the hazards presented by any dangerous goods are known and readily available for all parties involved in the transport. Therefore, the first key task of a shipper of dangerous goods is to identify the hazard that their dangerous goods present by carrying out the correct classification according to the UN Model Regulations[1].

The UN Manual of Tests and Criteria and other internationally recognised testing organisations include criteria, test methods and procedures to be used for classification of dangerous goods for transport in all modes, and of chemicals presenting physical hazards according to the Globally Harmonized System[2] of Classification and Labeling of Chemicals.

These test methods include laboratory procedures for establishing explosivity, toxicity of liquids, gases and solids, flash points of flammable liquids, ignitability for flammable solids, stability of self-reactive substances and peroxides, degree of corrosivity to skin and metal, propensity of substances to polymerize, environmental damage potential and many other hazardous characteristics.

At the end of the process, dangerous goods are classified into one of nine hazard classes, allocated a formal Proper Shipping Name and UN identification number, and where applicable, graded by packing group into high, medium or low degree of danger. Where substances have more than one hazard and there is no specific entry available, all the hazards should be identified in the Proper Shipping Name but the most significant hazard, in accordance with the Table for Precedence of Hazards, takes prominence.

Classification and hazard identification of the most commonly shipped base chemicals are well established. Shippers of these will have manufacturer's authenticated laboratory test reports available and will not need to repeat those tests.

However, shippers of commodities consisting of innovative combinations of two or more chemicals whose hazardous characteristics are not established will need to arrange for tests to be completed that identify the hazard class(es) and UN Number according to the UN Model Regulations and other testing organisations before the substance can be offered for sale and transport. They cannot be accurately documented for the IMDG Code or other transport modes until those tests are complete, except as small samples dispatched for test purposes (as noted in IMDG 2.0.4).

Shippers that design and develop chemical products would normally have personnel with the required skills to test and classify their own products to UN criteria, but shippers who only buy and sell dangerous substances need to obtain the hazardous classification information from the original manufacturer in the form of a Safety Data Sheet (SDS). This will contain the dangerous goods transport information, such as the UN number, transport hazard class, packing group, and any special transport precautions needed for road, rail, sea, or air.

From a P&I perspective, the carriage of dangerous goods in packaged form can generally be undertaken without prejudice to cover, provided that stowage, segregation, packing, labelling and marking are in accordance with the IMDG Code, and that Safety Data Sheets are provided to the vessel for use in the event of an incident.

**The Table of Precedence in the IMDG Code provides the rules for determining which hazard takes priority when a substance presents multiple hazards, as set out in IMDG Code Chapter 2.0.**

1. https://unece.org/transport/dangerous-goods/un-model-regulations-rev-24
2. https://unece.org/about-ghs

**UN Model Regulations and modal versions**

The United Nations Economic Commission for Europe (UNECE) biennially produces a set of Model Regulations for the Transport of Dangerous Goods. Each mode of transport then produces its own version.

- **Road:** Agreement concerning the International Carriage of Dangerous Goods by Road (ADR).
- **Inland waterways:** European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways (ADN).
- **Rail:** Regulations concerning the International Transport of Dangerous Goods by Rail (RID).
- **Sea:** International Maritime Dangerous Goods Code (IMDG).
- **Air:** International Civil Aviation Organization (ICAO) Technical Instructions For The Safe Transport of Dangerous Goods by Air/International Air Transport Association (IATA) Dangerous Goods Regulations.

From a P&I perspective, full compliance on any voyage is subject to the requirements of the country of origin, destination, any transit states, and the flag state of the carrying vessel.

Although these regulations are based on the same parent text, there is still variation due to the risks presented in each transport mode.

For journeys involving an international maritime leg, other modal regulations often allow the IMDG Code to take precedence (for example see ADR 1.1.4.2). This highlights the importance of verifying which mode applies with your transport provider.

The modal regulations are given force of law though regional or national legislation. Dangerous goods (also known as hazardous material or 'hazmat') are subject to workplace, storage, consumer and environmental protection regulations to prevent accidents to persons, property or the environment.

