

TECHNICAL POLICY BOARD

GUIDELINES FOR THE APPROVAL OF TOWING VESSELS

0021/ND

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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 GL 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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CONTENTS

SECTION	PAGE NO.
1 SUMMARY	5
2 INTRODUCTION	6
2.1 BACKGROUND	6
2.2 TOWING VESSEL APPROVABILITY SCHEME (TVAS)	6
2.3 SUMMARY OF REQUIREMENTS	6
2.4 OTHER GL NOBLE DENTON GUIDELINES	7
2.5 BOLLARD PULL AND EQUIPMENT TESTS	7
3 DEFINITIONS	8
4 TOWING VESSEL CATEGORIES	10
4.1 OCEAN-GOING SALVAGE TUG (ST)	10
4.2 UNRESTRICTED TOWAGES (U)	10
4.3 COASTAL TOWAGES (C)	11
4.4 RESTRICTED TOWAGES (R1)	11
4.5 BENIGN AREA TOWAGES (R2)	11
4.6 RESTRICTED BENIGN AREA TOWAGES (R3)	12
4.7 LIMITED DURATION AND SHORT DISTANCE TOWAGES	12
5 DOCUMENTATION	13
5.1 GENERAL SPECIFICATION	13
5.2 GENERAL ARRANGEMENT PLANS	13
5.3 TOWING/ANCHOR-HANDLING WINCHES	13
5.4 TOWING EQUIPMENT	13
5.5 CERTIFICATES	14
5.6 SALVAGE EQUIPMENT	14
6 TOWING EQUIPMENT	15
6.1 OCEAN-GOING SALVAGE TUGS (ST)	15
6.2 UNRESTRICTED (U) OR COASTAL (C) CATEGORIES	16
6.3 RESTRICTED CATEGORIES (R1)	16
6.4 BENIGN AREA CATEGORIES (R2)	17
6.5 RESTRICTED BENIGN AREA CATEGORIES (R3)	17
6.6 ALL ENTERED VESSELS	17
7 TOWING WINCH	19
8 TOWING WIRE PROTECTION AND CONTROL	20
8.1 PROTECTORS	20
8.2 TOW BARS, CARGO PROTECTION RAIL, BULWARKS, STERN RAIL, TAILGATE AND STERN ROLLER	20
8.3 ADJUSTABLE GOGWIRE SYSTEM	20
8.4 FIXED GOGWIRE SYSTEM	20
8.5 TOWING POD	20
9 STABILITY	21
10 MANNING AND ACCOMMODATION	22
11 SEAKEEPING	23
12 ADDITIONAL EQUIPMENT FOR SALVAGE TUGS (ST)	24
REFERENCES	25
APPENDIX A - SUMMARY OF REQUIREMENTS	26
APPENDIX B - BOLLARD PULL TESTS	27
APPENDIX C - TOWING EQUIPMENT TESTS	29

TABLES

Table 6-1	Towline Minimum Breaking Loads for Salvage Tugs	15
Table 6-2	Towline Minimum Breaking Loads for Unrestricted Towages	16
Table 6-3	Towline Minimum Breaking Loads for Restricted Towages	16
Table 6-4	Default Shackle SWL	18

1 SUMMARY

- 1.1 These Guidelines are intended to lead to an approval by GL: Noble Denton for entry into the Towing Vessel Approvability Scheme. They also provide guidance for the approval of towing vessels for specific tows, and bollard pull tests. They do not cover the towage of specific vessels or barges, guidance for which may be found in 0030/ND.
- 1.2 This revision 8 supersedes revision 7 dated 17th Nov 2008. Changes are described in Section 2.1.5.
- 1.3 This report refers to, and should be read in conjunction with other GL Noble Denton Guideline documents, in particular Reference [1] - GL Noble Denton report 0030/ND - "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 (Section 4)
 - Documentation (Section 5)
 - Towing Equipment (Section 6)
 - Towing Winch (Section 7)
 - Towing Wire Protection and Control (Section 8)
 - Stability (Section 9)
 - Manning and Accommodation (Section 10)
 - Seakeeping (Section 11)
 - Additional Equipment for Salvage Tugs (ST - Section 12)

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 GL Noble Denton Towing Vessel Approvability Scheme (TVAS).

2.1.3 Revision 6 superseded Revision 5 dated 1st April 2002. Major changes were:

- Updating to reflect changes to 0030/ND
- Modified definition of Approved Bollard Pull
- Recommendations for carrying a towing wire history for categories U and R1.

