



Bundesstelle für Seeunfalluntersuchung
Federal Bureau of Maritime Casualty Investigation
Federal Higher Authority subordinated to the Ministry of Transport
and Digital Infrastructure

Investigation Report 402/15

Very Serious Marine Casualty

**Fatal accident on board
the charter yacht DESDEMONA
on 21 September 2015 in the area of
the approach to Rostock-Warnemünde
between fairway buoys 9 and 11**

26 April 2017

The investigation was conducted in conformity with the Law to improve safety of shipping by investigating marine casualties and other incidents (Maritime Safety Investigation Law – SUG).

According to said Law, the sole objective of this investigation is to prevent future accidents. This investigation does not serve to ascertain fault, liability or claims (Article 9(2) SUG).

This report should not be used in court proceedings or proceedings of the Maritime Board. Reference is made to Article 34(4) SUG. The German text shall prevail in the interpretation of this report.

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1 Summary

An accident with subsequent loss of life occurred on the German-flagged sailing yacht *DESDEMONA* while en route from Gedser to Rostock-Warnemünde on 21 September 2015.

The *DESDEMONA* is a charter yacht and her port of registry is Lübeck. The four-person crew had chartered the yacht for the period 19–25 September 2015 for a sailing trip on the Baltic Sea.

On the day of the accident, the *DESDEMONA* sailed out of the Danish port of Gedser at about 1000¹ under engine power and then proceeded toward Rostock under sail in wind forces of 4–5 Bft.

She passed the Rostock approach shortly before 1300 and then continued close to the green buoy line of the Warnemünde navigational channel outside the fairway. A decision was made on board to strike the sails while in harbour mode and sail into Warnemünde under engine power.

At about 1330, a crew member who wanted to assist with taking in the sails suddenly fell overboard between fairway buoys 9 and 11. In all likelihood, the fall was due to a violent movement of the yacht caused by a swell. Despite the rescue effort immediately initiated by the other three crew members, it was not possible to haul the casualty back on board. Similar to the remaining crew members, the casualty was neither wearing a lifejacket nor was he secured by a line.

The casualty lost consciousness shortly after falling into the water and drowned in the Baltic Sea. The emergency services were alerted at about 1345. They arrived at the scene only a few minutes later but were unable to find the sailor.

On 1 October 2015, the body of the sailor was found drifting lifeless in the Baltic Sea some four nautical miles north-east of the scene of the accident by an operational vessel of the German Navy and recovered by the crew of the summoned WSP boat *WARNOW*.

¹ All times shown in this report are local = UTC + 2 hours (CEST).

2 FACTUAL INFORMATION

2.1 Photo of the SY DESDEMONA



Figure 1: Photo of the SY DESDEMONA

2.2 Ship particulars: SY DESDEMONA

Name of ship:	DESDEMONA
Type of ship:	Sailing yacht
Nationality/Flag:	Germany
Port of registry:	Lübeck
Official identification number:	HL-321
Year built:	1959
Shipyard:	G. D'Este, Venice
Length overall:	11.78 m
Breadth overall:	3.02 m
Draught:	1.60 m
Displacement:	7.50 t
Engine rating:	37.00 kW
Main engine:	VW diesel
Hull material:	Wood (mahogany on oak)
Crew (max./on the day of the accident):	6/4

2.3 Voyage particulars: SY DESDEMONA

Port of departure:	Gedser, Denmark
Port of call:	Rostock-Warnemünde
Type of voyage:	Private sailing trip on a chartered yacht

2.4 Marine casualty information

Type of accident:	Very serious marine casualty, fatal accident
Date, time:	21 September 2015, approximately 1330
Location:	Baltic Sea; Rostock-Warnemünde approach between fairway buoys 9 and 11
Latitude/Longitude:	Approx. ϕ 54°13.0'N λ 012°04.2'E
Ship operation and voyage segment:	Harbour mode
Consequences:	Death of crew member after falling into the water

Extract from Nautical Chart No 1672 (INT 1355; Port of Rostock), BSH

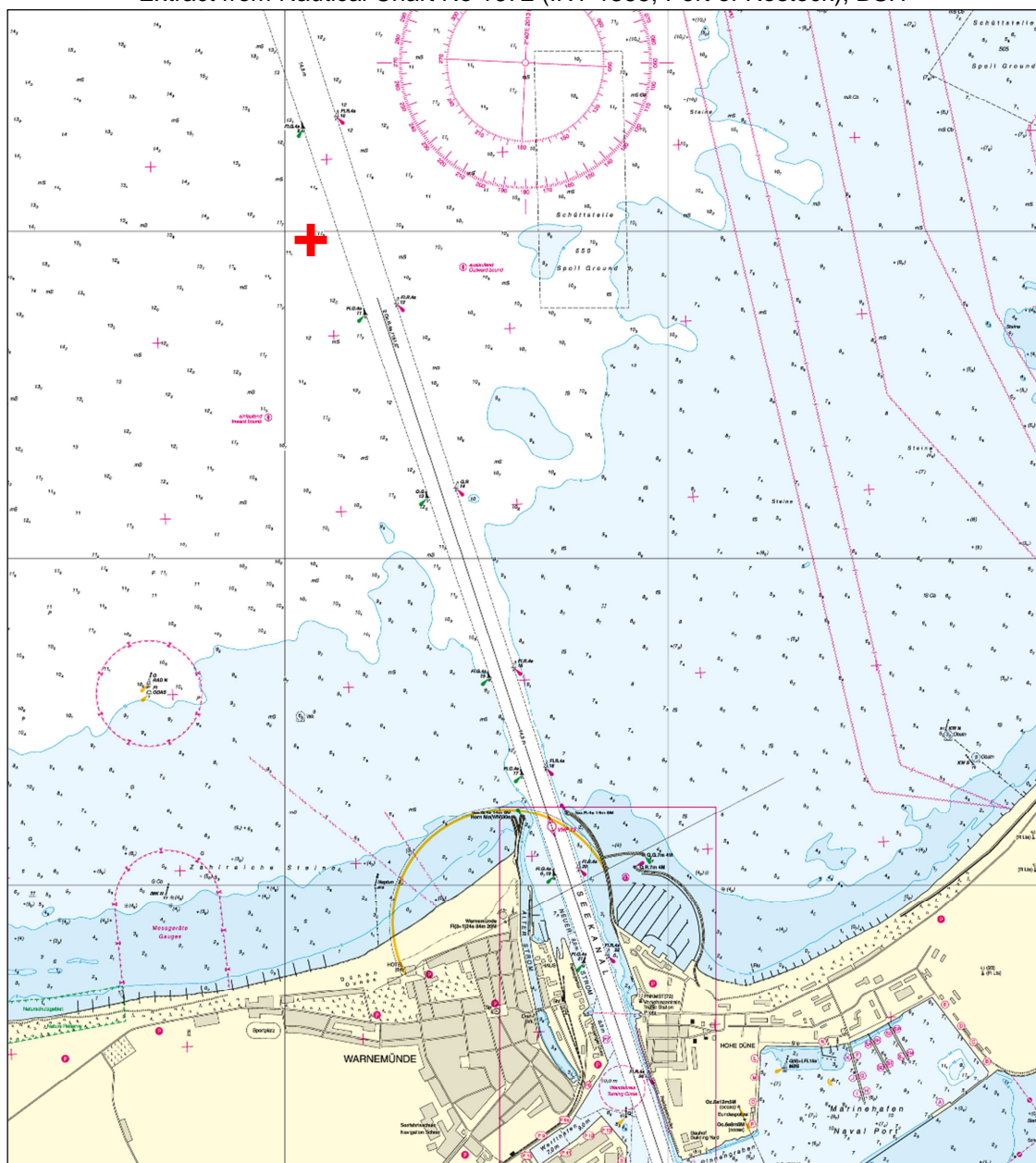


Figure 2: Scene of the accident

2.5 Shore authority involvement and emergency response

Agencies involved:	Co-ordination Centre Hanse, Maritime Rescue Co-ordination Centre (MRCC) Bremen, German Maritime Search and Rescue Association (DGzRS), Waterway Police (WSP) Rostock, Federal Police, Rostock Fire Service
Resources used:	Fire service vessel FLB 40-3 (including dive team), rescue cruiser ARKONA, pilot boat MUTTLAND, police boat WARNOW, federal police boat PRIGNITZ, rescue helicopter
Actions taken:	After receipt of the accident report, prompt initiation of the search operation by the above craft and the helicopter; search in the water by divers
Results achieved:	Search unsuccessful; casualty recovered from the Baltic Sea dead on 1 October 2015

