



ISSN 1400-5735

Report RS 2003:01e

Accident involving passenger ferry M/S VISBY in Visby Port, I County, Sweden, 10 April 2002

Case S-002/02

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Translated by Tim Crosfield from the original Swedish at the request of the Swedish Accident Investigation Board.

In case of discrepancies between the English and the Swedish texts, the Swedish text is to be considered the authoritative version.

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2003-04-23

S-002/02

Swedish Maritime Administration

SE-601 78 NORRKÖPING

Report RS 2003:01e

The Swedish Accident Investigation Board, (SHK) has investigated an accident that occurred on 10 April 2002 in Visby Port, I County, onboard the passenger ferry M/S VISBY.

In accordance with paragraph 14 of the Accident Investigation Ordinance (1990:717) the Board submits herewith a report on its investigation.

The Board will be grateful to receive, by 1 November 2003 at the latest, notice of what action is being taken regarding the recommendations included in the Report.

Carin Hellner

Hans Rosengren

Per Lindemalm

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S-002/02

Report completed 2003-04-23. Translation 2004-05

Vessel, call sign	M/S VISBY, SIJM
Owner/operator	Rederi AB Gotland, Visby
Time of event	10-04-2002 approx 10.00 h <i>Note: All times given refer to Swedish daylight saving time (UTC + 2 hours)</i>
Place	At the quay in Visby Port
No. of persons on board	1 repair mechanic, 42 crew members, 6 maritime administration inspectors and 318 supernumeraries
Injuries to persons	One person lost his life
Master's sex, age and certification	Man, 63 years, master mariner

The Swedish Accident Investigation Board (SHK) was notified on 10 April 2002 that an accident had occurred aboard the passenger ferry VISBY.

The accident has been investigated by SHK represented by Carin Hellner, chair, Hans Rosengren, chief nautical investigator and Per Lindemalm, chief maritime technical investigator.

The investigation was followed by Sten Anderson on behalf of the Swedish Maritime Safety Inspectorate.

SUMMARY

In the morning of 10 April 2002 an evacuation drill was conducted aboard the passenger ferry M/S VISBY, while she was at the quay in Visby Port. The purpose of the drill was to demonstrate the vessel's safety organisation to the Swedish Maritime Safety Inspectorate. In particular it was to be shown how in an emergency situation passengers could be evacuated from the passenger accommodation on deck 2, which is below the vehicle deck. On board were a full crew and a group of observers from the Maritime Safety Inspectorate. In addition, the shipping company had engaged 318 supernumeraries who were to act as passengers.

When the supernumeraries and observers had taken their places on board, the drill started with the fiction that a fire had broken out in an engine-room at the bottom of the vessel. In the introductory phase the crew were alerted and a fire-fighting group was sent out to engage the fire. The passengers were informed that the ship was to be evacuated. Closure of the vessel's watertight doors (WT doors) was activated from the bridge, whereupon two doors that were open, shut automatically. These were located in the passenger area on deck 2.

When the fire-fighting group arrived in the engine-room they discovered a man standing caught in a WT door. He was released and life-saving measures were started. However, he was found to be dead. The dead man was an electrical engineer, well familiar with the vessel and with the operation of its WT doors. He was employed temporarily to carry out electrical work.

An ambulance was called and the drill was broken off.

In addition to the fatal accident in the engine-room, a serious near-accident occurred through activation of the WT doors from the bridge, whereupon two doors in the passenger accommodation were shut. They were not being guarded.

1 THE FACTS

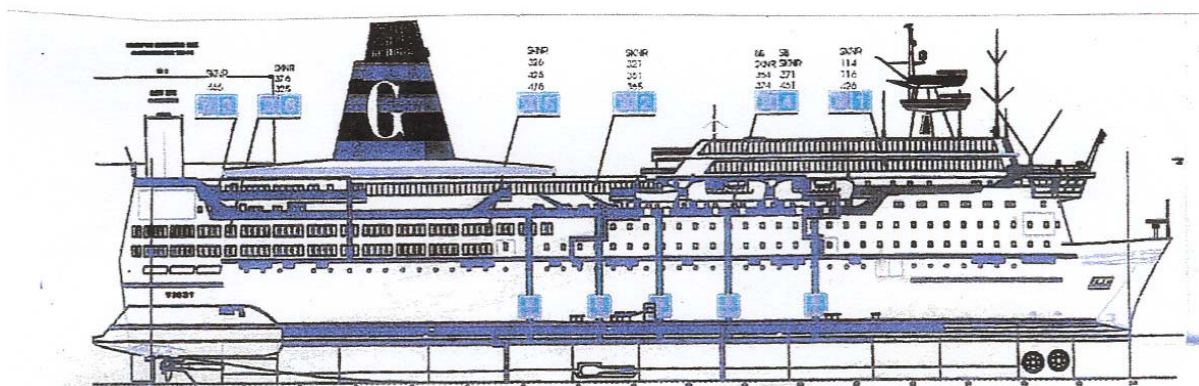
1.1 The vessel

M/S VISBY was built in 1980 at Öresundsvarvet AB, in Landskrona. She is a combined passenger and roll-on-roll-off ferry with 11 decks. Her engine-rooms are below on decks 1 and 2, aft section. The vehicle decks are nos. 3, 4 and 5. Passengers have cabins on decks 2, 6, 7 and 8. The navigation bridge and crew accommodation are on deck 9. Deck 10 contains a “sky bar” and deck 11 is a partial sun deck and promenade deck. On deck 2 between the engine area aft and the passenger cabins forward there is a cinema with a foyer and toilets.

