



Cargo Incident Notification System

Guidelines for the Safe Carriage of Charcoal in Containers

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Disclaimer

The purpose of these Guidelines is to provide a source of information which is additional to that available to the maritime industry from regulatory, advisory and consultative organisations. While care is taken to ensure the accuracy of the information, no warranty of accuracy is given, and users of that information are expected to satisfy themselves that the information is relevant and suitable for the purposes to which it is applied. In no circumstances whatsoever shall CINS or the contributors be liable to any person whatsoever for any loss of damage whensoever or howsoever, arising out of, or in connection with, the supply (including negligent supply) or use of this information.

Introduction

These Guidelines for the Safe Carriage of Charcoal in Containers have been prepared by the CINS Charcoal Work Group and supersede all previous charcoal guidance published by CINS. Although described as 'Carbon' in dangerous goods regulations, this document uses the term 'Charcoal' – except where further distinction is required.

It is estimated that global production of Charcoal for domestic and export markets is over 50 million tonnes per year.¹

From the incident records created by CINS members, it is known that there were at least 68 fire incidents on board ships during the period between January 2015 and December 2022. These CINS data are incomplete, but have exclusively involved consignments of Charcoal that were produced to be a used as a fuel intended for burning. Most of these incidents also arose from consignments that had been misdeclared and therefore the carrier was not aware of the hazards presented.

The practices set out in this document are intended to improve safety during the carriage of Charcoal and to ensure that it is properly prepared, declared, packaged and carried.

Charcoal shall be transported in compliance with the requirements set out in the International Maritime Dangerous Goods Code (IMDG Code)². However, the practices set out below include selected provisions from the IMDG Code plus additional precautions to enhance its safe carriage.

1. CARGO ISSUES

1.1. Hazardous Properties of Charcoal

Charcoal is a lightweight, black residue, consisting mainly of Carbon and any remaining ash, obtained by removing water and other volatile constituents from animal and vegetation substances, produced by slow pyrolysis³, which is the heating of wood or other organic substances in the absence of oxygen.

Charcoal is considered to be a self-heating substance⁴, being (other than pyrophoric⁵ substances) one which, in contact with air, is liable to self-heating. A self-heating reaction may result in extensive heat development and, when the heat is not sufficiently dissipated, may cause fire if the self-ignition temperature is reached. As a result, since this commodity is liable to spontaneous combustion, it is classified 4.2 (substances liable to spontaneous combustion) in the IMDG Code and other modal dangerous goods regulations. There is significant risk that spontaneous combustion may cause a fire in a container during transport.

The most combustible matter in the Charcoal is Carbon, which when stored in an environment containing oxygen, slowly oxidizes to form carbon dioxide and carbon monoxide. This reaction produces heat and

1 2020 Global Forest Products Facts and Figures of the Food and Agriculture Organization of the United Nation (<https://www.fao.org/faostat/en/#data/FO>)

2 This Code is mandatory and contains requirements for the safe carriage of packaged dangerous goods. It is published by the International Maritime Organization (IMO) and revised biennially. At the date of publishing these Guidelines, Amendment 41-22 to the Code is in force. Key aspects of this guidance document anticipate amendments that will enter transitional effect on 1 January 2025 and mandatory force on 1 January 2026.

3 Pyrolysis is a process involving thermal decomposition of materials at elevated temperatures, in the absence of oxygen.

4 The United Nations Manual of Tests and Criteria currently describes self-heating test methods for determining the properties of substances classified as self-heating. The tests to determine whether a commodity is liable to dangerous self-heating are being done with 25 mm or 100 mm sample cubes at temperatures of 100°C, 120°C or 140°C with a rise in temperature by 60°C within 24 hours. Note: as from Amendment 42-24 of the IMDG Code, this test shall not longer be applicable to Charcoal

5 Pyrophoric materials are substances that ignite instantly upon exposure to oxygen. They can also be water-reactive, where heat and hydrogen (a flammable gas) are produced.

since Charcoal is a relatively good thermal insulator, it traps the heat, increasing both the temperature and rate of oxidation, which gives rise to self-ignition.

