

Theoretical training for the use of tugboat assistance includes the following

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Appendix 2 in The Swedish Transport Agency's pilotage regulation (TSFS 2017:88) on pilotage, module C8 (a part in the practical examination for pilot exemption certificate (PEC))*

**This is a translation from the pilotage regulations TSFS 2017:88. The legal form is always the printed regulation issued in Swedish.*

Module C8, assistance of tugboats (if part of the PEC)

The applicant should have knowledge regarding:

- Available tugboats within the area, assistance methods that can be used along with their possibilities and limitations.
- How to use the tugboat to obtain the desired effect irrespectively of the influence of wind, current and ice.
- The performance of your own ship when using different methods of tugboat assistance.
- Different ways to connect the tugboat to the vessel.
- How to cooperation and have a proper communication (including recognized language) between ship and tugboat.

In order to use a tug boat with a PEC, the applicant shall perform an approved practical examination during assistance of a tug (according to module C8). The Swedish Transport Agency can make an alternative decision in certain cases. Theoretical questions for assistance of a tug may also be a part in the examinations process.

Contact the Swedish Transport Agency if you need more information regarding the regulations for supplement with tug to PEC:

<https://www.transportstyrelsen.se/>

Phone: +46 771-503 503

e-mail: pec@transportstyrelsen.se

1. The Tugboat service within the Port of Stockholm is supplied by Marin- & Haverikonsult KA AB

Marin- & Haverikonsult KA AB operates various designs of tugboats. Our fleet consists of two tractor tugs with a BP of 30-45 tonnes, mainly used for harbour towing operations. And four conventional tugs with a BB of 7-25 tonnes which if required can be used for harbour towage. One of the Tractor tugs is constantly on 24h duty for the Port of Stockholm, with a minimum response time of 5h from we get a call until we shall be onboard. The tugboats are based in Svindersvik, Nacka and have a transit time of app 30 min to reach the keys within Stockholm harbour area and 4,5h to reach Kapellskär.

2. Contact details

24h duty phone:	+46 70-999 71 66
E-mail address:	info@tug.se
VHF Ch:	69

3. Ordering procedures

All orders and changes of orders shall be made by e-mail and a telephone confirmation.

1. Send an order by email to info@tug.se
2. Call the duty phone +4670 999 71 66 to confirm the order.

For further details regarding prices, ordering hours etc. please see our webpage www.tug.se

3. Available tugboats and their limits

Tractor Tugs

B/B Montfred

- 45mt bollard pull
- 2x Bergendiesel tot 3600 BHP
- Draught 5,4 m – Length 27,0m – Beam 9,70m
- Deck winch with 130 m, 153mt BL towline
- Tow-hook with 30m, 120mt fixed towline as backup
- Maximum safe connection speed bow 3-5 knots
- Maximum safe connection speed stern 3-5knots
- Maximum safe connection speed abeam 3-5knots



B/B Tug

- 30mt bollard pull
- 4x Scania tot 2000 BHP
- Draught 4,8 m – Length 26,05m – 8,88m
- Tow-hook with 35 or 40m, app 97mt BL, fixed towline
- Maximum safe connection speed bow 3-5 knots
- Maximum safe connection speed stern 3-5knots
- Maximum safe connection speed abeam 3-5knots



