Always to be displayed on the bridge!

Maritime Bureau/Ministry of Land, Infrastructure, Transport and Tourism
Japan Coast Guard

Guidelines for preventing anchor dragging accidents

○ When the typhoon JEBI/MAYMAY (called as typhoon No. 21 in Japan) hit Japan in September 2018, a cargo ship dragged anchor and hit the Kansai International Airport access bridge. Accidents of similar nature have occurred since then by strong typhoons.

Important To prevent such accidents, it is essential to operate ships properly, but appropriate measures to prevent anchor dragging is just as important. Such measures includes a collective safety management system, in which top management of shipping company, shipmaster and crewmembers share necessary information both at sea and ashore.

To those who operate ships (shipmasters, operation managers, etc.)

Important Many typhoons of unprecedented scale has hit Japan in recent years and even more are expected in the future. Past knowledge and experience may not be sufficient to prevent anchor dragging accidents. Awareness that anchor dragging accident will DO occur is required to prepare for prevention of such accident.

Cargo ship collided with Kansai International Airport access bridge in September 2018

Routine measures

○ With the cooperation of the shipowner and the ship management company, shipmaster should establish the onboard system for storm and make it well known by the crew (see *1 below), while comprehending the ship's characteristics, such as maximum endurable wind speed when the ship is anchoring.

*1 Assign roles and responsibilities to each crewmember, develop manuals, conduct necessary drills as anchor dropping/weighing, checking emergency communication systems and collect information useful for accident prevention.

○ Operation manager and shipmaster should discuss measures against typhoon storms well in advance.

Measures against approaching typhoons

Take a few days advance measures before entering the strong wind area of typhoon.

Important Shipmaster should obtain the latest weather and sea state information (forecasts, warnings, sheltering advice, etc.), and start sheltering with ample time (see *2 below). In particular, large high endurance ships that can escape to open seas and high freeboard ships vulnerable to wind (car carriers, LNG carriers, cruise ships, etc.) are strongly advised to avoid anchoring in congested sea areas, such as inland seas/bays.

*2 Operation manager, etc. should provide shipmasters with necessary information on typhoon sheltering and advice on the escaping sea area and the timing to escape. Also, in order for ships to escape storm with ample time, they should coordinate with cargo owners/handlers regarding cargo handling plan, etc. as necessary.

- To reduce air draft and yawing/swaying, shipmaster should adjust the ballast and cargo to maintain deep draft and even-keel/bow trim (beware of propeller racing).
- Shipmaster shall also perform storm weather preparations, such as cargo securing, closing of open holes/doors, checking of functioning of anchoring system, main engine and thrusters and extending of the lifeline for deck work.

Measures to be taken when sheltering from typhoons

- Select proper anchorage and anchoring method so that anchor dragging does not easily occur (see right).
- Deploy sufficient length of anchor chain while paying attention to the surrounding anchoring ships (see *3 below) and perform necessary anchoring work (see *4).

*3 The length of anchor chain needed for normal storm weather is generally "4 x D (water depth) + 145" meters long, but in the case of typhoon, chain should be extended as long as possible for safety.
*4 When dropping the anchor, yawing/swaying range of the hull relative to the anchor point and chain length must be considered. It would help to determine the anchor dragging risk.

Important Keep an intensive anchor watch on the bridge during storm, including monitoring of ship's anchoring conditions and the ships in the vicinity (a yawing/swaying, ship's position, speed, etc.) by assessing weather and sea conditions by GPS, AIS, radar, ECDIS, etc. and keep listening watch on international VHF (see *5 below).

*5 JCG provides maritime safety information by international VHF and AIS.

Important When hit by a typhoon directly, it is difficult to maintain the ship's position only by anchor. Make sure that the main engine and thruster are ready for immediate use.

- If risk of dragging anchor was observed while monitoring the anchoring condition (see *6 below), use the main engine and thruster to turn the bow against the wind to hold the position. If you find it difficult to maintain position, take appropriate measures without delay, such as to shift the anchor or to move to other sea area.

*6 When anchor dragging started, hull will be swept slowly downwind with yawing/swaying. Full-scale dragging will begin and hull control may become difficult unless effective measures were taken by then.

Keep monitoring your ship's position to detect anchor dragging early!

Take early action if there is a risk of anchor dragging!!

