Antwerp Maritime Academy

# A suggestion for a legal Belgian framework for non-MARPOL Electronic Logbooks

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# Preface

The interest in electronic logbooks on board ships grew over the last two years while writing my bachelor's and master's thesis. I never heard of electronic logbooks before researching the subject. Everyone who asked me about my thesis seemed to be triggered by the subject, assuming that electronic logbooks were something that had been around for a long time and that their use was obvious in this digital age. The same question always came back: why are these electronic logbooks not used on Belgian ships? The simple answer is that there is no Belgian legislation. During the last two years of writing this thesis, some changes have already taken place. The only thing that is missing now is Belgian legislation for non-MARPOL electronic logbooks. The aim of this thesis is to formulate a suggestion for the Belgian legislation by studying the legislation and knowledge of other flag states.

During the writing of my master's thesis, I received help from several people whom I would like to mention.

Mr Klaas De Hert, my promotor, deserves my thanks for suggesting the interesting topic, for his advice, guidance and patience for two years. And for reading my bachelor's and master's thesis several times.

Jane Van Huylenbrouk, a jurist of the shipping control in Belgium, deserves my thanks for giving me a lot of information about the Belgian flag state's position on electronic logbooks and for her advice on a suggestion for a Belgian legal framework for non-MARPOL Electronic Logbooks.

My parents, for always motivating me to work hard and for giving me all the time and space I needed to write my thesis.

# Samenvatting

Verschillende vlaggenstaten hebben het gebruik van elektronische logboeken aan boord toegestaan. Elke vlaggenstaat moet het gebruik ervan in zijn wetgeving goedkeuren. Voor elektronische MARPOL logboeken is specifieke wetgeving gemaakt door MARPOL. Voor niet-MARPOL elektronische logboeken is geen specifiek format vastgesteld door een internationale organisatie en bepalen de vlaggenstaten zelf hoe het er moet uitzien.

In België is het gebruik van elektronische MARPOL logboeken reeds goedgekeurd en beschreven in een Belgian Maritime Inspectorate circular (BMI) 2022/003. Voor niet-MARPOL elektronische logboeken moet er een BMI circular worden opgesteld. Dit vereist meer onderzoek omdat er geen internationale wetgeving is die bepaalt waaraan een niet-MARPOL logboek moet voldoen.

Na contact met een juriste van de Shipping Control in België, bleek dat het opstellen van een suggestie voor de Belgische wetgeving inzake het gebruik van niet-MARPOL elektronische logboeken een meerwaarde is. Hiervoor werd een overzicht gemaakt van de wetgeving van internationale organisaties op gebied van wat er bijgehouden moet worden in een logboek. Verder is er gekeken naar welke vlaggenstaten elektronische logboeken goedkeuren en hoe dit verwoord wordt in de wetgeving. Ten slotte wordt op basis van deze informatie een voorstel geschreven om het gebruik van niet-MARPOL elektronische logboeken in een wettelijk kader te gieten.

# Abstract

Electronic logbooks have been introduced by several flag states on board. Each flag state has to approve their use in its legislation. For MARPOL electronic logbooks, specific legislation is established by MARPOL. For non-MARPOL electronic logbooks, no specific format has been established by an international organisation and the flag states themselves have to determine how it should be formulated in their legislation.

In Belgium, the use of MARPOL electronic logbooks is already approved and described in the Belgian Maritime Inspectorate (BMI) circular 2022/003. For non-MARPOL electronic logbooks, a BMI circular must be drawn up. This requires more research because there is no international legislation that defines what a non-MARPOL logbook should comply with.

After contacting a jurist from Shipping control in Belgium, it turned out that drafting a suggestion for Belgian legislation on the use of non-MARPOL electronic logbooks is of added value. An overview was made of the legislation of various international organisations on what should be kept in a logbook. After we looked at which flag states approves electronic logbooks and how this is formulated in their legislation. Finally, based on this, a suggestion is written to put the use of non-MARPOL electronic logbooks into a legal framework.

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# List of abbreviations

| | |
|---|---|
| ABS | American Bureau of Shipping |
| AIS | Automatic Identification System |
| ARPA | Automatic RADAR Plotting Aid |
| BMI | Belgium Maritime Inspectorate |
| BV | Bureau Veritas Marine & Offshore SAS |
| BWMC | Ballast Water Management Convention |
| CFR | Code of Federal Regulations |
| Class NKK | Nipon Kaiji Kyokai General Incorporated Foundation |
| ColReg | International Regulations for the Prevention of Collisions at sea |
| DNV | Det Norske Veritas |
| DOC | Document of Compliance |
| ECDIS | Electronic Chart Display System |
| ELB | Electronic Logbook |
| ENISA | European Union Agency for Cybersecurity |
| EPIRB | Emergency Position Indicating Radio Beacon |
| GMDSS | Global Maritime Distress System |
| GPS | Global Positioning System |
| H&M | Hull and Machinery insurance |

| | |
|---|---|
| IAMSAR | Aeronautical and Maritime Search and Rescue Manual |
| ICS | International Chamber of Shipping |
| ILO | International Labour Organisation |
| IMO | International Maritime Organization |
| IOMOLB | Isle of Man Official Logbook |
| ISM | International Safety Management |
| ISPS | International Ship and Port facility Security Code |
| ISSC | International Ship Security Certificate |
| LR | Lloyd's Register |
| MARPOL | Maritime Pollution Committee |
| MEPC | Maritime Environment Protection Committee |
| MLC | Maritime Labour Convention |
| MMC | Merchant Marine Circular |
| MMSI | Maritime Mobile Service Identity |
| MoU | Memorandum of Understanding |
| MSC | Maritime Safety Committee |
| MSL | Maritime Shipping Law |
| MSN | Manx Shipping Notice |
| NATO | North Atlantic Treaty Organisation |
| NOR | Notice of Readiness |

| | |
|---|---|
| NOx TC | NOx Technical Certificate |
| OLB | Official Logbook |
| P&I | Protection and indemnity insurance |
| PSC | Port State Control |
| RADAR | Radio Detection and Ranging |
| SAR | Search And Rescue |
| SECA | Sulphur Emission Control Area |
| SMC | Safety Management Certificate |
| SMS | Safety Management System |
| SOLAS | Safety Of Life At Sea |
| SRP | Ship Risk Profile |
| STCW | International Convention of Standards of Training, Certification and Watchkeeping |
| VDR | Voyage Data Recorder |

# Glossary

| | |
|---|---|
| Authority | a group of people with official responsibility for a particular area of activity. |
| Backup | a copy of information held on a computer that is stored separately from the computer. |
| Certificate | an official document that states the information on it is true. |
| Classification society | is a non-governmental organization that carries out technical inspections on ships and offshore structures. They issue rules and regulations for the construction and equipment of ships, supervise during the life of the ship and record the ship in the classification register. |
| Code | a set of rules or laws. |
| Convention | a formal agreement between country leaders, politicians and states on a matter that involves them all. |
| Dead reckoning | determining the new position of the ship by using the known initial position, the ships speed and course and how long that has been maintained. |
| Declaration | an official, public, usually written statement. |
| Dispute | an argument or disagreement. |
| Electronic logbook | An Electronic logbook (ELB) could be a device, system or software application designed to facilitate accurate entries for discharges, transfers and other operations into an efficient electronic format, while complying with International Conventions and flag state requirements. |
| Entry | an item written or printed in a diary, list, account book or logbook. |
| Flag state | the country where a ship is registered. |

| | |
|---|---|
| Format | the way in which information is arranged and stored. |
| Government | the group of people who officially control a country. |
| Guidelines | information intended to advise people on how something should be done or what something should be. |
| Human error | a person's mistake, which was not intended, not desired and not expected. |
| Inspection | the act of looking at something carefully, or an official visit to a building, ship or organisation to check that everything is correct and legal. |
| Legislation | a law or set of laws suggested by a government and made official by parliament. |
| Logbook | a record of events. |
| Non-repudiation | in legal terms, it is a case in which the authorship or the validity of a contract cannot be disputed. In digital security, non-repudiation means that a service can prove the origin and integrity of data, that the authentication is valid with a high degree of confidence and that the data is available under certain circumstances or for a certain period of time. |
| Officer | a person with a position of authority on a ship. |
| Prosecuted | to officially accuse someone of committing a crime in a law court, or (of a lawyer) to try to prove that a person accused of committing a crime is guilty of that crime. |
| Record | writing something down for later reference. |
| Regulation | an official rule or act of controlling something. |
| Resolution | an official decision that is made after a group or organisation has voted. |
| Shipowner | a person that owns the ship. |

| | |
|---|---|
| Survey | to look at or examine all of something, especially carefully. |
| True copy | a copy of an original recording of data that has been verified and certified to confirm. |
| Update | to make something more accurate and suitable for use now by showing new facts or conditions. |
| Verification | the act of verifying something, providing or checking that it is true or correct. |

# Introduction

Logbooks are widely used on board ships and are an important part of a seafarer's daily routine. Traditionally, logbooks are in paper form and each record is handwritten and marked with a date, time and signature. The information recorded in a logbook may relate to the ship's specifications, navigation, meteorological events, drills, trainings, tests, inspections, port operations and extraordinary events. Depending on the type of information, the data is recorded in different types of logbooks.

Logbook requirements are set by various international organisations and flag states. Records relating to pollution are regulated by the Maritime Pollution Conventions and are called MARPOL logbooks. All other logbooks are non-MARPOL logbooks, including the official logbook. Any logbook may be part of the official logbook. Examples of international organisations that set rules for non-MARPOL logbooks are the Safety of Life at Sea (SOLAS) Convention, the International Maritime Organisation (IMO), Safety Management System (SMS), International Regulations for the Prevention of Collisions at sea (COLREG), International Ship and Port facility Security Code (ISPS), Maritime Labour Convention (MLC), Aeronautical and Maritime Search and Rescue Manual (IAMSAR), etc. Logbooks are completed on board to demonstrate compliance with the regulations set by international organisations and to serve as evidence in the event of a maritime dispute.

Digitalisation of the world increased since the 21$^{st}$ century and most analogue methods have been replaced by digital systems. Digital systems were also introduced on board. Paper charts have been replaced by electronic navigational charts (ECDIS). The ship's course and position can now also be read from the Global Positioning System (GPS) display. The paper logbook can also be replaced by a digital system, namely an electronic logbook (ELB). A new digital system will only be implemented on board if it improves the operation of the ship as a whole. To prove this, it is important to assess the advantages and disadvantages of having an ELB on board. The ELB will centralise all recorded data and will reduce the paperwork for officers. Data from onboard digital installations will be automatically stored in the ELB and seafarers will no longer have to copy data from other digital displays. This will free up time to concentrate on the navigational aspect of the voyage. In addition, the shore side will be

able to monitor and analyse the recorded data in real time and can improve certain processes on board.

MARPOL enabled the use of MARPOL ELBs instead of paper MARPOL logbooks in October 2020 and published several guidelines that the ELB must comply with. This was a first step towards legalising the use of ELBs on board, but it does not mean that ELBs can be used on every ship around the world. Each flag state must approve ELBs in its legislation before they can be used on the ships flying their flag. On the other hand, if a ship sails to a flag state that has not approved the use of ELBs, then the ship will need to print out the ELB for the Port State Control of that flag state. Until the shipping industry does not fully accept the use of ELBs, an individual assessment will be made of the flag states were the ship will berth.

MARPOL has established legislation for MARPOL ELBs, but there is no legislation for non-MARPOL ELBs. It is the responsibility of each flag state to make its own legislation for the use of non-MARPOL ELBs on board. This means that each flag state must specify in its legislation the approval of non-MARPOL ELBs and MARPOL ELBs, before any type of ELB can be used on board. It is important for the ease of use of ELBs that the whole maritime industry accepts ELBs.

Belgium has only recently approved the use of MARPOL ELBs in the BMI circular 2022/003. There is no approval for non-MARPOL ELBs. The BMI circular for non-MARPOL ELBs has not been drafted yet and will require further research. This is because there is no international legislation that defines what a non-MARPOL ELB should comply with. After contact with a jurist from the Belgian Shipping control, it became clear that a draft suggestion for Belgian legislation on the use of non-MARPOL ELBs would contribute to their research. To this end, an overview of the legislation of various international organisations and flag states was made. The legislation of eight chosen flag states was also studied in detail, particularly with regard to legislation on official logbooks and ELBs, in order to get an idea of how to draft a suggestion.

# Chapter 1 The Logbook

## 1.1 Importance of a logbook on board

### 1.1.1 Basic elements of a logbook

The Merchant Shipping Law (MSL) and conventions of the International Maritime Organization require ships to keep diverse logbooks on board (Maritime Authority of the Cayman Islands, 2020). A logbook is an official record of important operations, events and daily routines at a specific time. The logbook documents the voyage by keeping crucial records for future reference and must be used daily. The master has full responsibility for the contents of all logbooks on board and confirms his approval of the entries by signing at the bottom of each page of the logbook (Singh, 2021). A logbook should be straightforward, easy to fill and simple to read. Everything that is written in the logbook should be clear and striking through is accepted, but what was written first should be readable. It is forbidden to erase or cover up mistakes (Maritime Authority of the Cayman Islands, 2020).

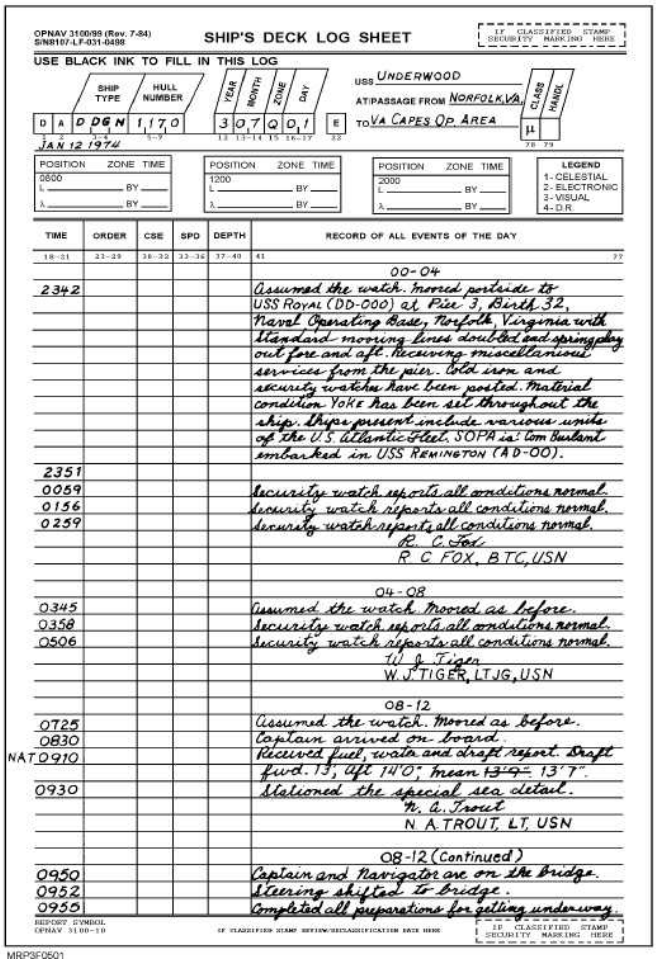
The use of logbooks began in the 18$^{th}$ century without globally standardized rules or formats. In the early days only navigational data was recorded in the logbook in order to reconstruct the voyage. The ship's position was determined by dead reckoning and an assessment of the weather and events was recorded. Over the years this changed as more and more data was required to track, different activities, procedures or events on board needed to be recorded in a variety of logbooks.

Every company needs to be able to prove that works have been carried out as agreed and in accordance with current regulations which makes documentation vital in the process. The information that recorded in a logbook provides evidence that certain activities have been carried out or that certain actions have taken. A logbook is particularly important in the event of juridical procedures. A logbook confirms the difference between what was done and what should have been done and provides a picture of the circumstances on board at a certain point in time. If the logbook is filled in correctly one can be sure that correct procedures have been followed, until proven otherwise (Abhishek, 2019). The logbook has

become a tool for resolving collision and accident disputes between insurance companies and courts. It should be recognised that information which is noted in a logbook can be subject to human error. It might reveal more about the officers' situational awareness than the actual circumstances of an incident. What happened, what the officer saw, what the officer thought and what he actually writes down can be 4 slightly different things. As it is based on the crew's judgement, actions and measures, standardization of different types of information contained in a logbook is difficult.

The logbook is mainly used when something has gone wrong. For example, the investigation of the Herald of Free Enterprise's accident includes a thorough examination of the ship's logbooks. It was found that the ship's draughts had been incorrectly recorded and that they had not been checked before departure. In addition, random draughts were noted in the logbook. This finding was used as evidence against the Herald's captain, who was found negligent and held responsible for failing to properly check the draughts before departure (Mr. Sheen, 1987).

The layout of a logbook on board may vary depending on the shipping company, the flag state or the purpose of the logbook. Logbooks regulated by the Maritime Pollution Committee (MARPOL) are the only ones that have standard formats available. Figures 1 and 2 show two extracts from a deck logbook where figure 1 uses one logbook page describing the day's events and figure 2 uses clear tables with various records and a small description of the situation on the side.



OPNAV 3100/98 (Rev. 7-84) S/N0107-LF-031-0498

**SHIP'S DECK LOG SHEET**

USE BLACK INK TO FILL IN THIS LOG

| SHIP TYPE | HULL NUMBER | YEAR | MONTH | ZONE | DAY |
|---|---|---|---|---|---|
| DDGN | 1170 | 3 | 0 | Q | 01 |

USS UNDERWOOD — AT/PASSAGE FROM NORFOLK VA — TO VA CAPES OP. AREA — CLASS — HANDL

JAN 12 1974

| POSITION | ZONE TIME |
|---|---|
| 0800 | |
| 1200 | |
| 2000 | |

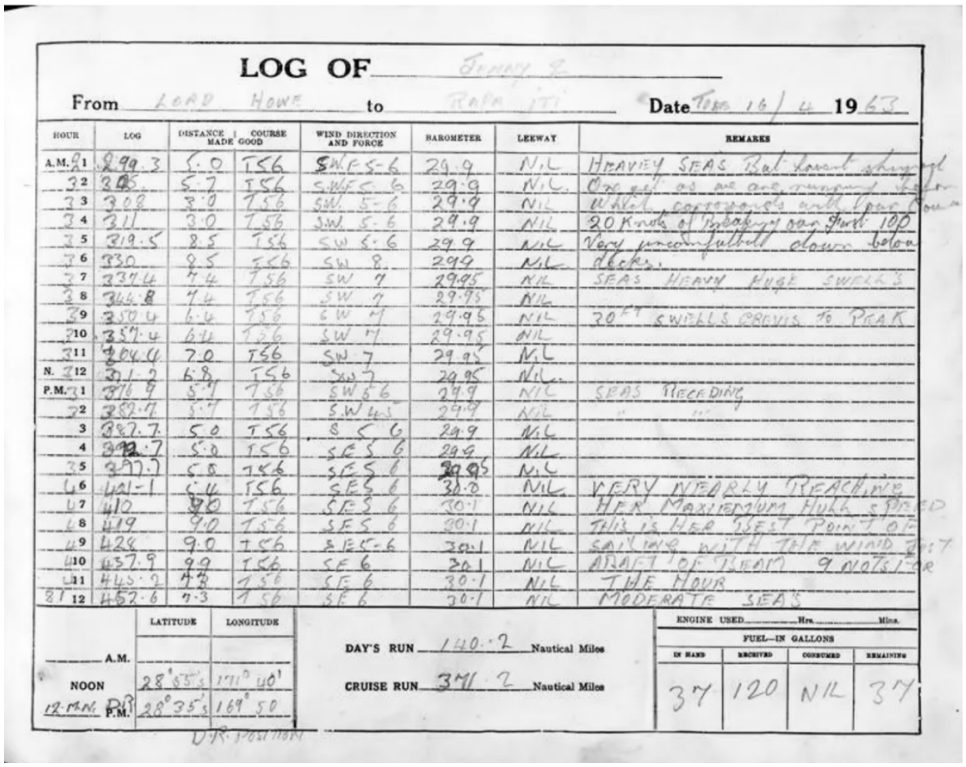
LEGEND: 1 - CELESTIAL; 2 - ELECTRONIC; 3 - VISUAL; 4 - D.R.

