GUIDELINES FOR THE APPROVAL OF TOWING VESSELS

NO: 0021/NDI

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<th>Rev.</th>
<th>Prepared by</th>
<th>Authorised by</th>
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PREFACE

This document has been drawn with care to address what are likely to be the main concerns based on the experience of the Noble Denton organisation. This should not, however, be taken to mean that this document deals comprehensively with all of the concerns which will need to be addressed or even, where a particular matter is addressed, that this document sets out the definitive view of the organisation for all situations. In using this document, it should be treated as giving guidelines for sound and prudent practice on which our advice should be based, but guidelines should be reviewed in each particular case by the responsible person in each project to ensure that the particular circumstances of that project are addressed in a way which is adequate and appropriate to ensure that the overall advice given is sound and comprehensive.
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1 SUMMARY

1.1 These Guidelines are intended to lead to an approval by Noble Denton for entry into the Towing Vessel Approvability Scheme. They also provide guidance for the approval of towing vessels for a specific tow. This report does not cover the towage of specific vessels, guidance for which may be found in 0030/NDI.

1.2 This revision 6 supersedes revision 5 dated 1st April 2002. Major changes are:
   - Updating to reflect changes to 0030/NDI
   - Modified definition of Approved Bollard Pull
   - Recommendations for carrying a towing wire history for categories U and R1.

1.3 This report refers to, and should be read in conjunction with other Noble Denton Guideline documents, in particular Reference [1] - Noble Denton report 0030/NDI - “General Guidelines for Marine Transportations”

1.4 A definitions section is included.

1.5 A description of the approval process is included.

1.6 There are Sections on:
   - Towing Vessel Categories
   - Documentation
   - Towing Equipment
   - Towing Winch
   - Towing Wire Protection and Control
   - Stability
   - Manning and Accommodation
   - Seakeeping
   - Additional Equipment for Salvage Tugs (ST)
2 INTRODUCTION

2.1 BACKGROUND

2.1.1 These guidelines are the basis for the approval of towing vessels for specific towages.

2.1.2 The guidelines are also the standard for owners, charterers, managers or builders of towing vessels when they seek entry of a vessel into the Noble Denton Towing Vessel Approvability Scheme (TVAS).

2.1.3 This revision 6 supersedes revision 5 dated 1st April 2002. Major changes are:
   - Updating to reflect changes to 0030/NDI
   - Modified definition of Approved Bollard Pull
   - Recommendations for carrying a towing wire history for categories U and R1.

2.2 TOWING VESSEL APPROVABILITY SCHEME (TVAS)

2.2.1 Noble Denton Consultants Ltd. (NDC) operate the Noble Denton Towing Vessel Approvability Scheme on behalf of the Noble Denton Group.

2.2.2 These guidelines provide a standard against which a towing vessel will be assessed for the issue of a Towing Vessel Approvability Certificate and entry into the TVAS database.

2.2.3 Such approval does not imply that approval by designers, regulatory bodies, harbour authorities and/or any other parties would be given. Nor does it imply approval of a vessel for any specific towage or operation for which further consideration of the suitability of the vessel for the towage or operation would be required.

2.3 SUMMARY OF REQUIREMENTS

A summary of the requirements for each towing vessel category is appended to this document as Appendix A.

2.4 OTHER NOBLE DENTON GUIDELINES

This document shall be read in conjunction with other Noble Denton current guideline documents. In the event of conflict between two or more Noble Denton Guideline Documents, the last dated shall apply unless specifically agreed otherwise.

2.5 BOLLARD PULL AND EQUIPMENT TESTS

Guidance notes for carrying out bollard pull and towing equipment tests are appended to this document as Appendices B and C.
### 3 DEFINITIONS