Such a process is further accelerated by wetting, which is an exothermic process, where heat is released. This risk may arise where Charcoal bags are stored in an open space before packing with inadequate protection from rain. The recommended vanning survey (See section 4.3 of these Guidelines) should assess whether the packages have been wetted.

In addition, if only partially burned, the organic material in the cargo may give rise to the possibility of lower than required temperatures during carbonizing process, which will leave the charcoal in a chemically unstable condition.

It should be recognised that, since the Charcoal of concern is intended as a fuel for burning (including for BBQ, shisha, boiler fuel and similar applications), the cargo is frequently treated with chemicals designed to accelerate ignition.

It should be noted that there are a limited number of technical types of Charcoal, such as used for artists' materials or other non-burning applications, which have production and packaging processes that may control the risks differently. Carriers are urged to take this into account in their cargo management and know your customer procedures.

Crucially, these guidelines draw a clear distinction between UN 1361 CARBON animal or vegetable origin (the correct declaration for Charcoal) and UN 1362 CARBON, ACTIVATED. Activated Carbon acts like an inert sponge to capture impurities at molecular level; it is used for purifying purposes in water and food preparations, for medicinal applications and other technical purposes. However, a key risk factor is that cargo classified as UN 1361 is one of the raw materials used for the production of UN 1362. Thus, cargo management activities need to ensure that such material presented for carriage prior to an activation process is correctly declared and prepared for carriage.

UN 1361 CARBON animal or vegetable origin is a carbonised material, produced from raw materials such as wood, coconut shells or bamboo.

UN 1362 CARBON, ACTIVATED is an industrial product manufactured to produce an inert, porous, amorphous, high surface area adsorbent material composed of largely elemental carbon and low ash content.

This guidance specifically addresses issues concerning proper preparation, packaging, packing and declaration of Charcoal which should correctly be classified as UN 1361 CARBON animal or vegetable origin.

The forthcoming revision to the IMDG Code in Amendment 42-24⁶ requires that Charcoal always be declared and transported as dangerous goods.

Due to the sensitivity of this product and significant history of incidents, CINS members, in a proactive approach, recommend that this commodity should already be treated as dangerous goods, regardless of current or previous regulatory provisions.

⁶ Entering transitional effect on 1 January 2025 and mandatory force on 1 January 2026

1.2. Charcoal and Carbon Categories

The regulatory dangerous goods classification of Charcoal and similar Carbon cargo potentially includes three categories. This causes confusion and increases the hazards faced by the shipping industry in ensuring the safe carriage of goods, avoiding danger to crews and damage to other cargo, ships and the environment. The associated entries in the IMDG Code are shown below.

IMDG Class	UN Number	Description
Class 4.2	UN 1361 PGII & III ⁷	CARBON animal or vegetable origin <i>Properties and observations</i> Black material originating from organic sources. Particularly includes carbon blacks of animal and vegetable material, 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.
Class 4.2	UN 1362 PGIII	CARBON, ACTIVATED <i>Properties and observations</i> 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.

Any shipment of Charcoal shall not be declared as UN 3088 SELF-HEATING SOLID, ORGANIC, N.O.S. (Charcoal)⁸. Therefore, Charcoal (non-activated) must be shipped under UN 1361 and not under UN 3088.

For UN 1361, PGII and III, P002 shall be used and PP12 no longer used. For PGIII only, large packaging of 3m³ is allowed and shall be sift proof (LP02).

In relation to Charcoal, the commodity classified as UN 1361 may also be known by reference to CAS⁹ and EC Inventory¹⁰ coding, as follows:

Source material	CAS #	EC #
From wood	16291-96-6	240-383-3
From coconut shells	68647-86-9	271-974-4

⁷ 'PG' refers to Packing Groups. There are assigned, for packing purposes, on the basis of the degree of danger the substance presents, with PGI being substances presenting high danger, PGII those presenting medium danger and PGIII those presenting low danger

⁸ Section 2.0.2.2 of the IMDG Code states: "Dangerous goods commonly transported are listed in the Dangerous Goods List in chapter 3.2. Where an article or substance is specifically listed by name, it shall be identified in transport by the proper shipping name in the Dangerous Goods List".