3 COURSE OF THE ACCIDENT AND INVESTIGATION

3.1 Course of the accident

3.1.1 Events on the yacht prior to the accident

On Friday 18 September 2015, a staff member of the charter agency² responsible for managing the privately owned sailing yacht DESDEMONA handed her over to the charterer, his brother and another crew member (the subsequent casualty) at her berth in Lübeck-Travemünde based on a charter contract typical of the industry. The contract merited no criticism from a legal or factual perspective. According to consistent witness testimony, an extensive pre-compiled list was used to check the yacht's inventory, which included various items of safety equipment, for completeness during the handover. The BSU was unable to obtain the corresponding handover record, however (see instead the example of a record in **Figure 3** below).

² As regards the particulars of the agency contract, which should be viewed separately to the charter contract, see the comments in section 3.3.2.1 of this investigation report.

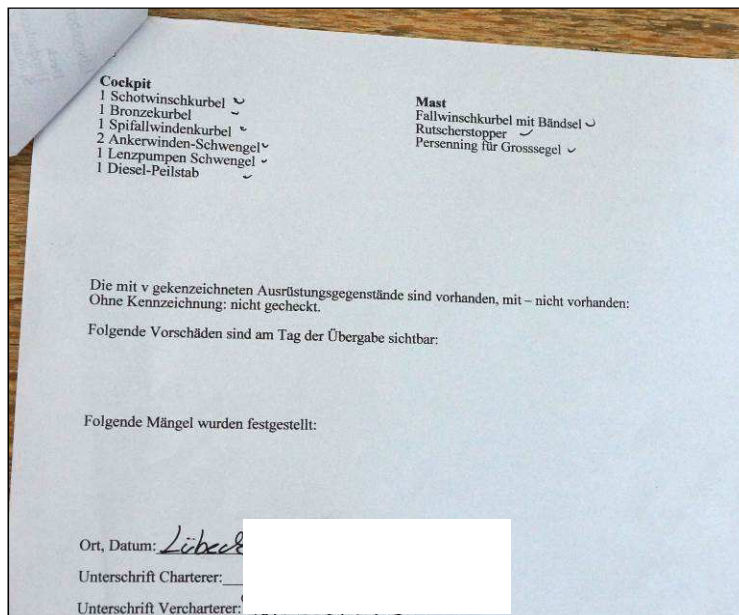
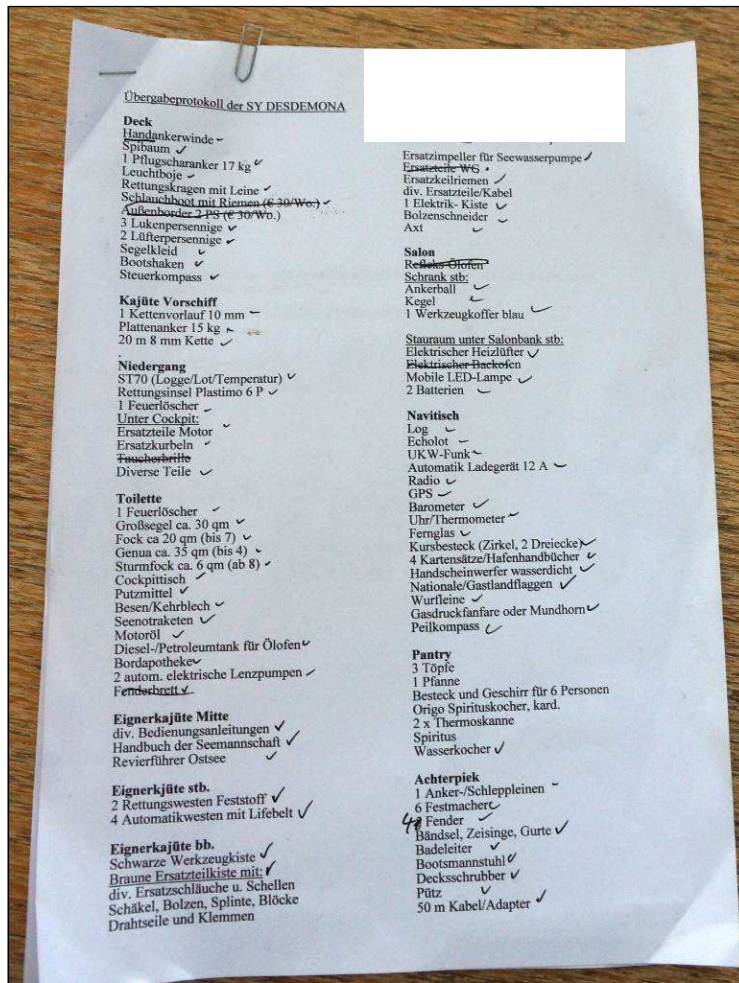


Figure 3: Example of a handover record used for the SY DESDEMONA³

³ Note: The record was prepared for a subsequent charter of the yacht and is used here only as an example.

A fourth crew member boarded in Travemünde on the morning of the following day, Saturday. Accordingly, the yacht's crew consisted of four people. They had agreed among themselves to share the cost of chartering the boat, which was scheduled to last for a week.

The role of skipper was divided between the principal charterer of the yacht and his brother in the days that followed. Both have years of experience in sailing pleasure craft and traditional vessels and hold Germany's international certificate for operating pleasure craft in coastal waters not exceeding 30 nautical miles (Sportseeschifferschein).⁴

The two other crew members were neither in possession of operator certificates for pleasure craft nor particularly experienced or trained in handling sailing vessels. The subsequent casualty did own and use a motor boat moored on the Greek coast, however. Inasmuch, the behaviour and safety requirements on board a pleasure craft were not entirely alien to him.

Due to insufficient or non-existing knowledge and experience in dealing with sails, the two skippers predominantly carried out the associated work on board and were a well-coordinated team in this regard. The two other crew members merely assisted from case to case and acted only as directed. Their assistance was not necessarily required to sail the yacht properly.

The first leg of the planned sailing trip on the Baltic Sea was made on 19 September 2015, i.e. they sailed from Travemünde to Fehmarn. After spending the night in the port there, they sailed to Gedser on the next day, Sunday 20 September 2015.

On 21 September 2015, the DESDEMONA sailed out of the port of Gedser at about 1000 under engine power and then proceeded under sail toward Rostock in wind forces of 4–5 Bft.

As on the days prior to that, they dispensed both with using the lifejackets available on board and personal protection using safety lines.

Shortly before 1300, they passed the Rostock approach in the middle of the fairway. A decision was made on board to strike the two sails that had been set (main and foresail) before the entrance of the port and then to sail toward the berth in Warnemünde under engine power. To avoid unnecessarily obstructing traffic transiting the fairway, the skipper steered the yacht in an area just outside (west of) the fairway.

⁴ Note: The Sportseeschifferschein („SSS“) is one of Germany's official certificates for operating pleasure craft. The training and examination focus on sailing yachts under sail and engine power in coastal waters. The test requirements are far more stringent than those needed to acquire the German certificate for operating seagoing pleasure craft (Sportbootführerschein-See). See also the comments in section 3.3.4.

They then started to take in the sails level with fairway buoys 9 and 11. To retain manoeuvrability in the meantime, the yacht's engine was started and set to neutral.

After the mainsail was taken in and secured, one of the two skippers went to the bow pulpit to take in the foresail from there. The second skipper controlled the helm. The third crew member stayed next to the helmsman in the aft section of the yacht.

