



Danish Maritime Accident  
Investigation Board

# MARINE ACCIDENT REPORT

## November 2012



**MAERSK CHAMPION**  
**Fire in accommodation on 9 January 2012**

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**This marine accident report is issued on 1 November 2012**

**Case number: 201200421**

**Front page: The ship's hospital after the fire**

The marine accident report is available from the webpage of the Danish Maritime Accident Investigation Board [www.dmaib.com](http://www.dmaib.com).

### **The Danish Maritime Accident Investigation Board**

The Danish Maritime Accident Investigation Board is an independent unit under the Ministry of Business and Growth that carries out investigations with a view to preventing accidents and promoting initiatives that will enhance safety at sea.

The Danish Maritime Accident Investigation Board is an impartial unit which is, organizationally and legally, independent of other parties.

### **Purpose**

The purpose of the Danish Maritime Accident Investigation Board is to investigate maritime accidents and to make recommendations for improving safety, and it forms part of a collaboration with similar investigation bodies in other countries. The Danish Maritime Accident Investigation Board investigates maritime accidents and occupational accidents on board Danish merchant and fishing vessels as well as accidents on foreign ships in Danish territorial waters.

The investigations of the Danish Maritime Accident Investigation Board procure information about the actual circumstances of accidents and clarify the sequence of events and reasons leading to these accidents.

The investigations are carried out separate from the criminal investigation. The criminal and/or liability aspects of accidents are not considered.

### **Accident reports**

The Danish Maritime Accident Investigation Board investigates about 140 accidents annually. In case of very serious accidents, such as deaths and losses, or in case of other special circumstances, either a marine accident report or a summary report is published depending on the extent and complexity of the accident.

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## 1. SUMMARY

On 9 January 2012, MAERSK CHAMPION was engaged in tanker lifting/heading control off the Brazilian coast when a fire broke out in the ship's hospital.

The cause of the fire was most likely self ignition by a chemical reaction between chlorine-containing granules and other chemical substances in a plastic box with medicine and chemical residues located in the ship's hospital.

Initially, an attempt was made to fight the fire with a portable fire extinguisher with dry powder. However, this was in vain because the fire was already too extensive. Thereafter the fire was fought and extinguished effectively with water by fire fighting teams using air breathing apparatuses. A supernumerary master acted as the first man on the fire hose and thus he was the leader in each fire fighting team with an AB as the 2<sup>nd</sup> man.

2½ hours after the fire broke out the ship headed for Rio de Janeiro and arrived the next day.

The ship's hospital burned out and the adjoining corridor, TV/recreation room, mess room and duty mess was also damaged as a result of the fire. The fire and smoke damages to the ship's interior were severe.

During the fire, it appeared that the two accesses to the air compressor for refilling air bottles to the firemen's outfits that was situated in the bosun's store in the forecastle was hindered through the deck hatch by a locked padlock, and through the accommodation by the dense smoke in the accommodation, and refilling of air bottles was not possible. Even though this did not create any problem, it was considered a lesson to be learned.

This report does not contain any recommendation. After this incident, the shipping company has initiated a number of preventive measures.

## 2. FACTUAL INFORMATION

### 2.1 Ship particulars

Name of vessel:	MAERSK CHAMPION
Type of vessel:	Anchor Handling Tug Supply
Nationality/flag:	Danish
Port of registry:	Ringkoebing
IMO number:	8401951
Call sign:	OXJZ6
DOC company	Maersk Supply Service A/S
IMO company no. (DOC)	0309317
Year built:	1986
Shipyard/yard number	Oerskov Christensens Staalskibsvaerft A/S / 144
Classification society	Det Norske Veritas
Length overall:	76.44 m
Breadth moulded:	17.61 m
Gross tonnage:	2,887
Deadweight:	2,546 t
Draught max.:	6.612 m
Engine rating:	10,552 kW
Service speed:	11.0 knots
Hull material:	Steel
Hull design:	Single hull

### 2.2 Photo of the ship



Figure 1: Anchor handling tug supply ship MAERSK CHAMPION  
Source: Maersk Supply Service A/S