<table>
<thead>
<tr>
<th>Term or acronym</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approved Bollard Pull</td>
<td>The Approved Bollard Pull is the continuous static bollard pull which Noble Denton is prepared to accept for towing service. Continuous static bollard pull is that obtained by a test at 100% of the Maximum Continuous Rating (MCR) of main engines, averaged over a period of 10 minutes. Where a certificate of Continuous Static Bollard Pull less than 10 years old can be produced, then this will normally be used as the Approved Bollard Pull. Approved Bollard Pull for tugs under 10 years old without a bollard pull certificate may be estimated as 1 tonne /100 (Certified) BHP of the main engines. Approved Bollard Pull for tugs over 10 years old, without a bollard pull certificate less than 10 years old, may be the greater of: • the certified value reduced by 1% per year of age since the BP test, or • 1 tonne/100 (Certified) BHP reduced by 1% per year of age greater than 10.</td>
</tr>
<tr>
<td>Benign area</td>
<td>An area which is free of tropical revolving storms and travelling depressions, (but excluding the North Indian Ocean during the southwest monsoon season and the South China Sea during the northeast monsoon season). The specific extent and seasonal limitations of a benign area should be agreed with the Noble Denton office concerned.</td>
</tr>
<tr>
<td>Brake Horse Power (BHP)</td>
<td>The measure of horsepower at continuous engine output after the combustion stage.</td>
</tr>
<tr>
<td>Continuous Bollard Pull (CBP)</td>
<td>See Approved Bollard Pull (above)</td>
</tr>
<tr>
<td>Maximum Bollard Pull (MBP)</td>
<td>The bollard pull obtained by a test, typically at 110% of the Maximum Continuous Rating (MCR) of main engines, over a period of 5 minutes.</td>
</tr>
<tr>
<td>Maximum Continuous Rating (MCR)</td>
<td>Manufacturer’s recommended Maximum Continuous Rating of the main engines.</td>
</tr>
<tr>
<td>Minimum Breaking Load (MBL)</td>
<td>Certified Minimum Breaking Load of wire rope, chain, stretcher or shackle in tonnes.</td>
</tr>
<tr>
<td>Noble Denton</td>
<td>Any company within the Noble Denton Group including any associated company which carries out (part of) the scope of work and issues a Certificate of Approval.</td>
</tr>
<tr>
<td>Term or acronym</td>
<td>Definition</td>
</tr>
<tr>
<td>-----------------------------------------------------</td>
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</tr>
<tr>
<td>Noble Denton International Ltd. (NDI)</td>
<td>The Company within the Noble Denton Group responsible for issue of this document.</td>
</tr>
<tr>
<td>Noble Denton Consultants Ltd. (NDC)</td>
<td>The company within the Noble Denton Group operating the Towing Vessel Approvability Scheme.</td>
</tr>
<tr>
<td>Register</td>
<td>The list published from time to time of towing vessels, including all towing vessels entered into the Towing Vessel Approvability Scheme.</td>
</tr>
<tr>
<td>SWL</td>
<td>Safe Working Load in tonnes. (see also Working Load Limit)</td>
</tr>
<tr>
<td>Survey</td>
<td>Attendance and inspection by a Noble Denton representative. Other surveys which may be required for a marine operation, including suitability, dimensional, structural, navigational, and Class surveys.</td>
</tr>
<tr>
<td>Surveyor</td>
<td>The Noble Denton representative carrying out a ‘Survey’. An employee of a contractor or Classification Society performing, for instance, a suitability, dimensional, structural, navigational or Class survey.</td>
</tr>
<tr>
<td>Tonnes</td>
<td>Metric tonnes of 1,000 kg (approximately 2,204.6 lbs) are used throughout this document. The necessary conversions must be made for equipment rated in long tons (2,240 lbs, approximately 1,016 kg) or short tons (2,000 lbs, approximately 907 kg).</td>
</tr>
<tr>
<td>Towing Vessel Approvability Certificate (TVAC)</td>
<td>The document issued by NDC stating that a vessel complied with these guidelines at the time of survey, or was reportedly unchanged at the time of revalidation, in terms of design, construction, equipment and condition, and is considered suitable for use in towing service within the limitations of its Category, bollard pull and any geographical limitations which may be imposed.</td>
</tr>
<tr>
<td>Towing Vessel Approvability Scheme (the Scheme)</td>
<td>The scheme whereby owners of vessels may apply to have their vessels surveyed and entered into the Scheme and the Register. The Scheme is administered by Rules, a copy of which may be obtained from NDC.</td>
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<tr>
<td>Towing Vessel Report</td>
<td>The surveyor's report on which the issue of a TVAC is based.</td>
</tr>
<tr>
<td>Working Load Limit (WLL)</td>
<td>The maximum static load that the wire, cable or shackle is designed to withstand.</td>
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</table>
4 TOWING VESSEL CATEGORIES
Vessels that are entered into the Scheme or proposed for towing duties will be designated one of five (5) categories. The requirements for each category are stated below, and summarised in Appendix A.

4.1 OCEAN-GOING SALVAGE TUG (ST)
4.1.1 Vessels within this category are approvable for all towages within the limits of their bollard pull in all geographical areas subject to the vessel’s Ice Classification.
4.1.2 Vessels shall be equipped with two (2) main towing wires and a spare towing wire, all of which shall comply with the strength and length requirements of Section 6.1.
4.1.3 Vessels shall be adequately manned for towing operations in all geographical areas. Each vessel shall have a minimum complement of officers and crew as required in the safe manning certificates and also have the capability of accommodating increased manning levels where it is deemed necessary for a specific towage. Refer to Section 10 and Appendix A.
4.1.4 Vessels shall be of such a design that they are capable of undertaking towages in all geographical areas subject to their Ice Classification and Section 11.
4.1.5 Vessels shall have a minimum bunker capacity of at least 35 days consumption at 80% MCR.
4.1.6 Vessels shall be equipped with a workboat with sufficient power and capacity to carry four (4) persons plus material/equipment to the casualty/tow.
4.1.7 Vessels shall be equipped with the additional equipment listed in Section 12.