The fourth crew member (the subsequent casualty) offered to assist with taking in the foresail. To that end, this member of the crew stayed in the area of the mast on the port side of the yacht in the ensuing period, from where he was supposed to pull the sail sternward after the skipper had taken it in and lashed it to the bow pulpit, so that it could be properly secured over the entire length on deck.

The positions described above, in which the four crew members were located immediately before and during the accident are indicated by a colour in **Figure 4** below, which shows the DESDEMONA at her berth in Lübeck-Travemünde on a later date. The subsequent casualty was located within the red circle.



Figure 4: Position of the crew members at the time of the accident

3.1.2 Events surrounding the accident

While the skipper was busy lashing down the struck foresail at the bow pulpit, the side of the yacht was suddenly caught by a wave, which caused her entire hull to rise and fall extremely violently. As a result of the centrifugal forces that inevitably occurred, the crew member crouching in the vicinity of the mast was thrown backwards over the guard rail on the port side. The casualty was initially able to hang onto the guard rail for a brief period outboard.

3.1.3 Rescue effort on board

The skipper busy with securing the foresail in the area of the bow pulpit did not initially notice that a fellow sailor had been thrown over the guard rail. He only became aware of the accident after a loud "person overboard" call made by the skipper controlling the helm and a subsequent glance toward the stern. He immediately went to the crew member, who was about two metres away hanging on the guard rail outboard, as quickly as the swell-induced movements of the yacht permitted, but the casualty slid off just as he arrived.

The accounts of the subsequent rescue effort given by the crew members differed in places. Items of information were contradictory or could not be reconciled with the circumstances found. After a global assessment of the witness testimony, it is reasonable to assume that the sequence of events was essentially as follows:

The boat was initially turned under engine power to return to the crew member drifting in the water. A mooring line was then thrown to the casualty – who also managed to take hold of it – at least once.⁵ It transpired after the line was thrown (or after the casualty pulled it) that the other end was neither fastened to the boat nor held onto by another crew member, meaning it fell into the water and the desired line connection between casualty and yacht inevitably failed.

A second rescue attempt, ultimately also unsuccessful, involved throwing the horseshoe buoy attached to the guard rail in the yacht's aft section to the casualty (see **Figures 5 f.**). These efforts also failed because the line belonging to the horseshoe buoy (see area marked red in **Figure 6**), which was on a drum and designed to form the connection between thrown horseshoe buoy and yacht, did not unwind properly when it was thrown. Accordingly, it was only possible to throw the horseshoe buoy about one to two metres in the direction of the drifting casualty, and thus not far enough.

⁵ Note: The fact that the casualty managed to take hold of the line thrown to him could be reconstructed beyond doubt based on the situation of the body when it was found – the line was still looped around his torso.



Figure 5: Horseshoe buoy in the yacht's aft section

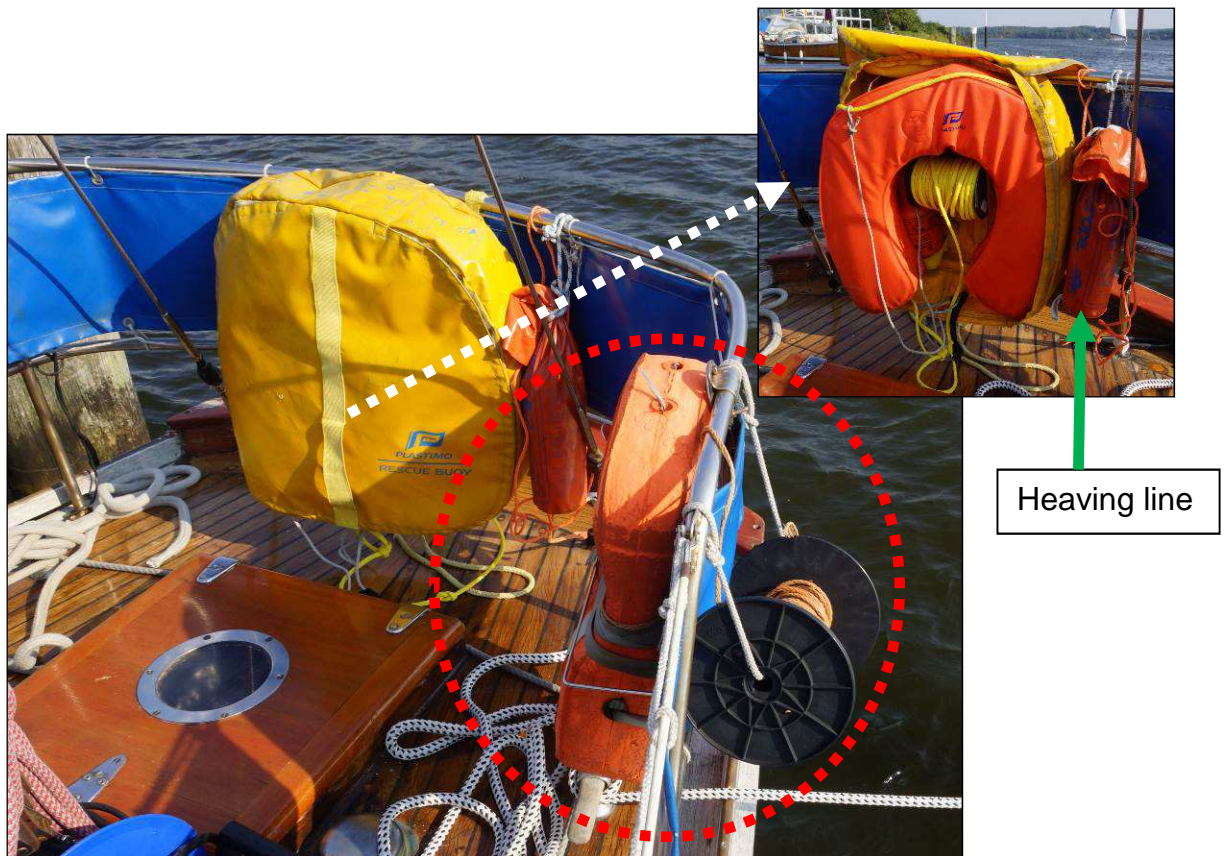


Figure 6: Horseshoe buoy and associated winding drum⁶

⁶ Note: The horseshoe buoy (also combined with a winding drum) under the yellow cover to the left of the horseshoe buoy circled red was not installed on board at the time of the accident. The charter company installed it on board additionally because of the accident. (This involved relocating the orange horseshoe buoy from the aft guard rail to its port side for reasons of space.)

Although the water temperature in the Baltic Sea was about 16°C and the average wave height less than one metre at the time of the accident, the casualty quickly ran out of energy in the water. According to the witness testimony, he mainly moved his legs after falling into the water. The sailor was clearly unconscious after a few minutes. He initially drifted on the surface with his face down before drowning in the Baltic Sea.

3.1.4 Emergency call/search and rescue (SAR) operation

After the rescue effort made on board failed and the casualty had drowned, one of the two skippers dialled the general emergency number (112) on his mobile phone. Sending an emergency call on VHF was reportedly impossible because the VHF radio on board the DESDEMONA had reportedly been defective since the handover. By contrast, claiming it was highly unlikely that it was defective at the time of the accident, the charter company emphasised that the radio reportedly (still) worked when the previous crew was on board.⁷

The general emergency call centre forwarded the skipper to the locally competent Rescue Co-ordination Centre Hanse, which after recording the emergency call immediately (at 1345) started to co-ordinate the SAR operation together with MRCC⁸ Bremen.

The police boat WARNOW and rescue cruiser ARKONA reached the DESDEMONA at about 1400. The yacht remained at the scene of the accident after sending the distress call and circled the area in which the casualty drowned so as to mark it.

After the police boat and the rescue cruiser had reached the scene of the accident, the DESDEMONA was released. She headed for Warnemünde and arrived there at about 1430. The crew was then supported by a counsellor.

