







Ankring

 **Linnéuniversitetet**
Sjöfartshögskolan


P-Å Kvik



Efter haveri – grundstötning M/T Astral (MAIB)



- The company is recommended to:
 - 2009/104 Review its SMS instructions and enhance its auditing procedures to ensure that masters and ships' officers:
 - Are provided with, and are familiar with, correct and clear anchoring procedures.
 - Understand the limitations of their vessel's anchoring systems.
 - Understand the company's emergency response procedures and are implementing these plans effectively.
- International Association of Marine Institutes and Association of Marine Educational and Training Institutes Asia-Pacific Regions are recommended to:
 - 2009/105 Encourage their members providing training to deck officers, to conduct a full review of the study programmes delivered to ensure that deck officers gain effective instruction on:
 - Navigation planning for anchoring, including the construction of swinging circles, holding ground, and position monitoring while at anchor.
 - The strengths, weaknesses and limitations of vessels' anchoring systems.
 - Command considerations for safe anchoring, including wind and tide effects, yawing, when to depart an anchorage and actions to take to prevent dragging, and to take when dragging is detected.

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Sveriges äldsta ankare

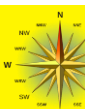




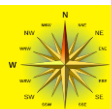

- År 1798 fann man i samband med byggandet av Trollhätte kanal en samling mycket märkliga fynd i Åkers insjö strax söder om Trollhättan. I bränntorven låg en mängd ekvirke, troligen rester av en brygganläggning och ett ankare. Daterat omkring år 500 e Kr

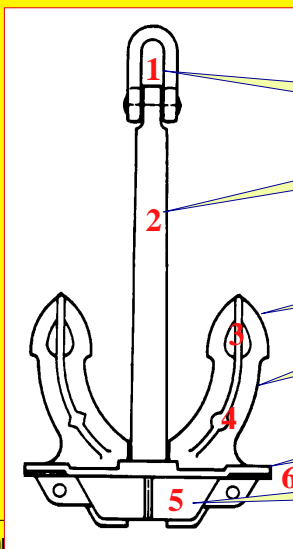


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Ankarets delar





1 Anchor ring (Röring)


2 Shank (Lägg)

3 Pea or Bill (Fly/pynt)

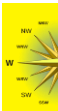
4 Fluke (Arm)

5 Tripping palm (Hjälpfly)

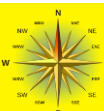
6 Crown (Krona)



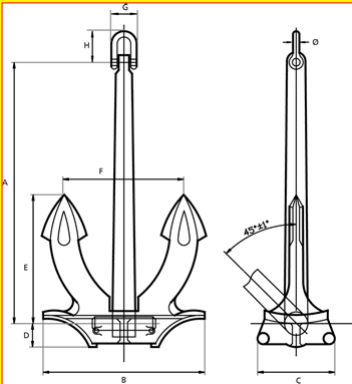
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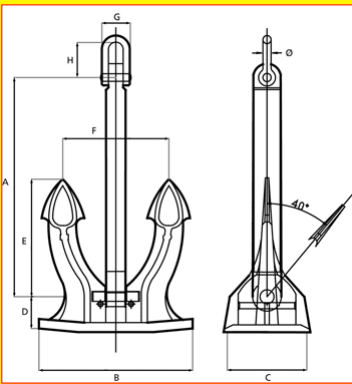
Different anchors




Hall



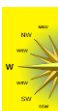
Spek



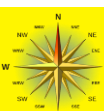


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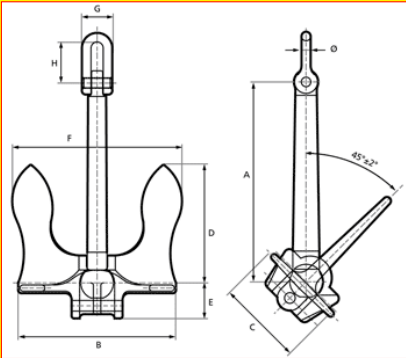
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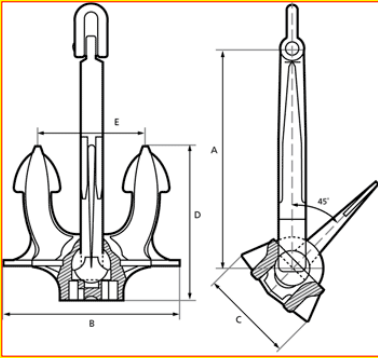
Different anchors




Baldt



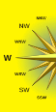
Union



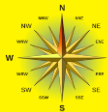


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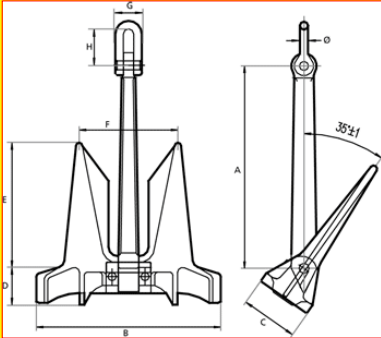
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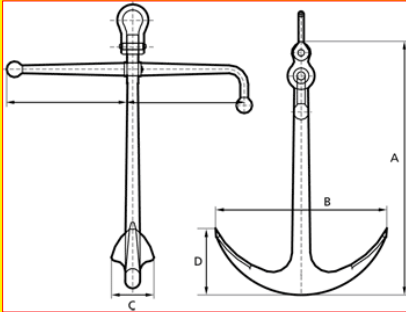
Different anchors




AC-14



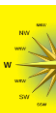
Admiralty





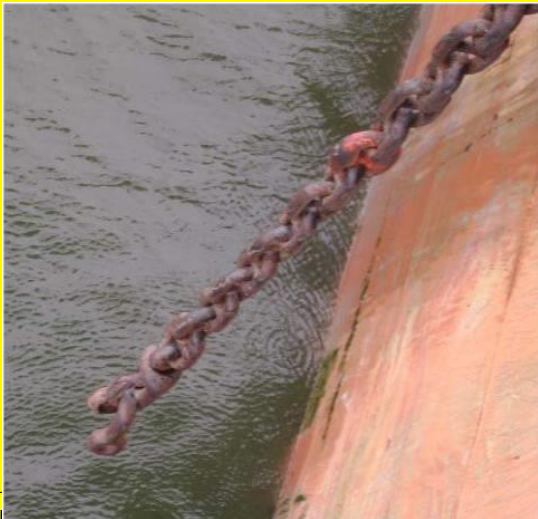
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Anchors aweigh,-or anchors away????

