STATUS LIST OF NAUTICUS HULL SEPTEMBER 2005

Nomenclature:

1 = the Rule is implemented in Nauticus Hull, and is based on JTP 2nd draft (March 2005 Rule version)

2 = the Rule is implemented in Nauticus Hull, based on JTP 1st draft (June 2004 Rule version). Update to the JTP 2nd draft is ongoing, but not completed.

3 = the Rule is not implemented in Nauticus Hull yet. Continuous update patches will be distributed during 2005, gradually covering the total scope of JTP Rules within January 2006.

Nauticus Hull status per May 5 (1= March 2005 2 = June 2004 3 = not supported, NA = not applicable)	JTP Rule March 2005 Reference	JTP Rule June 2004 Reference	Technical Changes
	Section 2	**Section 2**	**Underlying principles**
NA		2/2.1-2.6	Clarification issues – no technical changes
NA	2/2.7	2/2.7	New content which describes/summarizes the application of the principles. No technical changes.
	Section 4	**Section 4**	**Basic Information**
NA	4/2.1.1.3	New	Added definition of bending span in case of sniped webstiffeners
NA	4/2.1.1.4	New	Added definition of bending span for brackets fitted to the attached plating
1	Figure 4.2.1 d)	New	Updated by including bracket at one en of stiffener only
1	Figure 4.2.2	Figure 4.2.2	Updated by adding additional bracket arrangements
NA	4/2.1.2.3	New	Added definition of shear span for brackets fitted to the attached plating
NA	4/2.3.1.2	4/2.3.1.1	Cut-off value for maximum effective spacing is reduced from 10mm plating to 8mm plating

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NA	4/2.3.2.4	New	Added definition of effective span at ends of large brackets on primary support members
NA	4/2.3.2.4	4/2.3.2	Attached plate for PSM to be taken as average value of end and mid span
1	Figure 4.2.12	Figure 4.2.11	Corrosion addition for stiffener slightly changed (difference negligible)
NA	4/2.5.1.4	New	Added definition of effective web height in case of smaller openings
NA	4/2.5.2	New	Added definition on application of corrosion addition for primary support members
1	4/2.6.2	New	Added definition of horizontal hull girder section modulus
NA, given cut-outs are subtracted directly.	4/2.6.3.10	New	Added definition of effective area in way of large openings and in way of non-continuous decks and bulkheads
3	4/2.6.4.1	New	Added definition of effective hull girder shear elements
3	4/3.2.3.4	4/3.2.3.4	Updated bracket requirements to be more consistent with source (DNV) criteria, to include material strength factors and adjusted c(bkt) for consistency with 10/2.
3	4/3.2.5.1	4/3.2.5.1	Coefficient in the formula for the plate thickness supported by the sniped end stiffener slightly changed Modified to suit application of Design Load Sets and Acceptance Criteria Sets
3	4/3.4.3.3	4/3.4.3.3	fc factor in the formula to calculate load transmitted through the shear connection revised
3	Table 4.3.1	Table 4.3.1	Permissible stresses for cutouts revised from fixed value to utilization factor
NA	4/3.5.4	4/3.5.4	Modified to accept alternative arrangements and the stress based elements of the criteria and have been modified to suit application to Design Load Sets and Acceptance Criteria Sets

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	Section 5	**Section 5**	**Structural Arrangement**
3	All	All	Modified to more clearly separate class and statutory requirements. Impact is no change to requirements.
NA	5/5.1.1	5/5.3.1	Added requirements for “Access to and Within Spaces in, and Forward of the Cargo Area” of SOLAS II-1/3-6 (Permanent Means of Access).
	Section 6	**Section 6**	**Material and Welding**
NA	6/1.1.5.1	6/1.1.5.1	Changed applicability to partial and full penetration welding.
NA	6/3.1.1.2	New	Clarified application to various types of steel
NA	Table 6.1.3	Table 6.1.3	Updated to reflect the latest update of UR S6, applicability in Notes 1 and 2 reflect application within 0.4L amidships.
1 (FEM) 1 (Prescriptive)	Table 6.3.1	Table 6.3.1	Corrosion addition for internals of voids changed from 1.5mm to 2.0mm.
1	Table 6.3.2	Table 6.3.2	Corrosion addition for internals in voids increased from 1.5mm to 2.0mm
3	Table 6.3.2	Table 6.3.2	Corrected “Decks forming the tops of ... tanks” to t(corr) equal to “Corrosion addition for vertical bulkhead plating plus 0.5mm
NA	6/4.2.1.1	6/4.2.1.1	Minimum inside bending radius for cold forming for highly stressed members changed from 15 times to 10 times
NA	6/5.2.2.2	6/5.2.2.2	Max thickness difference without transition taper changed from 3mm to 4 mm