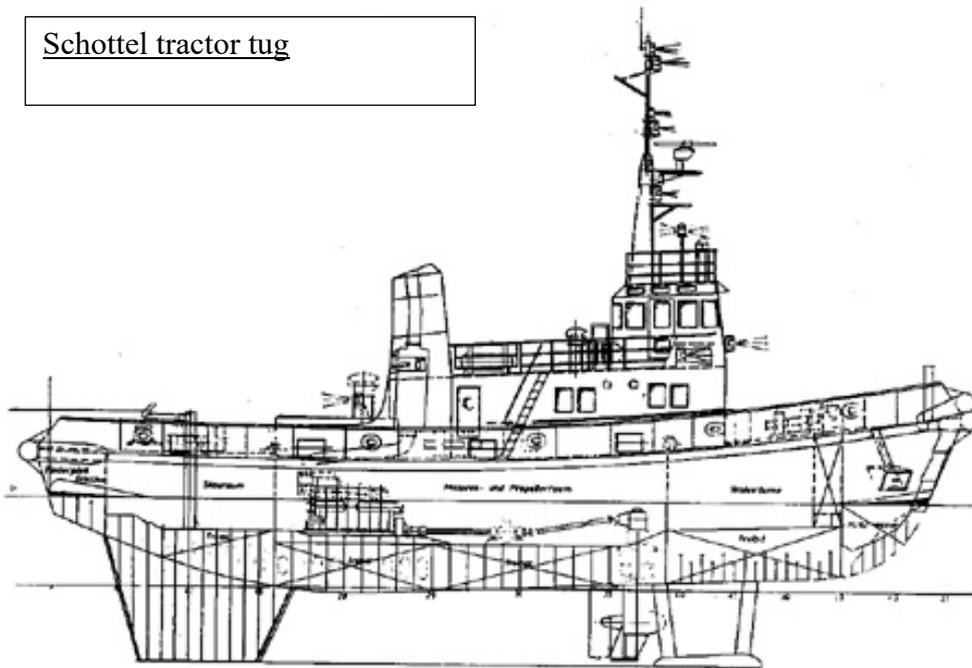
- **Pros**

- Tractor tugs are designed with 2 Schottel-nozzles (azimuth's) located forward of L/2 and a skeg aft.
- The skeg in the aft and the nozzles gives the tug very good manoeuvring capability making it very effective during harbour- as well as escort operations.
- Can be connected at most places on the vessel.
- The stern and/or bow area is heavily fendered, designed for push/pull operations.
- Have great puch capacity in any direction.
- MAXIMUM safe connection speed 3-5 knots depending on situation.
- Safer than conventional tugs as far as risk for gritting (being pulled over).

- **Cons**

- If pushing or pulling simultaneously as an object is moving, full power will not be available if not in the opposite direction of which the object (vessel) is moving.
- Draught 5,4m
- Interaction between vessels reducing pull effect especially connected to the side of deep draught vessels.

Schottel tractor tug



Conventional tugboats

Victoria

- 25 mt bollard pull
- 1 x Nohab Polar 212V-D825 16 cy diesel, 1940 kW
- Draught 4,9 m – Length 27,2 m – Width 9,5 m
- Tow hook with fixed towline, BL 90mt
- Maximum safe connection speed bow 3-5 knots
- Maximum safe connection speed stern 3-5 knots
- Maximum safe connection speed abeam 3-5 knots



Leif

- 10 mt bollard pull
- 2 x Scania tot 700 BHP
- Draught 3,4 m – Length 22m – width 6,2m
- Tow-hook with 40m, app 30mt BL, fixed towline
- Maximum safe connection speed bow 3-5 knots
- Maximum safe connection speed stern 3-5 knots
- Maximum safe connection speed abeam 3-5knots



Tom

- 7 mt bollard pull
- 1 x Hyundai L-13-600 tot 600 BHP
- Draught 2,8 m – Length 16,8m – width 5,64m
- Tow-hook with 40m, app 30mt BL, fixed towline
- Ice breaking capacity (hull and propeller)
- Maximum safe connection speed bow 3-5 knots
- Maximum safe connection speed stern 3-5knots
- Maximum safe connection speed abeam 3-5knots



Working Limits for conventional tugs

- When connected and pulled astern the maximum safe speed is less than 2 knots preferable under 1,5knots.
- Have a limited workarea for example from 10-2 during towing operations.
- Likely to grift (be pulled over) when connected, going astern over 2 knots or during other situation resulting that the tow line direction is abeam.
- Requires an adequate and complete correspondence between pilot and Tug boat captain.
- Conventional Tugs require more time between various orders for example if a conventional Tug is to alter from a pushing to at pulling position this manoeuvre can take
- Pushing is preferable if possible.

4. Assistance methods

- Not connected tug
 - Best alternative if pushing only is required and if there is enough space for the tugboat to manoeuvre throughout the operation.
 - 100% power, minimum interaction between tugboat and vessel assisted.
 - No risk for snapping and breaking of towlines resulting in injury to personnel and or lines tangled in propellers etc.

- Bow connected tug
 - Tug can control the bow when a vessel is moving astern or ahead at speed less than 4 knots.
 - The most critical place to connect a tug, speed shall not exceed 5 knots during connection. The tug is exposed to the forces of the bow wave simultaneously as flat water. Worst case scenario is if the tug can't maintain its position and get run down. It is therefore vital during the connection of the tug that no course nor speed alterations is made.
 - When disconnecting a tug from the bow it is important that the deck crew let go of the towline quickly in order for the tug to get away from the risk zone, the crew can drop the towline in the water.

- Shoulder connected tug
 - Tug can both push and pull be used as a spring to turn around and help the vessel to reduce the speed called "Yankee-connection".
 - Interaction between vessel is present and worst case scenario is vessel bang in to each other side to side.