During the period between 1400 and 1900, a helicopter, various vessels, and a dive team from the Rostock fire and rescue office carried out an extensive search for the missing sailor. The major search operation was discontinued after dusk until the following morning. It was not possible to find the sailor on the following day, either.

3.1.5 Recovery of the casualty

At about 1028 on 1 October 2015, the skipper of a motor launch (V19⁹) on a transfer voyage from Rostock to Stralsund reported the discovery of a person floating lifeless in the water at the position ϕ 54°15.4'N λ 012°09.9'E (=four nautical miles north-east of the scene of the accident) to Vessel Traffic Service Warnemünde on the area radio channel 73.

⁷ Note: A carriage requirement for a VHF radiotelephone system/GMDSS applies only for pleasure craft available for chartering of at least 12 metres in length.

⁸ MRCC: **M**aritime **R**escue **C**o-ordination **C**entre

⁹ Note: Motor launch V19 is a utility boat of the German Navy used for transporting personnel.

WSP boat WARNOW immediately sailed to the motor launch, which was waiting at the position specified. At the same time, the fishing vessel MV SEEADLER sailed for the position at which the casualty was found.

The police boat and an inflatable deployed by the SEEADLER both arrived at the position of the casualty at about 1124. A body recovery device was deployed from the police boat and the body, which had a mooring line of some 16 mm in thickness looped around the torso and right arm, was recovered with the help of the crew of the inflatable. The police boat moored at berth 30 in the sea port of Rostock at 1230.

The recovered body was subsequently unequivocally identified as the crew member from the DESDEMONA who lost his life on 21 September 2015.

3.2 Consequences of the accident

The casualty lost his life during the swell-induced fall into the Baltic Sea.¹⁰

3.3 Investigation

3.3.1 Course, sources and material particulars

Waterway Police Inspectorate (WSPI) Rostock informed the Federal Bureau of Maritime Casualty Investigation (BSU) about the accident on the day after it occurred.

During the investigation, the BSU interviewed witnesses, surveyed the yacht, sighted various documents, including the agency and charter contracts, and requested a report on the weather and sea conditions at the time of the accident from Germany's National Meteorological Service (DWD).

In the interest of an exhaustive review of all the available sources of information, the findings of the WSPI and Criminal Investigation Department Rostock were also referred to. Moreover, the autopsy report was evaluated.

The sources referred to above made it possible to understand the course of the accident and its causes, as well as to draw the necessary conclusions from this tragic event.

3.3.2 SY DESDEMONA

3.3.2.1 Legal categorisation of the vessel

The DESDEMONA is a privately owned wood sailing yacht. She is of a classical design and was built in Venice in 1959. The two current owners, who are domiciled in Berlin, placed the yacht at the disposal of a Lübeck-based company called Klassik-Yachtcharter (referred to below as 'agency') based on an agency contract concluded on 16 August 2004 for the purpose of chartering her to third parties.

¹⁰ Note: See the comments on the cause of death in section 3.3.6.

According to the aforementioned contract, which the BSU has been provided with, the agency is acting on behalf of the owners as an exclusive agent for charter contracts, which it concludes with the charterer in their names. In addition to acting as agent, i.e. concluding charter contracts, the agency has assumed the following obligations:

- transferring the yacht to/from and briefing the charterer;
- year-round assurance that the yacht is in an operational and clean condition;
- weekly inspection of the yacht at berth, and
- routine servicing, maintenance and cleaning work, as well as minor repairs (e.g. replacement of light bulbs, oil changes, installation of spare parts, inspection and testing of technical systems).

In addition to placing the yacht at the disposal of the agency, the owners have the following obligations according to the aforementioned agency contract, inter alia:

- equipment of the yacht in accordance with statutory requirements;
- responsibility for ensuring the yacht is in a technically perfect condition, and
- presentation of a valid boat certificate.¹¹

The agency receives a contractually agreed percentage of the charter revenue (charter commission) for the services it provides.

Due to her structural design (cabin with overnight accommodation, suitable and intended for voyages seaward of the baseline), the DESDEMONA is a large pleasure craft within the meaning of Article 2(1) of Germany's Regulation on seagoing pleasure craft (See-Sportbootverordnung – SeeSpbootV).

3.3.2.2 Boat certificate

3.3.2.2.1 General comments

Article 7(2) SeeSpbootV states that a pleasure craft may only be chartered, i.e. placed at the disposal of a charterer without provision of a skipper or crew, if she has a boat certificate issued by the approving authority, as per specimen 1 of this Regulation's Annex. Articles 5 and 6 SeeSpbootV deal with the formal requirements for the issue of the boat certificate, i.e. the approval procedure.

They state that upon request the boat certificate, which officially confirms the seaworthiness and proper equipment of the pleasure craft, is issued limited to a period of two years (or a period of three years for newly-built craft). It may be renewed for two-year periods thereafter. The approving authority is the waterways and shipping office (WSA) in whose district the pleasure craft is permanently berthed. The boat certificate for large pleasure craft includes a minimum equipment schedule that corresponds with the specimen shown in Annex 1 to Article 5 SeeSpbootV.

¹¹ Note: See also the comments in section 3.3.2.2.

The issue or renewal of the boat certificate requires that the approving authority inspect the pleasure craft based on the inspection schedule laid down in Appendix 2 of the SeeSpbootV. The necessary survey may also be performed by a surveyor from BG Verkehr¹² or an approved classification society.

3.3.2.2.2 Issuance of the boat certificate for the DESDEMONA

On 9 July 2014, the agency responsible for the DESDEMONA sent an application to the competent WSA Lübeck for renewal of the boat certificate, which was due to expire on 4 September 2014. A surveyor from the classification society (DNV GL) performed the necessary survey, which revealed minor deficiencies that were irrelevant to the subsequent accident, on 22 July 2014. Specifically, the absence of a proper anchor, the signal flags 'N' and 'C', and the inadequate contents of the first-aid kit were challenged. The surveyor also noted on the technical approval report that the seawater-bearing lines must be secured with two hose clamps per connection. The report indicated that written notification that the above deficiencies were eliminated must be sent to the WSA responsible for issuing the certificate.

The agency erroneously failed to send the corresponding notification to WSA Lübeck in the period that followed. As a result of this, the boat certificate that was prepared by the WSA following the survey was not sent to the agency, which inevitably meant that the DESDEMONA was not in possession of a valid boat certificate at the time of the accident.

3.3.2.3 General condition of the yacht

Apart from the absence of the boat certificate, the issue of the carriage of life-saving appliances discussed separately below, and the aforementioned problem that the VHF radio equipment, which although available on board was not a carriage requirement, was possibly defective, the yacht was in a satisfactory and seaworthy condition at the time of the accident.

3.3.2.4 Life-saving appliances on board

3.3.2.4.1 Equipment during the inspection of the yacht in July 2014

Since the surveyor from DNV GL did not find any deficiencies in the life-saving appliances required on board during the aforementioned inspection of the DESDEMONA on 22 July 2014, it is reasonable to assume that the relevant requirements of the SeeSpbootV were complied with at the time in question. During his inspection of the yacht, the surveyor found the deficiencies referred to above, which in terms of ship safety were only of secondary importance and viewed objectively can be regarded as extremely minor. This indicates that he proceeded very carefully during his inspection of the yacht. Consequently, it is highly unlikely that any deficiencies in the boat's safety equipment would have been overlooked. Rather, it can be assumed that in July 2014 the DESDEMONA was properly equipped with the life-saving equipment listed in the minimum equipment schedule belonging to the boat certificate.

¹² BG Verkehr: Berufsgenossenschaft Verkehrswirtschaft Post-Logistik Telekommunikation [German social accident insurance institution for commercial transport, postal logistics and telecommunication].

According to the technical approval report of 22 July 2014, the following life-saving appliances were on board:

- two lifebuoys, of which at least one with a line and light;
- six automatic/non-inflatable lifejackets (next service: 05/2015);
- six safety belts and safety lines;
- one liferaft;
- four parachute signals (red); four handheld flares (red), and
- two buoyant smoke signals (orange).