⁹ Chemical Abstracts Service (<https://www.cas.org/>)

¹⁰ European Community Inventory (<https://echa.europa.eu/information-on-chemicals/ec-inventory>)



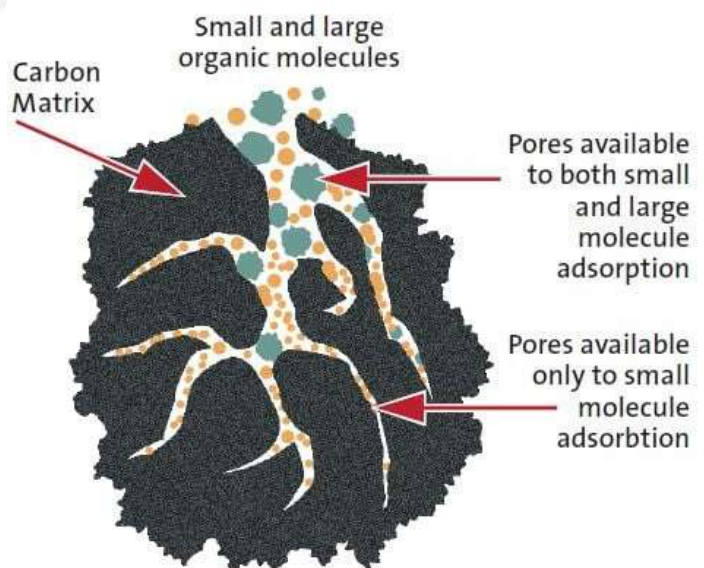
By way of further clarification, Activated Carbon, the commodity classified as UN 1362, has the following CAS and EC Inventory coding:

Source material	CAS #	EC #
Steam activated	7440-44-0	931-328-0
Chemically activated	7440-44-0	931-334-3
Alternative codes used by China	64365-11-3	264-846-4

As stated above, cargo management practitioners need to be aware that carbonised material being transported in order to be manufactured into UN 1362 CARBON, ACTIVATED may be misdeclared as though it has already completed the industrial process. The activation process (whether done by steam or chemicals) removes oxidising material, forming a highly porous material. This product is used in a wide variety of applications that rely on absorption of impurities or removal of contaminants, including water purification, food preparations and pharmaceuticals.



Steam activated carbon



1.3. Other Trade Names for Charcoal

Other trade names under which Charcoal may be presented for shipment include, but are not limited to, those listed below.

- Bamboo charcoal
- Carbon briquettes
- Carbon of vegetable origin
- Carbon shell
- Coal vegetable packages
- Coconut shell
- Hardwood
- Magnesite carbon brick.

Charcoal is also used in tablet form for water-pipes used for smoking, including Nargila, Shisha or Hookah pipes. This type of charcoal is suspected being manufactured with some flammable solid inside, resulting in lower ignition temperature.

The risk concern in relation to the use of other trade names is that they may conceal the true nature of the cargo. **It is strongly recommended that carriers implement effective cargo screening processes**, together with 'know your customer' due diligence to ensure that the cargo being presented is appropriately classified and properly declared to enable it to be transported safely.

2. CHARCOAL SHALL ALWAYS BE SUBJECT TO THE PROVISIONS OF THE IMDG CODE

The IMO has decided for the next Amendment of the IMDG Code to remove the two previously applicable Special Provisions (SP925¹¹ and SP223¹²) and insert a new Special Provision, SP 978.

The Special Provisions that are being removed have enabled shippers in certain conditions to seek acceptance of Charcoal on the basis that it may be exempt from the full application of the IMDG Code. This guidance recommends cargo management processes that require declaration as dangerous goods and application of controls that improve safety for all involved throughout the supply chain.

