



BRITANNIA LOSS PREVENTION

B GUIDANCE

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SAFE CARRIAGE OF CHARCOAL IN CONTAINERS

FIRE INCIDENTS INVOLVING CHARCOAL PRODUCTS IN CONTAINERS CONTINUE TO OCCUR.

As a cargo, charcoal presents unique stowage and handling requirements and requires strict safety protocols. In addition to the fire hazard, misdeclaration is known to result in the carrier being unaware of the risk.

The upcoming 2024 edition of the International Maritime Dangerous Goods (IMDG) Code¹ will include changes in the requirements applying to charcoal. This edition, incorporating Amendment 42-24, will become voluntary from 1 January 2025 and mandatory from 1 January 2026.

The Cargo Incident Notification System (CINS) Charcoal Work Group have updated their “Guidelines for the Safe Carriage of Charcoal in Containers”², reflecting the updated IMDG Code requirements.

CHARCOAL – ORIGIN, PROPERTIES AND USE

CHARCOAL IS A LIGHTWEIGHT SUBSTANCE COMPOSED MAINLY OF CARBON, PRODUCED BY HEATING ORGANIC MATERIAL WITH LIMITED OXYGEN IN A TRADITIONAL KILN, OR IN A MODERN INDUSTRIAL PROCESS.

Wood is the most common source material, but charcoal may also be obtained from other materials such as nut shells, bark, animal bones etc. Charcoal products are available in various forms, mostly in lumps or briquettes³.

The five biggest exporters of wood charcoal are Indonesia, India, Namibia, Myanmar, and Laos⁴. Charcoal may be offered for shipment under many trade names, some masking the presence of charcoal, potentially leading to a situation where associated risks are not recognised.

UNDERSTANDING THE RISKS OF CHARCOAL TRANSPORT

THE PRIMARY HAZARD ASSOCIATED WITH CHARCOAL IS SELF-HEATING.

If the heat cannot be dissipated quickly enough due to the thermal insulating properties of carbon, then the cargo temperature may rise further, possibly leading to self-ignition and **spontaneous combustion**.

The likelihood of spontaneous combustion in charcoal may be further affected by²:

- **Wetting** of the cargo, generating additional heat in an exothermic process
- Presence of **additives** such as ignition accelerants or flammable solids – typical in certain charcoal products, for example charcoal in tablet form used for water pipes (Nargila, Shisha, Hookah). This may result in lower ignition temperature, contributing to a fire incident
- **Chemically unstable** condition caused by the presence of organic material which did not undergo complete pyrolysis.

Charcoal may also pose other hazards:

- **Explosion:** charcoal dust is combustible and can form a flammable or explosive atmosphere
- **Toxicity:** charcoal can release carbon monoxide (CO), particularly dangerous in enclosed spaces.

CHARCOAL AND CLASSIFICATION OF CARBON CARGO

AS A SUBSTANCE LIABLE TO SPONTANEOUS COMBUSTION, CHARCOAL IS DESIGNATED AS CLASS 4.2 IN THE IMDG CODE.

The forthcoming edition of the IMDG Code requires that charcoal should always be declared and carried as dangerous goods.

In the Dangerous Goods List of the IMDG Code, charcoal is listed under the proper shipping name (PSN) of CARBON. The correct declaration for charcoal is:

UN 1361: CARBON, ANIMAL OR VEGETABLE ORIGIN

The IMDG Code classifies carbon cargoes in three categories, which may result in confusion and lead to misdeclaration of the cargo:

UN No.	IMDG CLASS	PROPER SHIPPING NAME (PSN)	PACKING GROUP	PPROPERTIES AND OBSERVATIONS
UN 1361	Class 4.2	CARBON, animal or vegetable origin	II	Black material originating from organic sources. Particularly includes carbon blacks of animal and vegetable origin, other non-activated carbon materials and charcoal produced from materials such as bone, bamboo, coconut shell, jute and wood. Liable to heat slowly and ignite spontaneously in air.
UN 1361	Class 4.2	CARBON, animal or vegetable origin	III	See entry above.
UN 1362	Class 4.2	CARBON, ACTIVATED	III	Activated porous black carbon materials not including charcoal (see UN 1361). May be in the form of powder, granules, pellets, fibres or felts. If chemically activated, may self-heat, and may ignite spontaneously in air.

CHANGES IN THE REQUIREMENTS OF THE IMDG CODE APPLICABLE TO CHARCOAL

THE 2024 EDITION OF THE IMDG CODE HAS REMOVED TWO SPECIAL PROVISIONS (SP), PREVIOUSLY APPLICABLE TO CHARCOAL CARGOES, AND INTRODUCED A NEW SP 978.

The removed SP's enabled exemptions from the requirements for charcoal:

- SP 925 stipulated that the provisions of the IMDG Code did not apply to a consignment of carbon if it passed certain tests for self-heating substances
- SP 223 exempts shipments which, when tested, do not meet the "established defining criteria for the class or division listed in column 3, or any other class or division", except in the case of a marine pollutant.

