

BRITANNIA LOSS PREVENTION

B GUIDANCE

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DRAGGING ANCHOR PREVENTION

IN RECENT YEARS, THE BRITANNIA LOSS PREVENTION TEAM HAS NOTICED AN INCREASE IN THE NUMBER OF DRAGGING ANCHOR INCIDENTS.

Ships anchor for a variety of operational reasons however anchoring can lead to the loss of control over the ship and ultimately to the loss of anchors or chains, grounding, collision or damage to property. As a result, anchor-related incidents have the potential to trigger high value incidents and claims.

Please note this guidance does not address all elements of the anchoring operation – only the elements which may influence the subsequent dragging of the anchor. For more information related to anchoring operations, please see our existing [guidance](#).



DRAGGING ANCHOR

DRAGGING ANCHOR IS DEFINED AS THE LOSS OF THE HOLDING POWER OF THE ANCHOR SYSTEM.

If this loss is sudden, it may require an immediate reaction to retain control over the ship. Once the anchor starts dragging, the change in the ship's position may occur quite rapidly, especially in adverse weather and current.

It is important to note "dragging anchor" refers to unintended loss of holding power, however "dredging anchor", is intentional and can be used for manoeuvring purposes.

CAUSES OF DRAGGING ANCHOR

THE REASONS FOR DRAGGING ANCHOR TYPICALLY EXTENDS BEYOND THE ANCHOR ITSELF.

In the publication "Anchoring Guidelines: A Risk-Based Approach"¹, INTERTANKO summarises the root causes of anchoring incidents as "*mainly related to poor seamanship, lack of planning and mishandling of equipment*".

A frequent immediate cause for dragging anchor is rough weather, which results in exceeding the operational limits of the anchoring equipment. In heavy weather, it may be necessary to avoid anchoring altogether by proceeding to open sea. When anchoring under extreme conditions, for example in typhoon or area of high winds/swell, always consider that other ships in the anchorage are also likely to experience dragging anchor.

In case of weather deteriorating whilst in the anchorage, delaying the decision to depart from the anchorage for too long may result in a difficulty in recovering the anchor. Weighing the dragging anchor may require additional time. Furthermore, in heavy wave/swell, the risk of anchor loss at the time of heaving up from the bottom increases significantly – this is because the ship's vertical motion may result in rapid overloading of the anchor chain.

Dragging anchor might be manageable if the amount of space available to the ship allows for it. However, the ship is likely to be in proximity of other ships or navigational hazards and the tolerance for uncontrolled movement may be very low. As the speed of dragging anchor in strong wind may quickly reach about 4 knots, the amount of time available to regain control of the situation is typically very limited.



FIGURE 1 Weighing the anchor

¹ INTERTANKO, Anchoring Guidelines: A Risk Based Approach, 2019.



FIGURE 2 Ship in ballast condition at anchorage

Dragging anchor is more likely to occur when the ship is light (in ballast condition) and has increased windage. Therefore, increasing the ship's draught and/or reducing the trim by the stern are effective precautions against dragging anchor. It may also be necessary to restrict other activities which increase windage, such as opening hatch covers or extending gantry cranes. There have been cases where opening large hatch covers in strong wind became the ultimate trigger for dragging the anchor.

PREPARING FOR THE ANCHORING OPERATION

THE PLANNING AND ASSESSMENT PROCESS OF THE ANCHORING OPERATION WILL HAVE A DIRECT BEARING ON THE LIKELIHOOD OF DRAGGING ANCHOR.

Like any critical operation, anchoring should be planned and subject to a robust risk assessment. Where applicable, these considerations should be an integral part of the passage planning process. It is strongly recommended that the Safety Management System (SMS) provides the necessary support in this regard.

The essential information which should be obtained and considered includes, but is not limited to:

- Assessment of the seabed as the holding ground
- Evaluation of depth and the topography of the bottom
- Proximity of hazards
- Amount of space available to the ship whilst anchoring; traffic conditions and any congestion
- Weather and tide conditions prevailing at the time of anchoring, as well as the forecast and tidal prediction for the duration of stay
- Any shelter provided by land in the vicinity
- Navigational marks or landmarks which could be used for terrestrial position fixing with sufficient accuracy for early detection of any movement
- Availability of navigational information – charts, sailing directions, local information.

The above information should be thoroughly assessed. It is recommended that a structured assessment process is in place and that the involved personnel are suitably trained. This process should then be subject to a periodical review, for example through the established navigational audit or navigational assessment programme.

