



**MARINE ACCIDENT REPORT  
DIVISION FOR INVESTIGATION OF MARITIME ACCIDENTS**

**MINA  
Occupational accident  
on 27 February 2006**

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## **The casualty report has been issued on 14 November 2006**

**Case:** 200602366

The casualty report is available on our homepage: [www.dma.dk](http://www.dma.dk).

### **The Division for Investigation of Maritime Accidents**

The Division for Investigation of Maritime Accidents is responsible for investigating accidents and serious occupational accidents on Danish merchant- and fishing ships. The Division also investigates accidents at sea on foreign ships in Danish waters.

### **Purpose**

The purpose of the investigations is to clarify the actual sequence of events leading to the accident. With this information in hand, others can take measures to prevent similar accidents in the future.

The aim of the investigations is not to establish legal or economic liability.

The Division's work is separated from other functions and activities of the Danish Maritime Authority.

### **Reporting obligation**

When a Danish merchant- or fishing ship has been involved in a serious accident at sea, the Division for Investigation of Maritime Accidents must be informed immediately.

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# 1 Summary

During the loading in Sandnes, Norway, of paper bales to the tween-deck by the ship's elevators, one paper bale, weighing about 500 kg, tipped off the elevator and fell approximately 4 meters to the deck, where it hit an ordinary seaman, OS, who passed by the elevator.

The paper bale came at rest on top of the OS. The able seaman, AB, driving the forklift on the tween-deck removed the paper bale.

An ambulance was called for, and the injured OS was brought to the local hospital.

The OS had broken the pelvis, had injured his right shoulder and had internal bleedings.



*Picture by the harbour authority, taken shortly after the accident*

## 2 The Investigation

The Investigation Division has received the report of the Stavanger Police and pictures by a representative from Sandnes harbour authorities.

On 18 March the Investigation Division visited MINA in Hilleren, Bergen, Norway, when the ship was loading paper bales similar to the loading at the day of the accident. The Investigation Division inspected the scene of the accident and the loading process and interviewed the master and the crewmembers involved in accident.

Over the telephone the Investigation Division has interviewed the mate on board at the time of the accident. The mate had left the vessel on 16 March.

The Investigation Division has received written comments from the injured OS.

### 3 Factual Information

#### 3.1 Accident data

Type of accident (the incident in details)	Occupational Accident
Character of the accident	Personal Accident
Time and date of the accident	27 February 2006 at 1525 hours
Position of the accident	Sandnes Harbour, Norway
Injured persons	An OS
Evacuation of injured persons	Yes – taken to hospital
IMO Casualty Class	Serious injury

#### 3.2 Ship data

Name	MINA
Home port	Norresundby
Call sign	OVJJ2
IMO No	7712896
Register	DIS
Flag State	Denmark
Construction year	1979
Type of ship	Pallets Carrier (side loader)
Tonnage	2065 GT / 1251 DWT
Classification	Det Norske Veritas
Length	76,71
Engine power	1449 kW
Area served	Unlimited
Regulation	"Meddelelser fra Søfartsstyrelsen B"

MINA was transferred from Norwegian register and registered in DIS on 1 December 2005 under the name of SCAN MINA. On 20 January 2006 the name was changed to MINA.

The owner is Janus Andersen & Co., Norresundby.

MINA was on charter to Norwegian Kystlinjen A/S and in trade along the Norwegian Coast.

#### 3.3 Weather data

Weather	Snowing
Light/dark	Light

#### 3.4 The Crew

Number of crewmembers	8
Minimum Safe Manning	5
Occupation on board the ship at the time of the accident (crewmembers relevant to the accident)	Age, Certificate of Competency, other certificates, training, sailing time.