3.3.2.4.2 Equipment at the time of the accident

According to the witness testimony concerning the course of the rescue operation and the findings of the survey of the yacht by officers of WSP Rostock during their preliminary investigation on board, it is reasonable to assume that the following life-saving appliances were on board the DESDEMONA on the day of the accident:

- one lifebuoy with line (in the form of a horseshoe buoy);
- four automatic lifejackets (including three with expired service date)¹³ with safety belts and lines attached.

The police report contains no information as to the presence of a liferaft, parachute signals or smoke signals.

Assuming the latter three items of equipment, which were irrelevant in terms of the events surrounding the accident, were on board the yacht, then it still remains to be noted that only one of the two lifebuoys referred to in the equipment schedule was on board. Furthermore, the total of four lifejackets was not consistent with the six lifejackets (including non-inflatable) required in the schedule.¹⁴

3.3.2.4.3 Use of life-saving appliances on the day of the accident

The witness testimony indicates that the crew members were not wearing lifejackets during their sailing trip on the Baltic Sea, including at the time of the accident, and consequently had also dispensed with securing themselves to the yacht by means of safety lines.

Only one of the two lifebuoys required according to the boat certificate was on board in the form of a horseshoe buoy equipped with a line. While attempting to throw the horseshoe buoy to the casualty after he fell overboard, it transpired that the line did not unwind from the corresponding winding drum properly.

¹³ Note: There is no legal requirement as to whether or at what intervals lifejackets must be serviced in Germany. The indication of the next service date on the jackets is a recommendation of their manufacturer.

¹⁴ Note: According to Article 7(4) SeeSpbootV, a pleasure craft may only be chartered if she is carrying the equipment specified in the boat certificate. As already established, the DESDEMONA did not have a valid boat certificate at the time of the accident due to a technicality. Therefore, the starting point for the deficiencies in the carriage of safety appliances found on the day of the accident is the (notional) assumption that the renewal of the boat certificate did not fail on a technicality following the survey of 22 July 2014.

During the investigation, it was no longer possible to ascertain with absolute certainty whether the unwinding issue was due to faulty installation of the winding drum or because the line had not been wound onto the drum properly. Potentially, there was even a culmination of the two sources of error.

Figure 7 below was taken during a survey of the yacht in autumn 2016. As regards the manner in which the winding drum was installed, it shows that insufficient attention was paid to ensure the drum would rotate freely, as required for the line to unwind, even after the accident.

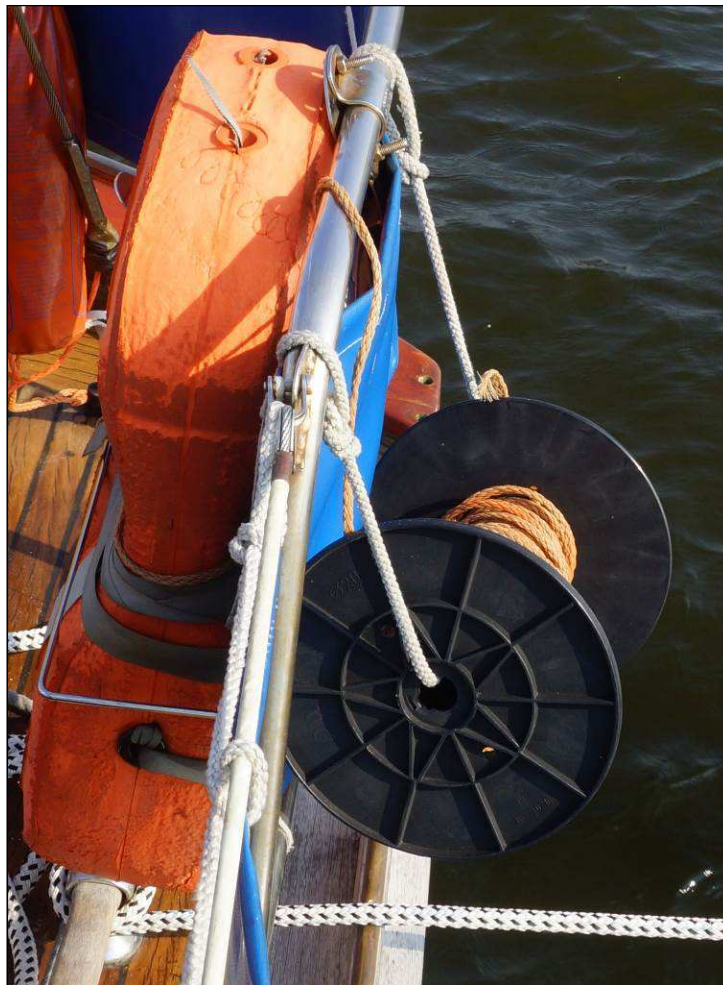


Figure 7: Improper installation of the winding drum belonging to the horseshoe buoy

Photographs in the daily press taken immediately after the DESDEMONA sailed into Warnemünde show that a fender board was mounted on the yacht's stern pulpit on the day of the accident (outlined in red in **Figure 8** below). According to the charter company, the crew must have mounted this board at the point in question after the handover of the yacht, presumably to use as a makeshift seat. That this board (additionally) prevented the lifeline from unwinding cannot be ruled out entirely. However, the above scenario is opposed by clear witness testimony indicating that the line did not unwind freely when the horseshoe buoy was thrown and then could not be pulled from the drum manually "due to a tangle" or "because it had not been wound on properly."



Figure 8: Stern of the DESDEMONA (on the day of the accident after sailing into Warnemünde)

It is also evident from the press photographs that on the day of the accident a bag containing a heaving line was secured to the stern pulpit next to the horseshoe buoy (see yellow marking in **Figure 8**). It is likely that the crew member who was inexperienced in sailing and unsuccessfully attempted to throw the horseshoe buoy had no knowledge of the content or functioning of this bag. It was not possible to ascertain why the two experienced skippers failed to use the heaving line during their rescue effort.

3.3.3 Weather conditions (DWD report)¹⁵

A summary of the DWD's official report of the weather conditions in the area and at the time of the accident follows:

"Weather and visibility:

Cloud cover initially variable but heavier toward the end of the period. Light rain fell only after 1500 CEST. Visibility stood at 60 km at the time of the accident.

Mean wind (at a height of 10 m above the water surface)/gusts:

The air mass was stable, meaning no gusts of more than 2 Bft above mean wind from higher layers of the atmosphere could be deflected down. A westerly to south-westerly wind of 8–14 kts (3–4 Bft) generally prevailed at the scene of the accident in Warnemünde (navigational channel).

Significant sea state:

The sea state computed stood at less than one metre during the period in which the accident occurred. It predominantly set in a westerly direction.

Temperature:

Water temperature stood at 16°C; air temperature at a height of 2 m above the water surface fluctuated around 14°C."

3.3.4 Knowledge and experience of the crew members

The role of skipper was divided between the principal charterer of the yacht and his brother. Both have years of experience in sailing pleasure craft and traditional vessels and have held the Sportseeschifferschein since 1997.

Germany's Sportseeschifferschein is an official certificate of competency recommended for all pleasure craft with engine and under sail. It is required when pleasure craft are used commercially in coastal waters. Its scope covers coastal waters, i.e. all seas up to 30 nm from the mainland, including marginal seas. Acquisition of the Sportseeschifferschein requires ownership of the Sportbootführerschein-See and evidence of 1,000 nm sailed on yachts in coastal waters (after acquisition of the Sportbootführerschein-See) as a watchkeeper or representative thereof. Extensive knowledge of navigation, seamanship, maritime law and meteorology must be demonstrated for each of those subjects in written and possibly oral examinations. That is supplemented by a practical examination in which the theoretical knowledge of sailing a yacht in coastal waters must be implemented and applied. In addition to the mandatory tasks (person-overboard manoeuvre and radar), other manoeuvres and skills must be demonstrated.

