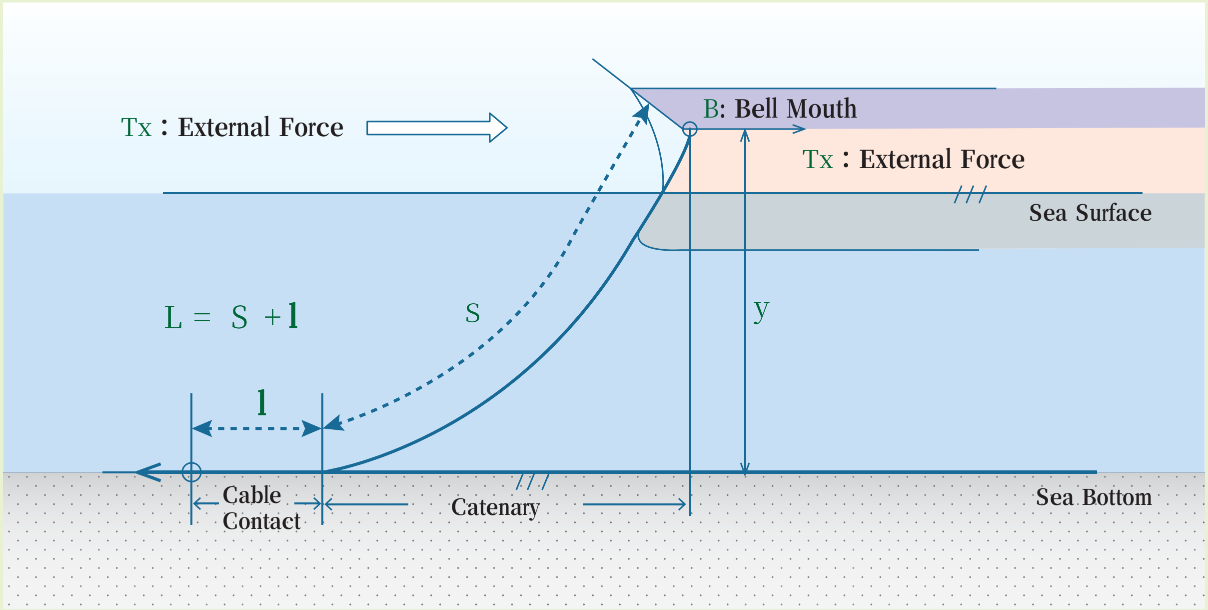
In addition, a representation of the anchor and anchor chain in the sea when external force was applied can be seen in Fig. 80. The catenary forms the suspension part of the anchor chain, from the anchor chain outlet (outside of hawsepipe) of the bow to the sea bottom.



S : Catenary length against the external force (m)
y : Water depth + hawsepipe height from sea surface (m)
l : Minimum required contacted length of the cable (m)
L : Minimum required length of anchor cable (S + l)
Tx : External force (kgf))

Fig. 70

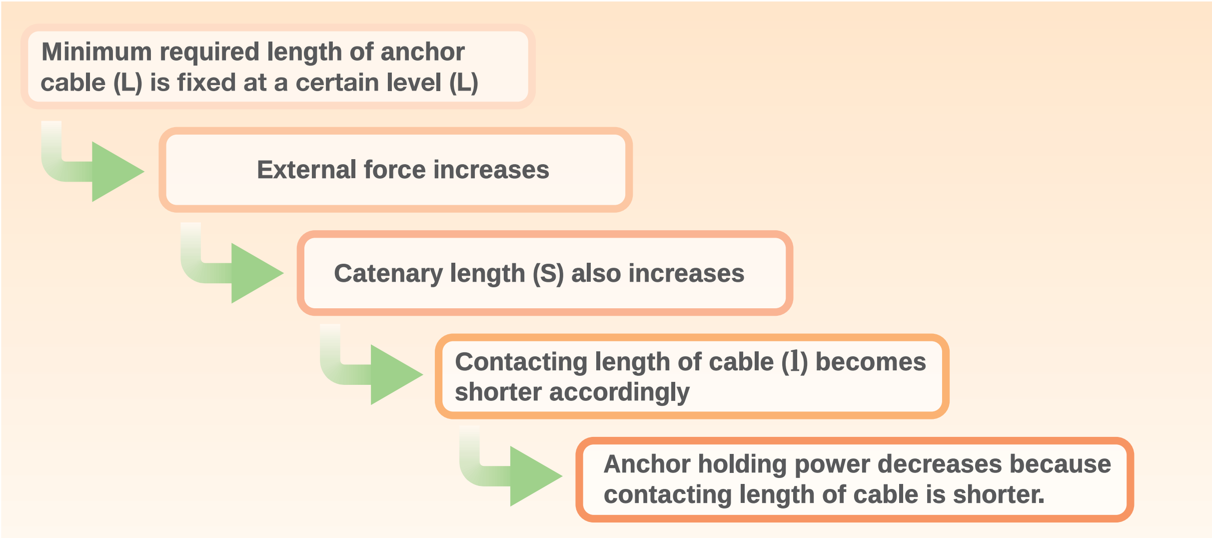
The catenary length of an anchor cable can be calculated with the following calculating formula.