Decks 1 and 2, which contain the engine area and passenger accommodation and are under the vehicle decks, are divided by transverse watertight bulkheads, giving a total of ten watertight zones on each deck. Some of these bulkheads contain door openings with a total of 11 watertight doors.

Main data:

Length overall	145.65 metres
Beam	24.02 metres
Draught	5.49 metres
Gross tonnage	23,842
Net tonnage	11,083
Engine output	15,742 kW
Passenger capacity, certified	1,816
Classification society	Det Norske Veritas



1.2 The event

On 10 April an evacuation drill was conducted on board the passenger vessel M/S VISBY. The ferry was moored at the quay in Visby Port. During the drill, central closure of the ferry's WT doors was activated.

In the introductory phase of the drill, a temporarily employed electrical engineer working in the engine-room was found caught fast in one of the WT doors. An ambulance was called and the medical orderly found that the man was dead. The drill was broken off.

1.3 The purpose of the drill

The drill was intended to demonstrate the vessel's safety organisation to the Maritime Safety Inspectorate so as to obtain the annual signature of her "Safety Management Certificate". This has been done at least once a year since 1996.

1.4 New safety organisation

In the drill a new safety plan was to be applied. This plan was based on a crew of 42. The earlier plan comprised 46 crew members. The shipping company had for some time intended to increase capacity from 1 280 passengers to 1 400 and to reduce the crew from 46 to 42. The safety officer had therefore been instructed to work out a new safety plan for 42 crew members. Part of the plan was to ensure the evacuation of passengers from deck 2.

Instructions for the new safety organisation were available in binders before the drill. They were distributed some days before the drill in the form of cards. In some cases these were distributed as late as on the morning of the drill.

In the new plan, many of the crew had been given new tasks in the safety organisation, and work groups new memberships.

According to the new plan, crew members are to make their way individually to the areas to be evacuated immediately following a coded call when the safety organisation is activated. In this way they are already in place and can start to evacuate passengers when the evacuation alert is given.

1.5 Drill scenario

The drill scenario established by the Maritime Safety Inspectorate involves a fire breaking out in the engine-room. The fire proves to be difficult to extinguish and it is decided to evacuate all passengers back to the ferry terminal.

1.6 Allocation of responsibility

The master of the vessel had the overall responsibility for the drill. The chief engineer was responsible for the fire-fighting groups and the purser for the evacuation groups. The chief officer was responsible for radio communications. The second officer was primarily on duty on the bridge.

From the Maritime Safety Inspectorate there were six ship inspectors present to follow the drill. One of them was drill supervisor.

1.7 The course of events

On the morning of 10 April the drill commenced when the 318 supernumeraries engaged to act as passengers during the proceedings were given a short briefing by the safety officer of the shipping company. They then took up their allocated positions, most in cabins and in the cinema on deck 2. The safety officer and the drill supervisor had previously had a short brief-

ing with the crew. In addition the master, the drill supervisor and the safety officer had also had a short run-through.

The vessel was moored at the quay and ready to sail, meaning among other things that according to routine nine of her eleven WT doors were shut.

The drill started shortly before 10.00 h when a crew member set off the fire alarm and the engineer on duty telephoned from the engine control room to the bridge to report a fire in one engine-room.

In the engine-room several people heard repeatedly that WT doors were in operation. They understood that it was the repair mechanic at work.

The master, the chief engineer, the chief officer, second officer and the purser were gathered on the bridge. Also on the bridge was the Maritime Safety Inspectorate drill supervisor. The inspectors were in several positions aboard the vessel to observe the course of events. One was in the engine control room and the other four in various positions in the passenger accommodation.

At about 10.00 h the master activated the vessel's safety organisation via a coded message over the vessel's loudspeaker system.

Evacuation groups and fire-fighting groups gathered at their respective stores to collect equipment. One fire-fighting group gathered at its station on deck 7, put on its equipment and made its way below to the engine-room.

Certain crew members had the job of evacuating all passengers from their cabins and from the cinema on deck 2 and leading them up via the lobby on deck 6 and thence via the gangway to the terminal.

A few minutes after the start of the drill it was reported from the engine control room to the bridge that the fire was proving difficult to extinguish.

