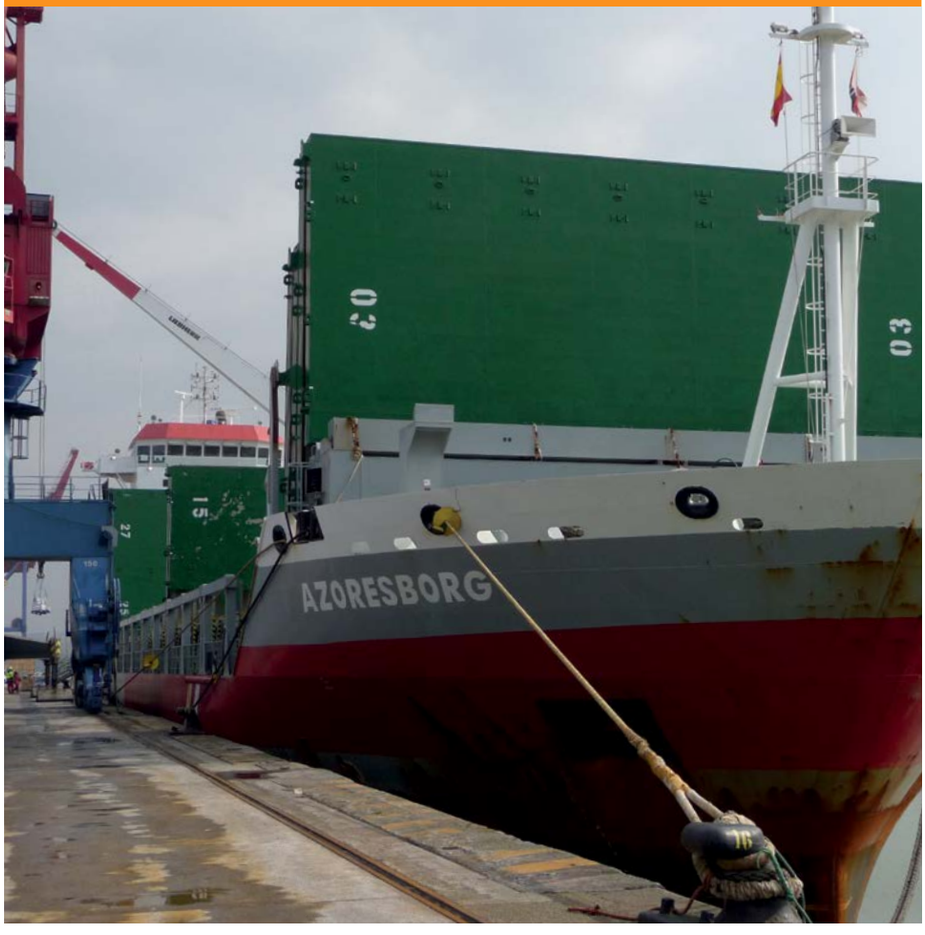
DUTCH
SAFETY BOARD

Fatal fall overboard during loading operations

M/V Azoresborg, Bilbao, Spain



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M/V Azoresborg, Bilbao, Spain, 27 February 2013

The Hague, May 2014

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Dutch Safety Board

The aim in the Netherlands is to limit the risk of accidents and incidents as much as possible. If accidents or near accidents nevertheless occur, a thorough investigation into the causes, irrespective of who are to blame, may help to prevent similar problems from occurring in the future. It is important to ensure that the investigation is carried out independently from the parties involved. This is why the Dutch Safety Board itself selects the issues it wishes to investigate, mindful of citizens' position of independence with respect to authorities and businesses. In some cases the Dutch Safety Board is required by law to conduct an investigation.

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SUMMARY

The accident took place on board a Dutch seagoing vessel in Bilbao, Spain. It was a very serious casualty as referred to in the Casualty Investigation Code of the International Maritime Organisation (IMO) and EU Directive 2009/18/EC. This means that the Netherlands, as the vessel's flag state, is obliged to ensure that a safety investigation is conducted. This requirement to ensure that an investigation is conducted is also set out in the Dutch Safety Board Decree [*Besluit Onderzoeksraad voor Veiligheid*].