Calculating the Catenary Length of an Anchor Chain

$$S = \sqrt{y^2 + 2\left(\frac{Tx}{Wc'}\right) y}$$

S : Catenary length against the external force (m)
y : Water depth + Hawsepipe height from sea surface (m)
Wc' : Anchor cable weight per m in water (kgs)
= 0.87 × Wc (kgs)
Tx : External force (kgf)

With the above mentioned formula, the more external force (Tx) increases, the longer the catenary is.
Therefore, under the condition that Minimum Required Length of Anchor cable is fixed at a certain level, as there is the following relationship, if External Force increases while the Anchor cable is fixed, the anchor holding power decreases, which leads to a vicious circle.



Also, it is not easy to manually calculate the catenary length and decrease of anchor holding power along with an increase in external force. Similar to the calculation used for external force (wind pressure force), the calculation result will be instantly displayed once the formula is input in the Excel File.

When entering data on holding factor coefficient, observed wind speed, and type of sea bottom coefficient, etc. be on the safe side when entering the data and do not over rely on it as it is intended to be a guide. Tables 71 and 72 show catenary length and calculation examples of anchor holding power.

Anchor Holding Power Calculation : Just Reference

1 The formula in this page are to calculate the holding power of your vessel's anchor and anchor cable.

2 In case of External Force<Anchor Holding Power (Wa' × λa), required length of cable is to calculate by following formula.
Required Length of cable = 3 × d + 90 m (Only External Force < Wa' × λa)

3 Expected total external force should be input by Maximum Impact force. For PCC/CTNR Ship : Wind Pressure on front × 5 ～ 6,
Other type of ship : Wind Pressure on front × 3 ～ 4 times

＊ IE) As per Wind force Cal., Relative Wind Direction θ=0 : 15ton : Max Impact Force 15 × 5 ～ 6 for PCC/CTNR= 75 ～ 90 tons

Input Data

Expected total external Max. force (MT) :(T x Impact Force)	85.56	
Anchor weight (MT) in Air :(Wa)	10.5	
Anchor chain weight in Air (MT/m) :(Wc)	0.166 ton	
Kind of anchor (1: JIS, 2: AC14)	2	
Total Length (Shackles) of using Chain on board	12 ss	
Water depth (m) : d	20.0 m	
Hawsepipe height from the sea surface (m) : h	5.0 m	
Anchor Holding Factor: (λ a)	AC14	7.0
Anchor Chain Holding Factor :(λ c)	1.0	

Result of Calculation

Total height (Bottom to Hawsepipe): (y)	25 m	
Catenary length against the external force :(S)	174 m	
Minimum Required Contacted length of the chain : l	150 m	
Minimum Required Length of Anchor Chain : L=S+l	324m	12ss

Notice

Keep Anchor Watch Strictly

Anchor Holding Factor (λ a) : Use Calculation Formula or Input by mannual.

Anchor Chain Holding Factor (λc) : 0.75 ～ 1.0

Table 71

Calculation Formula in above table

◉ Anchor Holding Factor (Subj. to Kind of Sea Bottom)

λ a : 3.0 (JIS)
: 7.0 (AC14)

λ a : Anchor Holding Factor

Type of Anchor	Sand	Mud	Dragging Anchor
JIS	3.5	3.2	1.5
AC14	7.0	10.6	2.0

λ c : Anchor Cable Holding Factor

	Holding	Dragging	
		Sand	Mud
λ c	0.75 ~ 1.0	0.75	0.60

◉ Anchor Chain Holding Factor

λ c : 0.75 ~ 1.0

◉ Total height (Sea Bottom to Hawsepipe)

y : d + h

Water Depth (d) + Hawspipe Height from Sea Surface (h)

◉ Catenary Length Against the External Force

$$S : S = \sqrt{y^2 + 2\left(\frac{Tx}{Wc'}\right) y}$$

◉ Anchor Weight in Air (Wa), Anchor Weight in Water (Wa')

(Wa') = Wa × 0.87

◉ Anchor Cable Weight per m in Air (Wc), Anchor Cable Weight per m in Water (Wc')

(Wc') = Wc × 0.87

◉ Minimum Required Contacted Length of the Cable

$$l : Tx = Wa' \times \lambda a + Wc' \times \lambda c \times l$$

$$: l = \frac{Tx - Wa' \times \lambda a}{Wc' \times \lambda c}$$

◉ Minimum Required Length of Anchor Cable

L : L = S + l

◉ In case of Tx < Wa' × λ a

: L = 3 × d + 90 (m)

Table 72

4—6 Countermeasures to prevent an anchor from dragging in stormy weather

Conventionally, there are guidelines, such as those listed below that serve as countermeasures against an anchor dragging in stormy weather. Consider the following reasons and remarks.

① Make the deep draft

Reason The ship's weight will increase, and the chance of the vessel horsing will decrease. Also, a decrease in wind pressure area can decrease the impact of external forces.

Remarks Consider increasing ballast quantity and hull strength.

② Even keel, or by the head (trim by bow) if possible, is to be applied.

Reason Horsing (yaw and sway) motion can be limited when wind pressure centre is moved to the stern.

Remarks Consider increasing ballast quantity and hull strength. Maintain propeller immersion.

③ Veer anchor cable

Reason Because holding factor between the anchor cable and sea bottom increases and catenary length increases, it is effective for improvement of anchor holding power and mitigation of impact force added to cable.

Remarks It takes 3 minutes heave-in one shackle (longer time taken during rough seas). The longer the veered anchor cable, the more time it will take.

④ To drop the other anchor as a snubber anchor

Reason It is effective to drop the snubber anchor because it can halve the amount of horsing (yaw and sway) motion which will decrease the amount of impact force on the anchor by approximately 30 to 40%.

