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ICMM
International Council
on Mining & Metals

**MINING WITH
PRINCIPLES**

QUICK REFERENCE GUIDE

Solid Inorganic Cargoes: Equivalence of
GHS Hazard Classes and Categories and
Dangerous Goods Classes and Packing Groups



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INTRODUCTION

To meet regulatory requirements, the mining industry carries out due diligence on the hazard(s) of existing and new products (substances and mixtures). Usually, the first step is to determine the hazard profile using the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) in order to produce the necessary information for labels and Safety Data Sheets (SDS). There is also a need to comply with transport regulations, for example, to determine if a product falls within any of the 9 classes of dangerous goods defined by the Recommendations on the Transport of Dangerous Goods, and to meet the specific requirements associated with each class. In the past two decades the various transport regulations (i.e. codes, agreements and regulations) have been converging in the way the hazard is assessed, mostly using the hazard types and categories of the GHS.

Purpose of the Quick Reference Guide

The aim of this guide is to offer the industry a summarized review, in the form of tables, of the relationships of the hazard types and categories in the GHS and the corresponding classes and packing groups included in the 9 classes of dangerous goods in the following regulatory transport instruments:

- Globally Harmonized System of Classification and Labelling of Chemicals (GHS), Rev. 8, 2019
- Recommendations on the Transport of Dangerous Goods - Model Regulations (UN Model Regulations), Rev. 21, 2019
- International Maritime Dangerous Goods Code (IMO-IMDG), Amendments 38-16, 2016

- International Maritime Solid Bulk Cargoes Code (IMO-IMSBC), Amendments 5-19, 2019
- European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR), Rev. 2019
- Regulations Concerning the International Carriage of Dangerous Goods by Rail (RID), Rev. 2021
- European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways (ADN), Rev. 2021

This guide includes, when relevant, the references to the testing methodology associated with a given GHS hazard type (United Nations Manual of Tests and Criteria, 7th Revision, 2019) (UN-MT&C).

The International Maritime Solid Bulk Cargoes Code (IMO-IMSBC) includes requirements for Materials Hazardous only in Bulk (MHB) and cargoes Harmful to the Marine Environment (HME).

Recommendations

This document is not intended as a comprehensive guidance; therefore, it is the responsibility of the user to study the source instrument (codes, agreements or regulations) and to review the specific requirements and exceptions. Whenever a given product falls into more than one class of dangerous goods, the order of precedence should be considered to determine the principal and subsidiary risks.

1. The SDS should provide comprehensive information about a substance or mixture for use in workplace chemical control regulatory frameworks. Both employers and workers use it as a source of information about hazards, including environmental hazards, and to obtain advice on safety precautions. The information acts as a reference source for the management of hazardous chemicals in the workplace (GHS, rev 8, Chapter 1.5).

GLOBALLY HARMONIZED SYSTEM OF CLASSIFICATION AND LABELLING OF CHEMICALS (GHS) AND THE RECOMMENDATIONS ON THE TRANSPORT OF DANGEROUS GOODS-MODEL REGULATIONS (UN MODEL REGULATIONS)

**RELATIONSHIP BETWEEN GHS HAZARD CATEGORIES
AND CLASSES OF DANGEROUS GOODS**



UN MODEL REGULATIONS

GHS Hazard Type	Category	Notes	UN Model Regulations Hazard Type	Classification as Dangerous Good and Packing group	Testing Methodology
Physical Hazards					
Flammable solids	Cat 1	Burning rate test: Substances or mixtures other than metal powders: (a) wetted zone does not stop fire; and (b) burning time <45s or burning rate >2.2mm/s Metal powders: burning time ≤5 min	Flammable solids (Division 4.1)	DG, PG II	UN-MT&C, Test N.1, Sub-section 33.2.4
	Cat 2	Burning rate test: Substances or mixtures other than metal powders: (a) wetted zone stops the fire for at least 4 min; and (b) burning time <45s or burning rate >2.2mm/s Metal powders: burning time >5 min and ≤10 min	Flammable solids (Division 4.1)	DG, PG III	
Self-reactive substances and mixtures	Type	Decision logic and guidance are shown in GHS sections 2.8.4	Self-reactive substances (Division 4.1)	See list of currently assigned self-reactive substances in packaging's (2.4.2.3.2.3) and follow packing methods in packing instruction P520 (and packing instruction ⁱ IBC520). The general classification logic can be found in the Figure 2.4.1 FLOW CHART SCHEME FOR SELF-REACTIVE SUBSTANCES.	Classification according to Part II of UN-MT&C, Sections 21 to 28
	A	As packaged, will detonate or deflagrate rapidly	Type A, Self-reactive substances (Division 4.1)	Prohibited from transport under the provisions for self-reactive substances of Division 4.1 in that type of packaging	

UN MODEL REGULATIONS

GHS Hazard Type	Category	Notes	UN Model Regulations Hazard Type	Classification as Dangerous Good and Packing group	Testing Methodology
Self-reactive substances and mixtures	B	Any self-reactive substance or mixture possessing explosive properties and which, as packaged, neither detonates nor deflagrates rapidly, but is liable to undergo a thermal explosion in that package	Type B, Self-reactive substances (Division 4.1)	The classification is directly related to the maximum quantity allowed in one unit of packaging	
	C	Any self-reactive substance or mixture possessing explosive properties when the substance or mixture as packaged cannot detonate or deflagrate rapidly or undergo a thermal explosion	Type C, Self-reactive substances (Division 4.1)	The classification is directly related to the maximum quantity allowed in one unit of packaging	
	D	Any self-reactive substance or mixture which in laboratory testing: (i) detonates partially, does not deflagrate rapidly and shows no violent effect when heated under confinement; or (ii) does not detonate at all, deflagrates slowly and shows no violent effect when heated under confinement; or (iii) does not detonate or deflagrate at all and shows a medium effect when heated under confinement	Type D, Self-reactive substances (Division 4.1)	The classification is directly related to the maximum quantity allowed in one unit of packaging	
	E	Any self-reactive substance or mixture which, in laboratory testing, neither detonates nor deflagrates at all and shows low or no effect when heated under confinement	Type E, Self-reactive substances (Division 4.1)	The classification is directly related to the maximum quantity allowed in one unit of packaging	

UN MODEL REGULATIONS

GHS Hazard Type	Category	Notes	UN Model Regulations Hazard Type	Classification as Dangerous Good and Packing group	Testing Methodology
Self-reactive substances and mixtures	F	Any self-reactive substance or mixture which, in laboratory testing, neither detonates in the cavitated state nor deflagrates at all and shows only a low or no effect when heated under confinement as well as low or no explosive power	Type F, Self-reactive substances (Division 4.1)	The classification is directly related to the maximum quantity allowed in one unit of packaging	
	G	Any self-reactive substance or mixture which, in laboratory testing, neither detonates in the cavitated state nor deflagrates at all and shows no effect when heated under confinement nor any explosive power, provided that it is thermally stable (self-accelerating decomposition temperature is 60C to 75C for a 50kg package), and, for liquid mixtures, a diluent having a boiling point greater than or equal to 150C is used for desensitization. If the mixture is not thermally stable or a diluent having a boiling point less than 150C is used for desensitization, the mixture shall be defined as self-reactive substance TYPE F	Type G, Self-reactive substances (Division 4.1)	May be considered for transport in ⁱⁱ IBCs or Tanks according to Figure 2.4.1 FLOW CHART SCHEME FOR SELF-REACTIVE SUBSTANCES.	
Pyrophoric solids	Cat 1	Solid which, even in small quantities, that is liable to ignite within five minutes after coming into contact with air	Pyrophoric solids (Division 4.2)	DG, PG I	UN-MT&C, Test N.2, Sub-Section 33.4.4
Self-heating substances and mixtures	Cat 1	A positive result is obtained in a test using a 25mm sample cube at 140C	Self-heating substances (Division 4.2)	DG, PG II	UN-MT&C, Test N.4, Sub-Section 33.4.6
	Cat 2	Table 2.11.1, criterium (a), (b) or (c), GHS Rev 8	Self-heating substances (Division 4.2)	DG, PG III	

UN MODEL REGULATIONS

GHS Hazard Type	Category	Notes	UN Model Regulations Hazard Type	Classification as Dangerous Good and Packing group	Testing Methodology
Substances and mixtures which, in contact with water, emit flammable gases	Cat 1	For criteria see Table 2.12.1 GHS Rev 8.	Substances which, in contact with water, emit flammable gases (Division 4.3), Criteria same as GHS Rev 8	DG, PG I	UN-MT&C, Test N.5, Sub-Section 33.5.4
	Cat 2	For criteria see Table 2.12.1 GHS Rev 8.	Substances which, in contact with water, emit flammable gases (Division 4.3), Criteria same as GHS Rev 8	DG, PG II	
	Cat 3	For criteria see Table 2.12.1 GHS Rev 8.	Substances which, in contact with water, emit flammable gases (Division 4.3), Criteria same as GHS Rev 8	DG, PG III	
Oxidizing Solid	Cat 1	For criteria see Table 2.14.1 GHS Rev 8.	Oxidizing substances (Division 5.1)	DG, PG I	UN-MT&C, Test 0.1, Sub-Section 34.4.1 and Test 0.3, Sub-section 34.4.3
	Cat 2	For criteria see Table 2.14.1 GHS Rev 8.	Oxidizing substances (Division 5.1)	DG, PG II	
	Cat 3	For criteria see Table 2.14.1 GHS Rev 8.	Oxidizing substances (Division 5.1)	DG, PG III	
Corrosive to Metals	Cat 1	Corrosion rate on either steel or aluminium surfaces exceeding 6.25mm per year at a test temperature of 55C when tested on both materials.	Corrosive Substances (Class 8)	DG, PG III	UN-MT&C, Test C.1, Sub-Section 37.4