On Wednesday, 27 February 2013, the chief mate of the Dutch-registered motor vessel Azoresborg got fatally injured in Bilbao, Spain. Under the chief mate's supervision, the crew were in the process of moving a tweendeck so that they could subsequently install the consoles (supports) to support the tweendeck in the ship's cargo hold. The ship's crane was used to hoist the tweendeck pontoon out of the hold so that it could be turned. Shortly afterwards the chief mate, who was standing on a fixed ladder near the hatch coaming, fell overboard. None of the crew members saw how this happened. The crew did manage to pull him out of the water between the quay and the ship, but the medical staff on shore who had rushed to assist found that he had died.

The Dutch Safety Board's investigation has established that the chief mate was standing in an unsafe position. The lack of effective fall protection enabled him to fall overboard.

The crew members on top of the tweendeck that was to be hoisted and the boatswain in the crane had not been informed beforehand of the working procedure that the chief mate planned to use. The crew did not discuss the activities, for instance, in a safety meeting. It furthermore emerged that the working practice on board did not coincide with the procedures of the Safety Management System (SMS).[1] The available instructions were experienced as 'unworkable' by the crew. Like on Azoresborg's sister vessels, an alternative working method was used to install the supports. The shipping company was aware of this but subsequently failed to ensure that the risks had been identified for the alternative method. As a result, effective safety measures were lacking.

After the accident the shipping company emphasized to crews that the person issuing hoisting instructions must at all times stand in a safe position, where he can maintain visual contact with the crane driver. In addition, the accident was discussed in the on board safety committee.[2]

1 The shipping company's safety management system (SMS) is elaborated in the Shipboard Operations Manual (SOM).
2 Section 26(e)(1) of the Dutch Shipping Act provides that there must be a safety committee on board every ship. The safety committee's main task is to advise the captain on measures for preventing workplace accidents on board.

The Dutch Safety Board's investigation revealed that the crew and the local stevedores responded immediately and managed to pull the chief mate out of the water. Nonetheless, the chief mate died.

Figure 1: mv Azoresborg. (Source: Wagenborg Shipping BV).

FACTUAL INFORMATION

Ship and crew

Wagenborg Shipping B.V. carries out the International Safety Management (ISM) of around 65 vessels, including the Azoresborg. The vessel was built in 2010 by Hudong Zhonghua Shipbuilding (Group) in Shanghai, China. In the months preceding the accident, the Azoresborg sailed in Europe, Africa and South America carrying different types of cargo. The Azoresborg contains two holds with a total loading capacity of 17,000 tons. The holds have a depth of 13.5 metres. On its port side the vessel is equipped with three cranes, each with a safe working load of 66 tons.

The required minimum safe manning on board the Azoresborg is nine crew members. At the time of the accident, twelve crew members were on board: five crew members of Dutch and seven of Philippine nationality. The official working language on board was English. The majority of the crew had worked for the shipping company for some time. All crew members held the required certificates of competency.

The Dutch chief mate was employed by crewing agency Redwise Maritime Recruitment. He held a Master STCW Reg II/2 certificate of competency for all vessels and had extensive experience at sea. He had worked for several Dutch shipping companies in the past. The chief mate joined the Azoresborg on 13 December 2012. He had not previously sailed on the Azoresborg or its sister vessels. However, he had previously sailed on other ship's types of Wagenborg Shipping B.V.

Tweendecks

Tweendecks are used to divide the hold into multiple compartments to enable simultaneous carriage of different cargoes (see figure 2). The tweendeck can be installed at three different heights in the hold and consists of several pontoons, each weighing around 33 tons. To store tweendeck pontoons, which are not being used, two positions on deck are available. One of these is located between the aft hold and the accommodation. Pontoons may be stored here in port and during a sea-voyage. In port pontoons may also be stored temporarily between the fore hold and forecastle. Finally, at sea the pontoons can be positioned on top of the hatchcovers or inside the hold.

Figure 2: A tweendeck on board the Azoresborg (hold 2). (Source: Dutch Safety Board)

Four support consoles support each pontoon. The consoles each weigh around 45 kg and have to be manually installed by the crew. After the tweendeck has been installed, it is secured by a locking pin (see figure 3).

