



DUTCH  
SAFETY BOARD

# Summary

## Breakage of mast Harlingen

Mast in full view, defects hidden



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*The Hague, July 2017*

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*Photo cover: CAMJO Media/Jaring Rispens*

## **Dutch Safety Board**

When accidents or disasters happen, the Dutch Safety Board investigates how it was possible for them to occur, with the aim of learning lessons for the future and, ultimately, improving safety in the Netherlands. The Safety Board is independent and is free to decide which incidents to investigate. In particular, it focuses on situations in which people's personal safety is dependent on third parties, such as the government or companies. In certain cases the Board is under an obligation to carry out an investigation. Its investigations do not address issues of blame or liability.

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NB: The full report is published in the Dutch language. If there is a difference in interpretation between the Dutch report and English summary, the Dutch text will prevail.

# SUMMARY AND CONSIDERATION

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On 21 August 2016, the captain of the historic sailing ship the 'Amicitia' was just about to turn his ship into the port of Harlingen, the end point of a week's sailing on the Wadden Sea, when catastrophe struck. A German family, consisting of twelve people, was on board. Three of the family members were on the foredeck helping to tie up the foresail. All of a sudden, the wooden mast broke and the 6.5-metre-long top fell, with a number of parts, onto the foredeck. The three people on the foredeck did not survive the accident.

The Dutch Safety Board has investigated the direct cause of the mast breaking and the underlying structural safety deficiencies from which lessons can be learned.

## **Summary**

### **Wood rot**

Although the breakage of the mast came as a complete surprise to those involved, the investigation has shown that a process lasting at least four years preceded the accident. In this period, water penetrated deeply into the mast and could not drain out again. In this course of time, the trapped water caused a rotting process inside the mast. In the two years prior the accident, the wood rotted to such an extent that the mast lost almost all its integrity. It was therefore a matter of time before the severely weakened mast broke.

The 20-metre-long wooden mast forms a prominent feature of the historic sailing ship the Amicitia. How could a rotting process go on for years, with the mast in full view, without someone noticing the full extent of it? The investigation has shown that, on paper, many parties were involved in keeping the wooden mast safe, but that none of these parties realized the severity of the situation. As a result, there was an uncontrolled safety risk on board the ship in question for a prolonged period.

### **The captain and maintenance personnel lacked expertise**

It is common knowledge that a wooden mast can rot. Provided this is identified in good time and adequately treated, it will not necessarily influence the structural integrity of the mast in question. It is therefore important that a mast is periodically inspected for potentially vulnerable spots. Specific know-how is required to be able to correctly assess the state of a mast and decide what type of maintenance personnel must be engaged.

There was no maintenance plan for the mast in question and it was not inspected periodically. This meant that changes and vulnerable spots were not identified. Because the captain himself did not have the relevant expertise, he relied on that of maintenance personnel he engaged. However, they did not have the necessary specific expertise concerning wooden masts either.

### **Shortcomings in certification**

The captain, who is also the owner of the ship in question, did not rely solely on the expertise of the maintenance personnel he engaged. The mast certificate issued in 2012, which was valid until 2018, caused that the captain was convinced that this safety-critical part of his ship met all the requirements.

The private approval body had indeed inspected the mast and subsequently issued the certificate in question, more than four years prior to its breaking. Although, according to the law, this certificate was only valid for a maximum of 2.5 years, the approval body wrongly stated a validity of 6 years on it. This suggested that the mast still had a valid certificate at the time of the accident, whereas, in fact, the certificate in question had expired a good while earlier.

The Dutch Safety Board has ascertained that, in the current situation, significant safety risks can go unnoticed when it comes to the inspection and certification of the sailing equipment on historic inland waterway vessels. What is more, the certificates create a sense of false security by implying that the safety of a mast is guaranteed for a period which is much longer than the period needed for the rotting process to cause irreversible damage to the mast.

Similar shortcomings have been found in the overarching community inland navigation certificate. By issuing a certificate of this kind, the approval body declares that the ship meets all the applicable requirements. Because the requirements are based on the current state of technology, transitional provisions can be applied to old ships, provided this does not yield any evident danger. The approval body had granted all 329 possible transitional provisions on the *Amicitia's* certificate. By applying all these provisions, without considering whether such exemptions were applicable or could yield any danger, the approval body acted in conflict with the EU Directive and the idea of safety embedded in it.