To ensure consistency across global regulatory systems, the UNECE developed the Globally Harmonized System of Classification and Labelling of Chemicals (GHS). This internationally harmonized system provides a standardized method for communicating chemical hazards through labels and safety data sheets, forming a common basis for chemical rules and regulations worldwide.

**Using this guide**

This first principles guide to dangerous goods classification has been developed to provide greater insight into the process of classification of dangerous goods to those who handle, store and transport goods through the supply chain.

It is not intended to be used as a stand-alone tool to classify dangerous goods for transport. The intention is to provide a foundational understanding of the underlying process to empower those handling, storing and transporting goods to undertake due diligence and to cross-examine information provided to them to verify accuracy, thereby increasing safety through the supply chain.

The principles included in this guide will be of equal value to stakeholders through the global supply chain who are less routinely tasked with handling, storing and transporting dangerous goods.

The demand for dangerous goods is so widespread that they are transported across all modes of transport worldwide. Although this guide aims to address hazards in a way that is relevant to every mode—since most hazards apply universally—it focuses primarily on the maritime transport sector and refers extensively to the IMDG Code throughout.

**It is equally important to verify the routing of the transport and which jurisdictions the goods will transit as there are regional variances such as CFR49 in the United States.**

# 2

# Importance of accurate classification

## In this section:

- Mis-declared cargo risk
- Accurate classification

Maritime transport accounts for approximately 80% of worldwide cargo. An estimated 5–10% of this cargo each year is declared as dangerous goods and another 5% is estimated to be dangerous but mis-declared.

Industry statistics show that significant challenges exist throughout the supply chain in areas such as documentation, labelling, packaging, placarding and segregation — all of which ultimately stem from the classification process. Every misclassified commodity has the potential to cause problems in the supply chain, whether due to:

- incorrect or fraudulent selection of one of the entries on the IMDG dangerous goods list
- incorrect selection of packaging for the commodity
- non-compliance of segregation rules inside a cargo transport unit (CTU), such as a shipping container
- improper CTU type being used
- incorrect stowage and segregation requirements on board ships
- incorrect emergency firefighting response.

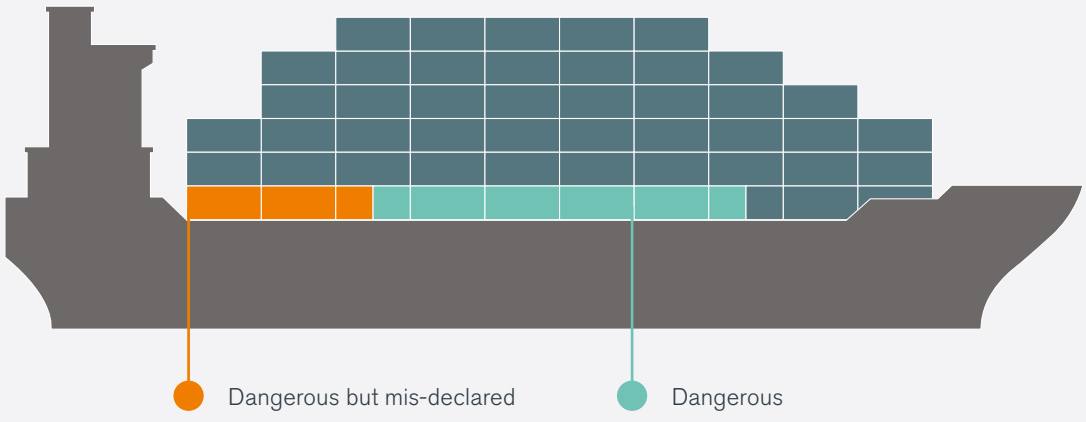
**Accurate classification**

Clearly, accurate classification is vital to mitigate the above risks.

The transport of dangerous goods requires an accurate classification process that serves as a bedrock for subsequent consequential decisions and outputs. As classification is the first step of the process, everything beyond depends on this initial stage.

The consequences of even a single mis-declared cargo within an LCL container have the potential to be devastating, with loss of life, cargo and property.