4.2 UNRESTRICTED TOWAGES (U)
4.2.1 Vessels within this category are approvable for all towages within the limits of their bollard pull in all geographical areas subject to the vessels’ Ice Classification.
4.2.2 Vessels shall be equipped with a main towing wire and a spare towing wire, both of which shall comply with the strength and length requirements of Section 6.2.
4.2.3 Vessels shall be adequately manned for towing operations in all geographical areas. Each vessel shall have a minimum complement of officers and crew as required in the safe manning certificates and also have the capability of accommodating increased manning levels where it is deemed necessary for a specific towage. Refer to Section 10 and Appendix A.
4.2.4 Vessels shall be of such a design that they are capable of undertaking towages in all geographical areas subject to their Ice Classification and Section 11.
4.2.5 Vessels shall be equipped with a workboat with sufficient power and capacity to carry four (4) persons plus material/equipment to the tow. The man overboard boat may be considered as a workboat provided there is sufficient space to carry out a workboat function and the appropriate flag state is in agreement.

4.3 RESTRICTED TOWAGES (R1)
4.3.1 Vessels within this category are approvable for assisting with towages within the limits of their bollard pull in all geographical areas subject to the vessels’ Ice Classification.
4.3.2 Vessels shall be equipped with a minimum of one main towing wire which shall comply with the strength and length requirements of Section 6.3.

4.3.3 Vessels in this category shall comply with the requirements for manning and seakeeping as outlined in Sections 4.2.3, 4.2.4, 10 and 11.

4.3.4 If proposed as the lead or only tug for a particular towage, as may be allowed in Section 4.6, vessels shall be equipped with a workboat with sufficient power and capacity to carry four (4) persons plus material/equipment to the tow. The man overboard boat may be considered as a workboat provided there is sufficient space to carry out a workboat function and the appropriate flag state is in agreement.

4.4 BENIGN AREA TOWAGES (R2)

4.4.1 Vessels within this category are approvable for towages within the limits of their bollard pull and the defined geographical limits of Benign Areas.

4.4.2 Vessels shall be equipped with a main towing wire and a spare towing wire, both of which shall comply with the strength and length requirements of Section 6.4.

4.4.3 Vessels shall be adequately manned for towage operations within the geographical limits of Benign Areas. These vessels shall have the capability of accommodating increased manning levels where it is deemed necessary for a specific towage. Refer to Section 10.

4.4.4 Vessels shall be of such a design that they are capable of undertaking towages within the geographical limits of Benign Areas. Refer to Section 11.

4.4.5 If proposed as the lead or only tug for a particular towage, vessels shall be equipped with a workboat with sufficient power and capacity to carry three (3) persons plus material/equipment to the tow. The man overboard boat may be considered as a workboat provided there is sufficient space to carry out a workboat function and the appropriate flag state is in agreement.

4.5 RESTRICTED BENIGN AREA TOWAGES (R3)

4.5.1 Vessels in this category are approvable for assisting with towages within the limits of their bollard pull and the defined geographical limits of Benign Areas.

4.5.2 Vessels shall be equipped with a minimum of one main towing wire which shall comply with the strength and length requirements of Section 6.5.

4.5.3 Vessels shall comply with the requirements for manning and seakeeping as outlined in Sections 4.4.3, 4.4.4, 10 and 11.

4.6 LIMITED DURATION AND SHORT DISTANCE TOWAGES

Noble Denton will not in normal circumstances approve single tug towages where the tug is equipped with only one tow wire. However, vessels in category R1 may in certain circumstances be approved for single tug towages where the towage is in sheltered waters or within the limits of a reliable weather forecast. Approval of a vessel for this type of towage will be subject to a specific assessment.
5 DOCUMENTATION

Prior to a survey of the vessel being carried out for entry into the Scheme, and in order to assess the likelihood of successful entry, copies of the following documents should be submitted to NDC for review.

5.1 GENERAL SPECIFICATION

This should include, but is not limited to, general details of:

- Overall dimensions and tonnages
- Classification
- Propulsion equipment
- Speed, consumption and bunker capacity
- Towing and anchor-handling equipment
- Anchoring system
- Accommodation capacity and layout

5.2 GENERAL ARRANGEMENT PLANS

These should show the overall arrangement of the vessel, and should be sufficiently detailed to show the deck area including the towing, anchor handling and mooring equipment.

5.3 TOWING/ANCHOR-HANDLING WINCHES

Specifications of the towing/anchor-handling winch and its foundation.

5.4 TOWING EQUIPMENT

Specifications of all towing equipment carried including briddles, chains, towing wires, pennant wires, stretchers, towing shackles and connecting links.
5.5 **CERTIFICATES**
Copies of the following valid documents shall be submitted to NDC, or made available to the surveyor at time of survey:

- Certificate of registry
- International load line certificate
- Certificates of class for hull and machinery
- Cargo ship safety equipment certificate
- Cargo ship safety radio certificate
- Certificate of safe manning
- Certificates for all required bridles, chains, tow wires, pennants, stretchers, and shackles and connecting links.
- Bollard Pull Certificate (by a recognised authority or body)
- Approved Stability Booklet.