| TIME | ORDER | CSE | SPD | DEPTH | RECORD OF ALL EVENTS OF THE DAY |
|---|---|---|---|---|---|
| | | | | | 00-04 |
| 2342 | | | | | Assumed the watch. Moored portside to USS ROYAL (DD-000) at Pier 3, Birth 32, Naval Operating Base, Norfolk, Virginia with standard mooring lines doubled and springs out fore and aft. Receiving miscellaneous services from the pier. Cold iron and security watches have been posted. Material condition YOKE has been set throughout the ship. Ships present include various units of the U.S. Atlantic Fleet. SOPA is: Com Bucant embarked in USS REMINGTON (AD-00). |
| 2351 | | | | | |
| 0059 | | | | | Security watch reports all conditions normal. |
| 0156 | | | | | Security watch reports all conditions normal. |
| 0259 | | | | | Security watch reports all conditions normal. R. C. Fox R C FOX, BTC, USN |
| | | | | | 04-08 |
| 0345 | | | | | Assumed the watch. Moored as before. |
| 0358 | | | | | Security watch reports all conditions normal. |
| 0506 | | | | | Security watch reports all conditions normal. W. J. Tiger W. J. TIGER, LTJG, USN |
| | | | | | 08-12 |
| 0725 | | | | | Assumed the watch. Moored as before. |
| 0830 | | | | | Captain arrived on board. |
| NAT 0910 | | | | | Received fuel, water and draft report. Draft fwd. 13', aft 14'0", mean ~~13'9"~~ 13'7". |
| 0930 | | | | | Stationed the special sea detail. N. A. Trout N. A. TROUT, LT, USN |
| | | | | | 08-12 (Continued) |
| 0950 | | | | | Captain and Navigator are on the bridge. |
| 0952 | | | | | Steering shifted to bridge. |
| 0955 | | | | | Completed all preparations for getting underway. |

REPORT SYMBOL OPNAV 3100-10

MRP3F0501

Figure 1 Example deck logbook page (Tenaglia, 1977)



**LOG OF** Jinny 2

From LORD HOWE to RAPA (FJI) Date Tues 16/4 19 63

| HOUR | LOG | DISTANCE MADE | COURSE GOOD | WIND DIRECTION AND FORCE | BAROMETER | LEEWAY | REMARKS |
|---|---|---|---|---|---|---|---|
| A.M. 1 | 299.3 | 5.0 | TS6 | SW FS-6 | 29.9 | NIL | HEAVY SEAS But have ship |
| 2 | 304 | 5.7 | TS6 | SWFS-6 | 29.9 | NIL | On gal as we are running before |
| 3 | 309 | 5.0 | TS6 | SW 5-6 | 29.9 | NIL | WAVE contrary sail (one |
| 4 | 314 | 5.0 | TS6 | SW 5-6 | 29.9 | NIL | 20 K mds of Peak of rag Fwd 100 |
| 5 | 319.5 | 5.5 | TS6 | SW 5-6 | 29.9 | NIL | Very uncomfortable down below |
| 6 | 330 | 9.5 | TS6 | SW 8- | 29.9 | NIL | decks. |
| 7 | 334.4 | 4.4 | TS6 | SW 7 | 29.95 | NIL | SEAS HEAVY HUGE SWELLS |
| 8 | 346.8 | 7.4 | TS6 | SW 7 | 29.95 | NIL | |
| 9 | 350.4 | 6.4 | TS6 | SW 7 | 29.96 | NIL | 20 FT SWELLS PRAYS TO PEAK |
| 10 | 357.4 | 6.4 | TS6 | SW 7 | 29.95 | NIL | |
| 11 | 364.4 | 7.0 | TS6 | SW 7 | 29.95 | NIL | |
| N. 12 | 371.2 | 6.8 | TS6 | SW 7 | 29.95 | NIL | |
| P.M. 1 | 376.9 | 5.7 | TS6 | SW 6 | 29.9 | NIL | SEAS MODERATING |
| 2 | 382.4 | 5.4 | TS6 | SW 6 | 29.9 | NIL | " " |
| 3 | 387.7 | 5.0 | TS6 | S S 6 | 29.9 | NIL | |
| 4 | 392.7 | 5.0 | TS6 | SES 6 | 29.9 | NIL | |
| 5 | 397.7 | 5.0 | TS6 | SES 6 | 29.95 | NIL | |
| 6 | 401-1 | 5.4 | TS6 | SES 6 | 30.0 | NIL | VERY NEARLY REACHING |
| 7 | 410 | 9.0 | TS6 | SES 6 | 30.1 | NIL | HER MAXIMUM HULL SPEED |
| 8 | 419 | 9.0 | TS6 | SES 6 | 30.1 | NIL | THIS IS HER BEST POINT OF |
| 9 | 424 | 9.0 | TS6 | SES-6 | 30.1 | NIL | SAILING WITH THIS WIND 9.7 |
| 10 | 437.9 | 9.9 | TS6 | SE 6 | 30.1 | NIL | ABAFT THE BEAM 9 KNOTS+ OR |
| 11 | 443.2 | 4.3 | TS6 | SE 6 | 30.1 | NIL | THE HOUR |
| 8T 12 | 452.6 | 9.3 | TS6 | SE 6 | 30.1 | NIL | MODERATE SEAS |

| | LATITUDE | LONGITUDE |
|---|---|---|
| A.M. | | |
| NOON | 28° 55' S | 171° 40' |
| 12 MN. P.M. | 28° 35' S | 169° 50 |

DAY'S RUN 140.2 Nautical Miles

CRUISE RUN 341.2 Nautical Miles

ENGINE USED ____ Hrs. ____ Mins.

FUEL—IN GALLONS

| IN HAND | RECEIVED | CONSUMED | REMAINING |
|---|---|---|---|
| 37 | 120 | NIL | 37 |

Figure 2 Example deck logbook page with meteorological information ('Log of Jinny 2', 1963)

### 1.1.2 Regulating parties of logbooks

Various international organisations, shipping companies and flag states dictate the specific data that must be recorded in a ship's logbook. Furthermore, shipping companies might require comprehensive data on cargo operations due to the financial implications of transporting goods and the associated insurance contracts. In addition, the analysis of navigational data is crucial for shipping companies to optimise routes, fuel consumption and to ensure that the captain makes informed decisions. The logbook is also an important legal document in the event of problems or accidents, as it can be used as evidence in legal proceedings.

Each international organisation has its own requirements. The data required by all these organisations may be found in different logbooks or can be centralised in one official logbook (MEPC, 2010). The regulating organisations of the logbook are listed below:

- Safety Of Life At Sea requires records of everything related to safety and navigation (International Maritime Organization, 1974).
- The Maritime Pollution Committee requires data concerning pollution and cargo (IMO, 1996).
- The International Maritime Organisation
- The Global Maritime Distress Safety System (GMDSS) requires data on communication systems (Australian Maritime Safety Authority, 2012).
- The International Labour Organisation (ILO) with the Maritime Labour Convention (MLC)
- International regulations for preventing collisions at sea (COLREG)
- Port state control
- Protection and indemnity insurance (P&I club)
- Hull and machinery insurance (H&M)
- International Convention of Standards of Training, Certification and Watchkeeping (STCW) code
- Code of Federal Regulations (CFR)
- Maritime Safety Committee (MSC)

In addition, flag states have their own requirements for onboard logbooks that supplement those of international organizations and companies. Flag states expect the logbook to comply with all regulations and to record all required data. Details of the information required by flag states are discussed later in Chapter 2.

### 1.1.3 Stakeholders of logbooks

To document a ship's voyage, the logbook is filled following current regulations. We already explained who sets the regulations, but it is also important to define what these mandatory records in a logbook are used for. Who are the logbook stakeholders and what kind of information do they need? It's important to include all relevant details that may be useful to various parties such as: crew, shipowners, insurance companies, cargo owners, authorities and any other person with a legal interest in the voyage.

Does keeping a logbook help an officer to be aware of the situation around him? Or does it distract him from the real situation and does it take his focus away from the safe navigation? There is a distinction between performing an activity purely for the practical purpose of completing it and performing an activity to raise awareness or to confirm that a system is working correctly. The logbook can improve the situational awareness of the crew, if the data is deliberately recorded in the logbook. It is critical for the crew to notice when conditions are worse or different than predicted and to record this along with the actions taken to avoid any incidents (Nordpoll, Steinsland, & Aasboø, 2021). In the event of a claim, it's important for the crew to protect themselves against any potential blame, and for the insurance company to have a reference point from where to assess the situation.

A shipowner is also a stakeholder in the logbook, he has an interest in complying with the logbook requirements to avoid fines. The information in certain logbooks can be useful for the shipowner to optimise certain processes or monitor other issues. This information can go from the logbook or ship to the shore manager via e-mail.

The Port State Control is the authority that verifies if logbooks comply with the applicable regulations. Its role as a stakeholder is explained in part 1.1.4.

After an incident, marine insurers rely on the logbook as evidence to assess the preventive measures taken and to gather all relevant information. However, the importance of the logbook has diminished with the advent of various electronic systems on board that record information relevant to marine insurers. These new electronic systems are discussed later in this chapter.

From the point of view of historians and historical climatologists a logbook can be of great importance. The information contained in logbooks can be kept for more than hundreds of years so it can be studied retrospectively. A logbook may contain information about the climate, weather conditions, animals, diseases, cultural aspects, navigation tools, land forms in the past and many more. Historians can use logbooks to build up a picture of the past (Nordpoll et al., 2021).

The logbook is often used by different stakeholders simply to comply with the regulations or for their work. One thing is for sure, the records describe the past and what has happened cannot be changed.

### 1.1.4 Port State Control

Port State Control (PSC) is one of the reasons why flag states, classification societies and shipping companies place so much emphasis on the accuracy of the logbook. The PSC carries out unannounced inspections of ships that are not registered under the flag of the country in which the port is located. If a ship fails a PSC inspection, it might be detained or banned from entering the country's waters. The objective of PSC is to reduce the number of substandard ships. The inspections rely on the International Law of the Sea and the SOLAS convention to monitor the application of regulations on board. However, due to a lack of resources, not all ports can carry out these inspections adequately (Heylbroeck, 2010).

Several countries have entered into reciprocal agreements regarding the organisation of PSC. These agreements, from different regions, are documented in a Memorandum of Understanding (MoU). Inspection criteria and procedures across different regions are standardised. A well-known example is the Paris MoU in which several European countries have defined specific aspects to be inspected on board, such as the logbook.

The aspects that may be controlled by the PSC are listed below.

I. Certificates: crew certificates (STCW), statutory and class certificates and international Safety Management (ISM) documentation.
II. Navigation bridge: navigation charts, nautical publications, magnetic compass, GMDSS radio installation and Emergency Position Indicating Radio Beacon (EPIRB), navigation lights, flares, sound signals and fire detection system
III. Lifesaving appliances: lifeboats structure, davits, inventory and engine, emergency lighting and batteries, life jackets and inflatable rafts.
IV. Accommodation: fire-fighting equipment, fire control plan, signalling and escape routes, fire doors and sanitary facilities.
V. Deck zone: corrosion of the deck surface, railing and gangways, loading hatches and other access hatches, watertight doors, ventilators and vent pipes, winches and capstans, firefighting equipment, fixed fire-fighting installation and fire dampers and quick release valves.
VI. Workspaces: emergency fire pumps, emergency generator and lighting.
VII. Engine room: general condition of the engine room, waste oil retention, tools, main engine, double fuel lines, oil separator, alarms, oil record book, bilge pumps, steering gear, emergency lighting and batteries, firefighting equipment, watertight doors, signalling and escape routes (Heylbroeck, 2010).

In order to prioritise inspections, PSC uses a database called 'Thetis'. It records inspection results and categorises ships based on their level of risk. The database creates a Ship Risk Profile (SRP) with three categories: High Risk, Standard Risk and Low Risk. A High Risk ship is one that has received many points during inspections, these points should be interpreted negatively. Ships with less than 5 points are Low Risk, ships with 5 or more points are Standard Risk and ships that do not meet the requirements of Low or Standard Risk are High Risk ships. The more points a ship receives during an inspection, the more likely it is that the PSC will inspect the ship when it arrives in port. This table describes the points a ship can receive (Heylbroeck, 2010).

| | | | High Risk Ship (HRS) | | Low Risk Ship (LRS) |
|---|---|---|---|---|---|
| | | | Criteria | Weight | Criteria |
| Type | | | Oil, Chemical, Gas, Bulk, passenger | 2 | All types |
| Age | | | >12 years | 1 | All ages |
| Flag | BGW-list[1] | | Black-VHR, HR, M to HR | 2 | White |
| | | | Black-MR | 1 | |
| | IMO-audit[2] | | - | - | Yes |
| Recognized Organisation | Performance | H | - | - | High |
| | | M | - | - | - |
| | | L | Low | 1 | - |
| | | VL | Very Low | | - |
| | EU recognized | | - | - | Yes |
| Company | Performance | H | - | - | High |
| | | M | - | - | - |
| | | L | Low | 2 | - |
| | | VL | Very Low | | - |
| Nr of deficiencies recorded in each insp within previous 36 months | | Deficiencies | Not eligible | - | ≥5 (and at least 1 insp carried out in 36 months) |
| Nr or detentions within previous 36 months | | Detentions | ≥2 detentions | 1 | No detention |

Figure 3 Risk analysis of ships by PSC (Heylbroeck, 2010)

The PSC will look back 36 months for deficiencies and detentions, not further. A detention is when a deficiency or several deficiencies result in the ship being detained. Therefore, if a ship has deficiencies or detentions recorded more than 36 months ago, they do not count for the Ship Risk Profile.

In addition, the quality of flag states is assessed on the basis of inspections carried out on all ships flying their flag, and they are divided into three lists: white, grey and black. These flag state lists are not the same as the Ship Risk Profiles lists, but they are related. If a flag state has a lot of ships with a High Risk profile flying its flag, the flag state will have a greater chance of being placed on the black list.

Shipping companies or shipping managers also have a risk profile listed as high, medium, low or very low risk. Again, this is related to the Ship Risk Profiles. It is important for the image and reputation of the flag state and the shipping company to be on the white list or the low risk list (Heylbroeck, 2010). Each list is published annually by the Paris MoU.

One of the things that the PSC inspects on board is the logbook. Annex 10 of the Paris MoU lists the logbooks that they inspect:

I. Ship's log book with respect to the records of drills, including security drills, and the log for records of inspection and maintenance of lifesaving appliances and arrangements and firefighting appliances and arrangements (SOLAS).

II. Oil Record Book part I and II (MARPOL)
III. Cargo Record Book (MARPOL)
IV. Garbage Record Book (MARPOL)
V. Logbook for fuel change-over (MARPOL)
VI. Record book of engine parameters (NOx TC)
VII. Ballast Water Record Book (BWMC) (Paris MoU, 2022a)

PSC reviews the deck logbook to validate and ensure the accuracy of the information recorded. They use the deck logbook for example to check that the rest and working hours recorded are consistent with the watch-schedule, known as cross-checking. Additionally, PSC checks the deck logbook to confirm that the fuel changeover has been carried out in accordance with the procedures for the Sulphur Emission Control Area (SECA) zone. In the event of an accident or complaint involving PSC, the deck logbook may also form part of an investigation (Heylbroeck, 2010).

The Paris MoU publishes the results of its inspections every year. If we take a closer look, we can see that the accuracy of logbooks is often insufficient. In this study, an overview is given of the logbook-related inspections in 2022. In 2020 and 2021 there were fewer inspections on board ships due to the Covid pandemic, which makes these figures not representative. Nevertheless, it is important to emphasise that there are now more ships with deficiencies than usual due to the low number of inspections by different organisations during the pandemic. In 2022, inspections were again carried out on a normal basis.

In 2022, the PSC reported that the Oil Record Book was the 13$^{th}$ most deficient of all the aspects controlled by PSC described above. The Oil Record Book had 500 deficiencies and 8 detainable deficiencies in 2022.

The other logbooks that PSC can control had fewer deficiencies, but the number is still remarkable. Below are two graphs illustrating the deficiencies and detainable deficiencies of the different logbooks controlled by PSC (Paris MoU, 2022b).

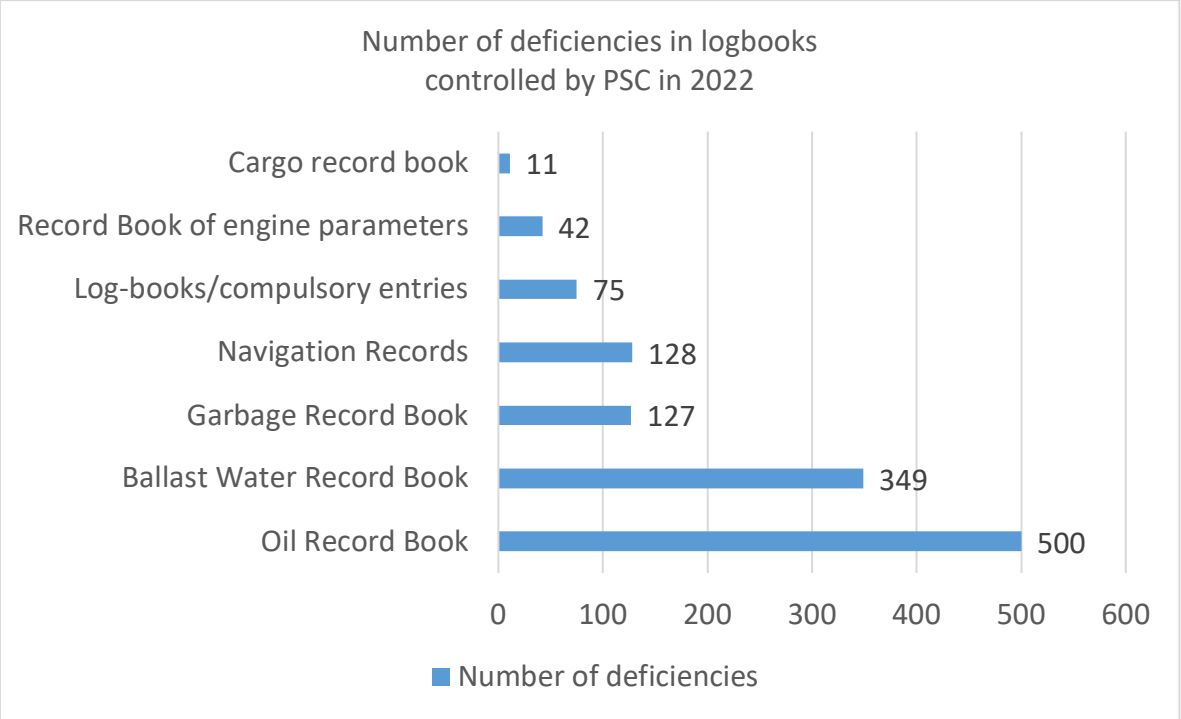



Figure 4 Number of deficiencies in logbooks by PSC in 2022 (own work)(Paris MoU, 2022b)

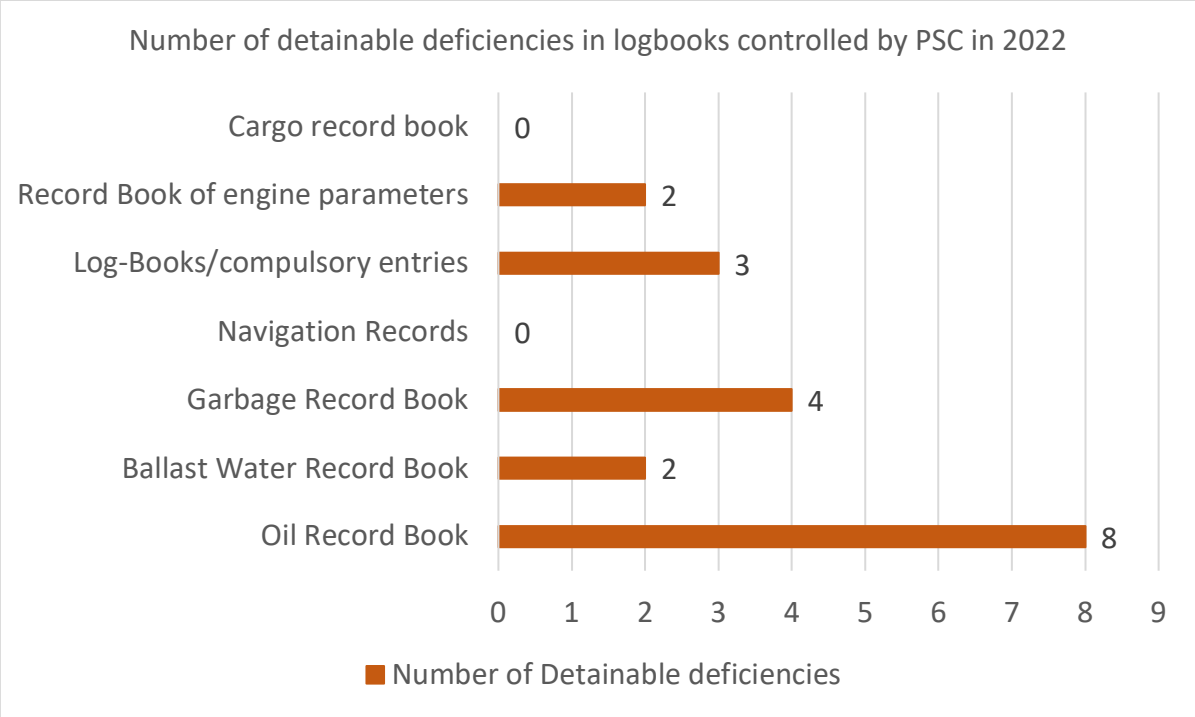



Figure 5 Number of detainable deficiencies in logbooks controlled by PSC in 2022 (own work)(Paris MoU, 2022b)

These graphs show that even in 2022 there are still some problems with filling in the logbooks required by SOLAS, MARPOL and the Ballast Water Convention, namely 1251 deficiencies in total, of which 19 even lead to immediate detention. Looking at the figures, we can conclude that not all logbooks are filled in correctly. The question is whether we can solve this problem or not? There are plenty of ships that can use some help with logbooks. There is space for improvement, but how will we do this?