Remarks Consider length needed for a second cable. One and a half times the depth of water will be needed. Consider the possibility of cable fouling, particularly when pitching heavily.

⑤ From the outset of anchoring, deploy both anchors

Reason Anchor holding power increases when riding at two anchors. Two-anchor mooring restricts horsing (yaw and sway).

Remarks There is a danger that the anchor cables may tangle. Two-anchor mooring is not flexible when the wind direction changes.

⑥ Main Engine, steering in combination with bow thruster

Reason It is an effective way to suppress horsing (yaw and sway) when an attempt is made to stand bow against the wind, using a combination of dead slow ahead speed and steering.

Remarks It is necessary to have in-depth meetings with the engine department. Ensure that the bow thrusters are kept submerged when the ship is pitching and rolling. Loosen the anchor chain temporarily by manoeuvring forward, and note that any sudden increase in tension may break-out the anchor when the hull falls leeward, which may lead to anchor dragging.

Of the above guidelines, we simulated ③ Veer anchor cable and ⑥ Main Engine, steering in combination with bow thruster (as per the situation of Vessel C, Case 3-3).

= "Increase of anchor holding power in the event of a veered length of the anchor cable" for single anchor mooring =

An increase in critical wind speed when the anchor chain was veered due to strong wind, during anchoring with a windlass at 6 shackles (distance of 151 meters from hawsepipe, with Hawsepipe being 25m from sea bottom) of a Pure Car Carrier laden with 6,000 units was calculated as a simulation under the following conditions:

= Calculation conditions =

Anchor weight in air (Wa) : 10.5ton Holding factor (λ a) 7.0
➡ Anchor weight in water 9.135 tons (Wa')

Anchor chain weight per m in air (Wc) : 0.166 ton/m Holding factor / (λ c) 1.0
➡ Anchor weight in water 0.144 ton/m (Wc')

Water depth + Hawsepipe height from sea surface (y)
: 25.0m

Length of one shackle of anchor cable : 27.5m

Projected area (front) (A) : 800 sqm

The wind force coefficient (CRa) : 0.75

Air density (ρ) : 0.125kg/sec^2/m^4

① When the anchor cable is constantly fixed

The external force is increased when keeping the anchor cable at 6 shackles and the catenary length of the anchor cable is enlarged. However, once the external force reaches 63.9 tons (wind speed at 16.9m/s), the anchor cable consists entirely of catenary which means that the only anchor holding power is by the anchor itself. When calculating backwards the wind speed to be given a critical wind speed, and dividing the critical wind speed by 1.25 to 1.50 and then replacing it with the average wind speed, 11.3 to 13.5 m/s will be the anchoring limit.

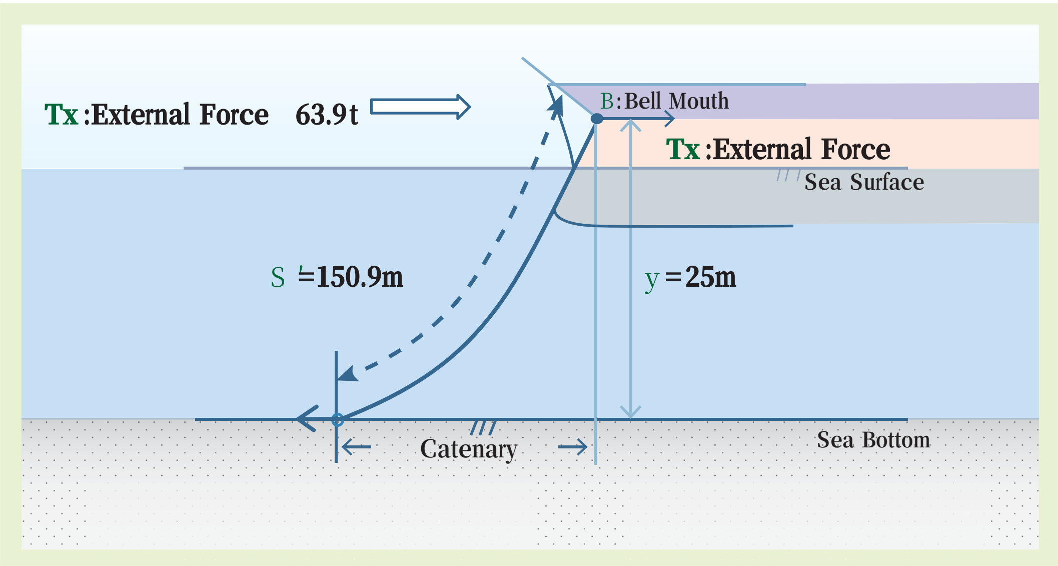


Fig. 73

(Calculation basis)

Before veering the anchor cable, the ship is moored exclusively with the anchor. This can be compared to the anchoring limit, as the anchor holding power is equal to the external force (impact force). The anchor cable is assumed to have formed a catenary with no cable lying on the sea bottom. Before determining the critical wind speed, the wind force from ahead must be calculated. It can be demonstrated that the impact force (which, in this case, is the same as the anchor holding power) should be divided by 6.

Anchor holding power ＝ external force （impact force） : 63.9 tonf

➡ Wind force from ahead 10.65 tonf

Catenary length （S'） : 150.9 m （5.5ss）

Calculate critical wind speed against wind force on front (110.65 tonf) from the Hugh's formula to find the critical wind speed and average wind speed as follows.

Critical wind speed : 16.9 m/sec

Average wind speed: 11.3 m/sec ～ 13.5 m/sec

＊ The critical wind speed can be converted into the average wind speed which can be solved by dividing the critical wind speed by1.5 or 1.25.