5.6 **SALVAGE EQUIPMENT**
For the entry of Ocean-Going Salvage Tugs (ST) details of the salvage equipment should be submitted. A list of the minimum requirements appears in Section 12.
6 TOWING EQUIPMENT

6.1 OCEAN-GOING SALVAGE TUGS (ST)

6.1.1 Vessels shall be equipped with two (2) main towing wires on separate winch drums, and one spare towing wire, each of adequate strength to satisfy the requirements of Minimum Breaking Load (MBL) as follows:

<table>
<thead>
<tr>
<th>Bollard Pull (BP)</th>
<th>Minimum Breaking Load (MBL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 90 tonnes</td>
<td>(3.8 - BP/50) x BP</td>
</tr>
<tr>
<td>Over 90 tonnes</td>
<td>2.0 x BP</td>
</tr>
</tbody>
</table>

6.1.2 The length (L) of both main wires and the spare towing wire shall be determined from the formula:

\[ L = \frac{BP}{MBL} \times 2,000 \text{ METRES} \]

except that in no case shall the length be less than 800 metres (see also Section 6.6.4).

6.1.3 A towing log indicating service history, maintenance and inspections shall be kept for each tow wire and each synthetic stretcher held on board the vessel.

6.1.4 Vessels shall be equipped with at least four (4) towing pennants of not less than the required MBL of the towing wire, and of the same lay.

6.1.5 If a surge chain is supplied then the MBL shall not be less than that of the main towing wire. The surge chain shall be a continuous length of welded studlink chain, having a length of not less than 27.5 metres, with an enlarged open link at each end.

6.1.6 Vessels shall be provided with the components for one towing bridle, which may be either all chain, or a combination of chain and wire. The ultimate load capacity (ULC) of each bridle leg shall be not less than the smaller of:

\[ \text{ULC} = 1.25 \times \text{MBL}, \text{ or} \]
\[ \text{ULC} = \text{MBL} + 40 \]

6.1.7 Vessels shall be equipped with at least twelve (12) towing shackles in accordance with the requirements of Sections 6.6.13 and 6.6.14.
6.2 UNRESTRICTED TOWAGES (U)

6.2.1 Vessels shall be equipped with both a main and a spare towing wire, each of adequate strength to satisfy the requirements of minimum breaking load (MBL) as follows:

<table>
<thead>
<tr>
<th>Bollard Pull (BP)</th>
<th>Minimum Breaking Load (MBL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 40 tonnes</td>
<td>3.0 x BP</td>
</tr>
<tr>
<td>40 to 90 tonnes</td>
<td>(3.8 - BP/50) x BP</td>
</tr>
<tr>
<td>Over 90 tonnes</td>
<td>2.0 x BP</td>
</tr>
</tbody>
</table>

6.2.2 The length (L) of both the main and spare towing wires shall be determined from the formula:

\[
L = \frac{BP}{MBL} \times 1,800 \text{ METRES}
\]

except that in no case shall the length be less than 650 metres (see also Section 6.6.4).

6.2.3 A towing log indicating service history, maintenance and inspections is recommended to be kept for each tow wire and each synthetic stretcher held on board the vessel.

6.3 RESTRICTED TOWAGES (RI)

6.3.1 Vessels shall be equipped with one main towing wire of adequate strength to satisfy the requirements of minimum MBL as follows:

<table>
<thead>
<tr>
<th>Bollard Pull (BP)</th>
<th>Minimum Breaking Load (MBL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 40 tonnes</td>
<td>3.0 x BP</td>
</tr>
<tr>
<td>40 to 90 tonnes</td>
<td>(3.8 - BP/50) x BP</td>
</tr>
<tr>
<td>Over 90 tonnes</td>
<td>2.0 x BP</td>
</tr>
</tbody>
</table>

6.3.2 The length (L) of the towing wire shall be determined from the formula:

\[
L = \frac{BP}{MBL} \times 1,800 \text{ METRES}
\]

except that in no case shall the length be less than 650 metres (see also Section 6.6.4).

6.3.3 It is good practice to keep a towing log, indicating service history, maintenance and inspections, for each tow wire and each synthetic stretcher held on board the vessel.
6.4 **BENIGN AREA TOWAGES (R2)**

6.4.1 Vessels shall be equipped with both a main and spare towing wire each of adequate strength to satisfy the requirements of Minimum BL as follows:

\[
MBL = 2.0 \times BP
\]

6.4.2 The length (L) of both the main and spare towing wires shall be determined from the formula:

\[
L = \frac{BP}{MBL} \times 1,200 \text{ METRES}
\]

except that in no case shall the length be less than 500 metres (see also Section 6.6.4).

6.5 **RESTRICTED BENIGN AREA TOWAGES (R3)**

6.5.1 Vessels shall be equipped with a towing wire of adequate strength to satisfy the requirements of MBL as follows:

\[
MBL = 2.0 \times BP
\]

6.5.2 The length (L) of the towing wire shall be determined from the formula:

\[
L = \frac{BP}{MBL} \times 1,200 \text{ METRES}
\]

except that in no case shall the length be less than 500 metres (see also Section 6.6.4).