2.1.4 Revision 7 superseded Revision 6 dated 4 October 2006. Major changes were:

- Introduction of a new category, Coastal Towages (C), in Section 4.3 for smaller tugs for vessels with an overall length of less than 40 metres unless they have very good seakeeping qualities including good propeller immersion in bad weather and a displacement greater than 1,000 tonnes.
- (For vessels with only one towing winch drum). Introduction in Section 7.10 of a maximum time requirement for safely transferring a spare towline to the towing winch after a towline break in bad weather.
- Introduction in Section 9 of stability requirements that allow for the effect of the towline force.
- Removal of the draught /length ratios in Section 11.4.
- Introduction in Section 11.5 of a requirement for the height of raised forecastles to be at least 2 metres above the freeboard deck for all categories except for in benign weather areas.

2.1.5 This revision 8 supersedes Revision 7 dated 17 November 2008. Changes include:

- the change from Noble Denton to GL Noble Denton
- certificate requirements in Section 5.5
- reduction in the maximum ULC of bridles for Category ST in Section 6.1.6.
- bollard pull test requirements in Section B.4.4.

2.2 TOWING VESSEL APPROVABILITY SCHEME (TVAS)

2.2.1 The GL Noble Denton entity in London operates the GL Noble Denton Towing Vessel Approvability Scheme on behalf of the GL 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 GL NOBLE DENTON GUIDELINES

This document shall be read in conjunction with other GL Noble Denton current guideline documents. In the event of conflict between two or more GL 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

3.1 Referenced definitions are underlined.

Term or Acronym	Definition
Approved Bollard Pull	<p>The Approved Bollard Pull is the continuous static bollard pull which GL Noble Denton is prepared to accept for towing service.</p> <p>Continuous static bollard pull is that obtained by a test at 100% of the <u>Maximum Continuous Rating (MCR)</u> of main engines, averaged over a period of 10 minutes.</p> <p>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.</p> <p>Approved Bollard Pull for tugs under 10 years old without a bollard pull certificate may be estimated as 1 tonne /100 (Certified) <u>BHP</u> of the main engines.</p> <p>Approved Bollard Pull for tugs over 10 years old, without a bollard pull certificate less than 10 years old, may be the greater of:</p> <ul style="list-style-type: none"> • the certified value reduced by 1% per year of age since the BP test, or • 1 tonne/100 (Certified) <u>BHP</u> reduced by 1% per year of age greater than 10.
Benign area	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 GL Noble Denton office concerned.
BHP / Brake Horse Power	The measure of horsepower at continuous engine output after the combustion stage.
CBP / Continuous Bollard Pull	See Approved Bollard Pull (above)
GL Noble Denton	Any company within the GL Noble Denton Group including any associated company which carries out (part of) the scope of work and issues a Certificate of Approval.
GL Noble Denton Consultants Ltd.	The company in London within the GL Noble Denton Group operating the Towing Vessel Approvability Scheme.
IACS	International Association of Classification Societies
MBL / Minimum Breaking Load (MBL)	Certified Minimum Breaking Load of wire rope, chain, stretcher or shackle in tonnes.
MBP / Maximum Bollard Pull	The bollard pull obtained by a test, typically at 110% of the <u>Maximum Continuous Rating (MCR)</u> of main engines, over a period of 5 minutes.
MCR / Maximum Continuous Rating	Manufacturer's recommended Maximum Continuous Rating of the main engines.
Register	The list published from time to time of towing vessels, including all towing vessels entered into the Towing Vessel Approvability Scheme.

GUIDELINES FOR THE APPROVAL OF TOWING VESSELS

Term or Acronym	Definition
Survey	Attendance and inspection by a GL Noble Denton representative. Other surveys which may be required for a marine operation, including suitability, dimensional, structural, navigational, and Class surveys.
Surveyor	The GL 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.
SWL	Safe Working Load in tonnes. (See also <u>Working Load Limit</u>)
Tonnes	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).
Towing Vessel Approvability Scheme (the Scheme)	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.
Towing Vessel Report	The <u>surveyor's</u> report on which the issue of a <u>TVAC</u> is based.
TVAC / Towing Vessel Approvability Certificate	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.
ULC / Ultimate Load Capacity	Ultimate load capacity of a wire rope, chain or shackle or similar is the certified minimum breaking load, in tonnes. The load factors allow for good quality splices in wire rope. Ultimate load capacity of a padeye, clench plate, delta plate or similar structure, is defined as the load, in tonnes, which will cause general failure of the structure or its connection into the barge or other structure.
WLL / Working Load Limit	The maximum static load that the wire, cable or shackle is designed to withstand.