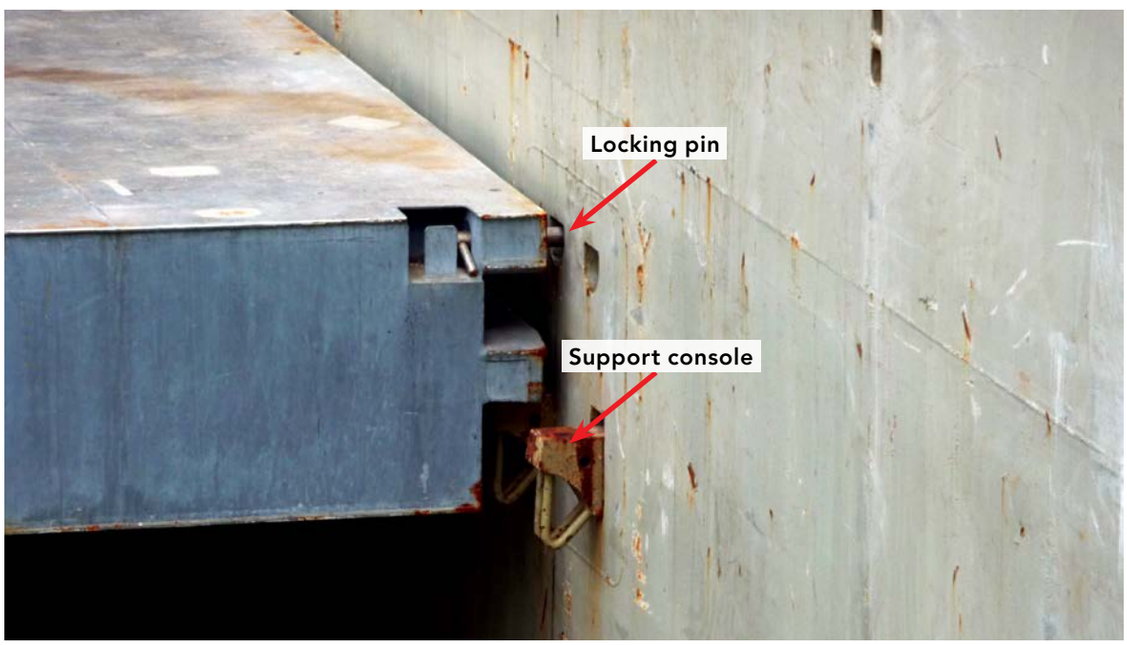

Figure 3: Consoles in cargo hold. (Source: Dutch Safety Board)

Consoles are usually installed on board the Azoresborg and its sister vessels using a pontoon as a work platform. After placing the consoles that are to be installed on the pontoon, the crew then position themselves between the four hoisting cables, to which they secure themselves with a safety harness (see figure 4).