6.6 **ALL ENTERED VESSELS**

6.6.1 All towing wires shall have hard eyes formed by a heavy-duty gusseted thimble, “pee-wee” or a closed spelter socket fitted at the outer end.

6.6.2 The main towing wire(s) should be spooled onto the towing winch drum(s) using adequate tension. The end of the wire must be adequately secured to the winch drum.

6.6.3 Where a spare towing wire is carried, it shall be stowed on a winch drum, or reverse stowed on a reel. Where the spare wire is stowed on a reel, it shall be accessible even in heavy weather, and be in such a position as to ensure that transfer to the main towing drum can be achieved safely and efficiently.

6.6.4 Where a reduced towline length demands a higher Minimum Breaking Load (MBL) in order to satisfy the towline length formula, then this increased MBL shall be the required MBL when determining the strength of the other components in the towing arrangement.

6.6.5 Vessels shall be equipped with at least 2 (4 for category ST) towing pennants of not less than the required breaking load of the main towing wire.

6.6.6 Pennants shall be of the same lay as the towing wire.

6.6.7 Pennants shall have hard eyes formed by a heavy-duty gusseted thimble, “pee-wee” or a spelter socket at each end.

6.6.8 If a soft-eyed pennant is carried, then such pennant shall be additional to the other requirements of this Section.

6.6.9 The towing pennants shall have a length appropriate to their intended service.
6.6.10 If synthetic stretchers are used, at least 2 shall be carried. For Benign Areas, one (1) synthetic stretcher may be acceptable.
6.6.11 If synthetic stretchers are used, the pennants should be in a sound condition and the Minimum Breaking Load should not be less than:
- 2.0 times the required towline MBL, for tugs with bollard pull less than 40 tonnes.
- 1.5 times the required towline MBL, for tugs with bollard pull greater than 90 tonnes.
- linearly interpolated between 1.5 and 2.0 times the required towline MBL for tugs with bollard pull between 40 tonnes and 90 tonnes.

When determining the required minimum towline break load the comments in Section 6.6.4 shall be taken into account.

6.6.12 The synthetic stretchers shall have a heavy-duty gusseted thimble at each end and be adequately protected against chafe.

6.6.13 Vessels shall be equipped with at least 6 (12 for category ST) towing shackles or approved connecting links.

6.6.14 The required capacity of towing shackles or connecting links shall be determined from the Certified Minimum Breaking Load (MBL), Certified Safe Working Load (SWL) or Certified Working Load Limit (WLL). If the MBL of a shackle is known, then the MBL shall not be less than 110% of the required MBL of the towing wire.

6.6.15 If the Minimum Breaking load of the shackle cannot be identified then the minimum Safe Working Load may be related to the continuous static bollard pull (BP) of the largest tug proposed, as follows:

<table>
<thead>
<tr>
<th>Bollard Pull (BP) (tonnes)</th>
<th>Safe Working Load (SWL) or Working Load Limit (WLL) (tonnes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 40</td>
<td>1.0 × BP</td>
</tr>
<tr>
<td>40 or more</td>
<td>(0.5 × BP) + 20</td>
</tr>
</tbody>
</table>

except that the comments contained in Section 6.6.4 shall be taken into account as appropriate, and the shackle SWL be increased in proportion.
7 TOWING WINCH

Vessels in all categories shall be provided with at least one towing winch, (two towing winch drums for category ST).

7.1 The towing winch and its connection to the vessel shall be strong enough to withstand a force equal to the breaking load of the tow wire acting at its maximum height above deck, without over-stressing either the winch or the deck connections.

7.2 If the power for the towing winch is supplied via a main engine shaft generator during normal operating conditions, then another generator shall be available to provide power for the towing winch in case of main engine or generator failure.

7.3 If a multi-drum winch is used, then each winch drum shall be capable of independent operation.

7.4 The towing winch drum(s) shall have sufficient capacity to stow the required minimum length of the tow wire(s).

7.5 A spooling device shall be provided such that the tow wire(s) is effectively spooled on to the winch drum(s).

7.6 The towing winch brake shall be capable of preventing the towing wire from paying out when the vessel is towing at its maximum continuous static bollard pull and shall not release automatically in case of a power failure.

7.7 The winch shall be fitted with a mechanism for emergency release of the tow wire.

7.8 There shall be an adequate means of communication between the winch control station(s) and the engine control station(s) and the bridge.
8 TOWING WIRE PROTECTION AND CONTROL

8.1 PROTECTORS

8.1.1 Sufficient towing wire protectors shall be provided to prevent the towing wire from being damaged by abrasion and chafe against tow bars, cargo protection rails, bulwarks, stern rail, tail gate or stern roller.

8.1.2 If a “fixed” gogwire system or towing pod is used, then whenever possible, towing wire protectors should also be provided for the towing wire at the gogwire shackle or towing pod.

