



**General Awareness Course
Dangerous Goods**



JAKARTA

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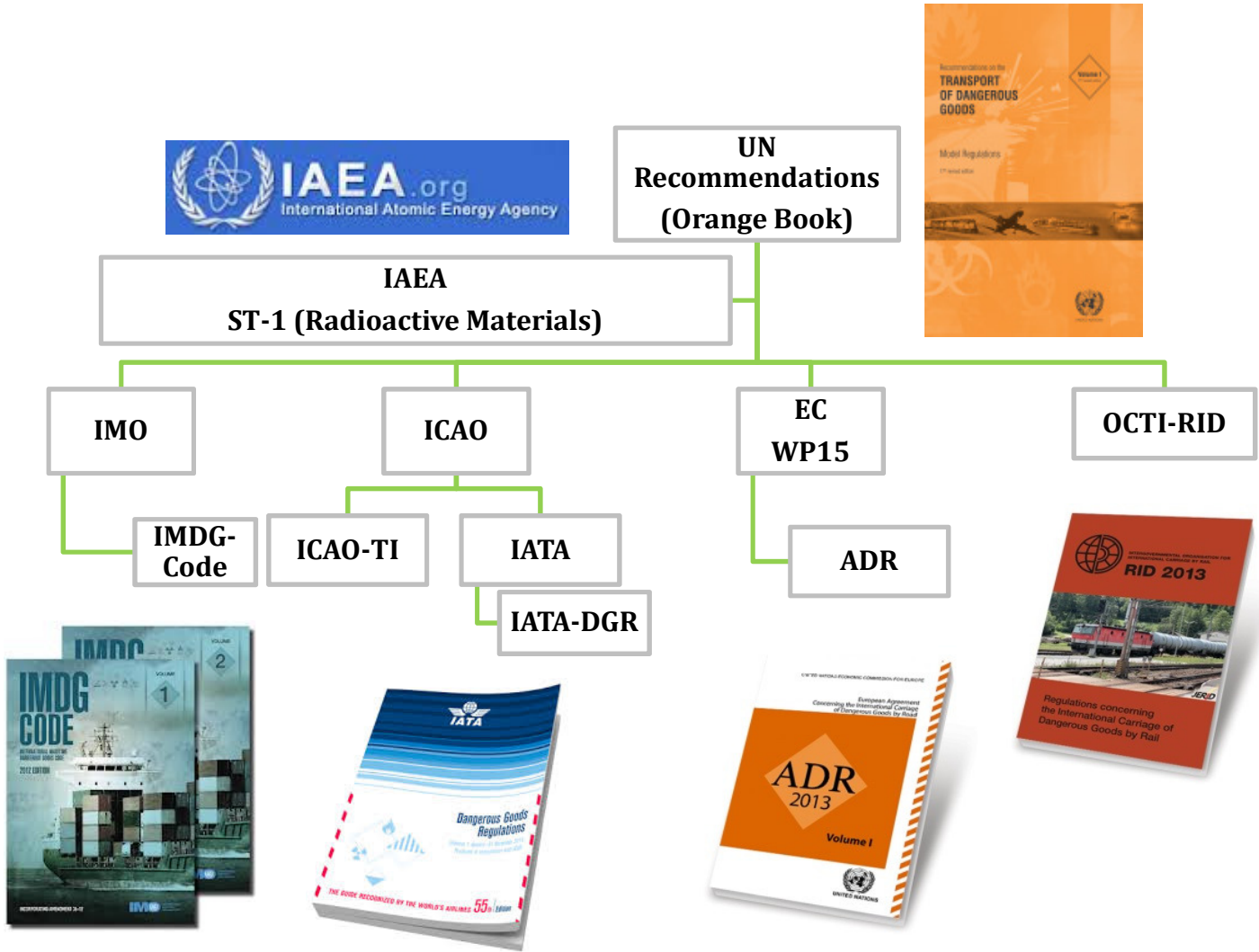


Foreword

DGM sebagai perusahaan yang berpengalaman dalam pengangkutan kargo barang-barang berbahaya melalui angkutan udara dan laut yang didokumentasikan didalam proses masing-masing multimodal transportasi sesuai aturan IATA DGR dan IMDG, dimana dibuat sebuah pelatihan yang berkesinambungan untuk memberikan pengetahuan tentang pengangkutan barang berbahaya melalui udara dan laut. Program ini memastikan bahwa semua staf yang berkecimpung dalam penanganan barang berbahaya secara langsung atau tidak langsung dilatih secara teratur dan paham serta di dokumentasikan sehingga menjadi bukti untuk mendapatkan Certifikat pelatihan barang-barang berbahaya.

Materi pelatihan di sini telah dirumuskan dalam hubungannya dengan staf kami sendiri untuk memastikan bahwa prosedur yang diberikan oleh DGM Indonesia sejalan dengan peraturan International dan nasional.

Pelatihan ini sejalan dengan persyaratan IATA DGR dan IMDG Code untuk kursus ini.



MODUL 1: PENGENALAN TENTANG INTERNATIONAL MARITIME DANGEROUS GOODS (IMDG) CODE

1.1 Sejarah of The IMDG Code

Asal-usul dari IMDG Code dapat ditelusuri kembali dari bencana Titanic tahun 1912, meskipun Kode itu sendiri tidak dipublikasikan sampai 1965. Sebagai akibat dari tenggelamnya kapal Titanic, sebuah konferensi dipanggil pada tahun 1929 untuk mempersiapkan Konvensi Internasional mengenai keselamatan Jiwa di Laut. Dalam sebuah pernyataan termasuk yang "setiap administrasi harus Menentukan barang apa yang harus dipertimbangkan barang berbahaya dan harus menunjukkan tindakan pencegahan yang harus diambil dalam kemasan dan penyimpanan daripadanya ".

aksi internasional sedikit diambil sehubungan persyaratan ini, tetapi pada tahun 1933, The Board of Trade di London menghasilkan versi pertama dari "Laporan Pengangkutan Barang Berbahaya dan Bahan Peledak di kapal" yang dengan cepat menjadi dikenal sebagai "The Blue Book". Dokumen ini terutama berlaku untuk kapal-kapal Inggris dan port Inggris tetapi karena ada masih menjadi Negara Kerajaan, persyaratan ini diterapkan di banyak daerah lain di dunia.

Pada tahun 1958 Inter-Governmental Maritime Consultative Organization (IMCO) dibentuk sebagai badan PBB dan bermarkas di London di mana ia tetap hari ini. Salah satu prestasi besar pertama dari tubuh ini adalah publikasi pada tahun 1965 dari International Maritime Dangerous Goods (IMDG) Code. Karena buku Blue Book adalah lebih banyak digunakan dalam Kode didasarkan pada dokumen bahwa meskipun perawatan diambil untuk memastikan bahwa Kode mengikuti prinsip-prinsip yang ditetapkan oleh Komite Ahli PBB pada Transportasi Barang Berbahaya. IMCO changed its name in 1982 to the International Maritime Organization (IMO).

The IMDG Kode diterbitkan dalam empat volume lepas (volume kelima adalah opsional) hingga tahun 2000. Buku-buku harus dibawa up-to-date setiap dua tahun, yang menjadi tugas padat karya? Pada pertengahan 1990-an, Amerika Serikat mengusulkan agar Rekomendasi PBB yang banyak dari Kode IMDG didasarkan harus diformat ulang menjadi gaya peraturan Model. Begitu prinsip ini telah diadopsi di PBB, penjaga pantai AS menawarkan rancangan setara dengan Kode IMDG. Tujuannya adalah untuk mendapatkan keselarasan cukup umum antara peraturan laut dan udara. Setelah beberapa hati mencari IMO setuju untuk mengambil rancangan ini dan 30 Perubahan yang datang ke dalam penggunaan 1 Januari 2001 adalah dalam gaya baru dan struktur yang mengurangi buku dari empat jilid ke dua tetapi dalam hal rak buku mengurangi dari lebih dari 12 inci sampai 4 inci.

Selain itu ada "Orange buku" yang mengacu kepada komite Ahli PBB (CoE) yang mempublikasikan "Rekomendasi tentang Transportasi Barang Berbahaya - Peraturan Modal".



Rekomendasi ini merupakan dasar untuk semua peraturan barang berbahaya, dan karena itu Sering disebut dalam "modus khusus peraturan transportasi" (IMG-code / ADR / ICAO). Untuk contoh ini adalah di mana semua nomor UN yang "diciptakan" dan diterbitkan. Biasanya "buku orange" tidak digunakan dalam praktek karena tidak mengambil "transportasi modus spesialisasi" menjadi pertimbangan.

1.2 Fungsi dari IMO

Organisasi Maritim Internasional (IMO) adalah badan khusus Perserikatan Bangsa-Bangsa. Tanggung jawab utama IMO adalah untuk mengembangkan dan mempertahankan kerangka peraturan yang komprehensif untuk pengiriman yang meliputi keselamatan, masalah lingkungan, masalah hukum, kerjasama teknis, keamanan maritim dan efisiensi kapal. Tujuan utama dari IMO adalah untuk memfasilitasi kerjasama antar pemerintah tentang hal-hal terkait teknis mempengaruhi pengiriman, terutama dalam promosi Keselamatan Jiwa di Laut (SOLAS), efisiensi navigasi, pencegahan dan pengendalian polutan laut.



1.3 Pembaruan IMDG Code

Buku IMDG Code diperbarui setiap dua tahun karena:

- Komite Ahli PBB alter / menambah rekomendasi mereka
- Perubahan dalam metode transportasi
- Metode baru kemasan dikembangkan
- Zat baru perlu ditambahkan.

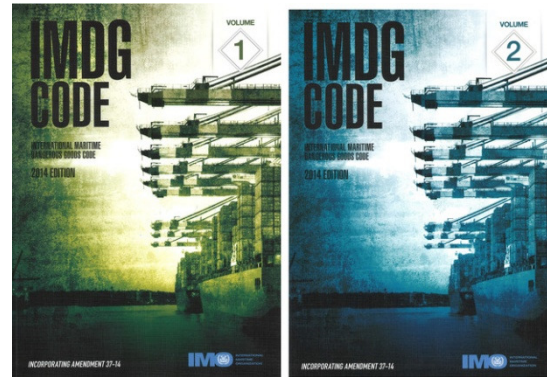
IMO memiliki Barang Berbahaya Sub Komite berurusan dengan pengangkutan barang berbahaya dalam jumlah besar dan paket yang memenuhi di sekitar dua tahun siklus mengadakan pertemuan akhirnya menyebabkan perubahan baru dengan Kode. Versi terbaru dari Kode IMDG (Amandemen 33-06) diterbitkan pada tahun 2006. Perubahan baru sekarang wajib per Januari 2007.

| 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|------|-------------------|--------------------|------|--------------------|------|------|
| | ← 34 - 08 V9 → | | | | | |
| | | ← 35 - 10 V10 → | | | | |
| | | | | ← 36 - 12 V11 → | | |

1.5 Informamasi yang terkandung dalam IMDG Code

Dalam tiga volume Kode IMDG adalah mungkin untuk menemukan informasi umum berikut:

- Daftar klasifikasi barang berbahaya
- Fisik - karakteristik kimia dari produk ini
- Bahaya mereka menyajikan
- Pelabelan dan placarding sistem, yang mudah dimengerti dan memungkinkan mengidentifikasi
- kemungkinan bahaya produk
- Karakteristik yang dibutuhkan untuk kemasan dan klasifikasi dalam kategori I, II dan III
- Rekomendasi untuk penyimpanan di papan tabel Pemisahan
- Produk atau zat PBB Identification Number (Nomor UN)
- Dokumentasi yang harus menyertai barang
- Aturan untuk mencegah polutan laut



Volum 1

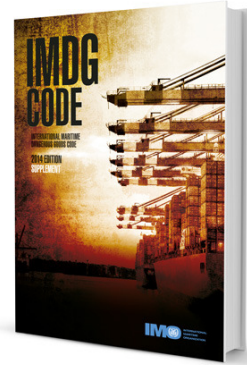
- Ketentuan Umum
- Klasifikasi
- Ketentuan mengenai kemasan / wadah dan tanktainers (tangki dibangun di atas standar, umumnya 20 kaki kontainer frame untuk transportasi cairan)
- Prosedur mengenai konsinyasi barang berbahaya, pelabelan, placarding dan dokumen yang diperlukan untuk transportasi
- Tes untuk pembangunan dan pengujian kemasan / botol / wadah, kontainer besar menengah (IBC) dan untuk tank dan kendaraan tangki jalan
- Ketentuan mengenai operasi transportasi, penyimpanan dan pemisahan
- Ketentuan khusus dalam kasus kecelakaan, tindakan pencegahan kebakaran dan pengangkutan limbah
- Lainnya

Volum 2

- Daftar Lengkap Barang Berbahaya, termasuk jumlah PBB barang, nama pengiriman yang tepat, kelas / divisi, anak perusahaan risiko, kelompok kemasan, dll
- Ketentuan jumlah terbatas dan dikecualikan
-
- Daftar definisi dan Lainnya

Volum 3 (Supplement)

- tanggap darurat, prosedur untuk kebakaran dan tumpahan
- Medis panduan pertolongan pertama
- Prosedur Pemberitahuan dalam kasus kecelakaan dengan barang-barang berbahaya
- Stowage di unit transportasi
- Penggunaan pestisida tanpa resiko
- INF Code (Kode Internasional untuk Aman Pengangkutan Dikemas Iradiasi Bahan Bakar Nuklir, Plutonium dan Tingkat Tinggi Limbah Radioaktif di Kapal Board) dan Lampiran,



IATA DGR

- Pada tahun 1953, perusahaan penerbangan beberapa anggota IATA menginformasikan dalam meningkatnya kebutuhan untuk mengangkut melalui udara dan ada beberapa masalah yang disebabkan oleh barang berbahaya dan zat-zat, di mana tidak terkendali sehingga dapat mempengaruhi keselamatan penumpang, awak dan pesawat yang mereka dilakukan.
- Pengalaman di moda transportasi lainnya telah menunjukkan bahwa kargo paling berbahaya dapat dilakukan dengan aman jika artikel atau zat yang benar dikemas, dan jumlah dalam setiap paket yang terbatas.