It is recommended that cargo management processes forbid reliance on the existing Special Provisions and embed effective screening to ensure that all Charcoal cargo intended as fuel for burning is correctly classified and declared, regardless of any tests that may have been conducted at any time.

11 Special Provision 925 states, in material part: "The provisions of this Code do not apply to... a consignment of carbon if it passes the tests for self-heating substances as reflected in the United Nations Manual of Tests and Criteria (see 33.4.3.3), and is accompanied by a certificate from a laboratory accredited by the competent authority, stating that the product to be loaded has been correctly sampled by trained staff from that laboratory and that the sample was correctly tested and has passed the test..."

12 Special Provision 223 states: "If the chemical or physical properties of a substance covered by this description are such that, when tested, it does not meet the established defining criteria for the class or division listed in column 3, or any other class or division, it is not subject to the provisions of this Code except in the case of a marine pollutant where 2.10.3 applies."

Further, it is recommended to align processes on the basis of the forthcoming Special Provision 978, which states:

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.

Further, it is recommended that all Charcoal shipments should meet the requirements for container selection, packaging, stuffing, inspection, stowage and segregation set out in guidelines below, and be classified as dangerous goods in advance of the applicability of Amendment 42-24.

3. CONTAINER SELECTION

Containers provided for packing should:

- be fit for purpose;
- comply with international structural integrity requirements;
- comply with international or national safety regulations;
- be clean, free of cargo residues, noxious materials, plants, plant products and visible pests¹³.

Bulk containers (BK1 and BK2) shall not be used for the packing of this cargo in unpackaged form.

13 CTU Code Chapter 4, paragraph 4.2.1



Weathering process for tablets for water pipes



Weathering process for charcoal (coconut shells)



Open air but covered

4. CONTAINER PACKING

4.1. Packaging and Quantity

After production, the unpackaged and loose material shall be subject to weathering (stored under cover, but in the open air) for a minimum period of 14 days before being packaged in preparation for transport. This weathering period starts from the conclusion of the pyrolysis process and the packaging process may not commence until after the end of this stipulated period.

The alternative permissible process after pyrolysis, of applying steam and cooling to the unpacked material and then packing under an inert gas atmosphere relates to a specialist product, “Biochar”, rather than commonly produced Charcoal.

The temperature of any part of the cargo prior to packaging shall not be exceed 40°C on the day of packing. The continuous use of a thermal camera to check the temperature during the packaging process is strongly recommended.

Charcoal shall only be shipped in packaged form. Packaging should be in good condition and must not be torn. The IMDG Code defines what packaging can be used for Charcoal classified as UN 1361. Packing instruction ‘P002’ is assigned to these entries and permits a maximum quantity of Charcoal per bag not exceeding 50 kg. This is applicable to both packing group entries.

However, it is recommended that the maximum quantity should not exceed 30 kg which would reflect the mass of individual bags that may be manually handled.

This guidance applies to other permitted types of packaging in this packing instruction.

For the packing group III entry large packagings are also permitted, however these guidelines do not recommend the shipment of Charcoal in these packaging types.

A ‘Weathering Report’ should be compiled in relation to the cargo and packaging, to include the following information – and made available for the vaning survey:

1. Date of production;
2. Date of packaging;
3. Type of packaging used; and
4. Mean temperature of the material on the day of packaging expressed in °C.



Before being packed

4.2. Packing

The shipper shall follow the CTU Code¹⁴ recommendations and of Special Provision 978.6.

Packing into a container may only commence after the weathering period has concluded (see paragraph 4.1 above).

The cargo should be properly packed and secured. However, packing should take account of the weight of the bags so as not to cause those at the bottom to be crushed or to split.