**Maritime transport accounts for approximately 80% of worldwide cargo. An estimated 5–10% of this cargo each year is declared as dangerous goods and another 5% is estimated to be dangerous but mis-declared.**



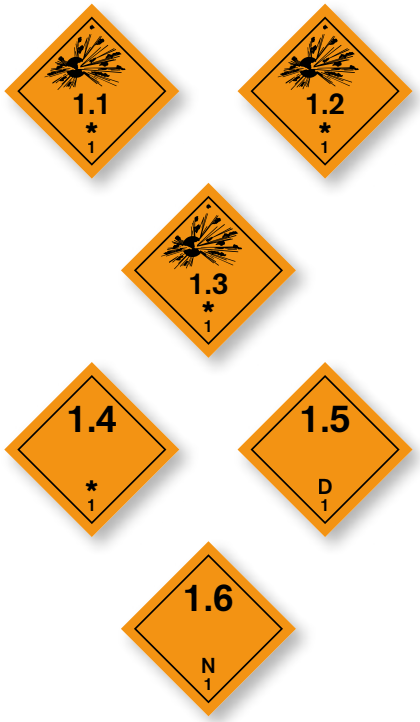
# 3

# Class-specific provisions

## In this section:

- Dangerous goods classes and sub-divisions
- Packing groups
- Not otherwise specified (NOS)

The UN regulations aim to classify every dangerous commodity into nine unique classes depending on their properties. The nine classes and, where appropriate, their subdivisions, are as follows, the relevant labels can be found in the UN regulations and IMDG Code - 5.2.2.2.2:

| Class 1: Explosives | |
|---|---|
| **Division 1.1**<br>Substances and articles which have a mass explosion hazard (omnidirectional) |  |
| **Division 1.2**<br>Substances and articles which have a projection (directional) hazard but not a mass explosion hazard | |
| **Division 1.3**<br>Substances and articles which have a fire hazard and either a minor blast hazard or a minor projection hazard or both | |
| **Division 1.4**<br>Substances and articles which present no significant hazard; only a small hazard in the event of ignition or initiation during transport with any effects largely confined to the package | |
| **Division 1.5**<br>Very insensitive substances which have a mass explosion hazard | |
| **Division 1.6**<br>Extremely insensitive articles which do not have a mass explosion hazard | |

**P&I Members should exercise additional caution when shipping explosives (IMDG Class 1). There have been several incidents involving unstable compounds, and carriers are generally advised to satisfy themselves that such shipments originate from reputable and trustworthy manufacturers. Expired explosives (such as ammunition, pyrotechnics or fireworks) for disposal or decommissioning should also be scrutinised. Deterioration beyond the stated expiry date can increase instability and unpredictability. Volatility and stability should be carefully assessed by a suitably qualified expert before carriage.**

## Class 2: Gases

**Division 2.1**
Flammable gases

**Division 2.2**
Non-flammable, non-toxic gases

**Division 2.3**
Toxic gases


## Class 3: Flammable liquids

**Flammable liquids**


## Class 4: Flammable solids

**Division 4.1**
Flammable solids

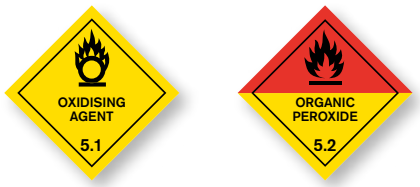
**Division 4.2**
Substances liable to spontaneous combustion

**Division 4.3**
Substances which, in contact with water, emit flammable gases


## Class 5: Oxidising substances and organic peroxides

**Division 5.1**
Oxidising substances

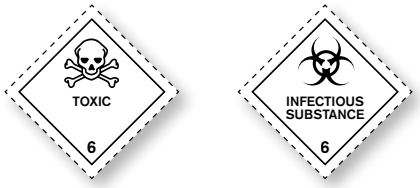
**Division 5.2**
Organic peroxides




## Class 6: Toxic and infectious substances

**Division 6.1**
Toxic substances

**Division 6.2**
Infectious substances



## Class 7: Radioactive material

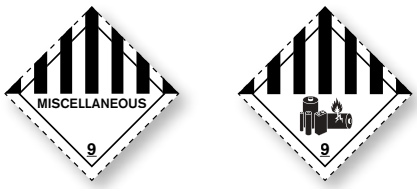
**Radioactive material**


## Class 8: Corrosive substances

**Corrosive substances**


## Class 9: Miscellaneous

Miscellaneous dangerous substances and articles (Class 9) and environmentally hazardous substances that do not meet the criteria for other classes including lithium-ion batteries