## 2.3 Voyage particulars

Port of departure:	Rio de Janeiro
Port of call:	Rio de Janeiro
Manning:	14
Pilot on board:	No
Number of passengers	0

## 2.4 Weather data

Wind – direction and speed:	ENE, 5 – 8 m/s
Wave height:	1 m
Visibility:	Good
Light/dark:	Daylight
Current:	East, 1 knot

## 2.5 Marine casualty or incident information

Type of marine casualty/incident:	Fire in accommodation
IMO classification	Serious
Date, time:	9 January 2012 at 1200 hours
Location:	South Atlantic Ocean, 22°09.8' S – 040°09.4' W
Place on board:	Ship's hospital
Consequences:	Severe fire and smoke damage to accommodation, no injury to person



Figure 2: Site of the accident  
Source: Extract from Google Earth

## 2.6 Shore authority involvement and emergency response

Involved parties: None

## 2.7 The ship's crew

Master	Danish citizen
Chief Officer	Danish citizen
1 <sup>st</sup> officer	Brazilian citizen
2 <sup>nd</sup> officer	Brazilian citizen
Supernumerary master	Danish citizen
Bosun	Brazilian citizen
Three able seamen (AB)	Brazilian citizens
Chief engineer	Danish citizen
2 <sup>nd</sup> engineer	Danish citizen
3 <sup>rd</sup> engineer	Brazilian citizen
Motorman	Brazilian citizen
Steward	Brazilian citizen

## 3. NARRATIVE

### 3.1 Sequence of events

MAERSK CHAMPION was engaged in tanker lifting i.e. holding a tanker in position related to a floating oil production, storage and offloading unit. During tanker lifting the ship's main and auxiliary engines were in operation and the ship was connected to a tanker with a 500 metre wire. A supernumerary master was on board from 6 January 2012 for taking over.

On 9 January 2012 between 0830 hours and 0930 hours, outdated medicine, six plastic bags with plastic containers holding chloride-containing granules for fresh water treatment and two aluminium bottles each containing approximately 0.5 litre of liquid insecticide/cockroach repellent ("insect lacquer"), had been collected in a plastic box in the ship's hospital in order to be taken ashore for destruction at next port of call. The two bottles of insecticide were standing upright in the plastic box and the box was closed with a lid and left on the floor in the hospital. See figure 3 below.



Figure 3: A plastic box of the similar type  
Source: Maersk Supply Service A/S

A fair copy of the contents of the plastic box had not yet been made out. It was the intention that this should be done later on the same day.

At noon, during lunch approximately at 1155, a boom was suddenly heard in the mess room adjacent to the hospital and the bulkhead between the dayroom and the hospital seemed to move slightly (see sketch on figure 4 on page 9).

The chief officer and others rose from the table, and the chief officer unlocked the door to the hospital, opened the door and noticed there was a minor fire in the hospital. The chief engineer grabbed a fire extinguisher with dry powder from the corridor with which they tried to extinguish the fire. However in vain, because then the fire was already too extensive.

The door was closed immediately, all persons withdrew from the accommodation because of the smoke from the fire and the fire alarm was raised automatically.

All crew mustered on the main deck according to the fire muster list. A census was taken and preparations were made for fighting the fire with water by teams of fire fighters with air breathing apparatuses (BA equipment).

Fire fighters from the deck crew donned fire suits and BA equipments etc. and the supernumerary master came with the BA equipment from the bridge offering his assistance.

Most of the crew spoke preferably Portuguese, but five officers including the chief officer, who was in charge of the fire fighting operation, spoke Danish and English. Partly because of different languages among the crew, the chief officer let the supernumerary master join the fire fighting team as the first man on the hose with an AB as the second man.