IATA (International Air Transport Association)

adalah asosiasi perusahaan penerbangan dunia yang anggotanya merupakan perusahaan penerbangan atau airlines dari negara-negara anggota ICAO.

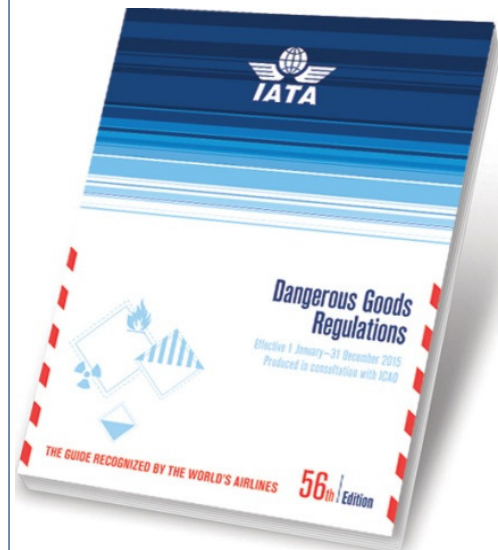
IATA membidangi aktivitas operasional penerbangan, menyelesaikan permasalahan penerbangan dari sisi bisnis komersial, membantu merumuskan kebijakan industri seperti keseragaman harga tiket, persyaratan angkutan barang dan penumpang, dan lain sebagainya.



Pembaruan buku IATA DGR adalah setiap 1 tahun dimulai dari awal bulan Januari hingga di akhir Bulan Desember

Isi dari buku IATA DGR

- Section 1 Applicability
- Section 2 Limitations
- Section 3 Classification
- Section 4 Identification
- Section 5 Packing
- Section 6 Packaging specifications and performance tests
- Section 7 Marking and labelling
- Section 8 Documentation
- Section 9 Handling
- Section 10 Radioactive material



1.4 Siapa saja yang menggunakan buku IMDG atau IATA DGR ?

Meskipun informasi di Kode diarahkan terutama pada kegiatan maritim, ketentuannya dapat mempengaruhi berbagai industri dan jasa:

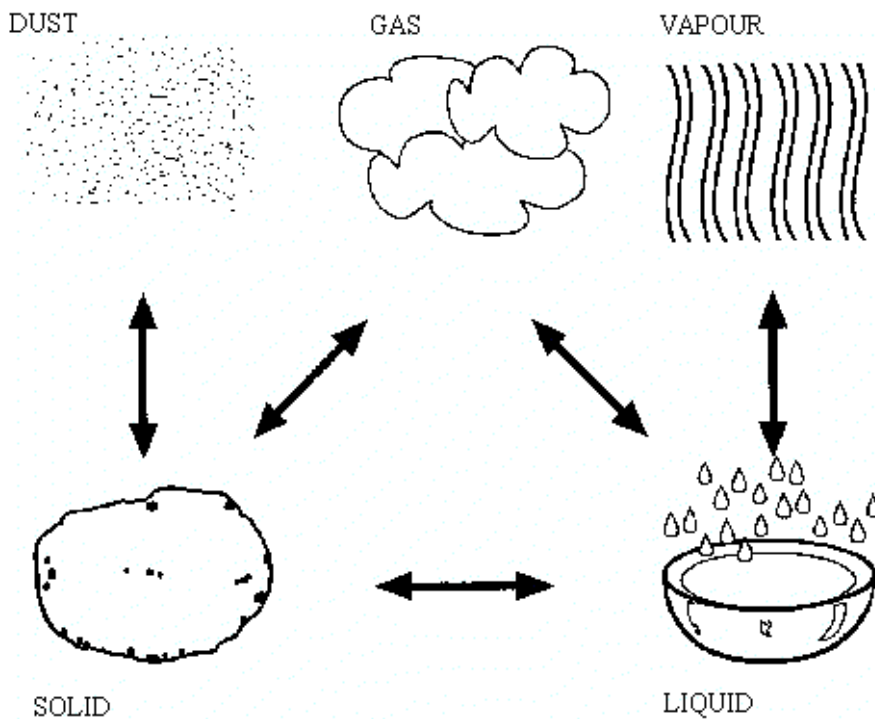
- Produsen
 - Packers
 - Pengirim
 - penyedia layanan Feeder seperti jalan, kereta api dan transportasi air
- saran terpercaya terminologi, pengepakan, pelabelan, klasifikasi, penyimpanan, segregasi dan tanggap darurat dapat ditemukan dalam Kode IMDG.

Prinsip Fisika dan Kimia

Semua benda di sekitar Anda-pensil, buku, batu, tanaman dan air merupakan materi alam semesta. Setiap jenis tertentu dari materi disebut sebagai bahan. Kami mendefinisikan kimia sebagai ilmu komposisi dan struktur material dan perubahan yang bahan mengalami. Fisika mempelajari hukum dasar yang mengatur alam semesta kita dan keterkaitan antara energi dan materi.

Buku IMDG Code atau IATA DGR mengklasifikasikan bahan kimia ke dalam tiga kelompok-padat, cair dan Gas

Air (H₂O) dalam keadaan normal adalah cair, tetapi bisa eksis sebagai es (padat) dan uap (gas).



barang berbahaya akan mengubah keadaan secara signifikan jika ada perubahan pada unsur-unsur berikut:

- Suhu
- Tekanan



Tingkat reaksi untuk bahan kimia didefinisikan sebagai perubahan pada kondisi yang berbeda-beda dalam waktu tertentu. Laju reaksi kimia tergantung pada berikut:

Konsentrasi zat kimia pada saat tertentu

- Suhu / paparan tekanan
- Waktu paparan
- Quantity (kilogram atau liter)

Konsekuensi dari reaksi kimia karena kesalahan penanganan barang berbahaya dapat mengakibatkan berikut:

- Api
- Kontaminasi
- Tumpahan
- Cedera
- ledakan
- Kelautan degradasi hidup
- radioaktif



MODULE: 2: KLARIFIKASI BARANG BERBAHAYA

2.1 Why do we need to classify Dangerous Goods ?

Hal ini diperlukan untuk mengklasifikasikan barang-barang berbahaya ke dalam kelas yang berbeda berdasarkan karakteristik kimia tertentu menghasilkan risiko. Klasifikasi penting bagi otoritas terkait untuk merencanakan tanggap darurat mereka. Jalur pelayaran akan menerapkan klasifikasi barang berbahaya dari Kode IMDG untuk mengisi dan faktur pelanggan / penerima barang sesuai.

2.2 Dangerous Goods classification and its related risks

Types of Dangerous Goods

Dangerous goods based on their origin and characteristics can be classified as follows:

- **Oil by-products** - fire and explosion being their main risk (benzenes, liquefied petroleum gas and other fuels)
- **Chemical products** - (Industrial, pharmaceutical and agricultural) manufactured and loaded either as final product for consumption or as by-products for industrial use. The latter are most of the dangerous goods transported, and if not properly handled, could cause great damage to people, transport units and the environment
- **Mineral** - such as coal, sulfur, mineral concentrates and other metals or asbestos which can cause different illnesses, injuries, intoxication or fires.
- **Products of animal or vegetable origin** - as fishmeal, pressed cakes of oleaginous seeds and cotton, which can also cause spontaneous combustion, fire or explosions.
- **Radioactive materials** - used in a variety of industrial and medical processes, as well as for military applications, which, in high doses could cause immediate harm, or even in small doses could cause cancer and other illnesses if exposed to people for prolonged periods of time.



- Many of the substances from Class 1 to Class 9 are deemed marine pollutants. A marine pollutant is defined as “any substance that will degrade the aquatic organisms that live in the water

Prior to stowage, segregation, marking, labeling and storing dangerous goods safely, those handling dangerous goods must know exactly what hazards these dangerous goods pose to the user. The term ‘hazard’ in this text means a source or a situation with a potential harm with regard to People, Environment, Asset and Reputation (**PEAR Concept**)



All chemicals are subject to the code and are assigned to one of the classes 1-9 according to the hazard or the most predominant hazards they present






Classification of Dangerous Goods





The classification is made by the consignor/shipper or by the appropriate competent authority. The IMDG Code classifies dangerous goods as follows (simplified form):

- Class 1: Explosives
- Class 2: Gases
- Class 3: Flammable Liquids
- Class 4: Flammable solids; substances liable to spontaneous combustion; substances which, in contact with water, emit flammable gases
- Class 5: Oxidizing substances and organic peroxides
- Class 6: Toxic and infectious substances
- Class 7: Radioactive material
- Class 8: Corrosive substances
- Class 9: Miscellaneous dangerous substances and articles




The numerical order of the classes and divisions does not indicate the degree of danger.





| Class or Division | Description |
|--|---|
|  <p style="text-align: center;">1</p> | <p>Explosives</p> |
|  <p style="text-align: center;">1.1</p> | <p>Articles and substances having a mass explosion hazard</p> |

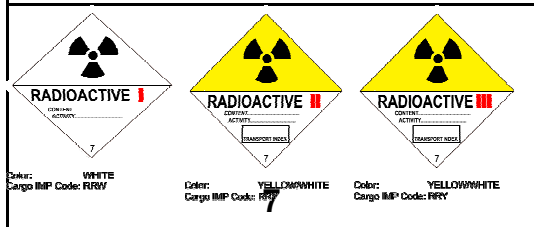
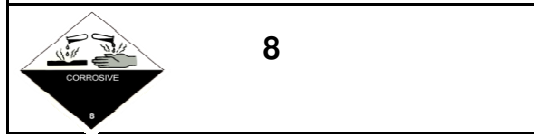

| | | |
|---|-----|---|
|  | 1.2 | Articles and substances having a projection hazard but not a mass explosion hazard |
|  | 1.3 | Articles and substances having a fire hazard, a minor blast hazard and/or a minor projection hazard but not a mass explosion hazard |
|  | 1.4 | Articles and substances presenting no significant hazard |
|  | 1.5 | Very insensitive articles which do not have a mass explosion hazard |
|  | 1.6 | Extremely insensitive articles which do not have a mass explosion hazard |

| Class or Division | Description |
|---|------------------------------|
|  2.1 | Flammable gas |
|  2.2 | Non-flammable, non-toxic gas |
|  2.3 | Toxic gas |
|  3 | Flammable liquids |

| Class or Division | Description |
|-------------------|-------------|
|-------------------|-------------|

| | |
|---|---|
| 4 | Flammable solids; Substances liable to spontaneous combustion; Substances which, in contact with water, emit flammable gases |
|  4.1 | Flammable solids |
|  4.2 | Substances liable to spontaneous combustion |
|  4.3 | Substances which, in contact with water, emit flammable gases |

| Class or Division | Description |
|---|---|
| 5 | Oxidizing substances and Organic Peroxides |
|  5.1 | Oxidizers |
|  5.2 | Organic Peroxides |
| 6 | Toxic and Infectious substances |
|  6.1 | Toxic substances |
|  6.2 | Infectious substances |

| Class or Division | Description |
|---|-------------------------------|
|  <p>Color: WHITE Cargo IMP Code: RFRW</p> <p>Color: YELLOW/WHITE Cargo IMP Code: RRF</p> <p>Color: YELLOW/WHITE Cargo IMP Code: RRFY</p> | Radioactive material |
|  <p>8</p> | Corrosives |
|  <p>9</p> | Miscellaneous dangerous goods |

2.3 The UN number and Proper Shipping Name

Finally the UN number and proper shipping name identify individual substances, but like the class the UN number does not indicate how dangerous a substance is relative to another.