**P&I Members should seek prior approval from their P&I Club before shipping radioactive cargo (IMDG Class 7), as these risks are excluded under the Club's Pooling Agreement. There is, however, an exception for the carriage of "excepted matter" as defined under the UK Nuclear Installations Act, which typically covers low-level radioactive materials, often for industrial or medical use. In such cases, the Club would require detailed information on the nature of the cargo, its radioactivity levels and the packaging in order to assess whether cover can remain in place.**

Dangerous goods which meet the requirements of more than one class are classified based on the primary hazard and assigned the appropriate subsidiary hazard(s).

Commodities with hazards not accounted for in classes 1–8 are placed into class 9. Common examples are lithium-ion batteries, commodities with an elevated temperature such as tar and asbestos. A list of other common class 9 commodities can be found under section 2.9.2 in the IMDG code.

### Packing group

For packing purposes, substances other than those of classes 1, 2, 5.2, 6.2 and 7, self-reactive substances of class 4.1 and articles are assigned to one of three packing groups (PG) in accordance with the degree of danger they present:

- Packing group I: substances presenting high danger
- Packing group II: substances presenting medium danger
- Packing group III: substances presenting low danger

A substance is any material or chemical classified as hazardous due to its potential to pose a risk to health, safety, property or the environment during transportation.

### 'Not otherwise specified' (NOS) entries

Around 3,000 dangerous commodities are assigned a four-digit number (UN number), such as UN1203. However, with many thousands registered commodities, many commodities are not specifically assigned. This leads to the use of generic and 'not otherwise specified' (NOS) entries to allow for a brief description of the hazards.

To determine the appropriate generic or N.O.S. entry, the substance is first classified by identifying its class and packing group using the relevant sections of Part 2—for example, Chapter 2.3 for flammable liquids or Chapter 2.6 for toxic substances. The primary hazard and any subsidiary hazards are then assigned with reference to the precedence of hazards table in Chapter 2.0. Once the hazards are established, Appendix A of the IMDG Code can be used to select the correct Proper Shipping Name (PSN). For instance, a Class 3 substance with a subsidiary hazard of Class 6.1 would normally be assigned the entry FLAMMABLE LIQUID, TOXIC, N.O.S. Where a more specific generic entry exists, that should be used instead.

# 4

# Information sources

## In this section:

- Chemical databases
- Safety data sheets
- Missing information

There are various available sources of information to assist with the classification of commodities. It would be prudent not to rely on a single source.

For example, databases should be checked against each other as far as reasonably practicable to reduce the impact and likelihood of mistakes. Some databases are highly regarded, such as the European Chemical Agency (ECHA)[3], as they are backed by a governing body.

### Safety data sheets

A Safety Data Sheet (SDS)[4] provides essential information about a chemical, including its hazards, safe handling requirements, and the measures needed in an emergency. It outlines the product's identification, its hazardous properties—such as flammability, toxicity or reactivity—and details of its chemical composition. An SDS also gives guidance on first-aid actions, firefighting methods, spill response, required personal protective equipment, safe storage practices, and key physical and chemical properties. SDSs follow a standard 16-section format, and Section 14 is dedicated to dangerous goods transport information, including the UN number, proper shipping name, hazard class, packing group, and any special precautions for carriage by road, rail, sea, or air. As an important document in the safe supply, handling and use of chemicals, the SDS helps ensure chemicals are used without risk to people or the environment. However, while the SDS is a valuable source of information, it is prudent not to rely on it alone; cross-checking against other reliable sources and databases helps ensure accuracy.