¹⁵ Source: Official report of the DWD of 21 September 2016 on the weather and sea conditions in the area of Rostock/Warnemünde level with buoy 9 on 21 September 2015 between 1200 CEST (1000 UTC) and 1500 CEST (1300 UTC).

The two other crew members were not in possession of operator certificates for pleasure craft and had no experience in handling sailing boats. However, the subsequent casualty was the owner and user of a motor boat moored on the Greek coast and therefore familiar with the basic behaviour and safety requirements to be observed on the water.

3.3.5 Fatigue, exhaustion, alcohol

The crew of the DESDEMONA had only begun their sailing trip a few days before the accident. They only sailed during the day and called at ports for each night. The DESDEMONA sailed out of the port of Gedser at about 1000 in good weather on the day of the accident. An alcohol test performed on the casualty revealed no evidence to suggest he was under influence of alcohol at the time of the accident.

The aforementioned aspects indicate that fatigue, exhaustion or alcohol did not cause or facilitate the accident.

3.3.6 Autopsy of the deceased and cause of death

An autopsy was carried out on the body of the casualty, who was 42 years old at the time of the accident, at the Institute of Forensic Medicine and Pathology of the Rostock University Medical Centre on 2 October 2015. It was no longer possible to determine the cause of death with the naked eye. According to the forensic pathologist, drowning or reflexogenic cardiac arrest after falling into the water, possibly facilitated by a pre-existing heart condition found during the autopsy, are the most appropriate assumptions. The physician believes that the pre-existing heart condition may have accelerated death or explains why the casualty was only able to remain on the surface of the water for a brief period after falling into the Baltic Sea.¹⁶

4 Analysis

4.1 Accident situation/cause

The exact circumstances of this tragic accident could not be clarified in every detail with absolute certainty. However, it can be assumed with very high probability that the casualty, not protected by lifejacket and safety line on board, lost his footing and fell into the water during a swell-induced movement.

That the casualty, suffering from a pre-existing heart condition possibly unknown to him, experienced acute heart problems before falling overboard cannot be ruled out. There are at least very strong indications that this was triggered at the latest in connection with the fall into the water. Otherwise, it is impossible to explain why the crew member, who suffered no external or internal injuries before or when he fell overboard and was able to swim, was no longer able to remain on the surface of the water only a few minutes after the accident in spite of only moderate swell and a water temperature of some 16°C.

¹⁶ Source: Autopsy report of the Institute of Forensic Medicine (Rostock University Medical Centre) of 23 October 2015 (Ref.: G 153/15).

4.2 Assessment of action taken after the accident

Witness testimony on the chronological and thematic sequence of the rescue operation was contradictory. This is probably due to the traumatisation of the other three crew members, which the sudden death of the casualty would naturally have caused. The deceased had been a work colleague and/or long-standing close friend of two of them.

Although it is no longer possible to reconstruct the rescue effort in every detail, the following conclusions can be drawn from the witness accounts and situation in which the casualty was found:

- (1) After the accident, the boat was turned (several times?) under engine power and then attempts were made (possibly also several) to throw the fellow sailor a mooring line that was on deck.
- (2) The casualty managed (possibly after one of several attempts) to take hold of the line and loop it around his arm and torso.
- (3) A line connection between the casualty and boat (or crew) could not be made because the line taken hold of by the casualty was neither made fast to the boat nor held onto by a crew member.
- (4) The lifebuoy (or horseshoe buoy) attached to the yacht's stern could not be thrown to the casualty with any promise of success for the simple reason that its line did not unwind from the drum properly during the corresponding attempt.

4.3 Safety precautions on board

4.3.1 Actual circumstances

The DESDEMONA did not have a valid boat certificate at the time of the accident due to a technicality. However, the minimum equipment required for obtaining the certificate was present on board, at least when DNV GL made its latest survey of the yacht for that purpose in July 2014.

Contrary to the specifications of the boat certificate, there was only one lifebuoy (horseshoe buoy) on board the yacht at the time of the accident, however.¹⁷ The requirement to carry six lifejackets in the certificate was not complied with, either. Only four jackets were on board when the police inspected the yacht after the accident. The service date recommended by the manufacturer had expired on three of the jackets.

¹⁷ Note: Only (one?) 'horseshoe buoy with line' is referred to even in the record of the yacht being handed over to a charterer in summer 2016 (see Figure 3 above: Handover record of July 2016).

4.3.2 Legal framework for the carriage of life-saving appliances

The provisions of the SeeSpbootV regulation relevant for German charter yachts form the starting point for the examination as to whether the DESDEMONA was properly equipped with life-saving appliances. Inter alia, they provide that this particular category of vessel requires a boat certificate and that the authority responsible for issuing or renewing it is the locally competent WSA (see Article 5 SeeSpbootV), as already explained above in section 3.3.2.2. Boat certification requires an inspection (technical approval) of the vessel by the approving authority or a surveyor from BG Verkehr or an approved classification society.

The boat certificate is then issued as per the specimen in Appendix 1 SeeSpbootV. The carriage requirement for small pleasure craft must to be entered in field 8 of the standardised certification form. As regards large pleasure craft, reference is made to the minimum equipment overleaf (see **Figure 9** below).

Fundstelle des Originaltextes: BGBl. I 2002, 3465 - 3466

Bundesrepublik Deutschland
 Wasserstraßen- und Schifffahrtsverwaltung des Bundes
 ... (nicht darstellbarer Bundesadler)
 Bootszeugnis (See)
 Nr. /

nach () § 5 () § 18 () § 5 Abs. 6 der See-Sportbootverordnung vom 29. August 2002 (BGBl. I S. 3457) für das
 () große Sportboot () kleine Sportboot () Wassermotorrad

Bootsname:
Kennzeichen:

1.	Name, Wohnort und Betriebsstätte des Unternehmers	Liegeplatz (im Ausland auch Heimathafen) des Sportbootes
2.	Art des Sportbootes Motor (Leistung in kW)	3. Baujahr CE-Kennzeichnung
4.	Länge über alles m	5. Größte Breite m
6.	Höchstzulässige Personenzahl	
7.	Grenzen des Fahrtgebietes (Fahrtbereich)	
8.	Ausrüstung - große Sportboote siehe umseitige Mindestausrüstung	

Figure 9: Specimen of page 1 of the boat certificate¹⁸

The second page of the certification form contains a table (see **Figure 10** below) for this purpose. Column 3 of this table lists various items of equipment. In the case of certain items of equipment, the designation in column 3 is such that it permits or requires individual specification (see serial numbers 1, 2, 3, 7, 8, 10, 11, 14, 15, 17). A corresponding label or where relevant quantity in column 2 of the table defines whether and how many of each item of equipment must be carried on the vessel.

¹⁸ See SeeSpbootV of 29 August 2002 (BGBl. [Federal Law Gazette] I p. 3457), as last amended by Article 64 of 2 June 2016 (BGBl. I p. 1257); Annex 1 (to Article 5).