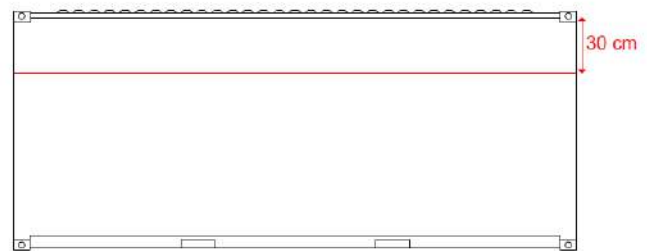
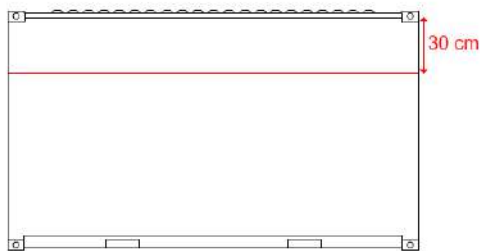
The use of a thermal camera to check the temperature of every packaging at the point of packing into the CTU is strongly recommended.

For compliance with Special Provision 978.6, a minimum headspace of 30 cm in the CTU shall be maintained whatever approach to packing is adopted – this is illustrated in Option 1 in the diagrams following. However, the additional recommendations provided in that point may also be implemented as illustrated in Options 2 and 3 in the diagrams.

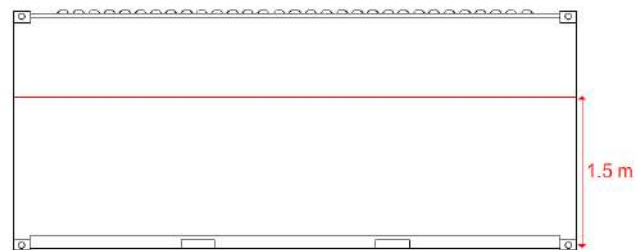
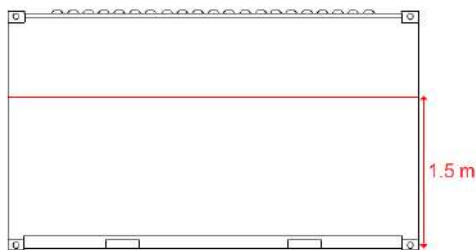
20 ft CTUs

40 ft CTUs

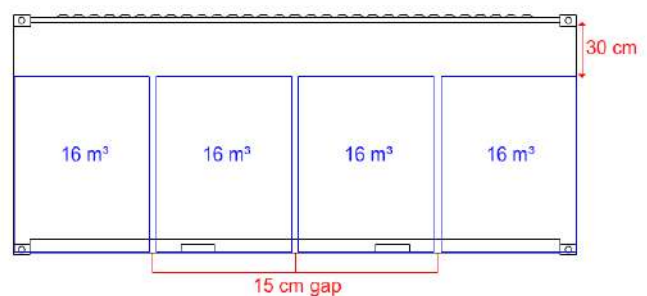
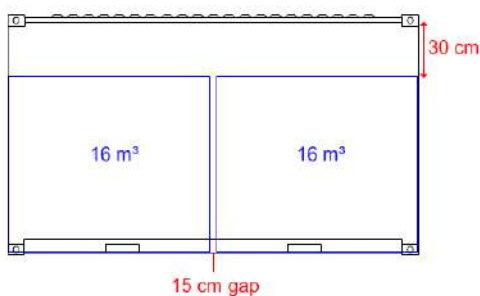
Option 1 (mandatory); or



Option 2 (recommendatory); or



Option 3 (recommendatory)



¹⁴ IMO/ILO/UNECE Code of Practice for Packing of Cargo Transport Units (https://unece.org/DAM/trans/doc/2014/wp24/CTU_Code_January_2014.pdf)

It is paramount that the consignment is well secured to prevent any movements of the packaging during the transport. The use of airbags is highly recommended in the configuration of the Option 3.

For all options, it is recommended that the packer evenly distributes the packages within the container and allows a void space adjacent to the container doors permitting, with the maximum efficiency, the flooding of the container in case of a fire at sea.

It is recommended that thermal liners are not used, due to the increased risk of a build-up of condensation, which may accelerate self-heating.

4.3. Vanning survey.

It is recommended that, prior to carriage, carriers satisfy themselves that the cargo has been packed and secured with a method that allows safe transportation, for example, by means of a photo story or container vanning survey¹⁵.