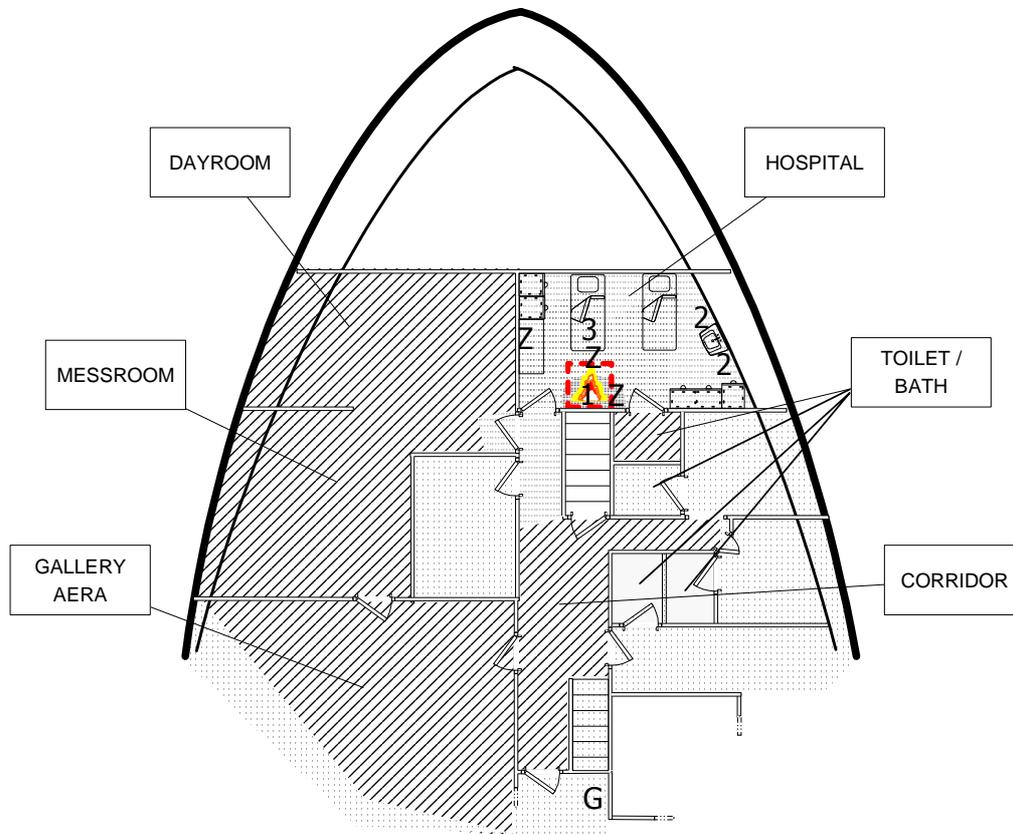
Dense smoke had developed making it impossible to see through the smoke. The chief officer organized that crew members not engaged directly by fire fighting were engaged by preparing more fire hoses and BA equipment etc. so that they did not disturb the fire fighting efforts.

Within approximately 15 minutes, the fire fighting team entered the accommodation from aft via the corridor and fought the fire with water. Also a minor fire was extinguished in the day room adjacent to the hospital. The entire fire fighting process was conducted in total darkness because of dense smoke. Every time the fire fighting team returned to the open deck, another AB had dressed up being ready to join the supernumerary master as the second man on the hose of the next fire fighting team. And the fire fighting operation proceeded. Even though it cost huge physical resources, the supernumerary master chose to be the first man on the hose so that no information about the situation should be lost in a handing over situation to another possible first man.

At approximately 1225, the fire was considered extinguished. Within the next hour fire fighting teams entered the accommodation every five minutes to check for any flare ups.

At 1430, the ship was disconnected from the tanker and headed for Rio de Janeiro arriving at 0945 the next day on 10 January 2012. On 11 January 2012, the ship was berthed at a shipyard for repairs.