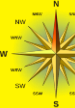




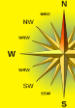


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ANCHORING



- Every second ship loses an anchor during its lifetime (Swedish Club P&I)

				
Windlass brakes etc	Breaking of chain etc	Un-specified	Heavy weather	Anchor-/chain tangled or stuck
38 %	20 %	15 %	15 %	12 %


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Almost lost it






Securing pin of bolt is missing.


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New shackle and lead plug

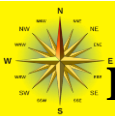
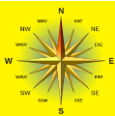


Anchor shackle as recovered







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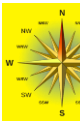
Large catch

- **Case 1:**
 - Claimed damages amounted to about SEK 9 million
- **Case 2:**
 - The damages paid by the Club were close to SEK 2,000,000





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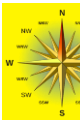
Anchor aware (NEPIA)

- **INTRODUCTION**

- A 30,000 GT bulk carrier was anchored off a South East Asian port awaiting a berthing slot. Upon receiving permission to proceed into port the vessel prepared to manoeuvre from its anchorage position toward the pilot boarding area.

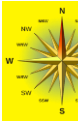
- **WHAT HAPPENED?**

- Upon receiving instruction from the bridge the anchor party, consisting of the chief officer and the bosun, started to raise the starboard anchor. As the anchor came up to two shackles in the water it appeared to be stuck fast on an obstruction and was unable to be heaved up further. The chief officer immediately reported this to the Master and ceased heaving.
- After discussions regarding the situation the decision was made to try and free the anchor by manoeuvring the vessel, walking back the anchor and then re-heaving. After a few such attempts it became increasingly clear that alternative arrangements would be needed to free the anchor.
- The Master decided that an inspection of the fouled anchor by divers was necessary. Arrangements for an underwater inspection were made and the vessel sat at anchor awaiting the divers.
- Soon afterwards an explosion off its Starboard bow threw a huge plume of water into the air and shook the vessel violently.
- On witnessing the explosion the Master made the decision to slip the fouled anchor and proceed to an alternative anchorage away from the immediate vicinity.
- The subsequent investigation found that the vessel (while performing its anchoring manoeuvre) had dragged its anchor across a newly constructed gas pipeline causing a rupture and the escape of a vast quantity of gas.



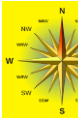
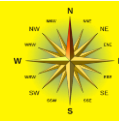
Damage undersea cable

- Internet and international telephone services have been disrupted in Sri Lanka after a ship's anchor is believed to have damaged an undersea cable connecting the island to the rest of the world.
- More than 800,000 Internet and phone users have had their services hit by the damage, according to Sri Lanka Telecom (SLT), after the cable was damaged at the weekend. The telco is now suing the vessel, the Indian-registered State of Nagaland for \$5m for damages. The ship is currently anchored outside Colombo Harbour.
 - Published Tuesday 24th August 2004 16:08 GMT



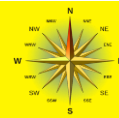
Lost anchor

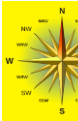
- **4,600-dwt Danish tank M/V Orahholm lost both anchors and anchor chains in stormy weather in the North Sea on its way from Gdansk to Rouen on Oct 27. It is unclear whether the salvage company will recover the lost anchor gear. [28-10-10]**



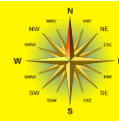
Lost Anchor ?

- **The starboard anchor was weighed and the vessel proceeded to berth. The starboard anchor was again used during berthing along with the mooring lines as per the port procedures, and six shackles were deployed in 25 metres of water. The next day, after discharging a parcel of cargo, the vessel was departing the port; the anchor was to be weighed after letting go the lines. As the starboard anchor broke the surface of the water the officer on duty informed the wheelhouse that the flukes and crown of the anchor were missing.**

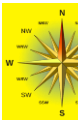




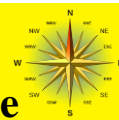
Lost anchor in bad weather

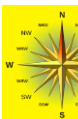


- A few hours after leaving port the weather conditions deteriorated and the Master reduced speed, taking all necessary precautions for navigation in bad weather. Some time later the weather improved and the Master had the crew check the forecastle for any damage and the lashing and anchor stowage. All was found in order. The same day, the chief officer went forward on safety rounds and both anchors were once again found in the proper stowage position and secured. Later that day the weather turned bad again until the late morning of the next day. At that time the starboard side anchor was found missing while the chain, including the swivel and the end link, was still onboard.