Master	<ul style="list-style-type: none"> <li>• 40 years</li> <li>• Certificate of Competency as Master</li> <li>• Joined MINA on 12 February 2006 as temporary master – 8 years experience in pallet vessels</li> </ul>
Mate	<ul style="list-style-type: none"> <li>• 56 years</li> <li>• Certificate as Chief Mate in ships less than 3,000 GT</li> <li>• Certificate Basic Training in Medical Care</li> <li>• Joined MINA on 17 February 2006 – In the company since September 2005 – Experience in Faroese pallet vessels</li> </ul>
AB1	<ul style="list-style-type: none"> <li>• 44 years</li> <li>• Joined MINA in January 2006 – in the company since 2002 – at sea since 1979</li> </ul>
AB 2	<ul style="list-style-type: none"> <li>• 41 years</li> <li>• Joined MINA in October 2005 – first time with this company and first time in Danish ships, sailed in Norwegian ships – at sea since 1989</li> </ul>
Motorman	<ul style="list-style-type: none"> <li>• 48 years</li> <li>• Joined MINA in October 2005 – sailed in Norwegian ships in the last approximately 7 years – at sea in approximately 20 years</li> </ul>
OS – The injured	<ul style="list-style-type: none"> <li>• 28 years</li> <li>• Finished as Bachelor of Science in Marine Transportation on October 2003</li> <li>• Completed one year apprenticeship</li> <li>• Joined MINA on 18 October 2005</li> <li>• VI/1 STCW – VI/2 STCW (acc. to On Hire Agreement)</li> </ul>

The master, the mate and the chief engineering officer were Danish citizens and the two ABs, the OS, the motorman and the cook were Philippines.

### 3.5 Narratives

MINA sailed from Nyhamn, Kristiansund, Norway, on 25 February at 1040 and arrived at Sandnes on 26 February at 2100.

The master and the mate run a 2-shift bridge watch with the master on the 06-12 and 18-24 watches. Due to frequent calls at port, up to three a day, the shift is maintained during stays in harbour and during cargo operations.

At about 0700 on 27 February MINA shifted to the loading berth and the loading of paper bales commenced at about 0800.

A forklift manned by shore personnel lifted the bales from the storage ashore up the ships ramp and placed them on one of the ships two elevators. The elevator was lowered to the deck and the bales were lifted off the elevator by the ships forklift and stored on the deck. The elevators and the forklift on board were operated by crewmembers.

The forklifts carried 2 bales at a time, one on top of the other. Some bales were placed on wood-pallets and some were not.

The elevators can be operated from an operator desk placed in a cubicle above and forward of the hatch and from where there is an overlook to the elevators and the tween-deck. The elevators can also be operated by remote control boxes hanging on the forward side of the hatch or used free through connecting cables.



Operators cubicle

*Picture by the Investigation Division*



Remote control box

*Picture by the Investigation Division*

The lower deck was loaded first. AB1 was driving the forklift and the OS was operating the elevators and removing empty pallets from the elevators.

At around noon they started loading to the tween-deck.

During the loading to the tween-deck AB1 and the OS were continuing to work as before noon. AB 2 was working on the main deck and the motorman was working in the engine room.

After noon it started snowing and the snow hampered somewhat the driving of the land forklift. The ramp became slippery due to the snow.

For those paper bales, which were placed on pallets, it was necessary to remove the empty pallets from the elevator, before placing the next bales on the elevator. According to the mate the shore personnel removed the pallets, until the snow made the ramp slippery. From then on the OS on the tween-deck removed the pallets and stored them temporary on board.

According to the OS, however, he was removing the empty pallets from the elevators the entire day and also operating the elevators.

At approximately 1525, when AB1, driving the forklift, was on his way with two bales to stow them at the end of the tween-deck and with his back to the hatch, he heard a shout from the OS, and when he turned around he saw him laying on the deck with a bale on top of him. He dropped the bales held by the forklift, turned the forklift around and lifted the bale free from the OS. The OS was lying outside the "marked area" along the elevators.

According to the OS he had just removed an empty pallet and put it on the other side and was walking back to the operating console, when he was hit at his back by the falling paper bale.

When the bale fell down the elevator was at the level with the ramp and stationary. The distance from elevator bottom plate to the tween-deck was approximately 2.5 meters.

The mate, who at the time of the accident incidentally was in the accommodation, and the master, who also was in the accommodation, was alarmed, and they rushed to the tween-deck, where they saw the OS lying outside the "marked area".

Also AB 2, on the main deck, heard shouting from the tween-deck. At first he thought it was for fun, but when the shouting continued he also ran to the tween-deck.