A system that already exists and that can help officers to fill in the logbook is the electronic logbook (ELB). The ELB will be discussed in part 1.3.

Currently, PSC in Belgium verifies electronic logbooks onboard according to MEPC.312(74) during periodic inspections. The Belgian Maritime Inspectorate accepts the use of ELBs on Belgian vessels for MARPOL Convention and NOx Technical Code 2008 record keeping requirements, as stated in the circular. The circular specifically references MSC/Circ.982 Guidelines on Ergonomic Criteria for Bridge Equipment and Layout, requiring ELBs to be located on the bridge. The Voyage Data Recorder (VDR) also records the ELBs data. (Belgian Maritime Inspectorate - Flagstate, 2022a)

## 1.2 Types of logbooks

To study the legislation on logbooks and ELBs it is important to define primarily what types of logbooks there are. The different types of logbooks can be divided into two main groups: standard logbooks or MARPOL logbooks and custom logbooks or non-MARPOL logbooks. Each entry made in a logbook must be signed by the person responsible for its content and the master must sign at the end of each logbook page (MEPC, 2010). Entries will be made in English, French or Spanish, as these are considered to be the three official working languages by the World Trade Organisation (World Trade Organisation, 2012). Entries may also be made in the official national language of the flag state, which will prevail in the event of a dispute. A logbook should be kept readily available at all times for both daily entries and inspections. The logbook should be retained for at least three years after the last entry. Copies can be made if certified by the master and true copies may be used as evidence in judicial proceedings. Inspections and the process of obtaining a true copy should not delay the ship in its operations (MEPC, 2010).

The standard logbooks are those obligated by IMO or MARPOL conventions and regulations. Standard formats are available for entering data. The existing standard logbooks or MARPOL logbooks are:

I. Oil Record Book Part I
II. Oil Record Book Part II (MARPOL Annex I)
III. Garbage Record Book (MARPOL Annex V)
IV. Cargo Record Book (MARPOL Annex II)
V. Ozone-depleting Substances Record Book (MARPOL Annex VI)
VI. Ballast Record Book (IMO Ballast Water Convention)
VII. Stability Record Book
VIII. GMDSS Radio Log Book
IX. Recording of tier and on/off status of marine diesel engines (MARPOL Annex VI)
X. Record of Fuel Oil Changeover (MARPOL Annex VI)
XI. Record Book of Engine Parameters (NOx Technical Code)

These Standard logbooks may be part of the ship's official logbook (OLB) or they may be individual logbooks. The official logbook is an example of a custom logbook and obligated by the Merchant Shipping Law. The OLB includes the deck logbook, but every other type of logbook can be part of the OLB. The OLB is important for inspections and surveys (The Secretary of State, 1981). There are many custom logbooks, they don't have a standard format, but the entries in these logbooks may be mandatory. Examples of custom logbooks or non-MARPOL logbooks are:

I. Official logbook

II. Deck logbook

The Ship's deck logbook is a backup in the event of RADAR or GPS failure. The logbook is a record of the last positions, weather records, incidents, sightings, and other navigational related information and will help to determine next positions using dead reckoning. But, the logbook is equally important for investigations. When something goes wrong, a logbook can play a major role in maritime disputes.

III. Engine log

Record keeping is an important aspect in the engine department. The Engine logbook records various parameters of the machinery. The purpose is to give a clear view of the working condition and situation in the engine room. The Engine logbook is kept in the engine control room since most of the readings are available there, although local readings in the engine room need to be checked regularly.

IV. Watch log

The watch log is used to keep record of the working hours of all crew members, the hours officers are on watch on the bridge, engineers in the engine room, the cook in the kitchen, etc. The watch logbook is kept by the master. This gives the master a clear overview of working hours and resting hours. It is very helpful to draw up a watch hours schedule or to adjust or change the schedule if necessary. The ILO has set minimum requirements for rest hours for seafarers on board. Rest periods should be at least 10 hours in a 24-hour period and 77 hours in a 7-day period (International Labour Organisation, 2006).

## V. Security log

In addition to all the navigational aspects of sailing, there is another important aspect: security. Ships must comply with the International Ship and Port facility Security Code (ISPS) and the ISM code. Ships must take precautionary measurements to ensure the safety and security of the ship, crew, cargo and the environment. The ship's security officer, together with the master, is responsible for ensuring that the security logbooks are properly maintained. SOLAS Chapter XI-2 (ISPS) contains all the fundamental security-related obligations that ships must comply with (IMO, 2022a).

If the ISM code and ISPS code are applicable to the ship, the ship must have a valid International Ship Security Certificate (ISSC), Document of Compliance (DOC) and Safety Management Certificate (SMC). It is important to have these documents readily available to ensure a smooth inspection.

The ISPS code states that activities covered by the ship security plan must be recorded and kept on board for at least the minimum period required by the Administration. Ship security involves the communication between ship and port, so in the security logbook the last port of call must be recorded or attached. Secondly, the security levels on board and in port must be recorded in the security logbook. The Security level may be 1, 2 or 3. They must be recorded with a brief explanation as to why this level was chosen. If the Security level changes, due to change of position, pirates or other threats, this should be recorded in the logbook. In addition, any ship specific security measures taken by the crew should be recorded.

Security drills or trainings that have been done on board should be recorded on a separate sheet. This sheet should include all the names and signatures of the participating crew with the briefing and debriefing. Security drills or exercises shall be conducted on board every 3 months. Security audits, reviews of security activities and maintenance, calibration and testing of equipment used to provide security, should be recorded in the security logbook. Finally, the periodic review of the ship security assessment, the security plan and any necessary amendments should also be recorded.

The ISPS code states that records should be available at all times to duly authorized officers of Contracting Governments to verify that the provisions of ship security plans

are being implemented. In addition, records may be kept in any format but should be protected from unauthorised access, disclosure, amendments, or destruction. Any format means that an electronic security logbook is permitted (SOLAS, 2003).

VI. Damage log

The damage log includes damage reports about damages to the ship or to the cargo. The following can be recorded: when the damage occurred, when the damage was discovered, the nature of the damage, whether or not the damage created a dangerous situation, whether the damage can be repaired and how it can be repaired.

VII. Hospital log or medical log

A hospital log is not something that is directly associated with a ship, but it is an important aspect of record keeping on board. Before seafarers can go on board, they must have a medical certificate stating that they are medically fit to sail. This is a requirement of the ILO and STCW. The Medical logbook contains a list of requirements for the medical chest on board and a medical inventory checklist. The medical logbook records medical treatments given, monitoring of a patient's parameters and medical incidents requiring attention. Most of the requirements of the ILO and STCW conventions are directed by flag states to ensure that sufficient measures are taken to protect the health of mariners on board and to provide access to medical care during voyages. The master is responsible for providing medical care to the casualty, following up on the patient and organising repatriation if necessary (STCW, 2010).

## 1.3 Change from paper to electronic logbooks

The maritime industry needs to improve on a number of aspects in order to sustain itself and sail more efficiently. Since the beginning of shipping, paper logbooks have been important to safe sailing by recording observations, navigational information and other data. The advantages of the paper logbook are that all these records are in writing and readily available, but the disadvantage is that there is only one unique copy on board.

Over the years, new technology has been introduced on board: the Voyage Data Recorder (VDR) and Automatic Identification System (AIS) were installed on the bridge in 2002, and the Electronic Chart Display Information System (ECDIS) in 2012 (IMO, 2019a, 2019b, 2019c). These electronic tools facilitate the work of the officers on board and help to better reconstruct parts of the voyage.

The VDR continuously records various information related to the vessel's operation. The data collected is retained for twelve hours and then overwritten with new data. The onboard activities recorded are: date, time, speed, engine command and response, heading, rudder angle, position, wind speed and direction, VHF communication, bridge audio, under keel clearance, hull opening status, hull stress monitoring and watertight and fire doors status. The IMO requires the use of the VDR on seagoing vessels (IMO, 2019a).

The AIS helps to improve officers' situational awareness by identifying vessels, assisting with target tracking and exchanging vessel information. The AIS transmits static information every six minutes and dynamic information more frequently over the VHF band. Static information includes IMO number, Maritime Mobile Service Identity (MMSI) number, name, call sign, length, beam, type of vessel and position. Dynamic information is the ship's speed, position and course (NATO Shipping centre, 2021).

ECDIS is an electronic chart system that replaces paper charts and has been adopted by the IMO. Electronic charts provide more accurate information than paper charts, with the ability to click through and ask for additional explanations. ECDIS is able to process information received from other bridge instruments, namely: the GPS, AIS, RADAR, gyrocompass and ARPA (Automatic RADAR Plotting Aid).

The data recorded by the VDR, AIS and ECDIS can also be recorded manually in the logbook. As a result, officers may feel that they are duplicating and doing unnecessary work. The paper logbook can be a good source of non-standardised records, standardised records are recorded on other electronic systems on the bridge and additionally in the logbook. As the same information is stored in different ways, there is an opportunity to reduce the time spent by the crew in recording standardisable information. In addition, it can be assumed that automatic recorded data is more trustworthy than the data recorded in the logbook by an officer, he can make mistakes or the officer's (visual) assessment of the situation can be wrong.

The information recorded in a logbook is 'old' news for the crew, it does not give the officer any accurate information about the current situation. So, if the officer fills in the logbook just because he has to, it will not improve his situational awareness, which is extremely important for safe navigation. Officers should not use their time to record standardised information when they can focus on watchkeeping. Checking electronic aids such as the ECDIS and RADAR and looking outside should be enough for an officer to be aware of the current situation. Considering this, it would be an improvement if standardisable information could be automatically recorded in a logbook providing more time for the officer of the watch to focus on his primary duties (Nordpoll et al., 2021).

Moreover, electronic instruments are considered more reliable than human beings. The VDR is a good example: the recording of a voice on the bridge is more reliable than the words written down by that person. It can be possible that a person writes poorly, uses the wrong words or forgets to write down an essential part.

The maritime industry is striving to digitise as much as possible to reduce the amount of paperwork for the crew and to improve officers' situational awareness. Focusing on logbooks a possible improvement could be the introduction of ELBs. According to the NAPA company, a developer of ELBs for the maritime industry, the ELB could save up to 78% of administrative time (NAPA, 2020). The ELB is able to record standardisable information automatically, and in most cases, without the intervention of an officer.

Officers on board are faced with the digitalization of various procedures and daily routines. In order to introduce ELBs on board, it is essential to ensure that they are secure, easy to use and contribute to safe sailing. Security can be guaranteed by the flag state and the provider. Ease of use can be ensured by the providers as well.

On the first of October 2020 MARPOL enabled the use of electronic logbooks in place of paper logbooks. Under MARPOL, several guidelines have been published with which an electronic logbook must comply. (MEPC, 2019) However, these guidelines only apply to electronic MARPOL logbooks and not to non-MARPOL logbooks. The guidelines for MARPOL ELBs are comprehensive and very clear. Nevertheless, there is still some room for interpretation, this allows companies involved in the development of ELB systems and software to add specific features to differentiate their products.

The decision to use ELBs has been formalised by amendments to the MARPOL and NOx Technical Code (DNV, 2020). These amendments are contained in Annex 1 Resolution MEPC.312(74) Guidelines for the use of electronic logbooks under MARPOL, Annex 3 Resolution MEPC.314(74) Amendments to MARPOL Annexes I, II and V, Annex 5 Resolution MEPC.316(74) Amendments to MARPOL Annex VI and MEPC.317(74) Amendments to the NOx Technical Code 2008. The provisions for ELBs will apply to subsequent MARPOL logbooks:

I. Oil Record Book, part I and II (MARPOL Annex I)
II. Cargo Record Book (MARPOL Annex II)
III. Garbage Record Book, part I and II (MARPOL Annex V)
IV. Ozone-depleting Substances Record Book (MARPOL Annex VI)
V. Recording of tier and on/off status of marine diesel engines (MARPOL Annex VI)
VI. Record of Fuel Oil Changeover (MARPOL Annex VI)
VII. Record Book of Engine Parameters (Nox Technical Code) (MEPC, 2019a).

It is obvious that there are currently no clear international guidelines for either paper or electronic non-MARPOL logbooks. Non-MARPOL logbooks have to follow the specific requirements described by each flag state. The lack of international guidelines for every type of logbook creates an unclear working environment.

## 1.4 Approval of flag states

Several flag states have implemented the use of ELBs on board ships into their legislation. Ships flying this flag are allowed to use ELBs instead of paper logs. In order to further investigate the implementation of ELBs in Belgium, it is interesting to look at the details of the guidelines for the use of ELBs in different legislations. By mapping the international legislation and examining the approval of ELBs by different flag states, it is possible to get a picture of how ELBs can be implemented in Belgian legislation.

Flag states and authorities must ratify the use of ELBs before they can be introduced on board by shipowners or charterers and the logbook software must meet the requirements of flag states, ports and regulatory authorities. MARPOL and non-MARPOL logbooks can only be used on board in electronic format if approved by the flag state. Flag states have the right to limit the types of logbooks that can be used in an electronic format and may make their own flag state specific requirements for non-MARPOL logbooks. For the use of electronic MARPOL logbooks, the IMO Maritime Environment Protection Committee (MEPC) has developed clear guidelines, which are applied by some flag administrations (DNV, 2020).

Flag states that have approved the use of ELBs on board of their ships can be divided into two different categories: the flag states that have accepted the use of MARPOL ELBs and the flag states that have approved MARPOL ELBs and non-MARPOL ELBs. Each flag state that has approved ELBs or a selection of ELBs has published documents indicating the approval. In these documents reference is made to the MARPOL resolutions covering ELBs. When a flag state approves non-MARPOL ELBs, there are often no further regulations or guidelines described.

The flag states that approve the use of MARPOL ELBs are listed below.

I. The Bermuda Maritime Authority approves only MARPOL ELBs. The approval is described in the Bermuda guidance notice for ELBs and in a document of the Red Ensign Group UI (unified interpretation) for MARPOL ELBs (Red Ensing Group, 2021).
II. The French flag state approves MARPOL ELBs. This is described in the French law by Arrêté du 17 décembre 2020, prévention de la pollution (Légifrance, 2020).

III. The Hong Kong Maritime Authority approves the use of MARPOL ELBs on board (Marine Departmennnt Multi-lateral Policy Division, 2019).
IV. The Isle of Men accepts the use of MARPOL ELBs for ships flying their flag (Isle of Man Ship Registry, 2020).
V. The Government of the Grand Duchy of Luxembourg approves the MARPOL ELBs on board of ships flying their flag since 24 December 2019 (The government of the Grand Duchy of Luxembourg Ministry of the Economy, 2019).
VI. The Republic of the Marshall Islands approves MARPOL ELBs since November 2020 (Republic of the Marchall Islands, 2020).
VII. The Netherland Shipping Inspectorate states that ships flying the Netherlands flag may use electronic logbooks under MARPOL (Netherlands Shipping Inspectorate, 2020).
VIII. United Kingdom flagged ships may use ELBs under MARPOL if the system is approved by the United Kingdom Administration (Maritime & Coastguarrd Agency, 2022).
IX. Belgian Maritime Inspectorate accepted the use of MARPOL ELBs on 26 July 2022 (Belgian Maritime Inspectorate - Flagstate, 2022b)

The flag states that approve the use of MARPOL ELBs and non-MARPOL ELBs are listed below.

I. The Bahamas Maritime Authority approves 12 types of non-MARPOL ELBs and the MARPOL ELBs. This is stated in the Bahamas Maritime Authority Marine notice 09 on electronic record keeping and the Marine notice 10 on MARPOL electronic logbooks (The Bahamas Maritime Authority, 2021a) (The Bahamas Maritime Authority, 2021b).
II. The Barbados Maritime Authority accepts 9 types of non-MARPOL ELBs and the MARPOL ELBs. This is stated in Bulletin 332 Electronic record keeping systems (Barbados Maritime Ship Registry, 2020).
III. Denmark grant the use of ELBs on ships flying there flag as long it is stated that the system is fulfilling the accessible standards and has the proper documentation (Carsten G;, 2016).

IV. The Faroe Islands Maritime Authority states in the executive order no.92 that all ship's log books may be kept in electronical form (Abrahamsen, 2020).

V. Finnish-flagged-vessels may keep ELBs on board only using systems from manufacturers that are approved by the Finnish Transport Safety Agency (Finnish Transport Safety Agency, 2017).

VI. The Liberian flag state approves MARPOL and SOLAS related electronic record keeping if the system is from an approved manufacturer (NAPA, 2022).

VII. Malta accepts the use of ELBs on Maltese registered ships as replacement of paper logs. Transport Malta stated the approval in Technical Notice SLS.11 (Merchant Shipping Directorate, 2012).

VIII. The Norwegian Maritime Authority permits the use of electronic deck and engine-room logbooks but they must be approved by the Norwegian Maritime Authority and the supplier must have an approval letter as confirmation. Electronic MARPOL logbooks must be approved by a RO (Norwegian Maritime Authority, 2017).

IX. The Panama Maritime Authority approves the use of optional and voluntary system for ELBs on Panamanian vessels. The ELBs must comply with the International Conventions ratified by the Republic of Panama (General Directorate of Merchant Marine Control and Compliance Department, 2018).

X. Singapore's Maritime Authority permits the use of deck and engine ELBs on board of Singapore registered ships (MPA Shipping Division, 2016).

XI. The Swedish Government has published a letter of acceptance that ELBs can be used (Swedish Transport Agency, 2006).

XII. The US Coast Guard says that ELBs should only be permitted if mandatory requirements are adopted and incorporated in the regulations of MARPOL (Blank Rome, 2020).

All the flag states listed above have been indicated on the world map figure 6. There are a several islands that are too small to be visible on this map, but they are indicated by their name. On the world map we see a lot of flag states that aren't coloured, but the flag states that are, represent at least 75,7% of total world vessels dead-weight tonnage in 2022 (UNCTAD, 2022).

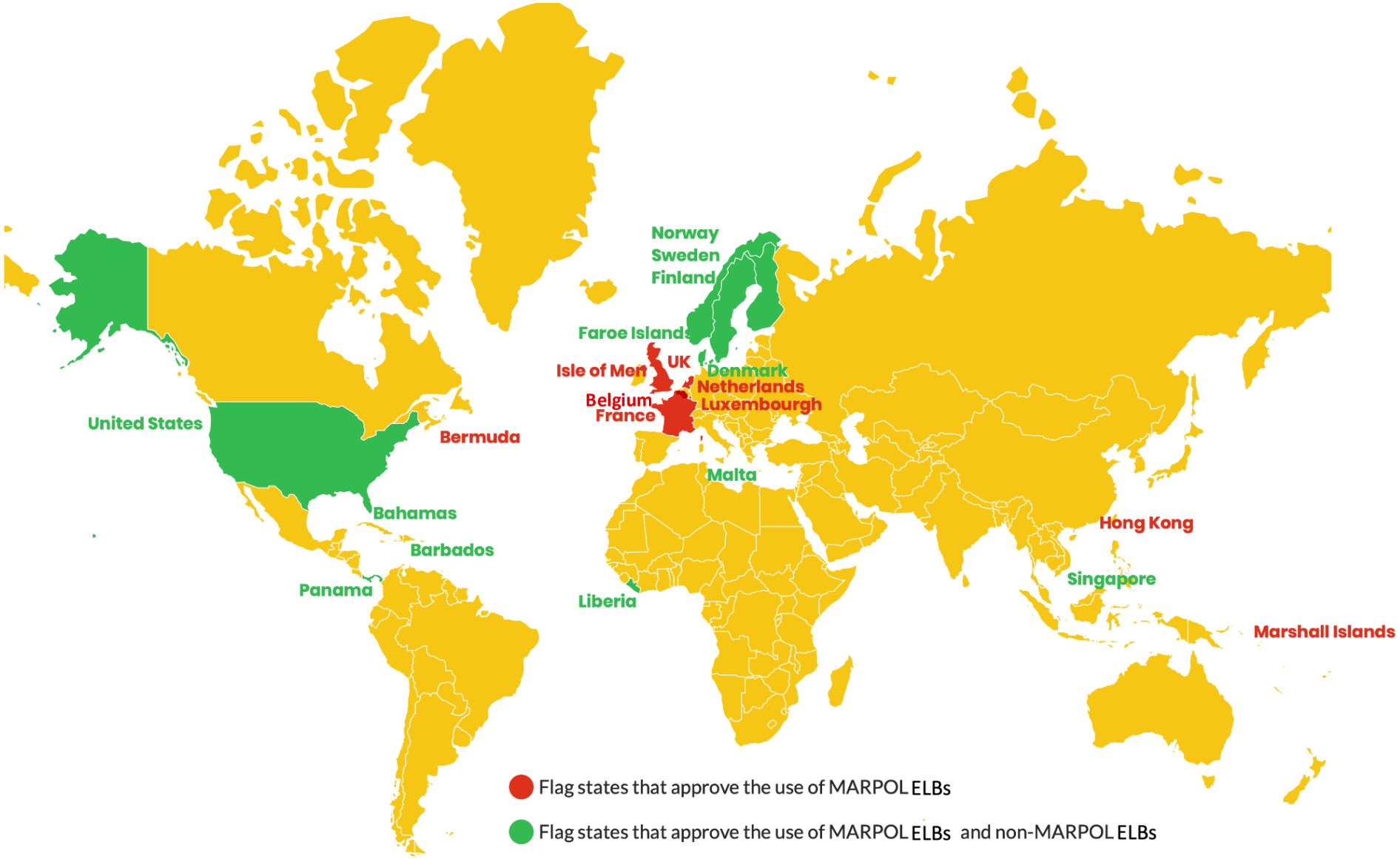



Figure 6 World map of flag states that approved ELBs (own work)

The number of flag states implementing ELBs on board is increasing. The most common argument for using ELBs is to reduce administrative work on board. Some flag states use the argument that ELBs are more environmentally friendly than paper logs, but this argument can be questioned because the MARPOL regulations still require that electronic records can be printed at all times. None of these countries have a comprehensive study that discusses the advantages and disadvantages of electronic logbooks. The Australian Journal of Maritime & Ocean Affairs published an article, “A comparative analysis of deck log records of merchant ships” which does describe some advantages and disadvantages of electronic record books. These kind of advantages and disadvantages are probably considered before a flag state introduced the electronic logbook (Turna & Burak Ozturk, 2020).