The concept of the UN number was developed to help overcome language barriers. At present the numeral sequence runs from 0004 to 3468. The numbers can be broken down as follows:

0004 – 0504 have been allocated to explosives (some have been cancelled / deleted).

1000 – 3473 apply to all other dangerous substances and articles.

Chemicals can be divided into:

- (a) directly named, e.g. acetone, sulphuric acid or phosphorus, and
- (b) ‘Families’ of chemicals (generic entries) by either chemical names or end use, e.g. ketones, or class descriptions, e.g. flammable liquid. Both of these latter entries are always followed by the letters N.O.S. (not otherwise specified), e.g. ketones, liquid N.O.S., flammable liquid N.O.S.

The name in **BOLD UPPER CASES** immediately following the UN number is the Proper Shipping Name (PSN). This has been determined by the UN Committee and it is the one that should always be quoted on packages, tanks and documentation.

The majority of the names are always written in singular.

MODUL 3: MARKING, LABELS, PLACARDS

3.1 Introduction

The IMDG Code requires that dangerous goods are identified, marked, labelled/placarded and documented. The full legal requirements are set down in Part A of Chapter VII of SOLAS 1974, as amended.

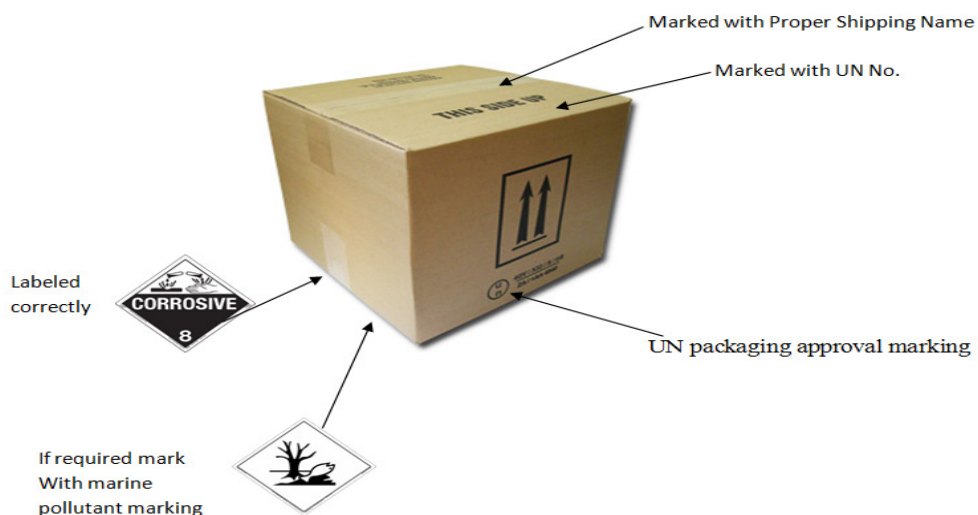
The chapter states that packages containing dangerous goods shall be:

- **Durably marked** with the correct technical name – trade names alone shall not be used, and
- **Labelled (or stencilled) or placarded** as appropriate to indicate the nature of the goods

This information must survive three months immersion in the sea if the package could survive for such a period.

Documentation is required and this must contain the correct technical name, classification and be accompanied by a signed certificate or declaration that the consignment being offered for carriage is packaged and marked, labelled or placarded, as appropriate and is fit for carriage.

In addition MARPOL 73/78 requires that MARINE POLLUTANTS are clearly marked and documented.





Each ship carrying dangerous goods shall have a manifest or stowage plan detailing what is on board and where it is located. A copy has to be left at the port before the ship sails.

The IMDG Code takes the SOLAS provisions and gives more precise details in Part 5. Some Special provisions (column 6 of the dangerous goods list) include special consignment procedures for particular substances.

3.2 Identification

To meet the requirements of SOLAS and common sense safety requirements it is essential to identify the dangerous goods.

The term Correct Technical Name referred to in SOLAS becomes the Proper Shipping Name in the Code in line with UN Model regulations (Note 1 Chapter 3.1.2).

The name in bold in Column 2 of the Dangerous Goods List is the proper shipping name. Synonyms only appear in the alphabetical index for reference purposes only, and should not be used for marking packages or on documentation. Initials and trade names should not be used unless they are approved by ISO. Where and”, „ör” etc appear the appropriate section should be selected.

e.g. The schedule for UN 2583 gives the following data “ALKYLSULPHONIC ACIDS, SOLID OR ARYLSULPHONIC ACIDS, SOLID, with more than 5% free sulphuric acid”.

| UN No. (1) | Proper Shipping Name (PSN) (2) | Class or division (3) | Subsidiary risk(s) (4) | Packing group (5) | Special provisions (6) | Limited quantities (7) | Packing | | IBC | |
|---------------|---|--------------------------|---------------------------|----------------------|---------------------------|---------------------------|---------------------|-------------------|----------------------|--------------------|
| | | | | | | | Instructions (8) | Provisions (9) | Instructions (10) | Provisions (11) |
| 2582 | FERRIC CHLORIDE SOLUTION | 8 | - | III | 223 | 5 l | P001 LP01 | - | IBC03 | - |
| 2583 | ALKYLSULPHONIC ACIDS, SOLID or ARYLSULPHONIC ACIDS, SOLID with more than 5% free sulphuric acid | 8 | - | II | - | 1 Kg | P002 | - | IBC08 | B2 B4 |

The shipper has two choices:

- ALKYLSULPHONIC ACIDS, SOLID
- ARYLSULPHONIC ACIDS, SOLID



NB: The note regarding the 5% free sulphuric acid is not an essential part of the name.

The purpose of the proper shipping name is to identify the shipment and particularly to facilitate the implementation of emergency procedures in the event of a spillage or fire.

There are some substances that can only be carried if they are STABILISED or INHIBITED. Where these terms appear as a part of the proper shipping name then the word must be included. There is a duty on the shipper to ensure that such substances are stabilised or inhibited to prevent any dangerous reaction during the voyage. Other words frequently included in proper shipping names are: **liquid, solid, molten, organic, inorganic, etc.**

Many chemicals regularly shipped do not have a specific UN number (see classification notes) and the appropriate one of the many Generic or Not Otherwise Specified (NOS) entries must be carefully selected.

e.g. Corrosive liquid, Flammable, n.o.s.
Pesticide, Solid, Toxic, n.o.s.

For the vast majority of these entries there is a requirement that additional information is supplied; normally this is a chemical name(s) from a recognised chemical dictionary or other technical publication. It is easy to identify those Proper Shipping Names that require an additional technical Name as SP 274 will appear in column 6 of the Dangerous Goods List.

In order that confusion is avoided the Code states that only two of the constituents of complex chemical mixtures which contribute most to the hazard have to be mentioned. If the Dangerous Goods List includes a subsidiary label in column 4 then one of the chemical names should represent that component.

e.g. FLAMMABLE LIQUID, TOXIC, N.O.S. (contains isopropanol and phenol)

Note: It is a requirement that the Technical Name is shown in parentheses immediately following the name.

3.3 Marking and labelling

Marking and labelling are two different things within the IMDG Code even though many shippers will put all the information together on a single label.

A Mark is the application of the proper shipping name, the UN number preceded by the letters 'UN', and the marine pollutant mark when applicable, on to the package, (and the elevated temperature mark on transport units) whilst

Labelling is the hazard diamond(s). Labels should not be less than 100 mm x 100 mm must show the class number in the bottom corner.



100 mm x 100 mm

Marking and labelling often has to be durable. This means that the information will still be identifiable on packages surviving 3 months in the sea. The rule only applies to packaging which will survive three months in the sea.

This requirement always caused the industry some difficulty.

Placarding

Placards are large labels. They must not be less than 250 mm x 250 mm and are applied to cargo transport units.



250 mm x 250 mm

These are: road vehicles, rail wagons, freight containers and portable tanks and road/rail tankers. The placards must be fitted to the exterior surfaces. A placard is shown for each of the

classes of goods in the unit plus, where required, subsidiary risk placards and if the goods are **marine pollutants** that mark (250 mm sides) must be displayed.

For most transport units including semi-trailers placards must be on each side and each end; other road vehicles are only required to have placards at the sides and rear.

In addition to the placards, where a full load of a single substance is being carried in packages, or tanks are used, the UN number should be displayed on either the lower half of the placard or on a separate panel of orange material with a black border. The proper shipping name has to be shown on both sides of all tanks and certain other cargo transport units.

There are three special marks in the Code:

- An elevated temperature mark, for 'hot' consignments,



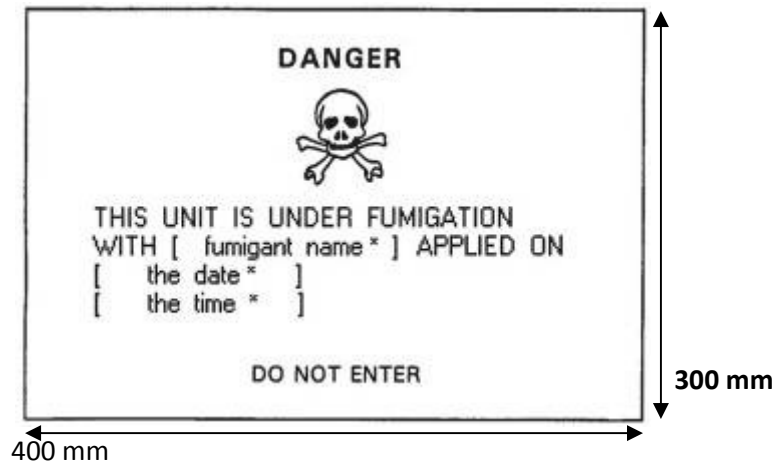
250 mm x 250 mm x 250 mm

- A Marine Pollutant mark



250 mm x 250 mm



- A fumigation warning sign, for cargo transport units under fumigation.




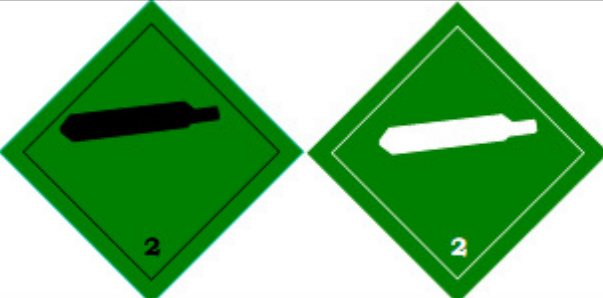

All these markings must be removed when the transport unit is cleaned and empty of dangerous goods.