8.2 TOW BARS, CARGO PROTECTION RAIL, BULWARKS, STERN RAIL, TAILGATE AND STERN ROLLER

8.2.1 The top of the tow bars, cargo protection rail, bulwarks, stern rail, tail gate and stern roller shall be free of sharp edges, corners or obstructions which could damage the towing wire or prevent it from free lateral movement.

8.2.2 Where, during normal towing conditions, the towing wire bears on tow bars, cargo protection rail, bulwarks, stern rail or tailgate, the radius of bend shall be at least ten (10) times the diameter of the towing wire.

8.3 ADJUSTABLE GOGWIRE SYSTEM

8.3.1 Preference shall be given to the use of an adjustable gogwire system.

8.3.2 The winch or capstan used to adjust the gogwire system shall be controlled from a safe location.

8.4 FIXED GOGWIRE SYSTEM

8.4.1 If a single wire or single chain gogwire system is used, then the connection point on the aft deck shall be on the centreline of the vessel.

8.4.2 The length of the single wire or single chain of the gogwire system shall not exceed half the distance between the cargo protection rails or bulwarks, whichever is less.

8.4.3 Either a “wide body” sling shackle, having an enlarged bearing surface at the bow, or a purpose-designed sheave, shall be used to connect the gogwire system to the towing wire.

8.5 TOWING POD

8.5.1 The centre line of the towing pod shall be in line with the centre line of the towing wire winch drum.

8.5.2 The towing pod shall be well faired and have a bend radius of at least ten (10) times the diameter of the towing wire.
9 STABILITY

10 MANNING AND ACCOMMODATION
10.1 Vessels in all categories shall be manned to meet the minimum requirements laid down by Statutory Regulations.
10.2 Manning levels for vessels in all categories will be subject to the requirements of a specific towage.
10.3 Where vessels are required to undertake long duration towages, difficult towages or where the tow is unmanned, they shall have adequate certified accommodation to enable manning levels to be increased. Any increase in manning levels will be subject to the limitations of the regulations relating to life-saving appliances.
10.4 In general, to satisfy category ST, certified accommodation and life-saving appliances shall be provided for a minimum of twelve (12) persons.
10.5 Vessels in category ST shall, when engaged in towing operations, carry a minimum of five (5) certificated officers. These would normally be the Master, two (2) Deck Officers and two (2) Engineer Officers.
10.6 In general, to satisfy categories U and R1, certified accommodation and life-saving appliances shall be provided for a minimum of eight (8) persons.
10.7 Vessels in categories U and R1 shall, when engaged in towing operations, carry a minimum of four (4) certificated officers. These would normally be the Master, one (1) Deck Officer and two (2) Engineer Officers.
10.8 Vessels in categories R2 and R3 shall, when engaged in towing operations, carry a minimum of three (3) certificated officers. These would normally be the Master, one (1) Deck Officer and one (1) Engineer Officer.
11 SEAKEEPING

11.1 Vessels in all categories shall be of such a design to allow them to operate safely and effectively in their designated areas.

11.2 Vessels in all categories must be purpose-built for towing operations or be of a multi-purpose design having towing capability.

11.3 Vessels must be assigned an appropriate Classification by a recognised Classification Society.

11.4 The length and normal operating draft of the vessel shall be adequate to maintain propeller effectiveness and reduce slamming in heavy weather conditions.

11.4.1 For vessels in category ST, the ratio of Loadline draft (D) to length between perpendiculars (LBP) shall comply with the formula:

\[
\frac{D}{LBP} > 0.080
\]

11.4.2 For vessels in categories U and R1, the ratio of Loadline draft (D) to length between perpendiculars (LBP) shall comply with the formula:

\[
\frac{D}{LBP} > 0.060
\]

11.4.3 For vessels in categories R2 and R3, the ratio of Loadline draft (D) to length between perpendiculars (LBP) shall comply with the formula:

\[
\frac{D}{LBP} > 0.045
\]

11.5 Vessels in category ST shall have a raised forecastle.

11.6 Vessels in categories U and R1 shall have a raised forecastle or have sufficient deck sheer and flare of the bow to minimise water on deck during heavy weather. The forecastle shall be of such a design to ensure minimum water retention.
12 ADDITIONAL EQUIPMENT FOR SALVAGE TUGS (ST)

All vessels in category ST shall carry the following equipment:

12.1 Lifting Equipment
A deck crane or derrick with a minimum capacity of two (2) tonnes for transferring equipment.

12.2 Pumps
Portable salvage pumps with an ample supply of suitable hoses.

12.3 Generators
Portable generator or facilities and cabling to allow power to be distributed to the casualty/tow from the tug.

12.4 Air Compressor
Portable air compressor suitable for salvage purposes with ample supply of hoses or facility to allow compressed air to be distributed to the casualty/tow.

12.5 Welding/Cutting
Portable welding and cutting equipment with ample supply of extension cables, hoses and consumables.