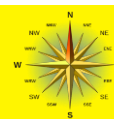


Vessel's anchor, fouled with a power cable

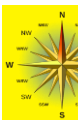




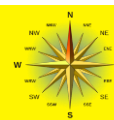
The Lessons



- 1. *Insufficient and inexperienced manpower had been allocated to the task of weighing anchor. It was unsafe for one seaman to operate the windlass, communicate with the bridge and observe the anchor cable. As a result, when the seaman looked overboard for the first time he assumed that the cable was fully home. In fact, it was probably leading under the bow and not visible because of the sheer.*
- 2. *The situation was made worse because the seaman, who was also the lookout, was also tasked to rig the pilot ladder alone. Specifically:*
 - *This was an unsafe practice which, had he fallen overboard, could have cost him his life.*
 - *The pilot ladder, and its associated equipment, was not checked by a responsible officer prior to the pilot boarding.*
 - *The approaching pilot vessel encouraged the seaman to rush so that he could rig the pilot ladder in sufficient time; this pressure might have influenced his report to the bridge that the anchor was secure.*
- 3. *Good seamanship dictates that the anchor cable should be clearly marked by paint and by turns of seizing wire secured around the relevant link adjacent to the joining shackle. Had this cable been more appropriately marked, anyone working it would have had a better chance of recognising that the anchor and cable could not be fully home. Furthermore, had the section of cable that passed over the windlass when the anchor was secure, been painted, the OOW might also have recognised that the anchor could not be home.*

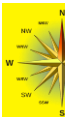


M/S Sigyn - Bryggan [choff.sigyn@gotlandsbolaget.se]

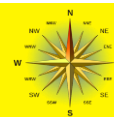


- Hej Per-Åke,
- Skolan har väl långa kättingar ute nu, när det blåser storm kring knutarna. Sigyn ligger väl förtöjd i Ringhals i solsken, stor skillnad i väder mellan öst och väst.
- Vi har med anledning av den olycka som idag hänt ställt oss frågan var man finner reglerna för hur långa ankarkättingar skall vara på olika fartygstyper. Har du detta i huvudet så kanske du kan ge oss ett tips var vi kan läsa det.

– MVH Lennart Ericsson



Sjöfartsverkets föreskrifter och allmänna råd om navigationssäkerhet och navigationsutrustning; SJÖFS 2003:5

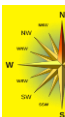


Förtöjnings- och ankringsutrustning

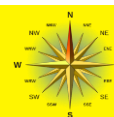
- 33 § Fartyg som har klass i ett klassificeringssällskap skall vara utrustade med ankare, ankarkätting och förtöjningsgods enligt det klassificeringssällskapets regler. Detsamma gäller för fartyg under 30 meter som använder ställina istället för ankarkätting.

Fartyg som inte har klass i ett klassificeringssällskap skall vara utrustade med ankare, ankarkätting och förtöjningsgods enligt ett godkänt klassificeringssällskaps regler. Detsamma gäller för fartyg under 30 meter som använder ställina istället för ankarkätting.

Är fartyget av sådan storlek att ett klassificeringssällskaps regler inte är tillämpliga skall fartyget vara utrustat enligt de krav som anges i ”Nordisk Båtstandard, Yrkesbåtar under 15 meter (NBS-Y)”.



Transportstyrelsens föreskrifter och allmänna råd om navigationssäkerhet och navigationsutrustning TSFS 2010:12



Förtöjnings- och ankringsutrustning

43 § Fartyg ska vara utrustade med förtöjnings- och ankringsutrustning.

Utrustningen ska minst uppfylla en erkänd organisations tillämpliga regler.

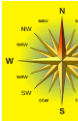
Fartyg utan mekanisk framdrivning ska vara utrustade med förtöjnings och ankringsutrustning enligt en erkänd organisations tillämpliga regler.

Om fartyget är av sådan storlek att en erkänd organisations regler inte är tillämpliga ska fartyget vara utrustat enligt de regler som fartyget är byggt efter.

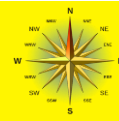
Fartyg som går i trafik enbart i fartområde E och D kan, i stället för ovanstående, tillämpa en erkänd organisations relevanta regler för höghastighetsfartyg eller lättdeplacementsfartyg. Ankringsutrustningen ska då vara försedd med broms för att kättingens eller linans längd ska kunna avpassas vid ankring. Ankaret ska enkelt kunna fällas av en person.

Allmänna råd

Riktlinjer för design och konstruktion av bogserings- och förtöjningsutrustning finns i IMO-cirkulär MSC/Circ.117578.



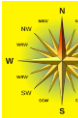
MSC/Circ.117524 May 2005



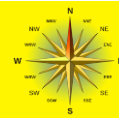
GUIDANCE ON SHIPBOARD TOWING AND MOORING EQUIPMENT

1 The Maritime Safety Committee, at its eightieth session (11 to 20 May 2005), following the recommendations made by the Sub-Committee on Ship Design and Equipment at its forty-eighth session, approved guidance concerning shipboard equipment, fittings and supporting hull structures associated with towing and mooring, as set out in the annex, with a view to ensuring a uniform approach towards the application of the provisions of SOLAS regulation II-1/3-8, which is expected to become effective on 1 January 2007.

2 Member Governments are invited to use the annexed guidance when applying SOLAS regulation II-1/3-8, and to bring it to the attention of all parties concerned.

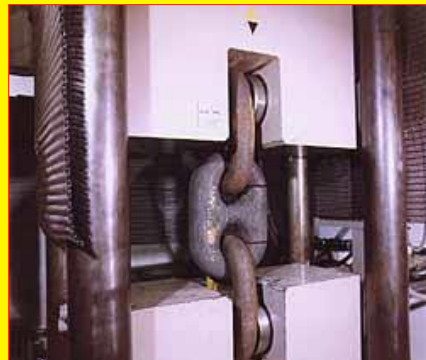


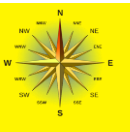
ANCHORING Equipment Number




- The Equipment Number will determine
 - # of anchors
 - Weight of anchor
 - Chain length
 - Diameter of chain
 - Breaking load