The approval body base this method on an informal instruction received from the Human Environment and Transport Inspectorate (ILT). However, the Dutch Safety Board is of the opinion that the approval bodies themselves must know enough about the EU Directive to be able to see that such an instruction is in violation to this Directive. After all, private approval bodies assess whether a ship meets all the legal requirements, including safety requirements, on behalf of the State of the Netherlands. They are accredited to do so by the Dutch Accreditation Council. The powers of approval bodies entail a great responsibility, which cannot be worn unless the law is correctly applied. Various shortcomings on this point came to light in the investigation, which have far wider implications than just the inspection of the ship in question or inspections by this particular approval body.

### **Inadequate supervision by the Human Environment and Transport Inspectorate**

The private approval bodies have been allocated their duties by the government: the Human Environment and Transport Inspectorate (ILT) has authorized private approval bodies to inspect and certify ships. The Minister of Infrastructure and the Environment has final responsibility in this system. To be able to carry this responsibility fully, it is crucial that the ILT has insight into the quality of the inspections carried out by the approval bodies on behalf of the Minister. The investigation has shown that the ILT does

not have this insight when it comes to the inspection of passenger sailing ships. In fact, the ILT does not supervise the methods used to inspect passenger sailing ships, and crucial parts of ships such as masts are not inspected during the supervision carried out directly by the ILT on board ships.

## **Consideration**

The *Amicitia* is one of the three hundred passenger sailing ships in what is known as the '*bruine vloot*'; this translates literally as the 'brown fleet' and comprises historic ships chartered for passengers. Ships in the *bruine vloot* are deemed Dutch cultural heritage. These ships, which are mostly commercially operated, are very popular with tourists, for school trips and for company outings. The fact that three tourists have died as a result of the apparently sudden breakage of a mast raises questions about the safety of passengers on similar ships and the supervision of the sector.

Although the primary responsibility for the safety of passengers on board ships in the *bruine vloot* lies with the ships' owners, it is the responsibility of the ILT and the approval bodies to verify that the owners of the ships in question live up to their responsibility by ensuring that their ships and actions comply with the legal requirements. In practice, the ILT does not appear to execute this responsibility.

Based on the findings of this investigation, the Dutch Safety Board concludes that there is no functioning supervisory system for the *bruine vloot*. The Board has been critical of the way in which the ILT implements its supervisory role in practice in earlier reports. The fact that this report exposes similar problem areas is cause for concern for the Dutch Safety Board and raises the question of what the underlying causes of this recurrent problem in the supervision are.

In the past, the ILT carried out the inspection and certification of inland waterway vessels by themselves, the focus being on compliance with the regulations. The ILT currently has the role of supervisor of the system. This means that the ILT examines, by means of audits, the extent to which an organization demonstrably manages its systems in work processes. The ILT opts for risk-driven supervision, that is, deploying its resources where the risks for the public interests are the greatest.

In regard to the *bruine vloot*, the Board has ascertained that the ILT has been evading its supervisory duties in this system. As a result, the ILT has no insight into the private approval bodies' methods when it comes to the *bruine vloot*. Not only does the ILT not carry out secondary supervision of the methods of approval bodies, there is also no communication structure between the ILT and the Dutch Accreditation Council (which checks the approval bodies). Due to this poor access of information, the ILT does not know what is going on and is unaware of the risks in this sector. It is therefore unable to make a balanced risk assessment. In practice, risk-driven supervision comes down to the fact that the ILT does not supervise the methods used by the approval bodies, working to inspect ships in the *bruine vloot*, on behalf of the ILT.

The role of supervisor of the system demands a high degree of expertise within the ILT. After all, good supervision depends on know-how. However, as was also ascertained in earlier reports, the choice to go with system supervision was accompanied by a reduction of inspection capacity, resulting in a knowledge drain from the ILT. The Board has noted that there is no knowledge of the *bruine vloot* in the ILT. As a result the ILT is unable to supervise this sector.