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NA	6/5.3.4.2	6/5.3.4	Joint at connection of hopper sloped plating to inner bottom modified to require partial or full penetration welding.
NA	6/5.7.1.2 and 6/5.9.4	6/5.7.1.2 and 6/5.9.4	Corrected text (to clarify the original intent) to permits the use of higher strength electrodes to reduce the required fillet size, by accounting for the use of electrodes with a higher strength weld deposit material.
3	6/5.11.1.2	6/5.11.1.2	Deleted the provision for alternative of sizing of welds on primary support members based on results of FEM calculations.
	Section 7	**Section 7**	**Loads**
1	7/2.1.2.1	New	Added minimum rule still water bending moment for seagoing conditions
1	7/2.1.2.2	New	Added minimum rule still water bending moment for harbour/tank testing conditions(1.25 times rule minimum for seagoing conditions)
1	Fig.7.2.1	Fig.7.2.1	Distribution of Msw fwd of 0.9L and aft of 0.1L changed
3 Shear force is input (seagoing only)	7/2.1.3.1	New	Clarified that permissible hull girder shear force is to be given by designer and is not given by capacity of actual design
3	7/2.1.4.1	New	Added minimum rule still water hull girder shear force for harbour/tank testing conditions (1.25 times the permissible shear force for seagoing conditions)
1	7/2.2.3.1 (Figure 7.2.3)	New	Min air pipe height above tank top (0.76m) specified
1	7/2.2.3.3	7/2.2.3.5	Min. pressure relief valve setting (25kN/m2) specified
1		7/2.2.3.3	P_{drop} calculations may be required if pressure-drop may be larger than 25kN/m^2

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3	7/3.1.3	New	GM and rolling radius of gyration (Rroll) created for reduced draft (0.6Tsc).
3 (input values are used, if any)	7/3.1.3	New	Fixed value of GM and Rroll to be used for scantling evaluation
1	7/3.5.3.1	7/3.5.3.1	Green sea pressure on deck distribution changed from Blocal to Bwdk
1		7/.3.5.3	Minimum green sea load of 5 kN/m^2 removed
1	7/3.5.4.2 7/3.5.4.3	New	Ullage effect for cargo tank added for transverse and longitudinal acceleration for use in strength assessment (not fatigue)
	7/3.5.4.6	7/3.5.4	Procedure for calculation of total effect of tank pressure for longitudinals in way of tank pressure from two adjacent tanks for fatigue
	7/3.5.4.7	7/3.5.4	Procedure for tank pressures to be used for FE-based fatigue evaluation added (moved from Appendix B)
3 (input values are used, if any)	7/4.2.3.1	7/4.2.3.3	Rule GM value to be used and not to be taken from Loading manual/Trim and Stability booklet.
3		7/4.3.2	Bottom slamming pressure to be taken as the greatest pressure resulting from loading conditions with and without ballast in ballast tanks within tank
3	7/4.3.2.2		Requirement to draught at F.P. specified for loading conditions without filling of ballast tanks in bottom slamming region
3	7/4.3.2.3		Requirement to draught at F.P. specified for loading conditions with filling of ballast tanks in bottom slamming region

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3	7/4.4.2.1	7/4.4.2.1	Distribution of f_{fim} changed to be continuous and with a larger extent aft wards
3	7/6.3.7.2	8/3, 8/4, 8/5	formula to calculate internal pressure outside cargo area added (moved from Section 8)
3	7/6.3.8	8/	formula to calculate deck-loads added (moved from Section 8)
1	Table 7.6.1	Table 7.6.1	Dynamic loads for flow-through BWE changed from S+0.8D to S+D
1	Table 7.6.1	Table 7.6.1	Pressure reference point for ballast tanks not extending to weather deck revised (no more 0.5Hair)
1 (give P_{drop}=0 as input)	Table 7.6.1	Table 7.6.1	Fresh water tank is included in “other tanks for liquid filling” (it was similar to ballast tanks before)
1	Tables 7.6.4, 7.6.6, 7.6.7	Tables 7.6.2, 7.6.3, 7.6.5, 7.6.6	Some Load Combination Factors corrected
3	Tables 7.6.8, 7.6.9	Tables 7.6.7, 7.6.8	Additional load cases for engine room and stern region
	Section 8	**Section 8**	**Scantling Requirements**
NA	8/1.1.2.3 8/1.1.2.4	New	Added operational limitations for the ships designed in accordance with the Rules. The specified conditions are not covered by the Rules minimum standard but may be requested used as basis for the approval.
NA	8/1.1.2.6	8/1.1.2.4	Added requirement for both a ”normal” and “heavy” ballast condition to be included in the loading manual. Added requirement for inclusion of propeller survey afloat condition in the loading manual.
1 (loading conditions)	8/1.2.1.2	New	Clarification of applicability of hull girder bending strength requirements added.