UN MODEL REGULATIONS

GHS Hazard Type	Category	Notes	UN Model Regulations Hazard Type	Classification as Dangerous Good and Packing group	Testing Methodology
Health Hazards					
Acute Toxicity	Cat 1	Oral toxicity	Toxic substances (Division 6.1)	DG, PG I	iii
	Cat 2	Oral toxicity	Toxic substances (Division 6.1)	DG, PG II	
	Cat 3	Oral toxicity	Toxic substances (Division 6.1)	DG, PG III	
	Cat 4	<i>Oral toxicity</i>	<i>No Classification</i>	<i>None</i>	
	Cat 5	<i>Oral toxicity</i>	<i>No Classification</i>	<i>None</i>	
Acute Toxicity	Cat 1	Dermal toxicity	Toxic substances (Division 6.1)	DG, PG I	
	Cat 2	Dermal toxicity	Toxic substances (Division 6.1)	DG, PG II	
	Cat 3	Dermal toxicity	Toxic substances (Division 6.1)	DG, PG III	
	Cat 4	<i>Dermal toxicity</i>	<i>No Classification</i>	<i>None</i>	
	Cat 5	<i>Dermal toxicity</i>	<i>No Classification</i>	<i>None</i>	
Acute Toxicity	Cat 1	^{iv} Inhalation toxicity by dusts and mists	Toxic substances (Division 6.1)	DG, PG I	
	Cat 2	Inhalation toxicity by dusts and mists	Toxic substances (Division 6.1)	DG, PG II	
	Cat 3	Inhalation toxicity by dusts and mists	Toxic substances (Division 6.1)	DG, PG III	
	Cat 4	<i>Inhalation toxicity by dusts and mists</i>	<i>No Classification</i>	<i>None</i>	
	Cat 5	<i>Inhalation toxicity by dusts and mists</i>	<i>No Classification</i>	<i>None</i>	
Skin Corrosion/irritation	Sub Cat 1a	Skin corrosion	^v Corrosive Substances (Class 8)	DG, PG I	^{vi} OECD 404, 435, 431, 430
	Sub Cat 1b	Skin corrosion	Corrosive Substances (Class 8)	DG, PG II	
	Sub Cat 1c	Skin corrosion	Corrosive Substances (Class 8)	DG, PG III	

UN MODEL REGULATIONS

GHS Hazard Type	Category	Notes	UN Model Regulations Hazard Type	Classification as Dangerous Good and Packing group	Testing Methodology
Environmental Hazards					
Hazardous to the Aquatic Environment	Acute Cat 1		Environmentally hazardous substances (aquatic environment) (Class 9)	DG, PG III, when transported under the entry UN 3077 ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S (See Dangerous Good List in Chapter 3.2).	Classification Methodology as per section 2.9.2 UN Model Regulations or Chapter 4.1 UN-GHS Rev 8
	Acute Cat 2		No Classification	None	
	Acute Cat 3		No Classification	None	
Hazardous to the Aquatic Environment	Chronic Cat 1		Environmentally hazardous substances (aquatic environment) (Class 9)	DG, PG III, when transported under the entry UN 3077 ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S (See Dangerous Good List in Chapter 3.2).	
	Chronic Cat 2		Environmentally hazardous substances (aquatic environment) (Class 9)	DG, PG III, when transported under the entry UN 3077 ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S (See Dangerous Good List in Chapter 3.2).	
	Chronic Cat 3		No Classification	None	
	Chronic Cat 4		No Classification	None	

Footnotes

i. See <https://adrbook.com/en/2017/Sutun/8/P520>

ii. IBC = Intermediate Bulk Containers. This type of container is used as a hybrid form between drums and bulk transport (truck transport, maritime container, or boat transport). IBCs allow manipulation with forklift or pallet trucks, but cannot be handled by hand, e.g., like drums.

iii. For the different exposure routes the acute toxicity values are determined using standard toxicity tests in animals

iv. In the case of acute dust and mist toxicity the GHS uses 4 hours exposure, see table 3.1.2 and the UN Model Regulations the values are for 1 hour exposition, see section 2.6.2.2.4.1.

See also GHS paragraph 3.1.2.6.1 and UN Model Regulations paragraph 2.6.2.2.4.2. These cut off values can be interconverted in accordance with available experimental data.

v. Special case: A substance or mixture meeting the criteria of Class 8 having an inhalation toxicity of dusts and mists (LC50) in the range of packing group I, but toxicity through oral ingestion or dermal contact only in the range of packing group III or less, shall be allocated to Class 8

vi GHS only mentions OECD Guideline No. 404

GLOBALLY HARMONIZED SYSTEM OF CLASSIFICATION AND LABELLING OF CHEMICALS (GHS) AND THE INTERNATIONAL MARITIME DANGEROUS GOODS CODE (IMO-IMDG)

RELATIONSHIP BETWEEN GHS HAZARDS AND CLASSES OF DANGEROUS GOODS



IMO-IMDG

GHS Hazard Type	Category	Notes	IMO-IMDG Hazard type	Classification as Dangerous Good and Packing group	Testing Methodology
Physical Hazards					
Flammable solids	Cat 1	Burning rate test: Substances or mixtures other than metal powders: (a) wetted zone does not stop fire; and (b) burning time <45s or burning rate >2.2mm/s. Metal powders: burning time ≤5 min	Flammable solids (Class 4.1)	DG, PG II	UN-MT&C, Test N.1, Sub-section 33.2.4
	Cat 2	Burning rate test: Substances or mixtures other than metal powders: (a) wetted zone stops the fire for at least 4 min; and (b) burning time <45 s or burning rate >2.2mm/s. Metal powders: burning time >5 min and ≤10 min	Flammable solids (Class 4.1)	DG, PG III	
Self-reactive substances and mixtures	Type	Decision logic and guidance are shown in GHS sections 2.8.4	Self-reactive substances (Class 4.1)	See list of currently assigned self-reactive substances in packaging's (2.4.2.3.2.3) and follow packing methods in packing instruction P520 (and packing instruction ⁱ IBC520). The general classification logic can be found in the Figure 2.4.1 FLOW CHART SCHEME FOR SELF-REACTIVE SUBSTANCES. (Chapter 2.4. UN-TMR)	Classification according to Part II of UN-MT&C, Sections 21 to 28
	A	As packaged, ⁱⁱ will detonate or deflagrate rapidly	Type A, Self-reactive substances (Class 4.1)	Prohibited from transport under the provisions for self-reactive substances of Division 4.1 in that packaging	

IMO-IMDG

GHS Hazard Type	Category	Notes	IMO-IMDG Hazard type	Classification as Dangerous Good and Packing group	Testing Methodology
Self-reactive substances and mixtures	B	Any self-reactive substance or mixture possessing explosive properties and which, as packaged, neither detonates nor deflagrates rapidly, but is liable to undergo a thermal explosion in that package	Type B, Self-reactive substances (Class 4.1)	Any substance possessing explosive properties and which, as packaged for transport, neither detonates nor deflagrates rapidly, but is liable to undergo a thermal explosion in that package, shall also bear an "EXPLOSIVE" subsidiary risk label (Model No. 1, see 5.2.2.2.2). Such a substance may be packaged in amounts of up to 25kg unless the maximum quantity has to be limited to a lower amount to preclude detonation or rapid deflagration in the package	
	C	Any self-reactive substance or mixture possessing explosive properties when the substance or mixture as packaged cannot detonate or deflagrate rapidly or undergo a thermal explosion	Type C, Self-reactive substances (Class 4.1)	Any substance possessing explosive properties may be transported without an "EXPLOSIVE" subsidiary risk label when the substance as packaged (maximum 50kg) for transport cannot detonate or deflagrate rapidly or undergo a thermal explosion	
	D	Any self-reactive substance or mixture which in laboratory testing: (i) detonates partially, does not deflagrate rapidly and shows no violent effect when heated under confinement; or (ii) does not detonate at all, deflagrates slowly and shows no violent effect when heated under confinement; or (iii) does not detonate or deflagrate at all and shows a medium effect when heated under confinement	Type D, Self-reactive substances (Class 4.1)	May be accepted for transport in packages of not more than 50kg net mass	

IMO-IMDG

GHS Hazard Type	Category	Notes	IMO-IMDG Hazard type	Classification as Dangerous Good and Packing group	Testing Methodology
Self-reactive substances and mixtures	E	Any self-reactive substance or mixture which, in laboratory testing, neither detonates nor deflagrates at all and shows low or no effect when heated under confinement	Type E, Self-reactive substances (Class 4.1)	Any substance which, in laboratory testing, neither detonates nor deflagrates at all and shows low or no effect when heated under confinement may be accepted for transport in packages of not more than 400kg/450 L	
	F	Any self-reactive substance or mixture which, in laboratory testing, neither detonates in the cavitated state nor deflagrates at all and shows only a low or no effect when heated under confinement as well as low or no explosive power	Type F, Self-reactive substances (Class 4.1)	Any substance which, in laboratory testing, neither detonates in the cavitated state nor deflagrates at all and shows only a low or no effect when heated under confinement as well as low or no explosive power may be considered for transport in IBCs	
	G	Any self-reactive substance or mixture which, in laboratory testing, neither detonates in the cavitated state nor deflagrates at all and shows no effect when heated under confinement nor any explosive power, provided that it is thermally stable (self-accelerating decomposition temperature is 60C to 75C for a 50kg package), and, for liquid mixtures, a diluent having a boiling point greater than or equal to 150C is used for desensitization. If the mixture is not thermally stable or a diluent having a boiling point less than 150C is used for desensitization, the mixture shall be defined as self-reactive substance TYPE F	Type G, Self-reactive substances (Class 4.1)	Any substance which, in laboratory testing, neither detonates in the cavitated state nor deflagrates at all and shows no effect when heated under confinement nor any explosive power shall be exempted from classification as a self-reactive substance of class 4.1 provided that the formulation is thermally stable (self-accelerating decomposition temperature 60C to 75C for a 50kg package) and any diluent meets the provisions of 2.4.2.3.5	

IMO-IMDG

GHS Hazard Type	Category	Notes	IMO-IMDG Hazard type	Classification as Dangerous Good and Packing group	Testing Methodology
Pyrophoric solids	Cat 1	Solid which, even in small quantities, that is liable to ignite within five minutes after coming into contact with air	Pyrophoric solids (Class 4.2)	DG, PG I	UN-MT&C, Test N.2, Sub-Section 33.4.4
Self-heating substances and mixtures	Cat 1	A positive result is obtained in a test using a 25mm sample cube at 140C	Self-heating substances (Class 4.2)	DG, PG II	UN-MT&C, Test N.4, Sub-Section 33.4.6
	Cat 2	Table 2.11.1, criterium (a), (b) or (c) , GHS Rev 8	Self-heating substances (Class 4.2)	DG, PG III	
Substances and mixtures which, in contact with water, emit flammable gases.	Cat 1	For criteria see Table 2.12.1, GHS Rev 8.	Substances which, in contact with water, emit flammable gases (Class 4.3)	DG, PG I	UN-MT&C, Test N.5, Sub-Section 33.5.4
	Cat 2	For criteria see Table 2.12.1, GHS Rev 8.	Substances which, in contact with water, emit flammable gases (Class 4.3)	DG, PG II	
	Cat 3	For criteria see Table 2.12.1, GHS Rev 8.	Substances which, in contact with water, emit flammable gases (Class 4.3)	DG, PG III	
Oxidizing Solid	Cat 1	For criteria see Table 2.14.1 GHS Rev 8.	Oxidizing substances (Class 5.1)	DG, PG I	UN-MT&C, Test 0.1, Sub-Section 34.4.1 and Test 0.3, Subs-section 34.4.3
	Cat 2	For criteria see Table 2.14.1 GHS Rev 8.	Oxidizing substances (Class 5.1)	DG, PG II	
	Cat 3	For criteria see Table 2.14.1 GHS Rev 8.	Oxidizing substances (Class 5.1)	DG, PG III	
Corrosive to Metals	Cat 1	Corrosion rate on either steel or aluminium surfaces exceeding 6.25 mm per year at a test temperature of 55C when tested on both materials.	Corrosive Substances (Class 8)	DG, PG III	UN-MT&C, Test C.1, Sub-Section 37.4