The mate and AB1 placed the OS in a proper position and covered him with blankets to counteract chock. The OS was conscious and groaned. The master called for an ambulance through one of the shore people.

The ambulance arrived at 1545 and the OS was brought to the Stavanger hospital.

At approximately 1600 the local police arrived. They examined the area of the accident and drew up a report.

At 2345 MINA sailed from Sandnes to Haugesund.

### 3.6 *Organization and instruction of the work*

MINA sailed in a coastal trade since approximately one month before the accident with frequent calls at port, up to three a day, and many cargo operations. The 2-shift bridge watch between the master and the mate was maintained during cargo operations.

The mate was on the 12-18 shift and therefore responsible for the loading operation at the time of the accident.

According to the master the crew has a general talk about a coming cargo operation. Instructions about the specific jobs are not given. During the loading / unloading the crewmembers shift between the different jobs.

It is quite normal that the three deck-crews and the motorman are involved in the cargo operations. At the time of the accident one AB and one OS was involved in the loading to the tween-deck. The AB was driving the forklift and the OS was operating the elevators and also removing empty pallets from the elevators. The other AB was working on the main deck and the motorman in the engine room.

According to the OS it was AB1 who told him to operate the elevators and to remove the empty pallets.

According to the mate he sees to that the crewmembers wears helmet and safety shoes, and he reminds the crew to be careful and to keep away from the hatch.

According to the report by the Norwegian police the injured OS did not wear a helmet.

According to the mate he has many doings during a cargo operation, of both practical and administrative character, and he can therefore not overview the loading continuously. At the time of the accident the mate incidentally was in the accommodation.

On the day of the Investigations Division's visit no replacement for the injured OS had arrived on board.

### 3.7 *The working area*

The accident happened on the tween-deck in the area close to the hatch and the elevators. An area of the deck along the hatch and the elevators, approximately ½ meter wide, is considered "dangerous area" according to the crews statements.

According to the mate and also according to the report by the Norwegian police the area was not marked at the time of the accident. (*See the picture on page 4*).

At the time of the Investigation Division's visit the area was painted red.



*Picture by the Investigation Division*

There are two elevators, which are operated independently. The elevators can be operated from a cubicle above and forward the hatch. From the cubicle the operator can oversee the tween-deck and through the elevator shaft he can look down at the shaft part of the lower deck. The elevators can also be operated from two remote control boxes hanging forward of the hatch or used free hand through cables. (See *the pictures on page 7*).

The elevator plate is approximately 1 x 2 meters. There is no securing on the plate.

According to the master and AB1 it happens that goods fall down from the elevators.

### ***3.8 Safety Management System (SMS)- Work Place Evaluation – Safety Board***

The Danish Maritime Authority held an initial audit on the vessel's SMS on 1 February 2006 to check whether it was concordant with the ISM Code.

A final SMC was not issued at that opportunity due to too many discrepancies. After the owner and the master rectified most of these the final SMC has been issued.

MINA's SMS includes "Work Place Evaluations" and "Working Instructions" and also a chapter on the ship's Safety Board.

In the Work Place Evaluation chapter is included an evaluation of "Deck – forklift" and in the Working Instruction chapter an instruction on the use of forklift on board.

There is no similar evaluation / instruction for the operation of the elevators and there is no mentioning of a specific "danger area" on the tween-deck.

All crewmembers are member of the Safety Board. In the chapter is inserted a record of a safety meeting on 10 December 2005. On the visit by the Investigation Division on the 18 March the chapter included nothing about this accident.

The two ABs, the motorman and the OS have confirmed that they have read the Safety Manual.

### 3.9 Hours of rest

The ships February month records of hours of rest read as follows:

For the master 12 hours all days, 00-06 and 12-18, starting on 13 February.

For the mate 12 hours all days, 06-12 and 18-24, starting on 18 February.

For the chief engineer 14 hours all days, 00-07, 12-13 and 17-24 (this actually comes to 15 hours totally), starting on 12 February.

For the cook 14 hours all days, 00-06, 13-16 and 19-24.

For the rest of the crew 14 hours all days, 00-07, 12-13 and 17-24 (this actually comes to 15 hours totally).

On 28 February the injured OS is recorded for 14 hours of rest.