zu 8.		Mindestausrüstung	
Lfd. Nr.	Anzahl/(vorh. *)	Ausrüstungsgegenstand	Bemerkungen/Hinweise
1		Positionslaternen +++)	gem. KVR/SeeSchStrO
2		Ankerlaterne +++), Ankerball, Kegel, Nebelhorn	gem. KVR
3		Feuerlöscher ++) a 2 kg, Pulver	
4		Log	
5		Kompass, Handpeilkompass	
6		Radarreflektor, Fernglas, Handlampe mit Morsetaste	
7		Rettungsringe, davon mindestens .. Ring(e) mit Leine und Licht	
8		vollautom. Rettungswesten ++)/ Feststoffwesten DIN 7929/EN 396/399	
9		Sicherheitsgurte DIN 7925 und Sicherheitsleinen DIN 7927	
10		Rettungsfloß ++) (Größe entsprechend Personenzahl)	
11		.. Fallschirmsignale, rot, Handfackeln, rot, schwimmfähige Rauchsignale, orange	
12		Flagge "N" und "C"/Bundesflagge	
13		Erste-Hilfe-Kasten	
14		1. Anker kg mit ... m Kette und m Leine/2. Anker ... kg	
15		Schlepptrosse m Länge, Bootshaken, Wurfleine 16 m Länge	
16		Fender, Festmacher	
17		Kochanlage (Petroleum/Spiritus/Gas ++))	Prüfbesch. SeeBG/DVGW
18		Handlot oder Echolot	
19		Empfangsanlage (Radio) oder NAVTEX	
20		Barometer	
21		Logbuch oder Tagebuch	
22		Seekarten, Seehandbuch, Leuchtfeuerverzeichnis gem. Fahrtgebiet	bei Erfordernis
23		Navigationshilfsmittel	
24		Bug- und Heckkorb, Seereeling	
25		Außenbordtreppe	
26		Toilette	
27		Kojen	
28		Wassertank l Inhalt/Kraftstofftank l Inhalt	
29		Absperrventile an Brennstofftanks	
30		Fäkalientank/-aufbereitungsanlage	> 10 Personen erforderl.
31		Treibanker	
32		Ersatzteile	
33		Leckdichtungsmaterial	
34		Werkzeug	
35		Feuerlöschanlage ++) im Motorraum	bei Motoryachten

Figure 10: Specimen of page 2 of the boat certificate (incomplete extract)

The version of the boat certificate issued for the DESDEMONA after the survey of 22 July 2014 and the identical, currently valid version issued on 21 June 2016 (see **Figure 11**) correspond with the formal criteria of the SeeSpbootV regulation, as discussed above.

Mindestausrüstung			
Lfd. Nr.	Anzahl/ vorh. *)	Ausrüstungsgegenstand.	Bemerkungen/Hinweise
1	X	Positionslaternen**	gem. KVR/SeeschStrO
2	X	Ankerlaternen**, Ankerball, Kegel, Nebelhorn	gem. KVR
3	2	Feuerlöscher* a` 2 Kg, Pulver	
4	X	Log	
5	X	Kompass, Handpeilkompass	
6	X	Radarreflektor, Fernglas, Handlampe mit Morsetaste	
7	2	Rettungsringe, davon mindestens ..1.. Ring(e) mit Leine und Licht	
8	6	vollautom. Rettungswesten*/Feststoffwesten DIN 7929/EN 396/399	
9	6	Sicherheitsgurte DIN 7925 und Sicherheitsleinen DIN 7927	
10	X	Rettungsinsel* (Größe entsprechend Personenzahl)	
11	X	..4.. Fallschirmsignale, rot, ..4.. Handfackeln, rot, ..2.. schwimmfähige Rauchsignale, orange	
12	X	Flagge "N" und "C" / Bundesflagge	
13	X	Erste-Hilfe-Kasten	
14	X	1. Anker 17 kg mit 30 m Kette und Leine /2. Anker 15 kg	
15	X	Schlepptrosse 50 m Länge, Bootshaken, Wurfleine 16 m Länge	
16	X	Fender, Festmacher	
17	X	Kochanlage (Petroleum / Spiritus / Gas)*	*Prüfbesch. BG-V/DVGW
18	X	Handlot oder Echolot	
19	X	Empfangsanlage (Radio)	
20	X	Barometer	
21	X	Logbuch oder Tagebuch	
22	X	Seekarten, Seehandbuch, Leuchtfeuerverzeichnis • gem.Fahrtgebiet	• bei Erfordernis
23	X	Navigationshilfsmittel	
24	X	Bug- und Heckkorb, Seereling	
25	X	Außenbordtreppe	
26	X	Toilette	
27	X	Kojen	
28	X	Wassertank ..160.. l Inhalt / Kraftstofftank ..100.. l Inhalt	
29	X	Absperrventile an Brennstofftanks	
30		Fäkalientank/-aufbereitungsanlage	> 10 Personen erforderl.
31		Treibanker	
32	X	Ersatzteile	
33	X	Leckdichtungsmaterial	
34	X	Werkzeug	
35		Feuerlöschanlage* im Motorraum	bei Motoryachten
36	X	Sturmfock / Trysegel	bei Segelyachten
37	X	Reffeinrichtung	
38	X	Drahtschere	
39	X	Kappbeil	

Zusätzlich für Sportboote mit einer Länge über alles von 12,00 Metern und mehr:

40		Fahrtstörungsleuchten**, Bälle	gem. KVR
41		Schallsignalanlage**	gem. KVR
42		Glocke, ø200 mm**	gem. KVR
43		UKW-Sprechfunkanlage/GMDSS	zugelassen
44		Navigationsanlage (Funkpeiler, GPS etc.)	
45		Feuerlöscher* a` 2 kg	

Sonstige Ausrüstung/Hinweise

zu lfd. Nr. 36: Rollfockanlage und Reffeinrichtung ersetzen Sturmfock und Trysegel im Bereich der Ostsee.

* Prüfungsnachweis/ ** baumustergeprüft

Figure 11: Boat certificate (page 2) of the DESDEMONA of 21 June 2016

While reviewing the provisions of the SeeSpbootV regulation relevant to the certification process in a material respect, it was noted that the regulation does not contain any requirements in respect of the minimum equipment for large pleasure craft in column 3, the quantities to be entered in column 2, in particular. References to requirements that are applicable in this regard are not evident in the SeeSpbootV, either. The only exception are the general references next to a few items of equipment already contained in column 4 of the specimen equipment table, e.g. to the Regulations for Preventing Collisions at Sea and the German traffic regulations for navigable maritime waterways (Seeschiffahrtsstraßen-Ordnung).

The review of the legislative framework for the seagoing pleasure craft sector in Germany revealed that there are no general legal requirements beyond the

SeeSpbootV, e.g. on the issue of the number of lifebuoys or lifejackets that must be carried on board.

This finding was confirmed in the course of enquiries made with WSA Lübeck, which is responsible for issuing the DESDEMONA's boat certificate, and the classification society commissioned with the associated survey of the DESDEMONA, DNV GL. The above bodies merely advised, e.g. that the number of lifejackets required on board large pleasure craft to be specified in the certificate is reportedly based on the maximum number of people indicated in the certificate. Recommendations of the Federal Ministry of Transport and Digital Infrastructure¹⁹ and statements of the German sailing association²⁰ were also referred to when determining the respective minimum equipment.

Following enquiries with the Fachverband Seenot-Rettungsmittel e. V. (German association of maritime life-saving appliances)²¹ and the Bundesverband Wassersportwirtschaft e.V. (German association of aquatic sports)²², they also advised the BSU that as opposed to the legal position in certain Mediterranean countries, there are no binding regulations in Germany, e.g. with regard to the number of lifejackets that must be carried.

Interim findings

There are no binding provisions for determining the quantity of life-saving appliances to be carried on board chartered pleasure craft in Germany. Beyond the charter sector, a legal requirement that life-saving appliances must be carried on board does not even exist for maritime or inland waters (with the exception of the requirements for Lake Constance)²³.

The specifications contained in the boat certificate relating to minimum equipment for large pleasure craft are ultimately the result of a discretionary decision by the approving authority, which is based on the findings of the survey of the boat and circumstances found in the process, as well as the maximum number of people indicated in the certificate, in particular.

4.3.3 Legal framework for lifejackets (mandatory use)

As a mirror image of the non-existent carriage requirement for lifejackets (apart from the charter boat sector) on seagoing pleasure craft, there is most definitely no legal requirement to wear lifejackets on board seagoing pleasure craft in Germany. However, even if a carriage requirement does apply, i.e. for all vessels on Lake

¹⁹ See Federal Ministry of Transport and Digital Infrastructure publication 'Sicherheit auf dem Wasser – Wichtige Regeln und Tipps für Wassersportler (Safety on the water – important rules and tips for water sport enthusiasts), in particular.

²⁰ See 'Sicherheitsrichtlinien Ausrüstung und Sicherheit von Segelyachten/Mehrrumpfbooten der Kreuzer-Abteilung' (Safety guidelines – equipment and safety of sailing yachts/multi-hull boats – of the cruiser section), in particular.