IMO-IMDG

GHS Hazard Type	Category	Notes	IMO-IMDG Hazard type	Classification as Dangerous Good and Packing group	Testing Methodology
Health Hazards					
Acute Toxicity	Cat 1	Oral toxicity	Toxic substances (Class 6.1)	DG, PG I	iii
	Cat 2	Oral toxicity	Toxic substances (Class 6.1)	DG, PG II	
	Cat 3	Oral toxicity	Toxic substances (Class 6.1)	DG, PG III	
	Cat 4	<i>Oral toxicity</i>	<i>No Classification</i>	<i>None</i>	
	Cat 5	<i>Oral toxicity</i>	<i>No Classification</i>	<i>None</i>	
Acute Toxicity	Cat 1	Dermal toxicity	Toxic substances (Class 6.1)	DG, PG I	
	Cat 2	Dermal toxicity	Toxic substances (Class 6.1)	DG, PG II	
	Cat 3	Dermal toxicity	Toxic substances (Class 6.1)	DG, PG III	
	Cat 4	<i>Dermal toxicity</i>	<i>No Classification</i>	<i>None</i>	
	Cat 5	<i>Dermal toxicity</i>	<i>No Classification</i>	<i>None</i>	
Acute Toxicity	Cat 1	^{iv} Inhalation toxicity by dusts and mists	Toxic substances (Class 6.1)	DG, PG I	
	Cat 2	Inhalation toxicity by dusts and mists	Toxic substances (Class 6.1)	DG, PG II	
	Cat 3	Inhalation toxicity by dusts and mists	Toxic substances (Class 6.1)	DG, PG III	
	Cat 4	<i>Inhalation toxicity by dusts and mists</i>	<i>No Classification</i>	<i>None</i>	
	Cat 5	<i>Inhalation toxicity by dusts and mists</i>	<i>No Classification</i>	<i>None</i>	
Skin Corrosion/irritation	Sub Cat 1a	Skin corrosion	^v Corrosive Substances (Class 8)	DG, PG I	OECD 404 & 435
	Sub Cat 1b	Skin corrosion	Corrosive Substances (Class 8)	DG, PG II	
	Sub Cat 1c	Skin corrosion	Corrosive Substances (Class 8)	DG, PG III	

IMO-IMDG

GHS Hazard Type	Category	Notes	IMO-IMDG Hazard type	Classification as Dangerous Good and Packing group	Testing Methodology
Environmental Hazards					
Hazardous to the Aquatic Environment	Acute Cat 1		^{vi} Marine pollutants (Class 9)	DG, PG III, when transported under the entry UN 3077 ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S (See Dangerous Good List in Chapter 3.2).	Classification Methodology as per section 2.9.3 IMDG or Chapter 4.1 UN-GHS Rev 8
	Acute Cat 2		No Classification	None	
	Acute Cat 3		No Classification	None	
Hazardous to the Aquatic Environment	Chronic Cat 1		Marine pollutants (Class 9)	DG, PG III, when transported under the entry UN 3077 ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S (See Dangerous Good List in Chapter 3.2).	
	Chronic Cat 2		Marine pollutants (Class 9)	DG, PG III, when transported under the entry UN 3077 ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S (See Dangerous Good List in Chapter 3.2).	
	Chronic Cat 3		No Classification	None	
	Chronic Cat 4		No Classification	None	

IMO-IMDG

Footnotes

- i. See <https://adrbook.com/en/2017/Sutun/8/P520>
- ii. IBC = Intermediate Bulk Containers. This type of container is used as a hybrid form between drums and bulk transport (truck transport, maritime container, or boat transport). IBCs allow manipulation with forklift or pallet trucks, but cannot be handled by hand, e.g., like drums.
- iii. For the different exposure routes the acute toxicity values are determined using standard toxicity tests in animals
- iv. In the case of acute dust and mist toxicity the GHS uses 4 hours exposure, see table 3.1.2 and the IMDG uses values for 1 hour exposure see section 2.6.2.2.4.1. These cut off values can be interconverted in accordance with available experimental data.
- v. Special case: A substance or preparation meeting the criteria of class 8 and having an inhalation toxicity of dusts and mists (LC50) in the range of packing group I, but toxicity through oral ingestion or dermal contact only in the range of packing group III or less, shall be allocated to class 8
- vi. Marine pollutants shall be transported under the provisions of Annex III of MARPOL, as amended (that related to the prevention of pollution by harmful substances carried by sea in packaged form, regulations 1 to 8) and under the appropriate entry according to their properties if they fall within the criteria of any of the classes 1 to 8. If they do not fall within the criteria of any of these classes, they shall be transported under the entry: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S., UN 3077 or ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S., UN 3082, as appropriate, unless there is a specific entry in class 9. IMDG 2.10.2.3

GLOBALLY HARMONIZED SYSTEM OF CLASSIFICATION AND LABELLING OF CHEMICALS (GHS) AND THE INTERNATIONAL MARITIME SOLID BULK CARGOES CODE (IMO-IMSBC)

RELATIONSHIP BETWEEN GHS HAZARD CATEGORIES
AND CLASSES OF DANGEROUS GOODS RELEVANT TO
SOLID INORGANIC CARGOES



IMO-IMSBC

GHS Hazard Type	Category	Notes	IMO-IMSBC Hazard type	Classification. Dangerous Good or Material Hazardous only in Bulk (MHB)	Testing Methodology
Physical Hazards					
Flammable solids	Cat 1	Burning rate test: Substances or mixtures other than metal powders: (a) wetted zone does not stop fire; and (b) burning time <45s or burning rate >2.2mm/s, 100mm. Metal powders: burning time ≤5 min	Flammable solids (Class 4.1)	DG, PG II, Group B	UN-MT&C, Test N.1, Sub-section 33.2.4.3.2
	Cat 2	Burning rate test: Substances or mixtures other than metal powders: (a) wetted zone stops the fire for at least 4 min; and (b) burning time <45s or burning rate >2.2mm/s. Metal powders: burning time >5 min and ≤10 min	Flammable solids (Class 4.1)	DG, PG III, Group B	
	None	In screening test: for solid material: burning over 200mm sample in ≤2 min. Powdered Metal: burning over 200mm of samples ≤20 min	MHB	ⁱ MHB (CB), Group B	UN-MT&C, Test N.1, Sub-section 33.2.4.3.1 Section 9.2.3.2 IMSBC Code.
Pyrophoric solids	Cat 1	Solid which, even in small quantities, that is liable to ignite within five minutes after coming into contact with air	Pyrophoric solids (Class 4.2)	DG, PG I, Group B	UN-MT&C, Test N.2, Sub-Section 33.4.4
Self-heating substances and mixtures	Cat 1	A positive result is obtained in a test using a 25mm sample cube at 140C	Self-heating substances (Class 4.2)	DG, PG II, Group B	UN-MT&C, Test N.4, Sub-Section 33.4.6
	Cat 2	Table 2.11.1, criterium (a), (b) or (c), GHS Rev 8	Self-heating substances (Class 4.2)	DG, PG III, Group B	
	None	In a test with 100mm sample cube the temperature increases 10C in an oven at 140C or 100C in 24 h	MHB	MHB (SH), Group B	UN-MT&C, Test N.4, Sub-Section 33.4.6.3. Section 9.2.3.3 IMSBC code

IMO-IMSBC

GHS Hazard Type	Category	Notes	IMO-IMSBC Hazard type	Classification. Dangerous Good or Material Hazardous only in Bulk (MHB)	Testing Methodology
Substances and Mixtures which, in contact with water, emit flammable gases	Cat 1	For criteria see Table 2.12.1, GHS Rev 8.	Substances which, in contact with water, emit flammable gases (Class 4.3)	DG, PG I	UN-MT&C, Test N.5, Sub-Section 33.5.4
	Cat 2	For criteria see Table 2.12.1, GHS Rev 8.	Substances which, in contact with water, emit flammable gases (Class 4.3)	DG, PG II	
	Cat 3	For criteria see Table 2.12.1, GHS Rev 8.	Substances which, in contact with water, emit flammable gases (Class 4.3)	DG, PG III	
	None	If any flammable gas evolution rate is greater than zero in test N5.	MHB	MHB (WF), Group B	UN-MT&C, Test N.5, Sub-Section 33.5.4. Section 9.2.3.4 IMSBC code
Substances and Mixtures which, in contact with water, emit toxic gases	GHS Acute Toxicity Gases/ Vapours Category 4	Any emission of gas in test N5 should be assessed for acute inhalation toxicity. A toxic gas is defined as showing inhalation toxicity (LC50) of or below 20,000 ppmV or 20 mg/l by 4 hours' testing	MHB	MHB (WT), Group B	UN-MT&C, Test N.5, Sub-Section 33.5.4. Section 9.2.3.5 IMSBC code
Oxidizing Solid	Cat 1	For criteria see Table 2.14.1 GHS Rev 8.	Oxidizing substances (Class 5.1)	DG, PG I	UN-MT&C, Test 0.1, Sub-Section 34.4.1 and Test 0.3, Sub-section 34.4.3
	Cat 2	For criteria see Table 2.14.1 GHS Rev 8.	Oxidizing substances (Class 5.1)	DG, PG II	
	Cat 3	For criteria see Table 2.14.1 GHS Rev 8.	Oxidizing substances (Class 5.1)	DG, PG III	

IMO-IMSBC

GHS Hazard Type	Category	Notes	IMO-IMSBC Hazard type	Classification. Dangerous Good or Material Hazardous only in Bulk (MHB)	Testing Methodology
Corrosive to Metals	Cat 1	Corrosion rate on either steel or aluminium surfaces exceeding 6.25 mm per year at a test temperature of 55C when tested on both materials.	Corrosive Substances (Class 8)	DG, PG III, Group B	UN-MT&C, Test C.1, Sub-Section 37.4.
	None	A material shall be classified as MHB when the corrosion rate on steel surface is between 4mm and 6.25mm a year at a test temperature of 55C when tested.	MHB	MHB (CR), Group B	MSC.1/Circ.1600, 2019 INTERIM GUIDANCE FOR CONDUCTING THE REFINED MHB (CR) CORROSIVITY TEST. Section 9.2.3.7.3 IMSBC code.
Health Hazards					
Acute Toxicity	Cat 1	Oral toxicity	Toxic substances (Class 6.1)	DG, PG I	ii
	Cat 2	Oral toxicity	Toxic substances (Class 6.1)	DG, PG II	
	Cat 3	Oral toxicity	Toxic substances (Class 6.1)	DG, PG III	
	Cat 4	Oral toxicity	MHB	MHB (TX), Group B	
	Cat 5	Oral toxicity	No Classification	None	
Acute Toxicity	Cat 1	Dermal toxicity	Toxic substances (Class 6.1)	DG, PG I	
	Cat 2	Dermal toxicity	Toxic substances (Class 6.1)	DG, PG II	
	Cat 3	Dermal toxicity	Toxic substances (Class 6.1)	DG, PG III	
	Cat 4	Dermal toxicity	No Classification	None	
	Cat 5	Dermal toxicity	No Classification	None	