$$EN = \Delta^{2/3} + 2BH + 0,1A$$



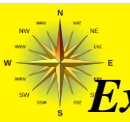


Equipment number		Stockless bow anchor	Stud link cables for bow anchor			Breaking load (kN)	Weight per 27,5 meters (kg)
Exceeding	Not Exceeding	Number	Mass of anchor (kg)	Total length (meters)	Diameter (mm)		
720	780	3	2280	467,5	36	1050	790
780	840	3	2460	467,5	38	1160	880
840	910	3	2640	467,5	40	1280	970
910	980	3	2850	495	42	1400	1070
980	1060	3	3060	495	44	1540	1170
1060	1140	3	3300	495	46	1680	1270
1140	1220	3	3540	522,5	46	1880	1270
1220	1300	3	3780	522,5	48	1810	1380
1300	1390	3	4050	522,5	50	1960	1480
1390	1480	3	4320	550	50	1960	1480
1480	1570	3	4590	550	52	2110	1600
1570	1670	3	4890	550	54	2270	1720
1670	1790	3	5250	577,5	56	2430	1850
1790	1930	3	5610	577,5	58	2600	1990
1930	2080	3	6000	577,5	60	2770	2120
2080	2230	3	6450	605	62	2940	2250
2230	2380	3	6900	605	64	3130	2440
2380	2530	3	7350	605	66	3300	2590
2530	2700	3	7800	632,5	68	3500	2750
2700	2870	3	8300	632,5	70	3690	2910
2870	3040	3	8700	632,5	73	3990	3180
3040	3210	3	9300	660	76	4300	3470
3210	3400	3	9900	660	78	4500	3650
3400	3600	3	10500	660	78	4500	3650
3600	3800	3	11100	687,5	81	4820	3930
3800	4000	3	11700	687,5	84	5160	4250
4000	4200	3	12300	687,5	87	5500	4560
4200	4400	3	12900	715	87	5500	4560
4400	4600	3	13500	715	90	5840	4860
4600	4800	3	14100	715	92	6080	5100
4800	5000	3	14700	742,5	95	6440	5400
5000	5200	3	15400	742,5	97	6690	5670
5200	5500	3	16100	742,5	97	6690	5670
5500	5800	3	16900	742,5	100	7060	6010
5800	6100	3	17800	742,5	102	7320	6250
6100	6500	3	18800	742,5	107	7960	6820
6500	6900	3	20000	770	111	8480	7290
6900	7400	3	21500	770	114	8890	7640
7400	7900	3	23000	770	117	9300	7980
7900	8400	3	24500	770	122	9990	8620
8400	8900	3	26000	770	127	10710	9380
8900	9400	3	27500	770	132	11420	10140




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Example EN

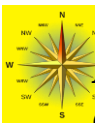
- EN = 3000 motsvarar ett ca 200 m långt containerfartyg
- EN = 3500 motsvarar ett tankfartyg med displacement på ca 80.000 ton ca 220 m långt (65.000DWT)
- EN = 8300 motsvarar ett tankfartyg om ca 300.000 DWT



EN		Antal	Vikt kg	Längd m	Dia mm	Brottgräns kN	Vikt 27,5m
2870	3040	3	8700	632,5 (23)	73	3990	3180
3400	3600	3	10500	660 (24)	78	4500	3650
7900	8400	3	24500	770 (28)	122	9990	8620

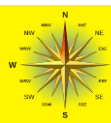
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ANCHORING

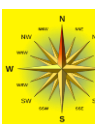
Class rules (IACS)



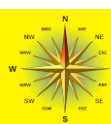
- **A1.1 Design of the anchoring equipment**
- **A1.1.1** The anchoring equipment required herewith is intended for temporary mooring of a vessel **within a harbour or sheltered area** when the vessel is awaiting berth, tide, etc.
- **A1.1.2** The equipment is therefore **not designed to hold a ship off fully exposed coasts in rough weather or to stop a ship which is moving or drifting**. In this condition the loads on the anchoring equipment increase to such a degree that its components may be damaged or lost owing to the high energy forces generated, particularly in large ships.
- **A1.1.4** The Equipment Numeral (EN) formula for required anchoring equipment is based on an assumed current speed of **2,5 m/s**, **wind speed of 25 m/s** and a scope of chain cable between **6 and 10**, the scope being the ratio between length of chain paid out and water depth.

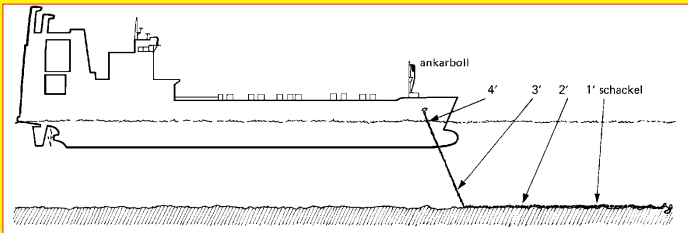


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Length of chain

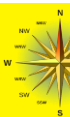




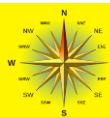
- **Factors to consider when determining length of chain**
 - Depth of water
 - Time at anchor
 - Bottom
 - Exposure- shelter
 - Current - tide
 - Weather, vind
 - Ice



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ANCHORING length of chain



▲ Rule of thumbs

▲ 3 x water depth (old types)

Modern anchors

▲ 4 x water depth (Seamanship notes)

▲ 5-7 x water depth (Modern Seamanship)


▲ 6-10 x water depth (Class)

$$\sqrt{d} = n$$

$d = \text{waterdepth (m)}$

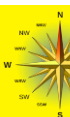
$n = \text{shackle}$

Recommended scope of chain from classification					
Water-depth	Good holding		Bad holding		Scope of chain Rule of thumb
	Kättinglängd min i m	Klass	Kättinglängd max i m	Klass	Schacklar
9	54	2	90	3	3
16	96	3	160	6	4
25	150	5	250	9	5
36	216	8	360	13	6