Shortly after the master had activated the safety organisation the second officer read his instruction card, Appendix 1: "WATERTIGHT DOORS". He asked the master whether he should shut the watertight doors. The answer was affirmative and he announced over the loudspeaker system that the watertight doors would be closed in two seconds.

He then moved the knob marked "All doors" from OFF to CLOSE, thus activating the central closure (All doors) for all the vessel's WT doors.

After a delay of about 15 seconds the activation caused the two of the vessel's WT doors that were open, to shut. These two doors were situated in the passenger accommodation on deck 2.

At 10.08 h the master gave the order to evacuate the vessel.

Some minutes later, 10.10 h, one of the fire-fighting groups came below into the engine-room to enter the area where the fictitious fire was going on. The group then found a person caught fast and apparently lifeless in WT door no. 11. When the group opened the door and took the person out it was found that the door closed immediately. The person who was caught in it was released and the bridge was telephoned to inform the chief engineer. Those in command of the drill first thought the message was part of the drill but soon realised that a serious accident had occurred and that the person involved was the temporary repair mechanic who was not taking part in the drill. An ambulance was called and a medical orderly established that the man was dead.

No guards were posted by the WT doors. A witness stated that an employee of the shipping company who was standing by one of the two WT doors prevented passengers from going through it during the closure phase.

1.8 The crew

All the ship's senior officers were fully certified for their appointments, all were experienced and with long service in the shipping company.

Certification and years of service for the command group on the bridge:

	Certification	Sex	Age	Time in appointment	Time in traffic
Commander	Master				
	Mariner	Male	63 yrs	26 yrs	38 yrs
Chief Engineer	Marine Engineer	Male	53 yrs	19 yrs	30 yrs
Chief Officer	Master				
	Mariner	Male	49 yrs	3 yrs	6 yrs
Second Officer	Master				
	Mariner	Male	51 yrs	3 yrs	5 yrs
Purser		Female	34 yrs	13 yrs	5 yrs

Attitude of the crew to the drill

Many in the crew considered they were poorly prepared for the drill. Many had been given altered tasks in the new safety organisation, e.g. altered posts or new group members. It was felt that the new instructions had not been worked through satisfactorily and that in addition they had been distributed far too late. Many in positions of authority felt that the drill ought not to be conducted and the chief engineer put this forward to the safety officer in the presence of the drill supervisor and the crew during the run-through before the drill.

The safety officer decided, however, despite the fact that some were upset, to conduct the drill. Many crew members also thought the drill should have been preceded by one with the crew only. This is what had been done in a drill on 3 April when 200 supernumeraries had been evacuated to the lifeboats. That drill had also been carried out according to the new organisation plan.

The new safety plan required each crew member to be issued with a communications radio. The vessel lacked these in sufficient numbers, and hence radios had to be borrowed. In several cases the users were untrained. Radio discipline was poor and it had not been laid down which channels the various activities were to use. Some crew members considered that too few channels were available.

Several years previously an investigation carried out by the ship's officers had considered the possibility of reducing the ship's crew by four people. At the same time there was a general concern about losing one's job since the company was planning to man the new fast ferries with crews of only 28. It was far from clear who was to have the opportunity of serving in these vessels if they were to replace the present ones, and for many this implied that it would be better to keep a low profile while awaiting developments and not to air any views that could be interpreted as critical.

Even though the shipping company had now worked out a new organisation that according to management was more practical, many on board were negative towards this, feeling it would not work. Motivation for the drill was therefore probably low.

On the bridge the stress level was high.

Owing to pressure of work and various upsetting events on board, the second officer had not slept for more than about three hours during the two days preceding the drill.

1.9 The victim's background and role

The victim of the accident had previously been a member of the crew but was now employed temporarily as electrical engineer and repair mechanic. He was stationed in and lived in Visby and worked on board the vessel when she was in port.

He was very experienced and knew the vessel well. On this occasion he was checking and testing various systems on board. On the night of 9 April he was testing, among other things, the loudspeaker system.

On the morning of 10 April he briefly discussed with the chief engineer whether his work would be affected by the Maritime Safety Inspectorate operative control. They decided he could work in the engine room without being affected by the drill.

1.10 The watertight doors

Function

The vessel has 11 WT doors. They comply with the regulations in SOLAS 1974 (Safety of Life at Sea). Four doors are in the passenger accommodation on deck 2, forward area. This contains three sections with passenger cabins, and a cinema with foyer. The other seven WT doors are situated in the engine-room area on deck 1. Appendix 3 shows WT door no. 11 where the accident occurred.

The purpose of the doors is to limit the spread of water in the vessel and hence prevent her from sinking in the event of major damage to the hull below the waterline. They must therefore be completely watertight and strong enough to withstand the pressure of the water and hence prevent one or more watertight sections from filling in the event of a collision or running aground. They must close with force so as to push aside or crush objects in the doorway.