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<tr><th>Nauticus Hull status per May 5
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<tr><td>1</td><td>8/1.3.1.1</td><td>New</td><td>Clarification of applicability of hull girder shear strength requirements added.</td></tr>
<tr><td>3</td><td>8/1.3.2.1
8/1.3.2.2</td><td>8/1.5.1.2</td><td>Clarified that ship has to have a shear force capacity equal or greater to the permissible shear force given by the designer and that permissible shear force is not equal to the capacity.</td></tr>
<tr><td>3</td><td>Figure 8.1.2</td><td>Figure 8.1.6</td><td>Corrected inner hull factor for two longitudinal bulkhead configuration</td></tr>
<tr><td>3</td><td>8/1.3.3.8
Table 8.1.6</td><td>New</td><td>Added Rule Minimum Conditions for calculation of net force on double bottom used in connection with shear force correction calculations.</td></tr>
<tr><td>3</td><td>8/1.3.4.1</td><td>8/1.5.3.1</td><td>Changed allowable utilization factor from 0.95 to 0.9.</td></tr>
<tr><td>1</td><td>8/1.4.1.2</td><td>New</td><td>Clarification of applicability of hull girder buckling strength requirements added.</td></tr>
<tr><td></td><td>Table 8.1.6</td><td>New</td><td>Rule Minimum Conditions for Double Bottoms added.
The correction force Pc is in no case to be less than that given by the rule minimum conditions given in Table 8.1.6.
<table>
<tr><th colspan="4">Table 8.1.6
Rule Minimum Conditions for Double Bottoms</th></tr>
<tr><th>Structural Configuration</th><th>Positive/negative force, Pc</th><th>Seagoing condition</th><th>Harbour condition</th></tr>
<tr><td rowspan="2">Ships with one inner longitudinal bulkhead</td><td>Max positive net vertical force, Pc+</td><td>0.9Tsc and empty cargo and ballast tanks</td><td>1.0Tsc and empty cargo and ballast tanks</td></tr>
<tr><td>Max negative net vertical force, Pc-</td><td>0.6Tsc and full cargo tanks and empty ballast tanks</td><td>0.33 Tsc and full cargo tanks and empty ballast tanks</td></tr>
</table></td></tr>
</table>

Nauticus Hull status per May 5 (1= March 2005 2 = June 2004 3 = not supported, NA = not applicable)	JTP Rule March 2005 Reference	JTP Rule June 2004 Reference	Technical Changes
			Ships with two inner longitudinal bulkheads: Max positive net vertical force, Pc+ — 1.0Tsc and empty cargo and ballast tanks — 1.0Tsc and empty cargo and ballast tanks Ships with two inner longitudinal bulkheads: Max negative net vertical force, Pc- — 0.6Tsc and full centre cargo tank and empty ballast tanks — 0.25 Tsc and full centre cargo tank and empty ballast tanks
1	Table 8.1.7	Table 1.1.1	Corrected errors in table.
	8/1.5.1.3	8/1.7.1.3	Corrected error in formula by dividing by factor of 1000
1	8/2.1.3.2	8/2.1.3	The requirement of scantlings of amidship 0.4L based on maximum required for any tank within 0.4L amidships removed. Instead, new rules require that the strength criteria are satisfied at all longitudinal positions.
3	8/2.1.5	New	Min thickness for stiffener on non-tight boundaries added
3	8/2.1.6	8/2.1.6	Min thickness for web/stringer in double side revised
1	8/2.5.6 8/2.5.7	8/2.5.6 8/2.5.7	Inconsistency of pressure point location for transverse corrugated bulkhead corrected
1	8/2.5.7.2	8/2.5.7.2	Plate thickness required over the lower 2/3 of the corrugation span is to be based on the requirements of 2.5.7.5 and 2.5.7.6. Note: Previously, the maximum local plate thickness over the lower 2/3 was applied over the lower 2/3 length, but this is removed.
1	8/2.5.7.8 (c)	8/2.5.7.9 (c)	The plate thickness required over the lower stool side is not to be less than 90% of the thickness based on the requirements of 2.5.7.2 (2.5.7.5 and 2.5.7.6). (The local plate thickness does not effect this requirement.)

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1	8/2.5.7.9 (c)	8/2.5.7.10 (c)	The plate thickness required over the upper stool side is not to be less than 80% of the thickness based on the requirements of 2.5.7.2 (2.5.7.5 and 2.5.7.6). (The local plate thickness does not effect this requirement.)
1	Table 8.2.3	Table 8.2.3	Some coefficients in the formulas for corrugated bulkheads are revised
1	Table 8.2.3	Table 8.2.3	Typo in the formulas for longitudinal corrugated bulkheads are corrected
1	Table 8.2.4 etal	Table 8.2.4 etal	Design Load Sets and Acceptance Criteria Sets introduced (criteria only)
1	Table 8.2.4	Table 8.2.4	application of Ca factor of1.0 for AC2 (S+D) from trans bulkhead to all non-longitudinal strength members
1	Table 8.2.7 Table 8.2.9	Table 8.2.10 Table 8.2.11	cargo tank pressure are to be based on GM, Rroll for partial load condition (0.6Tsc)
NA	Table 8.2.9	Table 8.2.11	draft for double bottom floor/gir and side trans in wing tank changed from Tsc to 0.9Tsc for max external pressure case Note: Draft for double bottom floor/gir in centre tank to be the same (T)
NA	Table 8.2.9	Table 8.2.11	draft for double bottom floor/girder changed from ballast draft T_{bal} to 0.6Tsc for max tank pressure case
NA	Table 8.2.9	Table 8.2.11	design pressure for cross tie changed from maximum pressure to average pressure
NA	Table 8.2.9	Table 8.2.11	for cross tie in wing cargo tanks to be checked at both Tsc and 0.6Tsc conditions
NA	8/2.6, 8/3, 8/4, 8/5, 8/7	8/2.6, 8/3, 8/4, 8/5, 8/7	Acceptance Criteria 1 (static condition) for bending and shear for PSM changed from 0.6 to 0.65. (outside cargo region also)