If the ship's typical operational activities involve any special requirements, or if they are subject to change, they should be reflected in the assessment process and any additional technical, procedural or training should be addressed.

In result of the above assessment, the anchoring plan should be established for the operation. This should include any required tests and checks, the anchoring and the organisation of the bridge team

and anchor party (i.e. personnel attending to the anchoring operation on forward deck), the planning of the subsequent anchor watch and the level of readiness/manning.

Prior to anchoring, the anchor party, in particular the team leader, should have adequate understanding of the plan as it may have direct bearing on the execution of the operation and personnel safety.

Shipboard operational instructions, as well as the SMS procedures should take the operational limits of the equipment into account. Additional familiarisation or training may need to be provided for ship officers. To maintain awareness, it is also highly recommended to display a bridge poster, such as the one collated by INTERTANKO¹.

DETECTION OF DRAGGING ANCHOR

CHECKING THE ANCHORING POSITION IS THE PRIMARY METHOD OF DETECTING DRAGGING ANCHOR AT AN EARLY STAGE.

In many cases, ships will experience a period of limited movement which indicates the imminent loss of holding power. Detecting and reporting this movement is critical to provide sufficient time to regain control of the ship.

Immediately after anchoring, the anchor drop position should be fixed and plotted, and the ship's swinging circle established (the track of the ship as it turns around the anchor position). It is also recommended that after anchoring, the main engine should remain in immediate readiness, until it has been confirmed the anchor is holding.

The position should be checked regularly, along with the distances from other ships and hazards in the vicinity. The combination of the position and heading at the time of the fix will enable tracking of the ship's position against the swinging circle. The level of alertness should be increased in adverse weather conditions, as well as in any situation which could result in a sudden loss of holding power: as an example, such conditions may occur at the time of tide change in a river, when the chain/anchor will re-align in the holding ground by around 180° after the tide turns.

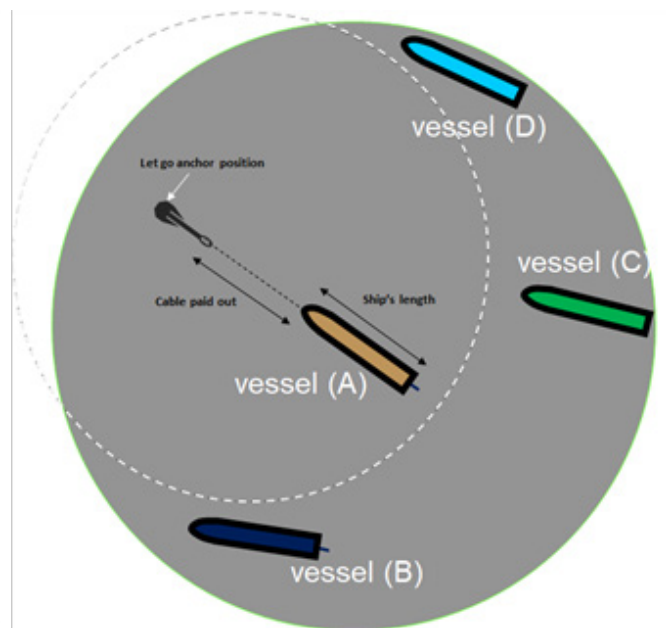


FIGURE 3 Anchor swinging circle

1 INTERTANKO, Anchoring Guidelines: A Risk Based Approach, 2019.

To enable regular checks with sufficient accuracy and frequency, it is necessary to follow good navigational practice, in particular utilise other position-fixing techniques rather than rely solely on GPS indications. Some terrestrial fixes are particularly suitable for position control, such as using two landmarks in a line as an immediate position line/reference.



FIGURE 4 Position monitoring on radar

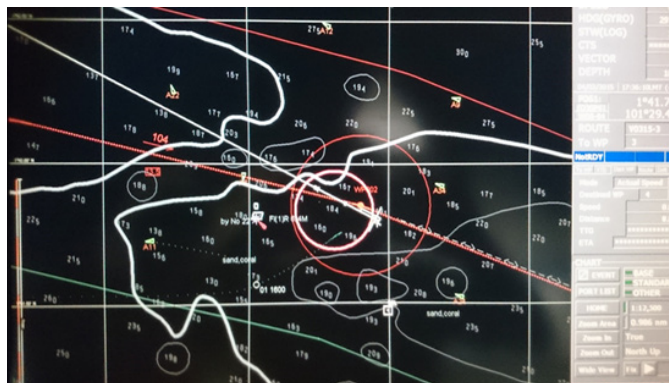


FIGURE 5 Position monitoring on Electronic Chart Display and Information System

However, GPS plots and position trails on the Electronic Chart Display and Information System (ECDIS) screen may help view and control of the ship's movement. At a sufficiently large zoom level, you can easily track the yaw (rotation) and sway (sideways motion) of the anchored ship as it displays the shape of the ship's hull in scale. If the anchor is holding, the combination of these movements usually leaves a figure-of-eight trail whilst the ship yaws and sways side to side. If the anchor starts dragging, this pattern changes. Typically, the anchor drags for some time when the ship sways after a yaw move, the figure-of-eight pattern stretches and starts to resemble a zigzag. Such an observation should prompt a timely reaction before a complete loss of holding power occurs.