The records contain the following Comments: "On days of arrival/days of departure and load days/discharging days deviations may occur".

When the Investigation Division visited MINA on 18 March the ship had had some rather intensive days with several calls at port, loading and discharging.

According to the AB1 the rest periods are sufficient. AB2 thought he had a hard time on board with too much work and too little rest. The motorman also found it hard work because he works on deck besides his normal work in the engine room.

According to the ships log book MINA had been at sea from the 25 February at 1040 and until arrival Sandnes on 26 February, the day before the accident, at 2100. The shifting of berth and the loading of cargo started the next day at 0700.

On the day of the accident the OS felt well rested at the start of the work.

*Due to the statements about hard work and little rest from some of the crew members the Investigation Division has compared the ships log book from February month with the records of hours of rest.*

According to the log book there is one or more calls at port on several days, also during evening and night times.

Although the column *Work and special incidents* on the right hand pages of the log book are very sparsely filled in these call must have involved crew members in connection with loading or discharging of cargo. This is, however, not to be seen from the records of hours of rest, which shows rest hours between 1700 and 2400 all days.

For instance the ship sailed from Sandnes on 13 February at 1630 hours and was alongside in Mjølkevik on the same evening between 1810 and 2110.

On 15 February the ship arrived at Midsund at 1720. In the column *Work....* Is noted "1810-1910 Load (4) pcs. tanks" and " 1910-2030 Shifting Berth".

On 24 February the ship arrived at Midsund at 2105 and sailed again on 25 February at 0400.

On 27 February in Sandnes the following work is logged in the log book:

- At 0700: Shifting to loading berth.
- At 1525: Loading stopped due to accident in cargo room. AB on hospital. Owner and Authorities informed, see report.
- At 1700: Loading continued.
- At 2345 Departure Sandnes.

The records of hours of rest show rest period 1700 – 2400.

On 28 February the ship was in Husøy between 0400 and 0450, in Bergen between 1500 and 1800 and in Hilleren between 1950 and 0330 (on 1 March).

### *3.10 The weather*

After lunch it began to snow and the snow hampered the forklift driving at shore and made the ships ramp slippery.

### *3.11 Health Treatment*

The mate and AB1 comforted the injured OS as well as possible and covered him with blankets to counteract chock.

An ambulance arrived approximately 20 minutes after the accident and brought the OS to the hospital.

At the hospital the OS was treated for a broken pelvis and injured right shoulder and also for internal bleedings.

After a period in the Norwegian hospital the injured OS was transferred to Manilas followed by a nurse and was hospitalized near his home.

### *3.12 Legislation*

DMA's Notice A: Occupational health in ships is valid for MINA. Notice A contains general and specific rules for the planning of safe and healthy working processes on board ships. Chapter VI on Technical Remedies contains rules on the use of working equipment on board ships and on instruction and training.

DMA's Technical Regulation No. 12 of 12 October 2000 on lifting appliances and cargo gear etc. on board ships is valid for MINA with the exemption of some of the rules, which relates to new ships only.

DMA's Guidance No. 6 of 28 November 2002 concerning cargo elevators in ships is valid for MINA but is not compulsory. Point 7 in the guidance is about safety measures on board the ship against danger of precipitation and of being jammed.

Moveable and fixed barring is recommended around a cargo elevator and the painting of black/yellow warning stripes on the deck up to 1 meter from the shaft is also recommended.

### 3.13 Survey

*The Danish Maritime Authority has given the following information (translated into English by the Investigation Division):*

“MINA was transferred to DIS on 1 December 2005. When cargo ships of a gross tonnage of more than 500 and under the class are flagged in it was the normal procedure at that date to issue an interim certificate valid for 6 months, in this case until 19 May 2006. In the period between, the owner should among other things consider a checklist on occupational health in ships forwarded to him and provide technical information for assessment. Prior to the 19 May 2006 a regular initial survey would be carried out.

Due to a necessary visit to a shipyard the owner wished the initial survey to be carried out already in February 2006. The survey was carried out in Fredericia and the normal checklists were used.