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NA	8/2.6.3.2	8/2.6.3.2	Location of pressure point for double bottom floor and girder, where wash bulkhead is fitted, is revised
NA	8/2.6.3.2	8/2.6.3.2	Shear span of double bottom floor, where the floor ends on a girder at a hopper or stool structure, revised
NA	8/2.6.4.3	8/2.6.4.3	Coefficient for deck transverse bending moment revised
NA	8/2.6.6.1	8/2.6.6.1	Required depth of the vertical web on the long'l bulkhead revised from 14% bending span to 9%
3	8/2.6.7.2	8/2.6.7.2	Coefficient for bending moment on horizontal stringer on trans. bhd revised
3	8/2.6.7.2	8/2.6.7.2	Min bending span (60% tank breadth) also applicable to ships with CL bhd
NA	8/2.6.8.1	8/2.6.8.1	utilization factor for cross tie from 0.4/0.5 to 0.5/0.65
3	8/3, 8/4 8/5, 8/6 and 8/7	8/3, 8/4 8/5, 8/6 and 8/7	Modified format of criteria to suit application to Design Load Sets and Acceptance Criteria Sets
3	8/3,8/4,8/5	8/3,8/4,8/5	application of Ca factor of1.0 for AC2 (S+D) from trans bhd to all non-longitudinal strength members (same as midship part)
3	8/3 8/4 8/5	8/3 8/4 8/5	Modified C(t) factor for primary support members Acceptance Criteria Set AC1 (Static) from 0.60 to 0.65 for primary support members, similar to midship part
NA	8/3.1.2.4, 8/4.1.2.3*, 8/5.1.2.4*, 8/7.2.3.2	8/3.1.2.4, 8/4.1.2.3, 8/5.1.2.4, 8/7(New)	application of shear and bending requirements with regards to the extent of primary support members changed to "between end supports" from "clear of end brackets". As applicable, the end brackets contribute to offered section modulus at the ends of the member.

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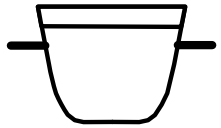
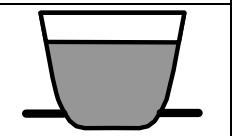
<tr><td></td><td>* Errata update</td><td></td><td></td></tr>
<tr><td>NA</td><td>8/3.5.3.4
8/4.6.3.4
8/5.5.3.4</td><td>8/3.5.3.4
8/4.6.3.4
8/5.5.3.4</td><td>Modified minimum depth of primary support members on tank boundaries from 20% of the span to 14% of the span.</td></tr>
<tr><td>3</td><td>Table 8.3.4</td><td>Table 8.3.5</td><td>Notes added to table similar to those of Table 8.7.1 to reflect the application of primary support member strength requirements over the length between support points. Same applies in application of 8/3, 8/4 and 8/5.</td></tr>
<tr><td>3</td><td>Table 8.3.4</td><td>Table 8.3.5</td><td>Load model B (trapezoidal distribution of load) removed (former Table 8.3.4)</td></tr>
<tr><td>NA</td><td>Table 8.3.8
(Table 8.7.2 similar)</td><td>New</td><td>Loading pattern details for each loading condition added.
<table>
<tr><th colspan="6">Table 8.3.8
Loading Pattern Details for each Loading Condition</th></tr>
<tr><td>Type of Local Support and Primary Support Member</td><td>Design Load Set See Note 1</td><td>Load Component</td><td>External Draught</td><td>Comment</td><td>Diagrammatic presentation</td></tr>
<tr><td rowspan="4">Shell Envelope</td><td>1</td><td>P_{ex}</td><td>T</td><td rowspan="2">Sea pressure only</td><td rowspan="2">  </td></tr>
<tr><td>2</td><td>P_{ex}</td><td>T</td></tr>
<tr><td>5</td><td>P_{in}</td><td>T_{bal}</td><td rowspan="2">Tank pressure only. Sea pressure to be ignored</td><td rowspan="2">  </td></tr>
<tr><td>6</td><td>P_{in}</td><td>0.25T</td></tr>
</table></td></tr>
</table>