## 1.5 Advantages, disadvantages and risks of an electronic logbook

The way ships are operated is constantly changing as innovative technologies are being introduced on board. An officer sailing on a ship today faces different challenges than 20 years ago. Technologies such as computers, the Internet, electronic charts, communications and GPS have become increasingly important. The shipping industry has gone digital, although it is lagging behind compared to other industries.

The logbook plays an important role in the operation of a vessel, yet there has been no in-depth research into the use of ELBs on board. In order to support the process of digitalisation of logbooks, it is the responsibility of flag states to establish clear guidelines and legislation for their use. The basis for the development of these guidelines is a thorough research on the subject.

The advantages and disadvantages must be properly assessed before considering the introduction of any new digital technology on board a ship. It is important that every element on board contributes to the maximum safety of the ship, the crew and the environment. Guidelines and regulations for the use of digital equipment are essential to ensure that it can be used correctly and safely. Developing these policies and regulations is challenging as it requires a lot of time and administrative work.

It is a common complaint of seafarers that they are faced with more and more administrative work on board. This creates a challenge for the maritime world to find solutions and reduce this factor that contributes to higher work pressure. The main objective is to have an officer who can concentrate on his main task: the safe navigation of the ship. One possible time saver could be assisted logbook filling. Traditionally, logbooks are kept up-to-date manually in a paper logbook, an electronic logbook could centralise and collect all the data and allow automatic recording, reducing the workload by simplifying the logging process. Digitising a logbook means that all data recorded can be evaluated by anyone with the correct credentials on any computer running the software. Each record is centralised and easily

accessible. The officer of the watch no longer wastes time on copying information from a digital source as it is automatically transferred into the system. The ELB collects the data from various systems at regular intervals, which makes the information more accurate and trustworthy. A disadvantage could be that the officer doesn't check the automated data and loses situational awareness.

The ELB system should ensure that records are stored correctly. Any ELB forms part of the Information Technology Business Continuity Plan, which is a set of policies, standards, procedures and tools to ensure that critical systems and services do not fail or are repairable within specified limits. The plan enables the organisation to remain operational before, during and after a crisis incident. These incidents can range from fires and floods to cyber-attacks, human error, natural disasters and stolen equipment. A proper plan will reduce the chances of a costly power outage or IT failure. This plan is drawn up by IT administrators and updated regularly (ENISA, 2023).

It is important to have a regular automatic backup to an offline storage facility and a backup power supply for the ELB. Some ELBs offer an online storage so that it can be shared with the shipping company, allowing real-time monitoring by various interested parties. This provides the opportunity for shore-based data analysis to improve onboard processes. The danger with these offline and online storages is that they can be hacked or misused. This is why MARPOL requires the use of cryptography: the logged data is hidden with a secret key. This method ensures that only authorised persons can decrypt and access the data (DNV GL, 2020). Despite the strong security system and regulations, the threat of cyber-attacks or hacking is a hot topic. Security systems must be regularly updated to prevent misuse of recorded data.

The use of ELBs creates new training needs. The different logbook systems that will be used might require a type specific training so that everyone learns how to work with the system provided on board. The company will have to invest in this type-specific training, which may result in an increased workload at the beginning of the implementation. Providers of ELBs sometimes offer to organise these trainings.

The main limiting factor for the implementation of ELBs on board is the lack of acceptance by different flag states. The ELB cannot be used to replace the paper logbook as long as the ports of call do not accept it. For instance, there is no mention of ELBs by the Paris MoU. Furthermore, there is a difference between the acceptance of non-MARPOL ELBs and MARPOL ELBs. The implementation of an ELB as an official onboard logbook is something that could benefit officers on board if it's clearly regulated. As long as it is limited by the possible acceptance or rejection of a PSC, the added value remains limited (DNV, 2020).

# Chapter 2 A comparative analysis of deck log records of merchant ships

## 2.1 Literature study

After looking into the different types of logbooks and the international regulations that exist for MARPOL and non-MARPOL logbooks, it became clear that there are no international regulations for non-MARPOL paper logbooks and ELBs. The data to be recorded in non-MARPOL paper logbooks or ELBs is regulated by different international organisations, flag states, shipping companies or the master. However, there is no specific list that summarises everything that needs to be recorded in a non-MARPOL logbook.

While writing this master's thesis in 2022, I was in contact with Jane Van Huylenbrouck through Mr De Hert. She is a jurist of the shipping control in Belgium and has supported the writing of a circular in which Belgium accepted the use of MARPOL ELBs by ships flying their flag. On 26 July 2022, Circular 2022/003 was published, stating that the "Belgian Maritime Inspectorate accepts the use of ELBs on board of Belgian vessels for record keeping requirements related to the MARPOL Convention and the NOx Technical Code 2008" (Belgian Maritime Inspectorate - Flagstate, 2022a). The preceding research by Ms Van Huylenbrouck and her colleagues took a long time and a circular for non-MARPOL ELBs will take even longer. Less is known about non-MARPOL logbooks because there is no general international legislation for them, so additional research is needed before they can be implemented in Belgium.

After having studied the topic thoroughly the decision was made to focus on the implementation of the non-MARPOL ELBs in Belgium. Therefore, the primary focus has to be put on finding out what records have to be, or can be, recorded in the official deck logbook. The official deck logbook was chosen since it can contain all the other non-MARPOL logbooks. The next step would then be to implement this overview in an official document for the Belgian flag state by designing a suggestive framework for the regulations of the non-MARPOL ELBs.

Scientific articles on the topic are limited, nevertheless one valuable document was found that describes what data should be recorded in the official deck logbook. The article is the result of a research carried out by Ídris Turna and Orkun Burak Ozturk at the Tayyip Erdogan Üniversitesi. The article 'A comparative analysis of deck log records of merchant ships' was published in the Australian Journal of Maritime & Ocean Affairs in December 2020.

Ídris Turna is a Master Mariner who does some research for the Tayyip Erdogan Üniversitesi in the Department of Maritime Transportation Management and Engineering. He has worked several times with Orkun Burak Ozturk, who has a doctorate in philosophy. They specialise in naval architecture, transport management, maritime security, marine navigation and modelling and simulation. Tayyip Erdogan Üniversitesi is a university in Turkey with a strong focus on science and health-related fields. The university has several research centres where maritime related research is possible in the Faculty of Turgut Kiran Maritime (Study Portal Turkey, 2020).

The purpose of their study was to collect and classify the deck-log recording requirements from various sources and to compare their distribution through quantitative analysis. The sources of these requirements are SOLAS, MARPOL, ILO, MLC, COLREG, P&I and flag states. A total of 135 examples of records for different phases of shipping operations were studied. The study also shows that SOLAS Chapter 5 and the International Chamber of Shipping (ICS) Bridge Procedures Guide do not provide guidance on current deck logbook recording requirements, which was an unexpected finding.

Unlike previous studies which have used deck recordings as a data source only, this study provides a structured examination of recording standards. By collecting and categorising the deck logbook recording requirements under specific headings, the study provides a systematic approach to analysing the distribution of these requirements (Turna & Burak Ozturk, 2020). Therefore, this study is of significant value to my thesis.

## 2.2 What should be kept in a deck logbook?

In the first part of the study the focus was put on researching which sources provide legislation on deck logbook entries. The sources that were found include: SOLAS, MARPOL, MLC, ILO, COLREG, IMO and various flag states, although not all flag states were examined. Turna and Burak Ozurk selected eight flag states representing 59,49% of the total deadweight tonnage of the world's merchant shipping. The figures for the total deadweight tonnage of these flag states are taken from the United Nations Conference on Trade and Development (UNCTAD) publication 'Review of maritime transport 2019' (UNCTAD, 2020). Comparing these figures with the UNCTAD publication for 2022, Panama, the Marshall Islands, Liberia, Singapore, Malta, the Isle of Man, the Bahamas and Turkey account for 60% of the world's vessel deadweight tonnage in 2022. This indicates that the selected countries are still representative for this study three years later (UNCTAD, 2022).
In addition, the safety management system instructions for deck logbooks of four shipping companies flying the flags of Turkey, Malta, the Marshall Islands and Panama were examined.

All required logbook entries from these sources were collected, listed and categorised into seven groups in Table 1:

Table 1 Classification of the deck logbook records

Source: edited from (Turna & Burak Ozturk, 2020)

| Table 1 Classification of the deck logbook records | | |
|---|---|---|
| **Table** | **Headline** | **Total number of entries** |
| 1 | Specification of the ship (S) | 13 |
| 2 | Navigation (N) | 38 |
| 3 | Meteorological events (M) | 8 |
| 4 | Drills and trainings (D) | 25 |
| 5 | Tests and inspections (T) | 11 |
| 6 | Port operations (P) | 21 |
| 7 | Extraordinary events (E) | 20 |

Each category has been given a code letter: S, N, M, D, T, P or E. The required entries are given the letter of their category and a sequential number. The frequency with which a particular entry must be made in the logbook is also indicated. Furthermore, the reference and source are added in the tables.

### 2.2.1 Deck logbook records related to specifications of the ship

Table 2 shows the requirements to be recorded according to the ship's particulars. The ship's particulars in this section are entered by the master only once, when the deck logbook is opened for the first time.

Table 2 Deck logbook records that related specifications of the ship (S)

Source: edited from (Turna & Burak Ozturk, 2020)

| Table 2 Deck logbook records related to specifications of the ship | | | | |
|---|---|---|---|---|
| **No.** | **Data to be recorded** | **Source** | **Reference** | **Frequency** |
| S1 | Registry number | Certificate of Registry (COR) | Flag state | Once |
| S2 | Name of vessel | COR | Flag state | Once |
| S3 | IMO number | COR | Flag state | Once |
| S4 | Port of registry | COR | Flag state | Once |
| S5 | Gross tonnage | COR | Flag state | Once |
| S6 | Net tonnage | COR | Flag state | Once |
| S7 | Length over all | COR | Flag state | Once |
| S8 | Breadth | COR | Flag state | Once |
| S9 | Approval | Harbour master | Flag state | Once |
| S10 | Ship owner/manager details | COR | Flag state | Once |
| S11 | Working language | Safety Management System (SMS) | SOLAS Ch.V-Reg 14, Flag state | Once |
| S12 | Date and pace logbook is opened | Master | Flag state | Once |
| S13 | Date and place logbook is closed | Master | Flag state | Once |

The most commonly used source of this information is the International Certificate of Registry. This is a commercial certificate containing information about the ship that does not change or is unlikely to change. For example, it gives information on the nationality and the port of registry. The working language is determined by the master in accordance with the requirements of the Safety Management System and SOLAS Chapter V: “On all ships … a working language shall be established and recorded in the ship's log-book. The company … or the master … shall determine the appropriate working language. Each seafarer shall be required to understand and … give orders and instructions and to report back in that language.” (SOLAS, 2023, chap. V reg 14). In addition, the working language depends on the language of the flag state.

### 2.2.2 Deck logbook records related to navigation

Table 3 lists the records relating to the ship’s voyage events. The navigational data to be recorded are obtained from various sources such as bridge instruments, personal observations of the officers of the watch, documents on the bridge or directly from the master.

Table 3 Deck logbook records related to navigation (N)

Source: edited from (Turna & Burak Ozturk, 2020)

| Table 3 Deck logbook records related to navigation (N) | | | | |
|---|---|---|---|---|
| **No.** | **Data to be recorded** | **Source** | **Reference** | **Frequency** |
| N1 | Date, time | GPS | Flag state | Hourly |
| N2 | Heading | Compass, GPS | SOLAS Ch.V-Annex 22, flag state | Hourly |
| N3 | Alternations of course | Compass | SOLAS Ch.V-Annex 22, flag state | In case of |
| N4 | Compass error | Astronomical, ARPA, visual | Flag state | Hourly |
| N5 | Course over ground | GPS, D-GPS | SOLAS Ch.V-Annex 22, flag state | Hourly |
| N6 | Magnetic course | Magnetic compass | SOLAS Ch.V-Annex 22, flag state | Hourly |
| N7 | Magnetic variation | Charts | Flag state | Hourly |
| N8 | Deviation | Deviation table | SOLAS Ch.V-Reg.19, Annex 13, flag state | Hourly |
| N9 | Position | GPS, AIS | SOLAS Ch.V-Reg.28, Annex 22, flag state | According to the flag state |
| N10 | Speed | Speed log, GPS, AIS | SOLAS Ch.V-Reg.19, flag state | Hourly |
| N11 | Covered distance | Speed log, GPS | SOLAS Ch.V-Annex 22, flag state | Every watch |
| N12 | M/E RPM | RPM indicator | Flag state | Hourly |
| N13 | Tank/bilge soundings | Manual, gauges | Flag state, Protection and indemnity insurance (P&I) | Daily |
| N14 | Hand over the watch | OOW | Flag state, SMS | 4 hourly |
| N15 | Hold ventilation | Cargo logbook | P&I | In case of |
| N16 | Embarkation of pilot | Visual | SOLAS Ch.V-Annex 22, flag state | In case of |
| N17 | Disembarkation of pilot | Visual | SOLAS Ch.V-Annex 22, flag state | In case of |

| | | | | |
|---|---|---|---|---|
| N18 | Commence of sea passage | Master | SOLAS Ch.V-Annex 22, flag state | In case of |
| N19 | End of sea passage | Master | SOLAS Ch.V-Annex 22, flag state | In case of |
| N20 | Making fast/let go tugs | Visual, bell book | Flag state | In case of |
| N21 | First line to shore | Visual | Flag state | In case of |
| N22 | Let go everything | Visual | Flag state | In case of |
| N23 | Boarding a Navaid | Visual, ARPA | Flag state | In case of |
| N24 | Entering a VTS/breakwater | GPS, visual | SOLAS Ch.V-Annex 22, flag state | In case of |
| N25 | Fuel oil change over | GPS | MARPOL VI Reg.14, Port State | Entering ECA area |
| N26 | Preparation for anchoring | Master | SOLAS Ch.V-Annex 22, flag state | In case of |
| N27 | Anchorage position | GPS | SOLAS Ch.V-Annex 22, flag state | In case of |
| N28 | Preparation for departure | Master | SOLAS Ch.V-Annex 22 | In case of |
| N29 | Preparation for arrival | Master | SOLAS Ch.V-Annex 22, flag state | In case of |
| N30 | Navigation in heavy weather | Master | SMS | In case of |
| N31 | Navigation in ice | Master | IMO Res. MEPC.264(68) | In case of |
| N32 | Precautions in restricted visibility | Master | COLREG Rule 35, P&I | In case of |
| N33 | Coastal navigation | Master | SMS | In case of |
| N34 | Changing the voyage plan | Master | SOLAS Ch.V-Annex 22 | In case of |
| N35 | Taking command | Master | Flag state | In case of |
| N36 | Name(s) of lookout | OOW, SMS | Flag state | Every watch |
| N37 | Definition of time zone | OOW, SMS | Flag state | Daily |
| N38 | Ballast water operations | OOW, SMS | Port state | In case of |

Sources of navigational data can be bridge instruments such as GPS, gyro-, magnetic- and GPS compass, Automatic Radar Plotting Aid (ARPA), charts, deviation table, D-GPS, AIS or speed log. Other sources mentioned are astronomical, visual, manual, officer of the watch, master and SMS. Navigational related data must be recorded frequently, depending on the degree of change, hourly, 4-hourly, every watch, daily or in case of. 'In case of' means when the event to be recorded occurs, for example an alternation of course does not occur at regular intervals. A course change may occur very frequently in a traffic lane or not at all for a day on an ocean passage.

Most of the information in Table 3 is required by SOLAS Chapter V-Annex 22. This actually refers to IMO Resolution A.916(22), adopted on 29 November 2001, Guidelines for the recording of events related to navigation. The resolution states that navigational activities and incidents relevant to the safety of navigation should be recorded in sufficient detail to allow a complete record of the voyage to be reconstructed (IMO, 2001). The information that should be recorded in relation to navigation, in addition to the national requirements of flag states, is divided into four groups:

I. Before the voyage: condition of the ship, manning, provisions, cargo, draught, stability, inspections, steering gear and navigational and radiocommunication equipment.
II. During the voyage: courses, distances, position, weather, changes to the voyage plan, embarkation or disembarkation of pilots and entry into special areas.
III. Special events: death, injuries, malfunctions, hazardous situations, emergencies and distress messages.
IV. At anchor or in port: operational and administrative matters relating to the safety and security of the ship (IMO, 2001).

In addition, Resolution A.916(22) states that records should be permanent and may be handwritten, electronic or mechanical. This again shows that the IMO recognises the use of electronic logbooks on board. They do specify some preservation of records:

- The logbook should be paged and incorrect entries should be crossed out and rewritten.
- The times in automatic recording should be synchronised.

- Electronic records should be protected so that they can't be deleted, destroyed or overwritten.
- Records should be retained for as long as required by the Administration, but not less than one year (IMO, 2001).

The flag state requirements include almost all of the records listed in Table 3. A flag state can make his own requirements for all non-MARPOL logbooks, including the official logbook or deck logbook.

### 2.2.3 Deck logbook records related to meteorological events

Table 4 represents the records related to meteorological events. The data to be recorded under this headline are obtained by personal observations of the officers of the watch and by meteorological instruments.

Table 4 Deck logbook records related to meteorological events (M)

Source: edited from (Turna & Burak Ozturk, 2020)

| Table 4 Deck logbook records related to meteorological events (M) | | | | |
|---|---|---|---|---|
| **No.** | **Data to be recorded** | **Source** | **Reference** | **Frequency** |
| M1 | Wind direction | Anemometer, visual | SOLAS Ch.V-Annex 22, flag state, P&I | Hourly |
| M2 | Wind force | Anemometer | SOLAS Ch.V-Annex 22, flag state, P&I | Hourly |
| M3 | Sea state | Visual | SOLAS Ch.V-Annex 22, flag state, P&I | Hourly |
| M4 | Sky | Visual | SOLAS Ch.V-Annex 22, flag state, P&I | Hourly |
| M5 | Visibility | Visual, ARPA | SOLAS Ch.V-Annex 22, flag state, P&I | Hourly |
| M6 | Atmospheric pressure | Barometer | Flag state, P&I | Hourly |
| M7 | Air temperature | Thermometer | Flag state, P&I | Hourly |
| M8 | Relative humidity | Dry and wet bulb | Flag state, P&I | Hourly |

The Protection and Indemnity insurance (P&I) expects all records relating to meteorological events to be recorded. A claim may be made against the ship or the shipping company in the event of an accident on board, with another ship, with the cargo or with officers. A P&I Club covers the civil liability of shipowners and charterers to third parties. The quality of the evidence available determines the settlement of the claim. Gathering this variety of evidence in different situations is the responsibility of the crew on board, depending on the P&I Club of which the particular shipping company is a member. After an incident the evidence must be collected by the shipping company and submitted to the P&I Club, so it is vital that this evidence is carefully and properly stored.