IMO-IMSBC

GHS Hazard Type	Category	Notes	IMO-IMSBC Hazard type	Classification. Dangerous Good or Material Hazardous only in Bulk (MHB)	Testing Methodology
Acute Toxicity	Cat 1	ⁱⁱⁱ Inhalation toxicity by dusts and mists	Toxic substances (Class 6.1)	DG, PG I	
	Cat 2	Inhalation toxicity by dusts and mists	Toxic substances (Class 6.1)	DG, PG II	
	Cat 3	Inhalation toxicity by dusts and mists	Toxic substances (Class 6.1)	DG, PG III	
	Cat 4	Inhalation toxicity by dusts and mists	MHB	MHB (TX), Group B	
	Cat 5	<i>Inhalation toxicity by dusts and mists</i>	<i>No Classification</i>	<i>None</i>	
Specific Target Organ Toxicity Single Exposure	Cat 1	Dermal Toxicity	MHB	MHB (TX), Group B	
	Cat 2	<i>Dermal Toxicity</i>	<i>No Classification</i>	<i>None</i>	
	Cat 3	<i>Dermal Toxicity</i>	<i>No Classification</i>	<i>None</i>	
Specific Target Organ Toxicity Repeated Exposure	Cat 1	Dermal Toxicity	MHB	MHB (TX), Group B	
	Cat 1	Any target		may be HME ^{iv}	
	Cat 2	<i>Any target</i>	<i>No Classification</i>	<i>None</i>	
Germ cell mutagenicity	Cat 1A & 1B		MHB	MHB (TX), Group B, may be HME	
	Cat 2		<i>No Classification</i>	<i>None</i>	
Carcinogenicity	Cat 1A & 1B		MHB	MHB (TX), Group B, may be HME	
	Cat 2		<i>No Classification</i>	<i>None</i>	
Reproductive toxicity	Cat 1A & 1B		MHB	MHB (TX), Group B, may be HME	
	Cat 2		<i>No Classification</i>	<i>None</i>	

IMO-IMSBC

GHS Hazard Type	Category	Notes	IMO-IMSBC Hazard type	Classification. Dangerous Good or Material Hazardous only in Bulk (MHB)	Testing Methodology
Skin Corrosion/irritation	Sub Cat 1a	Skin corrosion	^v Corrosive Substances (Class 8)	DG, PG I, Group B	OECD 404 & 435
	Sub Cat 1b	Skin corrosion	Corrosive Substances (Class 8)	DG, PG II, Group B	
	Sub Cat 1c	Skin corrosion	Corrosive Substances (Class 8)	DG, PG III, Group B	
	Cat 2	Skin irritation		MHB (CR), Group B	
	Cat 3	Mild irritation	No Classification	None	
Respiratory sensitization	Cat 1		MHB	MHB (CR), Group B	
Serious eye damage	Cat 1		MHB	MHB (CR), Group B	
Eye irritation	Cat 2A		MHB	MHB (CR), Group B	
	Cat 2B		No Classification	None	
Environmental Hazards					
Hazardous to the aquatic environment	Acute Cat 1		^{vi} Marine pollutants (Class 9)	HME and DG, PG III, when transported under the entry UN 3077 ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S (See IMDG Dangerous Good List in Chapter 3.2).	Chapter 4.1 UN-GHS Rev 8
	Acute Cat 2		No Classification	None	
	Acute Cat 3		No Classification	None	

IMO-IMSBC

GHS Hazard Type	Category	Notes	IMO-IMSBC Hazard type	Classification. Dangerous Good or Material Hazardous only in Bulk (MHB)	Testing Methodology
Hazardous to the aquatic environment	Chronic Cat 1		Marine pollutants (Class 9)	HME and DG, PG III, when transported under the entry UN 3077 ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S (See IMDG Dangerous Good List in Chapter 3.2).	
Hazardous to the aquatic environment	Chronic Cat 2		Marine pollutants (Class 9)	HME and DG, PG III, when transported under the entry UN 3077 ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S (See IMDG Dangerous Good List in Chapter 3.2).	
	<i>Chronic Cat 3</i>		<i>No Classification</i>	<i>None</i>	
	<i>Chronic Cat 4</i>		<i>No Classification</i>	<i>None</i>	

Footnotes

- Materials hazardous only in bulk (MHB)
- for the different exposure routes the acute toxicity values are determined using standard toxicity tests in animals
- In the case of acute dust and mist toxicity the GHS uses 4 hours exposure, see table 3.1.2 and the IMDG uses values for 1 hour exposure see section 2.6.2.2.4.1. These cut off values can be interconverted in accordance with available experimental data.
- Harmful to the maritime environment (HME), see criteria in Note 1 below, or in Appendix 1 in Resolution MEPC 277(70) of October 28th 2016.
- Special case: a substance or preparation meeting the criteria of class 8 and having an inhalation toxicity of dusts and mists (LC50) in the range of packing group I, but toxicity through oral ingestion or dermal contact only in the range of packing group III or less, shall be allocated to class 8
- As 2021, in the IMSBC code, the Class 9 related to aquatic hazards, such as Marine pollutants (Class 9) is under discussion, so far, the class 9 due to aquatic hazards has not been used in the characteristics table, nor in the naming of the schedules in appendix I. It must be noted that the provisions for Marine pollutants (Class 9) in the IMDG code make specific reference to the regulations in Annex III of MARPOL, that are related to the prevention of pollution by harmful substances carried by sea in packaged form. The decision is pending in the relevant Committees and Sub committees of the IMO. If the IMO decides to follow the IMDG procedure, the cargo shall be transported under the appropriate schedule entry according to its properties if they fall within the criteria of any of the classes 1 to 8. If they do not fall within the criteria of any of these classes, they shall be transported under the entry: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S., UN 3077, unless there is a specific entry in class 9. IMDG 2.10.2.3

Note 1

Taken from Resolution MEPC 277(70)

"Appendix I

Criteria for the classification of solid bulk cargoes as harmful to the marine environment

For the purpose of this Annex, cargo residues are considered to be harmful to the marine environment (HME) if they are residues of solid bulk cargoes which are classified according to the criteria of the United Nations Globally Harmonized System of Classification and Labelling of Chemicals (GHS) meeting the following parameters:

- Acute Aquatic Toxicity Category 1; and/or
- Chronic Aquatic Toxicity Category 1 or; and/or
- Carcinogenicity Category 1A or 1B combined with not being rapidly degradable and having high bioaccumulation; and/or
- Mutagenicity Category 1A or 1B combined with not being rapidly degradable and having high bioaccumulation; and/or
- Reproductive Toxicity Category 1A or 1B combined with not being rapidly degradable and having high bioaccumulation; and/or
- Specific Target Organ Toxicity Repeated Exposure Category 1 combined with not being rapidly degradable and having high bioaccumulation; and/or
- Solid bulk cargoes containing or consisting of synthetic polymers, rubber, plastics, or plastic feedstock pellets (this includes materials that are shredded, milled, chopped or macerated or similar materials)."

Note 2

Most bulk cargoes classified as DG included in Appendix I correspond to Packing Group III (low danger). However, in practice, DG cargoes Packing Group II, are acceptable for bulk transport, when the main hazard falls within packing group III and a subsidiary hazard, e.g., Class 6.1, result in the assignment of PG II in the IMDG Code.

GLOBALLY HARMONIZED SYSTEM OF CLASSIFICATION AND LABELLING OF CHEMICALS (GHS) AND THE EUROPEAN AGREEMENT CONCERNING THE INTERNATIONAL CARRIAGE OF DANGEROUS GOODS BY ROAD (ADR)

RELATIONSHIP BETWEEN GHS HAZARD CATEGORIES AND CLASSES OF DANGEROUS GOODS RELEVANT TO SOLID INORGANIC CARGOES



ADR

GHS Hazard type	Category	Notes	ADR Hazard type	Classification as Dangerous Good and Packing group	Testing Methodology
Physical Hazards					
Flammable solids	Cat 1	Burning rate test: Substances or mixtures other than metal powders: (a) wetted zone does not stop fire; and (b) burning time <45s or burning rate >2.2mm/s Metal powders: burning time ≤5 min	ⁱ Flammable solids (Class 4.1) have a burning time of less than 45 seconds over a measured distance of 100mm; if the flame passes the wetted zone Metal powders: burning time ≤5 min Substances and articles already classified as flammable solids of Class 4.1 are listed in Table A of Chapter 3.2	DG, PG II	UN-MT&C, Test N.1, Sub-section 33.2.4
	Cat 2	Burning rate test: Substances or mixtures other than metal powders: (a) wetted zone stops the fire for at least 4 min; and (b) burning time <45s or burning rate >2.2mm/s Metal powders: burning time >5 min and ≤10 min	Flammable solids (Class 4.1) have a burning time of less than 45 seconds over a measured distance of 100mm; if the wetted zone stops the flame for at least four minutes Metal powders: burning time >5 min Substances and articles already classified as flammable solids of Class 4.1 are listed in Table A of Chapter 3.2	DG, PG III	

ADR

GHS Hazard type	Category	Notes	ADR Hazard type	Classification as Dangerous Good and Packing group	Testing Methodology
Self-reactive substances and mixtures	Type	Decision logic and guidance are shown in GHS sections 2.8.4	Self-reactive substances (Class 4.1)	Self-reactive substances which have already been classified and are already permitted for carriage in packaged form are listed in 2.2.41.4, those already permitted for carriage in IBCs are listed in 4.1.4.2, packing instruction IBC520 and those already permitted for carriage in tanks according to Chapter 4.2 are listed in 4.2.5.2, portable tank instruction T23. Each permitted substance listed is assigned to a generic entry of Table A of Chapter 3.2 (UN Nos. 3221 to 3240), and appropriate subsidiary hazards and remarks providing relevant transport information are given.	Classification according to Part II of UN-MT&C, Sections 21 to 28
	A	As packaged, will detonate or deflagrate rapidly	Type A, Self-reactive substances (Class 4.1)	Not be accepted for carriage. See general collective entries in 2.2.41.3	
	B	Any self-reactive substance or mixture possessing explosive properties and which, as packaged, neither detonates nor deflagrates rapidly, but is liable to undergo a thermal explosion in that package	Type B, Self-reactive substances (Class 4.1)	The classification of types B to F is directly related to the maximum quantity allowed in one unit of packaging. See general collective entries in 2.2.41.3	
	C	Any self-reactive substance or mixture possessing explosive properties when the substance or mixture as packaged cannot detonate or deflagrate rapidly or undergo a thermal explosion	Type C, Self-reactive substances (Class 4.1)	The classification of types B to F is directly related to the maximum quantity allowed in one unit of packaging. See general collective entries in 2.2.41.3	