The arrangement for loading and discharging were thoroughly assessed. The arrangement is rather complicated. Therefore it was found, that accidents could not be prevented by markings. A system of barriers or a fixed screening was also considered, but it was thought that such measures would have no effect, or that they would cause a radical alteration of the system, not seen in other similar systems. Instead visual and acoustic alarms in the working area were required.

The process of loading and discharging was discussed and assessed on the spot together with crew members. With reference to DMA's Notice A, Chapter VI, on technical remedies, it was required that Work Place Evaluations for all dangerous work processes should be drawn up.

The arrangement was also assessed in relation to DMA's Technical Regulation No. 12 on lifting appliances and cargo gear etc. on board ships. This Regulation is mentioned specifically in the checklist used. It was found, that the arrangement complied with the Regulation.

When deficiencies are found on board a ship the surveyor can choose between four standard texts for the rectification of the deficiencies. In the actual case the surveyor required the deficiencies to be rectified within a certain timeframe, and the master was required to sign in the ship's survey-book, when the requirements were complied with and to state date and location here fore. On its next survey on board, the DMA would check whether the requirements were complied with within the set time frame. Other possibilities would have been to require the reports forwarded including information on the rectification or to require a control survey, by which the DMA by personal inspection could note that the deficiencies were rectified.

The DMA has not surveyed the ship since February 2006 and has consequently not been able to check whether the requirements issued at the initial survey have been complied with.”

As a result of the above mentioned survey 28 deficiencies were required rectified prior to departure. Two of these were related to the cargo elevators as follows:

“All the emergency stops of the cargo elevator must function” and

“All the warning flashes of the cargo elevator must function”.

36 deficiencies were to be rectified by the master on 19 May at the latest. One of these was about work place evaluations as follows:

“Relevant work place evaluations must be in place”.

The rest of the 36 deficiencies had no relevance for this accident.

## 4 Analyses

### 4.1 *The accident*

A paper bale weighing about 500 kg tipped off the elevator and hit the OS. The elevator was stationary at the time of the accident. The bale fell approximately 4 meters down to the tween-deck. The bale was on top of another bale, both being placed on the elevator by the forklift a-shore. Due to snow the ramp was slippery.

No one looked at the elevators at the moment of the accident. Present at the tween-deck were only the OS and AB1, who was driving the forklift. He saw the OS lying under the bale.

The OS was hit at his back when he walked past the elevator on his way back to the operating controls after having moved pallets to the other side.

The police report contains no statement from the person driving the land forklift and the Investigation Division has not visited Sandnes harbour.

Although not verified by any eyewitness the most probable cause for the paper bale to tip over is that the land forklift has loaded the two bales on the elevator in a hard and distorted way with the result that the topmost bale fell to the deck. A slippery ramp due to snow and ice may have interfered the manoeuvring of the forklift.

### 4.2 *Organization and instruction of the work*

Both the master and the mate were new on board. Both were, however, experienced in pallet vessels.

The two ABs and the motorman were experienced sailors. The injured OS had about 4 month experience on board MINA.

Before a cargo operation there was a general talk about how the work should be done. There were no special instructions given for the individual jobs. According to the mate he checks that the crew use safety shoes and bring with them their helmet. He also reminds the crew to be careful when moving around on the deck and not to pass to and from in the hatch area.

It was common knowledge on board that goods could fall down from the elevator,

According to the Norwegian police the OS did not wear a helmet, but there is no indication, that it had any consequential effect.

According to the OS he was instructed by AB1 on the day of the accident to operate the elevators and to remove empty pallets.

There is no indication that the crewmembers did not know their jobs during the loading, when all went by routine.

The OS passed the area under the falling bale, because the work of loading was organized in such a way that he should both operate the elevators and remove empty pallets from the elevator.

The work on the deck was not planned and controlled in such a way that it could be carried out in a safe manner.

If an extra crewmember had assisted on the tween-deck, then the operator of the elevators could have concentrated on this from the cubicle from where he would have a good overview of the deck.

19 days after the accident the injured OS was not replaced. In the actual coastal trade with frequent calls at port the lack of one deckhand is a disadvantage. Although the OS was not required in the Safe Manning Document, the ship management should have arranged for a substitute for the OS.

### *4.3 The working area*

MINA was loading to the tween-deck, when the accident happened.