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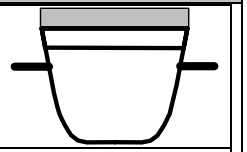
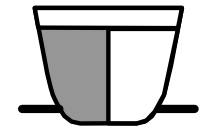
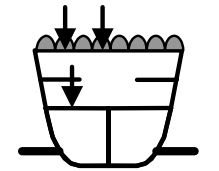
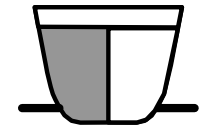
<tr><td></td><td></td><td></td><td>
<table>
<tr><td>External Decks</td><td>1</td><td>P_{ex}</td><td>T</td><td>Green sea pressure only</td><td>  </td></tr>
<tr><td rowspan="3">Decks forming Tank Boundaries and/or Watertight Boundaries</td><td>5</td><td>P_{in}</td><td>T_{bal}</td><td rowspan="3">Pressure from one side only
Full tank with adjacent tank empty</td><td rowspan="3">  </td></tr>
<tr><td>6</td><td>P_{in}</td><td>0.25T</td></tr>
<tr><td>11</td><td>P_{flood}</td><td>-</td></tr>
<tr><td rowspan="2">Internal and External Decks or Flats</td><td>9</td><td>P_{dk} or F_{dk}</td><td>T_{bal}</td><td rowspan="2">Distributed or concentrated loads only. Adjacent tanks empty. Green sea pressure may be ignored</td><td rowspan="2">  </td></tr>
<tr><td>10</td><td>P_{dk} or F_{dk}</td><td>T_{bal}</td></tr>
<tr><td rowspan="3">Other Tank Boundaries or Watertight Boundaries</td><td>5</td><td>P_{in}</td><td>T_{bal}</td><td rowspan="3">Pressure from one side only
Full tank with adjacent tank empty</td><td rowspan="3">  </td></tr>
<tr><td>6</td><td>P_{in}</td><td>0.25T</td></tr>
<tr><td>11</td><td>P_{flood}</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>NA</td><td>8/4.5.2.2</td><td>8/4.5.2.2</td><td>Thickness of foundation top plates made guidance (not Rule requirement).</td></tr>
<tr><td>3</td><td>8/6.4.2.1</td><td>8/6.4.2.1</td><td>Longitudinal extent of strengthening against bow impact pressure changed from 0.08L to 0.1L (to be consistent of 6.4.1 Application)</td></tr>
<tr><td>NA</td><td>8/6.4.7.2</td><td>8/6.4.7.2</td><td>Max limit of Spacing of PSM for bow impact area changed from 3+0.006L to 3+0.008L</td></tr>
</table>

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	Section 9	**Section 9**	**Design Verification**
NA	n/a	9/2.2.5.5	• Paragraph removed, relative deflection criteria removed. FE fine mesh analysis of deck, double bottom longitudinal and adjoining transverse bulkhead vertical stiffeners made mandatory.
NA	Table 9.2.1	Table 9.2.1	• Bilge plate added to structural component group • Removal of *k* factor from criteria • Limited material yield stress of high tensile steel to 315 N/m^2 in way of stress concentration
NA	Table 9.2.2	Table 9.2.2	• No technical changes
NA	n/a	Table 9.2.3	• Relative deflection criteria removed. FE fine mesh analysis of deck, double bottom longitudinal and adjoining transverse bulkhead vertical stiffeners made mandatory.
NA	9/2.3.1.1	2.3.1.1	• Add FE fine mesh analysis of deck, double bottom longitudinal and adjoining transverse bulkhead vertical stiffeners as mandatory requirement
NA	Table 9.2.4	Table 9.2.4	• Stress criteria in way of a weld revised, 1.5 for S+D design combination, 1.2 for S design combination • *k* factor for material yield stress of high tensile steel limited to 0.78 • Removed criteria for average stress over neighbour elements • Introduced requirement for checking average stress, over area equivalent to the mesh size of the cargo tank finite element model, is less than the criteria required for cargo tank analysis.
NA	9/2.4	n/a	• New sub-section added to specify procedure for the application of the scantlings that comply with the requirements of the finite element strength assessment to the structure within the cargo tank region.
NA		9/3.3.2.2 9/3.4.1.1	Add requirement to scallops in way of block joints on the strength deck within the cargo tank region