OUTLINE IS NOT DRAWN TO SCALE



- G CIRCUIT BREAKER BOX
- Z MARKS AFTER SHORT CIRCUIT
- 1 BOX WITH OLD MEDICINE ETC
- 2 OXYGEN CYLINDERS
- 3 OXYGEN CYLINDERS IN BAG UNDER THE BED
-  HOTBED AREA
-  BURNING IN THE FLOOR
-  HEAVY FIRE DAMAGED
-  FIRE DAMAGED
-  EXCESSIVE SMOKE DAMAGE
-  SMOKE DAMAGE

Figure 4: Arrangement of compartments in accommodation on main deck  
 Source: The Danish Institute of Fire and Security Technology

### 3.2 Air compressor for refilling air bottles

The ship was equipped with four sets of fireman's outfit including air breathing apparatuses (BA equipments) and eight air bottles.

Furthermore, there was an air compressor for refilling the air bottles. The air compressor was situated in the forecabin and access to the compressor was possible either via the ship's accommodation or via a hatch in the forecabin deck.

Two sets of fireman's outfit were used at a time, and in total six bottles of air for BA equipments were used. It appeared during the fire that access to the compressor either via the door from the laundry in the accommodation or via the hatch in the forecabin deck was hindered by the dense smoke in the accommodation and a padlock on the deck hatch. Thus refilling of air bottles was not possible. However, this did not create any problem because refilling of air bottles was not needed, but it was considered a lesson to be learned.

As soon as the access to the compressor in the forecabin again was possible, the empty air bottles were refilled.

### 3.3 Consequences

The hospital burned out and the adjoining corridor, day room, mess room and duty mess was also damaged as a result of the fire. In total the fire and smoke damage to the ship's interior was severe. Fire damages in the accommodation are shown on figure 5, 6, 7 and 8.



Figure 5: Ship's hospital after the fire  
Source: Danish Institute of Fire and Security Technology



Figure 6: The corridor viewed from aft towards the open door of the ship's hospital  
Source: Danish Institute of Fire and Security Technology



Figure 7: Ship's hospital after the fire  
Source: Danish Institute of Fire and Security Technology



*Figure 8: Site and residues from the plastic box with outdated medicine and chemicals after the fire  
Source: Danish Institute of Fire and Security Technology*

### **3.4 The cause of the fire**

The scene of the fire was investigated by the Danish Institute of Fire and Security Technology with the purpose to determine the cause of the fire.

It was found that the fire had occurred in the plastic box placed in the ship's hospital used to contain medicine and chemical residues.

The cause of the fire was with high probability determined to be self ignition by a chemical reaction between chlorine-containing granules and other chemical substances in the plastic box with medicine and chemical residues that was located in the ship's hospital.

A range of laboratory tests were carried out at the Danish Institute of Fire and Security Technology to experiment with some chemicals of the same type and make to induce possible chemical reaction and subsequent heat and visible flames. It was revealed that petroleum based solvent for the liquid insecticide/cockroach repellent ("insect lacquer") in question can diffuse through some plastic bag material and also deform and dissolve other types of plastic packaging.

The laboratory tests did not show that mixing of the insect lacquer and the chlorine-containing granules resulted in rise of temperature or flame.

### **3.5 Fire fighter skills**

The Brazilian ABs were holding certificates of mandatory basic training in fire fighting, and by regular fire drills and on-board instructions they were familiar with the ship and its fire fighting equipment. However, the daily use of different languages among the crew members had to be considered.

### **3.6 Machinery in operation**

During the fire, the main engines and auxiliary engines were in operation as normal, but ventilation to accommodation spaces was stopped and fire dampers were shut by the chief engineer.

The fire had no impact on the ship's manoeuvrability. After the fire, MAERSK CHAMPION could be released from the tanker and sail for Rio de Janeiro by own propulsion.

### **3.7 Explosion**

The fire was initially observed by hearing a loud boom like from an explosion in the hospital by which the bulkhead between the hospital and the day room slightly moved, but the investigation of the cause of the fire did not reveal any certain cause of explosion.

In the hospital were stored 10 bottles of oxygen each of 4 litres at 200 bar for medical purposes. However, none of these oxygen bottles were emptied by the fire.

## **4. ANALYSIS**

### **4.1 The cause of the fire**

Outdated medicine, aluminium containers with insecticide and plastic containers with chloride-containing granules were collected and contained in a plastic box to be taken ashore. Everything contained in the box was packed and wrapped. A few hours later a serious fire broke out at the site of the plastic box.