4 TOWING VESSEL CATEGORIES

Vessels that are entered into the Scheme or proposed for towing duties will be designated one of six (6) 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 (see Section 11). They must have very good seakeeping qualities including good propeller immersion in bad weather. These qualities are unlikely to be satisfied with a Length Over All (LOA) less than 40 metres and a displacement of less than 1,000 tonnes.
- 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. They must have very good seakeeping qualities including good propeller immersion in bad weather. These qualities are unlikely to be satisfied with a Length Over All (LOA) less than 40 metres and a displacement of less than 1,000 tonnes.
- 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 that it will not only be used for man overboard duties.

4.3 COASTAL TOWAGES (C)

- 4.3.1 Vessels within this category are approvable for all coastal towages within the limits of their bollard pull in all geographical areas subject to the vessels' Ice Classification. Coastal towages are defined as routes for which a tow can safely reach a place of safety within the period of a reliable weather forecast, or are in benign weather areas.
- 4.3.2 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.
- 4.3.3 Vessels shall be adequately manned for towing operations in all relevant 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.
- 4.3.4 Vessels shall be of such a design that they are capable of undertaking towages in all relevant geographical areas subject to their Ice Classification and Section 11.
- 4.3.5 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 that it will not only be used for man overboard duties.

4.4 RESTRICTED TOWAGES (R1)

- 4.4.1 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.
- 4.4.2 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.
- 4.4.3 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.
- 4.4.4 If proposed as the lead or only tug for a particular towage, as may be allowed in Section 4.7, 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 that it will not only be used for man overboard duties.

4.5 BENIGN AREA TOWAGES (R2)

- 4.5.1 Vessels within this category are approvable for towages within the limits of their bollard pull and the defined geographical limits of Benign Areas.
- 4.5.2 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.
- 4.5.3 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.
- 4.5.4 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.
- 4.5.5 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 that it will not only be used for man overboard duties.

4.6 RESTRICTED BENIGN AREA TOWAGES (R3)

- 4.6.1 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.
- 4.6.2 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.
- 4.6.3 Vessels shall comply with the requirements for manning and seakeeping as outlined in Sections 4.5.3, 4.5.4, 10 and 11.

4.7 LIMITED DURATION AND SHORT DISTANCE TOWAGES

- 4.7.1 GL 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 bridles, chains, towing wires, pennant wires, stretchers, towing shackles and connecting links.

5.5 CERTIFICATES

Copies of the following valid documents (unless not legally required, typically for some vessels less than 500 gt) 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
- Safety Construction Certificate
- Certificate of safe manning
- International Oil Pollution Prevention Certificate
- Safety Management Certificate
- International Ship Security Certificate
- Ballast Water Exchange Certificate (if required)
- Certificates for all required bridles, chains, tow wires, pennants, stretchers, and shackles and connecting links. These certificates shall be issued or endorsed by bodies approved by an IACS member or other recognised certification body accepted by GL Noble Denton.
- Bollard Pull Certificate (by a recognised authority or body)
- Approved Stability Booklet.

8

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 6-1 Towline Minimum Breaking Loads for Salvage Tugs

Bollard Pull (BP)	Minimum Breaking Load (MBL)
Up to 90 tonnes	$(3.8 - BP/50) \times BP$
Over 90 tonnes	$2.0 \times BP$

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

$$L = (BP/MBL) \times 2,000 \text{ METRES}$$

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 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), in tonnes, of each bridle leg shall be not less than:

$$ULC = 1.25 \times MBL \quad (\text{for } MBL \leq 160 \text{ tonnes}) \text{ or}$$

$$ULC = MBL + 40 \quad (\text{for } MBL \geq 160 \text{ tonnes}) \text{ with a maximum of ULC of 400 tonnes (considered to be the maximum able to be handled at sea without a crane)}$$

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 (U) OR COASTAL (C) CATEGORIES

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 6-2 Towline Minimum Breaking Loads for Unrestricted Towsages