The M/S VISBY doors are of ship's plate and are lateral sliding doors. The actual door runs between steel guides. Opening and closing is effected by means of one hydraulic cylinder for each door. The cylinders are connected to a common hydraulic system with pump and storage tank in the engine-room. The closing force in one cylinder is approximately seven tons.

Each door can be opened and closed locally, and the doors can also be closed centrally from a panel of knobs on the bridge.

Local operation

At each door there is a mechanism consisting of two levers on a common shaft mounted through the bulkhead beside the door. With either lever it is possible to operate the hydraulic valve that opens or closes the door. In this way the door can be opened or closed from either side of the bulkhead by moving one lever up or down. When the spring-loaded lever is released it returns to its neutral position.

To open the door, the tip of the lever is raised, whereupon the door starts to open. At the same time a bell rings and a signal lamp blinks. When the lever is released the lever returns to neutral, and the door stops and re-

mains still. If the door is fully open, the bell stops ringing and the lamp goes out. If the door stops partly open, the warning signals continue.

To close the door the lever is lowered, whereupon the door starts to shut, the bell rings and the lamp blinks. When the lever is released it returns to neutral position and the door stops. When the door is fully shut the warning signals stop.

Central closure

The doors can be closed centrally from the bridge. There is a panel with a knob for each door and also a special knob marked "All doors", with which all the doors can be closed simultaneously. Each knob has two positions: Zero= Off and 1= Close.

The panel includes two lamps for each door showing whether the door is shut, open or moving. A green lamp lights for shut, a red for open and blinking red indicates a door in movement.

Normally all the knobs are in the Off position.

When a door is closed from the bridge by turning its knob from Off to Shut a signal is sent to that door's activator. At the door, the signal bell and lamp are first activated and start to ring and blink, respectively. After about 15 seconds the door starts to shut and when it is fully shut the warning signals stop.

As long as the knob on the bridge remains in the Close position the closing signal persists. There is no indication at the door that it is affected by a Close signal from the bridge. If a door is already shut when it receives a Close signal from the bridge, nothing happens: the door does not move and no warning signal is given.

If the "All doors" knob is turned from Off to Close, all the WT doors receive the Close signal and those not already fully shut will be closed after the 15-second delay.

The doors cannot be opened from the panel on the bridge: this must be done locally at each door.

Local control takes over

The local control levers act direct on the doors' hydraulic valves and hence override central closing.

Even if a door is affected by the Close signal from the central bridge panel it can still be opened locally. When the lever by the door is raised and kept in that position the door opens, the bell rings and the lamp blinks. As soon as the lever is released, it returns to neutral and the door immediately starts to shut, now controlled by the signal still being received from the bridge.

If one wishes to go through a WT door while it is receiving the Close signal from the bridge, one raises the control lever and holds it there until the door is fully open. One then reaches to the lever on the other side of the bulkhead, holds it in the upward position, lets go the first lever and goes through the doorway. Once through, one can let go the second lever, whereupon the door immediately starts to shut. During the operation the bell rings and the lamp blinks.

Instructions

By every WT door there are instructions in Swedish and English on how the doors must be operated. It is specially noted that the door must be fully open before one goes through.

All personnel working on board must receive instruction on the WT doors and practice in opening and shutting them. During the questioning by SHK of the officers and crew affected by the accident, most answered that they had been instructed on the WT doors and some that they had also had opportunities of operating a WT door. However, a few answered that they did not know how the doors functioned and one stated that he did not know they were dangerous, i.e. shut with much force.

Contact protection

By the WT doors in the passenger accommodation, the shipping company had enclosed the levers in the local control boxes in protective covers of transparent plastic. This was done to prevent passengers from closing and opening the doors without authorisation, which could be risk of injury to them. The covers are provided with locks, the keys being kept in boxes whose glass fronts can be broken when necessary.

Directly after the accident, the central door control panel on the bridge was fitted with a transparent plastic cover, taped on. The intention is to prevent inadvertent movement of the knobs.

Regular testing of the doors

According to the questioning of the crew, the function of the doors is tested every week. The controls and warning signals are tested by shutting and opening each door locally and by shutting it from the bridge.

According to unanimous reports the "All doors" knob has not been tested. This is reportedly because in this case it would be necessary to post guards at all the doors simultaneously.

Personal protection

There is no form of personal protection at or round the doors. Such protection is fitted in e.g. buses and commuter trains where a special strip is affected if a person or object is in the way when the door is shutting.

The reason for not having such protection in a passenger vessel is that the function of the doors is to shut firmly if there is imminent danger to the vessel and her passengers.

1.11 SHK's examination of the watertight doors

During the questioning on board, SHK had all the vessel's WT doors tested. The crew helped in this. One group went from door to door and operated each door with the local controls. Another group shut each door from the knob panel on the bridge. The group at the door timed the closing and shutting. They tested whether the local control could override the central Close signal. The time delay from turning the knob on the bridge to the Close position till the door started to shut was also noted.