These average wind speeds are the maximum limits under which the vessel in this example can lay safely at anchor without any more force being exerted on the anchor and cable system than it can withstand.

② Situation after one additional shackle of cable is veered

The critical wind speed was simulated assuming that seven shackles of anchor cable were veered.

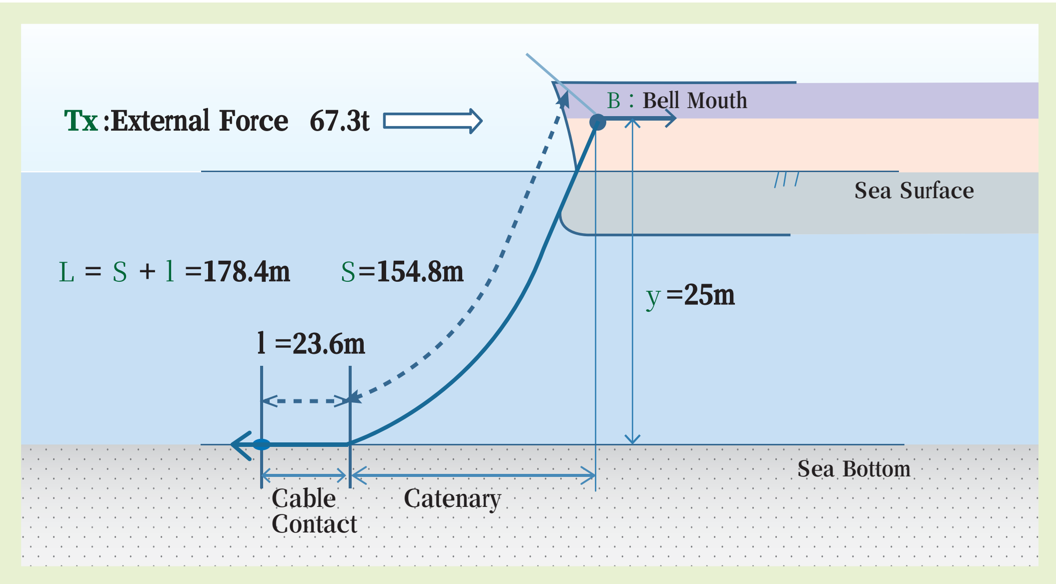


Fig. 74

When calculating the critical wind speed assuming that one additional shackle of anchor cable is veered, the ship can withstand an external force of up to 67.3 tons (wind speed at 17.3 m/s). (This external force is balanced assuming that 23.6m of veered anchor cable is contacting the sea bottom. If the external force is greater than this, part of the anchor cable will be contacting the sea bottom. However, the total anchor holding power will be smaller than the external force, and the ship will drag anchor.)
Similarly, replacing it with average wind speed, it becomes 11.5m/s to 13.8m/s. Even when compared with 6 shackles being veered, only an average wind speed of 0.2 to 0.3m/s was applicable.

(Calculation basis)

After a further shackle of cable was veered, the critical wind speed increased. Only part of the longer cable system will lay along the sea bottom with the remainder forming part of a new catenary, which will now be longer as it will be extended by the increased external force caused, in turn, by the increased critical wind speed. Veered length of the cable (laid over the sea bottom) (l) was calculated by the quadratic equation from the calculation formula as below.

$$S' + (27.5m - l) = \sqrt{y^2 + 2 \times \left[\frac{Wa' \times \lambda a + Wc' \times \lambda c \times l}{Wc'}\right] \times y}$$

S' : **Catenary length before one shackle is veered** : 150.9m

l : **Veered length of the cable (laid over the sea bottom) (this is to be calculated)**

Veered anchor cable contact	:	23.6m
Catenary	:	3.9m
Total	:	27.5m

③ When the anchor cable is completely veered to 12 shackles

Similar to the above, when calculating the critical wind speed assuming that all additional shackles (12 shackles) of anchor cable have been veered, the ship can withstand up to an external force of 86.3 tons (wind speed at 19.6 m/s). However, replacing it with the average wind speed, it becomes 13.1m/s to 15.7m/s. Even compared with the assumption that 6 shackles are veered, only an average wind speed of 1.8 to 2.2 m/s was applicable.

(Calculation basis)

(S) Catenary length	:175.0m
(l) Contacted length of the cable (laid over the sea bottom)	:155.0m (+22.4 tonf)
(L) Total length of anchor cable	:330.0m (12ss)
The holding power created by the anchor and cable system Total	:86.3tonf (Impact force)
	➡ Wind force from front 14.38tonf

Critical wind : 19.6 m/sec
The average wind speed can then be calculated as13.1 m/sec ~ 15.7 m/sec
(This is an increase of 1.8 ~ 2.2 m/sec)

In summing up; from the viewpoint of the ship commander, even veering anchor cable as a countermeasure of dragging anchor cannot be considered highly effective for increasing anchor holding power. This is because wind gusts and does not blow in a constant direction or speed, thus it is also worth considering the necessity of weighing the dragging anchor in time of an emergency, just in case.

Importantly for those on the bridge, the critical wind speed does not increase as much as might be expected even if the anchor cable is veered considerably.

＝ Combination use of main engine, steering and bow thruster ＝

Countermeasures to be taken under rough sea conditions, using a combination of the main engine, steering and bow thruster, will be examined.

① Use of the bow thruster

In order to avoid horsing (yaw and sway), it may be necessary to use a bow thruster, if one was outfitted on the ship. In this situation, it is necessary to consider the influence on the generator as a result of outputting from the bow thruster or when changing load frequently.