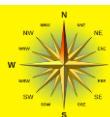


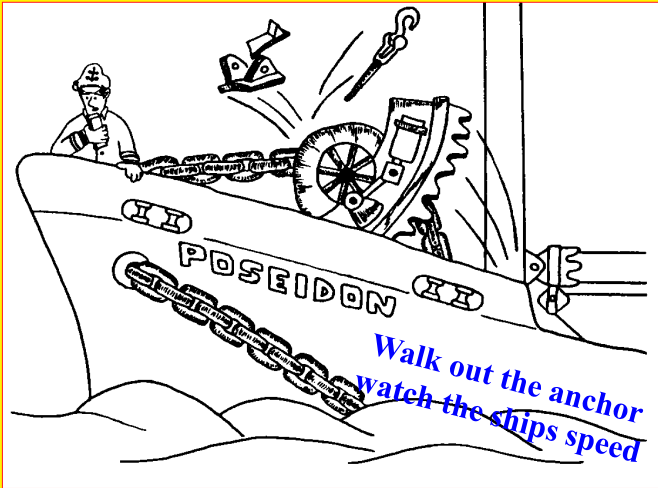
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ANCHORING Check force, speed

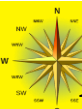






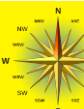
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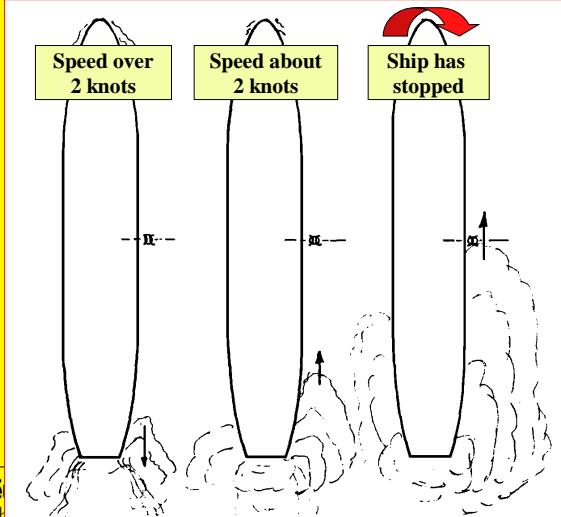
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ANCHORING MANOEUVRES

A way to estimate speed







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ANCHORING

Check before







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<http://www.youtube.com/watch?v=y3WveEZYkJ8&feature=related>

<http://www.youtube.com/watch?v=RAcfaMDcY68&feature=related>

ANCHORING MANOEUVRES

	Shale/Sand	Rock with Layer of Mud & sand	Blue Clay
AC 14	8 x weight	2,4 x weight	10 x weight
Stockless	3,5 x weight	1,8 x weight	3-4 x weight

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ANCHORING Holding Power

(a) ANCHOR DRAGGING ON HARD SEAFLOOR WITH FLUKE TIPS UNABLE TO BITE IN.

(b) ANCHOR STANDING UP ON HARD SEAFLOOR AFTER TIPS HAVE BITTEN IN, FLUKES UNABLE TO PENETRATE.

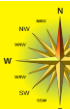
(c) ANCHOR STANDING UP BUT TIPPING TO SIDE AND DRAGGING.

At 5 degrees, holding power reduced by approximately 25%

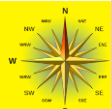
At 15 degrees, holding power reduced by approximately 50%

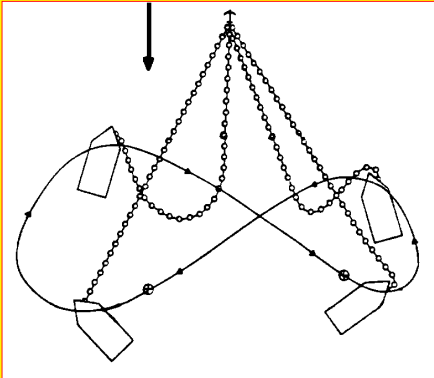
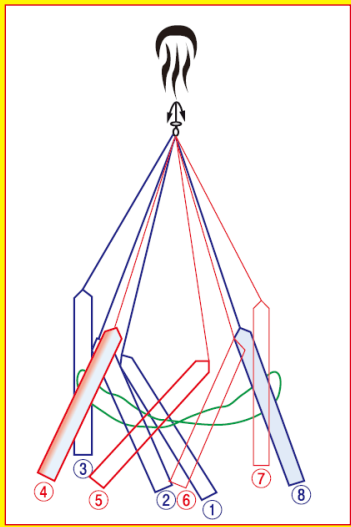
Practical test AC-14					
Angle (lägg-botten)	0°	5°	10°	15°	20°
Holding power	6,8	5,7	4,5	3,4	3,0
Loss of power	--	16%	34%	50%	56%


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Anchor holding





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Full City- dragged anchor in bad weather





- Bulk vessel in ballast.
- 1100 tons HF oil onboard.
- Bad weather at night time, dragged starboard anchor (6,5 tons) and grounded.
- 250 tons HF oil lost, polluting 37 protected areas of 120 km coastline.
- Captain sentenced to 6 months in jail, 3.mate to 60 days.
- Starboard anchor flukes broke off.
- Anchoring equipment is subject to investigation. No report yet



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***Selendang Ayu* drifting with port anchor chain wrapped tightly around the stem.**



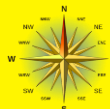



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***Selendang Ayu* off shore of Unalaska Island. Both anchor chains are out and deck lights are visibly illuminated, showing that ship's generators are still producing power.**






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Selendang Ayu







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ANCHORING Don't Wait and See

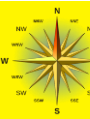


- Claims from ships dragging anchor, or being blown off a berth occur with an alarming frequency.
- The circumstances are always very similar – weather reports and barometer changes warn of an approaching storm. The master decides to monitor the situation – how bad will it be? And when the storm arrives, it is worse than he expects. The ship either drags anchor or is blown off the berth. In every case, it was clear that if the ship had proceeded to sea just six hours before the storm arrived, then the subsequent large claim would have been avoided.
- There is no logical explanation as to why the ships stayed at anchor, or in port, when those on board knew that it would be safer to set to sea. The master waits to see how severe the storm will be, but by the time he finds out, it is too late. To leave port because of approaching bad weather is not always easy, but there is no reason why a ship's anchor should not be hauled in and the ship sailed safely offshore. It is important to remember that safety should never be compromised by commercial considerations or by lethargy.
 - *Marine Matters 13, july 2001, The Standard P&I Club.*