3.4 Shapes and Colors of Labels and Placards


Class 1-Explosive

| | |
|---|---|
|  | <p>Division 1.1 / 1.2 / 1.3 Symbol – explosion in black color Background – orange color Text – Explosive (optional) ** Location of division and/or Compatibility Group * Location of Compatibility Group or text Number 1 – in the bottom corner</p> |
|  | <p>Division 1.4 / 1.5 / 1.6 Background – orange color Subclass numbers – in black color (approximately 30 mm x 5 mm in labels of 100 mm x 100 mm) * Location of Compatibility Group Number 1 – in the bottom corner</p> |



Class 2-Gases

| | |
|---|---|
|  | <p>Division 2.1 Flammable Gases Symbol – Flame in black or white Background – in red color Text – Flammable Gas (optional) Number 2 – in the bottom corner</p> |
|  | <p>Division 2.2 Non-flammable gases Symbol – Gas cylinder in black or white color Background – in green color Text – Non flammable compressed gas (optional) Number 2 – in the bottom corner</p> |
|  | <p>Division 2.3 Toxic Gases Symbol – skull and crossbones in black color Background – in white color Text – Toxic (optional) Number 2 – in the bottom corner</p> |



Class 3-Flammable Liquid

| | |
|---|---|
|  | <p>Symbol – flame in black and white color Background – red color Text – Flammable Liquid (optional) Number 3 – in the bottom corner</p> |
|---|---|


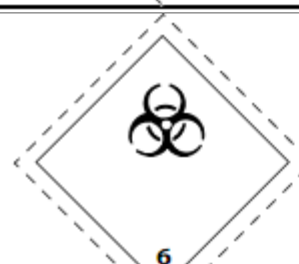
Class 4- Flammable Solids; Substances liable to spontaneous combustion; substances which, in contact with water emit flammable gases

| | |
|---|--|
|  | <p>Division 4.1 Flammable Solids Symbol – flame in black color Background – white with seven red vertical stripes Text – Flammable Solid Number 4 – In the bottom corner</p> |
|  | <p>Division 4.2 Substances liable to spontaneous combustion Symbol – flame in black color or white color Background – blue color Text – Spontaneous combustion substances (optional) Number 4 – in the bottom corner</p> |
|  | <p>Division 4.3 Substances which, in contact with water, emit flammable gases Symbol – flame in black or white color Background – blue color Text – Substances which, in contact with water, emit flammable gases (optional) Number 4 – in the bottom corner</p> |




Class 5 - Oxidizing Substances or Organic Peroxides

| | |
|---|--|
|  | <p>Division 5.1 Oxidant Substances Symbol – flame with circle in black color Background – yellow color Text – Oxidizing Substance (optional) Number 5.1 – in the bottom corner</p> |
|  | <p>Division 5.2 Organic Peroxides Symbol – flame in white color Top Half – red Bottom Half – yellow Text – Organic Peroxide (optional) Number 5.2 – in the bottom corner</p> |

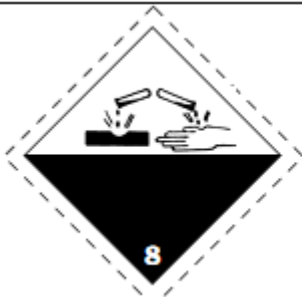
Class 6 - Toxic Substances or Infectious Substances

| | |
|---|--|
|  | <p>Division 6.1 Toxic Substances Symbol – black skull and crossbones Background – white color Text – Toxic (optional) Number 6 – in the bottom corner</p> |
|  | <p>Division 6.2 Infectious Substances Symbol – three crescents superimposed on a circle and inscriptions in black Background – white color Text – Infectious substance, notify Public Health Authority (optional) Number 6 – In the bottom corner</p> |

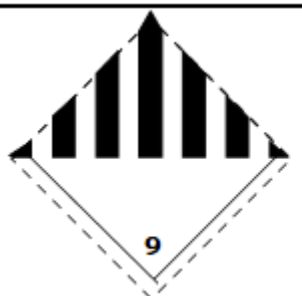
Class 7 - Radioactive Materials

| | |
|---|--|
|  | <p>Category I – White Symbol – trefoil in black color Background – white color Text (mandatory) in black – in the lower half of the label “Radioactive I”, “Contents...”, “Activity...” and “Transport Index” box Number 7 – in the bottom corner</p> |
|  | <p>Category II – Yellow Symbol – trefoil in black color Background – the upper half in yellow color with white borders, the lower half in white Text in black – in the lower half of the label “Radioactive II”, “Contents...”, “Activity...” and “Transport Index” box Number 7 – in the bottom corner</p> |
|  | <p>Category III – Yellow Symbol – trefoil in black color Background – the upper half in yellow color with white borders, the lower half in white Text in black – in the lower half of the label “Radioactive III”, “Contents...”, “Activity...” and “Transport Index” box Number 7 – in the bottom corner</p> |

Class 8 – Corrosive Substances

| | |
|---|---|
|  | <p>Symbol – Liquids falling from two test tubes onto a hand and a black piece of metal Background – Upper half in white color and lower half in black with white borders Text – Corrosive (optional) Number 8 – In the bottom corner</p> |
|---|---|

Class 9 - Miscellaneous Dangerous Substances and Articles Potentially Damaging to the Environment

| | |
|---|---|
|  | <p>Symbol – seven vertical bars in black in the upper half Background – in white color Number 9 – In the bottom corner</p> |
|---|---|

3.5 Dangerous Goods Packing and Packages

Packing Groups, Classifying Criteria

The risks presented by dangerous goods in maritime transport are related to their packaging, therefore it must be safe, well designed and manufactured and in good condition. It is very unlikely you will suffer injuries due to this cargo, but if the cargo is damaged, it is possible for dangerous substances or vapors to be released.

The packages/containers must comply with the following requirements:

- Must not be affected by the cargo it contains
- Must be strong enough to endure the rough treatment and risks involved in maritime transport
- Must be able to endure rain, wind and sea water
- Must be practical and adequate for the cargo they carry
- Must be in good condition
- Must be correctly marked, label and signposted

For packing purposes, dangerous goods belonging to all classes, except for class 1, 2, 6.2 and 7 have been divided into three “packing groups” depending on the degree of danger they represent:

- **Packing Group I** - High level of danger



- **Packing Group II** - Medium level of danger
- **Packing Group III** - Low level of danger

UN Packaging and Approval Marking

Most packages also need to bear the UN packaging approval mark confirming that the packaging has been tested and approved in accordance with relevant United Nations performance standards. Example below:

- 1) Combination packaging

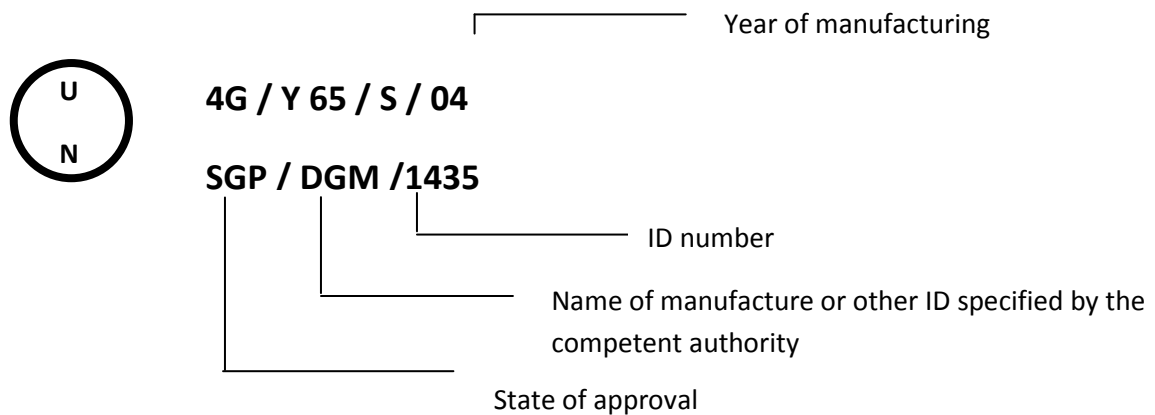


UN symbol

Type of packagings

PG and maximum gross weight

Solids or inner packagings



MODUL 4: DANGEROUS GOODS DOCUMENTATION

4.1 Documentation

All modes of transport require some form of documentation and the sea rules are no exception. Prior to shipment the IMDG Code requires for the majority of shipments at least two documents to be produced to the shipping company or its agents. The requirements can be found in Chapter 5.4 and can be described as follows:

- A declaration by the shipper
- A container packing certificate/ vehicle declaration

Although it is standard practice in many countries to include both items on the same document the signatures for each element will usually be different.

There is no mandatory model for the dangerous goods declaration. The IMDG Code recommends the use of the following document for the multimodal transport of dangerous goods, where the dangerous goods declaration is combined with the vehicle/container packing certificate (Regulation 4, Chapter VII, Solas 74) or Declaration of Dangerous Goods.

One of the main requirements of a dangerous goods transportation document is to contain the basic information regarding the risks entailed by these dangerous goods. This dispatch document is normally the same for all transportation modes, and the information stipulated must be clear and legible. Nevertheless IMO recommends the use of the Multimodal Form, which will be mentioned later.



Dangerous Goods Transportation Document

Information which must be included in the Dangerous Goods Transportation Document

- ❖ The shipping name or correct technical name (no commercial names will be accepted)

- ❖ The Class and Division when applicable. The Class or Division can be included in the risk class number. The compatibility group will also be indicated in goods from class 1; and in the case of gases involving secondary risks, information will be extended to indicate such risks

- ❖ The United Nations number preceded by the letters UN

- ❖ The packing group when assigned

- ❖ The number and types of bundles, as well as the total quantity of dangerous goods per volume or mass

- ❖ The flashpoint for materials having a flashpoint the same or lower than 61°C

- ❖ The subsidiary risks not indicated in the shipping name

- ❖ When applicable, the goods shall be identified as “Marine Pollutant”

- ❖ Empty means of containment, which contain the residue of dangerous goods shall be described as such, for example, by placing the words “Empty”, “Uncleaned” or “Residue Last Contained” before or after the proper shipping name

- ❖ For dangerous goods in limited quantities, the phrase “Dangerous Goods in Limited Quantity” shall be included

- ❖ For class 5.2 or self reactive substances of class 4.1, the regulation and emergency temperatures

- ❖ A statement signed in the name of the consignor, saying that the goods are correctly described, classified, packed, marked and labeled and that its conditions are appropriate for transport

- ❖ Additional information may also be required in certain cases for explosives, radioactive materials, dangerous goods transported in a molten state, etc.

General Awareness



Dangerous cargo secured incorrect inside containers, which then becomes loose and damaged during transport has been the cause of the majority of accidents concerning dangerous goods. This is why it is very important to check that this has been carried out correctly

Container/Vehicle Packing Certificate

When dangerous goods are packed or loaded into any container or vehicle, those responsible for packing or loading shall provide a "container/vehicle packing certificate". Basically this document certifies the following:

- The cargo transport unit was clean, dry and apparently fit to receive the goods
- Incompatible substances have not been placed into the cargo transport unit (unless this had been specifically authorized by the competent national authority)
- All packages have been externally inspected for damage, and only sound packages have been loaded
- All packages have been properly loaded and secured within the cargo transport unit
- The cargo transport unit and the packages are properly marked, labeled and placarded
- A dangerous goods transport document has been received for each dangerous goods consignment loaded in the container/vehicle

The certificate must be signed by the person responsible of stowing the goods in the cargo transport unit. It is possible to incorporate this certificate and the Dangerous Goods Declaration into a single document, the "Dangerous Goods Multimodal Transport".

| MULTIMODAL DANGEROUS GOODS FORM | | | | |
|--|--|---|----------|-----------|
| 1. Shipper/Consignor/Sender DGM INDONESIA Komp.Pergudangan Soewarna, Unit A 15/ , PHONE: 62 21 55913029 19110 JAKARTA , INDONESIA For: CHUGOKU PAINTS INDONESIA JL. INDUSTRI VIII NO 6, KAWASAN INDUSTRI JATAKE, TANGERANG TEL: 690 2005 / 06 | | 2. Transport document number | | |
| 3. Page 1 of 1 Pages | | 4. Shipper's reference 1529/11/28/2007-SEA | | |
| 6. Consignee CHUGOKU MARINE PAINTS (SHANGHAI) LTD NO 4677, JIA SONG ROAD(NORTH), JIADING, SHANGHAI CHINA ,, (201814) . TEL : (21) 69501000 | | 5. Freight Forwarder's reference | | |
| | | 7. Carrier (to be completed by the carrier) | | |
|  | | SHIPPER'S DECLARATION I hereby declare that the contents of this consignment are fully and accurately described below by the proper shipping name, and are classified, packaged, marked and labeled/placarded and are in all respect in proper condition for transport according to the applicable international and national governmental regulations. | | |
| 8. This shipment is within the limitations prescribed for: (Delete non-applicable) PASSENGER AND CARGO AIRCRAFT | | 9. Additional handling information 24 Hour Emergency contact number: 62 818 0845 5946 Contact Person M. Hermawan | | |
| CARGO AIRCRAFT ONLY | | | | |
| 10. Vessel/flight no. and date | 11. Port/place of loading JAKARTA,INDONESIA | | | |
| 12. Port/place of discharge SHANGHAI,CHINA | 13. Destination | | | |
| 14. Shipping marks | Number and kind of packages; description of goods | Gross mass (kg) | Net mass | Cube (m³) |
| AS ABOVE | 38 STEEL DRUMS x 15 KG NET UN 1325, FLAMMABLE SOLID, ORGANIC, N.O.S. (CONTAINS REFINED PETROLEUM, DISTILLATE,BENZYL ALCOHOL MIXTURE), CLASS 4.1 PG II, (42°C c.c.), MARINE POLLUTANT, EmS: F-A, S-G | 646 kg | 570 kg | |
| AS ABOVE | 8 JERRICANS x 15 L NET EACH UN 2810, TOXIC LIQUID, ORGANIC, N.O.S. (CONTAIN BARIUM HEXOATE AND MINERAL SPIRIT MIXTURE), CLASS 6.1 PG I, (42°C c.c.), MARINE POLLUTANT, EmS: F-A, S-A | 148 kg | 136 kg | |
| AS ABOVE | 15 STEEL DRUM x 178 L NET EACH UN 1866, RESIN SOLUTION | 3030 kg | 2700 kg | |