Regarding a pure car carrier laden with 6,000 units, the wind force on front at a force of 16m/s (it will be time at 1.50 = 24m/sec, if under the gusting at storm) is 22 tons. Because 80% of the horsepower (one ton 100PS) is necessary, the following amount of power from the bow thruster will be required.

$$22 \text{ tons} \times 0.8 \times 100 = 1{,}760\text{PS}$$

② Combination use with main engine

In theory, it is assumed that ship operating using both the main engine and the steering in order to stand the hull against the wind can limit horsing (yaw and sway) and reduce tension on the anchor cable. However, from a practical perspective, a situation that requires the use of an engine will mean that it is getting closer to critical wind speed for anchoring. In addition, according to the usage of the engine, the anchor chain may repeatedly slacken and then become taut, which may rather increase the impact force and lead to dragging achor.

The result simulated using the case of Vessel C above in 3-3 is introduced in the Maritime Casualty Analysis Report (Vol. 6): “Typhoons and Marine Accidents”. The conditions for simulation are shown in Tables 75.

(Simulation method)

Ship's particulars			
Loa	224.0 m	Draft (fore)	8.00m
Length between perpendiculars	215.0 m	Draft (aft)	11.60m
Total width B	32.2 m	Mean draft	9.80m
		Block coefficient of fitness (Cb)	0.821

Classification of speed force		
Classification	Speed (full load / ballast)	Engine rpm (revolution per minute)
Navigation full speed (Nav. Full)	14.0 knots	75～77 r pm
Harbour full speed (S/B Full)	10.3/11.0	56 r pm
Half ahead eng. speed	8.9/9.6	48 r pm
Slow ahead eng. speed	7.4/8.0	40 r pm
Dead slow ahead eng. speed	5.5/6.0	30 r pm

Conditor of external force	
Wind speed	25m/s
Wind direction	East-northeast (direction of 67.5 degrees)
Wave height of swell/wavelength	5m/200m
Wave height of swell and wavelength incident angle	Direction of 118 degrees

Table 75

Photograph 76 This was not the actual simulator used.

(Simulation method)

By rotating the propeller during horsing (yaw and sway) motion, in order to supply the need for holding power against the force, propeller thrust power applicable to the ship speed in flat water of 6 to 14 knots was given. Then, an evaluation was conducted using the following calculation, in the event of giving the propeller thrust power.

- Maximum of cable tension (Tmax)
- Maximum of holding power (FAmax)
- Minimum of holding power (FAmin)

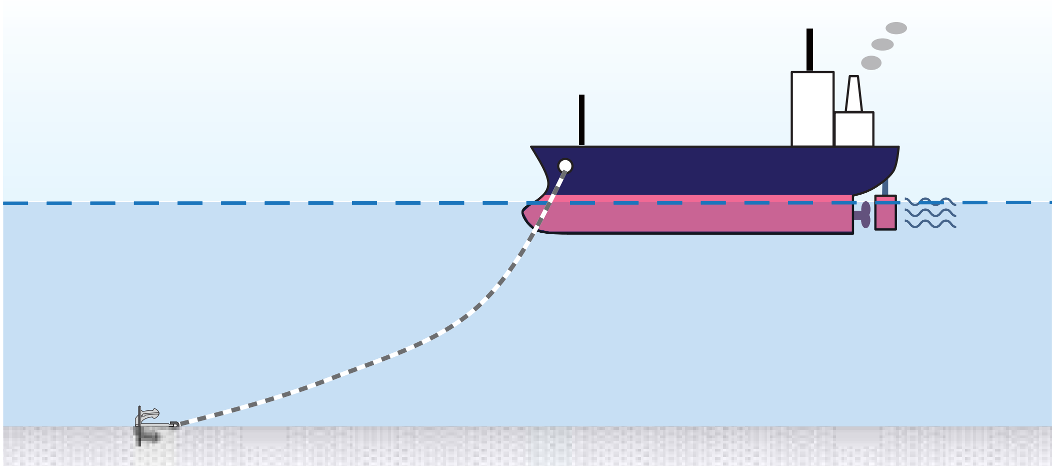
The method of evaluation will be described below. A summary of it is shown in Table 77.

When Tmax does not exceed FAmin : (Tmax < FAmin) ⇒ "Non-dragging of anchor"

When Tmax exceeded FAmin : (Tmax > FAmin) ⇒ "Dragging anchor"

Anchorage in heavy weather using engine Simulation results						
Anchor cable Veered	Propulsion / judgement	Equiv. to 6kt (D.Slow) Dead slow ahead eng. speed	Equiv. to 8kt (Slow) Slow ahead eng. speed	Equiv. to 10kt (Half) Half ahead eng. speed	Equiv. to 11kt (S/B Full) Harbour full speed	Equiv. to 14kt (Nav. Full) Navigation full speed
6 shackles	Tmax (tons)	51.1	48.8	50.0	0.0	0.0
	FAmin (tons)	16.2	48.8	48.8	64.2	64.2
	FAmax (tons)	52.6	56.5	64.2	64.2	64.2
	Judgement	**Dragging anchor**	**Non-dragging of anchor**	**Excess thrust**	**Excess thrust**	**Excess thrust**
8 shackles	Tmax (tons)	51.9	48.8	58.8	0.0	0.0
	FAmin (tons)	22.1	48.8	21.4	70.2	70.2
	FAmax (tons)	58.6	62.5	70.2	70.2	70.2
	Judgement	**Dragging anchor**	**Non-dragging of anchor**	**Excess thrust**	**Excess thrust**	**Excess thrust**
12 shackles	Tmax (tons)	48.8	48.8	61.2	0.0	0.0
	FAmin (tons)	13.6	48.8	48.8	82.2	82.2
	FAmax (tons)	70.6	74.6	82.2	82.2	82.2
	Judgement	**Dragging anchor**	**Non-dragging of anchor**	**Excess thrust**	**Excess thrust**	**Excess thrust**