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ANCHORING MANOEUVRES

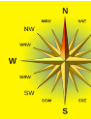
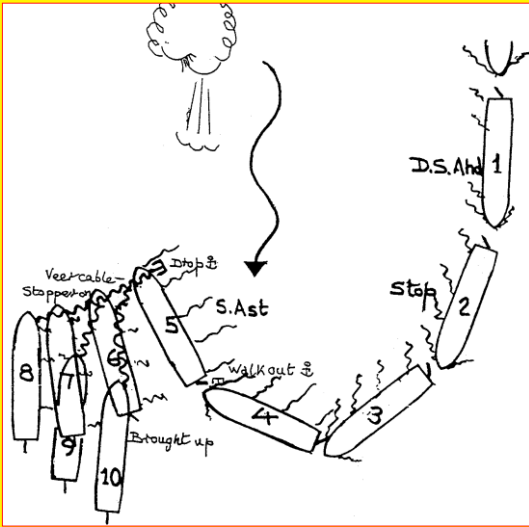

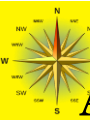



Diagram illustrating anchoring manoeuvres. The ship's path is shown with numbered steps (1-10) and labels: D.S. Ahl 1, Stop 2, S. Ast, Walkout 3, Brought up, 4, 5, 6, 7, 8, 9, 10. The diagram also shows the ship's position relative to the anchor and the anchor's position relative to the ship.



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ANCHORING MANOEUVRES

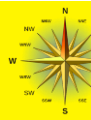

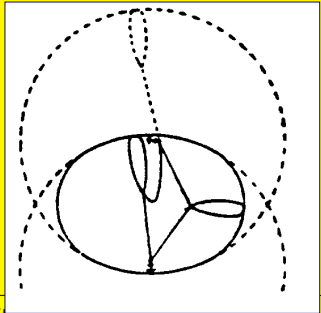

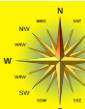




Diagram illustrating anchoring manoeuvres. The ship's path is shown with numbered steps (1-10) and labels: D.S. Ahl 1, Stop 2, S. Ast, Walkout 3, Brought up, 4, 5, 6, 7, 8, 9, 10. The diagram also shows the ship's position relative to the anchor and the anchor's position relative to the ship.

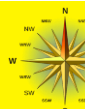


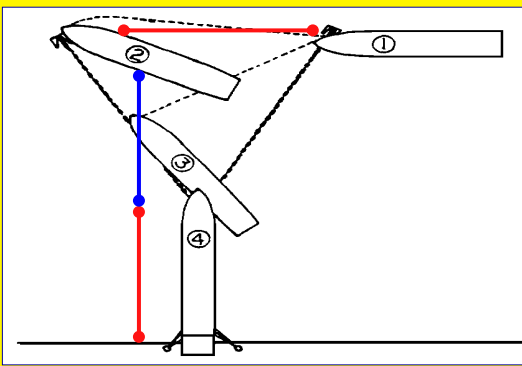
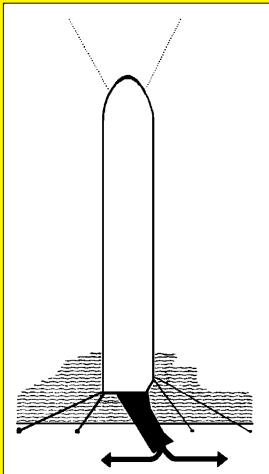
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ANCHORING MANOEUVRES





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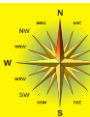
Mediterranean mooring



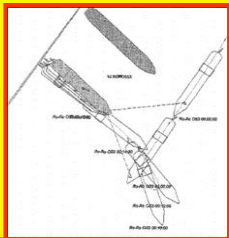








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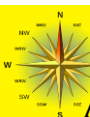
Mediterranean mooring Simulator and manned model