ADR

GHS Hazard type	Category	Notes	ADR Hazard type	Classification as Dangerous Good and Packing group	Testing Methodology
Self-reactive substances and mixtures	D	Any self-reactive substance or mixture which in laboratory testing: (i) detonates partially, does not deflagrate rapidly and shows no violent effect when heated under confinement; or (ii) does not detonate at all, deflagrates slowly and shows no violent effect when heated under confinement; or (iii) does not detonate or deflagrate at all and shows a medium effect when heated under confinement	Type D, Self-reactive substances (Class 4.1)	The classification of types B to F is directly related to the maximum quantity allowed in one unit of packaging. See general collective entries in 2.2.41.3	
	E	Any self-reactive substance or mixture which, in laboratory testing, neither detonates nor deflagrates at all and shows low or no effect when heated under confinement	Type E, Self-reactive substances (Class 4.1)	The classification of types B to F is directly related to the maximum quantity allowed in one unit of packaging. See general collective entries in 2.2.41.3	
	F	Any self-reactive substance or mixture which, in laboratory testing, neither detonates in the cavitated state nor deflagrates at all and shows only a low or no effect when heated under confinement as well as low or no explosive power	Type F, Self-reactive substances (Class 4.1)	The classification of types B to F is directly related to the maximum quantity allowed in one unit of packaging. See general collective entries in 2.2.41.3	

ADR

GHS Hazard type	Category	Notes	ADR Hazard type	Classification as Dangerous Good and Packing group	Testing Methodology
Self-reactive substances and mixtures	G	Any self-reactive substance or mixture which, in laboratory testing, neither detonates in the cavitated state nor deflagrates at all and shows no effect when heated under confinement nor any explosive power, provided that it is thermally stable (self-accelerating decomposition temperature is 60C to 75C for a 50kg package), and, for liquid mixtures, a diluent having a boiling point greater than or equal to 150C is used for desensitization. If the mixture is not thermally stable or a diluent having a boiling point less than 150C is used for desensitization, the mixture shall be defined as self-reactive substance TYPE F	Type G, Self-reactive substances (Class 4.1)	Not subject to the provisions for self-reactive substances of Class 4.1	
Pyrophoric solids	Cat 1	Solid which, even in small quantities, that is liable to ignite within five minutes after coming into contact with air	Pyrophoric solids (Class 4.2). Substances and articles classified in Class 4.2 are listed in Table A of Chapter 3.2.	DG, PG I	UN-MT&C, Test N.2, Sub-Section 33.4.4.
Self-heating substances and mixtures	Cat 1	A positive result is obtained in a test using a 25mm sample cube at 140C	Self-heating substances (Class 4.2). Substances and articles already classified in Class 4.2 are listed in Table A of Chapter 3.2. Specific criteria in section 2.2.42.1.8 (b)	DG, PG II	UN-MT&C, Test N.4, Sub-Section 33.4.6
	Cat 2	Table 2.11.1, criterium (a), (b) or (c), GHS Rev 8	Self-heating substances (Class 4.2). Substances and articles already classified in Class 4.2 are listed in Table A of Chapter 3.2. Specific criteria in section 2.2.42.1.8 (c)	DG, PG III	

ADR

GHS Hazard type	Category	Notes	ADR Hazard type	Classification as Dangerous Good and Packing group	Testing Methodology
Substances and Mixtures which, in contact with water, emit flammable gases	Cat 1	For criteria see Table 2.12.1, GHS Rev 8.	Substances which, in contact with water, emit flammable gases (Class 4.3). Substances and articles already classified in Class 4.2 are listed in Table A of Chapter 3.2.	DG, PG I	UN-MT&C, Test N.5, Sub-Section 33.5.4
	Cat 2	For criteria see Table 2.12.1, GHS Rev 8.	Substances which, in contact with water, emit flammable gases (Class 4.3). Substances and articles already classified in Class 4.2 are listed in Table A of Chapter 3.2.	DG, PG II	
	Cat 3	For criteria see Table 2.12.1, GHS Rev 8.	Substances which, in contact with water, emit flammable gases (Class 4.3). Substances and articles already classified in Class 4.2 are listed in Table A of Chapter 3.2.	DG, PG III	
Oxidizing Solid	Cat 1	For criteria see Table 2.14.1 GHS Rev 8.	Oxidizing substances (Class 5.1). Substances and articles already classified in Class 5.1 are listed in Table A of Chapter 3.2	DG, PG I	UN-MT&C, Test 0.1, Sub-Section 34.4.1 and Test 0.3, Subs-section 34.4.3
	Cat 2	For criteria see Table 2.14.1 GHS Rev 8.	Oxidizing substances (Class 5.1). Substances and articles already classified in Class 5.1 are listed in Table A of Chapter 3.2	DG, PG II	
	Cat 3	For criteria see Table 2.14.1 GHS Rev 8.	Oxidizing substances (Class 5.1). Substances and articles already classified in Class 5.1 are listed in Table A of Chapter 3.2	DG, PG III	

ADR

GHS Hazard type	Category	Notes	ADR Hazard type	Classification as Dangerous Good and Packing group	Testing Methodology
Corrosive to Metals	Cat 1	Corrosion rate on either steel or aluminium surfaces exceeding 6.25mm per year at a test temperature of 55C when tested on both materials.	Corrosive Substances (Class 8) Substances and articles already classified in Class 8 are listed in Table A of Chapter 3.2	DG, PG III	UN-MT&C, Test C.1, Sub-Section 37.4
Health Hazards					
Acute Toxicity	Cat 1	Oral toxicity	Toxic substances (Class 6.1) Substances and articles already classified in Class 6.1 are listed in Table A of Chapter 3.2	DG, PG I	i
	Cat 2	Oral toxicity	Toxic substances (Class 6.1) Substances and articles already classified in Class 6.1 are listed in Table A of Chapter 3.2	DG, PG II	
	Cat 3	Oral toxicity	Toxic substances (Class 6.1) Substances and articles already classified in Class 6.1 are listed in Table A of Chapter 3.2	DG, PG III	
	Cat 4	Oral toxicity	No Classification	None	
	Cat 5	Oral toxicity	No Classification	None	
Acute Toxicity	Cat 1	Dermal toxicity	Toxic substances (Class 6.1) Substances and articles already classified in Class 6.1 are listed in Table A of Chapter 3.2	DG, PG I	
	Cat 2	Dermal toxicity	Toxic substances (Class 6.1) Substances and articles already classified in Class 6.1 are listed in Table A of Chapter 3.2	DG, PG II	

ADR

GHS Hazard type	Category	Notes	ADR Hazard type	Classification as Dangerous Good and Packing group	Testing Methodology
Acute Toxicity	Cat 3	Dermal toxicity	Toxic substances (Class 6.1) Substances and articles already classified in Class 6.1 are listed in Table A of Chapter 3.2	DG, PG III	
	<i>Cat 4</i>	<i>Dermal toxicity</i>	<i>No Classification</i>	<i>None</i>	
	<i>Cat 5</i>	<i>Dermal toxicity</i>	<i>No Classification</i>	<i>None</i>	
Acute Toxicity	Cat 1	Inhalation toxicity by dusts and mists	ⁱⁱ Toxic substances (Class 6.1) Substances and articles already classified in Class 6.1 are listed in Table A of Chapter 3.2	DG, PG I	
	Cat 2	Inhalation toxicity by dusts and mists	Toxic substances (Class 6.1) Substances and articles already classified in Class 6.1 are listed in Table A of Chapter 3.2	DG, PG II	
	Cat 3	Inhalation toxicity by dusts and mists	Toxic substances (Class 6.1) Substances and articles already classified in Class 6.1 are listed in Table A of Chapter 3.2	DG, PG III	
	<i>Cat 4</i>	<i>Inhalation toxicity by dusts and mists</i>	<i>No Classification</i>	<i>None</i>	
	<i>Cat 5</i>	<i>Inhalation toxicity by dusts and mists</i>	<i>No Classification</i>	<i>None</i>	
Skin Corrosion/irritation	Sub Cat 1a	Skin corrosion	ⁱⁱⁱ Corrosive Substances (Class 8) Substances and articles already classified in Class 8 are listed in Table A of Chapter 3.2	DG, PG I	OECD 404 & 435
	Sub Cat 1b	Skin corrosion	Corrosive Substances (Class 8) Substances and articles already classified in Class 8 are listed in Table A of Chapter 3.2	DG, PG II	