The ILT has given the private approval bodies many duties and responsibilities. The report's conclusions raise the question of whether these private bodies can cope with these responsibilities at the moment. After all, there appear to be structural shortcomings in the correct application of the law in the inspection of these ships. By granting an excessively long period of validity and by applying the transitional provisions too generously, the certificates issued by the inspection bodies create a sense of false security.

The distance between the government and the *bruine vloot* sector entails a greater responsibility for the sector in question as well. This requires that those involved take the initiative to raise the safety standard by themselves. The Dutch Safety Board is of the opinion that such a broad internal driving force is not consistently present in the sector. However a publication by the German Safety Board BSU<sup>1</sup> about the accident and the role played by wood rot did temporarily raise alertness in a part of the sector. Captains wondered about the condition of their masts and some had their masts inspected as a precautionary measure. Mast makers reported an increase in the numbers of masts offered for inspection.

Although the temporary increase in alertness regarding wooden masts improves safety, the Dutch Safety Board has ascertained that the causes leading to the mast breakage in this ship do not necessarily apply only to masts, but could also affect other safety-critical components. The deterioration in the mast in question, which had been going on for years, is a symptom of a broader problem in parts of the sector. The Board has ascertained that the commercialization of the *bruine vloot* has not brought about the necessary professionalization with regard to safety. The maintenance of masts, for example, is therefore dependent on ships' owners and maintenance workers for whom training requirements do not apply and who do not all possess sufficient expertise in the matter. Professional knowledge is not guaranteed. The accident on board the *Amicitia* illustrates that the consequences can be far reaching. The Dutch Safety Board expects a minimum level of knowledge of safety-critical components from a commercial sector which transports thousands of passengers annually, in order to guarantee the safety of these passengers.

The results of the investigation give reason to conclude that some of the ships in the *bruine vloot* have currently not been proven safe and that the safety nets of inspection, certification and supervision do not work adequately, if at all. Since the accident, a number of ships' owners have had their masts inspected by mast makers or inspectors as a precautionary measure. Passengers can ask about this if they are planning to book a sailing trip on a *bruine vloot* ship. In this way, passengers can, to a certain extent, take responsibility for their own safety.

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1 Bundesstelle für Seeunfalluntersuchung – [www.bsu-bund.de/EN](http://www.bsu-bund.de/EN)

## Recommendations

It is important that action is taken to guarantee the safety of passengers. The Dutch Safety Board would therefore like to make the following recommendations:

*To the Dutch Charter Vessel Association (BBZ):*

1. Arrange for a professional standard which is in line with the extent of commercial operation of the *bruine vloot* sector. To this end, at least implement the following:
  - a. Develop a platform for knowledge sharing of historic ships and the maintenance of specific components. Involve captains, mast makers, inspectors, ships' owners, approval bodies and other relevant parties, such as booking offices.
  - b. With the aid of this knowledge platform, draw up branch standards to give practical support to ships' owners as regards maintaining the safety-critical components of their ships and promote the application of these standards. In these branch standards, pay attention to recognizing signs of wood rot and to a good method of inspection.
  - c. On the basis of these branch standards, develop a practically applicable multi-year maintenance plan for ships which at least covers their safety-critical components.

*To the accredited approval bodies:*

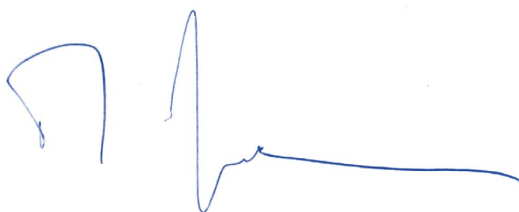
2. Take your responsibility for the correct application of the law, paying particular attention to the correct inspection frequency and the application of transitional provisions. To this end, at least implement the following:
  - a. Reinspect wooden masts which were inspected more than 2.5 years ago as quickly as is reasonably possible.
  - b. In the short term, check all community inland navigation certificates of passenger sailing ships for the correct application of the transitional provisions.

*To the Human Environment and Transport Inspectorate:*

3. Deliberate and consult on the implementation of the secondary supervision and make the risk assessment regarding the *bruine vloot* explicit.

*To the Minister of Infrastructure and the Environment and the Minister of Economic Affairs:*

4. Arrange for structural coordination between the Dutch Accreditation Council and the ILT and consult with each other on the allocation of roles.



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