Bollard Pull (BP)	Minimum Breaking Load (MBL)
Less than 40 tonnes	3.0 x BP
40 to 90 tonnes	(3.8 - BP/50) x BP
Over 90 tonnes	2.0 x BP

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

$$L = (BP/MBL) \times 1,800 \text{ METRES}$$

except that in no case shall the length be less than 650 metres for Unrestricted categories or 500 metres for Coastal (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 CATEGORIES (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 6-3 Towline Minimum Breaking Loads for Restricted Towsages

Bollard Pull (BP)	Minimum Breaking Load (MBL)
Less than 40 tonnes	3.0 x BP
40 to 90 tonnes	(3.8 - BP/50) x BP
Over 90 tonnes	2.0 x BP

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

$$L = (BP/MBL) \times 1,800 \text{ METRES}$$

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 CATEGORIES (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:

$$\text{MBL} = 2.0 \times \text{BP}$$

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

$$L = (\text{BP}/\text{MBL}) \times 1,200 \text{ METRES}$$

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

6.5 RESTRICTED BENIGN AREA CATEGORIES (R3)

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

$$\text{MBL} = 2.0 \times \text{BP}$$

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

$$L = (\text{BP}/\text{MBL}) \times 1,200 \text{ METRES}$$

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. Typically these will be in the range of 10 to 50 metres long but at least 2 should be suitable for making up a towing bridle.

6.6.10 If synthetic stretchers are used, at least 2 shall be carried. For Benign Areas, one (1) synthetic stretcher may be acceptable.

GUIDELINES FOR THE APPROVAL OF TOWING VESSELS

- 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 6-4 Default Shackle SWL

Bollard Pull (BP) (tonnes)	Safe Working Load (SWL) or Working Load Limit (WLL) (tonnes)
Less than 40	1.0 x BP
40 or more	(0.5 x BP) + 20

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

- 7.1 Vessels in all categories shall be provided with at least one towing winch, (two towing winch drums for category ST).
- 7.2 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
- 7.3 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.
- 7.4 If a multi-drum winch is used, then each winch drum shall be capable of independent operation.
- 7.5 The towing winch drum(s) shall have sufficient capacity to stow the required minimum length of the tow wire(s).
- 7.6 A spooling device shall be provided such that the tow wire(s) is effectively spooled on to the winch drum(s).
- 7.7 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.
- 7.8 The winch shall be fitted with a mechanism for emergency release of the tow wire.
- 7.9 There shall be an adequate means of communication between the winch control station(s) and the engine control station(s) and the bridge.
- 7.10 If there is only one towing winch then the crew must be able to demonstrate that a spare tow wire can be safely run onto the towing winch within 6 hours of a towline break in bad weather.

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

- 9.1 The stability of the vessel shall never be less than that required by the "Guidelines for the Design and Construction of Offshore Supply Vessels" (Resolution A.469 [XII] adopted by the International Maritime Organisation 1981) and the Merchant Shipping (Load Line) Rules 1966, S.I. 1053.
- 9.2 In addition, if the vessel has an IACS class notation of "Tug" or "Towing Vessel" then the stability booklet should contain an example loading condition that fulfils the Classification Society's Notation. The vessel's Master should show to the attending surveyor how the example loading condition relates to that for the voyage(s), including whether any roll reduction tanks may be in use.
- 9.3 If the example loading condition varies, the Master should prove adequate stability, including the arrival fuel loads. The relevant print out(s) from the onboard calculations (e.g. "Loadmaster") should be given to the surveyor.
- 9.4 If the vessel cannot show that it satisfies an IACS class "Tug" or "Towing Vessel" notation as described above, then the heeling lever (defined below) must not exceed 0.5 times the maximum GZ for the most critical loading condition.
- 9.5 **Heeling Lever** = $[0.6 \times \text{Max. Bollard Pull} \times \text{Vertical Distance between Hawser and Centre of the Propeller(s)}] / \text{Displacement}$
- 9.6 The height of the hawser should be measured at:
- the fixed gog, or the side rails if higher, if a fixed gog is always used, or
 - the top of the winch drum (with no towline deployed), or the side rails if higher, if a fixed gog is not always used.
- 9.7 If the maximum GZ occurs at an angle greater than 30 degrees of heel then the GZ value for 30 degrees of heel should be used instead of the angle of maximum GZ.