- Stern connected tug
 - The tug can control and/or reduce the speed, movement of the stern and stop the vessel
 - Interaction from the vessels propeller especially during connection, speed under 5 knots creates less effect on the tug and a safer connection

- Quarter connected tug
 - Tug can both push and pull (depending of the vessel's lay out)
 - The tug is affected by the interaction and a risk of being pulled towards the quarter is present if connected on the forward part of the quarter

5. Manoeuvres from a tugboat and their result

- A tug connected on the bow above 4 knots ahead is useless for handling the movement of the bow but if the vessel is going astern the bow connected tug has a great control of the bow if the weather circumstances not are exceeding the tugs limits. Same is applicable on a stern tug when going astern. The reason for this is the pivot point. The effect of the tug is lower working ahead or close to the pivot point.
- A tugboat working with a short towline, especially on a deep draught vessel in shallow water will have significant reduced pull effect. In such events it is more convenient to move the tug to a pushing position.
- It is obvious that when a tug has to move sideways rather than longitudinally the resistance created by her hull being dragged sideways through the water will increase substantially and she will need to use more of her available propulsion power for this motion, leaving less pull available for the assisted vessel. Apart from that, being dragged sideways is generally a very dangerous situation for any tug not equipped with a dynamically rotating towing point that shifts the tow load to the side of the tug under sideways pull, like for instance a DOT-system or a Carrousel Towing System.
(Guidelines For Safe Harbour Towage Operations, 1st Edition - February 2015)

6. Standard routines when connecting/disconnecting a tugboat

- **Connection of tug**

- Ship informs the tugboat of what the plan is and if there are any specific difficulties expected, deficiencies and SWL for the bollard to be used.
- Tug master order a suitable connection speed.
- Tugboat approaches the vessel.
- Deck crew send down messenger line to tugboat.
- Messenger line is connected to towline and hoisted up by the vessels crew and secured on an adequate bollard.
- Vessels deck crew gives the signal (crossed arms) to the tug that they are connected and the tug reports, connected to the vessels bridge.
- Tugboat is standby until further notice.

- **Disconnection of tug**

- Master of vessel informs the tug that they want to disconnect.
- Tug moves in position to be disconnected.
- When the towline is slack the deck crew disconnects it and gives the sign to the tug that it is ok to recover the towline. If the tug is connected in the bow the deck crew shall just let go of the line. If the tug is connected in the stern the line should be lowered so it doesn't end up in any of the tugs propellers
- When the towline is free from the vessel the Captain of the tug reports disconnected to the vessel Captain.

7. Standard communication between tugboat and assisted vessel including standard phrases

- **When connected**

- Positioning of tugboat is given by the clock method where 12 o'clock is straight ahead, 3 and 9 is abeam and 6 o'clock is astern.
- Power setting is always ordered in percent (0-100%).

- **If not connected**

- If the tug is ordered to a specific position (we will position our self in a place which is suitable on e.g. the bow, port quarter, L/2, under No1 lifeboat etc.
- Power setting is always ordered in percent (0-100%).

8. Effect of wind and current

The effect of wind and current must always be evaluated before each operation. We like to use the wind calculating formula to get a grip of how large the forces working against us in a worst case scenario could be.

- Example 180 x 30m ro-ro vessel approximately 10m freeboard and 15 m superstructure. Calculation $F_v = ((0,5 \times 1,2 \times v^2 \times A) / 9,81)$ for winds blowing from abeam 90°
 - 5 m/s → P = 4,8 MT distributed over the entire side of the vessel
 - 10 m/s → P = 19,3 MT
 - 15 m/s → P = 43,3 MT
 - 20 m/s → P = 77 MT
 - 25 m/s → P = 120,4 MT
 - 30 m/s → P = 173,4 MT
- When the ship alters its course the wind force on the ships body changes according to the following simplified formula. $F_v(\text{vinkel}) = K(lh \cos \alpha + bh \sin \alpha)$
 - 10 m/s 45° → P = 15,59 MT - 10 m/s 70° → 9,18 - 10 m/s 80° → 6,05 MT
 - 20 m/s 20° → $F_v = 76,1 \text{ MT}$ - 20 m/s 70° → 36,6 - 20 m/s 80° → 24 MT

1. Risk of interaction between vessels

Interaction is constant but the impact of the interaction stands in direct correlation to the speed of the vessels.