If weather was expected to worsen by typhoon and reach a dangerous level, the port authority will issue the escape advice and recommend to take measures against anchor dragging in accordance with the Act on Port Regulations. For ships deemed not to comply with the recommendations without justifiable reason, individual recommendation or order with penalties may be issued, depending on situation.

Criteria for the selection of anchorage and anchoring method

With advance consultation with operation manager, shipmaster is advised to select the appropriate anchorage and anchoring method by taking account of the following:

① Information on weather and sea state conditions (including forecasts and warnings)
The latest position/course/speed of the typhoon, etc., storm zone size, maximum speed/direction of wind against the ship and its time, warning status, etc.

② Ship's condition
Wind effect characteristics, presence of cargo, draft/trim, type of engine/thruster and skill of the crew

③ Nature of the anchorage
Wind shield feature by terrain/structures, water depth, bottom nature as sediment/slope/obstacle, effects of current and waves from open seas

④ Status of other anchoring ships in the vicinity
Availability of free water area, ship's size and freeboard, presence of foreign ships with communication difficulty, method of anchoring

⑤ Vital infrastructure near the anchorage (Sea airport, LNG berth, etc.)

⑥ Advantages and disadvantages of anchoring method (single or twin anchor mooring, etc.) (see overleaf)

⑦ Information provided by the port authority

Important

Guidance for selecting the anchoring method

- To secure sufficient anchor holding, it is necessary to deploy anchors on both sides of the ship (anchor chain should be extended against the expected maximum wind direction as long as possible).
- In cases where anchors are deployed on both sides, however, there is a risk that the anchor chains will foul or weighing anchors is difficult when wind speed and direction fluctuate rapidly by typhoon passing.
- Even when single anchor mooring was chosen, early decision should be made to shift to other anchoring methods, such as deploying a second anchor according to the expected wind direction with maximum speed before it is too late to do so, based on the latest weather and sea state information (including forecasts and warnings).

  * There are cases in the past that many ships that had moored by separate anchors had caused anchor dragging under storm by direct hitting typhoon.

- Shipmaster has the final responsibility to make a decision on the selection of anchoring method, taking account of the criteria described in the guideline.

Regional information useful for selecting anchorage and anchoring method is available from local JCG Office and District Transport Bureau. Keep it on the bridge together with this guideline.

Advantages and disadvantages of each anchoring method

Method of anchoring	Advantages	Disadvantages
Single anchor mooring • Most commonly chosen 	• Anchor can be weighed easily for quick anchorage changing. • Easy to switch to other anchoring method such as steady anchor or twin-anchor mooring according to the wind direction change.	• The anchor holding is weaker than other anchoring methods.
Single anchor mooring with snubber anchor 	• Effective to reduce bow yawing/swaying. • The snubber anchor is effective to reduce yawing/swaying by halves and to reduce the force on the anchor by 30-40%. • Effective in sea areas where wind is not very strong.	• Anchor may foul by wind direction changes. • Fouled chain is difficult to fix it on ship's own. • Weighing of anchor is difficult in the strong wind.
Two-anchor mooring 	• Anchor holding is enhanced. • Effective in strong wind and current from the same direction.	• Anchor may foul by the wind direction changes. • Fouled chain is difficult to fix on ship's own. • Weighing of anchor is difficult in the strong wind.
Twin-anchor mooring Same effect as single anchor mooring when wind direction changes. 	• The effect of reducing yawing/swaying is highest when anchor chain angle is set to 45-60 degrees and the force on the anchor will be reduced by nearly 40%.	• Anchor may foul by the wind direction changes. • Fouled chain is difficult to fix on ship's own. • Weighing of anchor is difficult in the strong wind.

To cargo owners and cargo handling companies

Important They are requested to cooperate flexibly with the ships intending to avoid anchoring in congested sea areas, e.g., large high endurance ships that can escape in open seas and high freeboard ships vulnerable to wind, by coordinating cargo loading/unloading plans, so that they can escape to safer sea areas with ample time to do so.

Websites providing useful information

Anchor Dragging Accident Prevention Portal Site
(Navigation Safety Division, Maritime Traffic Department, Japan Coast Guard)
https://www.kaiho.mlit.go.jp/mission/kaijyoukoutsu/soubyo.html

Contact the **Coast Guard** by International VHF, or by dialing **118** when you met an accident.

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