DANGEROUS GOODS

CONTAINER PACKING CERTIFICATE

VEHICLE DECLARATION

| |
|----------|
| Unit No. |
|----------|

Those responsible for the packing of dangerous goods into a unit, e.g. a container, flat, trailer or other vehicle intended for sea transport should provide this Container/vehicle Packing Certificate

It is hereby certified that when packing the above unit;

- The unit was clean, dry and apparently fit to receive the goods.
- Packages which need to be segregated in accordance with applicable segregation requirement have not been packed together onto or in the container/vehicle (unless approved by the competent authority concerned in accordance with 7.2.2.3)
- All packages have been externally inspected for damage and only sound packages have been loaded.
- Drums have been stowed in an upright position, unless otherwise authorized by the competent authority, and all good have been properly loaded and, where necessary, adequately braced with securing material to suit the mode(s) of transport for the intended journey.
- Goods loaded in bulk have been evenly distributed within the container/vehicle.
- For consignments including goods of class 1, other than division 1.4, the container/vehicle is structurally serviceable in conformity with 7.4.6.
- The container/vehicle and packages therein are properly marked, labelled and placarded, as appropriate.
- When solid carbon dioxide (dry ice) is used for cooling purposes, the container/vehicle is externally marked or labelled in a conspicuous place at the door end, with the words:
"DANGEROUS CO₂ GAS (DRY ICE) INSIDE,
VENTILATE THOROUGHLY BEFORE ENTERING"
- The dangerous goods transport document, as indicated in 5.4.1*, has been received for each dangerous goods consignment loaded in the container/vehicle.

| |
|-----------------|
| Place and date: |
| Signed for: |
| by |

(*) The consignor should certify, either on the shipping papers or in a separate declaration, that the goods which he offers for shipment have been properly packaged, marked, labelled and are in proper condition for carriage.



MODUL 5: SEGREGATION AND SEPARATION

5.1 Introduction

One of the most important aspects of managing the transport of dangerous goods is the stowage, segregation and separation of these goods. Hazardous substances must not be carried with goods which are liable to interact and cause danger to P.E.A.R.

Incompatible hazardous substances must be adequately separated from each other during transport and storage. Improper stowage or segregation of dangerous goods may result in the release of toxic fumes, fire spill and degradation of the product's quality. For this reason the IMDG Code has provided provisions in Volume 1 Part 7 titled "Provisions Concerning Transport Operations", which focuses on stowage and segregation.

5.2 Principles of segregation and stowage

The following issues may contribute towards major chemical accidents during stowage and segregation:

- Failure to understand the nature of the substance handled
- Failure of quality assurance-container inspection certificates
- Insufficient recording of chemical register inventories at different terminal locations
- Insufficient labeling and recording of chemicals
- Poor housekeeping-firefighting equipment not available in work area

The IMDG Code requires dangerous goods to be stored and segregated according to the hazard, class and compatibility. The code also provides detailed information on these important factors in terms of where dangerous goods should be stowed and how they should be separated or segregated from other cargoes.

Although the IMDG Code provides detailed information on ship stowage, the requirements can also be applied to storage ashore and even to container packing. The requirement offers a framework for port authorities when preparing their regulations for the safe transport of handling and storage of dangerous goods in ports. Dangerous goods which have to be segregated from each other shall not be transported in the same cargo transport unit.

5.3 IMDG Code segregation, stowage and Dangerous Goods list

General segregation is applied to all cargo spaces on deck or under deck of all types of ships and cargo in transport units and incompatible goods shall be segregated from one another. For the



purpose of segregation, the IMDG Code has grouped together similar chemical properties in the dangerous goods list. In the dangerous goods list, the group substances are referred as follows:

1. Acids
2. Ammonium Compound
3. Bromates
4. Chlorates
5. Chlorites
6. Cyanides
7. Heavy metals and their salts
8. Hypochlorite
9. Lead and its compounds
10. Liquid halogenated hydrocarbons
11. Mercury and mercury compounds
12. Nitrites and their mixtures
13. Perchlorates
14. Permanganates
15. Powdered metals
16. Peroxides
17. Azides
18. Alkalis

If substances are shipped under Not Otherwise Specified (N.O.S) entries, the shipper will decide the appropriate segregation group.

In the IMDG code Volume 2 under column 16 of the numerical list of dangerous goods, the stowage conditions for each one of the dangerous goods listed can be found. Also, in this column there is information on stowage related to sleeping, food, solutions and mixtures areas, etc. For example, the product "ALLYL BROMIDE / UN 1099", column 16 indicates "Category B, far from living quarters."

In the following paragraph the five stowage categories stipulated by the IMDG Code are described.



5.4 Stowage Categories

| | |
|---|-----------------------|
| Stowage category A | |
| Cargo ships or passenger ships carrying a number of Passengers limited to not more than 25 or to 1 passenger per 3 m of overall length, whichever is the greater number | ON DECK OR UNDER DECK |
| Other passenger ships in which the limiting number of passengers transported is exceeded | ON DECK OR UNDER DECK |
| Stowage category B | |
| Cargo ships or passenger ships carrying a number of passengers limited to not more than 25 or to 1 passenger per 3 m of overall length, whichever is the greater number | ON DECK OR UNDER DECK |
| Other passenger ships in which the limiting number of passengers transported is exceeded | ON DECK ONLY |
| Stowage category C | |
| Cargo ships or passenger ships carrying a number of passengers limited to not more than 25 or to 1 passenger per 3 m of overall length, whichever is the greater number | ON DECK ONLY |
| Other passenger ships in which the limiting number of passengers transported is exceeded | ON DECK ONLY |
| Stowage category D | |
| Cargo ships or passenger ships carrying a number of passengers limited to not more than 25 or to 1 passenger per 3 m of overall length, whichever is the greater number | ON DECK ONLY |
| Other passenger ships in which the limiting number of passengers transported is exceeded | PROHIBITED |
| Stowage category E | |
| Cargo ships or passenger ships carrying a number of passengers limited to not more than 25 or to 1 passenger per 3 m of overall length, whichever is the greater number | ON DECK OR UNDER DECK |
| Other passenger ships in which the limiting number of passengers transported is exceeded | PROHIBITED |

In brief, the IMDG Code establishes a system whereby dangerous goods can be stowed in a safe way, considering their compatibility with other types of cargo and therefore preventing further damage in case of accidents.

Mastering the techniques on how to stow dangerous goods correctly on board ships is fundamentally the responsibility of the Ship Planner. Port Terminals are not concerned with

planning of the stowage of dangerous goods on board; they are only responsible of stowing the cargo in the positions indicated in the ships plan, which is provided by the Shipping Line through the respective agencies

5.5 Segregation

The separation of incompatible dangerous goods is of crucial importance because it is applicable on shore as well as aboard ship, and within outer packaging, freight containers, vehicles etc as well as to the cargo transport units themselves.

The Code states that “two substances or articles are considered mutually incompatible when their stowage together may result in undue hazards in case of leakage or spillage, or any other accident” (7.2.1.3).

Segregation is achieved by keeping incompatible goods a certain distance apart from each other, and/or requiring steel bulkheads/decks between them.

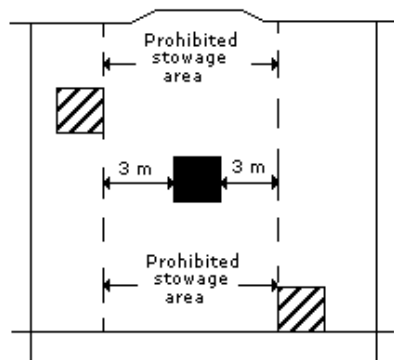
Amendment 37 to the Code introduces diagrams that demonstrate the meanings of the various segregation terms.

The key to segregation requirements is the segregation table in section 7.2.1.16 which indicates, for each combination of classes, the applicable segregation term.

The IMDG Code defines four segregation terms:

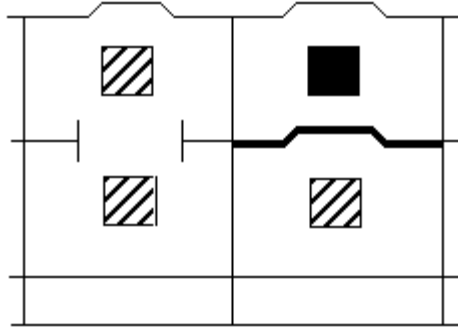
1. “Away from” (the minimum separation between two incompatible goods)

Effectively segregated so that the incompatible goods cannot interact dangerously in the event of an accident but may be transported in the same compartment or hold or on deck, provided a minimum horizontal separation of 3 metres, projected vertically, is obtained.



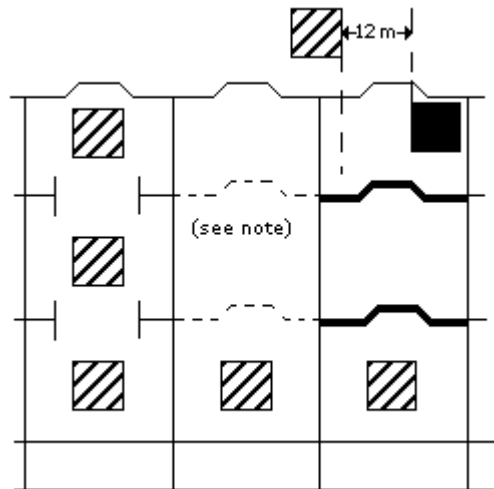
2. “Separated from”

In different compartments or holds when stowed under deck. Provided the intervening deck is resistant to fire and liquid, a vertical separation, i.e. in different compartments, may be accepted as equivalent to this segregation. For on deck stowage, this segregation means a separation by a distance of at least 6 metres horizontally.



3. “Separated by a complete compartment or hold from”

Either a vertical or a horizontal separation. If the intervening decks are not resistant to fire and liquid, then only a longitudinal separation, i.e. by an intervening complete compartment or hold, is acceptable. For on deck stowage, this segregation means a separation by a distance of at least 12 metres horizontally. The same distance has to be applied if one package is stowed on deck and the other one in an upper compartment.



Note: One of the two decks must be resistant to fire and to liquid

4. **“Separated longitudinally by an intervening complete compartment or hold from”
(this is the maximum separation between two incompatible goods)**

Vertical separation alone does not meet this requirement. Between a package under deck and one on deck, a minimum distance of 24 metres, including a complete compartment, must be maintained longitudinally. For on deck stowage, this segregation means a separation by a distance of at least 24 metres longitudinally