ADR

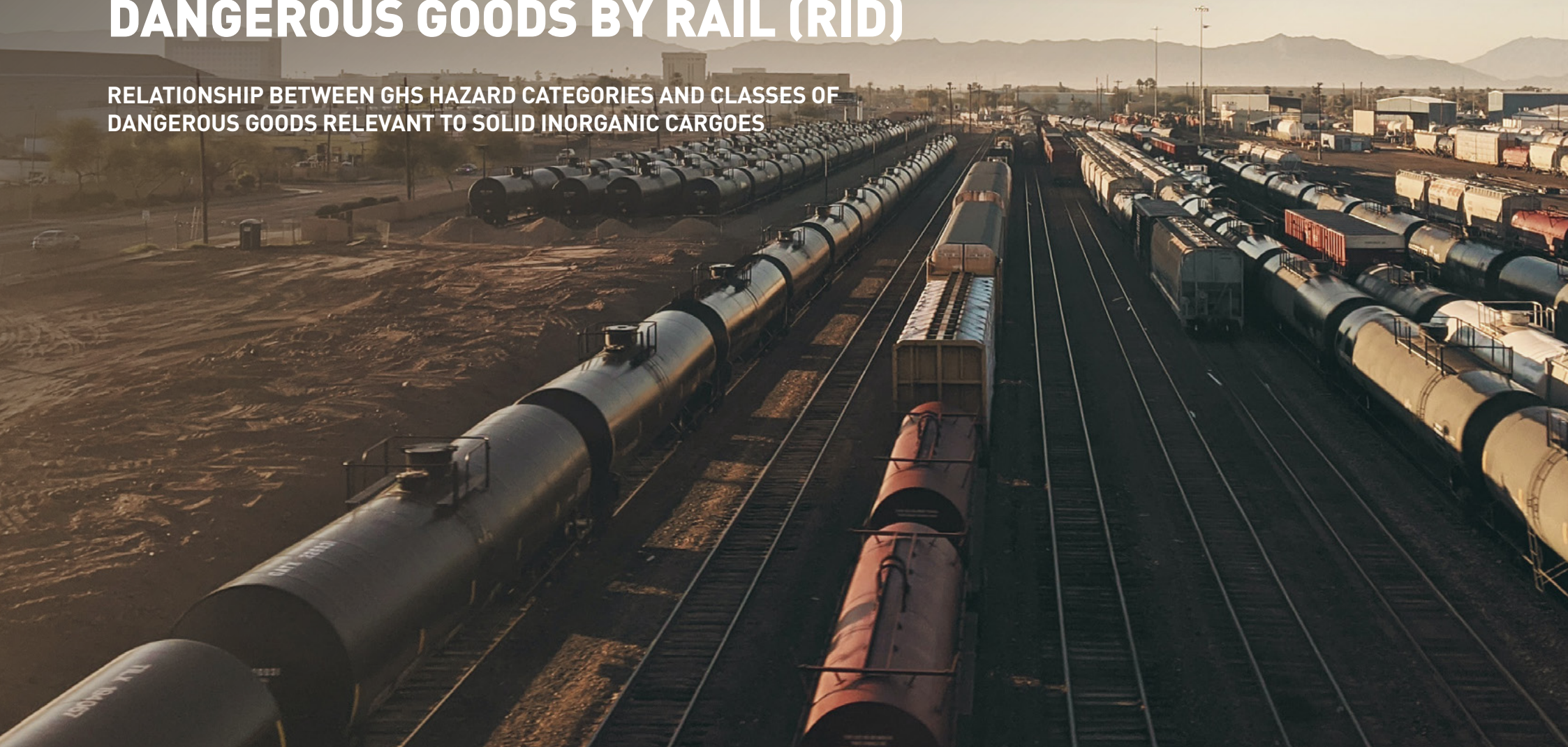
GHS Hazard type	Category	Notes	ADR Hazard type	Classification as Dangerous Good and Packing group	Testing Methodology
Skin Corrosion/irritation	Sub Cat 1c	Skin corrosion	Corrosive Substances (Class 8) Substances and articles already classified in Class 8 are listed in Table A of Chapter 3.2	DG, PG III	
Environmental Hazards					
Hazardous to the Aquatic Environment	Acute Cat 1		M7 Pollutant to the aquatic environment, solid; (Class 9). 3077 ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.	DG, PG III, (See ADR Dangerous Good List in Chapter 3.2).	Classification Methodology as per section 2.2.9.1.10 ADR or Chapter 4.1 UN-GHS Rev 8
	Acute Cat 2		No Classification	None	
	Acute Cat 3		No Classification	None	
Hazardous to the Aquatic Environment	Chronic Cat 1		M7 Pollutant to the aquatic environment, solid; (Class 9). 3077 ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.	DG, PG III, (See ADR Dangerous Good List in Chapter 3.2).	
	Chronic Cat 2		M7 Pollutant to the aquatic environment, solid; (Class 9). 3077 ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.	DG, PG III, (See ADR Dangerous Good List in Chapter 3.2).	
	Chronic Cat 3		No Classification	None	
	Chronic Cat 4		No Classification	None	

Footnotes

- For the different exposure routes, the acute toxicity values are determined using standard toxicity tests in animals
- In the case of acute dust and mist toxicity the GHS use 4 hours exposure, see table 3.1.2 and the ADR use values for 1 hour exposure see section 2.2.61.1.7.3. These cut off values can be interconverted in accordance with available experimental data.
- Special case: A substance or mixture meeting the criteria of class 8 and having an inhalation toxicity of dusts and mists (LC50) in the range of packing group I, but toxicity through oral ingestion or dermal contact only in the range of packing group III or less, shall be allocated to class 8. Section 2.2.8.1.4.5 also see 2.2.61.1.7.2

GLOBALLY HARMONIZED SYSTEM OF CLASSIFICATION AND LABELLING OF CHEMICALS (GHS) AND THE REGULATIONS CONCERNING THE INTERNATIONAL CARRIAGE OF DANGEROUS GOODS BY RAIL (RID)

**RELATIONSHIP BETWEEN GHS HAZARD CATEGORIES AND CLASSES OF
DANGEROUS GOODS RELEVANT TO SOLID INORGANIC CARGOES**



RID

UN-GHS Hazard type	Category	Notes	RID Hazard type	Classification as Dangerous Good and Packing group	Testing Methodology
Physical Hazards					
Flammable solids	Cat 1	Burning rate test: Substances or mixtures other than metal powders: (a) wetted zone does not stop fire; and (b) burning time <45s or burning rate >2.2mm/s Metal powders: burning time ≤5 min	Flammable substances (Class 4.1) have a burning time of less than 45 seconds over a measured distance of 100mm; if the flame passes the wetted zone Metal powders: burning time ≤5 min Substances and articles classified as flammable solids of Class 4.1 are listed in Table A of Chapter 3.2	DG, PG II	UN-MT&C, Test N.1, Sub-section 33.2.4
	Cat 2	Burning rate test: Substances or mixtures other than metal powders: (a) wetted zone stops the fire for at least 4 min; and (b) burning time <45s or burning rate >2.2mm/s. Metal powders: burning time >5 min and ≤10 min	Flammable solids (Class 4.1) have a burning time of less than 45 seconds over a measured distance of 100mm; if the wetted zone stops the flame for at least four minutes. Metal powders: burning time >5 min Substances and articles classified as flammable solids of Class 4.1 are listed in Table A of Chapter 3.2	DG, PG III	

RID

UN-GHS Hazard type	Category	Notes	RID Hazard type	Classification as Dangerous Good and Packing group	Testing Methodology
Self-reactive substances and mixtures	Type	Decision logic and guidance are shown in GHS sections 2.8.4	Self-reactive substances (Class 4.1)	Self-reactive substances which have already been classified and are already permitted for carriage in packaging's are listed in 2.2.41.4, those already permitted for carriage in IBCs are listed in 4.1.4.2, packing instruction IBC520 and those already permitted for carriage in tanks according to Chapter 4.2 are listed in 4.2.5.2, portable tank instruction T23. Each permitted substance listed is assigned to a generic entry of Table A of Chapter 3.2 (UN Nos. 3221 to 3240), and appropriate subsidiary hazards and remarks providing relevant transport information are given.	Classification according to Part II of UN-MT&C, Sections 21 to 28
	A	As packaged, will detonate or deflagrate rapidly	Type A, Self-reactive substances (Class 4.1)	Not be accepted for carriage. See general collective entries in 2.2.41.3	
	B	Any self-reactive substance or mixture possessing explosive properties and which, as packaged, neither detonates nor deflagrates rapidly, but is liable to undergo a thermal explosion in that package	Type B, Self-reactive substances (Class 4.1)	The classification of types B to F is directly related to the maximum quantity allowed in one packaging. See general collective entries in 2.2.41.3	

RID

UN-GHS Hazard type	Category	Notes	RID Hazard type	Classification as Dangerous Good and Packing group	Testing Methodology
Self-reactive substances and mixtures	C	Any self-reactive substance or mixture possessing explosive properties when the substance or mixture as packaged cannot detonate or deflagrate rapidly or undergo a thermal explosion	Type C, Self-reactive substances (Class 4.1)	The classification of types B to F is directly related to the maximum quantity allowed in one packaging. See general collective entries in 2.2.41.3	
	D	Any self-reactive substance or mixture which in laboratory testing: (i) detonates partially, does not deflagrate rapidly and shows no violent effect when heated under confinement; or (ii) does not detonate at all, deflagrates slowly and shows no violent effect when heated under confinement; or (iii) does not detonate or deflagrate at all and shows a medium effect when heated under confinement	Type D, Self-reactive substances (Class 4.1)	The classification of types B to F is directly related to the maximum quantity allowed in one packaging. See general collective entries in 2.2.41.3	
	E	Any self-reactive substance or mixture which, in laboratory testing, neither detonates nor deflagrates at all and shows low or no effect when heated under confinement	Type E, Self-reactive substances (Class 4.1)	The classification of types B to F is directly related to the maximum quantity allowed in one packaging. See general collective entries in 2.2.41.3	
	F	Any self-reactive substance or mixture which, in laboratory testing, neither detonates in the cavitated state nor deflagrates at all and shows only a low or no effect when heated under confinement as well as low or no explosive power	Type F, Self-reactive substances (Class 4.1)	The classification of types B to F is directly related to the maximum quantity allowed in one packaging. See general collective entries in 2.2.41.3	

RID

UN-GHS Hazard type	Category	Notes	RID Hazard type	Classification as Dangerous Good and Packing group	Testing Methodology
Self-reactive substances and mixtures	G	Any self-reactive substance or mixture which, in laboratory testing, neither detonates in the cavitated state nor deflagrates at all and shows no effect when heated under confinement nor any explosive power, provided that it is thermally stable (self-accelerating decomposition temperature is 60C to 75C for a 50kg package), and, for liquid mixtures, a diluent having a boiling point greater than or equal to 150C is used for desensitization. If the mixture is not thermally stable or a diluent having a boiling point less than 150C is used for desensitization, the mixture shall be defined as self-reactive substance TYPE F	Type G, Self-reactive substances (Class 4.1)	Not subject to the provisions for self-reactive substances of Class 4.1	
Pyrophoric solids	Cat 1	Solid which, even in small quantities, that is liable to ignite within five minutes after coming into contact with air	Pyrophoric solids (Class 4.2). Substances and articles classified in Class 4.2 are listed in Table A of Chapter 3.2.	DG, PG I	UN-MT&C, Test N.2, Sub-Section 33.4.4