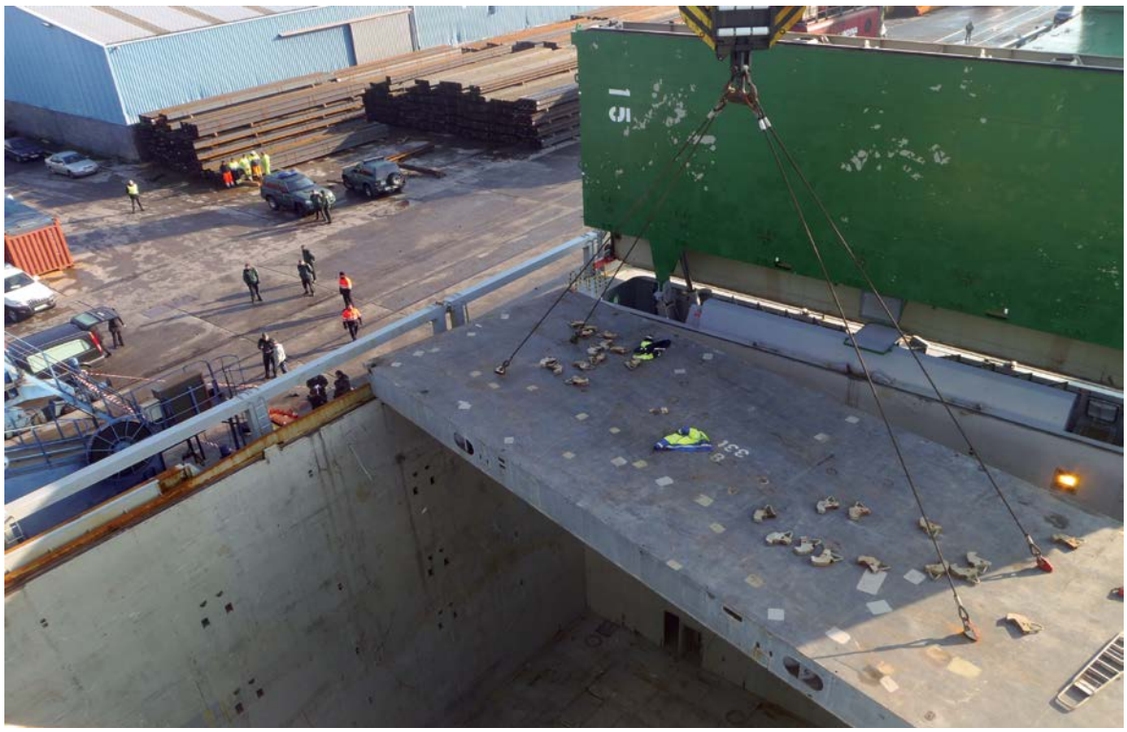

Figure 4: The pontoon used as a work platform. (Source: Dutch Safety Board)

The ship's crane then hoists the pontoon above the hatch coaming. With the aid of a leading line on the pontoon the crew member on the gangway on deck can turn the pontoon 90 degrees (until the long side of the pontoon is parallel to the ship's longitudinal direction). The crane driver then lowers the pontoon into the hold and presses it against the hold's side. Next, the crew install the consoles onto which the pontoon is ultimately placed. The activities are carried out under the supervision and directions of the chief mate or second mate.

The SMS contains a risk assessment for the operations on board, which include working with cranes and shifting tweendecks. To control the identified risks associated with these operations a safety briefing is required to be carried prior to commencement. Furthermore a safety sheet is available, which refers to manufacturer's manual (MacGregor). This manual explains how consoles can be installed from a work cage suspended from the hook of the ship's crane. Before the work cage is hoisted, the crew suspends a console to the same hook using a hoisting sling. After the crane driver has hoisted the work cage (with the console) to the correct working height, the crew member in the work cage suspends the console in the hold's side.

The Azoresborg uses what is known as stevedore platforms to supervise loading and unloading operations from the side opposite to where the ship is being loaded or unloaded (see figure 5). The crew can reach the fold-out platform with a fixed ladder. The platforms contain supports on which detachable fall protection can be installed. None of the platforms had (recently) been equipped with fall protection. This is evident from the fact that none of the platforms, particularly the supports, showed any paint damage. This type of damage inevitably occurs when installing fall protection.

Figure 5: Reconstruction of the position on the stevedore platform. No fall protection had been installed. The platform is located on the aft side of the forward hold. (Source: Dutch Safety Board)

Safety Management System
The safety management system (SMS) used by Azoresborg and Wagenborg Shipping B.V. is certified in accordance with the International Safety Management (ISM) Code. The most recent external audit on board took place on 30 July 2010. The Azoresborg also has a Risk Inventory and Evaluation (RI&E) as required by Dutch legislation, which sets out the health and safety risks on board as identified by the employer. The RI&E also provides an overview of the measures that have been put in place to mitigate the risks as far as possible. The RI&E was last reviewed by an external company in 2012.

Weather conditions
It was dry and cloudy in Bilbao on the morning of the accident. The temperature was three degrees Celsius. There was a moderate easterly wind (Beaufort wind force scale 4). There was no swell in the Port of Bilbao. On 27 February 2013, sunrise was recorded at 07.51 hour. It was light at the time of the accident.

Relevant facts
On Wednesday, 27 February 2012, the Azoresborg was at anchor on the Bilbao roadstead. The vessel had arrived the day before, after a voyage from Bejaia, Algeria. The vessel carried no cargo. The chief mate had been on duty until 20.00 hour on the evening before the accident. He then took a break and returned to duty at 04.00 hour on the morning of the accident. At around half past four in the morning the vessel heaved the anchor, and then moored starboard side at the wharf at 06.10 hour. Steel and project cargo destined for Mexico was to be loaded in Bilbao.