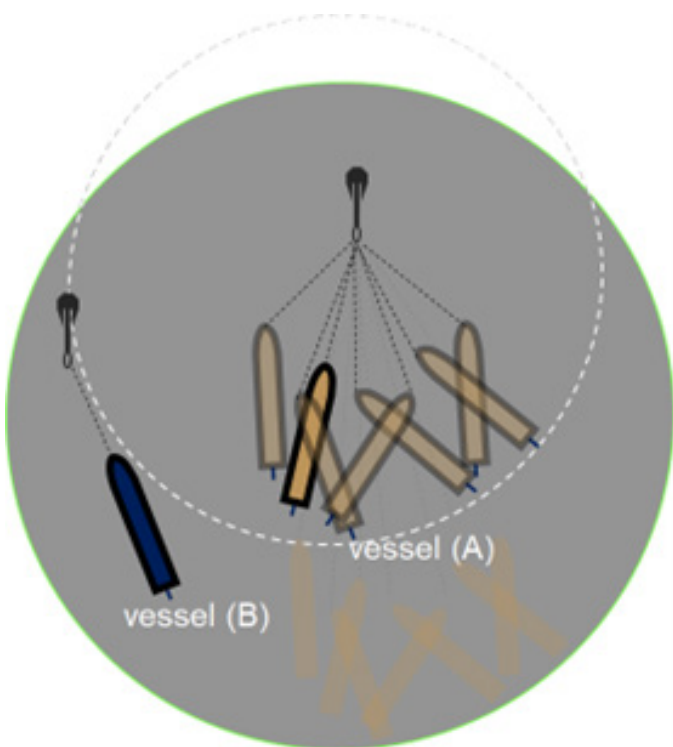


FIGURE 6 Position monitoring whilst at anchor – “zigzag” pattern observed

The pattern on the left may only be visible if the loss of holding power is gradual. If there is a sudden and complete loss of holding power, the ship will leave a straight line. It is then necessary to react immediately and decisively to ensure the safety of the ship.

MONITORING THE ANCHOR CHAIN

THE PROBABILITY OF DRAGGING ANCHOR INCREASES WITH THE LOAD ON THE ANCHORING SYSTEM AND POSITION CONTROL.

Therefore it is necessary that the anchor watch is periodically and visually monitors the relative direction and tension of the anchor chain.

If the chain is leads “up and down” or stays at a short length (extends horizontally to only a small degree), this indicates the forces acting on the anchor and chain are low or moderate, and the likelihood of dragging anchor is reduced. However, if the chain is in a medium to long stay, it signifies that the force acting on the anchor system has increased to a level where the catenary curve formed by the chain becomes progressively shallower.

It may serve as a warning that the load on the chain and anchor has increased to a level where the loss of holding power is more likely or imminent, especially in the case of a very long stay. It is worth bearing in mind that as the catenary curve of the anchor chain flattens, the length of the chain adjacent to the anchor and remaining on the seabed becomes shorter. In result, the holding power decreases.