Table 77

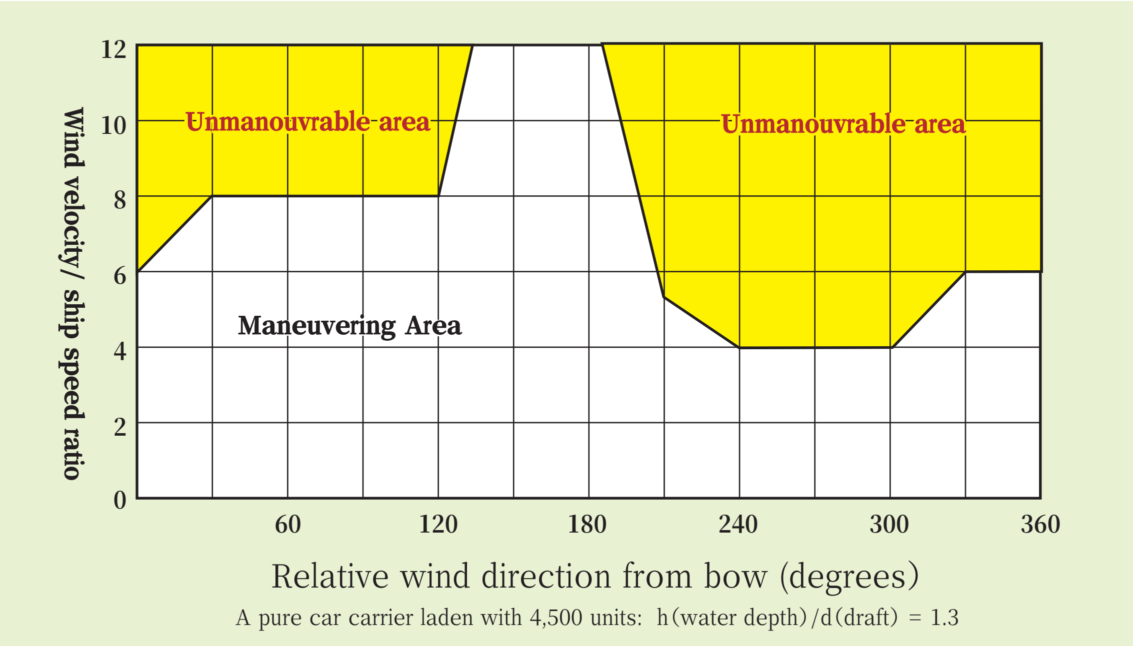


Regarding Vessel C case, the Master started to use the engine before anchor dragging started. Under the 25m/s wind speed condition, it was possible to prevent anchor dragging with engine thrust power at the slow ahead engine speed (Slow Ahead), but there was a shortage of thrust power when it was set to Dead slow ahead engine speed (D. Slow Ahead). However, the thrust power was too large at more than Half Ahead engine speed (Half Ahead) which caused the anchor to drag as a result.

Vessel C attempted to control the ship's posture by setting the engine to full speed, however, she was exposed to the wind from the Unmanouvrable area during dragging anchor caused by wind pressure, which will be referred to below, and as a result, she was presumably grounded without the Master being able to control the ship's posture.
In addition, because the wind does not blow in the same direction and speed, it is necessary to fully understand that wrong usage of an engine may rather lead to greater impact force.
In the event that large vessels can evacuate to the open sea, it would be ideal to refuge at a point away from the typhoon by heaving up anchor rather than staying anchored while using the engine.

4—7 Difficulty in maintaining manoeuvrability after dragging anchor has started

If the ship swings broad on to the wind and begins to move to leeward, considerable time and space may be required before effective control can be restored by using the main engine, rudder and bow thruster. In addition, when the propeller is working the effect of the bow thruster will be decreased by about 20% per 1 knot of ahead speed. (Ahead speed at about 5 knots, turning round yields no affect even when setting to full power.) It is important to understand the Unmanouvrable area of the ship.