- Less speed → Less interaction
- More speed → More interaction

9. Limits and restrictions for tugboat assistance within the Port of Stockholm

Bogserbåtskrav: Stockholm & Kapellskär

För lotsade fartyg:

Värtan 503			Värtan 521-524		
Längd	Ank	Avg	Längd	Ank	Avg
100-140 m	1	1	100-140 m	1	1
140-200 m	2	2	140-200 m	2	2
200 m -	3	2	200 m -	3	2
Värtan 505-506 & Loudden 705-706 4)			Värtan 511 OBS - Inget undantag för fartyg > 140m med 2 prop/1 roder oavsett vändning!		
Längd	Ank	Avg	Längd	Ank	Avg
100-140 m	1	1	100-140 m	1	1
140-200 m	2	2	140 m -	2	2
Stadsgården 156-167			Loudden 701-704 5) och 707-710		
Längd	Ank	Avg	Längd	Ank	Avg
100-140 m	1	1	80-125 m	1	1
140-200 m 1)	2	2	125-200 m	2	2
200 m -	2	2			

Frihamnen 2) Om fartyg på F638 alltid 1 B/B om ftg > 140m! Om 2 B/B F632-634 - Inga fartyg på F655			Nybrokajen		
Längd	Ank	Avg	Längd	Ank	Avg
100-140 m	1	1	> 90 m	1	1
140-200 m 1)	2	2			
200 m -	2	2			
Hammarbyhamnen 3)			Bergs 4)		
Längd	Ank	Avg	Längd	Ank	Avg
> 100 m	1	1	100-140 m	1	1
Special	xx		140-200 m	2	2
Kapellskär			Skeppsbron		
Längd	Ank	Avg	Längd	Längd	Längd
100-140 m	1	1	100-140 m	1	2
140 m -	2	2	140 m -	2	2

Stockholms ström

Se sidan: [Boj-Boj/Ankring Stockholms ström](#)

Generellt:

Med längd avses Längd Över Allt (LOA)

Gäller vid medelvind max 10 m/s.

Fartyg över 25 000 dwt ska alltid assisteras av minst 1 bogserbåt vid ankomst

För fartyg längre än 140 m krävs en bogserbåt (ASD, Tractor) med minsta dragkraft 20 ton.

Fartyg utrustat med fast propeller över 125m skall alltid assisteras av minst en bogserbåt

Avsteg enligt nedan förutsätter att all manöverutrustning i övrigt fungerar

Allmänna avsteg från tabell:

Fungerande kraftfull bogpropeller ersätter en bogserbåt.
Fungerande kraftfull tvärpropeller akter ersätter i förekommande fall en bogserbåt.
Fungerande aktivt roder ersätter en bogserbåt. Aktivt roder är Becker-, Schilling- eller liknande högeffektsroder
Fungerande dubbla propellrar med dubbla roder ersätter en bogserbåt.
Fungerande azipod ersätter en bogserbåt.

Särskild avsteg från tabell:

För fartyg >140m utrustade med två propellrar och ett roder:

Avdrag med en bogserbåt om fartyget ankommer eller avgår utan att vända.

För fartyg till/från Frihamnen 650-655:

Om fartyg bredare än 32,5m på F638(utanför 550) eller fartyg bredare än 20m mellan 375-550 **skall** fartyg >140m eller fartyg utrustat med högergångad cp propeller >125m alltid assisteras av minst en bogserbåt.

Ovan gäller under kryssningssäsongen vid övrig tid konsulterar hamnen lotsarna.

Eventuella dispenser från bogserbåtsrestriktionerna gäller ej.

För fartyg till/från Hammarbyhamnen och kanalen:

Fartyg längre än 70m oavsett manöverutrustning skall alltid assisteras av en bogserbåt om fartyget har för avsikt att förflytta sig akteröver i kanalen.

Enstaka dispenser för avgångar kan ges av lots efter en utvärdering av fartyget efter ankomst.

Dessa dispenser gäller endast för en avgång.

En NR medlem eller CLO ska kontaktas innan dispens ges.

Kajer som är aktuella för enstaka dispenser är:

Loudden 705-706/ Värtan 505-506 stäven utåt.

Bergs oavsett sida till kaj.

Loudden 701-703: För fartyg som inte kan tillgodose avdrag av bogserbåt helt eller delvis är max djupgående 6,2m.

Om bogserbåt är av typ ASD, Tractor med minsta dragkraft 20 ton gäller vanliga tabellen.

För Beckholmsdockorna: Kontakta sjötrafikområdet angående bogserbåtsrestriktioner, minst 24h innanankomst.

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Theoretical training for the use of tugboat assistance.