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	Section 10	**Section 10**	**Buckling and Ultimate Strength**
1		10/2.2.1.1	C factor (minimum s/t for normal strength steel) for plate panels in hull envelope and tank boundaries is increased from 90 to 100.
1		10/2.2.1.1	definition of d_w (depth of web plate) is clarified
3		10/2.3.1.1	C factor (minimum s_w/t_w for normal strength steel) for web plate of primary support members is increased from 90 to 100.
3		10/2.3.3.1	A minimum value of 3 m for required maximum distance between tripping brackets is added.
3		10/2.4.2.2	Maximum length of un-stiffened edge of tripping bracket is increased from $65t_{bkt}$ to $75t_{bkt}$.
3		10/2.4.3.1	Minimum web depth of of edge stiffener is reduced from 75 mm to 50 mm.
		10/2.4.3.1	C=50 is added for edge reinforcements (stiffeners) in way of openings.
1		10/3.2.1.1	Minimum value for C_σ (buckling coefficient) is added for case (a) in Table 10.3.1, compression on short edge. The minimum value is based on the C_σ coefficient for (b) compression on the long edge: $C_\sigma = c\left[1+\left(\frac{l_a}{1000 l_b}\right)^2\right]^2 \frac{2.1}{\Psi + 1.1}$
1		10/3.2.1.1	The stiffener influence factor *c* (edge constraint for transverse buckling) may be taken as average value, when different type of stiffener are fitted along the long edges of a plate panel.
3		10/3.4.2.1	Buckling coefficient for compression and shear in way of a web without edge reinforcement is

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			changed to (Table 10.3.3): $C_\sigma = 1 + 0.43\left(\frac{s_{stf}}{h_{opn}}\right)^2$ $C_\tau = 9.34$ for $\frac{s_{stf}}{h_{opn}} \geq 1$ $C_\tau = 5.34 + 4\left(\frac{s_{stf}}{h_{opn}}\right)^2$ for $\frac{s_{stf}}{h_{opn}} < 1$
NA		10/3.5.1.5	Table 10.3.4; single symmetrical section with one web. St. Venants moment of inertia corrected to: $I_{sv-net50} = \frac{1}{3}\left(b_f t_{f-net50}^3 + d_w t_{w-net50}^3\right)$
NA		10/3.5.1.5	Table 10.3.4; single symmetrical section with one web. Position of shear centre relative to the cross-sectional centroid is added: $y_0 = 0$ cm $z_0 = \frac{0.05 \cdot (d_w + 0.5 t_{w-net50})}{\frac{b_f^3 t_f}{t_{w-net50}^3 (d_w - 0.5 t_{f-net50})} + 1}$ cm
NA		10/3.5.1.5	Table 10.3.4; single symmetrical section with two webs. Position of shear centre relative to the cross-sectional centroid is added:

Nauticus Hull status per May 5 (1= March 2005 2 = June 2004 3 = not supported, NA = not applicable)	JTP Rule March 2005 Reference	JTP Rule June 2004 Reference	Technical Changes
			$y_0 = 0$ cm $z_0 = \frac{0.05 \cdot d_w^2 t_{w-net50} b_{fu}^2}{t_{w-net50}^3 d_w / 3 + b_{fu}^2 (d_w t_{w-net50} + t_{f-net50} b_{fu} / 6)}$ cm
NA		10/3.5.1.5	Table 10.3.4; definition of following cross section parameters is clarified: b_f b_{fu} d_w
	Section 11	**Section 11**	**General Requirements**
NA	11/1.2.3.2 11/1.3.4.2	11/1.2.3.2 11/1.3.4.2	Corrected pressure equation in accordance with UR S27. (JTP pressure is now a factor of 9.8 less).
3	11/1.4	11/1.4	Corrected higher strength factor to 235/yield.
3	11/1.4.7	11/1.4.7	Added provisions to accept alternative calculations for bending, shear and depth requirements for deck house primary support members.
3	11/1.4.8.2	11/1.4.8.2	Coefficients for HTS pillars in deckhouse added
3	11/2.1.2.2	11/2.1.2.2	Modified requirement so that bulwark says are to be generally spaced 2.0m and Table 11.2.2 has been deleted.

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NA	11/2.1.4.2	11/2.1.4.2	Corrected deck spill coming requirements for aft end to reflect SOLAS requirements. Requirement that the coaming surround the cargo deck has been retained.
NA	11/3.1.2.15	11/3.1.3.15	Increase permissible stress levels to 0.85yield for bending and 0.58yield for shear, to reflect application of extreme (not working) loads.
NA	11/3.1.3.1	11/3.1.4.1	Removed the requirement that pillars or pillar bulkheads be provided to support the windlass.
NA	11/3.1.3.8	11/3.1.4.8	Design load of the supporting structure for mooring winch with brake increased from 80% to 100% of the holding load
NA	11/3.1.4.14	11/3.1.5.14	Updated welding to require a full penetration weld of the crane pedestal to the deck where the crane pedestal terminates at the deck and to require full penetration weld of main structure supporting the pedestal where the pedestal passes through the deck.
NA	11/3.1.6	New	Added new sub-section for “Supporting structure for bollards and bitts, fairleads, stand rollers and chocks” to incorporate the requirements of UR A2. This replaces “former” text of 11/3.1.7.7.
3	11/3.3.3.4	11/3.3.3.4	Modified the point of termination of bilge keel to require that “An internal transverse support member is to be positioned between the end of the bilge keel web and the halfway point between the end of the bilge keel web and the end of the ground bar.”
3	11/4.2.4.1	New	Submission of emergency towing and mooring arrangement plans and data are required. (This corrects previous omissions.)
NA	11/4.2.17	New	Added new sub-section for “Bollards and bitts, fairleads, stand rollers and chocks” to incorporate the requirements of UR A2. Text of “former” 11/4.2.16.2 deleted.
NA	11/4.2.18.1	11/4.2.17.1	Clarified that mooring winch design and capacity are not subject to class approval. The “former” text is changed to a guidance note.