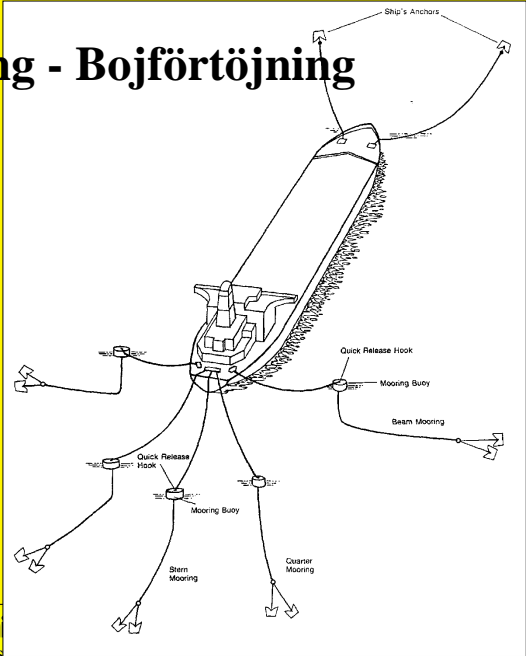



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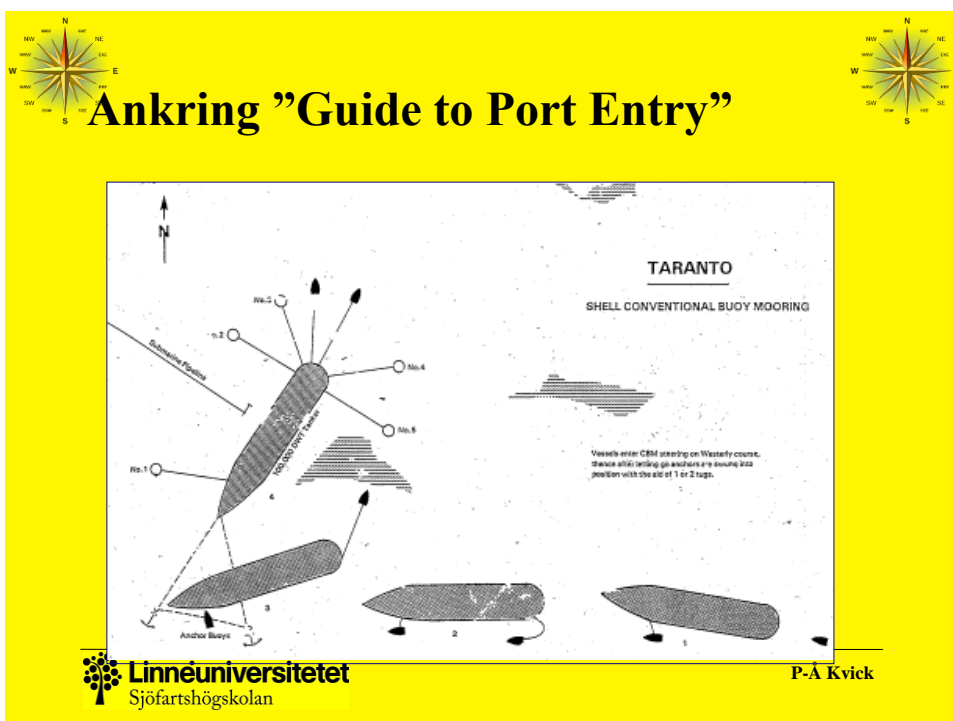
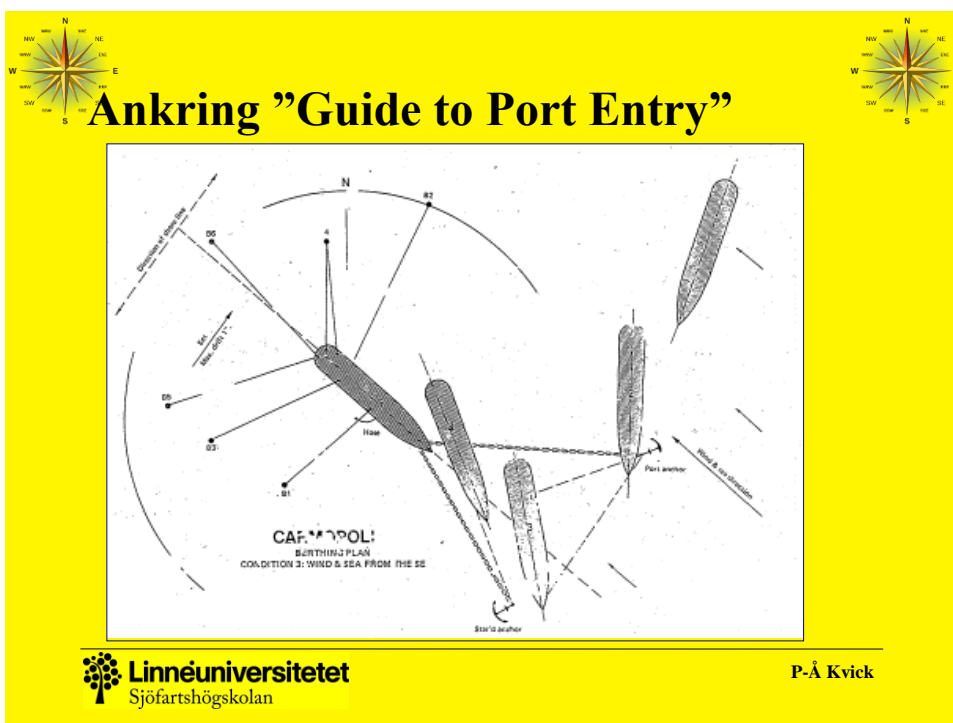
Ankring - Bojförötjning

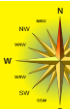




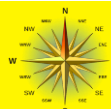
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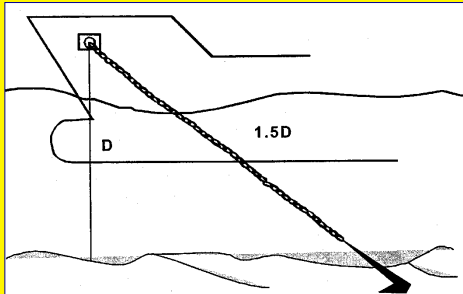
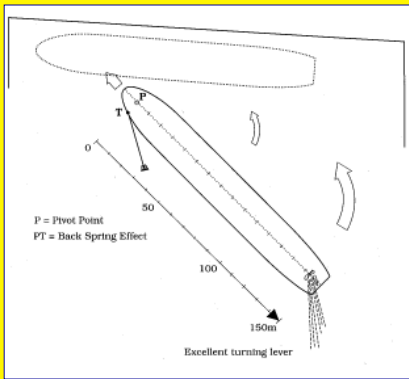
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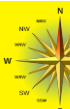
ANCHORING MANOEUVRES



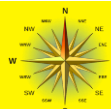



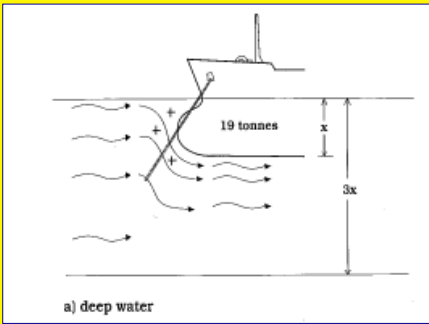
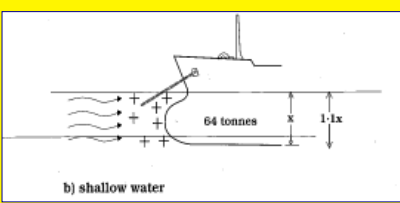



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From Shiphandler's Guide





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Trouble







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Besiktning av ankare vart 5:e år



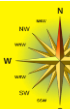




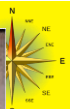
- Dry docking the opportunity for a thorough inspection.
- Are yard workers competent?
- Is the superintendent alert?
- Is the class surveyor competent and alert?
- Ship crew competent?