The following is a list of the records that the P&I Club may use as evidence:

I. Technical records
II. Operational records
III. VDR & ECDIS information: it is important here that essential data is not overwritten and is stored separately.
IV. Printouts
V. Official reports
VI. Notes of protest
VII. Witnesses
VIII. Statements
IX. Electronic evidence
X. Additional evidence

An image of the weather conditions is an important item. In the event of damage or loss of cargo, ship's structure, machinery or equipment, a full record of the weather conditions is important for the legal defence of the crew or shipping company.

Port authorities may also request of a copy of the deck log, if it describes severe weather, to add to the Note of protest. Photographs or videos showing weather conditions may also be used as evidence by the P&I Club (WEST, 2020).

### 2.2.4 Deck logbook records related to drills and trainings

Onboard drills and trainings are carried out at varying intervals in accordance with the requirements of international conventions. Records of drills and exercises are shown in Table 5. Most drills are regulated by SOLAS Chapters II, III and V. SOLAS Chapter II-1 defines the requirements for construction, structure, subdivision and stability, machinery and electrical installations. Regulation 19 sets out the obligations relating to damage control drills for passenger ships, 8 different drills should be executed as described in Table 5. SOLAS Chapter III regulation 19.3 gives a lot of information about the emergency trainings and drills with life-saving appliances and arrangements that should be carried out on board. SOLAS Chapter V regulation 26.4 states: “In addition … emergency steering drills shall take place at least once every three months in order to practice emergency steering procedures” (IMO, 2022b).

To ensure effective implementation of the provisions of the ship security plan the ISPS Code part B 13.6 requires that ISPS drills should be conducted at least every three months or when there is a 25% change in the ship’s crew. Part B 13.7 describes that various types of drills should be conducted at least every 18 months to ensure that shipboard personnel are proficient in all assigned security duties at all security levels and to identify any security-related deficiencies. These drills may include:

I. Full-scale or live.
II. Tabletop simulation or seminar.
III. Combined with other exercises held, such as search and rescue or emergency response exercises (SOLAS, 2003, pt. B 13.5, 13.6, 13.7).

Table 5 Deck logbook records related to drills and trainings (D)

Source: edited from (Turna & Burak Ozturk, 2020)

| Table 5 Deck logbook records related to drills and trainings (D) | | | | |
|---|---|---|---|---|
| No. | Data to be recorded | Source | Reference | Frequency |
| D1 | Abandon ship drill (without water) | SMS | SOLAS Ch.III-Reg 19.3.2, flag state | Monthly or when change of 25% crew |
| D2 | Abandon ship drill (in water) | SMS | SOLAS Ch.III-Reg 19.3.3, flag state | Every 3 months |
| D3 | Abandon ship drill (free-fall) | SMS | SOLAS Ch.III-Reg 19.3.4, flag state | Every 6 months |
| D4 | Abandon ship drill (alternative) | SMS | SOLAS Ch.III-Reg 19.3.4, flag state | Every 6 months |
| D5 | Fire drill | SMS | SOLAS Ch.III-Reg 19.3.5, flag state | Monthly or when change of 25% crew |
| D6 | Enclosed space entry and rescue drill | SMS | SOLAS Ch.III-Reg 19.3.6, flag state | Every 2 months |
| D7 | Emergency steering drills | SMS | SOLAS Ch.V-Reg.26.4, flag state | Every 3 months |
| D8 | MOB drill | SMS | SOLAS Ch.III-Reg 19.3.4.6, flag state | Every 3 months |
| D9 | ISPS drills | SMS | ISPS Code Part B 13.6, flag state | Every 3 months/when change of 25% crew |
| D10 | ISPS drills with port facility | SMS | ISPS Code Part B 13.7, flag state | Every 18 months |
| D11 | Oil pollution prevention drill | SMS | MARPOL Annex I-Ch.V, flag state | Every 3 months |
| D12 | Onboard training and instructions | SMS | SOLAS Ch.III-Reg.19.4, flag state | In two weeks after joining |
| D13 | Initial security awareness training | SMS | STCW A-VI/6, flag state | In 24 h after joining |

| | | | | |
|---|---|---|---|---|
| D14 | Safety committee meeting | SMS | MLC Title 4 Reg.4.3, flag state | monthly |
| D15 | Emergency steering drills | SMS | CFR 164.25 (d), flag state | 48 h before entering USA waters |
| D16 | Bunker training | SMS | CFR 155 | 48 h before bunkering |
| D17 | Collision/allision (passenger ships (ps)) | SMS | SOLAS Ch.II-1 Reg 19, flag state | Every 3 months |
| D18 | Grounding/stranding (ps) | SMS | SOLAS Ch.II-1 Reg 19, flag state | Every 3 months |
| D19 | Flooding (ps) | SMS | SOLAS Ch.II-1 Reg 19 | Every 3 months |
| D20 | Loss of power (ps) | SMS | SOLAS Ch.II-1 Reg 19, flag state | Every 3 months |
| D21 | Emergency unberthing (ps) | SMS | SOLAS Ch.II-1 Reg 19 | Every 3 months |
| D22 | Emergency (ps) | SMS | SOLAS Ch.II-1 Reg 19 | Every 3 months |
| D23 | Hull/structural failure (ps) | SMS | SOLAS Ch.II-1 Reg 19 | Every 3 months |
| D24 | Heavy weather damage (ps) | SMS | SOLAS Ch.II-1 Reg 19, flag state | Every 3 months |
| D25 | Use of line throwing gun drills | SMS | CFR 199.180 | Every 3 months |

The Maritime Labour Convention (MLC) also appears in Table 5 with a safety committee meeting. The MLC of 2006 consists of 5 different Titles, Title 4 is discussed in this table and covers health protection, medical care, welfare and social security protection. Regulation 4.3 deals with health and safety protection and accident prevention. To improve this, the MLC proposes a safety committee on board with five or more seafarers elected by other seafarers, who would then be given the role of safety representatives (MLC, 2006).

CFR stands for Code of Federal Regulations, which is the codification of general and permanent rules published in the Federal Register National Archives and Records Administration by the departments of the US Federal Government. CFR 164.25 describes

the tests that must be completed in less than 48 hours before entering or getting underway in US waters. You will not be allowed to enter US waters without an emergency steering drill and recording this in the vessel's logbook (CFR, 2023). 48 hours before bunkering, there should be a bunkering drill for the crew. The training must include:

I. Pre-loading plan
II. Civil and criminal penalties and liability for non-complying
III. Oil transfer procedures, including the bunkering duties of each person.

Immediately after the training, the date and time of the training should be recorded in the deck logbook with a list of attendees (The Washington State Department of Ecology, 2018).

The STCW is an international convention setting minimum standards of competence for personnel on board seagoing ships, adopted by the IMO in 1978. The convention applies to seafarers, shipowners, maritime administrations and training institutes, with the exception of seafarers on warships, government or non-commercial ships and fishing vessels. The STCW code sets out the technical details in the annex and consists of Part A, which is mandatory, and part B, which contains recommended guidelines for training, certification and watchkeeping. Chapter VI in part A contains obligations relating to emergency, occupational safety, security, medical care and survival functions, which are divided into several regulations (US Coast Guard, 2010). Regulation 6 applies to ship's personnel designated with security duties or security awareness and states that "Seafarers employed or engaged in any capacity on board a ship which is required to comply with the provisions of the ISPS Code on the business of that ship as part of the ship's complement without designated security duties shall, before being assigned to any shipboard duties: receive appropriate approved training or instruction in security awareness as set out in table A-VI/6-1" (IMO, 2022a) According to the ISPS Code, this security awareness training is mandatory within 24 hours of the crew embarking (SOLAS, 2003).

### 2.2.5 Deck logbook records related to tests and inspections

Table 6 shows records related to tests and inspections.

Table 6 Deck logbook records related to tests and inspections (T)

Source: edited from (Turna & Burak Ozturk, 2020)

| Table 6 Deck logbook records related to tests and inspections (T) | | | | |
|---|---|---|---|---|
| No. | Data to be recorded | Source | Reference | Frequency |
| T1 | Steering gear tests | SMS | SOLAS Ch.V-Reg.26 Annex 22, flag state, P&I | Within 12h before departure |
| T2 | Operational readiness of all LSA | SMS | SOLAS Ch.III-Reg.20.2, flag state | Before departure, P&I |
| T3 | Prevention and control of water ingress | SMS | SOLAS Ch.II-Part B Reg.24, flag state, P&I, Hull & Machinery insurance (H&M) | Before departure, P&I |
| T4 | Preparation for voyage | SMS | SOLAS Ch.V-Annex 22, flag state | Before departure, P&I |
| T5 | inspections of life-saving appliances | SMS | SOLAS Ch.III-Reg.20.6, flag state, P&I | Weekly |
| T6 | Inspection of survival crafts and general alarm | SMS | SOLAS Ch.III-Reg.20.7, flag state, P&I | Monthly |
| T7 | Accommodation hygiene inspection | SMS | MLC Title 3.1 & ILO 92 Part III Art.17, flag state | Weekly |
| T8 | Food, water and catering inspection | SMS | MLC Title 3.2, flag state, P&I | Weekly |
| T9 | Ship security alarm system test | SMS | SOLAS Chapter XI-2, flag state, P&I | Acc. flag state rules |
| T10 | EPIRB and SART test | SMS | SOLAS Ch.IV-15.9, flag state | Monthly |
| T11 | Tests before entering or getting underway | SMS | SOLAS Ch.V-Annex 22, CFR 164.25 (a), flag state | 12h before entering USA waters |

Hull & Machinery (H&M) insurance covers the insured against the risk of physical damage to the vessel, her machinery and equipment caused by a peril of the seas or other stipulated risks. The subjects that are covered by an H&M insurer are:

I. The hull of the ship
II. Machinery: propulsion, generators, boilers, steering, refrigeration machinery and electronic systems
III. Equipment and gear
IV. Spare parts
V. Provisions and stores
VI. Fuel and lubricating oil (Capt. Justers, 2021).

The standard risks that can be covered by an H&M insurer in the event of loss or damage to the ship are:

I. Perils of the seas and other navigable waters: weather, grounding and collision
II. Fire or explosion: may also occur alongside the vessel, as long as it is accidental
III. Piracy
IV. Violent theft by persons from outside the vessel
V. Contact with harbour
VI. Contact with an aircraft or objects falling from an aircraft
VII. Jettisoning
VIII. Accidents during loading, discharging or transfer of cargo, fuel or stores
IX. Earthquake, lightning or volcanic eruption (Capt. Justers, 2021).

The H&M insurance covers a lot of risks and items, so it is logical that they require some of these items to be tested and inspected to reduce the risk of damage and to ensure that they are in good condition (Capt. Justers, 2021).

This is also true for the ship's P&I Club, which wants to be sure that the ship and her equipment are in a good state before the insurance is completed.

The MLC returns in Table 6. Good hygiene, food, water and catering are fundamental to the welfare and medical care of the crew on board. It is important that they are inspected and checked regularly, as a voyage may take several months. A lack of hygiene or poor-quality

food and water can have serious direct consequences for the health of the crewmembers and indirect consequences for work performance.

Almost all of the topics in Table 6 are covered in several SOLAS chapters. SOLAS requires a large number of tests and inspections to guarantee the safety of crew, ship and cargo at sea.

### 2.2.6 Deck logbook records related to port operations of the ship

Table 7 summarises the records relating to port operations. This section contains the data required for the statement of fact documents, which is one of the key documents in maritime transport.

Table 7 Deck logbook records related to port operations of the ship (P)

Source: edited from (Turna & Burak Ozturk, 2020)

| Table 7 Deck logbook records related to port operations of the ship (P) | | | | |
|---|---|---|---|---|
| Number | Data to be recorded | Source | Reference | Frequency |
| P1 | Notice of readiness | Master | Flag state | On arrival |
| P2 | Time of opening/closing watertight doors | Master | SOLAS Ch.II-Reg.24, P&I | On arrival/departure |
| P3 | Commencement of loading | Port log, visual | Flag state, P&I | At start of loading |
| P4 | Completion of loading | Port log, visual | Flag state, P&I | At end of loading |
| P5 | Stability and stress checks | SMS | SOLAS Ch.V-Annex 22, flag state, H&M | Before departure |
| P6 | Draughts of vessel | Port log, visual | SOLAS Ch.V-Annex 22, flag state | On arrival/departure |

| | | | | |
|---|---|---|---|---|
| P7 | Density of sea water | Refractometer | Flag state | On arrival/departure |
| P8 | Free pratique granted | Agent | Flag state | On arrival |
| P9 | Quantity of cargo | Mate receipt, B/L | SOLAS Ch.V-Annex 22, flag state, P&I | On departure |
| P10 | Commencement of discharging | Port log, visual | Flag state, P&I | At start of discharging |
| P11 | Completion of discharging | Port log, visual | Flag state, P&I | At end of discharging |
| P12 | Damage of cargo | Visual, related documents | Flag state, P&I | In case of |
| P13 | Damage to ship | Visual related documents | Flag state, P&I, H&M | In case of |
| P14 | Crew signing on/off | Company assignment | MLC Title 2.1, flag state | In case of |
| P15 | On appointment of safety officer | Company/Master assignment | MLC Title 4 REG 4.3, flag state | In case of |
| P16 | Quantity of fresh water supplied | Visual, port log | Flag state | In case of |
| P17 | Quantity of bunker water supplied | Visual, port log | Flag state | In case of |
| P18 | Crew member(s) that send to doctor | Visual, visitors log | Flag state | In case of |
| P19 | Quantity of cargo load/discharged | Mate receipt, port log | Flag state | Daily |
| P20 | Stowaway search | Master, SMS | Flag state | Before departure |
| P21 | Port clearance | Agent | Flag state | Before departure |

When a ship leaves, enters or is in port, many operations are started or completed. Flag states require most of these data to be recorded in the official logbook in order to monitor the ship's operations in port.

There are a few records in Table 7 that require some explanation. A Notice of Readiness (NOR) is issued by the master to inform the company that the vessel is ready for loading or unloading and that the hire may commence. The NOR also specifies a time slot within which loading and unloading must take place. If a NOR is not issued or is invalid, the charterer should not pay demurrage. It is important to record in the logbook that a NOR has been issued as evidence. There are 3 general requirements before a NOR may be issued:

I. The vessel arrives at the agreed place in port
II. The vessel is physically ready to commence the cargo operations immediately.
III. The vessel is legally ready, in other words that all necessary documents of the charter service are in order. Customs clearance or entry, immigration and police approval and health or free pratique are the documents that should be ready (WEST, 2017).

Free practice granted means that the ship has received a certificate from the port health authorities stating that there are no infectious diseases on board. The certificate of free pratique allows the ship to enter the port and people to embark and disembark. The free practice is actually the part of the NOR that states that a ship is legally ready. So when the master receives a certificate of free pratique from the ship's agent, he can complete the NOR and record all this information in the logbook (Biltoo, 2022).

### 2.2.7 Deck logbook records related to extraordinary events of the ship

Table 8 lists the records relating to extraordinary events. Extraordinary events are onboard occurrences which are unusual or remarkable and which go beyond the normal or usual. They are recorded in the logbook only when they occur.

Table 8 Deck logbook records related to extraordinary events of the ship (E)

Source: edited from (Turna & Burak Ozturk, 2020)

| Table 8 Deck logbook records related to extraordinary events of the ship (E) | | | | |
|---|---|---|---|---|
| Number | Data to be recorded | Source | Reference | Frequency |
| E1 | Crew injury | Master, medical log | SOLAS Ch.V-Annex 22, flag state, P&I | In case of |
| E2 | Death/birth | Master, medical log | SOLAS Ch.V-Annex 22, flag state, P&I | In case of |
| E3 | Marriage | Master | Flag state | In case of |
| E4 | Ceases to be a member of the crew (out of death) | Master, SMS | Flag state, P&I | In case of |
| E5 | Details of any conviction by a court of any seafarer engaged | Master | Flag state, P&I | In case of |
| E6 | Details of any criminal or disciplinary offence | Master, SMS | Flag state, P&I | In case of |
| E7 | Changing master | Master, SMS | Flag state, P&I | In case of |
| E8 | Collision/allision | Master, SMS | MSC-MEPC.3/Circ.3, flag state, P&I | In case of |
| E9 | Any damage caused by the ship | Master | MSC-MEPC.3/Circ.3, flag state, P&I, H&M | In case of |

| | | | | |
|---|---|---|---|---|
| E10 | Grounding | Master, SMS | MSC-MEPC.3/Circ.3, flag state, H&M | In case of |
| E11 | Abandon ship | Master, SMS | SOLAS Ch.V-Annex 22, flag state, H&M | In case of |
| E12 | Fire on board | Master, SMS | SOLAS Ch.V-Annex 22, flag state, H&M | In case of |
| E13 | Salvage | Master, SMS | SOLAS CH.V-Annex 22, flag state | In case of |
| E14 | Reporting a pollution incident | Oil record book | MARPOL Annex I-Ch.III.Reg.17, flag state | In case of |
| E15 | Search and rescue operation | Master | IAMSAR Manual Vol.III, flag state | In case of |
| E16 | Reasons for not assisting a distress call | Maser | IAMSAR Manual Vol.III | In case of |
| E17 | Emergency medical evacuation | Master, SMS | IAMSAR Manual Vol.I, flag state | In case of |
| E18 | Receiving a distress or emergency message | Master, GMDSS log | SOLAS Ch.V-Annex 22, flag state | In case of |
| E19 | Malfuctions of shipboard equipment | Master, SMS | SOLAS Ch.V-Annex 22, flag state | In case of |
| E20 | Piracy/robbery attack | Master, SMS | SOLAS Ch.V-Annex 22, flag state, P&I | In case of |

SOLAS requires the recording of extraordinary events relating to safety on board, for example: an injury, death, birth, abandonment, fire, salvage, distress or emergency messages, malfunctions and piracy or robbery. These records are described in IMO Resolution A.916(22) Guidelines for the recording of events related to navigation (IMO, 2001).

P&I Clubs cover damage caused by a number of extraordinary events on board, so in the event of an extraordinary event, a recording should be made in the logbook. These special events are mentioned in the insurance policy between the P&I Club and the shipping company.

MSC-MEPC.3/Circ.3 is a document of the Maritime Safety Committee discussing the reporting of marine casualties and incidents. The purpose of the Circular is to harmonise the casualty reporting procedures contained in other MSC and MEPC Circulars. For this purpose, marine casualties are divided into 4 different groups:

I. Very serious casualties: total loss of the ship, severe pollution or loss of life. 'Severe pollution' is assessed by the affected coastal state or the flag state. A report form should be provided within 6 months and at the end of the investigation, together with a full investigation report.

II. Serious casualties: are not 'very serious casualties' and may involve fire, explosion, grounding, collision, contact, hull breach or defect, severe weather or ice damage. These casualties may result in:
   - Pollution (in any quantity)
   - Engine immobilisation, damage to accommodation or structure, etc.
   - Failure of towage or shore assistance.

   A report form should be filled in and provided within 6 months and at the end of the investigation a full investigation report is not mandatory but recommended.

III. Less serious casualties: none of the above. Reports and full investigation reports are not mandatory.

IV. Marine incidents: for hazardous incidents and near misses. The administration does not obligate a report to be completed for marine casualties.

The information to be provided under this Circular is as follows:

I. Casualties involving dangerous goods or marine pollutants in package form on ships or in port areas.
II. Damage cards and intact stability records
III. Fire casualty records
IV. GMDSS
V. Fatigue as a cause of an accident, with a fatigue factor data record sheet
VI. Liquid spillage of 50 tonnes or more
VII. Record of casualties involving life-saving appliances. Accidents involving life-saving appliances should be recorded, even if there are no injured persons, loss of life or when used for drills or emergencies.

The Annexes of the MSC-MEPC.3/Circ.3 explain all the information that should be included in the casualty and full investigation reports. These Annexes provide standard formats that are easy to complete based on the information recorded in the ship's logbook before, during and after the incident. It is therefore important to record these extraordinary events in the ship's logbook (MSC, 2008).

The International Aeronautical and Maritime Search and Rescue Manual (IAMSAR) also requires the recording of some exceptional events on board. IAMSAR is a manual describing Search and Rescue (SAR) procedures for aviation and shipping, and is an IMO code associated with SOLAS. IAMSAR consists of 3 Volumes:

I. Volume I, Organization and management: for SAR system known worldwide.
II. Volume II, Mission coordination: assists people in planning and coordinating SAR drills or operations
III. Volume III, Mobile facilities: about rescue units that can assist in SAR operation

The data that IAMSAR requires to be recorded are SAR operations, reasons for not assisting a distress call and an emergency medical evacuation. These requirements are described in IAMSAR Volumes I and III (IMO, 2022c).

## 2.3 An overview of legislation on the official deck logbook in eight selected countries

In the comparative analysis of the deck log records of merchant ships of Ídris Turna and Orkun Burak Ozturk, the requirements were collected from various international sources, as well as some flag states. Following flag states have extensive regulations concerning the deck logbook records:

I. Panama
II. Marshall Islands
III. Liberia
IV. Singapore
V. Malta
VI. Isle of Man
VII. The Bahamas
VIII. Turkey

As mentioned above, according to the UNCTAD figures, these flag states will account for 60% of the world's vessel deadweight tonnage in 2022, (UNCTAD, 2022).