To prepare the holds for the cargo, the crew needed to take out the stored pontoons and place the tweendeck supports, in order to be able to position the tweendecks inside the hold later on. The chief mate supervised the third mate, boatswain and two seamen. The boatswain operated the crane. The third mate and the two seamen stood between the four hoisting cables in the middle of the pontoon that was to be moved. The chief mate stood on the rear ladder in the gangway to give instructions from there to the boatswain in the crane using hand signals or via portable VHF. This meant that the chief mate's upper body was located above the hatch coaming (see figure 6). The third mate on the pontoon also carried a portable VHF and could therefore listen in to the orders given by the chief mate.

Figure 6: Simulated position of the chief mate on the ladder near the hatch coaming. The person in the photograph is around the same height as the fatally injured chief mate. (Source: Dutch Safety Board)

The tweendeck was hoisted out of the hold at 07.52 hour. When the pontoon was positioned above the hatch coaming, the chief mate instructed the crane driver to swing the pontoon to the left and then slowly lower it. Shortly thereafter the seaman near the gangway noticed that someone located amidships had fallen overboard. It later emerged that the person was the chief mate. The seaman grabbed a life buoy, went ashore and ran over the quay to the position where he presumed that the chief mate had fallen into the water.

The AB also informed the other crew members via portable VHF that he had 'seen something fall' amidships. As the pontoon was positioned too high at that time to climb onto the hatch coaming, the third mate instructed the boatswain via portable VHF to lower the pontoon. When the crane driver had placed the pontoon onto the hatch coaming (pontoon position as shown in figure 4), the third mate stepped off and looked over the railing. He saw the chief mate lying on his back in the water between the quay and the vessel.

The chief mate remained afloat despite the fact that he was not wearing a life jacket. The seaman who had rushed to help was unable to bring the chief mate to safety from the quay with a life buoy. The chief mate lost consciousness shortly afterwards. Using a rope ladder, a crew member climbed down and, with half of his body submerged in the water, attempted to get the chief mate into the life buoy. However, he was forced to cease his rescue attempt due to the cold. The boatswain then climbed down.

He managed to get the chief mate onto a stretcher. With the aid of a quay crane the chief mate was lifted out of the water onto the stretcher.

The Port Authority's medical staff and ambulance staff established shortly afterwards that the chief mate had died. The autopsy report states that the chief mate had died as a result of internal bleeding. The report does not contain any indication of alcohol or medication use.

Action taken by the shipping company

As a result of the accident, Wagenborg Shipping B.V. emphasized to ships' crews that the person issuing instructions during tweendeck operations must stand in a safe position, where he can maintain visual contact with the crane driver at all times. Before an operation to hoist and shift tweendecks, a leading line should be attached to the pontoon in order to turn it. In June 2013 the shipping company also reiterated the importance of the safety briefing to seamen in its circular *FleetNews*. The accident was discussed in the safety committee on board the Azoresborg.

The shipping company stated that it aimed to improve the safety of tweendeck operations. In autumn 2013 an external company has been hired to evaluate the operations with the pontoons and to work out the possibilities of a more practicable way of shifting the tweendecks. On the basis of the advice, the SMS procedures related to tweendecks will be amended. The adopted working practice of the crew of mv Azoresborg will be taken as basis for the amended procedures. Particularly attention will be paid to the following identified risks:

a. Risk of falling from heights of more than 2.5 meters
b. Risk of falling from heights of less than 2.5 meters
c. The use of leading lines
d. Safe positions of crewmembers

The company also formulated a proposal to amend the Risk Inventory and Evaluation with the risks associated with falling from heights of less than 2.5 meters.

ANALYSIS

Safety briefing

No safety briefing was held prior to commencing the activities. A safety briefing was, however, stipulated by the shipping company. As a result, the crew did not discuss in what manner they would install the consoles and the pontoons, nor in what manner safety would be ensured when doing so. Contrary to the usual working method, no leading line was attached to the pontoon. Furthermore, a leading line was not send for during the execution of the activities. By failing to discuss the activities in detail, the crew members had different ideas about the manner in which the pontoons would be installed.

The Safety Board finds that because no briefing was held, the crew had not been given an opportunity to ask questions and raise any objections. Consequently, the crew failed to realize that the chief mate's position was unsafe and that there was no leading line for turning the pontoon before and during hoisting operations. There are no indications that time pressure on the morning of the accident formed a reason for not holding a (safety) briefing.

The fall

On board the chief mate was known to be safety conscious. According to statements from other crew members, the chief mate emphasized to the crew, both on request and of his own accord, the importance of ensuring safety when performing any activities.