SP 978 introduces the following, specific requirements:

1. For the purpose of this Code, carbon of animal or vegetable origin means carbon, generated in a production or manufacturing process, not formed in a geological process and not obtained from mining. Carbon covered by this entry is produced by pyrolysis of an organic material such as bone, bamboo, coconut shell, jute or wood.
2. The UN N.4 test according to section 33.4.6 of the UN Manual of Tests and Criteria shall not be used to exempt carbon of animal or vegetable origin (UN 1361) from the provisions of this Code.
3. Without testing, the material shall be assigned to at least packing group III.
4. Unless otherwise approved by the competent authority, the following provisions apply:
 1. after production, the unpacked material shall be subject to weathering (stored under cover, but in the open air) for a minimum period of 14 days before being packaged for transport; or
 2. after pyrolysis, steam and cooling shall be applied to the unpacked material and the material shall be packed under an inert gas atmosphere (e.g. nitrogen); packages shall then be stored under loose cover or in the open air for a minimum of 24 hours before transport.
5. The material shall be packed into packagings only when the temperature of the material does not exceed 40°C on the day of packing.
6. When stowed in a cargo transport unit, minimum headspace in the CTU of 30 cm shall be maintained, and:
 1. the stowage height of the package(s) in the unit should not exceed 1.5 m; or
 2. the maximum block size of the packages should be 16 m³ and a minimum of 15 cm of space between blocks should be maintained.

CINS RECOMMENDED PRACTICES

CARGO PRACTICES RECOMMENDED BY CINS GUIDELINES INCLUDE SELECTED REQUIREMENTS OF THE IMDG CODE, COMBINED WITH ADDITIONAL PRECAUTIONS TO ENSURE THE SAFE CARRIAGE OF CHARCOAL.

CINS Guidelines recommend that all charcoal shipments should be classified as dangerous goods, even prior to the applicability of the IMDG Code Edition 2024 (Amendment 42-24).

Further recommendations set out by CINS address the following areas:

- Container selection
- Cargo weathering and packaging
- Container packing and vanning survey
- Ship loading, container stowage and segregation
- Documentation requirements.

For full details, please refer to the current CINS Guidelines².

PREVENTATIVE MEASURES AGAINST CHARCOAL FIRE INCIDENTS

WHEN CONSIDERING PREVENTATIVE MEASURES, REGULATORY REQUIREMENTS AND INDUSTRY GUIDANCE SHOULD BE SUPPLEMENTED BY A COMPREHENSIVE RISK ASSESSMENT.

This is necessary to ensure that the measures are applicable to the circumstances of the ship, operational situation, provisions of the Safety Management System (SMS) and the business environment including terminals and customers. If needed, a gap analysis should be carried out and cargo management procedures revised as appropriate.

The following objectives should be considered²:

- Cargo management and booking process should ensure that cargo containing charcoal is correctly identified and declared
- Charcoal should be pro-actively treated as dangerous goods even before the 2024 edition of the IMDG Code is in force. In particular, the cargo management process should not enable the two existing Special Provisions (SP 925 and SP 223) and ensure that all charcoal cargo intended as fuel for burning is correctly classified and declared as dangerous goods. It is recommended to align cargo management process with the forthcoming SP 978 (including the requirements for container selection, packaging, stuffing, inspection, stowage and segregation set out in SP 978)
- Where charcoal is traded under names which may conceal its dangerous nature, carriers should implement effective cargo screening, together with the appropriate "Know Your Customer" (KYC) due diligence to ensure the cargo is correctly classified and properly declared
- Carbonised material intended for manufacturing of UN 1362: CARBON, ACTIVATED has been known to be misdeclared – the cargo management process should take it into account
- The weathering report, the vanning survey, as well as other surveys in place, should effectively identify additional risk factors, such as insufficient weathering of charcoal cargo, wetting of the cargo, or the effect of chemical additives present in the cargo on its stability and propensity to self-heat
- The KYC approach may be effective in reducing the risk by proactively assessing the cargo management prior to container packing and shipping
- Accessible stowage on deck (accessible from a fixed platform, deck or a lashing bridge), exceeding IMDG requirements is recommended. Accessibility is required to enable prompt extinguishing action.

Note that the Club has produced guidance on prevention of [misdeclaration of cargo in containers](#).

EMERGENCY PREPAREDNESS

THE BURGOYNES' REPORT "FIRES INVOLVING CONTAINERISED CARGOES OF CHARCOAL" HIGHLIGHTS THAT OWING TO THE NATURE OF SELF-HEATING PROCESS, IGNITION DOES NOT OCCUR IMMEDIATELY.

Depending on the circumstances, ignition can occur days after the charcoal has been stowed⁵.

The report considers two main factors in container fire incidents involving charcoal:

- Tight container packing without adequate separation which would allow the heat to dissipate, and;
- the exposure to external heat sources, such as prolonged exposure to sunlight in storage ashore or in stowage on board, or to other heat sources on board such as heated fuel tanks or machinery.

Given that charcoal fires are likely to initiate towards the centre of the stow where the thermal mass is highest, the exact location of the fire may be inaccessible from outside the container and extinguishing the fire in situ may be challenging.

The report suggests the best course of action is to discharge the affected containers without delay and extinguish them on the quayside. However, this may be impossible or impractical. The ship's fixed fire-extinguishing systems may also be used to contain the fire whilst the ship proceeds to the nearest port.

New systems and devices are being developed. One of the currently available options is the [*HydroPen™ System*](#), a drilling/spraying device mounted on a pole to perform direct firefighting. The device, powered by the pressure in fire main, drills through the container door, then automatically changes mode to extinguish the fire inside by spraying water.

BIBLIOGRAPHY

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- ⁴ FAO, "FAOSTAT: Forestry Production and Trade," [Online]. Available: <https://www.fao.org/faostat/en/#data/FO>. [Accessed 2024].
- ⁵ Burgoyne, "Fires Involving Containerised Cargoes of Charcoal," 2022.
- ⁶ IUMI, "IUMI Position Paper - Fire-Fighting on Container Vessels," 2017.

FOR FURTHER INFORMATION

For further information, please do not hesitate to email lossprevention@tindallriley.com.

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