The handling of the outdated medicine etc. was not considered associated with any particular risk and thus without requiring any special attention. Furthermore, it was a recurring task that had been carried out frequently in this and other ships with no known precedents of causing fire.

Laboratory tests did not show that mixing of the insect lacquer and the chlorine-containing granules resulted in rise of temperature or flame. However, laboratory testing is associated with many variables, making it impossible to recreate the exact same conditions as happened was present in the plastic box.

However, the cause of the fire was, with high probability, self ignition by a chemical reaction between chemical substances from liquid insecticide and chlorine-containing granules contained in the plastic box.

### **4.2 Explosion**

A boom like from an explosion was heard from the hospital. None of the oxygen bottles in the hospital were emptied by the fire, and no other cause or certain explanation of that matter has been revealed.

However, before the fire, there were two aluminium bottles each containing approximately 0.5 litre of liquid insecticide/cockroach repellent – dissolved in a volatile petroleum based solvent – in the plastic box left in the hospital. Since no other certain cause of an explosion can be determined the Investigation Board considers it most likely that the content of one of these aluminium bottles vaporized by heating from the initial fire in the plastic box and caused an explosion of that aluminium bottle.

### **4.3 The fire fighting**

Initially, an attempt was made to extinguish the fire by the use of a portable fire extinguisher with dry powder. However, this had no effect, because the fire had already become too extensive.

Thereafter, the fire fighting was organized according to the fire muster list, with minor deviations, which were found expedient in the situation, and the fire was fought and extinguished by the ship's crew using fireman's outfits and water.

The supernumerary master had language, background and fire fighting skills in common with the chief officer who was in charge of the fire fighting. This created a high degree of mutual confidentiality and implied that the supernumerary master acted as the first man on the hose in the fire fighting team.

The fire fighting effort was quickly organized and the supernumerary master stepped in and performed an important function as the first man on the hose in the fire fighting team. This favoured the fire fighting and proved effective so the fire did not spread in the in the ship.

Even though the fire was severe and the fire fighting efforts were hampered by very intense smoke the fire was confined to the hospital and to some degree the day room and other spaces adjacent to the hospital.

## **5. CONCLUSIONS**

The fire in MAERSK CHAMPION's hospital was caused by self ignition i.e. a chemical reaction between chlorine-containing granules and other chemical substances in a plastic box with outdated medicine and liquid insecticides dissolved in volatile solvent.

The fire was effectively extinguished by the ship's crew, and the fire fighting was favoured by a supernumerary master taking part as the first man on the hose in the fire fighting team. This reduced the risk of possible linguistic or operational misunderstandings between the chief officer in charge of the fire fighting operations and the fire fighting teams in action.

During the fire, it was revealed, but without influence on the course and the outcome of the fire fighting, that both accesses to the air compressor for refilling air bottles for the AB equipments were hindered. One access via the deck hatch was hindered by a padlock, and one access via the accommodation was hindered by dense smoke.

## **6. PREVENTIVE MEASURES TAKEN**

The shipping company has initiated that an internal procedure for handling and storage of paints and chemicals containing hazardous substances will be amended to include the requirement for a specific risk assessment for storage taking the various risks into consideration.

The shipping company has initiated that internal guidelines for storage of expired medicine are being developed.

The shipping company has initiated that a fleet information notice is distributed to the fleet to share the immediate learning regarding storage of expired medicine and chemicals.

The company gained experience from what equipment was in the fire fighting locker and how the equipment package was assembled. For example that all equipment was ready to grab in a bag, except for boots which fire fighters did not wear.

Total review of how this was done in fleet has been completed and all fire fighter bags now contain boots.

The compressor was found to be in most ideal spot. However, fleet has been notified of the fact that the ISPS securing hindered the safe access to forecastle bosun's store and stressed that all vessels to take this into consideration when doing their next SSP review.

Fire fighting gloves quality to be reviewed.