There are various authorities that require certain data to be recorded in the logbook, so any kind of summary or list of all required records is a great help to seafarers. However, such an international list does not exist and each flag state is free to draw up its own list. Belgium doesn't have a list of required records for the official logbook, and when drafting a legislation for the approval of non-MARPOL electronic logbooks in Belgium, it is helpful to know exactly what has to be recorded.

In order to define a list of items to be logged, each of the 8 flag states will be studied to find their legislation for the official logbook and how they formulate it.

### 2.3.1 Panama

Each year the Autoridad Marítima De Panama produces a guide to the Annual Safety Inspection of Panamanian Registered vessels. This guide can help prepare the Panamanian vessel for these inspections. The official logbook is referred to in this guide as the 'Bridge

logbook'. The only addition in this guide about the deck logbook is the language requirement and a brief explanation that if the de bridge logbook is not used as the official logbook, it must be stamped by a Panamanian Consulate or the main office of the Administration (Direccion general de marina mercante, 2010).

An important reference document is the MMC 107, which is a Merchant Marine Circular from the Panama Maritime Authority. It is a Circular addressed to the owners/operators of vessels flying the Panamanian flag, class societies and Authorised Persons. The subject of the Circular is the publications and records required for vessels flying the Panamanian flag and of 500 gross tonnage or more. The sources used for the preparation of this Circular are MARPOL and SOLAS.

There are twenty-five publications mentioned in the MMC that are necessary to prepare and conduct a safe voyage at sea, for example: the List of Lights, IMO MARPOL, Pilot charts, Navigational Charts, etc. In addition, there is a list of fourteen plans and instructions that can be necessary to use on board, for example: Muster list and emergency instructions, Fire control plan, Intact stability booklet, Ballast water management plan, etc. A list of 18 possible logbooks is added, as well as MARPOL logbooks as non-MARPOL logbooks (General Directorate of Merchant Marine Control and Compliance Department, 2021).

No reference was found describing the entries to be made in an official logbook.

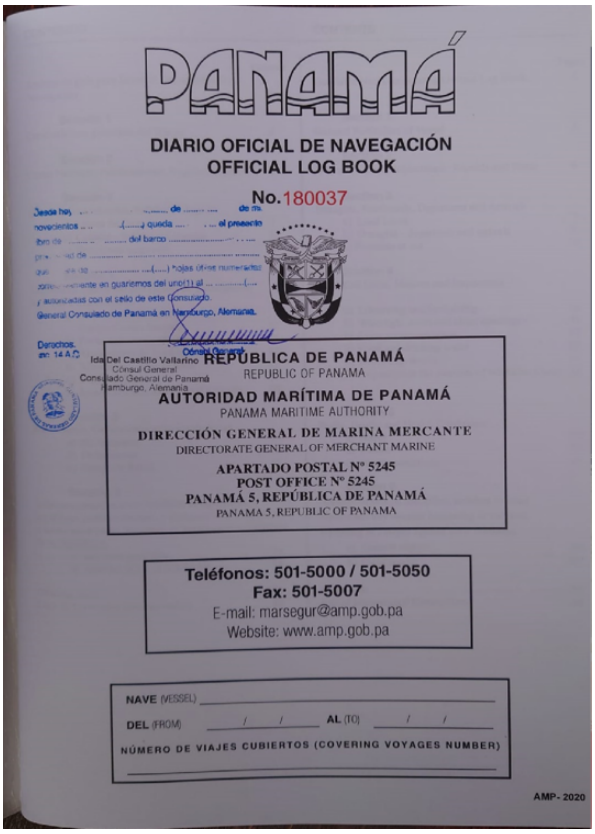




Figure 7 Official logbook Panama (Autoridad Maritíma de Panamá, 2020)

### 2.3.2 Marshall Islands

The Republic of the Marshall Islands has a document called the Maritime Regulations, published by the Maritime Administrator of the Republic of the Marshall Islands. This document has ninety pages and covers many maritime subjects and regulations. Page fifty-six discusses the duties and responsibilities of the Master's. This chapter describes the different types of logbooks that may be used on board and lists sixteen mandatory entries for the official logbook.

I. Any offence and any penalty or fine imposed.
II. Death on board and burial at sea.
III. Marriages, with the names, citizenships and places of residence.
IV. Births, with sex of child and names of parents.
V. Crew members who have ceased to be members of the crew, other than by death, with place, time, manner and cause.

VI. Wages and gross amount of all deductions made on the death of the crew member.

VII. Collision, allision, grounding, spillage or other casualty at sea should be recorded as soon as practicable.

VIII. Before departure: load line and draught information.

IX. Time of mustering to boats and fire station, drills or training, or reason why not held.

X. Date of enclosed space entry and rescue drills, every two months.

XI. Security drills and exercises, with details.

XII. Closing and opening of watertight doors and SOLAS inspections and drills.

XIII. Drill of line-throwing apparatus every three months (no firing).

XIV. Search for stowaways and contraband (smuggled goods) before each departure.

XV. Dates and results of inspections of areas.

XVI. Change of Master: "I, (name of new Master), a citizen of (country of citizenship), holder of the RMI Certificate of Competence No. (number of certificate) in the grade of Master, assumed command of the vessel on (date on which officially took command) at the port of (port where change effected)."

These regulations are specifically required by the Marshall Islands Administration. A ship flying the flag of the Marshall Islands is required to record these sixteen events as they occur, at least at specified intervals in addition to the SOLAS, MARPOL, ILO and other international organisation requirements mentioned in the previous chapter (Republic of the Marchall Islands, 2021).

### 2.3.3 Liberia

The Republic of Liberia has a similar document to the Marshall Islands, the Liberian Maritime Regulations, published by the Liberia Maritime Authority. On page forty-four there is a comparable explanation of the master's duties and responsibilities, such as filling in the various required logbooks. For the official logbook, only twelve entries are specified, which are the same as in the Marshall Islands regulations.

There are no further instructions for the completion of the official logbook for flag state of Liberian (The republic of Liberia, 2013).

### 2.3.4 Singapore

The Merchant Shipping Act Chapter 179, Section 89 of Singapore describes the Merchant Shipping Regulations for the official logbook. A Merchant Shipping Act is a document that is used in some countries for the legislation relating to merchant shipping. Each Merchant Shipping Act incorporates itself and other earlier acts. There are a number of distinct regulations that are worth noting.

The official logbook for Singapore flagged ships should be approved by the Director of the flag state. An entry can be made by any authorised person, it is not specified whether this person should be an officer or the master of the ship. There is even an option for an authorised officer to sign the official logbook instead of the master. Important to note is that each entry, unless otherwise specified, must be witnessed by a person other than the one who made the entry.

If an entry is too long to fit on one page of the official logbook, it should be attached as a separate document. Furthermore, a reference to the attachment has to be made in the official logbook referring to that specific annex.

Any person who fails to comply with the regulations of the official logbook is guilty of an offence and may be fined up to a maximum of $2000.

A schedule is added at the end of the Merchant Shipping Act. This schedule defines each entry that is specifically required to be made in the official logbook. There are thirty-six different events to be recorded which are all broken down into smaller parts. It is noticeable that three columns are provided, one for the particulars of the entry, one for the signature of the master or the authorised person and a final column for the witness, if needed (Maritime & Port Authority of Singapore, 1997).

The official logbook is divided into 3 parts:

- Part I - Entries relating to every ship
- Part II – Entries relating to ships to which the merchant shipping (disciplinary offences) regulation (RG 21) applies
- Part III – Entries relating to ships in respect of which a load line certificate has been issued (Maritime & Port Authority of Singapore, 1997)

The below figure shows an example of the first eight entries to be made in Part I of the official logbook according to the Merchant Shipping Act.

| COLUMN 1<br>Particulars of entry | COLUMN 2<br>Signatory | COLUMN 3<br>Witness |
|---|---|---|
| 1. The name of the ship, its port of registry, official number and gross and nett registered tonnage. | The master. | None. |
| 2. The name and address of the registered owner or ship's manager. | The master. | None. |
| 3. The name of the master and the number of his certificate of competency and issuing authority. | The master. | None. |
| 4. Where a person ceases to be the master of the ship during a voyage, a record that he has delivered to his successor the documents relating to the ship or its crew which are in his custody. | The master in person and the former master in person. | None. |
| 5. The date on and place at which the official log book is opened. | The master. | None. |
| 6. The date on and place at which the official log book is closed. | The master. | None. |
| 7. A record of the date and hour of departure for sea from, and arrival from sea at, any dock, wharf, anchorage, port or harbour. | The master in person. | An officer. |
| 8. A record of each occasion on which, in accordance with the Safety Regulations, a muster, drill or training of the crew in the use of life saving and fire appliances and equipment is held on board the ship or on which the appliances and equipment required by the rules for life-saving appliances to be carried are examined to see whether they are fit and ready for use; and of the result of any such examination. | The master. | A member of the crew. |

Figure 8 The schedule, a part of entries required to be made in the official logbook of Singapore (Maritime & Port Authority of Singapore, 1997)

If only "the master" is mentioned in column 2, a person authorised by the master may also sign the entry. If it says "the master in person", only the master himself is authorised to sign. Column 2 may sometimes be signed by persons other than the ones mentioned above, for example the person carrying out the inspection, the director, the ship's doctor or the person holding the inquiry. The witness in column 3 may be an officer, a member of the crew or a seaman making a complaint.

### 2.3.5 Malta

The legislation of the official logbook for Malta is described in the Merchant Shipping Act of Malta. The chapter on the legislation of official logbooks starts at page ninety-three. This chapter states that the official logbook must be approved by the Minister and must be kept

as evidence until proven otherwise. The entries required by the Maltese regulations are thirteen items which differ from those of previous flag states, namely:

I. Any conviction of a crew member and the punishment imposed.
II. Any offence committed by a crew member which is to be prosecuted. A statement or reading of the record and the charge required by the Act is mandatory.
III. Any offence for which the punishment is inflicted on board and statement of the punishment inflicted.
IV. Any arrest and confinement and the circumstances leading to it.
V. A statement of the conduct, character and qualifications of each crew member or a refusal to give an opinion.
VI. Any case of illness or injury, together with the cause and medical treatment.
VII. Any marriage, with the names and ages of the parties.
VIII. Birth or death of any person on board. The manner of entry, in accordance with articles 285 and 304 of the Civil Code.
IX. Any last will and testament made at sea, in accordance with article 678 of the Civil code.
X. Any crew member who has ceased to be a member of the crew, other than by death, stating the place, time, manner and cause.
XI. Wages due and gross amount of all deductions made in the event of the death of the crew member.
XII. Any collision and the circumstances thereof.
XIII. Any other matter required by any other law or by this Act.

The official logbook must be kept as required by this act, if not the master is liable to a fine. The person who wilfully destroys entries in the logbook or makes false entries shall be liable to imprisonment for a term of maximum two years, or to a fine or to both.

The official logbook shall be delivered by the master of the vessel to the shipping master within forty-eight hours of the vessel's arrival in a port in Malta. If the master fails to do so without a reasonable explanation, he shall be liable to a fine (Legizlazzjoni Malta, 2018).

### 2.3.6 Isle of Man

A ship flying the flag of the Isle of Man must carry and maintain the official logbook in accordance with the regulations of the Isle of Man Registry. The Merchant Shipping (Masters and Seaman) Act 1979 of the Isle of Man and the Manx Shipping Notice 004 (MSN 004) set out the requirements for the official logbook for Manx. 'Manx' is a term used to describe people from the Isle of Man or for ships flying the flag of the Isle of Man.

The MSN 004 contains a description of the Isle of Man official logbook (IOMOLB), the crew list, the required entries, the format of the IOMOLB and a guidance for completing the IOMOLB. The purpose of the IOMOLB is a communication channel between the master and the Isle of Man Ship Registry (Isle of Man Ship Registry, 2019).

The IOMOLB required entries consist of eight sections:

I. Safety committee meetings, appointment of safety officers and safety committee members.
II. Musters, drills and training of crew and weekly and monthly inspections of life saving appliances, required by the ISM.
III. Weekly inspections.
IV. Checks, tests, drills and inspections of the ship's steering gear, required by the ISM.
V. Deck line, load lines, door and openings and change in load line assignment.
VI. Departures and arrivals, draughts, freeboard, closing doors and openings.
VII. Births and deaths.
VIII. Narrative section (Isle of Man Ship Registry, 2019).

The entries required and belonging to these eight sections are explained in great detail in the act from page six to page thirteen. These pages are included in the annex of this thesis. The way in which these required entries are listed in this act can be an example if a suggestive legislation on the official logbook is drawn up for the Belgian flag state.

The IOMOLB can be opened for a maximum of 12 months on board, the master can decide to close the IOMOLB at any time during these 12 months period.

The 1979 act on the IOMOLB contains a comprehensive explanation with examples of how the official logbook must be filled in. These examples provide guidance on how to complete the IOMOLB correctly (Isle of Man Ship Registry, 2019). For example, the way in which these sections are recorded is correct:

| Date and time of Inspection | Type of inspection A B C D E | Name and rank of persons making the inspection | Result of inspection | Signature of seafarers making inspection |
|---|---|---|---|---|
| 4/10/14 | A B | A Young, Master | Crew accommodation and food supplies found | A Young |
| 1100 | | A Hunter, Ch Officer | satisfactory, hospital and fridge room alarms | A Hunter |
| | | W Waller, Cook | tested, no defects. | W M Waller |
| | | | | |
| 11/10/14 | A | A Young, Master | Wardrobe door found damaged and shower curtain | A Young |
| 1100 | | A Hunter, Ch Officer | missing in cabin No. 5. Repaired and replaced as | A Hunter |
| | | W Waller, Cook | necessary. Vegetable Room cooling unit found | W M Waller |
| | | | defective- replacement parts ordered. | |
| | | | | |
| 12/10/14 | B | A Young, Master | Vegetables found in poor condition and discarded. | A Young |
| 1300 | | W Waller, Cook | | W M Waller |

Figure 9 Example of weekly inspections in IOMOLB (Isle of Man Ship Registry, 2019)

| Date, time and place | Nature of drill, check, or test of steering gear A, B, comments | Signature of master and an officer |
|---|---|---|
| 1/10/14 0600 | A - Steering gear tested satisfactorily before departure | A Young |
| at Douglas, IOM | | A Hunter |
| | | |
| 12/10/14 1100 | B - Emergency steering gear and systems tested as part of emergency drill, | A Young |
| 51 - 27.0' N | crew members instructed in emergency steering procedures. | A Hunter |
| 006 - 43.9' W | | |

Figure 10 Example of tests steering gear in IOMOLB (Isle of Man Ship Registry, 2019)

| Date and time of the occurrence | Port or latitude and longitude if at sea | Date and Time of Entry | Entries and signatures - Refer to Manx Shipping Notice 004 for required entries. In addition to the required entries masters may use this section to record any factual information about ship operations considered appropriate. |
|---|---|---|---|
| 11/11/2014 | Ramsey, IOM | 11/11/2014 | This is to certify that ref. No. 1 Capt. A. Young has been superseded as |
| 0900 | | 0900 | master of this ship by ref. No. 35, Capt. F. Kramer. All documents |
| | | | relevant to the operation of the vessel and crew have been handed over in |
| | | | good order. A. Young outgoing master F Kramer new master |
| | | | |
| 11/11/2014 | Ramsey, IOM | 11/11/2014 | This is to certify that ref. No. 35 Capt. F. Kramer has become master of |
| 0900 | | 0900 | this ship. F Kramer master |

Figure 11 Example of change of master in the IOMOLB (Isle of Man Ship Registry, 2019)

### 2.3.7 The Bahamas

The Merchant Shipping Act of the Bahamas describes the requirements for the official logbook in Part III Master and Seamen. The act lists fourteen mandatory entries for the official logbook. They are similar to those mentioned in the regulations of Malta and the Marshall Islands, there are no special entries required that are not mentioned previously (Bahamas Legislation, 2013).

### 2.3.8 Turkey

The regulations for the official logbook of ships flying the Turkish flag are described in the Turkish Commercial Code. The Turkish Commercial Code consists of six books, which are Commercial Business, Trade Companies, Negotiable Documents, Transportation Affairs Maritime Trade and Insurance Law.

It is noteworthy that the Turkish law is the only one among these eight flags that clearly states at the beginning that the ships logbook shall be kept by the first officer, under the supervision of the master (Dr. A. Bumin DOĞRUSÖZ, Av. Öznur ONAT, & Dr. Funda TUNÇEL TÖRALP, 2011). In other legislation, only the master is mentioned as being responsible for the logbook.

The entries required for the official logbook are briefly described by the Turkish law:

I. Meteorological data, in particular weather and wind conditions.
II. The course and route of the vessel.
III. The position of the vessel, with latitude and longitude.
IV. Water level in the bilges.
V. Water depth soundings.
VI. Embarkation and disembarkation of pilots.
VII. Changes between seafarers.
VIII. Accidents involving the ship or goods on board, with an explanation.
IX. Births or deaths on board and crimes committed (Dr. A. Bumin DOĞRUSÖZ et al., 2011)

The Turkish flag state's official logbook does not contain any further description in the Commercial Law.

### 2.3.9 Conclusion

Looking at the official logbook legislation of these eight selected flag states, there is a great deal of variety to be found. The Marshall Islands, Liberia, Singapore, Malta and the Bahamas provide a very short list of required entries. The Isle of Man and Turkey provide a list of different subjects of entries that should be recorded in the official logbook, but not in detail. Each of the flag states described above has different requirements for the official logbook, apart from the entries. The most unusual requirements are those from Singapore and Turkey. Singapore requires a second person, the witness, to sign the entries. The Turkish flag state states that the first officer is responsible for the official logbook and that the master is the supervisor. Other legislations always refers to the master as the person responsible for the logbooks, not the supervisor. A confused picture of the official logbook is created by reading all these small differences in the legislation of the flag states, but the corresponding points recur frequently and give clarity.

Each official logbook must be approved and stamped by the flag state authority or director. The sources MARPOL and SOLAS have been used by each flag state to draw up its legislation. The corresponding entries to be made in the official logbook, as mentioned in the legislation of the flag states studied, are:

- Any offence and any penalty or fine imposed
- Deaths, births or marriages on board with names, nationality and place of residence
- Crew members who have ceased to be members of the crew, other than by death, with place, time, manner and cause
- Wages and gross amount of all deductions made on the death of the crew member
- Collision, allision, grounding, spillage or other casualty at sea, with explanation
- Change of master

There were a number of other required entries in the flag state's regulations that only occurred once. The corresponding recurring items are items containing information that is important to most flag states.

## 2.4 An overview of the legislation on the ELB in eight selected countries

### 2.4.1 Panama

The Panama Maritime Authority approves the use of non-MARPOL ELBs and MARPOL ELBs on Panamanian vessels. The ELBs must comply with the International Conventions ratified by the Republic of Panama (General Directorate of Merchant Marine Control and Compliance Department, 2018).

The MMC-193 is issued by the Panama Maritime Authority for shipowners, operators, consuls, organizations and PSC Authorities. The MMC suggests optional and voluntary systems for ELBs and ensures that they comply with the International Conventions ratified by the Republic of Panama. The MMC-193 states the purpose, technical specifications and general requirements of the non-MARPOL ELBs, including the official deck logbook (General Directorate of Merchant Marine Control and Compliance Department, 2019).

The companies recognized by the Panamanian flag state as manufacturers of ELBs, specifically on board of National Merchant Marine vessels are Kongsberg Maritime AS, On board NAPA Ltd, Prevention at sea Ltd, Spectral Technologies INC and Ingenium Marine solutions private limited (General Directorate of Merchant Marine Control and Compliance Department, 2019).

### 2.4.2 Marshall Islands

The Marshall Islands have accepted the use of MARPOL ELBs, as confirmed by the publication of the Republic of the Marshall Islands Maritime Regulations (MI-108). ELBs must comply with the relevant International convention under MARPOL and the NOx Technical Code 2008.