At the day of the accident the area close to the hatch and the elevators was not clearly marked as a "danger area". After the accident the area was painted red.

DMA's Guidance No. 6 recommends that the deck should be painted with black/yellow warning stripes up to 1m from the shaft.

During the DMA survey it was found that accidents could not be prevented by markings.

The Investigation Division is of the opinion that a clear marking on the deck, as recommended in the Guidance, would have raised the attention of the crew to the risks of working close to the elevators.

As a safety measure against falling down in the shaft and also against being jammed by the elevator DMA's Guidance No. 6 also recommends moveable barriers at the sides from which the elevator is being loaded.

In MINA there was no barrier around the shaft. It is a question whether it is a realistic possibility to raise or lower a barrier every time the elevator is moved during loading or discharging of goods. The question, however, could have been discussed on board and the possibility to implement other safety measures in stead.

The working place safety standards were low, because the area around the elevator shaft was not clearly marked as an area to be avoided during the operation of the elevators and there had been no formal discussions about safety measures in connection with the operation of the elevators.

#### *4.4 Safety Management System (SMS) – Work Place Evaluation – Safety Board*

Following the DMA's audit on 1 February 2006 the Safety Management Certificate was issued under the date 1 February 2006.

In the DMA's survey report from 1 February it is required that relevant work place evaluations must be in place before 19 May 2006.

At the Investigation Division's visit on 18 March the SMS did not contain evaluation or instructions for the elevator handling of cargoes. The SMS did contain evaluation and instructions for driving forklift in cargo-room.

The Investigation Division is of the opinion that a written work place evaluation would have raised the attention of the crew to the risks involved in the operation of the elevator.

At the date of the Investigation Division's visit, on 18 March, the Safety Board had not yet met to discuss the accident. This is not in conformity with the rules in DMA's Notice A. The work with the elevators and loading operations are continuous jobs for MINA's crew. The accident has shown that there are certain risks involved in these jobs. It is therefore important for the safe performance of the work that the risks and countermeasures are well understood. An early meeting in the Safety Board to discuss this accident in a formal way would have been a responsible action by the ship management.

#### *4.5 Hours of rest*

According to the records of hours of rest for February the crew has had 14 hours of rest all days.

The injured OS is recorded for 14 hours of rest also on 28 February, the day after the accident.

The records are signed by the master and the crewmember in question. The injured OS has not signed his February record.

The frequent calls at ports at irregular hours for loading or discharging, as logged in the ship's log book, are, however, not to be seen from the records of hours of rest.

There is a clear indication, that the records of hours of rest are more or less kept automatically and that they are not recording the true picture of the rest periods for the crewmembers.

The vessel had been at sea for about 35 hours before the day of the accident and was alongside with no activity the night before.

As the deck crew does not have bridge watch duties under normal conditions, there is thus no indication that lack of rest has influenced the circumstances leading to the accident.

## 5 Conclusions

Although not verified by any eyewitness the most probable cause for the paper bale to tip over is that the land forklift has loaded the two bales on the elevator in a hard and distorted way with the result that the topmost bale fell to the deck. A slippery ramp due to snow and ice may have interfered the manoeuvring of the forklift.

The work of loading was not planned and executed in a safe manner.

The OS passed the area under the falling bale, because the work of loading was organized in such a way that he should both operate the elevators and remove empty pallets from the elevator.

The Investigation Division is of the opinion that a clear marking on the deck of the “danger area” and also a written work place evaluation would have raised the attention of the crew to the risks of working close to the elevators. The lack hereof is underlying factors of the accident.

The following observations indicate a low safety standard on board:

- The “danger area” around the elevator shaft on the tween-deck was not marked.
- The ship’s SMS did not contain work place evaluation and working instructions for the operation of the elevators and cargo handling.
- 19 days after the accident it had not been discussed in the ship’s Safety Board.
- There is a clear indication that the records of hours of rest are not recording the true picture of the rest periods.
- 19 days after the accident the injured OS had not been replaced.
- The OS did not wear a helmet.

## 6 Action taken

As a consequence of this accident the DMA intends to assess similar side load elevators in ships. The purpose of this assessment is to optimize safety around the elevator and the operation of the elevator.