12.6 Damage Control
Assorted steel plate, timber, canvas, cement, sand, tools, etc. for damage control purposes.

12.7 Spare Parts
A comprehensive inventory of spare parts should be carried, for the vessel to allow repairs to be carried out during long voyages.
REFERENCES

Reference 1 Noble Denton report 0030/NDI - General Guidelines for Marine Transportations
APPENDIX A - SUMMARY OF REQUIREMENTS

The following table provides a summary of the requirements contained in this Guideline for each Category of vessel. Use of the table should be made together with reference to the appropriate text in the Guideline.

<table>
<thead>
<tr>
<th>Category</th>
<th>ST Salvage Tug</th>
<th>U Unrestricted</th>
<th>R1 Assist</th>
<th>R2 Benign area</th>
<th>R3 Assist /Benign</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General design and range</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Raised fo’c’sle</td>
<td>Yes</td>
<td>Yes, or sheer/ flare</td>
<td>Yes or sheer/ flare</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Minimum D:LBP ratio</td>
<td>0.08</td>
<td>0.06</td>
<td>0.06</td>
<td>0.045</td>
<td>0.045</td>
</tr>
<tr>
<td>Bunker capacity</td>
<td>35 days at 80% power</td>
<td>-</td>
<td>-</td>
<td>-</td>
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</tr>
<tr>
<td><strong>Certificates/documentation</strong></td>
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<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Registry</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Loadline</td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Class, hull</td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<td>Safe manning</td>
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<tr>
<td>Safety equipment</td>
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<td>Yes</td>
<td>Yes</td>
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<td>Safety radio</td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>All towing equipment</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Bollard Pull</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Towing wire log</td>
<td>Yes</td>
<td>Yes</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Towage and salvage equipment</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Towing winch</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Number of winch drums</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Number of main tow wires</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Number of spare tow wires</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Towline MBL, tonnes (BP&gt; 90 t)</td>
<td>2.0 x BP</td>
<td>2.0 x BP</td>
<td>2.0 x BP</td>
<td>2.0 x BP</td>
<td>2.0 x BP</td>
</tr>
<tr>
<td>Towline MBL, tonnes (40&lt;BP&lt; 90 t)</td>
<td>(3.8-BP/50) x BP</td>
<td>(3.8-BP/50) x BP</td>
<td>(3.8-BP/50) x BP</td>
<td>2.0 x BP</td>
<td>2.0 x BP</td>
</tr>
<tr>
<td>Towline MBL, tonnes (BP&lt;40 t)</td>
<td>(3.8-BP/50) x BP</td>
<td>3.0 x BP</td>
<td>3.0 x BP</td>
<td>2.0 x BP</td>
<td>2.0 x BP</td>
</tr>
<tr>
<td>Towline length, metres</td>
<td>(BP/MBL) x 2,000</td>
<td>(BP/MBL) x 1,800</td>
<td>(BP/MBL) x 1,800</td>
<td>(BP/MBL) x 1,200</td>
<td>(BP/MBL) x 1,200</td>
</tr>
<tr>
<td>Minimum towline length</td>
<td>800 metres</td>
<td>650 metres</td>
<td>650 metres</td>
<td>500 metres</td>
<td>500 metres</td>
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<tr>
<td>Towing pennants</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Shackles /Connecting Links</td>
<td>12</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Surge chain</td>
<td>Optional</td>
<td>-</td>
<td>-</td>
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<td>-</td>
</tr>
<tr>
<td>Towing bridle</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Salvage equipment</td>
<td>Yes</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Work boat</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes*</td>
<td>Yes*</td>
<td>-</td>
</tr>
<tr>
<td>Crane/derrick</td>
<td>2 tonnes</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Pumps</td>
<td>Yes</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Compressor</td>
<td>Yes</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Welding equipment</td>
<td>Yes</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Damage control</td>
<td>Yes</td>
<td>-</td>
<td>-</td>
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<td>-</td>
</tr>
<tr>
<td>Spares</td>
<td>Yes</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Manning and accommodation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accommodation</td>
<td>12</td>
<td>8</td>
<td>8</td>
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<td>-</td>
</tr>
<tr>
<td>LSA</td>
<td>12</td>
<td>8</td>
<td>8</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Number of certificated officers</td>
<td>5</td>
<td>4</td>
<td>4</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>

* A workboat is required for Categories R1 and R2 if the vessel is proposed as the lead tug or only tug for a particular towage.
APPENDIX B - BOLLARD PULL TESTS

B.1 GENERAL
B.1.1 The following guidance notes apply to the bollard pull test of any towing vessel which Noble Denton is requested to approve or attend.
B.1.2 The safe working load of the test equipment, fittings and any connection points ashore shall be at least 10% in excess of the designed maximum continuous static bollard pull of the vessel.

B.2 LOCATION
B.2.1 The water depth at the test location shall be at least 20 metres within a radius of 100 metres of the vessel.
B.2.2 If a water depth of 20 metres cannot be obtained at the test location, then a minimum water depth which is equal to twice the maximum draft of the vessel may be accepted. The owner of the vessel must be advised that the reduced water depth may adversely affect the test results.
B.2.3 The test location shall be clear of navigational hazards and underwater obstructions within a radius of 300 metres of the vessel.
B.2.4 The current shall be less than 0.5 metres/second from any direction.
B.2.5 The wind speed shall be less than 5 metres/second from any direction.
B.2.6 The condition of the sea at the test location shall be calm, without swell or waves.