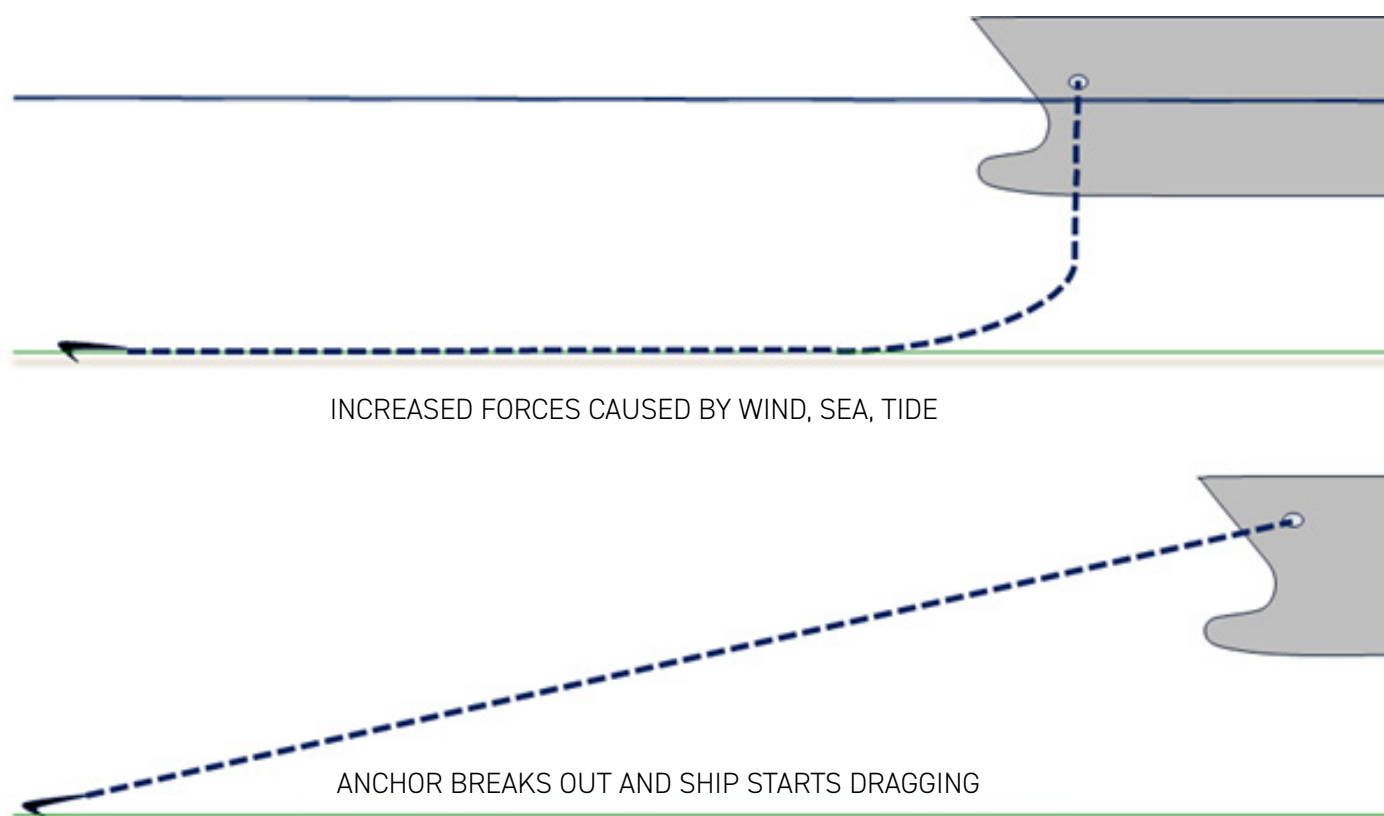


FIGURE 7 Anchor with maximum holding power and anchor with a loss of holding power

If the anchor is already dragging, the cable may interchangeably slack and re-tension.

Whilst present on the forecandle to monitor the chain, the anchor watch should also be aware of and report any sounds of the chain cable dragging on the bottom. These sounds are quite characteristic but may be missed, particularly in strong wind.

IF DRAGGING ANCHOR IS DETECTED

In the event of a detected dragging anchor, or if other ships in the vicinity start dragging anchor, the officer of the watch should:

- Immediately report it to the master
- Contact the engine room or duty engineer to make the main engine, and any other required machinery ready
- Advise the designated anchor party to prepare the windlass and stand by
- Ensure the bridge is manned as required (helmsman and lookout)
- If applicable, advise other ships in the anchorage and the harbour authority. If pilotage is mandatory, it may add further complexity in case the ship needs to depart or re anchor.

The above steps should be a part of the established procedure. The level of readiness of both the main engine and the anchor party should be explicitly set by the master in advance, in proportion to the likelihood of dragging, and in consideration of the proximity of other ships and navigational hazards. The SMS should assist the master in this regard by providing clear guidance on the level of readiness and the manning / crew resources that need to be allocated.

MEASURES AGAINST DRAGGING ANCHOR

There are two main courses of action against dragging anchor (which may be used concurrently):

- Pay out more chain to improve the holding power by increasing the contact length remaining on the seabed
- Use the main engine to decrease the load on the anchor and/or stabilise the ship to suppress yaw and sway.

The extension of the chain scope by paying out more links may have limits; this limitation could apply to congested anchorages (due to space restriction) or anchorages with relatively deep water (as it might require more chain than is available).