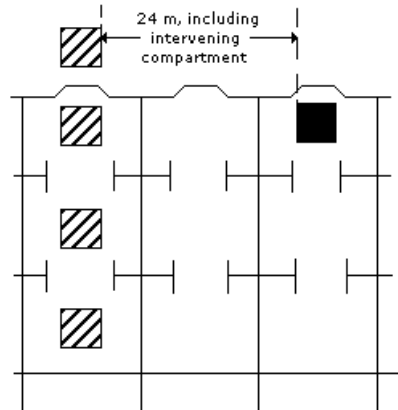




Table of segregation of freight containers on board container ships

| SEGREGATION REQUIREMENT | VERTICAL | | | HORIZONTAL | | | | | |
|--|---|---|---|-------------------------------------|---|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| | CLOSED VERSUS CLOSED | CLOSED VERSUS OPEN | OPEN VERSUS OPEN | CLOSED VERSUS CLOSED | | CLOSED VERSUS OPEN | | OPEN VERSUS OPEN | |
| | | | | ON DECK | UNDER DECK | ON DECK | UNDER DECK | ON DECK | UNDER DECK |
| "AWAY FROM" .1 | ONE ON TOP OF THE OTHER PERMITTED | OPEN ON TOP OF CLOSED PERMITTED OTHERWISE AS FOR "OPEN VERSUS OPEN" | | NO RESTRICTION | NO RESTRICTION | NO RESTRICTION | NO RESTRICTION | ONE CONTAINER SPACE | ONE CONTAINER SPACE OR ONE BULKHEAD |
| | | | | NO RESTRICTION | NO RESTRICTION | NO RESTRICTION | NO RESTRICTION | ONE CONTAINER SPACE | ONE CONTAINER SPACE |
| "SEPARATED FROM" .2 | NOT IN THE SAME VERTICAL LINE UNLESS SEGREGATED BY A DECK | AS FOR "OPEN VERSUS OPEN" | NOT IN THE SAME VERTICAL LINE UNLESS SEGREGATED BY A DECK | ONE CONTAINER SPACE | ONE CONTAINER SPACE OR ONE BULKHEAD | ONE CONTAINER SPACE | ONE CONTAINER SPACE OR ONE BULKHEAD | ONE CONTAINER SPACE | ONE BULKHEAD |
| | | | | ONE CONTAINER SPACE | ONE CONTAINER SPACE | ONE CONTAINER SPACE | TWO CONTAINER SPACES | TWO CONTAINER SPACES | ONE BULKHEAD |
| "SEPARATED BY A COMPLETE COMPARTMENT OR HOLD FROM" .3 | NOT IN THE SAME VERTICAL LINE UNLESS SEGREGATED BY A DECK | AS FOR "OPEN VERSUS OPEN" | | ONE CONTAINER SPACE | ONE BULKHEAD | ONE CONTAINER SPACE | ONE BULKHEAD | TWO CONTAINER SPACES | TWO BULKHEADS |
| | | | | TWO CONTAINER SPACES | ONE BULKHEAD | TWO CONTAINER SPACES | ONE BULKHEAD | THREE CONTAINER SPACES | TWO BULKHEADS |
| "SEPARATED LONGITUDINALLY BY AN INTERVENING COMPLETE COMPARTMENT OR HOLD FROM" .4 | | PROHIBITED | | MINIMUM HORIZONTAL DISTANCE OF 24 M | ONE BULKHEAD AND MINIMUM HORIZONTAL DISTANCE OF 24 M* | MINIMUM HORIZONTAL DISTANCE OF 24 M | TWO BULKHEADS | MINIMUM HORIZONTAL DISTANCE OF 24 M | TWO BULKHEADS |
| | | | | PROHIBITED | PROHIBITED | PROHIBITED | PROHIBITED | PROHIBITED | PROHIBITED |



The general provisions regarding segregation between different classes of dangerous goods can be found in the code in the following Segregation Table:

| CLASS | 1.1 1.2 1.5 | 1.3 1.6 | 1.4 | 2.1 | 2.2 | 2.3 | 3 | 4.1 | 4.2 | 4.3 | 5.1 | 5.2 | 6.1 | 6.2 | 7 | 8 | 9 |
|--|-------------------|------------|-----|-----|-----|-----|---|-----|-----|-----|-----|-----|-----|-----|---|---|---|
| Explosives 1.1,1.2,1.5 | * | * | * | 4 | 2 | 2 | 4 | 4 | 4 | 4 | 4 | 4 | 2 | 4 | 2 | 4 | X |
| Explosives 1.3, 1.6 | * | * | * | 4 | 2 | 2 | 4 | 3 | 3 | 4 | 4 | 4 | 2 | 4 | 2 | 2 | X |
| Explosives 1.4 | * | * | * | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | X | 4 | 2 | 2 | X |
| Flammable gases 2.1 | 4 | 4 | 2 | X | X | X | 2 | 1 | 2 | X | 2 | 2 | X | 4 | 2 | 1 | X |
| Non-toxic, non-flammable gases 2.2 | 2 | 2 | 1 | X | X | X | 1 | X | 1 | X | X | 1 | X | 2 | 1 | X | X |
| Toxic gases 2.3 | 2 | 2 | 1 | X | X | X | 2 | X | 2 | X | X | 2 | X | 2 | 1 | X | X |
| Flammable Liquids 3 | 4 | 4 | 2 | 2 | 1 | 2 | X | X | 2 | 1 | 2 | 2 | X | 3 | 2 | X | X |
| Flammable solids 4.1 | 4 | 3 | 2 | 1 | X | X | X | X | 1 | X | 1 | 2 | X | 3 | 2 | 1 | X |
| Substances liable to spontaneous combustion 4.2 | 4 | 3 | 2 | 2 | 1 | 2 | 2 | 1 | X | 1 | 2 | 2 | 1 | 3 | 2 | 1 | X |
| Substances which, in contact with water, emit flammable gases 4.3 | 4 | 4 | 2 | X | X | X | 1 | X | 1 | X | 2 | 2 | X | 2 | 2 | 1 | X |
| Oxidizing substances 5.1 | 4 | 4 | 2 | 2 | X | X | 2 | 1 | 2 | 2 | X | 2 | 1 | 3 | 1 | 2 | X |
| Organic peroxide 5.2 | 4 | 4 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | X | 1 | 3 | 2 | 2 | X |
| Toxic substances 6.1 | 2 | 2 | X | X | X | X | X | X | 1 | X | 1 | 1 | X | 1 | X | X | X |
| Infectious substances 6.2 | 4 | 4 | 4 | 4 | 2 | 2 | 3 | 3 | 3 | 2 | 3 | 3 | 1 | X | 3 | 3 | X |
| Radioactive material 7 | 2 | 2 | 2 | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 2 | X | 3 | X | 2 | X |
| Corrosive substances 8 | 4 | 2 | 2 | 1 | X | X | X | 1 | 1 | 1 | 2 | 2 | X | 3 | 2 | X | X |
| Miscellaneous dangerous substances and articles 9 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |



(This table is applied to unitized dangerous goods; this is to say, in pallets, drums, boxes and crates and other similar packaging. It is not applied to containers carrying dangerous goods)

x > The segregation, if any, is shown in the Dangerous Goods List

Segregation within the Cargo Transport Units

Dangerous goods which need to be segregated from each other must not be stowed in the same cargo transport unit (container). Nevertheless, goods which require to be segregated “away from” may be transported in the same cargo transport unit upon authorization by the corresponding authority. In this case an equivalent safety degree must be kept.

5.6 Using MSDS

The classification procedures previously described is solely the responsibility of the shipper. Normally this classification (and the basis of it) will be available in the form of a MSDS (Material Safety Data Sheet). The MSDS is the responsibility of the manufacturer and/or the importer of the goods, and should be made available upon request to anyone involved in the handling/use/shipping of chemical substances. The MSDS gives valuable information of chemical properties, such as Flash Point, and Transport Information.

MSDS is issued about data, fact and information about character substance or article. MSDS is needed when delivery or transport, because MSDS can provide information:

- **That substance or article can be classify as dangerous goods or not.**
- **If dangerous goods can know about Class, UN number, Proper shipping name, and packing group.**
- **Can be information about storage handling.**
- **Can be guidance for medical personal so they can handled incident case or spill from substance chemical.**
- **With MSDS can determine kind of PPE its must when that product used, so can be spared with all risk can issued by substance danger be contained with that product.**

On the following pages you will find examples for a dangerous goods MSDS :



Material Safety Data Sheet

Acetone
Version 1.0

Effective Date 01.01.2006

according to EC directive 2001/58/EC

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND COMPANY/UNDERTAKING

Material Name : Acetone
Uses : Industrial Solvent. Restricted to professional users.
Product Code : DGM0001

Supplier : Dangerous Goods Management
 Full address

Telephone : +47 51715540
Fax : +47 51715541

Emergency Telephone Number : +47 51715540

2. COMPOSITION/INFORMATION ON INGREDIENTS

Material Formal Name : Propan-2-one
Synonyms : Dimethyl Ketone
CAS No. : 67-64-1
INDEX No. : 606-001-00-8
EINECS No. : 200-662-2

Hazardous Components

| Chemical Name | CAS | EINECS | Symbol(s) | R-phrases) | Conc. |
|---------------|---------|-----------|-----------|-----------------------|----------|
| Acetone | 67-64-1 | 200-662-2 | F, Xi | R11; R36; R66; R67 | 100.00 % |

Additional Information : Refer to chapter 16 for full text of EC R-phrases.

3. HAZARDS IDENTIFICATION

Health Hazards : Vapours may cause drowsiness and dizziness. Slightly irritating to respiratory system. Repeated exposure may cause skin dryness or cracking. Irritating to eyes. Harmful; may cause lung damage if swallowed. Exposure may enhance the toxicity of other materials. See Chapter 11 for details.
Signs and Symptoms : Breathing of high vapour concentrations may cause central nervous system (CNS) depression resulting in dizziness, light-headedness, headache, nausea and loss of coordination. Continued inhalation may result in unconsciousness and death. Defatting dermatitis signs and symptoms may include a burning sensation and/or a dried/cracked appearance. Eye irritation signs and symptoms may include a burning sensation, redness, swelling, and/or blurred vision. If material enters lungs, signs and symptoms may include coughing, choking, wheezing, difficulty in breathing, chest congestion, shortness of breath, and/or fever.



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- Safety Hazards** : Highly flammable.
- Environmental Hazards** : Not classified as dangerous under EC criteria.

4. FIRST AID MEASURES

- Inhalation** : Remove to fresh air. If rapid recovery does not occur, transport to nearest medical facility for additional treatment.
- Skin Contact** : Remove contaminated clothing. Flush exposed area with water and follow by washing with soap if available.
- Eye Contact** : Immediately flush eyes with large amounts of water for at least 15 minutes while holding eyelids open. Transport to the nearest medical facility for additional treatment.
- Ingestion** : If swallowed, do not induce vomiting; transport to nearest medical facility for additional treatment. If vomiting occurs spontaneously, keep head below hips to prevent aspiration.
- Advice to Physician** : Potential for chemical pneumonitis. Consider: gastric lavage with protected airway, administration of activated charcoal.

5. FIRE FIGHTING MEASURES

Clear fire area of all non-emergency personnel.

- Specific Hazards** : Containers exposed to intense heat from fires should be cooled with large quantities of water. The vapour is heavier than air, spreads along the ground and distant ignition is possible.
- Extinguishing Media** : Alcohol-resistant foam, water spray or fog. Dry chemical powder, carbon dioxide, sand or earth may be used for small fires only.
- Protective Equipment for Firefighters** : Wear full protective clothing and self-contained breathing apparatus. Proper protective equipment including breathing apparatus must be worn when approaching a fire in a confined space.
- Additional Advice** : All storage areas should be provided with adequate fire fighting facilities. Keep adjacent containers cool by spraying with water.

6. ACCIDENTAL RELEASE MEASURES

Avoid contact with spilled or released material. Immediately remove all contaminated clothing. For guidance on selection of personal protective equipment see Chapter 8 of this Material Safety Data Sheet. For guidance on disposal of spilled material see Chapter 13 of this Material Safety Data Sheet. Observe all relevant local and international regulations.

- Protective measures** : Isolate hazard area and deny entry to unnecessary or unprotected personnel. Stay upwind and keep out of low areas. Shut off leaks, if possible without personal risks. Remove all possible sources of ignition in the surrounding area. Use appropriate containment (of product and fire fighting water) to avoid environmental contamination. Prevent from spreading or entering drains, ditches or rivers by using sand, earth, or other appropriate barriers. Attempt to disperse the vapour or to direct its flow to a safe location for example by using fog sprays. Take precautionary measures against static discharge. Ensure



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- Clean Up Methods** : electrical continuity by bonding and grounding (earthing) all equipment. Ventilate contaminated area thoroughly.
: For large liquid spills (> 1 drum), transfer by mechanical means such as vacuum truck to a salvage tank for recovery or safe disposal. Do not flush away residues with water. Retain as contaminated waste. Allow residues to evaporate or soak up with an appropriate absorbent material and dispose of safely. Remove contaminated soil and dispose of safely.
: For small liquid spills (< 1 drum), transfer by mechanical means to a labelled, sealable container for product recovery or safe disposal. Allow residues to evaporate or soak up with an appropriate absorbent material and dispose of safely. Remove contaminated soil and dispose of safely.
- Additional Advice** : Notify authorities if any exposure to the general public or the environment occurs or is likely to occur. Local authorities should be advised if significant spillages cannot be contained. Vapour may form an explosive mixture with air. See Chapter 13 for information on disposal.