²¹ Association representing the interests of well-established German and foreign manufacturers and importers of maritime life-saving appliances.

²² Association representing the interests of companies in the aquatic sports sector.

²³ See Lake Constance shipping ordinance (Bodensee-Schiffahrts-Ordnung – BSO) of 10 December 2001, Article 13.20.

Constance and for large seagoing pleasure craft intended for charter, there is no corresponding mandatory use.

5 Conclusions

5.1 Primary cause of the accident

In spite of all remaining uncertainties regarding the actual course of the accident, it is clear with a probability bordering on certainty that it was caused by the casualty falling overboard due to swell.

Whether or to what extent the casualty's heart condition, found during the autopsy, played a role in the accident or its tragic outcome could not be clarified. If we disregard the possibility that the casualty suffered a heart attack before falling overboard, which cannot be ruled out entirely, then it should be noted that it is extremely likely that the accident would not have been fatal if the casualty was wearing a lifejacket and secured on board with a safety line.

With regard to the effort to rescue the fellow sailor, it must be stated first that a hectic atmosphere clearly developed and second the life-saving appliances available on board were insufficient or not in the condition required for effective action.

5.2 Consequences

From the perspective of the BSU, with the exception of sound education and continuous training, there is little scope for reducing the intrinsic characteristic of humans to start to panic in an emotional state of emergency. This generally applicable finding is true of the pleasure craft sector, in particular. Precisely here it is regularly the case that participants of this hobby do not feel as if they are confronted, on a daily basis, with specific risk situations. Unlike professional emergency services (e.g. maritime, fire, mountain rescue), the operators of pleasure craft are, by the very nature of things, not trained specifically in responding properly to a distress situation almost instinctively, even if they have enjoyed good training and carried out their hobby for years.

Accordingly, the issue of carrying sufficient (in terms of quantity and quality) life-saving appliances is all the more relevant in the pleasure craft sector, in particular. Inextricably linked with the above is the need to ensure that corresponding items of equipment are actually made use of.

The review of the corresponding legal framework of relevance in Germany delivers the following findings:

- (1) The impression that the legal framework for the pleasure craft sector (as with merchant shipping) is extremely confusing and often illogical per se was once more confirmed.

- (2) A carriage requirement for life-saving appliances on pleasure craft used only privately does not exist for the sea area in Germany.
- (3) Accordingly, there is most definitely no legal requirement to wear lifejackets on pleasure craft used only privately in the sea area.
- (4) As regards large pleasure craft available for charter, requirements do indeed exist in respect of the equipment with life-saving appliances of relevance here in the form of the standardised schedule of minimum equipment enclosed with the certificate. As far as is evident, the criteria and ensuing consequences used to determine the actual quantity of life-saving appliances are not subject to any binding provisions at all, however.
- (5) As far as a requirement to carry lifejackets arises from the boat certificate, an ensuing obligation to actually use them cannot be derived from that.
- (6) Based on factual considerations, it is hard to justify why a requirement to carry lifejackets only exists for chartered (large) pleasure craft. Assessment of the prevailing risk and need of protection of people on board watercraft must not be influenced by whether the vessel is sailing on Lake Constance or in maritime or inland waters. Furthermore, the prevailing risk is not dependent on whether the vessel is a large or only a small pleasure craft. Finally, the prevailing risk is not dependent on whether people sailing on a boat do so as a private owner (or her/his private guest) or as the charterer of a yacht (or her/his private guest), either.

In this context, arguing that the owner of a chartered boat would earn money with her and (therefore?) the charterer would be entitled to expect a properly equipped boat in return as justification for the inconsistent treatment of privately used pleasure craft on one hand, and charter yachts on the other, can also be ruled out. In commercial vehicle or cycle hire, nobody would expect more stringent standards to be applied for the required (safety) equipment in rental vehicles than is the case for vehicles only used privately, either.

With regard to lifejackets, a carriage requirement and mandatory use should be regulated by law for all pleasure craft operating on navigable maritime waterways and in German territorial waters, regardless of size and legal classification, for reasons of safety.

In particular, children, adolescents, but also people who go on the water on board a boat only occasionally or once, e.g. during a holiday on the coast, are not able to estimate the particular risks they expose themselves to by not wearing a lifejacket. Moreover, such people possibly have no idea whatsoever that lifejackets – depending on the vessel's legal status, which also is not even visible outwardly – are not or do not have to be on board under certain circumstances.

The comparison with mandatory use of seat belts in road traffic, or helmets in the case of motorcyclists, also shows that it would be quite possible from a legal perspective, and evidently for good reason also factually appropriate, to standardise the corresponding obligations and not simply rely on the individual responsibility of traffic users, as is so readily put forward.

The counterargument of a thus far non-existent requirement for cyclists to wear a helmet does not hold. The absence of a perhaps meaningful, at any event legally possible provision does not allow the conclusion that similar circumstances may go unregulated.

Introduction should not be precluded by the fact that it is difficult to control such mandatory use effectively in practice. On one hand, it is reasonable to assume that the mere establishment of a corresponding legislative framework would result in a significant increase in safety awareness and over time growing acceptance of the regulation. On the other hand, Germany's administrative legislation and criminal legislation contain enough examples of prescriptive provisions or prohibitions for which the legislator or regulator did not focus primarily on whether or to what extent their observance could actually be controlled when establishing them.

Moreover, the argument of making the use of lifejackets purely incumbent upon pleasure craft users (who may not be or are not at all able to estimate the risk associated with not using them) is opposed by the following points:

- (1) Dispensing with the use of lifejackets regularly leads to extensive SAR operations after a person falls overboard, which in turn involves a considerable cost for the general public.
- (2) The complex SAR operation that potentially only becomes necessary because the use of lifejackets was dispensed with could pose a considerable risk to the life and limb of rescuers.

After all, imposing a statutory requirement to carry on board and use lifejackets upon pleasure craft users does not appear to constitute a disproportionate restriction in their general freedom of action given the foregoing reasoning. It should also be noted here that products have long been available on the market, which only restrict freedom of movement when sailing or otherwise spending time on pleasure craft very slightly.

A lack of acceptance of such legal requirements should not preclude their adoption. Although the mandatory use of seat belts²⁴ in road traffic encountered heavy resistance before its introduction, it is now regarded as perfectly normal and observed by the vast majority of road users.

²⁴ See https://en.wikipedia.org/wiki/Seat_belt.

6 Safety recommendations

Federal Ministry of Transport and Digital Infrastructure (BMVI)

6.1 Statutory requirement to carry lifejackets

The Federal Bureau of Maritime Casualty Investigation recommends that the Federal Ministry of Transport and Digital Infrastructure (BMVI) examine the legal options for extending the legal requirement to carry lifejackets to all seagoing pleasure craft, i.e. regardless of classification as a charter boat.

6.2 Statutory requirement to use lifejackets

The Federal Bureau of Maritime Casualty Investigation recommends that the Federal Ministry of Transport and Digital Infrastructure (BMVI) examine the legal options for introducing a requirement to use lifejackets on seagoing pleasure craft.

7 SOURCES

- Witness testimony taken by the BSU
- Findings of the police and public prosecutor's office in Rostock
- Autopsy report of the Institute of Forensic Medicine (Rostock University Medical Centre) of 23 October 2015 (Ref.: G 153/15)
- Official report of the DWD of 21 September 2016 on the weather and sea conditions in the area of Rostock/Warnemünde level with buoy 9 on 21 September 2015 between 1200 CEST (1000 UTC) and 1500 CEST (1300 UTC)
- Information from WSA Lübeck
- Communication with the DNV GL classification society, Fachverband Seenot-Rettungsmittel e. V. (German association of maritime life-saving appliances), and Bundesverband Wassersportwirtschaft e.V. (German association of aquatic sports)
- Internet research
- Extract from a press photograph by Steffen Grafe, NonstopNews Rostock (see page 20 of this report, Figure 8)
- Statements on the draft investigation report