Result

The time taken for closing or opening the door proved to be independent of whether the control was local or central. Thus it took the same amount of time for a door to go from fully open to fully closed irrespective of whether it was closed from the lever by the door or from the knob panel on the bridge.

However, the time for complete closure could be appreciably longer or shorter than for complete opening; and the times also differed a great deal between the doors.

Thus door 1 opened in 15 seconds but shut in 32 seconds, while door 3 opened in 38 seconds and shut in 17 seconds.

Door 11 (the accident door) opened in 12 seconds and shut in 7 seconds. Together with door 5 it had the shortest closing time of the eleven doors. The times measured are shown in the table below.

Later versions of SOLAS recommend a shutting time of between 20 and 40 seconds.

At SHK's request it was demonstrated that the time taken for opening and closing can be regulated by partly closing the input to or output from the hydraulic cylinder. This test was carried out on door no. 7, for which the closing time was prolonged from 12 seconds to 47 seconds by partly shutting off the circulation of hydraulic fluid.

According to the chief engineer, no adjustments or alterations had so far been made to the doors since the accident.

Table: WT doors, opening and closing times:

Door no	Opening sec	Closing sec
1	15	32
2	15	29
3	38	17
4	13	9
5	15	7
6	34	20
7	22	12
8	21	16
9	26	17
10	20	19
11	12	7

1.12 Rules in force, etc.

ISM rules

On board, all activity involving safety is regulated in compliance with the vessel's approved safety organisation system (SMS). The system meets the requirements of the International Safety Management (ISM) code, an international set of rules. To show that the vessel meets these requirements a check is carried out annually by the Maritime Safety Inspectorate. The purpose of the drill in question to carry out, in the presence of the Maritime Safety Inspectorate, an operative control for the granting of the annual signing of the vessel's Safety Management Certificate, SMC, a precondition for the vessel to remain in service. A control of this type has been performed at least once per year since 1996.

The shipping company must compile a manual for all the vessel's safety equipment handled by crew members. The manual must describe how the ship's crew is to be trained in the operation of the equipment.

SHK notes that the company's approved security handbook describes how the WT doors are operated, but that there is no section describing

situations in which they are to be closed – locally or centrally – or what safety measures must be taken.

Watertight doors

The design of, and warning signals for, WT doors are regulated in the international SOLAS 1974 rule system, continuously amended over the years. SOLAS 1974 covers many safety aspects of ships such as stability and buoyancy, closure mechanisms, life-saving appliances and fire precautions.

Rules in force for the vessel concerning the design of and warning signals for WT doors are given in SOLAS 1974 ch. II-I , rule 13. The regulations are implemented through the Code of Statutes of the Swedish Maritime Administration (SJÖFS) 1980:8. Nothing is laid down there concerning a minimum time for closure of WT doors.

According to the altered and amended rules (Consolidated SOLAS), the central knob for simultaneous closure of WT doors (All Doors) may only be used in an emergency and during testing.

2 ANALYSIS

SHK's technical investigation showed that the WT door in question and its controls functioned normally. While the closing time was shorter than what is now recommended under SOLAS, it complied with the rules applying to the vessel.

It is first discussed how the accident in the engine-room, when the repair mechanic was crushed in WT door no. 11, may have taken place. This is followed by an account of how the course of events was affected by measures taken on the bridge.

2.1 How can the accident have happened?

The repair mechanic was working alone in the engine-room area, testing various control systems. He started work before the evacuation drill started. For his work he needed to go through WT doors that had been shut locally for the drill.

He was found caught fast in door no. 11 with the door itself pressed against his back and the door-frame against his chest. Both arms were free and from his position he could have reached the two levers used to operate the door locally.

It is possible to go through the door in different ways:

1 Follow the instruction and open the door fully. Keep pressing the lever on one's own side of the bulkhead and take hold of the lever on the other side. Then let go of the first lever and go through the doorway. Once through, release the second lever. The alarm bell rings and the lamp blinks while the door is in motion.

2 Follow the instruction, open the door fully and release the lever. The door immediately starts to close, the alarm bell continues to ring and the lamp to blink. In this case the door is activated from the bridge. Stay on one's own side of the door, take hold of the lever again and open the door

fully. While holding it in the “Open” position, reach through to the lever on the other side and continue as in alternative 1.

3 Follow the instruction, open the door fully and release the lever. The door stops, the alarm bell stops ringing and the warning lamp stops blinking. In this case the door is not activated from the bridge. Go through the opening.

4 Partly open the door and release the lever. The door stops but the alarm bell continues to ring and the lamp to blink. In this case the door is not activated from the bridge. Go through the opening and close the door with the corresponding lever on the other side of the bulkhead.

5 Partly open the door, release the lever and start to go through. The door starts to close the moment one releases the lever. The alarm bell rings and the lamp blinks. The door is activated from the bridge. The opening closes in a few seconds.

If one follows the instruction and acts according to alternatives 1 to 3, one comes to no harm.