No one actually saw the chief mate fall. However, in view of the chief mate's position on the ladder, his tasks and the proximity of the moving pontoon, there most probably is a relationship between the fall and the activities performed. It is conceivable that he lost his balance, either because he had been hit by the swinging pontoon, or due to a startle response. The exact direct cause, however, could not be ascertained.

During the installation of the tweendeck pontoons, the chief mate was carrying out two tasks. He acted as supervisor and gave instructions to the crane driver. He was able to perform these tasks from three positions, i.e. by positioning himself on the cross deck amidships, by using a ladder at the front of the hold or by using a ladder at the rear of the hold. He chose the latter option. This was the only position from where he could reach the pontoon directly in order to turn it by hand. If he had used one of the other positions, he would still have had to move to the location of the accident in order to turn the pontoon. From this position the chief officer could directly see the crane driver and the hoisting operations, as long as the pontoon had not been lifted above the hatch coaming.

The position and design of the stevedore platform near the ladder made it unsuitable to use for the work carried out. With the removable fall protection installed on the platform, a quick and easy escape would be impossible, once a load would come to close.

Figure 7: Reconstruction of the chief officer's position and fall. (Source: Dutch Safety Board)

When the chief mate was last seen, he was standing on a ladder at a height of about 80 centimetres. It follows from the witness statement and the autopsy report that the chief mate fell over the railing onto the quay and then ended up between the quay and the vessel. The proximity of the hoisted pontoon and his unstable position on the ladder meant that it was all the more relevant to have effective fall protection in place. However, there was no fall protection. Because the chief mate was standing on a ladder, the height of the railing proved to be insufficient.

Figure 8: mv Azoresborg moored in Bilbao on 1 March, two days after the accident, showing a gap between the quay and the vessel (seen from the forward part of the forward hold). (Source: Dutch Safety Board)

Safety management

The Shipboard Operation Manual (SMS) and the RI&E on board describe possible hazardous activities, the risks and safety measures. Working at height and working with tweendecks have both been identified has risky activities. Additional working procedures have been set out in safety sheets which explain in what manner the operations referred to should be carried out.

The RI&E and the safety sheet both define working at height as working at a height of 2.5 metres or above. The risk of falling from a lower height were not identified as a risk and corresponding safety measures had not been incorporated in the safety sheet.

Despite the fact that crews regularly work with tweendecks and that this involves safety risks, the shipping company's instructions and the risks identified are only briefly described in the SMS and the RI&E. The procedures that have been incorporated state that the working procedure described by the manufacturer should be followed when installing tweendecks. It emerged from the interviews and the analysis, however, that this procedure is time-consuming and impractical.

The crew used an alternative method to install tweendecks. The shipping company was aware of this and, as stated, the alternative method was also used on other vessels. However, the shipping company failed to ensure that the risks had been identified for the alternative method. This consequently meant that effective safety measures were lacking. The Safety Board is of the opinion that stipulated procedures should be supportive to the crew and should incorporate effective measures for working safely.

The SMS states that a safety briefing must be held in order to 'work with tweendecks' and 'operate a ship's crane'. After a safety briefing has taken place, the briefing must be recorded in the ship's logbook. However, no such safety briefing had been held prior to the accident on the Azoresborg.

Following the alternative method on one's own initiative and not holding a safety briefing raises the question as to what extent the crew follow the shipping company's instructions set out in the SMS, and how the shipping company subsequently monitors whether its procedures are correctly followed.

Risk of falling

According to the Dutch Working Conditions Act 'there is a risk of falling in any event if there are high risk situations, openings in floors or if there is a risk of falling down at least 2.5 metres'.[3] The shipping company only applied the latter criterion in evaluating the risks of the risk of falling. As a result, the risks of falling from a height below 2.5 metres were excluded. While the chief mate was positioned in a vertical line at a height of only 80 centimetres, in view of the narrow width of the gangway and the manner in which he fell overboard from the steep vertical ladder, the railing with a height of about one metre failed to offer effective protection for the tasks being carried out from the ladder.

There is no section on working with tweendecks and the risk of falling in the Health and Safety Catalogue[4] drawn up by the employers and employees. To date this catalogue only contains safety sheets on 'Hatch Cover Cranes and Gantry Cranes', 'Mooring and Unmooring Operations' and 'Use of small hoists and cranes'.