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NA	11/4.2.19.3	11/4.2.18.3	Updated sperling pipe access and sealing requirements to be more in line with present practice and to remove the specific requirement that it be weathertight.
3	Table 11.5.1	Table 11.5.1	Regarding Note 1 to the table: The text “This relaxation does not apply to cargo space boundaries and tanks for segregated cargoes or pollutants (of series ships).” has been deleted and replace with text that leaves the interpretation of this relaxation for cargo space boundaries and tanks for segregated cargoes or pollutants (of series ships) to the interpretation of the individual classification society.
	Section 12	**Section 12**	**Ship in Operation Renewal Criteria**
3	All	All	Wastage allowances within this Section have been updated to be consistent with the changes incorporated in Section 6/3, considering the 0.5mm differences between t(corr) and the Ship in Operation wastage allowance. Changes have been made to the text to clarify the requirements. The new text is consistent with present IACS and SOLAS requirements covering “in service” gauging requirements and scantling evaluations, and do not result in any technical changes to the JTP criteria.
3	12/1.1.3	New	Added requirements for documentation
3	12/1.3	New	Added categories of corrosion
3	12/1.4.2.1	12/1.2.1.2	Criteria given as renewal thickness instead of wastage allowance
3	12/1.4.2.3	New	Added requirement for thickness of renewed members
3	Table 12.1.1	Table 12.1.1	Wastage allowance for internals in voids increased from 1.0mm to 1.5mm
3	Table 12.1.2	Table 12.1.2	Corrosion addition for internals in voids increased from 1.0mm to 1.5mm
3	12/1.5.3	12/1.3.2	Clarified how to calculate minimum allowable hull girder sectional properties

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3	12/1.6	New	Added criteria for allowable local wastage in form of pitting, grooving and edge corrosion
	Appendix B	**Appendix B**	**Structural Strength Assessment**
1	B/1.1.1	B/1.1.1	Sub-section rewritten Add definition of region for midship strength assessment. Add definition of regions for hull girder shear strength assessment. Add definition of mandatory and optional assessment.
1	B/2.2.1.1	B/2.2.1.1	Add clarification for selection of tank for modelling if the tanks within the midship cargo region are of different length. Add clarification that the cargo tank model can be prismatic.
1	B/2.2.1.10	B/2.2.1.10	Add clarification that shell elements in association with beam elements are to be used to represent stiffened panels in areas under lateral pressure load.
1	B/2.3.1	B/2.3.1	Add clarification of mandatory and optional FE load cases.
1	Table B.2.3	Table B.2.3	Table revised: Revised and assignment of hull girder still water bending moment and shear force to each loading pattern. Introduce filling of ballast wing tanks in checker board loading patterns. Introduce new loading patterns for harbour load cases. Remove normal ballast condition from standard load cases Revised assignment of dynamic load cases to load patterns. Define load cases required for the assessment of midship region scantlings and load cases required for the assessment of strengthening in way of individual transverse bulkhead due to hull girder shear loads. Revised ship draught for loading patterns; 1. Minimum draught used for seagoing load cases reduced to 0.6 T_{sc} from 2/3 T_{sc}. 2. Maximum draught used for seagoing load cases with one or more wing cargo tanks empty reduced to 0.9 T_{sc} from T_{sc}. 3. For tankers with two oil-tight longitudinal bulkheads, loading pattern with all cargo tanks abreast empty is assessed with a reduced draught of 0.6 T_{sc} (previously 0.9 T_{sc}) for seagoing load cases. Corresponding loading pattern in harbour is added based on a ship