RID

UN-GHS Hazard type	Category	Notes	RID Hazard type	Classification as Dangerous Good and Packing group	Testing Methodology
Self-heating substances and mixtures	Cat 1	A positive result is obtained in a test using a 25mm sample cube at 140C	Self-heating substances (Class 4.2). Substances and articles already classified in Class 4.2 are listed in Table A of Chapter 3.2. Specific criteria in section 2.2.42.1.8 (b)	DG, PG II	UN-MT&C, Test N.4, Sub-Section 33.4.6
	Cat 2	Table 2.11.1, criterium (a), (b) or (c) , GHS Rev 8	Self-heating substances (Class 4.2). Substances and articles already classified in Class 4.2 are listed in Table A of Chapter 3.2. Specific criteria in section 2.2.42.1.8 (c)	DG, PG III	
Substances and Mixtures which, in contact with water, emit flammable gases.	Cat 1	For criteria see Table 2.12.1, GHS Rev 8.	Substances which, in contact with water, emit flammable gases (Class 4.3). Substances and articles already classified in Class 4.2 are listed in Table A of Chapter 3.2.	DG, PG I	UN-MT&C, Test N.5, Sub-Section 33.5.4
	Cat 2	For criteria see Table 2.12.1, GHS Rev 8.	Substances which, in contact with water, emit flammable gases (Class 4.3). Substances and articles already classified in Class 4.2 are listed in Table A of Chapter 3.2.	DG, PG II	
	Cat 3	For criteria see Table 2.12.1, GHS Rev 8.	Substances which, in contact with water, emit flammable gases (Class 4.3). Substances and articles already classified in Class 4.2 are listed in Table A of Chapter 3.2.	DG, PG III	

RID

UN-GHS Hazard type	Category	Notes	RID Hazard type	Classification as Dangerous Good and Packing group	Testing Methodology
Oxidizing Solid	Cat 1	For criteria see Table 2.14.1 GHS Rev 8.	Oxidizing substances (Class 5.1). Substances and articles already classified in Class 5.1 are listed in Table A of Chapter 3.2	DG, PG I	UN-MT&C, Test 0.1, Sub-Section 34.4.1 and Test 0.3, Subs-section 34.4.3
	Cat 2	For criteria see Table 2.14.1 GHS Rev 8.	Oxidizing substances (Class 5.1). Substances and articles already classified in Class 5.1 are listed in Table A of Chapter 3.2	DG, PG II	
	Cat 3	For criteria see Table 2.14.1 GHS Rev 8.	Oxidizing substances (Class 5.1). Substances and articles already classified in Class 5.1 are listed in Table A of Chapter 3.2	DG, PG III	
Corrosive to Metals	Cat 1	Corrosion rate on either steel or aluminium surfaces exceeding 6.25mm per year at a test temperature of 55C when tested on both materials.	Corrosive Substances (Class 8) Substances and articles already classified in Class 8 are listed in Table A of Chapter 3.2	DG, PG III	UN-MT&C, Test C.1, Sub-Section 37.4
Health Hazards					
Acute Toxicity	Cat 1	Oral toxicity	Toxic substances (Class 6.1) Substances and articles already classified in Class 6.1 are listed in Table A of Chapter 3.2	DG, PG I	
	Cat 2	Oral toxicity	Toxic substances (Class 6.1) Substances and articles already classified in Class 6.1 are listed in Table A of Chapter 3.2	DG, PG II	

RID

UN-GHS Hazard type	Category	Notes	RID Hazard type	Classification as Dangerous Good and Packing group	Testing Methodology
Acute Toxicity	Cat 3	Oral toxicity	Toxic substances (Class 6.1) Substances and articles already classified in Class 6.1 are listed in Table A of Chapter 3.2	DG, PG III	
	<i>Cat 4</i>	<i>Oral toxicity</i>	<i>No Classification</i>	<i>None</i>	
	<i>Cat 5</i>	<i>Oral toxicity</i>	<i>No Classification</i>	<i>None</i>	
Acute Toxicity	Cat 1	Dermal toxicity	Toxic substances (Class 6.1) Substances and articles already classified in Class 6.1 are listed in Table A of Chapter 3.2	DG, PG I	
	Cat 2	Dermal toxicity	Toxic substances (Class 6.1) Substances and articles already classified in Class 6.1 are listed in Table A of Chapter 3.2	DG, PG II	
	Cat 3	Dermal toxicity	Toxic substances (Class 6.1) Substances and articles already classified in Class 6.1 are listed in Table A of Chapter 3.2	DG, PG III	
	<i>Cat 4</i>	<i>Dermal toxicity</i>	<i>No Classification</i>	<i>None</i>	
	<i>Cat 5</i>	<i>Dermal toxicity</i>	<i>No Classification</i>	<i>None</i>	

RID

UN-GHS Hazard type	Category	Notes	RID Hazard type	Classification as Dangerous Good and Packing group	Testing Methodology
Acute Toxicity	Cat 1	Inhalation toxicity by dusts and mists	ⁱⁱ Toxic substances (Class 6.1) Substances and articles already classified in Class 6.1 are listed in Table A of Chapter 3.2	DG, PG I	
	Cat 2	Inhalation toxicity by dusts and mists	Toxic substances (Class 6.1) Substances and articles already classified in Class 6.1 are listed in Table A of Chapter 3.2	DG, PG II	
	Cat 3	Inhalation toxicity by dusts and mists	Toxic substances (Class 6.1) Substances and articles already classified in Class 6.1 are listed in Table A of Chapter 3.2	DG, PG III	
	Cat 4	<i>Inhalation toxicity by dusts and mists</i>	<i>No Classification</i>	<i>None</i>	
	Cat 5	<i>Inhalation toxicity by dusts and mists</i>	<i>No Classification</i>	<i>None</i>	
Skin Corrosion/irritation	Sub Cat 1a	Skin corrosion	ⁱⁱⁱ Corrosive Substances (Class 8) Substances and articles already classified in Class 8 are listed in Table A of Chapter 3.2	DG, PG I	OECD 404 & 435
	Sub Cat 1b	Skin corrosion	Corrosive Substances (Class 8) Substances and articles already classified in Class 8 are listed in Table A of Chapter 3.2	DG, PG II	
	Sub Cat 1c	Skin corrosion	Corrosive Substances (Class 8) Substances and articles already classified in Class 8 are listed in Table A of Chapter 3.2	DG, PG III	

RID

UN-GHS Hazard type	Category	Notes	RID Hazard type	Classification as Dangerous Good and Packing group	Testing Methodology
Environmental Hazards					
Hazardous to the Aquatic Environment	Acute Cat 1		M7 Pollutant to the aquatic environment, solid; (Class 9). 3077 ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.	DG, PG III, (See RID Dangerous Good List in Chapter 3.2).	Classification Methodology as per section 2.2.9.1.10 and 2.2.9.1.10.1.3 RID or Chapter 4.1 UN-GHS Rev 8
	Acute Cat 2		No Classification	None	
	Acute Cat 3		No Classification	None	
Hazardous to the Aquatic Environment	Chronic Cat 1		M7 Pollutant to the aquatic environment, solid; (Class 9). 3077 ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.	DG, PG III, (See RID Dangerous Good List in Chapter 3.2).	
	Chronic Cat 2		M7 Pollutant to the aquatic environment, solid; (Class 9). 3077 ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.	DG, PG III, (See RID Dangerous Good List in Chapter 3.2).	
	Chronic Cat 3		No Classification	None	
	Chronic Cat 4		No Classification	None	

Footnotes

- For the different exposure routes the acute toxicity values are determined using standard toxicity tests in animals
- In the case of acute dust and mist toxicity, the GHS use 4 hours exposure, see table 3.1.2 and the RID use values for 1 hour exposure see section 2.2.61.1.7.3. These cut off values can be interconverted in accordance with available experimental data.
- Special case: A substance or mixture meeting the criteria of class 8 and having an inhalation toxicity of dusts and mists (LC50) in the range of packing group I, but toxicity through oral ingestion or dermal contact only in the range of packing group III or less, shall be allocated to class 8. Section 2.2.8.1.4.5

GLOBALLY HARMONIZED SYSTEM OF CLASSIFICATION AND LABELLING OF CHEMICALS (GHS) AND THE EUROPEAN AGREEMENT CONCERNING THE INTERNATIONAL CARRIAGE OF DANGEROUS GOODS BY INLAND WATERWAYS (ADN)

**RELATIONSHIP BETWEEN GHS HAZARD CATEGORIES
AND CLASSES OF DANGEROUS GOODS RELEVANT
TO SOLID INORGANIC CARGOES**



GHS Hazard type	Category	Notes	ADN Hazard type	Classification as Dangerous Good and Packing group	Testing Methodology
Physical Hazards					
Flammable solids	Cat 1	Burning rate test: Substances or mixtures other than metal powders: (a) wetted zone does not stop fire; and (b) burning time <45s or burning rate >2.2mm/s Metal powders: burning time ≤5 min	Flammable substances (Class 4.1) have a burning time of less than 45 seconds over a measured distance of 100mm; if the flame passes the wetted zone. Metal powders: burning time ≤5 min Substances and articles classified as flammable solids of Class 4.1 are listed in Table A of Chapter 3.2	DG, PG II	UN-MT&C, Test N.1, Sub-section 33.2.4
	Cat 2	Burning rate test: Substances or mixtures other than metal powders (a) wetted zone stops the fire for at least 4 min; and (b) burning time <45s or burning rate >2.2mm/s. Metal powders: burning time >5 min and ≤10 min	Flammable solids (Class 4.1) have a burning time of less than 45 seconds over a measured distance of 100mm; if the wetted zone stops the flame for at least four minutes Metal powders: burning time >5 min Substances and articles classified as flammable solids of Class 4.1 are listed in Table A of Chapter 3.2	DG, PG III	

ADN

GHS Hazard type	Category	Notes	ADN Hazard type	Classification as Dangerous Good and Packing group	Testing Methodology
Self-reactive substances and mixtures	Type	Decision logic and guidance are shown in GHS sections 2.8.4	Self-reactive substances (Class 4.1)	Self-reactive substances which have already been classified and are already permitted for carriage in packaged form are listed in 2.2.41.4, those already permitted for carriage in IBCs are listed in 4.1.4.2 ADR, packing instruction IBC520 and those already permitted for carriage in tanks according to Chapter 4.2 are listed in ADR 4.2.5.2, portable tank instruction T23. Each permitted substance listed is assigned to a generic entry of Table A of Chapter 3.2 (UN Nos. 3221 to 3240), and appropriate subsidiary hazards and remarks providing relevant transport information are given.	Classification according to Part II of UN-MT&C, Sections 21 to 28
	A	As packaged, will detonate or deflagrate rapidly	Type A, Self-reactive substances (Class 4.1)	Not be accepted for carriage. See general collective entries in 2.2.41.3	
	B	Any self-reactive substance or mixture possessing explosive properties and which, as packaged, neither detonates nor deflagrates rapidly, but is liable to undergo a thermal explosion in that package	Type B, Self-reactive substances (Class 4.1)	The classification of types B to F is directly related to the maximum quantity allowed in one unit of packaging. See general collective entries in 2.2.41.3	
	C	Any self-reactive substance or mixture possessing explosive properties when the substance or mixture as packaged cannot detonate or deflagrate rapidly or undergo a thermal explosion.	Type C, Self-reactive substances (Class 4.1)	The classification of types B to F is directly related to the maximum quantity allowed in one unit of packaging. See general collective entries in 2.2.41.3	