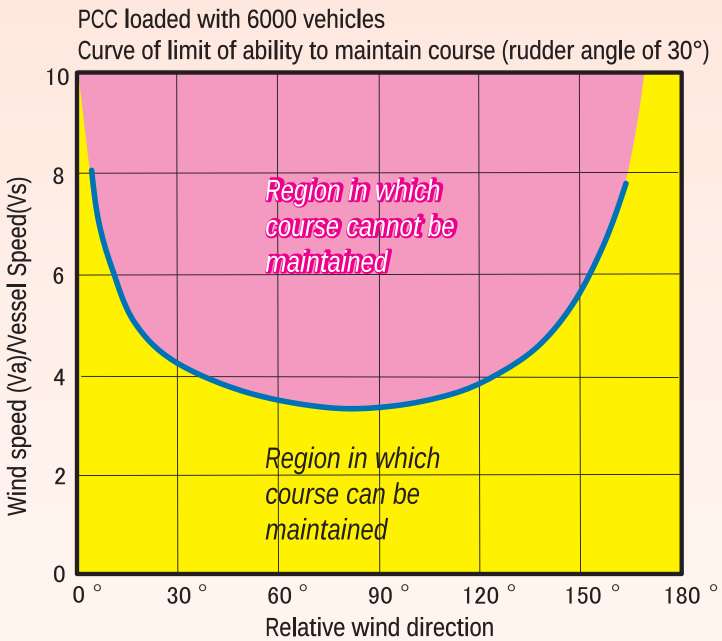
Graph 78

Graph 78 indicates the Unmanouvrable area of a pure car carrier laden with 4,500 units. This illustrates the limitations on manoeuvrability imposed by various wind strengths compared to the vessel's speed. Numbers entered in the vertical axis are wind speed per ship's speed and the wind force angle is entered along the horizontal axis. Except for when being exposed to tailwind from the stern direction, it is an Unmanouvrable area area if the wind speed is more than four times that of the ship's speed.

For example, in the event of turning round to the starboard side (windward) by being exposed to wind from the starboard side, it is impossible to change course at more than an 8 of wind velocity/ship speed ratio. On the other hand, in the event of turning round to the port side (leeward) by being exposed to wind from the port side, it is impossible to change course at a 4 of wind velocity/ship speed ratio. The cause is the transient change due to the mutual influences of wind pressure moment, water resistance moment and steering moment.
With a wind speed of 20m/s, the ship's speed would have to be more than 5 knots (2.5m/s), in order to stand a chance of stemming the wind. If it is more than 5 knots, the bow thruster will cease to be effective.

Note: A difference in a ship's speed will permit as to whether the vessel can maintain a given course. This should not be confused with limit for course keeping. The limit for course keeping is an area whereby it is not possible to keep on course if the wind velocity/ship speed ratio is large during the voyage. It is different from limitation of manoeuvring by rudder.

The graph on the right shows the limit for course keeping, the area whereby it is or is not possible to keep on course at the rudder angle at 30 degrees. Once the wind velocity/ship speed ratio exceeds 3.7, it will be in an area whereby it will not be possible to keep on course because of the relative wind direction from bow. This should not be confused with limitation of manoeuvring by rudder.



Graph 79

4—8 Safe distance from other ships, shallows and other facilities

There is no definite criteria regarding a safe distance to keep from other ships, shallows and other facilities. The reasons are as follows.

The following items are to be considered, when focusing on the area of sea one is to use for restoring the ship's posture using a combination of the main engine, steering and bow thruster promptly after discovering a dragging anchor.

①	A radius of swinging circle	A circle with a radius of minimum required length of anchor cable + the ship's Loa
②	Speed of dragging anchor under wind pressure force:	approximately 3 - 4 knots
③	Required time to weigh anchor:	In general, an anchor cable will be retrieved at a rate of about 9 m/min and to retrieve 1 shackle takes about 3 minutes. It may not be possible to heave in a taut cable continuously, thus prolonging the operation of weighing anchor.
④	Time needed for preparing the main engine:	Early S/B Eng.
⑤	Time required to obtain speed ahead needed to restore the ship to full manoeuvrable condition after being exposed to wind from the leeward	

Compared with the situation of weighing the anchor during dragging anchor with yaw and sway (the first stage) and then regaining control of the hull, with weighing the anchor after the anchor has dragged caused by wind pressure, the simulation result indicates that approximately 3.5 times the amount of water area on the leeward side will be required.

Simulation of the time full control is achieved over the ship's manoeuvrability following dragging anchor: Case study