### Missing information

If in-house laboratory facilities do not exist, and it is found that a piece of information is required to continue, two are three primary options.

1. Perform due diligence: for example, perform know-your-customer checks and check if the SDS provides the required information.
2. Request a test house to run the test required in line with the UN manual of tests and criteria and other internationally recognised testing organisations. Test houses are external laboratories with the necessary competence to perform the required tests. There is no accredited list, so it is appropriate to perform due diligence checks on laboratories.

**Artificial intelligence powered tools can deliver efficiencies, however where the complexities of dangerous goods shipments are concerned should be used with caution and not used as a substitute for qualified experts. Experts have a responsibility to get assessments correct - AI does not.**

[3] https://echa.europa.eu/substance-information/-/substanceinfo/100.000.602
[4] https://www.sigmaaldrich.com/GB/en/sds/sigald/179124

# 5

# After classification

## In this section:

- Packing instructions
- Documentation

Once a commodity has been classified, allocated a UN number, proper shipping name and packing group (if appropriate), the next step will be to identify a suitable containment system (packaging, intermediate bulk container, portable tank or bulk container).

The packing instructions are found in column 8 of the Dangerous Goods List (DGL) and special packing provisions in column 9 of the DGL. This code (for example, P001) will lead to IMDG Code Chapter 4.1.4 giving information on the types of packaging, what amount per packing group. It is important that any special packing provisions identified in column 9 are noted and actioned where applicable.

The packaging used is often required to be an approved type, and in all cases be strong enough to withstand the normal transport environment, including shocks, impacts, humidity, vibrations, and pressure, temperature and phase changes. This is especially important when transporting long distance, where the commodity is likely to endure a range of conditions.

For example, if shipping a container from Norway to Australia, it will likely first experience low Scandinavian temperatures then pass through the tropical equator to Australia. The packaging must be able to withstand these temperature fluctuations.

**In the event of an incident, first and emergency responders will rely on the information provided**

**Documentation**

Finally, once a commodity has been classified, packed and labelled, the last stage is to complete a multimodal dangerous goods form. This contains a declaration stating:

> *"I hereby declare that the contents of this consignment are fully and accurately described above/ below 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 government regulations".*

An example of a multimodal dangerous goods form template can be found in the IMDG Code at Chapter 5.4.5. This document will travel digitally with the commodity and will show important information, such as origin, destination, a description of the goods, mass and who is shipping it.

The importance of correct classification and accurate documentation cannot be overstated, particularly in the maritime mode. The declared and stated information in documents, declarations, labels, markings and placarding will all be used by other stakeholders through the supply chain to make critical decisions, such as on-board stowage location and emergency response.

In the event of an incident, first and emergency responders will rely on the information provided and form strategies when considering their response. Inaccurate information can be catastrophic, such as using water to put out a fire involving a Class 4.3 cargo that has not been correctly declared.

# 6

# Other transport considerations

## In this section:

- Practical considerations relating to marking, labelling and placarding, documentation, and segregation
- Importance of accuracy

Once classification has been correctly determined, this is not the end of the journey where safety is concerned. There are various other considerations related to practical items, as shown in the following table.

| | |
|---|---|
| **Multimodal Transport Considerations** | Although the main part of the journey may take place on a container ship, transport to and from the port will still be required, meaning that other modal regulations may apply. When routing the consignment to the vessel, it is important to consider the requirements of these other modes—for example, compliance with land-transport regulations if the journey involves travelling through a tunnel or other controlled infrastructure. |
| **Packaging** | Packaging must be of good quality and strong enough to withstand shocks and loading normally encountered, and to prevent any loss of cargo under normal conditions of transport. |
| **Special provisions** | These provisions modify, clarify or exempt the general requirements of the Code for identified entries. Special Provisions (if applicable) are listed in the DGL at column 6. A full index of special provisions can be found in chapter 3.3 of the IMDG Code. |
| **Limited quantities** | State the maximum quantity per inner packaging that may be carried not subject to all provisions, found in column 7a of the DGL. |
| **Excepted quantities** | State the maximum quantity per inner and outer packaging that may be carried not subject to all provisions, found in column 7b of the DGL. |