Källa: Beslut av sjötrafikområdeschefen

10. Possible situations/scenarios when tug assistance is to be aborted

- If the tugboat master evaluates the situation to be out of control where the safety for his vessel and crew is at risk. Information will be given to the master of the assisted vessel and the operation will be cancelled. The tugboat has a quick release on its tow gear which will be released in the worst case scenario.

11. General recommendations

- If a tug is to be connected, we recommend that it should be done in the fairway before the vessel enter the harbour basin. Speed reduction is only necessary during tug-connection and can normally be resumed when the tug is fast (after approval from tug Master).
- When a tug is connected speed or course alterations must clearly be communicated to the tug in advance.

12. “DO NOT” AND “DO” IN HARBOUR TOWAGE OPERATIONS

(Guidelines For Safe Harbour Towage Operations, 1st Edition - February 2015)

DO NOT Actions of Pilot, ship’s Master and mooring parties

Do not send the crew to the mooring stations (too) late

Do not maintain the speed of the vessel too high whilst securing tugs.

Do not use DANGEROUSLY HEAVILY WEIGHTED HEAVING LINES.

Do not execute course changes whilst the tugs are securing their towlines.

Do not use tug Master’s name when communicating orders to the tugs.

Do not engage the vessel’s engine/s during manoeuvres without first informing the respective Tug Masters

Do not throw the heaving line (at the bow) from the centre line but from the ship’s shoulder

Do not make rapid and excessive steering changes without informing the tugs.

Do not build up speed in excess of 6 knots through the water with the bow tug (still) connected

Do not use full engine power particularly on a large vessel when a tug is secured aft.

Do not keep floodlights shining into the tug master’s eyes; this will impair his night vision and will seriously hamper his ability to estimate distances and to assess the operations.

Do not keep floodlights shining towards the tug in case of restricted visibility.

Do not make headway on own power in very dense fog with a bow tug secured without prior agreement between tug and pilot. Consider letting the tug(s) tow the vessel rather than using the vessel’s propulsive power.

Do not build up speed over 6 knots through the water starting from a “dead ship” with a bow tug secured

Do not drop the towline at the stern when disconnecting the tug (unless instructed otherwise by the tug.)

Do not delay to drop the towline at the bow when disconnecting the tug once instructed to do so by the tug.

Do not wait for something to happen to start preparing the heaving line(s) again.

DO Pilot - Master exchange of information or vice versa

- Pilot-Master exchange to include info on modus operandi of tugs
 - Tug name(s), type, bollard pull and position for securing
 - Whether tug lines or ship's lines will be used
 - Normal heaving line or heavy messenger line
 - Position for passing heaving line forward (bow / shoulder).
- First make fast the stern tug then the bow tug.
- First let go the bow tug, then the stern tug.
- Pilot to instruct vessel's Master to have his crew at mooring stations in ample time, agree on period of notice needed by ship's crew.
- At night, Pilot to instruct vessel's Master to turn off blinding floodlights
- Inform vessel's Master of Local regulations, if applicable
- To secure the bow tug in very dense fog, it is imperative that the assisted vessel takes off all speed through the water and the tug moves in to make fast.
- It should be discussed and agreed well in advance with the tug master whether once the bow tug is secured the vessel may use her own propulsion power.
- Keep vessel's speed at maximum 6 knots through the water particularly when the bow tug is being connected and whilst the bow tug is still connected
- Pilot to use tug's name when giving orders, so the bridge team can understand
- Pilot to inform the stern tug when engaging the vessel's propeller in order to watch out for the propeller wash.
- Pilot to inform the stern tug about any rudder position changes about to be effected during manoeuvring.

- Tug Master to inform the Pilot whilst reaching 75% of the total engine power of the tug.
- Pilot to be made aware of any “novice” or “trainee” Tug Masters or of any Tug Masters who may not be familiar with the area and who will be participating during the harbour towing operation.

DO Actions of Pilot, ship’s Master and mooring parties

Do bring speed down sufficiently before securing a tug, especially the bow tug

Do limit use of propeller to the minimum required for steering,

Do drop the towline at the bow when disconnecting the tug, however only when instructed to do so by the tug.

Do slack away the towline slowly at the stern when disconnecting the tug and only let go off the messenger line when instructed to do so by the tug

Do use tug’s names when conveying orders to the tug and provide clear and concise instructions.

Do turn off floodlights as soon as the tug is secured.

Do have a spare heaving line ready at hand and a skilful deckhand to handle same.

Do use heaving lines with light weights, preferably using soft sand bags.

Do inform the stern tug before engaging engines astern.

As may be noticed, items are repeated in both the Do and Do Not section, obviously in the opposite way. This was done intentionally to increase the chances that they will be noted and remembered.