It may also be possible to use a configuration of two anchors to increase the holding power (in a two-anchor mooring configuration, riding on two anchors or with the other anchor as a snubber), however each of these scenarios may carry further risks which should be subject to a careful assessment.

It may ultimately become necessary to heave up and re-anchor, or to depart from the anchorage altogether. The urgency may be further increased by the proximity of hazards or underwater installations. Dragging the anchor over a cable or pipeline may result in further hazards to the crew and the ship, as well as an extensive damage to property.

SAFETY CHECKLIST

Below are some of the practical safety tips for anchoring and dragging anchor:

ANCHORING

- Establish the depth of water, under keel clearance, nature of bottom, any subsea hazards, which anchor to use and how much cable to pay out based on the traffic conditions and the available sea room
- Select the position of the anchorage and plan the approach with the anchor party, taking into account the expected duration of stay at the anchorage
- Ensure the ship's swinging circle has been determined and plotted on the chart and ECDIS from the nearest land, ship and charted obstructions
- Mark out no-go-areas on nautical charts so that such areas are readily apparent to navigating officers in an emergency
- Monitor the prevailing and forecasted weather, tidal stream and flow changes
- Keep the anchor party and main engine on standby or on short notice

DRAGGING ANCHOR

- Monitor the ship's position and movement of other ships in the vicinity, as well as the weather and sea conditions by keeping sharp lookout and using all available means such as radars or terrestrial objects
- Confirm whether the ship is dragging anchor by carefully monitoring the ship's past position trail, observing any zigzag pattern from the initial let-go anchor position, and ensuring the ship stays within the swinging circle
- Monitor the movements of adjacent ships and the scope of their anchor cable, and any decrease in their closest point of approach (CPA), bearing in mind that all ships do not have the same scope of swinging circle and do not swing uniformly
- Check the anchor cable leading regularly, examining for any slacking or vibration on the chain cables
- Keep the anchor not in use on standby, ready for immediate dropping when required
- Call the master whenever there are any changes in circumstances or when there is doubt of dragging anchor
- Execute the contingency plans as per Company's Safety Management System (SMS) to ensure rapid response times
- Get the anchor party to prepare the windlass and contact the engine room to get main engine for manoeuvring
- Inform ships in the vicinity and harbour authority of possibility of ship dragging anchor
- Request for pilot, if applicable, to re-anchor the ship and/or request for tugboat service to hold the ship in position

CONSIDERATIONS

The master must consider all action points and determine whether these actions could further complicate the situation for the ship's safety.

- Increase drafts to reduce the effects of a "zigzag" motion, whilst considering any draft restrictions and stability concerns
- Consider trimming the ship by head to reduce the windage area. This will impact the ship's manoeuvrability, propeller submersion and may create stability concerns
- If there is enough sea room, increase the scope of the anchor chain to enhance holding power
- Drop the second anchor to improve holding power, either when initially at anchor, or when it is apparent one anchor is not holding. However, there is potential for fouling the anchors, when two are in use
- Utilise the bow thruster to reduce the oscillation whilst considering the load on the auxiliary engine
- Use of main engine to decrease the load on the anchor chain. When using the main engine in this way there is a possibility of the anchor breaking out from the ground and the ship will need to re-anchor
- Call for pilot and tugboat on standby to position the ship and prevent further dragging anchor

Dragging anchor incidents have the potential to escalate to high-risk incidents, involving groundings, collisions, allisions, pollution and damage to property. It is therefore essential that anchoring is always a well-planned operation which ensures the operational limits of the anchoring equipment are observed, and as a result minimise the likelihood of dragging anchor. The anchor watch should be carried out with due diligence and the officer should always be prepared to initiate the necessary actions if dragging is detected.

If required, additional training should be provided in order to increase the risk awareness, procedural knowledge and embed correct behaviours.

FOR FURTHER INFORMATION

For further information, please do not hesitate to email lossprevention@tindallriley.com.

BIBLIOGRAPHY

INTERTANKO, Anchoring Guidelines: A Risk Based Approach, 2019.

International Association of Classification Societies (IACS), Requirements concerning mooring, anchoring and towing (UR-A).

DISCLAIMER

THIS LOSS PREVENTION GUIDANCE ARTICLE IS PUBLISHED BY THE BRITANNIA STEAM SHIP INSURANCE ASSOCIATION EUROPE (THE ASSOCIATION).

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The purpose of this document is to provide a general overview of the hazards and precautions associated with the carriage of coal. It is not intended to repeat or replace the comprehensive guidance contained in the IMSBC Code and other regulations and practices.