7. HANDLING AND STORAGE

- General Precautions** : Avoid breathing of or contact with material. Only use in well ventilated areas. Wash thoroughly after handling. For guidance on selection of personal protective equipment see Chapter 8 of this Material Safety Data Sheet. Use the information in this data sheet as input to a risk assessment of local circumstances to help determine appropriate controls for safe handling, storage and disposal of this material.
- Handling** : Avoid inhaling vapour and/or mists. Avoid contact with skin, eyes, and clothing. Extinguish any naked flames. Do not smoke. Remove ignition sources. Avoid sparks. Electrostatic charges may be generated during pumping. Electrostatic discharge may cause fire. Ensure electrical continuity by bonding and grounding (earthing) all equipment. Restrict line velocity during pumping in order to avoid generation of electrostatic discharge (≤ 1 m/sec until fill pipe submerged to twice its diameter, then ≤ 7 m/sec). Avoid splash filling. Do NOT use compressed air for filling, discharging, or handling operations.
- Storage** : Must be stored in a well-ventilated area, away from sunlight, ignition sources and other sources of heat. Keep away from aerosols, flammables, oxidizing agents, corrosives and from other flammable products which are not harmful or toxic to man or to the environment. The vapour is heavier than air. Beware of accumulation in pits and confined spaces. Vapours from tanks should not be released to atmosphere. Breathing losses during storage should be controlled by a suitable vapour treatment system. Bulk storage tanks should be diked (bunded).
- Product Transfer** : Electrostatic charges may be generated during pumping. Electrostatic discharge may cause fire. Keep containers closed when not in use. Do not use compressed air for filling.



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- Recommended Materials** : discharging or handling.
: For containers, or container linings use mild steel, stainless steel. For container paints, use epoxy paint, zinc silicate paint.
- Container Advice** : Containers, even those that have been emptied, can contain explosive vapours. Do not cut, drill, grind, weld or perform similar operations on or near containers.
- Additional Information** : Use the information in this data sheet as input to a risk assessment of local circumstances to help determine appropriate controls for safe handling, storage and disposal of this material. Ensure that all local regulations regarding handling and storage facilities are followed.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Occupational Exposure Limits

| Material | Source | Type | ppm | mg/m3 | Notation |
|----------|--------|------|---------|-------|----------|
| Acetone | ACGIH | TWA | 500 ppm | | |
| | ACGIH | STEL | 750 ppm | | |

| Material | Source | Hazard Designation |
|----------|--------|---|
| Acetone | ACGIH | Not classifiable as a human carcinogen. |

- Exposure Controls** : The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Select controls based on a risk assessment of local circumstances.
Appropriate measures include: Provide adequate ventilation in storage areas. Use sealed systems as far as possible. Adequate explosion-proof ventilation to control airborne concentrations below the exposure guidelines/limits. Local exhaust ventilation is recommended. Firewater monitors and deluge systems are recommended. Eye washes and showers for emergency use.
- Personal Protective Equipment** : Personal protective equipment (PPE) should meet recommended national standards. Check with PPE suppliers.
- Respiratory Protection** : If engineering controls do not maintain airborne concentrations to a level which is adequate to protect worker health, select respiratory protection equipment suitable for the specific conditions of use and meeting relevant legislation. Where air-filtering respirators are suitable, select an appropriate combination of mask and filter. Select a filter suitable for organic gases and vapours [boiling point <65°C (149°F)] meeting EN371. Where respiratory protective equipment is required, use a full-face mask. Where air-filtering respirators are unsuitable (e.g., airborne concentrations are high, risk of oxygen deficiency, confined space) use appropriate positive pressure breathing apparatus.
- Hand Protection** : Suitability and durability of a glove is dependent on usage, e.g. frequency and duration of contact, chemical resistance of glove



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| | |
|----------------------------|--|
| Eye Protection | : Chemical splash goggles (chemical monogoggles). |
| Protective Clothing | : Use protective clothing which is chemical resistant to this material. Safety shoes and boots should also be chemical resistant. |
| Monitoring Methods | : Monitoring of the concentration of substances in the breathing zone of workers or in the general workplace may be required to confirm compliance with an OEL and adequacy of exposure controls. For some substances biological monitoring may also be appropriate. Examples of sources of recommended air monitoring methods are given below or contact supplier. Further national methods may be available. National Institute of Occupational Safety and Health (NIOSH), USA: Manual of analytical Methods http://www.cdc.gov/niosh/nmam/nmamenu.html Occupational Safety and Health Administration (OSHA), USA: Sampling and Analytical Methods http://www.osha-slc.gov/dts/slc/methods/toc.html Health and Safety Executive (HSE), UK: Methods for the Determination of Hazardous Substances http://www.hsl.gov.uk/search.htm |

9. PHYSICAL AND CHEMICAL PROPERTIES

| | |
|---|--|
| Appearance | : Clear Liquid. |
| Odour | : Characteristic |
| pH | : Not applicable. |
| Boiling point | : 56 °C / 133 °F |
| Flash point | : -18 °C / 0 °F (IP 170) |
| Explosion / Flammability limits in air | : ca. 2.1 - 13 %(V) |
| Auto-ignition temperature | : 540 °C / 1,004 °F (ASTM D-2155) |
| Vapour pressure | : 24.7 kPa at 20 °C / 68 °F |
| Density | : 790 - 792 kg/m ³ at 20 °C / 68 °F (ASTM D-4052) |
| Water solubility | : at 20 °C / 68 °F Completely miscible. |
| n-octanol/water partition coefficient (log Pow) | : 0.2 |
| Dynamic viscosity | : 0.33 mPa.s at 20 °C / 68 °F |
| Vapour density (air=1) | : 2 at 20 °C / 68 °F |
| Coefficient of expansion | : 0.0014 / °C |
| Dielectric constant | : 21.4 at 20 °C / 68 °F |
| Heat of vapourisation | : 525 kJ/kg °C |
| Refractive index | : 1.359 at 20 °C / 68 °F (ASTM D-1218) |
| Specific heat | : 2.14 kJ/kg °C at 20 °C / 68 °F |
| Saturated Vapour concentration (in air) | : 590 g/m ³ at 20 °C / 68 °F (estimated value(s)) |
| Thermal conductivity | : 0.16 W/m °C at 20 °C / 68 °F |
| Evaporation rate (nBuAc=1) | : 5.6 (ASTM D 3539, nBuAc=1) |

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Surface tension : 2 (DIN 53170, di-ethyl ether=1)
: 22.8 mN/m at 20 °C / 68 °F
Molecular weight : 58.08 g/mol

10. STABILITY AND REACTIVITY

Stability : Stable under normal conditions of use.
Conditions to Avoid : Avoid heat, sparks, open flames and other ignition sources.
Materials to Avoid : Strong oxidising agents.
Hazardous : None expected under normal use conditions.
Decomposition Products

11. TOXICOLOGICAL INFORMATION

Basis for Assessment : Information given is based on product testing.
Acute Oral Toxicity : Low toxicity: LD50 >2000 mg/kg , Rat
Aspiration into the lungs when swallowed or vomited may cause chemical pneumonitis which can be fatal.
Acute Dermal Toxicity : Low toxicity: LD50 >2000 mg/kg , Rabbit
Acute Inhalation Toxicity : Low toxicity: LC50 >20 mg/l / 4 hours, Rat
High concentrations may cause central nervous system depression resulting in headaches, dizziness and nausea; continued inhalation may result in unconsciousness and/or death.
Skin Irritation : Not irritating to skin.
Prolonged/repeated contact may cause defatting of the skin which can lead to dermatitis.
Eye Irritation : Irritating to eyes.
Respiratory Irritation : Inhalation of vapours or mists may cause irritation to the respiratory system.
Sensitisation : Not a skin sensitiser.
Repeated Dose Toxicity : Low systemic toxicity on repeated exposure.
Mutagenicity : Not mutagenic.
Carcinogenicity : Not expected to be carcinogenic.
Reproductive and Developmental Toxicity : Not expected to impair fertility.

Causes slight foetotoxicity. Effects were seen at high doses only.
Additional Information : Exposure may enhance the toxicity of other materials. May potentiate the peripheral neurotoxicity of n-hexane, and the liver and kidney toxicity of some chlorinated hydrocarbons such as carbon tetrachloride.

12. ECOLOGICAL INFORMATION

Acute Toxicity
Fish : Low toxicity: LC/EC/IC50 > 1000 mg/l
Aquatic Invertebrates : Low toxicity: LC/EC/IC50 > 1000 mg/l
Algae : Low toxicity: LC/EC/IC50 > 1000 mg/l
Microorganisms : Low toxicity: LC/EC/IC50 > 1000 mg/l
Mobility : If product enters soil, it will be mobile and may contaminate groundwater.

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Persistence/degradability : Dissolves in water.
Bioaccumulation : Readily biodegradable.
: Not expected to bioaccumulate significantly.

13. DISPOSAL CONSIDERATIONS

Material Disposal : Recover or recycle if possible. It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated to determine the proper waste classification and disposal methods in compliance with applicable regulations.

Container Disposal : Drain container thoroughly. After draining, vent in a safe place away from sparks and fire. Residues may cause an explosion hazard. Do not puncture, cut or weld uncleaned drums. Send to drum recoverer or metal reclaimer.

Local Legislation : Local regulations may be more stringent than regional or national requirements and must be complied with.

14. TRANSPORT INFORMATION

IMDG
Identification number : UN 1090
Proper shipping name : ACETONE
Class / Division : 3
Packing group : II
Marine pollutant: No

IATA (Country variations may apply)
UN No. : 1090
Proper shipping name : Acetone
Class / Division : 3
Packing group : II

IMPORTANT !!!!!

15. REGULATORY INFORMATION

The regulatory information is not intended to be comprehensive. Other regulations may apply to this material.

EC Label Name : ACETONE
EC label/EC Number : 200-662-2
EC Classification : Highly flammable, Irritant.
EC Annex I Number : 606-001-00-8
EC Symbols : F Highly flammable.
: Xi Irritant.
EC Risk Phrases : R11 Highly flammable.
: R36 Irritating to eyes.
: R66 Repeated exposure may cause skin dryness or cracking.
: R67 Vapours may cause drowsiness and dizziness.



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| | | |
|-------------------|---|--|
| EC Safety Phrases | : | S9 Keep container in a well-ventilated place. S16 Keep away from sources of ignition - No smoking. S26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. |
| AICS | : | Listed. |
| DSL | : | Listed. |
| INV (CN) | : | Listed. |
| ENCS (JP) | : | Listed. (2)-542 |
| TSCA | : | Listed. |
| EINECS | : | Listed. 200-662-2 |
| KECI (KR) | : | Listed. KE-29367 |
| PICCS (PH) | : | Listed. |

16. OTHER INFORMATION

R-phrase(s)

| | |
|-----|---|
| R11 | Highly flammable. |
| R36 | Irritating to eyes. |
| R66 | Repeated exposure may cause skin dryness or cracking. |
| R67 | Vapours may cause drowsiness and dizziness. |

| | | |
|------------------------------|---|---|
| MSDS Version Number | : | 1.0 |
| MSDS Effective Date | : | 01.01.2006 |
| MSDS Revisions | : | A vertical bar () in the left margin indicates an amendment from the previous version. |
| MSDS Regulation | : | The content and format of this safety data sheet is in accordance with Commission Directive 2001/58/EC of 27 July 2001, amending for the second time Commission Directive 91/155/EEC. |
| Uses and Restrictions | : | Industrial Solvent. Restricted to professional users. |
| MSDS Distribution | : | The information in this document should be made available to all who may handle the product |
| Disclaimer | : | This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product. |



MSDS Non Dangerous Goods



Material Safety Data Sheet

DGManol
Version 1.0

Effective Date 01.01.2006

according to EC directive 2001/58/EC

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND COMPANY/UNDERTAKING

Material Name : DGManol
Product Code : DGM0002

Supplier : Dangerous Goods Management
 Full address

Telephone : +4751715540
Fax : +4751715541

Emergency Telephone Number : +4751715540

2. COMPOSITION/INFORMATION ON INGREDIENTS

Material Formal Name : Poly (oxy-1, 3-propanediylloxycarbonyl -1,4-phenylenecarbonyl)
Synonyms : Poly (1,3 - propylene glycol terephthalate)
 Polyester of 1,3 - propylene terephthalate

CAS No. : 26590-75-0

Hazardous Components

| Chemical Name | CAS | EINECS | Symbol(s) | R-phrase(s) | Conc. |
|-----------------------------------|------------|--------|-----------|-------------|----------|
| Poly (Trimethylene Terephthalate) | 26590-75-0 | | | | 100.00 % |

Additional Information : Do not use in the manufacture or preparation of foods, drugs, or cosmetics. Do not use in medical application involving permanent implantation in the human body.