ADN

GHS Hazard type	Category	Notes	ADN Hazard type	Classification as Dangerous Good and Packing group	Testing Methodology
Self-reactive substances and mixtures	D	Any self-reactive substance or mixture which in laboratory testing: (i) detonates partially, does not deflagrate rapidly and shows no violent effect when heated under confinement; or (ii) does not detonate at all, deflagrates slowly and shows no violent effect when heated under confinement; or (iii) does not detonate or deflagrate at all and shows a medium effect when heated under confinement	Type D, Self-reactive substances (Class 4.1)	The classification of types B to F is directly related to the maximum quantity allowed in one unit of packaging. See general collective entries in 2.2.41.3	
	E	Any self-reactive substance or mixture which, in laboratory testing, neither detonates nor deflagrates at all and shows low or no effect when heated under confinement	Type E, Self-reactive substances (Class 4.1)	The classification of types B to F is directly related to the maximum quantity allowed in one unit of packaging. See general collective entries in 2.2.41.3	
	F	Any self-reactive substance or mixture which, in laboratory testing, neither detonates in the cavitated state nor deflagrates at all and shows only a low or no effect when heated under confinement as well as low or no explosive power	Type F, Self-reactive substances (Class 4.1)	The classification of types B to F is directly related to the maximum quantity allowed in one unit of packaging. See general collective entries in 2.2.41.3	

ADN

GHS Hazard type	Category	Notes	ADN Hazard type	Classification as Dangerous Good and Packing group	Testing Methodology
Self-reactive substances and mixtures	G	Any self-reactive substance or mixture which, in laboratory testing, neither detonates in the cavitated state nor deflagrates at all and shows no effect when heated under confinement nor any explosive power, provided that it is thermally stable (self-accelerating decomposition temperature is 60C to 75C for a 50kg package), and, for liquid mixtures, a diluent having a boiling point greater than or equal to 150C is used for desensitization. If the mixture is not thermally stable or a diluent having a boiling point less than 150C is used for desensitization, the mixture shall be defined as self-reactive substance TYPE F	Type G, Self-reactive substances (Class 4.1)	Not subject to the provisions for self-reactive substances of Class 4.1	
Pyrophoric solids	Cat 1	Solid which, even in small quantities, that is liable to ignite within five minutes after coming into contact with air	Pyrophoric solids (Class 4.2). Substances and articles classified in Class 4.2 are listed in Table A of Chapter 3.2.	DG, PG I	UN-MT&C, Test N.2, Sub-Section 33.4.4
Self-heating substances and mixtures	Cat 1	A positive result is obtained in a test using a 25mm sample cube at 140C	Self-heating substances (Class 4.2). Substances and articles already classified in Class 4.2 are listed in Table A of Chapter 3.2. Specific criteria in section 2.2.42.1.8 (b)	DG, PG II	UN-MT&C, Test N.4, Sub-Section 33.4.6
	Cat 2	Table 2.11.1, criterium (a), (b) or (c), GHS Rev 8	Self-heating substances (Class 4.2). Substances and articles already classified in Class 4.2 are listed in Table A of Chapter 3.2. Specific criteria in section 2.2.42.1.8 (c)	DG, PG III	

ADN

GHS Hazard type	Category	Notes	ADN Hazard type	Classification as Dangerous Good and Packing group	Testing Methodology
Substances and Mixtures which, in contact with water, emit flammable gases.	Cat 1	For criteria see Table 2.12.1, GHS Rev 8.	Substances which, in contact with water, emit flammable gases (Class 4.3). Substances and articles already classified in Class 4.2 are listed in Table A of Chapter 3.2.	DG, PG I	UN-MT&C, Test N.5, Sub-Section 33.5.4
	Cat 2	For criteria see Table 2.12.1, GHS Rev 8.	Substances which, in contact with water, emit flammable gases (Class 4.3). Substances and articles already classified in Class 4.2 are listed in Table A of Chapter 3.2.	DG, PG II	
	Cat 3	For criteria see Table 2.12.1, GHS Rev 8.	Substances which, in contact with water, emit flammable gases (Class 4.3). Substances and articles already classified in Class 4.2 are listed in Table A of Chapter 3.2.	DG, PG III	
Oxidizing Solid	Cat 1	For criteria see Table 2.14.1 GHS Rev 8.	Oxidizing substances (Class 5.1). Substances and articles already classified in Class 5.1 are listed in Table A of Chapter 3.2	DG, PG I	UN-MT&C, Test 0.1, Sub-Section 34.4.1 and Test 0.3, Subs-section 34.4.3
	Cat 2	For criteria see Table 2.14.1 GHS Rev 8.	Oxidizing substances (Class 5.1). Substances and articles already classified in Class 5.1 are listed in Table A of Chapter 3.2	DG, PG II	
	Cat 3	For criteria see Table 2.14.1 GHS Rev 8.	Oxidizing substances (Class 5.1). Substances and articles already classified in Class 5.1 are listed in Table A of Chapter 3.2	DG, PG III	

ADN

GHS Hazard type	Category	Notes	ADN Hazard type	Classification as Dangerous Good and Packing group	Testing Methodology
Corrosive to Metals	Cat 1	Corrosion rate on either steel or aluminium surfaces exceeding 6.25mm per year at a test temperature of 55C when tested on both materials.	Corrosive Substances (Class 8) Substances and articles already classified in Class 8 are listed in Table A of Chapter 3.2	DG, PG III	UN-MT&C, Test C.1, Sub-Section 37.4
Health Hazards					
Acute Toxicity	Cat 1	Oral toxicity	Toxic substances (Class 6.1). Substances and articles already classified in Class 6.1 are listed in Table A of Chapter 3.2	DG, PG I	i
	Cat 2	Oral toxicity	Toxic substances (Class 6.1) Substances and articles already classified in Class 6.1 are listed in Table A of Chapter 3.2	DG, PG II	
	Cat 3	Oral toxicity	Toxic substances (Class 6.1). Substances and articles already classified in Class 6.1 are listed in Table A of Chapter 3.2	DG, PG III	
	Cat 4	Oral toxicity	No Classification	None	
	Cat 5	Oral toxicity	No Classification	None	
Acute Toxicity	Cat 1	Dermal toxicity	Toxic substances (Class 6.1). Substances and articles already classified in Class 6.1 are listed in Table A of Chapter 3.2	DG, PG I	
	Cat 2	Dermal toxicity	Toxic substances (Class 6.1). Substances and articles already classified in Class 6.1 are listed in Table A of Chapter 3.2	DG, PG II	

ADN

GHS Hazard type	Category	Notes	ADN Hazard type	Classification as Dangerous Good and Packing group	Testing Methodology
Acute Toxicity	Cat 3	Dermal toxicity	Toxic substances (Class 6.1). Substances and articles already classified in Class 6.1 are listed in Table A of Chapter 3.2	DG, PG III	
	<i>Cat 4</i>	<i>Dermal toxicity</i>	<i>No Classification</i>	<i>None</i>	
	<i>Cat 5</i>	<i>Dermal toxicity</i>	<i>No Classification</i>	<i>None</i>	
Acute Toxicity	Cat 1	Inhalation toxicity by dusts and mists	ⁱⁱ Toxic substances (Class 6.1). Substances and articles already classified in Class 6.1 are listed in Table A of Chapter 3.2	DG, PG I	
	Cat 2	Inhalation toxicity by dusts and mists	Toxic substances (Class 6.1). Substances and articles already classified in Class 6.1 are listed in Table A of Chapter 3.2	DG, PG II	
	Cat 3	Inhalation toxicity by dusts and mists	Toxic substances (Class 6.1). Substances and articles already classified in Class 6.1 are listed in Table A of Chapter 3.2	DG, PG III	
	<i>Cat 4</i>	<i>Inhalation toxicity by dusts and mists</i>	<i>No Classification</i>	<i>None</i>	
	<i>Cat 5</i>	<i>Inhalation toxicity by dusts and mists</i>	<i>No Classification</i>	<i>None</i>	

ADN

GHS Hazard type	Category	Notes	ADN Hazard type	Classification as Dangerous Good and Packing group	Testing Methodology
Skin Corrosion/irritation	Sub Cat 1a	Skin corrosion	ⁱⁱⁱ Corrosive Substances (Class 8) Substances and articles already classified in Class 8 are listed in Table A of Chapter 3.2	DG, PG I	OECD 404 & 435
	Sub Cat 1b	Skin corrosion	Corrosive Substances (Class 8) Substances and articles already classified in Class 8 are listed in Table A of Chapter 3.2	DG, PG II	
	Sub Cat 1c	Skin corrosion	Corrosive Substances (Class 8) Substances and articles already classified in Class 8 are listed in Table A of Chapter 3.2	DG, PG III	
Environmental Hazards					
Hazardous to the Aquatic Environment	Acute Cat 1		M7 Pollutant to the aquatic environment, solid; (Class 9). 3077 ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.	Classify, DG, PG III, only if no other hazard classes associated, classes 1 to 8. (See ADN Dangerous Good List in Chapter 3.2, Table A).	Classification Methodology as per Chapter 2.4 ADN and Annex 10 GHS rev 8, for poorly soluble inorganic compounds
	Acute Cat 2		No Classification	None	
	Acute Cat 3		No Classification	None	

ADN

GHS Hazard type	Category	Notes	ADN Hazard type	Classification as Dangerous Good and Packing group	Testing Methodology
Hazardous to the Aquatic Environment	Chronic Cat 1		M7 Pollutant to the aquatic environment, solid; (Class 9). 3077 ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.	Classify as DG, PG III, only if no other hazard classes associated, classes 1 to 8 (See ADN Dangerous Good List in Chapter 3.2, Table A).	
	Chronic Cat 2		M7 Pollutant to the aquatic environment, solid; (Class 9). 3077 ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.	Classify as DG, PG III, only if no other hazard classes associated, classes 1 to 8. (See ADN Dangerous Good List in Chapter 3.2, Table A).	
	<i>Chronic Cat 3</i>		<i>No Classification</i>	<i>None</i>	
	<i>Chronic Cat 4</i>		<i>No Classification</i>	<i>None</i>	

Footnotes

- For the different exposure routes the acute toxicity values are determined using standard toxicity tests in animals
- In the case of acute dust and mist toxicity the GHS use 4 hours exposure, see table 3.1.2 and the ADN use values for 1 hour exposure see section 2.2.61.1.7.3. These cut off values can be interconverted in accordance with available experimental data.
- Special case: A substance or mixture meeting the criteria of class 8 and having an inhalation toxicity of dusts and mists (LC50) in the range of packing group I, but toxicity through oral ingestion or dermal contact only in the range of packing group III or less, shall be allocated to class 8. Section 2.2.61.1.7.2 and 2.2.8.1.4.5

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