A vanning survey should confirm that:

- Cargo is packed and secured in a proper manner, consistent with the recommendations of the CTU Code and these guidelines;
- Packaging is in good condition and not torn;
- The Weathering Report (see paragraph 4.1) is available and credible; and
- The interior atmosphere of the CTU is clean and odourless, with no presence of fumes or smoke.

The carrier or Competent Authority may additionally carry out a container inspection¹⁶ after the completion of the packing process, which should additionally look at documentation in general, ensure the container is sound and legal, check the packaging is good, and that marking and labelling are compliant.

5. SHIP LOADING: CONTAINER STOWAGE AND SEGREGATION

Charcoal shall be transported in compliance with the stowage and segregation requirements set out in the IMDG Code. This requires the cargo to be protected from sources of heat (SW1) and kept as cool as practically possible (H2).

However, in excess of IMDG requirements, accessible stowage¹⁷ ON DECK is strongly recommended under these guidelines. Further, containers packed with Charcoal should be protected from a direct sunlight.

A stowage under deck could be considered if an autonomous device with automatic triggering capable of putting out a fire without external action is placed within the container. However, fire fighting with CO₂ is unlikely to be effective and a container stowed under deck may be difficult to access.



¹⁵ A vanning survey should be carried out by an independent party. This differs from a container inspection process.

¹⁶ See MSC.1/Circ.1649 Guidelines for the Implementation of the Inspection Programmes for Cargo Transport Units

¹⁷ A stowage position accessible from a fixed platform, deck or a lashing bridge



6. DOCUMENTATION

It should be noted that, in accordance with this guidance document, the documentation requirements reflect what will be required in Amendment 42-24 of the IMDG Code, as set out below:

“For transport of UN 1361, the transport document shall contain the following additional information (see special provision 978 of chapter 3.3):

1. Date of production ...
2. Date of packing into packagings ...
3. Temperature of the material on the day of packing into the packagings ... °C.”

For all shipments of Charcoal, it is recommended that the carrier should additionally be provided with the following information:

- a. Vanning survey (see section 4.3 above); and
- b. Any additional measures taken by the shipper/packer

About the Publishers of the Guidelines



CINS – Cargo Incident Notification System

CINS is a shipping line initiative, launched in September 2011, to improve safety in the supply chain, reduce the number of cargo incidents on-board ships and on land, and highlight the risks caused by certain cargoes and/or packing failures. Membership of CINS comprises container shipping lines, the Members of the International Group of P&I Clubs and the TT Club, together with technical experts specialising in safe containerised cargo transport.

CINS provides analysis of operational information on cargo and container incidents which lead to injury or loss of life, loss or serious damage of assets, environmental concerns. Data relating to any cargo incident on-board a ship is uploaded to the CINS database. The data includes information on cargo type, nature, packaging, weight; journey (load and discharge ports); type of incident and root cause.



International Group of P&I Clubs

The principal underwriting associations which comprise the International Group, between them provide liability cover (protection and indemnity) for approximately 90% of the world's ocean-going tonnage. Each Group Club is an independent, non-profit making mutual insurance association, providing cover for its shipowner and charterer members against third party liabilities relating to the use and operation of ships. Each Club is controlled by its members through a board of directors, or committee, elected from the membership. Clubs cover a wide range of liabilities, including loss of life and personal injury to crew, passengers and others on board, cargo loss and damage, pollution by oil and other hazardous substances, wreck removal, collision and damage to property.



TT Club

TT Club is the established market-leading independent provider of mutual insurance and related risk management services to the international transport and logistics industry. TT Club's primary objective is to help make the industry safer and more secure. Founded in 1968, the Club has more than 1200 Members, spanning container owners and operators, ports and terminals, and logistics companies, working across maritime, road, rail and air. TT Club is renowned for its high-quality service, in-depth industry knowledge and enduring Member loyalty. It retains more than 95% of its Members with a third of its entire membership having chosen to insure with the Club for 20 years or more. TT Club has been actively involved in CINS since its foundation.

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