**The ship's Document of Compliance (DOC) should be referenced for the carriage of dangerous goods, as required under SOLAS Regulation II-2/19, which should be checked before accepting cargo for shipment. The DOC does not cover IMDG Class 6.2 (infectious substances) and Class 7 (radioactive materials), and it often excludes dangerous goods carried in limited quantities and excepted quantities under the IMDG Code.**

### Importance of accuracy

Once classification has been correctly determined and the above aspects have been considered, the importance of accurate completion of documentation and communication should not be underestimated. The dangerous goods note is the pivotal document to communicate cargo details to the shipping line.

In previous legal cases involving dangerous goods, it was highlighted in judges' decisions that compliance with the relevant regulations was nothing more than a baseline. It was noted that the consignor (the business or individual responsible for sending the goods) ought to know everything about a product, including all characteristics and all potential hazards. It has been stressed that all relevant information should be communicated to parties in the supply chain with a view to maintaining the greatest levels of safety.

Simply classifying dangerous goods where there are other potential hazards known and present would not provide a sufficient defence should the worst happen.

# 7

# Examples

## In this section:

- Understanding common examples of dangerous goods
- Routinely shipped goods such as fungicide, sealant and household cleaner

The process of classification of substances is complex and can involve multiple laboratory tests to establish attributes such as levels of toxicity or ignition points.

Furthermore, there are countless liquid solutions that are transported globally. Typically, these solutions will contain a proportion of classified dangerous goods, but in concentrations such that the product might fall outside of the scope of the regulations.

This section provides some examples which those handling, storing and transporting goods might routinely face. The intention is to empower a wider range of stakeholders in the supply chain to query and cross-examine declared goods and to identify potential red flags, leading to requests for further information to validate the classification of the cargo. Due diligence can prove valuable in sense checking goods that are declared for transport and storage.

The first step is to check the IMDG Code for the specific entry on the dangerous goods list (DGL). It would then be prudent to check the SDS transport information section for the product and its IMDG Code declaration. If the product is declared as dangerous goods, this is usually correct. But it is always advisable to double check on the declared hazards on reliable databases.

If the product is not declared as dangerous goods, but the SDS includes necessary information denoting a particular hazard or a UN Number, further information should be requested. Occasionally, it is necessary to ask the shipper to clarify.

**It is always advisable to double check on the declared hazards on reliable databases.**

# Example 1: Fungicide

Azoxystrobin is a systemic fungicide used in agriculture to protect crops from fungal diseases.

The first step is to check the IMDG Code, but there is no specific entry for azoxystrobin. Next, check the shipper's SDS declaration. This declares azoxystrobin as UN3077 ENVIRONMENTALLY HAZARDOUS SUBSTANCE. The SDS also confirms that the material is solid, not combustible or self-reacting, does not release gas, is not oxidising and is not corrosive. It is not declared as toxic but as environmentally hazardous. This is worth double checking.

The SDS further states that the inhalation toxicity ($LC_{50}$)[5] for particle sizes of 2–15 µm is 4.7mg/l, which places it as non-toxic according to the latest IMDG Code. However, a European Commission (EC) review for this pesticide states the toxicity for particles of less than 2 µm is 0.7 mg/l. Since without further investigation one cannot predict what the particle size is in the crystalline material, the lower $LC_{50}$ figure, that is higher toxicity, must be considered. This means the material should be classified and shipped as UN2588 Class 6.1 PESTICIDE, SOLID, TOXIC, NOS, packing group II (0.2–2mg/l) (SP274 applies).

The ecotoxic element admitted in the SDS is correct. The EC review shows ecotoxicity for all three aquatic trophic levels (less than 1 mg/l). These are all within the levels for inclusion as an 'environmentally hazardous substance', Acute 1. Therefore, the commodity must be declared and carried as a marine pollutant in addition to the UN2588 declaration. The technical name must be included, so this material should be shipped as UN2588 Class 6.1 PESTICIDE, SOLID, TOXIC, NOS, (azoxystrobin) PG II.