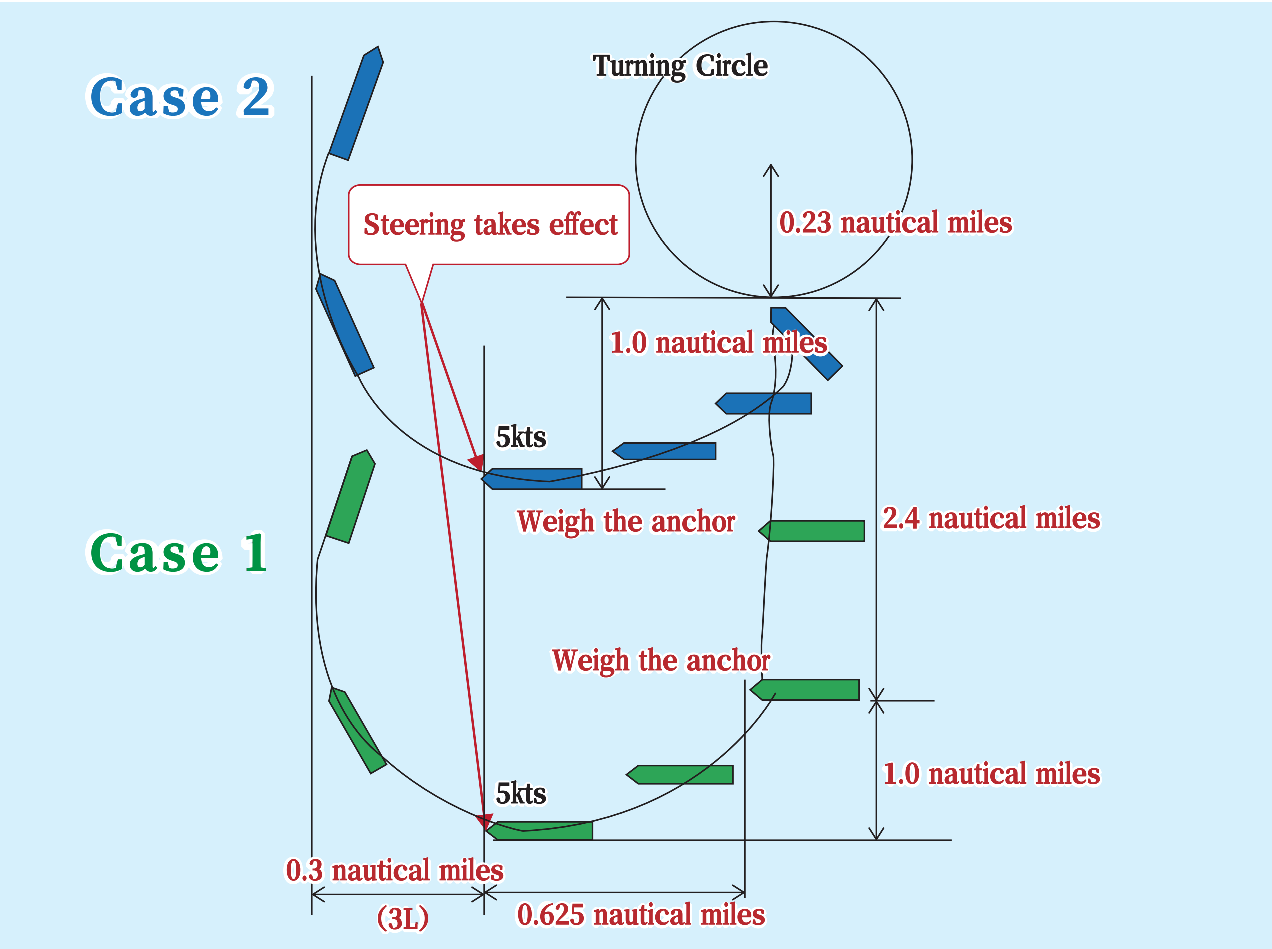


Fig. 80

Case1　Weighing anchor after dragging anchor is detected

In the case of ◀ **Fig. 80**

The ship's LOA is 200m.

- She is lying at anchor with 8 shackles.
- Time to weigh anchor is 1.5 times longer than is usually required.
- During that period, the ship is being brought to leeward at 4 knots.
- After weighing anchor, it takes 15 minutes until the ship's speed reaches 5 knots.
- In the interval, the ship's side has been pressed by the wind.
- The main engine and bow thruster are ready prior to dragging anchor.
- Whilst weighing anchor, both are available. The wind speed was at 20m/sec.

It has been clarified that accidents may be caused, if there is no navigable water area with 3.63 nautical miles to the leeward direction and 0.925 nautical miles in the horizontal direction. It would be difficult in many cases to secure this size of water area when needing to shelter from a typhoon.

1 Turning Radius of the Circle is:

8 shackles (220 m) + 200 m = 420 m = 0.227 nautical miles

2 Time needed for weighing the anchor:

After dragging anchor caused by wind pressure starts, it is no longer possible to manoeuvre the ship. The anchor cable recovery rate in moderate weather is known to be 9m per minute. Therefore, it would take about 24 minutes to weigh anchor in moderate weather. However, in this situation, it would take 1.5 times as long or about 36 minutes.

In this interval, the distance which the ship is pressed to leeward = 4 knots x 0.6 hours = 2.400 nautical miles (distance covered in 36 minutes at 4 knots).

3 After the anchor is aweigh, a further 15 minutes elapse before the vessel's speed reaches 5 knots. During this period, the vessel will drift about 1 mile to leeward (distance covered in 15 minutes at 4 knots).

0.25 hours × 4 knots = 1.000 nautical mile

Leeward direction: 3.627 nautical miles (6,717m) is necessary.

4 The distance sliding transverse

Advance at 5 knots is (3L) = 0.300 nautical miles

(0 knot + 5knots) ÷2 × 0.25 hours = 0.625 nautical miles

Horizontal direction: 0.925 nautical miles (1,713m) are required

Case2　Started to weigh the anchor during dragging anchor with yaw and sway

In the case of ◀ **Fig. 80**

If weighing the anchor at the early stage of dragging anchor with yaw and sway, it may be possible to weigh the anchor almost right away using the engine for operation to weigh the anchor accordingly. Even if the vessel has entered into an unmanouvrable area and, even worse, exposed to wind from the side, as long as the following water area both for leeward direction and sliding transverse are secured, it is possible to achieve full control over the ship's manoeuvrability.

Leeward direction: 1.230 nautical miles (2,278m)

Horizontal direction: 0.925 nautical miles (1,713m)

Most accidents such as collisions and groundings involving ships occur when an anchor drags because an insufficient amount of sea area was not secured.

§ 5　Conclusion

Three different cases and mechanisms of dragging anchor were introduced. We are sometimes forced to anchor to shelter from stormy weather such as from large swells and wave heights exceeding 5 meters.
However, as can be seen from the introduced cases, even though there were opportunities to evacuate from the sea area away from the typhoon, a large number of accidents were caused due to a lack of weather information.
In the case of large vessels that had a method of riding at two anchors and two-anchor mooring, it is concluded that mainly single anchor mooring was decided on because of the difficulty of ship handling.
Therefore, it is a requirement that as much weather information be available as possible in order better ensure safety. Also, the Master should not be alone in making a judgement, it is also necessary for operators and ship management companies to support the Master. Even if dragging anchor is already under way, the ship’s posture may be adequately controlled if it is detected at an early stage.

References

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