3. HAZARDS IDENTIFICATION

Health Hazards : May cause respiratory tract irritation. At process temperatures or upon opening containers, acrolein (a toxic and irritating vapour) may be released. Hot product may cause severe eye and skin burns. Dust or small particles may abrade skin and irritate eyes. Low toxicity if swallowed.

Safety Hazards : At high temperatures, for example fire conditions, exothermic polymerisation may occur causing possible container rupture.

4. FIRST AID MEASURES

General Information : Acrolein may be released. DO NOT attempt to rescue the victim unless proper respiratory protection is worn. Keep victim calm. Obtain medical treatment immediately.

Inhalation : DO NOT DELAY. Remove to fresh air. Do not attempt to rescue the victim unless proper respiratory protection is worn. If the victim has difficulty breathing or tightness of the chest, is



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- dizzy, vomiting, or unresponsive, give 100% oxygen with rescue breathing or CPR as required and transport to the nearest medical facility.
- Skin Contact** : DO NOT DELAY. If contact with hot product, cool the burn area by flushing with large amounts of water. Do not attempt to remove anything from the burn area or apply burn creams or ointments. Cover the burn area loosely with a sterile dressing, if available. Transport to the nearest medical facility for additional treatment.
 - Eye Contact** : Flush eyes with water while holding eyelids open. Rest eyes for 30 minutes. If redness, burning, blurred vision, or swelling persist, transport to the nearest medical facility for additional treatment.
 - Ingestion** : In general no treatment is necessary unless large quantities are swallowed, however, get medical advice. If vomiting occurs spontaneously, keep head below hips to prevent aspiration.

5. FIRE FIGHTING MEASURES

Clear fire area of all non-emergency personnel.

- Specific Hazards** : Material will not burn unless preheated. Hazardous combustion products may include: Acrolein. Carbon monoxide. Toxic gases.
- Extinguishing Media** : Alcohol-resistant foam, water spray or fog. Dry chemical powder, carbon dioxide, sand or earth may be used for small fires only.
- Protective Equipment for Firefighters** : Wear full protective clothing and self-contained breathing apparatus.
- Additional Advice** : All storage areas should be provided with adequate fire fighting facilities. Evacuate the area of all non-essential personnel. Keep adjacent containers cool by spraying with water.

6. ACCIDENTAL RELEASE MEASURES

- Protective measures** : Avoid raising a dust cloud. Avoid contact with the skin. Prevent from spreading or entering into drains, ditches or rivers by using sand, earth, or other appropriate barriers. If molten allow to congeal.
- Clean Up Methods** : Shovel into a suitable clearly marked container for disposal or reclamation in accordance with local regulations. Flush away residues with water. Do not use water in a jet.
- Additional Advice** : May solidify and block drains. Observe all relevant local regulations.

7. HANDLING AND STORAGE

- Handling** : In accordance with good industrial hygiene practices, precautions should be taken to avoid breathing of material. Avoid breathing dust. Ventilate workplace in such a way that the Occupational Exposure Limit (OEL) is not exceeded. Use local exhaust extraction over high temperature processing area



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- Storage** : to prevent exposure to toxic/irritating gases (acrolein). When handling product in drums, safety footwear should be worn and proper handling equipment should be used.
- Product Transfer** : Local exhaust ventilation is recommended. Keep away from flammables, oxidizing agents, and corrosives.
- Container Advice** : Keep containers closed when not in use. Ensure electrical continuity by bonding and grounding (earthing) all equipment. Restrict line velocity during pumping in order to avoid generation of electrostatic discharge.
- Additional Information** : Do not cut, drill, grind, weld or perform similar operations on or near containers.
- Additional Information** : Caution! Acrolein may be present in the headspace of closed containers. Ventilate after opening. Ensure that all local regulations regarding handling and storage facilities are followed. Use the information in this data sheet as input to a risk assessment of local circumstances to help determine appropriate controls for safe handling, storage and disposal of this material. Surfaces that are sufficiently hot may ignite liquid material.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Occupational Exposure Limits

| Material | Source | Type | ppm | mg/m3 | Notation |
|----------|--------|-----------------------|---------|----------|-----------------------------------|
| Acrolein | ACGIH | Ceiling | 0.1 ppm | | |
| | ACGIH | SKIN_DES | | | Can be absorbed through the skin. |
| Dusts | ACGIH | TWA | | 3 mg/m3 | |
| | | Respirable particles. | | | |
| | ACGIH | TWA | | 10 mg/m3 | |
| | | Inhalable particles. | | | |

Additional Information : Wash hands before eating, drinking, smoking and using the toilet. Launder contaminated clothing before re-use.

| | | |
|-----------------------------|------------------------|--|
| Material Acrolein | Source ACGIH | Hazard Designation Not classifiable as a human carcinogen. |
|-----------------------------|------------------------|--|

Exposure Controls : The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Select controls based on a risk assessment of local circumstances. Appropriate measures include: Eye washes and showers for emergency use. Adequate explosion-proof ventilation to control airborne concentrations below the exposure guidelines/limits. Exhaust emission systems should be designed in accordance with local conditions; the air should always be moved away from the source of vapour generation and the person working at this point. Use local exhaust extraction over high temperature processing area to prevent exposure to



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- toxic/irritating gases (acrolein). Provide adequate ventilation in storage areas.
- Personal Protective Equipment** : Personal protective equipment (PPE) should meet recommended national standards. Check with PPE suppliers.
- Respiratory Protection** : In accordance with good industrial hygiene practices, precautions should be taken to avoid breathing of material. Acrolein may be generated during high temperature processing. If engineering controls do not maintain airborne concentrations to a level which is adequate to protect worker health, select respiratory protection equipment suitable for the specific conditions of use and meeting relevant legislation. Check with respiratory protective equipment suppliers.
- Hand Protection** : Suitability and durability of a glove is dependent on usage, e.g. frequency and duration of contact, chemical resistance of glove material, glove thickness, dexterity. Always seek advice from glove suppliers. Contaminated gloves should be replaced.
- Eye Protection** : Wear safety glasses or full face shield if splashes are likely to occur.
- Protective Clothing** : Skin protection not ordinarily required beyond standard issue work clothes.
- Environmental Exposure Controls** : Exhaust emission systems should be designed in accordance with local conditions; the air should always be moved away from the source of vapour generation and the person working at this point.

9. PHYSICAL AND CHEMICAL PROPERTIES

- Appearance** : Opaque white Solid. Granules.
- Odour** : Odourless
- Melting / freezing point** : 225 - 228 °C / 437 - 442 °F
- Flash point** : Not applicable.
- Density** : 1,300 - 1,440 kg/m³ at 20 °C / 68 °F
- Water solubility** : Insoluble.
- n-octanol/water partition coefficient (log Pow)** : Not applicable.

10. STABILITY AND REACTIVITY

- Stability** : Stable. At processing temperatures, some degree of thermal degradation will occur. Although highly dependent on temperature and environmental conditions, a variety of decomposition products may be present ranging from simple hydrocarbons to toxic/irritating vapours.
- Hazardous Decomposition Products** : Thermal decomposition is highly dependent on conditions. A complex mixture of airborne solids, liquids and gases, including carbon monoxide, carbon dioxide and other organic compounds will be evolved when this material undergoes combustion or thermal or oxidative degradation. Hazardous decomposition products are not expected to form during normal storage.
- Hazardous Polymerisation** : At 310° C/600° F, the polymer will undergo a decomposition resulting in an exotherm and the release of water. Keep polymer processing temperatures below 310° C/600° F.

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DGManol
Version 1.0

Effective Date 01.01.2006

according to EC directive 2001/58/EC

11. TOXICOLOGICAL INFORMATION

- Basis for Assessment** : Information given is based on data from similar products.
- Acute Oral Toxicity** : Expected to be of low toxicity: LD50 >2000 mg/kg , Rat
- Acute Dermal Toxicity** : Expected to be of low toxicity: LD50 >2000 mg/kg , Rat
- Skin Irritation** : Not irritating to skin.
- Eye Irritation** : Not irritating to skin.
- Sensitisation** : Not expected to be a skin sensitiser.
- Mutagenicity** : No evidence of mutagenic activity.

12. ECOLOGICAL INFORMATION

- Acute Toxicity**
- Fish** : Expected to be not toxic at limit of water solubility.
- Aquatic Invertebrates** : Expected to be not toxic at limit of water solubility.
- Algae** : Expected to be not toxic at limit of water solubility.
- Microorganisms** : Expected to be not toxic at limit of water solubility.
- Mobility** : Sinks in water.
- Bioaccumulation** : Does not have the potential to bioaccumulate significantly.

13. DISPOSAL CONSIDERATIONS

- Material Disposal** : Recover or recycle if possible. It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated to determine the proper waste classification and disposal methods in compliance with applicable regulations.
- Container Disposal** : Drain container thoroughly. After draining, vent in a safe place away from sparks and fire. Residues may cause an explosion hazard. Do not puncture, cut or weld uncleaned drums. Send to drum recoverer or metal reclaimer.

14. TRANSPORT INFORMATION

- IMDG**
This material is not classified as dangerous under IMDG regulations.
- IATA (Country variations may apply)**
This material is not classified as dangerous under IATA regulations.

15. REGULATORY INFORMATION

The regulatory information is not intended to be comprehensive. Other regulations may apply to this material.

- EC Classification** : Not classified as dangerous under EC criteria.
- DSL** : Listed.



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Material Safety Data Sheet

according to EC directive 2001/58/EC

| | | | |
|-----------|---|---------|----------|
| INV (CN) | : | Listed. | |
| TSCA | : | Listed. | |
| KECI (KR) | : | Listed. | 97-3-197 |

16. OTHER INFORMATION

| | | |
|------------------------------|---|---|
| MSDS Version Number | : | 1.0 |
| MSDS Effective Date | : | 01.01.2006 |
| MSDS Revisions | : | A vertical bar () in the left margin indicates an amendment from the previous version. |
| MSDS Regulation | : | The content and format of this safety data sheet is in accordance with Commission Directive 2001/58/EC of 27 July 2001, amending for the second time Commission Directive 91/155/EEC. |
| Uses and Restrictions | : | Used for demonstration only..... |
| MSDS Distribution | : | The information in this document should be made available to all who may handle the product |
| Disclaimer | : | This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product. |



MODUL 6: DANGEROUS GOODS LIST in VOLUM 2

6.1 Identification

Column 1 – UN Number

Contains the United Nations Number assigned by the United Nations Committee of Experts on the Transport of Dangerous Goods (UN List).

Column 2 – Proper Shipping Name (PSN)

Contains the Proper Shipping Names in upper case characters which may be followed by additional descriptive text in lower-case characters.

Column 3 – Class or Division

Contains the class and, in the case of class 1, the division and compatibility group.

Column 4 – Subsidiary Risk(s)

Contains the class number(s) of any subsidiary risk(s). This column also identifies if dangerous goods are marine pollutants by showing the letter 'P':

Column 5 – Packing Group

Contains the packing group number (i.e. I, II or III) where assigned to the substance or article.

Column 6 – Special Provisions

Contains a number referring to any special provision(s) indicated in chapter 3.3.

Column 7a – Limited Quantities

Provides the maximum quantity per inner packaging.



Column 7b – Excepted Quantities

Provides a code which can be referenced to determine the maximum quantity per inner and outer packaging.

Column 8 – Packing Instructions

Contains packing instructions for the transport of substances and articles.

Column 9 – Special Packing Provisions

Contains special packing provisions.

Column 10 – IBC Packing Instructions

Contains IBC instructions which indicate the type of IBC that can be used for the transport.

Column 11 – IBC Special Provisions

Refers to special packing provisions applicable to the use of packing instructions bearing the code 'IBC' in 4.1.4.2.

Column 12 – IMO Tank Instructions

This column is no longer used but used to apply to IMO portable tanks and road tank vehicles.

Column 13 – UN Tank and Bulk Container Instructions

Contains T codes (see 4.2.5.2.6) applicable to the transport of dangerous goods in portable tanks and road tank vehicles.



Column 14 – Tank Special Provisions

Contains TP notes (see 4.2.5.3) applicable to the transport of dangerous goods in portable tanks and road tank vehicles.

Column 15 – EmS

Refers to the relevant emergency schedules for FIRE and SPILLAGE in 'The EmS Guide – Emergency Response Procedures for Ships Carrying Dangerous Goods'.

Column 16 – Stowage and Segregation

Contains the stowage and segregation provisions as prescribed in part 7.

Column 17 – Properties and Observations

Contains properties and observations on the dangerous goods listed.

Column 18 – UN Number

Contains the United Nations Number for ease of reference across both pages of the printed book.