The table below shows software providers that are approved under MARPOL for MARPOL ELBs:

Table 9 Approved software providers under MARPOL for MARPOL ELBs

Source: edited from (MARPOL, 2023)

| | ORB I and ORB II | Cargo Record Book (RB) | Garbage RB Part I & II | Marine Fuel Sulfur RB | Ozone-Depleting Substances | RB of Engine Parameters | RB of Tier and On/Off Status of Marine Diesel Engines | RB of Fuel Oil Change Over |
|---|---|---|---|---|---|---|---|---|
| ABS Nautical Systems | X | X | X | X | X | X | | |
| ABS Wavesight | X | X | X | | X | X | X | X |
| ChartCo LogCentral | X | X | X | X | X | X | | |
| CherSoft Ltd | X | X | X | | | | | |
| Danaos Management Consultants S.A | X | | | | | | | |
| iMar Technology iLog | X | X | X | | | | | |
| InfoShip ELB | X | X | X | | | | | |
| Ingenium Marine ME Green Logs eZ-orb | X | X | X | | X | X | X | X |
| IR Class IR Scribe | X | | | | | | | |
| Kongsberg K-Fleet | X | X | X | | | | | |
| LJ Yacht & Commercial Services | X | | X | | | X | X | X |
| MariApps Marine Solutions Pte Ltd PAL eRB | X | X | X | | X | | | |
| MARSIG mbH | X | X | X | | X | X | X | X |
| NAPA Ltd | X | X | X | | X | X | X | X |
| Prevention at Sea e-ORB | X | | | | | | | |
| Prevention at Sea M.O.R.S.E | X | | X | | X | X | X | X |
| RINACube ELB | X | X | X | | X | | | |
| S.A. Malliaroudakis Maritime UK Ltd. SMM | X | | | | | | | |
| Silver Lake Shipping Company S.A. | | | X | X | X | X | | |
| South Nests Software Solutions Pvt. Ltd. (SNSS) | X | X | X | | X | X | X | X |
| Spectral Technologies ERB | X | | | | | | | |
| StormGeo GmbH s-Insight Log | | | X | | | | | |
| The Viswa Group | X | | | | | | | |
| V.Ships ShipSure Environmental Log Books | X | X | X | | X | X | X | X |

### 2.4.3 Liberia

Liberia has approved both non-MARPOL ELBs and MARPOL ELBs. The Marine Notice POL-012 of the Republic of Liberia provides guidance on the use of ELBs under MARPOL, SOLAS and BWM Convention and additional logbooks (Office of Deputy Commissioner of Maritime Affairs, 2021).

In addition to any MARPOL ELB, the non-MARPOL ELBs approved by the flag State of Liberia and mentioned in this marine notice are: Record of Navigational Activities (Navigation logbook), Record of Engine Room activities and Parameters (Engine Room logbook), Record of Radiocommunication Services (GMDSS Radio log), Medical log, Compass Deviation log and Ballast Water Record Book (Office of Deputy Commissioner of Maritime Affairs, 2021)

Every ELB should follow the IMO record keeping requirements and the Liberia Maritime Regulations.

In addition, the marine notice indicates the regulations for updating, signatures, power supply, storage of recorded data, operating environment, description, user documentation, test plan, test records, quality management system (QMS), maintenance, inspection, approval and basic procedures for ELBs on Liberian vessels. The QMS is a system that ensures that the software is produced in accordance with the software engineering guidelines defined by the International Organisation for Standardisation (Office of Deputy Commissioner of Maritime Affairs, 2021).

The ELB software providers approved for use on Liberian flagged vessels are (Liberian Registry, 2023): Prevention at Sea Ltd, IB Srl, Ingenium Marine ME LLC, RINA Consulting S.p.A., NAPA Ltd, MARIAPPS Marine Solutions Pte. Ltd., Volteo Maritime Pte Ltd., CHERSOFT LTD., Raytheon Anschutz GmbH, MARSIG mbH and ABS Digital Solutions (Liberian Registry, 2023).

### 2.4.4 Singapore

The MARPOL ELBs and non-MARPOL ELBs have been approved by the Maritime & Port Authority of Singapore as a mean to improve the efficiency and accuracy of record keeping.

The legislation for the non-MARPOL ELBs is described in the Shipping Circular No. 7 of 2016. The data to be recorded in the official ELB is described in one sentence, very general and not at all clear. The ELB should comply with the IMO guidelines in Resolution A.916(22) "Guidelines for the recording of events related to navigation". It is noteworthy that existing automatic recording devices that are already on board are being considered as acceptable as a part of the ELB.

In Shipping Circular No. 7, an annex is added with the specific guidelines for the ELB in terms of technical design, control and management, data storage and the various declarations to be kept on board for inspectors or Port State Control officers.

The technical design and software of the ELB should comply with the Merchant Shipping Act Chapter V Reg 13, Reg 28 and IMO Resolution A.916(22), including future amendments. All software changes or updates should be traceable. The ELB should be ergonomically installed on board in accordance with the guidelines on ergonomic criteria for bridge equipment and layout (MSC/Circ.982). Electromagnetic interference with other electronic equipment on board should be avoided at all times. In case of power loss or failure, the ELB should be able to easily return to the last recorded data prior to the power loss (MPA Shipping Division, 2016).

Access to the ELB should be controlled and tracked and each user on board should be identifiable in the system. It should be possible to print out the ELB at any time in the event of a Port State Control investigation. Finally, each record should be time-stamped to control and manage the entries (MPA Shipping Division, 2016).

For the storage and preservation of data in the ELB, regular back-ups should be made and it should not be possible to delete, destroy or overwrite records. Each ELB should have at least two backups on an independent storage medium to ensure secure storage. Without an internet connection, the ELB can still function as normally and store data. (MPA Shipping Division, 2016b).

The MARPOL ELBs have to follow the MARPOL regulations, as Singapore has adopted the MARPOL regulations and guidelines on ELBs in its list of Circulars and Notices.

### 2.4.5 Malta

Malta has approved only the use of MARPOL ELBs. This approval is described in Malta's Technical Notice MARPOL.7, which was motivated by the burdens arising from the use of paper versions of MARPOL logbooks and the complexity of properly recording entries.

This Technical Notice, for the acceptance of MARPOL ELBs, was issued before the amendments in the MARPOL Convention for MARPOL ELBs were ready. Therefore, the possibility to print the ELB pages, as required by the current MARPOL Convention, had to be included afterwards (Merchant Shipping Directorate Malta, 2018).

### 2.4.6 Isle of Man

In the Technical Advisory Notice Ref. 008-20, the Isle of Man Ship Registry gives its approval for the use of MARPOL ELBs on board.

The Isle of Man outlines two steps to be followed before using the ELB:

I. "The generic system must be approved by an IMO authorised Recognised Organisation or a member of the Red Ensign Group."
II. "The Recognised Organisation issuing the MARPOL certificates must be contacted and will verify that the system is correctly installed on board. If the system is acceptable, the Declaration of MARPOL ELBs will be issued" (Isle of Man Ship Registry, 2020).

### 2.4.7 The Bahamas

The Bahamas have described their approvals in Marine Notices 09 (non-MARPOL ELBs) and 10 (MARPOL ELBs). The Marine Notices should be read in conjunction with the IMO Resolutions A.813(19) and A.916(22) and IMO Circular MSC/Circ.982.

The flag state of the Bahamas is committed to reducing administrative burdens and wishes to recognise the increasing use of electronic devices on board ships. The Bahamas Marine Notice is the first flag state to distinguish between "official" records, "unofficial" records and "MARPOL" logbooks. The "official" and "unofficial" records are non-MARPOL records. Both can be maintained in an electronic record system.

Official records are:

I. Bahamas official Logbook Part I
II. Bahamas official Logbook Part II
III. Articles of Agreement or Seafarer's Employment Agreements
IV. Records required by Regulation 17 of Chapter IV of SOLAS
V. Records required by Regulation 28 of Chapter V of SOLAS
VI. Ballast Water Record Book
VII. Compass Error Book
VIII. Security Records required by Regulation 9.2.3 of Chapter XI-2 of SOLAS and Section 10 of the ISPS Code
IX. Safety Records required by Regulation 19.5 and 36 Chapter III of SOLAS

Unofficial records are:

I. Bridge logbook
II. Engine room logbook
III. Biofouling Record Book

It's an interesting fact that the Bahamas flag state seem to have more (or different) non-MARPOL logbooks than those required by the IMO or other flag state legislations. The reason for this is that the non-MARPOL logbooks have no specific format requirements and the format can be chosen by the flag states themselves. The only thing required by the IMO is an official logbook and any other logbook may be part of that. As long as everything that needs to be recorded is somewhere in a logbook, a flag state can choose to split the official logbook completely and choose the name of the smaller logbooks.

The regulations for the use of MARPOL ELBs on board ships flying flag of the Bahamas are set out in Marine Notice 10. This Marine Notice is fully compliant with the MARPOL regulations and amendments.

### 2.4.8 Turkey

Turkey does not approve the use of ELBs on board ships flying the Turkish flag.

### 2.4.9 Conclusion

The approval of MARPOL ELBs and non-MARPOL ELBs is in most cases described in two different flag state documents. The only exception among these eight flag states is Liberia, which has the approval of both types of logbooks in one document. As the Belgian approval for MARPOL ELBs is ready and the one for non-MARPOL ELBs is not, it will also be convenient to have two documents in which the Belgian flag state approves the two different types of ELBs.

The documents in which a flag state approves the use of ELBs often contain a description of the technical design, specifications, purpose, control, management and data storage. There is no approval document that also describes the required entries in a logbook.

# Chapter 3 Suggestion for a legal framework for non-MARPOL ELBs in Belgium

## 3.1 Chosen legal framework

To approve the use of non-MARPOL ELBs on board ships flying their flag, each flag state is responsible to develop a legal framework. In international legislation the current subject matter is vaguely described. Furthermore, it is spread over the legislation of various international organisations. This clearly shows that there is a need for a clear framework. In a paper logbook, the flag state is still free to decide what goes into a non-MARPOL logbook. Working with electronic logbooks creates a need for a clear overview on which logs need to be made since the software will be standardised. The entries in MARPOL logbooks are regulated by MARPOL legislation. In contrary, the responsibility for making the legislation on logs for non-MARPOL logbooks lies with the flag states themselves. This is applicable both for the electronic and the paper version.

There are two types of legal frameworks that can be used to make a suggestion for non-MARPOL ELBs in Belgium. Namely, a Royal Decree or a Belgian Maritime Inspectorate (BMI) Circular.

A Royal Decree in Belgium is a general framework for a decision taken by the government. A Royal Decree can be issued without the direct involvement of Parliament. It is linked to the implementation of laws and detailed technical clarifications are made at a lower level. It only stipulates that certain rules may be elaborated. A Royal Decree consists of five parts: the title with a number if necessary, a preamble, the normative text, the king's signature, the signature of responsible ministers and/or state secretaries and annexes (*Grondwet*, 1831, bk. Grondwet).

The BMI is the Belgium authority for merchant ships and issues all international certificates for this fleet. Besides that, the BMI also issues BMI circulars, which are frameworks of specific regulations for merchant shipping in Belgium. The first circular is from 2010 on load lines and the last circular is from 2022 on the use of ELBs for MARPOL related record keeping.

As merchant ships are the target group of the ELBs, a BMI circular framework is more appropriate than a Royal Decree (Belgian Maritime Inspectorate - Flagstate, 2022c).

The suggestion for a new BMI circular, following the recent circular on MARPOL ELBs, will focus on non-MARPOL ELBs. The intention is to allow, but not mandate, the use of non-MARPOL ELBs on merchant ships. In order to define the content of the suggestion in this research, support was given by a jurist of the shipping control in Belgium. With this help a list was created with the elements that should definitely be included in the proposal:

- An introduction to who is making the suggestion.
- The importance of the circular with an explanatory memorandum. This usually not included the law, but always attached before a law is adopted.
- A clear overview of the general principles.
- Target group.
- The objective.
- Definitions.
- Scope.
- Development of the subject matter.

The ultimate suggestion for non-MARRPOL ELBs, beginning on the next page, is made on the basis of the information that was received from the Belgian shipping control and the information included in the circular 2022/003 on the use of ELBs for MARPOL related record keeping.

## 3.2 The ultimate suggestion

### I. Introduction

There is a general interest in the shipping industry to make all logbooks electronic: to save time, to avoid duplication work, to centralize data and to free time to focus more on navigational aspects of watchkeeping. The electronic logbook will save time by recording data automatically from other electronic instruments on board, for example the GPS, ECDIS and VDR. Instead of copying these data into the logbook, the officer will have less paperwork so there is the opportunity to focus more on the navigation of the ship. In addition, the electronic logbook creates the possibility to centralize and to analyse the recorded data to improve certain processes on board. The use of MARPOL electronic logbooks is already approved by the Belgian flag state. The use of non-MARPOL electronic logbooks on ships flying the Belgian flag is beneficial for seafarers and shipping companies.

### II. Subject matter

The approval of the use of non-MARPOL electronic logbooks (ELBs) by the Belgian flag state on merchant ships flying their flag.

### III. To

Owners, operators, representatives of the Belgian flagged vessels, recognised organisations, Port State Control (PSC) Authorities and seafarers using a logbook.

### IV. Scope

The non-MARPOL ELB legislation applies to all merchant ships under Belgian flag.

### V. Definition

An Electronic logbook (ELB) could be a device, system or software application designed to facilitate accurate entries related to navigation, meteorological events, drills and trainings, inspections, tests, port operations and extraordinary events into an efficient electronic format, while complying with International Conventions and flag state requirements.

## VI. Explanatory memorandum.

A part of the solution for the growing administrative workload on board is approval of the use of ELBs on board merchant ships. The Belgian flag state's approval already exists for MARPOL ELBs, but not yet for non-MARPOL ELBs. It is the responsibility of the flag state to establish its own clear guidelines and legislation for non-MARPOL ELBs.

Apart from reducing paperwork for officers on board the ELB has several other strengths. The ELB will be able to record data automatically by using information coming from device on the bridge which are already electronic. With an ELB the officer of the watch no longer wastes time on copying information from a digital source (GPS position, heading, wind speed, etc.) as it is automatically transferred into the system. As the officer gains more time on the bridge during his watch, the situational awareness of the crew will improve. There will be more time for safe navigation which is the most important responsibility on board at all times.

Automatically stored records from electronic devices are more reliable than handwritten records. There is an important distinction between what happened in reality, what the officer witnessed, how it was perceived and eventually what was written in the logbook. Since logs are based on the crew's judgement, actions and measures, standardization of different types of information contained in a logbook is difficult.

Another advantage of the ELB is being able to collect all ship and voyage data from different logbooks into one general system. Any employee from the company which has the correct credentials can access the data from any computer running the software. This creates the possibility to analyse the recorded data on the shore side to improve certain processes on board.

The use of non-MARPOL ELBs could benefit different parties involved in merchant shipping. It is therefore in the interest of seafarers, companies and governments that a legal framework is designed and approved by the Belgian flag state.

## VII. General principles

The Belgian flag state approves the use of non-MARPOL ELBs so that companies have the option to install this system onboard. By doing this data can be collected electronically and all data of different logbooks will be centralised in one system.

The services required under the optional and voluntary system of ELBs are limited to making the electronic means for receiving, recording and control of the information relating to:

I. Official logbook or deck logbook
II. Engine log
III. Watch log
IV. Security log
V. Damage log
VI. Hospital log or medical log.

The data to be contained in such a non-MAROL logbook is determined by the legislation of various international organisations, namely SOLAS, MARPOL, MLC, ILO, COLREG, IMO, P&I and H&M and flag states.

## VIII. The objective

A legal framework is essential to implement an ELB system in a safe and secure manner. The minimum requirements necessary to provide ELBs within the Belgian flag state are listed below.

The installation process of ELBs on the bridge should respect the guidelines outlined in MSC/Circ.982 – Guidelines on ergonomic criteria for bridge equipment and layout. It is essential to consider the ergonomic criteria when positioning the bridge equipment to ensure optimum functionality. In addition, it is important to ensure that the installation does not cause any electromagnetic interference that could disturb the proper operation of the ship's navigational systems and equipment.

The development, editing and release of new software versions will follow the regulations in accordance with ISO 9002 development routines for the work process. This ensures a systematic and standardised approach to software development. Any

changes made to the software are thoroughly documented and tested before being released.

The ELB system should ensure that records are stored correctly. Any ELB should form part of the Information Technology Business Continuity Plan, which is a set of policies, standards, procedures and tools to ensure that critical systems and services do not fail or are recoverable within specified limits. The plan enables the organisation to remain operational before, during and after a crisis incident. These incidents can range from fires and floods to cyber-attacks, human error, natural disasters and stolen equipment. A proper plan will reduce the chances of a costly power outage or IT failure. This plan is drawn up and regularly updated by IT administrators.

The ELBs shall include a facility to create a security copy or backup of the data. This ensures that in the event of a hard drive corruption or failure on the ELB server, the information remains protected and is not lost. In addition, the system should have the capability to recover the data from the security copy, ensuring that the information can be recovered and accessed in the event of an unexpected problem.

According to IMO Resolution MSC.333(90), paragraph 5.5.20 ELB, for Voyage Data Recorders (VDRs) that are installed on or after 1 July 2014, it is required that the information from the ELBs is recorded in the VDR.

If the non-MARPOL ELBs are to be approved, the process will involve a two-step procedure: software type approval and onboard installation survey. The type approval of the ELB software must follow the guidelines set by the IMO, which also includes additional optional specifications for improved non-repudiation. It is important to note that the type approval of the software cannot be carried out by the company's own Recognised Organisation or by a Belgian Recognised Organisation. An external EU Member State must carry out the approval process.

In order to qualify as a service provider in this field, companies must demonstrate the effectiveness of their ELBs, as well as compliance with the minimum requirements established by the relevant International Conventions, the regulations of the respective administration and the guidelines set out in this circular.

List of Belgian Recognised Organisations:

- American Bureau of Shipping (ABS)
- Bureau Veritas Marine & Offshore SAS (BV)
- DNV AS
- Lloyd's Register Group Ltd (LR),
- Nipon Kaiji Kyokai General Incorporated Foundation (Class NKK)
- RINA Services S.p.A.

During the onboard installation survey, the Belgian Recognised Organisation (Belgian RO) will evaluate the ELB against the guidelines in this circular. If the ELB complies with these guidelines during the verification process, the Belgian RO will issue a "Declaration of non-MARPOL ELB". It is mandatory to retain a copy of this declaration on board the ship, as it will demonstrate compliance with the necessary requirements during inspections.

The "Declaration of non-MARPOL ELB" is tailored to the specific ship and includes details such as the flag state, the ship's particulars (such as a name and IMO number), ELB manufacturer, supplier, installer and software version.

The management of ELBs should be documented and controlled through the Safety Management System (SMS), as described in section 11 of the International Safety Management Code (ISM Code). For ships that are not required to comply with the ISM Code, similar principles of a controlled document system should still be applied to ensure effective management of ELBs. By integrating the management of the ELBs into the SMS or a controlled document system, appropriate procedures for their use, maintenance and revision can be established.

An ELB should be able to retain all records made for a minimum period specified by the IMO, which can be 2 or 3 years. In addition, the ELB should be able to produce hard copies of verified records on request from the relevant authorities. This will allow the master of the ship to certify the hard copies as true copies, thus providing a physical record that can be presented for inspection purposes. Furthermore, the ELB should have an automatic backup to an off-line storage facility.

It's important to recognise that the use of ELBs does not reduce the shipowner's obligation to accurately document, maintain, and present records during an inspection. It is therefore advisable to ensure that all shipboard records and logs are maintained accurately and in a timely manner.

The owner, operator, master and crew of a ship equipped with an ELB system must undergo specific training in the use of ELBs. They must complete and maintain on board a "statement of the owner or agent responsible for the operation of the ship" which includes:

I. Crew training: the statement should confirm that the crew members have received appropriate and concise training in management, use and operation of ELBs, in accordance with the STCW-95 regulation I/14.1.4.
II. The statement should also ensure that the ship's procedures and protocols for the preservation, maintenance and upkeep of ELBs are in accordance with the regulations set by the IMO. These procedures should be documented and specified in the ship's International Safety Management Code.

Although MARPOL has introduced ELBs, some port states may still be reluctant to adopt them. It is therefore essential that the feasibility of moving to full ELBs is carefully assessed before abandoning paper versions. This assessment should consider factors such as the ship's trading area and the ports it frequently visits. By considering these aspects, a decision can be made to replace traditional paper logbooks with ELBs.

The mandatory data to be recorded in non-MARPOL logbooks has been established by a number of different international organisations and flag states, but a complete overview is lacking. An overview of the records that need to be completed is necessary to ensure that any ELB system can comply with the regulations. Providers can therefore take this list into account when designing or updating their ELB systems so that these records can be entered into each ELB.

An overview of all the records to be filled in in the official logbook as well as in the Electronic official logbook is given on the next page.