In 2012 and 2013 two very serious and 22 serious casualties, at which a person fell to a lower level, have been reported to the Shipping Inspectorate. These casualties have resulted in two fatalities, one of them being the chief officer of the Azoresborg. A number of these accidents also resulted in severe injuries, including permanent incapacity. The Dutch Safety Board is also investigation two casualties from 2013 that resulted in falling overboard, leaving three seafarers missing.

Rescue operation

The crew responded adequately to the chief mate's fall overboard. They had, however, limited equipment available to enable them to quickly reach the chief mate and rescue him. Despite the fact that this had no influence on the severity of the accident outcome, it underlines just how important it is for shipping companies and crews to examine the available equipment for reaching and rescuing a man overboard when a vessel is moored at the quay. The International Maritime Organisation (IMO) has meanwhile drawn up additional requirements for the purpose of recovery of persons from the water, which will enter into force on 1 July 2014.

3 Working Conditions Decree, Article 3.16. Preventing the risk of falling.

4 The authorities establish goal based rules, in which minimum protection and safety levels are indicated that should be offered to employees in order to work in a safe and healthy environment. The goal based rules are therefore elaborated in a Health and Safety Catalogue. Such a catalogue consists of safety sheets, drawn up by employers and employees that describe specific activities carried out by the branch or company. By doing so they, in fact, assume the tasks to develop policy rules from the authorities. The Health and Safety Catalogue thus form a directional, practical and accesible means to meet goal based rules. (sources: The Labour Foundation and the Social and Economic Council of the Netherlands).

CONCLUSIONS

- The chief mate was standing in an unsafe position. Partly because no effective fall protection was in place to prevent him from falling over the railing, he fell overboard. He died as a result of the injuries he suffered during the accident.

- The crew members had different views about the manner in which the tweendecks would be installed and how safety would be ensured while doing so, due to the fact that limited work preparations had been made, which consequently gave rise to ambiguity in carrying out the hoisting operations for the purpose of installing the tweendecks.

- The adopted procedures of the SMS were not followed by the crew for practical reasons. The shipping company was aware of this. The working method that had been followed was not documented and no corresponding risk assessment had been carried out.

- The risks of falling overboard had been insufficiently identified. Rather than pro-actively evaluating in what specific situations the risk of falling from a height existed, only a height of 2.5 metres or above was used to identify risks. Consequently, the provisions set out in the Dutch Working Conditions Act were insufficiently implemented.

- The crew and the stevedores responded adequately and attempted to rescue the chief mate in difficult circumstances, despite the limited equipment available to them.

RECOMMENDATION

The Board makes the following recommendation:

To the Royal Association of Netherlands Shipowners and Nautilus International:

Extend the existing Health and Safety Catalogue to include a safety sheet on "Risk of falling", taking into account all risk-increasing circumstances.

SHIP'S PARTICULARS

Vessel specifications Azoresborg	
Call sign	PBPU
IMO number	9466051
Flag state	The Netherlands
Home port	Delfzijl
Vessel type	General cargo with container capacity
ISM manager	Wagenborg Shipping B.V.
Classification society	Lloyd's Register
Year of built	2010
Shipyard	Hudong Zhonghua Shipbuilding Group Ltd., Shanghai, China
Length over all (Loa)	143.0 m
Length between perpendiculars (Lpp)	132.0 m
Breadth	21.50 m
Actual draught	4.91 m (fore), 6.46 m (aft)
Gross Tonnage	5,650
Engines	Wartsila 6L46F
Propulsion	1 controllable pitch propeller, 1 bow thruster
Maximum propulsion power	7,500 kW
Container capacity	959 TEU
Maximum speed	16.5 knots
Ship certificates	All valid

RESPONSES RECEIVED FOLLOWING REVIEW OF THE DRAFT REPORT

In accordance with the Dutch Safety Board Act, a draft version of this report was submitted to the parties involved for review. The parties were requested to check the report for any factual inaccuracies and to provide additional information, where applicable. The report was submitted to the following parties for review:

- Wagenborg Shipping B.V. (reactions incorporated in final report);
- Azoresborg captain (no reaction);
- Azoresborg third mate (no comments);
- Azoresborg chief mate's next of kin (no reaction).

DUTCH
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