Passage according to points 4 and 5 is against the instructions and is a very dangerous way of going through a WT door.

When the vessel is in port the WT doors in the engine-room are usually open to allow free passage between the areas during work. If a door is shut, crew members normally open it according to alternative 3. If an open door is activated from the bridge the alarm bell first starts to ring and the warning lamp to blink for 15 seconds before the door starts to close. Personnel going through or working near the door have time to move or take hold of one of the control levers.

In alternative 4 the alarm bell and lamp are already warning. Anyone approaching the door to go through cannot decide if or when the door will start to shut, activated from the bridge.

If the door in question was half open, it took only three seconds to close it completely.

In unfortunate circumstances an accident can occur even if the instructions are followed. An example is if the person going through the door trips and lets go of the control levers. But in this case, when the door starts to shut the person has the time it takes for the door to close to get away from the doorway or to grasp one of the levers.

The deceased was standing up in the door facing the frame where the levers are mounted. There was no sign that he had tripped or become caught up in anything when going through.

SHK considers it most probable that the repair mechanic was crushed in the door when he had not opened it completely and that the accident thus occurred according to alternative 5 or possibly alternative 4.

A probable chain of events is as follows:

It was established from the interviews that the repair mechanic had commenced work and started opening and shutting WT doors before the doors were activated from the bridge. Here he would have noted that the doors were controlled locally, i.e. that a door opened with a hand lever stopped when the lever was released and had to be shut actively with a lever. Thus assured, he continued work.

The repair mechanic could not hear the announcement from the bridge that the WT doors were going to be closed. This is because there were no loudspeakers in the engine room areas.

If he shut the doors after him according to instructions in force it is not likely that he could have noted when the doors were activated from the bridge. For this it would have been necessary for him to notice a door shutting even though he was not using its lever, or that a door he had completely opened started to give the alert with bell and lamp. If he had observed this, as an experienced worker he would surely have reacted and realised that the doors were now activated from the bridge.

Now if all the WT doors in the engine room were still shut when the second officer turned the "All doors" knob to "Close", nothing would be noticed in the engine-room since, when already shut, a door gives no warning signal when closure is activated from the bridge.

When the repair mechanic came to a door he found it shut, apparently in the normal way. Not until he released the lever with which he had started to open the door did it change direction immediately and start to shut instead of remaining in the same position as previously. He was unprepared for this and if he had only partly opened the door he would have been surprised and would have no time to get out of the way, but was caught.

Since he went through the opening with his back to the actual door, it is not even certain that he noticed that the door had immediately started to close.

The repair mechanic was experienced, and fully aware that the doors possessed great closing force. But for a person who works for a long time in the same place and performs many work items as routine, it is natural to cut down on items that appear familiar, well-controlled and, moreover, unnecessarily time-consuming. Such an item may be the need to wait some tens of seconds while a WT door opens fully, leaving an opening of more than a metre wide: this when one needs only half a metre to pass through. And maybe there is only a brief job to be done on the other side of the door before one is to return through the same door.

Experience from other shipping companies shows that it is common for those whose jobs involve operating WT doors to be tempted to shorten the operation by only partly opening a door and going through without first taking hold of the lever on the other side. This has led to a number of serious accidents in Swedish and foreign ships, Appendix 2.

2.2 Signals by the door

Signal lamps and bells beside a WT door give warning of when a door is in motion or is partly open. The signals are the same regardless of whether the automatic closing system is activated. This must be considered to be an unsuitable design. The purpose of a warning signal is to call attention to a circumstance that requires special caution. With the present design, there is no warning signal to show that central door closure is activated.

2.3 The central panel

The central panel features knobs for shutting each WT door separately and a knob for simultaneous shutting of all WT doors: "All doors". It takes only a few seconds to activate door closure by turning the individual knobs. In

this way each closure can be considered separately and the "All doors" knob could be omitted.

2.4 Instruction and training

SHK notes that several of the ship's command group said they had not operated a WT door and at least one did not know that they shut with great force.

SHK also notes that the company's safety manual deals with how the WT doors are operated but that there is no section on circumstances in which they are to be closed – locally or centrally – or on what safety measures are to be taken.

2.5 What happened on the bridge that affected the situation in the engine-room?

SHK considers that WT doors should not be closed from a central position during a drill.

Shutting WT doors centrally in the event of a fire in the engine-room cannot be considered advisable since any fire hoses passing through the doorways would have been crushed, thus shutting off the water supply.

The factual report describes how the command group assembled on the bridge, how the drill started; and that the group was notified from the engine control room that the engine-room fire was out of control. The master decided that the passengers were to be evacuated to the terminal.

When the second officer asked the master if he was to shut the WT doors the latter asked no questions but answered affirmatively. The master gave no instructions but left it to the second officer to perform this operation himself. He returned to the control panel, called out over the loudspeaker system that the WT doors were to be shut, and then activated all the WT doors with the "All doors" knob.