5. $LC_{50}$ is the toxicity from inhalation of a vapour for 1 h which will give a 50% survival rate within 14 days. Given in terms of volume or mass per litre of air (ml/l or mg/l). Compare this with $LD_{50}$, the toxicity of a single dose of a substance that will cause a 50% survival rate within 14 days, given in terms of mass of substance per mass of test animal (mg/kg).

# Example 2: Sealant

Elastic polyurethane sealant is a typical construction sealant for use in bathrooms. There are three constituents that make up to 21% of the material, with the remainder being relatively harmless material such as calcium carbonate and silica:

- up to 10% xylene – a solvent and flammable liquid
- up to 10% N,N-dibenzyliden polyoxypropylene diamine
- up to 1% 4,4'-methylenediphenyl diisocyanate.

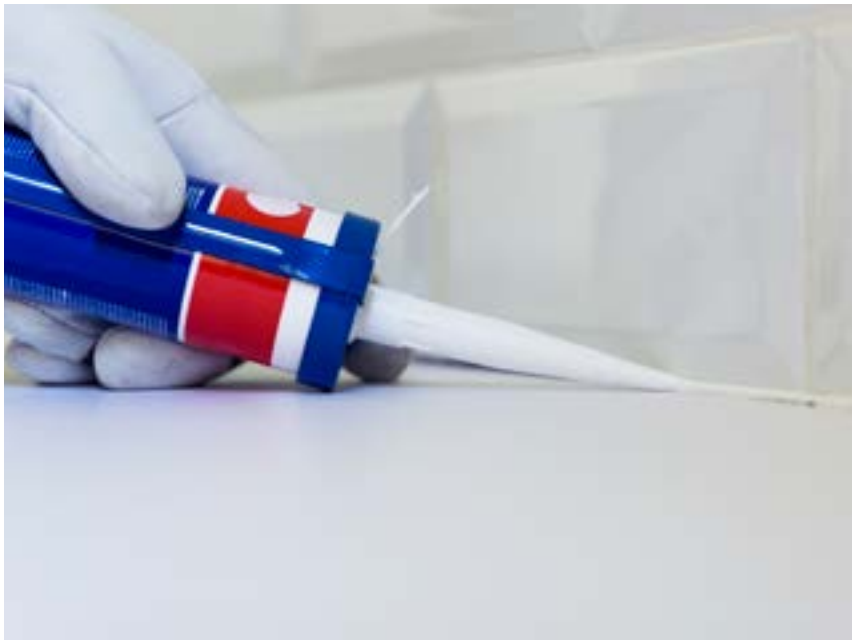
The first step is to check the IMDG Code.

Xylene is in the Code as UN1307 under Class 3 flammable. No other hazards are identified for xylene, so logically this is the only relevant consideration. It is present at only 10% in this product. In formulations and mixtures, xylene might evaporate only slowly or interact with the product matrix and therefore not present sufficient flammability to be Class 3. In this and other reliable company SDSs for similar products, a flashpoint test has been reported for the material. In several cases, the flashpoint was above the limit for a flammable liquid classification (70°C). This is the same case here, so a non-flammable rating is appropriate.

N,N-dibenzyliden polyoxypropylene diamine is a solid polymer. It is not in the IMDG Code. The SDS states it is not flammable or self-reacting, does not release gas and is not oxidising. It is considered hazardous in its pure form and has an EC designation of H314, which means it will corrode skin at a rate sufficient for it to be considered a Class 8 corrosive product. However, since it is in the product at 10% of the volume, its effect may be lessened (consider bridging principles at 2.8.4.2). The SDS and other reliable sources class the formulation as EC category 3 (mild irritant), so it is not a Class 8 corrosive. It is not toxic or environmentally hazardous under any criteria.