B.3 VESSEL
B.3.1 The draft and trim of the vessel shall be as near as possible to the draft and trim under normal operating conditions.
B.3.2 The propellers and fuel used during the tests shall be the same as the propellers and fuel used under normal operating conditions.
B.3.3 All auxiliary equipment such as pumps, generators and other equipment which are driven from the main engine(s) or propeller shaft(s) during normal operation of the vessel shall be connected during the test.

B.4 TEST
B.4.1 The distance between the stern of the vessel and the shore shall be at least 300 metres.
B.4.2 If it is not possible to maintain a distance of 300 metres between the stern of the vessel and the shore, then a minimum distance which is equal to twice the waterline length of the vessel may be accepted. The owner of the vessel must be advised that the reduced distance between the vessel’s stern and the shore may adversely affect the test results.
B.4.3 Adequate communications shall be established between the vessel and instrument recording station.

B.4.4 The continuous bollard pull (CBP) test shall be carried out at the manufacturer’s recommended maximum continuous rating of the main engines (100% MCR), for a period of 10 minutes with the vessel on a steady heading. In this respect engine revolutions at MCR may be used to confirm the level of engine output over the trial period and correlated with the bollard pull readings obtained.

B.4.5 Whenever possible a maximum (MBP) test shall be carried out at the manufacturer’s maximum rating of the main engines (typically 110% MCR), for a period of 5 minutes.

B.4.6 When requested, continuous bollard pull may also be verified at different RPM and/or propeller pitch settings or with fewer propellers or engines in use.

B.4.7 The load cell used for measuring the bollard pull shall have an accuracy of ±2% for the average temperature observed during the test and shall have been calibrated not more than six (6) months prior to the test date. The calibration certificate shall be available.

B.4.8 An autographic recording instrument giving a continuous read-out of the bollard pull shall be connected to the load cell.

B.4.9 If no continuous record of the test is printed, then the bollard pull shall be the mean of consecutive readings recorded at 20 second intervals over the test period.

B.5 BOLLARD PULL TESTS ACCEPTANCE

B.5.1 Bollard pull test certificates issued by Classification Societies are acceptable, or by another recognised body provided that acceptable procedures for the tests are produced.
APPENDIX C - TOWING EQUIPMENT TESTS

C.1 GENERAL

C.1.1 The following guidance notes apply to the towing equipment tests of any vessel which Noble Denton is requested to approve or attend.

C.1.2 Before carrying out any tests, it shall be ascertained that the equipment to be tested has been installed according to the manufacturer’s recommendations and can be operated safely.

C.1.3 The wire used during the winch tests shall be equal to the towing wire in breaking load, diameter and construction and shall be spooled onto the towing winch drum with a tension of 25% of the vessel’s CBP or 40 tonnes, whichever is less.

C.1.4 During stalling, brake and quick release tests, the wire shall be kept as near as possible to the centre line of the vessel.

C.1.5 The safe working load of the test equipment, fittings and any connection points ashore shall be at least ten (10) percent in excess of the designed maximum static bollard pull of the vessel.

C.2 WINCH TESTS

C.2.1 Stalling Test

First Test: To be carried out with a full drum.

Second Test: To be carried out with an effective drum diameter which is estimated to stall the winch at CBP.

The winch shall be heaving in wire while the engine revolution or propeller pitch is gradually increased.

When the winch stalls, the following shall be recorded:

a. Bollard Pull
b. Effective Drum Diameter

C.2.2 Brake Test

The test shall be carried out with a full drum of wire.

A wire of approximately 300 metres shall be connected to the winch wire if required.

The brake shall be applied at maximum holding capacity.

The engine revolutions or propeller pitch shall be gradually increased until CBP is achieved.

The following shall be recorded:

a. Bollard Pull
b. Brake Pressure
C.2.3 **Quick Release Test**

The quick release tests shall be carried out when the vessel is towing at approximately 30% of its CBP.

- **First Test:** When heaving in the test wire.
- **Second Test:** When the brake is engaged.

C.2.4 **Spooling Gear Test (if fitted)**

The spooling gear shall be engaged when tested.

The engine power or propeller pitch shall be gradually increased to CBP.

The test wire shall be at an angle of approximately 60° to the centreline, on each side of the vessel.

The duration of the test shall be not less than one (1) minute.

C.3 **FIXED GOGWIRE SYSTEM, TOWING POD, LINE STOPS AND GUIDE PINS TESTS**

The spooling gear, if fitted, shall be disengaged during the “fixed” gogwire system, towing pod, line stops and guide pin tests.

The engine power or propeller pitch shall be gradually increased to the CBP.

The test wire shall be at an angle of approximately 60° to the centreline, on each side of the vessel.

The duration of each test shall not be less than one (1) minute.