No member of the command group reacted and SHK in its investigation has been unable to establish whether the others on the bridge, including the master and the drill supervisor from the Maritime Safety Inspectorate realised that it was the "All doors" knob that was used. In this way all the WT doors in the vessel were activated and two open doors in the passenger accommodation were shut.

SHK judges that the reason why guards were not posted when the doors were closed and that the "All doors" knob was used was that nobody present on the bridge was prepared for the eventuality that the WT doors would be closed at all.

This applies to the master, the command group and the drill supervisor from the Maritime Safety Inspectorate. None of these prevented the operation or uttered any warning.

One explanation of the action on the bridge can be the high level of stress and the fact that at least one member of the command group had slept for only a few hours during the two days preceding the drill.

3 CONCLUSIONS

3.1 Findings

- All the officers involved were certificated for their tasks
- The WT doors and their operating systems complied with the rules applying to the vessel.
- A serious near-accident occurred through the WT doors being activated from the bridge, whereupon two doors in the passenger accommodation were closed. They were not guarded.

3.2 Causes of the accident

The probable cause of the accident was that the deceased did not follow the instructions for safe passage. Contributing to the accident were the following factors:

- The door where the accident took place had a short closing time.
- Closure of the doors was activated from the bridge.
- There was no direct indication of when a shut WT door had been activated from the bridge.
- The master did not use the resources on the bridge, i.e. the command group.

4 RECOMMENDATIONS

SHK recommends

- that the warning signal at WT doors be so designed that special warning is given when closing is activated centrally (*RS 2003:01 R1*).
- that, in vessels with individual knobs in the central panel for the WT doors, the "All doors" knob be abandoned (*RS 2003:01 R2*).
- that the knobs in the central panel be touch-protected, e.g. under a removable cover (*RS 2003:01 R3*).
- that the closing time for WT doors should comply with the latest SOLAS recommendations (*RS 2003:01 R4*).
- that the shipping company's safety manuals should contain instructions on the situations in which WT doors are to be closed, and how. These should also include situations in which drills or operative controls are being conducted with passengers taking part. (*RS 2003:01 R5*).
- that it be stated in the shipping company's safety manuals that all the ship's crew are to receive regular instruction regarding the design of WT

doors and their signals, and that crew members are to practice operating these doors. (*RS 2003:01 R6*).

- that the Swedish Maritime Safety Inspectorate should examine the routines for planning operative controls involving passengers and supernumeraries. In this planning, particular attention should be paid to dangerous components and to the ship inspectors' preparedness to intervene if situations arise where there is risk of injury to passengers. (*RS 2003:01 R7*).

Appendix 1: Instruction cards

(Bilder borttagna av TC pga många megabyter!)

106 Watch First officer. Rescue command Visby

Crew alert Mr Gothlight Red or Green

Mr Gothlight Red indicates fire Green other incident

Day/night tour Duty: Navigation Assembly station: Bridge

- IF INCIDENT REQUIRES MR GOTHLIGHT
- ANNOUNCE VIA LOUDSPEAKERS MR GOTHLIGHT RED OR GREEN
- SEND HAND IMMEDIATELY TO AROUSE CREW DECK 9 and **38/4324** (?*)
- WATERTIGHT DOORS
- REVIEW OF SITUATION WITH RESCUE COMMAND
- NAVIGATION/COMMUNICATION ONGOING WITH MASTER
- EXTERNAL COMMUNICATION/COMMUNICATION ONGOING WITH MASTER
- FURTHER REVIEW OF SITUATION WITH RESCUE COMMAND

Channel

Evacuation alert

Seven short signals and one long -----

Day/night tour Duty: Navigation Assembly station: Bridge

- REVIEW OF SITUATION WITH RESCUE COMMAND
- NAVIGATION/COMMUNICATION ONGOING WITH MASTER
- EXTERNAL COMMUNICATION/COMMUNICATION ONGOING WITH COMMANDER
- FURTHER REVIEW OF SITUATION WITH RESCUE COMMAND
- REVIEW OF SITUATION WITH RESCUE COMMAND

Channel

Appendix 2

References to accidents with WT doors

SHK has found the following reports concerning accidents with water-tight doors in passenger ships. There are several examples both in Sweden and abroad.