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 **Category ST.** 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 **Categories U, C and R1.** In general, to satisfy categories U, C and R1, certified accommodation and life-saving appliances shall be provided for a minimum of eight (8) persons.
- 10.7 Vessels in categories U, C 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 draught of the vessel shall be adequate to maintain propeller effectiveness and reduce slamming in heavy weather conditions.
- 11.5 Vessels in category ST, U, C and R1 shall have a raised forecastle with a height of at least 2 metres above the freeboard deck. 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

- [1] GL Noble Denton report 0030/ND - Guidelines for Marine Transportations
- [2] International Maritime Organization (IMO), Guidelines for Safe Ocean Towing, Ref T1/3.02

All GL Noble Denton Guidelines can be downloaded from www.gl-nobledenton.com

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.

Category	ST Salvage Tug	U Unrestrict ed	C Coastal	R1 Assist	R2 Benign area	R3 Assist / Benign
General design and range						
Adequate displac (LOA > 40m)	Yes	Yes	-	-	-	-
Raised fo'c'sle	Yes	Yes	Yes	Yes	-	-
Bunker capacity at 80% power	35 days	-	-	-	-	-
Certificates/documentation						
Registry	Yes	Yes	Yes	Yes	Yes	Yes
Loadline	Yes	Yes	Yes	Yes	Yes	Yes
Class, hull for this category	Yes	Yes	Yes	Yes	Yes	Yes
Safe manning	Yes	Yes	Yes	Yes	Yes	Yes
Safety equipment	Yes	Yes	Yes	Yes	Yes	Yes
Safety radio	Yes	Yes	Yes	Yes	Yes	Yes
All towing equipment	Yes	Yes	Yes	Yes	Yes	Yes
Bollard Pull	Yes	Yes	Yes	Yes	Yes	Yes
Towing wire log	Yes	Yes	Yes	Yes	-	-
Towage and salvage equipment						
Towing winch	Yes	Yes	Yes	Yes	Yes	Yes
Number of winch drums	2	1	1	1	1	1
Number of main tow wires	2	1	1	1	1	1
Number of spare tow wires	1	1	1	-	1	-
Towline MBL, tonnes (BP > 90t)	2.0 x BP	2.0 x BP	2.0 x BP	2.0 x BP	2.0 x BP	2.0 x BP
Towline MBL, tonnes (40 < BP < 90t)	(3.8-BP/50) x BP	(3.8-BP/50) x BP	(3.8-BP/50) x BP	(3.8-BP/50) x BP	2.0 x BP	2.0 x BP
Towline MBL, tonnes (BP < 40t)	(3.8-BP/50) x BP	3.0 x BP	3.0 x BP	3.0 x BP	2.0 x BP	2.0 x BP
Towline length, metres (European formula)	(BP/MBL) x 2,000	(BP/MBL) x 1,800	(BP/MBL) x 1,800	(BP/MBL) x 1,800	(BP/MBL) x 1,200	(BP/MBL) x 1,200
Minimum towline length (m)	800	650	500	650	500	500
Towing pennants	4	2	2	2	2	2
Shackles /Connecting Links	12	6	6	6	6	6
Surge chain	Optional	-	-	-	-	-
Towing bridle (see Section 6.1.6)	1	-	-	-	-	-
Salvage equipment	Yes	-	-	-	-	-
Work boat	Yes	Yes	Yes	Yes*	Yes*	-
Crane/derrick	2 tonnes	-	-	-	-	-
Pumps	Yes	-	-	-	-	-
Compressor	Yes	-	-	-	-	-
Welding equipment	Yes	-	-	-	-	-
Damage control	Yes	-	-	-	-	-
Spares	Yes	-	-	-	-	-
Manning and accommodation						
Accommodation	12	8	8	8	-	-
LSA	12	8	8	8	-	-
Number of certificated officers	5	4	4	4	3	3

* 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 GL 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 draught 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 draught and trim of the vessel shall be as near as possible to the draught 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 (see IMO requirements in Ref [2]) with the vessel on a steady heading.
- 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 $\pm 2\%$ 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 GL 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

C.3.1 The spooling gear, if fitted, shall be disengaged during the "fixed" gogwire system, towing pod, line stops and guide pin tests.

C.3.2 The engine power or propeller pitch shall be gradually increased to the CBP.

C.3.3 The test wire shall be at an angle of approximately 60° to the centreline, on each side of the vessel.

C.3.4 The duration of each test shall not be less than one (1) minute.