**Overview of all the records to be filled in in the official logbook**

**Legend**

Sources: COR; Master; Port; SMS; Bridge equipment; Visual; Manual; OOW; Company; Agent; Mate receipt

Reference: Flag state; SOLAS; P&I; IMO; MARPOL; SMS; COLREG; ISPS; STCW; MLC; CFR; H&M; IAMSAR

S1 Registry number
S2 Name of vessel
S3 IMO number
S4 Port of registry
S5 Gross tonnage
S6 Net tonnage
S7 Length over all
S8 Breadth
S9 Approval
S10 Ship owner/manager details
S11 Working language
S12 Date, pace logbook opened
S13 Date, place logbook closed

M1 Wind direction
M2 Wind force
M3 Sea state
M4 Sky
M5 Visibility
M6 Atmospheric pressure
M7 Air temperature
M8 Relative humidity

P1 Notice of readiness
P2 Time of opening/closing watertight doors
P3 Commencement of loading
P4 Completion of loading
P5 Stability and stress checks
P6 Draughts of vessel
P7 Density of sea water
P8 Free pratique granted
P9 Quantity of cargo
P10 Commencement of discharging
P11 Completion of discharging
P12 Damage of cargo
P13 Damage to ship
P14 Crew signing on/off
P15 On appointment of safety officer
P16 Quantity of fresh water supplied
P17 Quantity of bunker water supplied
P18 Crew member(s) that send to doctor
P19 Quantity of cargo load/discharged
P20 Stowaway search
P21 Port clearance

D1 Abandon ship drill (without water)
D2 Abandon ship drill (in water)
D3 Abandon ship drill (free-fall)
D4 Abandon ship drill (alternative)
D5 Fire drill
D6 Enclosed space entry and rescue drill
D7 Emergency steering drills
D8 MOB drill
D9 ISPS drills
D10 ISPS drills with port facility
D11 Oil pollution prevention drill
D12 Onboard training and instructions
D13 Initial security awareness training
D14 Safety committee meeting
D15 Emergency steering drills
D16 Bunker training
D17 Collision/allision (passenger ships (ps))
D18 Grounding/stranding (ps)
D19 Flooding (ps)
D20 Loss of power (ps)
D21 Emergency unberthing (ps)
D22 Emergency (ps)
D23 Hull/structural failure (ps)
D24 Heavy weather damage (ps)
D25 Use of line throwing gun drills

E1 Crew injury
E2 Death/birth
E3 Marriage
E4 Ceases to be a member of the crew (out of death)
E5 Details of any conviction by a court of any seafarer engaged
E6 Details of any criminal or disciplinary offence
E7 Changing master
E8 Collision/allision
E9 Any damage caused by the ship
E10 Grounding
E11 Abandon ship
E12 Fire on board
E13 Salvage
E14 Reporting a pollution incident
E15 Search and rescue operation
E16 Reasons for not assisting a distress call
E17 Emergency medical evacuation
E18 Receiving a distress or emergency message
E19 Malfuctions of shipboard equipment
E20 Piracy/robbery attack

N1 Date, time
N2 Heading
N3 Alternations of course
N4 Compass error
N5 Course over ground
N6 Magnetic course
N7 Magnetic variation
N8 Deviation
N9 Position
N10 Speed
N11 Covered distance
N12 M/E RPM
N13 Tank/bilge soundings
N14 Hand over the watch
N15 Hold ventilation
N16 Embarkation of pilot
N17 Disembarkation of pilot
N18 Start of sea passage
N19 End of sea passage
N20 Making fast/let go tugs
N21 First line to shore
N22 Let go everything
N23 Boarding a Navaid
N24 Entering VTS/breakwater
N25 Fuel oil change over
N26 Preparation for anchoring
N27 Anchorage position
N28 Preparation for departure
N29 Preparation for arrival
N30 Navigation in heavy weather
N31 Navigation in ice
N32 Precautions restricted visibility
N33 Coastal navigation
N34 Changing the voyage plan
N35 Taking command
N36 Name(s) of lookout
N37 Definition of time zone
N38 Ballast water operations

T1 Steering gear tests
T2 Operational readiness of all LSA
T3 Prevention and control of water ingress
T4 Preparation for voyage
T5 Inspections of life-saving appliances
T6 Inspection of survival crafts and general alarm
T7 Accommodation hygiene inspection
T8 Food, water and catering inspection
T9 Ship security alarm system test
T10 EPIRB and SART test
T11 Tests before entering or getting underway

## IX. List of possible non-MARPOL ELB software providers

- Kongsberg
- NAPA
- RINA Consulting S.p.A.
- Prevention at Sea Ltd
- IB Srl
- Ingenium Marine ME LLC
- NAPA Ltd
- MARIAPPS Marine Solutions Pte. Ltd.
- Volteo Maritime Pte Ltd.
- CHERSOFT Ltd.
- Raytheon Anschutz GmbH
- MARSIG mbH
- ABS Digital Solutions

# Conclusion

The regulating parties of official logbooks is limited to twelve international organisations and flag states. With this knowledge and a thorough research of the legislation of these international organisations and flag states, an overview of all required entries in the official logbook could be made. This overview was missing in the international legislation and was necessary for the research on ELBs in order to make a suggestion for a legal framework for the use of non-MARPOL ELBs in Belgium. It is important to know what the ELB should be able to record, where this data can be found and that the standardised data can be automatically recorded in the ELB. In this way, the ELB will be able to contribute to the safety of the ship as a whole.

Studying the legislation of eight specific flag states and the BMI circulars of Belgium was an added value to understand how the suggestion could be structured and what it should contain in terms of technical design, specifications, purpose, control, management and data storage. There were a lot of similar parts and structures that could be seen in the different official documents and only a few unusual ones.

All stakeholders in the logbook will benefit from switching from a paper logbook to an ELB on board. Officers will have more time to focus on the navigational aspects of the ship, as standardised data can be recorded automatically and blind copying will be avoided. The shipowner on shore can monitor the logbook in real time when connected to the internet and analyse the recorded data to improve processes on board. Port State Control will be able to access all recorded data centralised in one system. In addition, the problem of incorrectly completed logbooks, deficiencies and detentions by Port State Control can be solved by switching to ELBs. If most of the data is automatically recorded in the ELB, marine insurers can be assured that there is less chance of incorrect data being recorded, because automatically recorded data is more trustworthy than an officer who can make mistakes. Even the historians and climatologists will be able to process all the data digitally from the outset.

An important limiting factor for the global use of ELBs is the possible acceptance or rejection of a Port State Control. A shipowner wishing to have an ELB on board will still have to make personal considerations when entering ports where the flag states does not allow ELBs, as

the ELB will then have to be printed. A suggestion for the approval of non-MARPOL ELBs, after the approval of MARPOL ELBs by Belgium, is a second step in the right direction.

The analysis of the different ELB providers is a suggestion for further research. The suggestion for a legal framework for non-MARPOL ELBs in Belgium lists possible non-MARPOL ELB providers, these providers are not approved. Before these providers can be approved, the systems of the various ELBs need to be compared. It will be necessary to check whether they fully comply with the legislation, whether they are easy to use and if they make a positive contribution to the safety of the ship as a whole. This research will require contacting various ELB providers and testing ELB systems. An authorised person from an external European member state could then later approve or reject the provider. It would also be more accessible if the same provider could offer both non-MAPROL and MARPOL ELBs.

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# Annex

Logbook entries required by the Isle of Man for the official logbook (Isle of Man Ship Registry, 2019).

**Chapter 2**

**Official Log Book – required entries**

**(IOMOLB and IOMOLB-LL)**

The relevant sections of the Official Log Book cover page and Sections 1 to 8 must be completed according to the entry requirements stated below. In addition to the required entries the master may make any factual entry concerning any aspect of ship operations considered appropriate in Section 8 of the Official Log Book.

Official Log Book loose leaf versions (IOMOLB-LL) must, where indicated, have the following information entered on each page:

- when a new page commences - date page commenced, section page number; and
- when a page is complete - date page completed, signature of master

**Cover page**

The following entries must be made on the Official Log Book cover page:

| | Required entries – to be completed only by the master | Signatory | Counter signature |
|---|---|---|---|
| 1 | Name of Ship, Port of Registry, Official Number, IMO Number, Gross Tonnage, Net Tonnage | none | none |
| 2 | Name of master, type/certificate number/country of issue of master's certificate of competency. | Master | none |
| 3 | The official working language on the ship. | none | none |
| 4 | Date and place the Official Log Book is opened. | none | none |
| 5 | Date and place the Official Log Book is closed. | none | none |

**Section 1 - Safety Committee Meetings, Appointment of Safety Officers and Safety Committee Members**

The following entries must be made in Section 1 of the Official Log Book:

| | Section 1.1<br>Safety committee meeting and appointment of safety officers<br>Required entries | Signatory | Counter signature |
|---|---|---|---|
| 1 | Date of safety committee meeting, comments. | Master | none |
| 2 | Name of safety officer required under MLC[4] A4.3.2(c) and corresponding reference in the List of Crew. | Master | none |

| | Section 1.2<br>Safety committee members - Required entries | Signatory | Counter signature |
|---|---|---|---|
| 1 | Name of safety committee member required under MLC A4.3.2(d) and corresponding reference in the List of Crew. | Master | none |

[4] Maritime Labour Convention 2006

**Section 2 – Musters, Drills and Training, Inspections and Instructions of Life Saving and Fire Fighting Appliances**

The following entries must be made in Section 2 of the Official Log Book or in the ship's ISM system (refer to 1.2.6 of this notice):

| | **Section 2.1 – Musters, drills and training of crew Required entries** | **Signatory** | **Counter signature** |
|---|---|---|---|
| **1** | Date, record of musters, drills, training, inspection and instruction and any comments relating to the requirements of SOLAS II-2/15, SOLAS III/19 and III/30.<br>For commercial yachts certified under the applicable Large Commercial Yacht Code:<br>Any musters drills, training, inspections and instructions required by the yacht's procedures required by the Large Commercial Yacht Code | Master | An officer |

| | **Section 2.2 – Weekly inspection of life saving appliances Required entries** | **Signatory** | **Counter signature** |
|---|---|---|---|
| **1** | Date of inspection of life saving appliances together with results and any comments relating to the requirements of SOLAS III/20.6.<br>For commercial yachts certified under the applicable Large Commercial Yacht Code:<br>Any weekly Large Yacht Code LSA inspections required by the yacht's procedures in accordance with the Large Commercial Yacht Code. | Master | An officer |

| | **Section 2.3 – Monthly inspection of life saving appliances Required entries** | **Signatory** | **Counter signature** |
|---|---|---|---|
| **1** | Date of inspection of life saving appliances together with results and any comments relating to the requirements of SOLAS III/20.7.<br>For commercial yachts certified under the applicable Large Commercial Yacht Code:<br>Any monthly Large Yacht Code LSA inspections required by the yacht's procedures in accordance with the Large Commercial Yacht Code | Master | An officer |

**Section 3 – Weekly Inspections**

The following entries must be made in Section 3 of the Official Log Book:

| | **Required entries** | **Signatory** | **Counter signature** |
|---|---|---|---|
| **1** | Date and time of the inspection, name of persons making the inspection and the results of the inspection of the crew accommodation required under MLC A3.1.18 or the Merchant Shipping (Crew Accommodation) Regulations 1978 (SI 1978 No 795). | Master | A seafarer who conducted the inspection |
| **2** | Date and time of the inspection, name of persons making the inspection and the results of the inspection of the food supplies, drinking water, food storage and handling areas and galley and food preparation required under MLC A3.2.7. | Master | A seafarer who conducted the inspection |

**Section 4 – Checks, Tests and Drills of the Ship's Steering Gear**

The following entries must be made in Section 4 of the Official Log Book or in the ship's ISM system (refer to 1.2.6 of this notice):

| | Required entries | Signatory | Counter signature |
|---|---|---|---|
| **1** | Date, time and place conducting the checks and tests required by SOLAS V/26.1 and V/26.2 and any comments. | Master | An officer |
| **2** | Date, time and place conducting the drill required by SOLAS V/26.4 and any comments. | Master | An officer |

**Section 5 – Load Line and Depth of Loading**

Passenger ships do not need to complete this section.

The following entries must be made in Section 5 of the Official Log Book:

| | **Section 5.1 – Deck line, load lines, door and openings**<br>**Required entries – to be completed only by the master** | Signatory | Counter signature |
|---|---|---|---|
| **1** | • Particulars of load line assignment taken from the ship's Load Line Certificate.<br>• Maximum draught of salt water in summer zone.<br>• Details of any watertight doors fitted under the requirements of SOLAS II-1/22.6 and II-1/24.3 or reference to a document containing such information.<br>• Details of any hinged doors, portable plates, sidescuttles, gangways, cargo and bunkering ports and other openings fitted under the requirements of SOLAS II-1/22.12 or reference to a document containing such information. | None | None |

| | **Section 5.2 – Change in load line assignment**<br>**Required entries – to be completed only by the master** | Signatory | Counter signature |
|---|---|---|---|
| **1** | • Date, time and place the change occurred.<br>• Particulars of new load line assignment taken from the ship's Load Line Certificate.<br>• Maximum draught of salt water in summer zone. | Master | An officer |

**Section 6 – Departures and Arrivals, Draughts, Freeboard, Closing Doors and Openings**

Passenger ships do not need to complete this section.

The following entries must be made in Section 6 of the Official Log Book:

| | Required entries | Signatory | Counter signature |
|---|---|---|---|
| **1** | Departures:<br>• Date and time^<br>• Dock, wharf, harbour or other place^<br>• Draught in dock water – Forward and aft<br>• Freeboard in dock water – Port, starboard, mean<br>• Allowances*<br>1. Density of water<br>2. Allowance for density of dock water<br>3. Allowances for weight of fuel, water, stores etc. to consume on inland water stretch<br>4. Total allowances<br>5. Mean draught in salt water after making allowances<br>6. Mean freeboard amidships in salt water after making allowances<br>• Date and time of closing watertight doors fitted under the requirements of SOLAS II-1/22.6 and II-1/24.3^<br>• Date and time of closing doors, portable plates, sidescuttles, gangways, cargo and bunkering ports and other openings fitted under the requirements of SOLAS II-1/22.12^<br>Arrivals:<br>• Date and time^<br>• Dock, wharf, harbour or other place^<br><br>^ Large commercial yachts are only required to complete the entries marked. SOLAS requirements are those as applied by the Large Yacht Code. By signing the master and officer confirm the freeboard has been verified as no less than the minimum permitted by the yacht's freeboard assigning authority.<br><br>*Allowances are only to be completed when the mean freeboard in dock water is less than the appropriate minimum salt water freeboard indicated under the ship's load line assignment. | Master<br>Prior to departure | An officer<br>Prior to departure |

**Section 7 – Births and Deaths**

The following entries must be made in Section 7 of the Official Log Book:

| | Required entries | Signatory | Counter signature |
|---|---|---|---|
| **1** | In the event of a birth on board the ship or in the ship's boats:<br>• Date of birth, place of birth (or latitude and longitude if the ship is at sea)<br>• Forename(s) if any and Surname of the child<br>• Sex<br>• Father's forename, surname, usual residence, nationality, occupation, rank or profession*<br>• Mother's forename, maiden surname or surname at marriage if different, usual residence, nationality<br>• Name of ship's master<br>*If the child is illegitimate, particulars relating to the father must not be entered unless a written request signed by the mother and the person acknowledging himself to be the father is submitted to the Isle of Man Ship Registry. | Master | Mother of the child (optional) |
| **2** | In the event of a death on board the ship or in the ship's boats:<br>• Date of death or loss<br>• Place of death or loss (or latitude and longitude if the ship is at sea)<br>• Forename and surname of the deceased (and maiden surname if applicable)<br>• Sex, date of birth or age<br>• Occupation, rank or profession<br>• Usual residence, nationality<br>• Cause of death or loss (certified by a ship's doctor or other qualified medical practitioner where possible)<br>• Name of ship's master | Master | None |

**Section 8 - Narrative Section**

The following entries must be made in Section 8 of the Official Log Book:

| | Required entries | Signatory | Counter signature |
|---|---|---|---|
| **1** | For ships of less than 500 GT only, the name and address of the ship's operator or manager. | Master | None |
| **2** | If a person ceases to be master of a ship, a record that the documents relating to the ship and its seafarers which are in the master's custody, have been delivered to the master's successor. | The former Master | New Master |
| **3** | A record of the date and time a person becomes master of the ship. | New Master | None |
| **4** | A record of any instance where the ship proceeds to sea not in compliance with the Minimum Safe Manning Document. The record must include a reference to the exemption obtained from the Isle of Man Ship Registry in accordance with regulation 8(3) of the Merchant Shipping (Manning and STCW) Regulations 2014 (SD 2014/0238). | Master | None |
| **5** | A brief description of each accident, casualty or incident reported to the Isle of Man Ship Registry in accordance with regulations 5, 6, or 7 of the Merchant Shipping (Accident Reporting and Investigation) Regulations 2001 (SD815/01). | Master | An officer |
| **6** | A record of every distress signal or message observed or received that is not recorded in the radio records as required by SOLAS IV/17. The record must include –<br>(a) the date, time and position of the ship when the distress signal or message is observed or received;<br>(b) a brief description of the distress signal or message; and<br>(c) a brief description, if known to the master, of the nature of the distress. | Master | An officer |
| **7** | A record in accordance with SOLAS Chapter V regulation 33.1 of the reason for failing to proceed to the assistance of persons in distress. | Master | An officer |
| **8** | If a seafarer is left behind in any country, a record of –<br>(a) the name of the seafarer and reference in list of crew;<br>(b) the date and place the seafarer was left behind;<br>(c) the reason, if known to the master, for the seafarer being left behind;<br>(d) any provision made by the master to ensure that the Isle of Man Ship Registry is informed that the seafarer has been left behind;<br>(e) the seafarer's employer being informed that the seafarer has been left behind and of the employer being given any particulars required;<br>(f) the seafarer's property or money left on board the ship (or reference to a document containing this information);and<br>(g) what will happen to the seafarer's property and money (or reference to a document containing this information). | Master | An officer |
| **9** | A record of any onshore complaints investigation conducted by an authorised officer in accordance with the Maritime Labour Convention (A5.2.2) and the results of the investigation. | Master | An officer |

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| **10** | If it appears to the master that a seafarer -<br>(a) may be unfit to discharge his or her duties, whether by reason of incompetency or misconduct or for any other reason; or<br>(b) may have been seriously negligent in the discharge of his or her duties, a record of -<br>(i) the name of the seafarer and reference in the list of crew;<br>(ii) the event or a reference to a document containing this information;<br>(iii) any statement made by the seafarer to the master in respect of that event or those events and which the seafarer wishes to be recorded; and<br>(iv) that the entries made in accordance with sub-paragraphs (i) to (iii) have been read to the seafarer by the master, and if not the reason for not doing so. | Master | A seafarer other than the person named in sub-paragraph (b)(i) |
| **11** | A record of any demotion or promotion of a seafarer, including the date upon which the demotion or promotion takes effect. | Master | The seafarer promoted or demoted |
| **12** | If a seafarer is alleged to have committed a breach of a code of conduct which the seafarer is required to comply with by their employer, and the penalties for that breach include the option of dismissal from the ship, a record of all the following particulars which are relevant -<br>(a) the nature of the allegation;<br>(b) the name of the seafarer and reference in the list of crew against whom the allegation is made;<br>(c) that the master has read the allegation to the seafarer;<br>(d) that the master has advised the seafarer of his or her right to be accompanied by a friend who may advise the seafarer and speak on the seafarers behalf;<br>(e) (i) if the seafarer admits the allegation, a statement that he or she admits it; or<br>(ii) in any other case, a statement that the seafarer does not admit the allegation;<br>(f) (i) any statement made by the seafarer, or by the seafarer's friend on behalf of the seafarer, in answer to the allegation; or<br>(ii) that the seafarer declines to make a statement in answer to the allegation;<br>(g) that the master has given a formal warning to the seafarer;<br>(h) that the master has given a written reprimand to the seafarer;<br>(i) that the master has informed the seafarer that he or she will be dismissed from the ship either at the first opportunity or at the end of the voyage;<br>(j) that the master has informed the seafarer that the matter will be referred to a shore-based disciplinary committee; and<br>(k) that the seafarer has been given, and has acknowledged receipt of, a copy of all entries made in the official log book relating to the breach of the code of conduct, together with a copy of any report made to a shore-based disciplinary committee. | Master | A seafarer other than the person named in paragraph(b) |

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| **13** | If in the opinion of the master, consideration should be given to the prosecution of any person in respect of any conduct on the ship during a voyage (whether under any statutory provision relating to merchant shipping or otherwise) a record of -<br>(a) the event;<br>(b) the name of the person and (if applicable) reference in the list of crew;<br>(c) any statement made by the person to the master in respect of that event which the person wishes to be recorded; and<br>(d) that the entries made in accordance with paragraphs (a) to (c) have been read by the master to the person concerned. | Master | A seafarer other than the person named in paragraph (b) |
| **14** | If a seafarer dies whilst being employed on a ship, a record -<br>(a) of the circumstances of the death, and if the death occurs as a result of any person being lost from a ship, ships lifeboat or liferaft, the efforts which were made to rescue the deceased person;<br>(b) that the deceased's next of kin (including name and address) has been notified;<br>(c) of the seafarer's property or money left on board the ship (or reference to a document containing this information); and<br>(d) what will happen to the seafarer's property and money (or reference to a document containing this information). | Master | An officer |
| **15** | If any part of the Official Log Book, Official Log Book (Passenger Ships) and List of Crew is lost the master must make a written statement of the circumstances of the loss and any steps for its recovery. | Master | An officer |