1. Marine Surveying Department, Norrköping: **Passenger vessel LION PRINCE, SDGW – fatal accident 1993-10-10**
report dated 1993-12-09 (in Swedish)

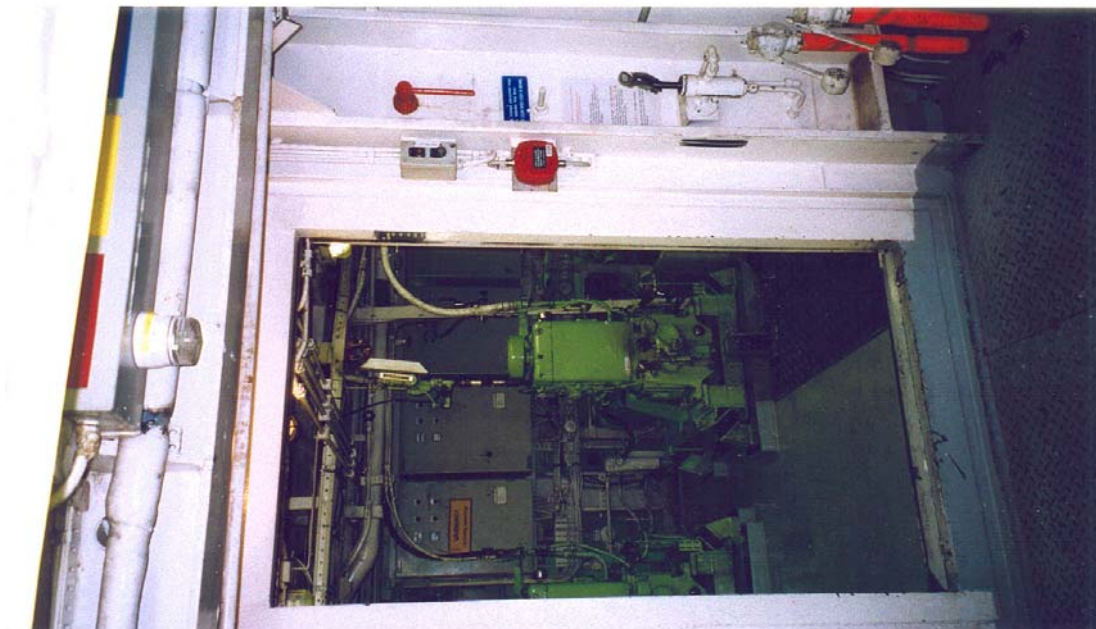
2. Department of Transport, Marine Accident Investigation Branch, United Kingdom
Report of the Investigation into the death of a donkeyman on mv P&OSL KENT on 10 November 1998 off the Port of Dover MAIB 1/10/186

3. Department of Transport, Marine Accident Investigation Branch, United Kingdom
Report on the investigation of an accident which caused major injury to an engineer officer on board ROYAL PRINCESS in NE traffic lane, Dover Strait TSS, 4 August 2001
/MAIB Report No 34/2002, November 2002

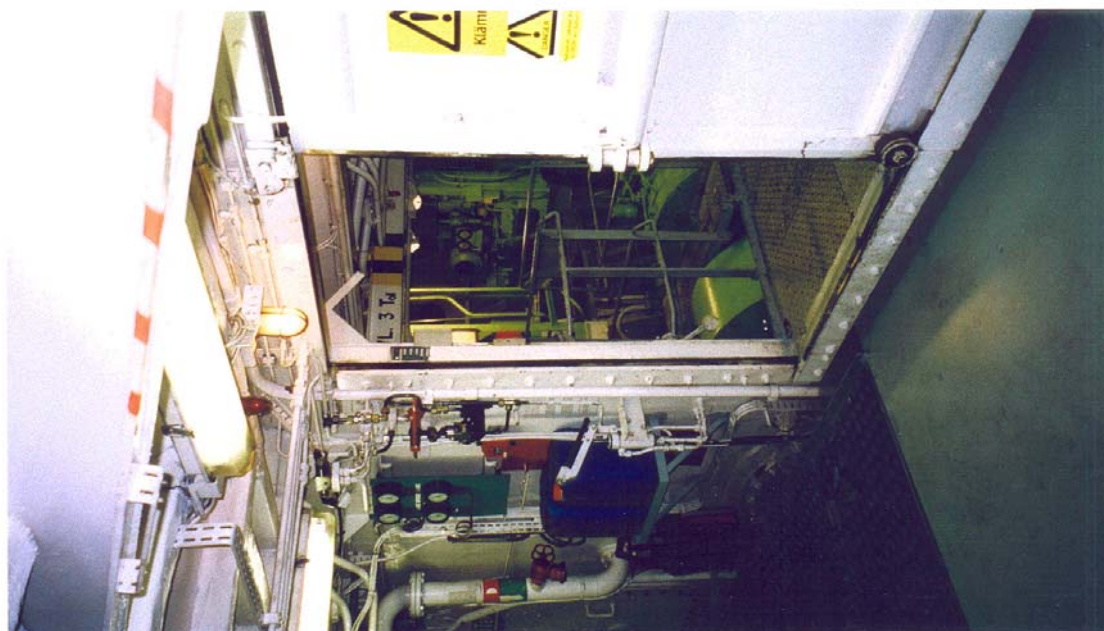
Appendix 3

The door where the accident happened, WT door no. 11

Bilaga 3: Dörren där olyckan hände, VT-dörr nr 11



Dörren sedd akterifrån



Dörren sedd förförån

Upper picture picture: View looking forward
Lower picture: View looking aft