4,4'-methylenediphenyl diisocyanate is also not in the IMDG Code. It is a solid polymer, it is not flammable or self-reacting, it does not release gas and is not oxidising. It is a skin and eye irritant but falls below the criteria for inclusion as a Class 8 corrosive. It is classed as toxic for inhalation in pure form (2.4 mg/l). It is present at only 1% in the product and therefore the inhalation toxicity for the product is over 20 mg/l and hence is not classified as toxic.

It can be concluded that the product is not hazardous under any criteria.



# Example 3: Household cleaner

A toilet cleaner product is declared as non-dangerous goods. The contents suggest:

- Surfactants 1–5%
- Sulfamic acid 3–6%
- Hydrochloric acid 2–8%
- Colorants and perfume 0.5–2%

The main ingredients of interest are hydrochloric acid and sulfamic acid, both of which are declared as corrosive in the IMDG Code without any other hazard, so this is the focus.

For dilute mixtures of acids such as in this instance, the declaration relies on the extent of corrosivity of the commodity and the fact that very dilute or weak acids are often not sufficiently corrosive. For example, there is an IMDG special provision (SP 223) applicable for hydrochloric acid, which can be declared as non-dangerous goods at low concentration. However, 8% hydrochloric acid alone is classed as UNECE Class 8 Corrosive PG II in other SDSs. So, for the toilet cleaner, the corrosivity is suspected to be higher given the potential sulfamic acid contribution. Based on the currently available information, it is not possible to suggest a provisional declaration.

Other identical formulations in SDSs from reputable companies have declared the product as Class 8 UN 3264 CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S.

In such circumstances, it is suggested to ask the shipper for the corrosivity test data if it insists on a non-hazardous declaration. There are tests that should have been conducted and these are set out in the IMDG Code sections 2.8.2.4 to 2.8.2.5, which measure corrosion rate in skin samples and/or metal plates.

**It is important to undertake corrosivity tests for liquids or solids which may become liquid during transport, on both skin and metal.**

# For more information

Please contact us at **riskmanagement@ttclub.com**
or visit us at **ttclub.com**

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The UK P&I Club is a leading provider of Protection and Indemnity insurance, supporting the global maritime industry with over 150 years of technical expertise, financial strength and responsive service. Our international team delivers specialist claims handling, risk management insight and operational guidance across every major shipping sector. Today, the Club covers more than 250 million tonnes of owned and chartered vessels, remaining a trusted and forward-looking partner to the world's fleet.

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National Cargo Bureau (NCB) is an independent, not-for-profit organization dedicated to safeguarding life and cargo through safer, smarter supply chains. NCB delivers integrated inspection, compliance, and training products and services that support organizations in managing cargo risk and safety across complex global trade networks. Since its founding in 1952, NCB's reputation has extended far beyond its original regulatory support role. Its inspection and certification services have become widely recognized not only as evidence of compliance within the United States, but also as a trusted standard relied upon by carriers, terminal operators, insurers, and cargo stakeholders worldwide. Operating globally, NCB combines deep regulatory expertise with advanced digital screening and data analytics to help carriers, terminals, regulators, and shippers identify, assess, and mitigate dangerous goods and cargo risks at scale. NCB's Hazcheck software suite and technology-enabled services provide industry-leading capabilities for cargo screening, documentation validation, container inspection, and regulatory compliance assurance. With headquarters in the United States and the United Kingdom and operational coverage across major U.S. ports and Asia-Pacific trade hubs, NCB maintains a strong international presence while delivering consistent standards worldwide. As a trusted industry partner at the intersection of physical inspection and digital risk intelligence, NCB enables safer, more transparent, and more resilient supply chains across global commerce.

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**TT Club**

TT Club is the established market-leading independent provider of mutual insurance and related risk management services to the international transport and logistics industry. TT Club's primary objective is to help make the industry safer and more secure. Founded in 1968, the Club has more than 1100 Members, spanning container owners and operators, ports and terminals, and logistics companies, working across maritime, road, rail, and air. TT Club is renowned for its high-quality service, in- depth industry knowledge and enduring Member loyalty. It retains more than 93% of its Members with a third of its entire membership having chosen to insure with the Club for 20 years or more.

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