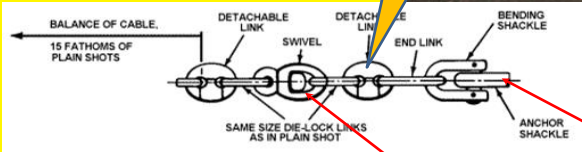


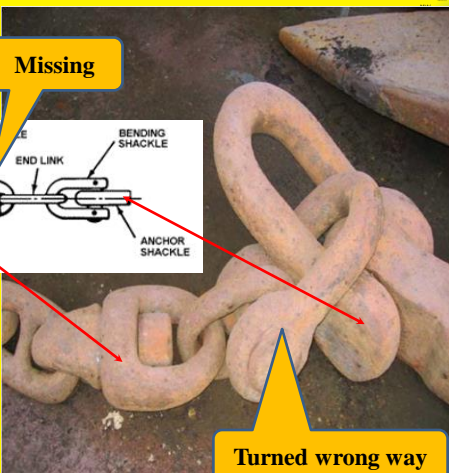
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Saknas länkar

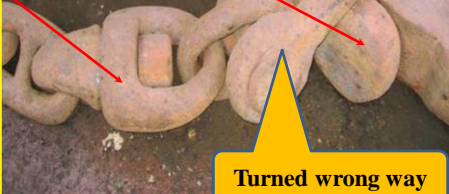







Missing






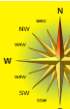
Turned wrong way



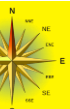
Är detta korrekt?




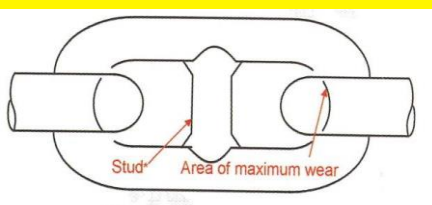
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Ankarkätting






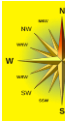




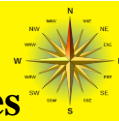




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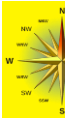


Most common problem of windlass brakes

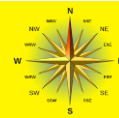


- The brakes are not adjusted, when brake lining becomes worn!
- **Crew members do not read instruction manual for maintenance!**
- When the lining is worn down, the circumference of the brake band becomes too large and needs tightening in. That is done at a tightening device at the lower part of the brake band assembly.
- **IF THE BAND HAS NOT BEEN ADJUSTED, ONE WILL NOT OBTAIN MAXIMUM BRAKING POWER BY TIGHTENING THE HAND WHEEL, AND HE MAY LOOSE CONTROL OF THE ANCHOR AND CHAIN DURING DROPPING.**
- Service department of manufacturer informs that this is most frequent problem of anchor windlass.
- The brake must be able to hold 45% of breaking strength of chain.

<http://www.youtube.com/watch?v=RAcfaMDcY68&feature=related>



Chain stoppers



- Strong chain stoppers are installed between windlass and hawse pipe to absorb the pull of the chain. Chain stoppers normally have a roller for the running of the chain and a solid steel guillotine bar or pawl to place across the chain to stop it from running out. Stoppers must have a minimum holding force of 80% of breaking strength of anchor chain.
- **Problem:**
- Guillotine bar hinge pin may be heavily wasted allowing movements of bar. The securing pin of the bar is often missing.
- Guillotine bar is not always possible to fit between two vertical chain links, across the horizontal one, when anchor is stowed.
- If bar cannot be placed across the anchor chain, efficiency of windlass brake is essential, as well as solidity of cable tensioners of various types (devil's claw, wire and turnbuckles, etc).



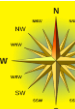
Anchor windlasses and chain stoppers



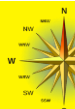





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Chain stopper pawl type

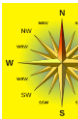




- The pawl does not fit the chain and will not lock the chain from being pulled out.
- When at anchor, this vessel will depend on windlass brake alone.
- The pawl is designed for 80 % of breaking strength of chain, the brake band only for 45 %.

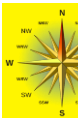
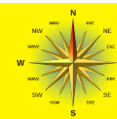


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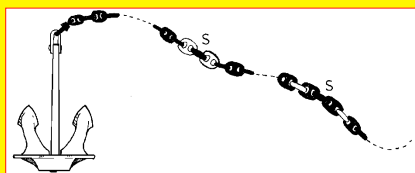


Marking of chain lengths of 15 fathoms(27,5m)

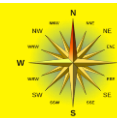
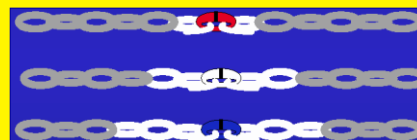
- Kenter shackles are marked red.
- Stud links next to kenter shackles are painted white.
- 3 white links on either side for the third length of chain, 4 for the fourth and so on. Studs may also be marked by thin wire.
- Need to know how much chain is out.
- Some vessels have cable indicators.

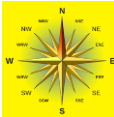


Color Codes

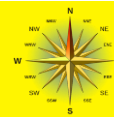


- ✓ 3rd shot: W/W/W/B/W/W/W
- ✓ Second to last shot: entirely yellow
- ✓ Last shot: entirely red

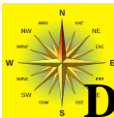




Förtöjningsgods (ABS)



<i>EN</i>	<i>Antal</i>	<i>Längd m</i>	<i>Brottgräns kN</i>
3040	6	200	520,0
3600	6	200	618,0
8400	12	200	736,0



Don't make fast on truck