Nauticus Hull status per May 5 (1= March 2005 2 = June 2004 3 = not supported, NA = not applicable)	JTP Rule March 2005 Reference	JTP Rule June 2004 Reference	Technical Changes
			draught equal to 0.8 T_{sc}. Deeper draught for this loading pattern is to be an optional requirement. Revised notes to table.
1	Table B.2.4	Table B.2.4	Table revised, see above.
1	B/2.3.2	B/2.3.2	Revision of dynamic load combination factors (LCFs) for hull girder loads for beam sea and oblique sea dynamic load cases; For beam sea cases, LCFs for vertical wave bending moment, horizontal wave bending moment and vertical wave shear force are set to zero (previously ranging from 0.1 to 0.3, 0.1 to 0.2 and 0.1 respectively). For oblique sea cases, LCF for vertical wave shear force is set to zero (previously 0.1). Note that Table B.2.5 in June 2004 version of Rules is removed, and relocated to Section 7/6/Table 7.6.2 in March 2005 version of Rules.
NA	n/a	Table B.2.5	Table B.2.5 in June 2004 version of Rules is removed, and relocated to Section 7/6/Table 7.6.2 in March 2005 version of Rules.
1	Table B.2.5	Table B.2.6	Table updated to clarify GM and roll radius of gyration to be used for various loading patterns.
NA	n/a	Table B.2.7	Table B.2.7 in June 2004 version of Rules is removed. Still water bending moment and shear force is now assigned to loading patterns and given in Table B.2.3 and Table B.2.4 in March 2005 version of the Rules.
1	Table B.2.6	n/a	New Table: Define load parameters to be used for various FE assessments Define positions for calculating loads and accelerations for various FE assessments Define still water bending moments and shear forces for various FE assessments
1	B/2.4.2.3	B/2.4.2.3	Revised density of steel to 7.85 t/m^3 (7.8 t/m^3 previously)
1	B/2.4.3	B/2.4.3	Formulae for static sea pressure now given in Section 7/2.2.2.
1	B/2.4.4	B/2.4.4	Formulae and calculation now given in Section 7/6.3.5 (dynamic wave pressure).

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			Green sea load applied to FE analysis revised to be inline with other parts of the Rules. Formulae and calculation now given in Section 7/6.3.6 (green sea load).
1	B/2.4.5	B/2.4.5	Formulae and calculation for wave vertical bending moments and shear forces now given in Section 7/6.3.2 and 6.3.4
1	B/2.4.6	B/2.4.6	Formulae and calculation for wave horizontal bending moments now given in Section 7/6.3.2
1 1	B/2.4.7	B/2.4.7	Factors have been introduced to the formula for cargo tank internal pressure to account for the reduction in pressure due to ullage effect. Formulae and calculation for wave horizontal bending moments now given in Section 7/3.5.4. Revised application of overpressure and pressure drop to be consistent with all parts of the Rules. Formulae and calculation procedure now given in Section 7/2.2.3.
1	B/2.5.2.3	B/2.5.2.3	Clarify that self weight of beam model for the calculation of hull girder bending moments and shear forces is to be based on net scantlings (i.e. $t_{grs} - 0.5\, t_{corr}$)
	B/2.7.2.4	B/2.7.2.4	Clarification added for procedure to correct of shear stress in way of web plate with opening.
NA	n/a	B/2.7.4	Sub-section regarding assessment of relative deflection removed from March 2005 version of Rules.
1 3	B/3.1.2	B/3.1.2	Fine mesh analysis on transverse web frame Scope of FE mesh analysis increased with the introduction of screening procedure for openings and bracket toes.
1 3	B/3.1.3	B/3.1.3	Fine mesh analysis on transverse bulkhead stringers, buttress and adjacent web frame Scope of FE mesh analysis increased with the introduction of screening procedure for openings and bracket heels and toes.

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3 3	B/3.1.4	B/3.1.4	Fine mesh analysis of longitudinal connections and transverse bulkhead web stiffeners Scope reduced. Longitudinal stiffeners on double side and longitudinal bulkhead not longer required but the FE analysis of deck, double bottom longitudinal and transverse bulkhead vertical stiffeners now mandatory.
3	n/a	B/3.1.6	New sub-section Introduction of screening procedure and criteria for determining whether a FE fine mesh analysis needs to be carried out. Screening procedure applies to openings, bracket toes and heels of primary support structural members.
NA	Figure B.4.5	n/a	Figure removed and relocated to Section 7/Figure 7.3.9.
NA	4.5.2.4	4.5.2.4	Editorial error corrected for formula
	Appendix C	**Appendix C**	**Fatigue Strength Assessment**
1		1.4.1.6	Update Weibull parameter for bottom from $\xi = 1.1 - 0.35\frac{L-100}{300}$ to $\xi = 0.95\left(1.1 - 0.35\frac{L-100}{300} \right)$
1		1.4.4.11	stress factor for bending stress in longitudinal stiffeners caused by relative deformation between supports, to be taken as: 1.0 at frame connections 1.15 for all longitudinals at transverse bulkhead connections including swash bulkheads except: (a) in full load condition: 1.3 for side longitudinals at mid position between lowest side stringer and deck corner 1.15 for side longitudinals at lowest side stringer and deck corner to be linearly interpolated between these two positions 1.5 for bottom longitudinals at mid position between longitudinal bulkhead, bottom girders or buttress structure 1.15 for bottom longitudinals at longitudinal bulkhead, bottom girders or buttress structure to be linearly interpolated between these two positions

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			See *Figure C.1.3* (b) in ballast condition: 1.5 for bottom longitudinals in the mid position between longitudinal bulkhead, bottom girders or buttress structure 1.15 for bottom longitudinals at longitudinal bulkhead, bottom girders or buttress structure to be linearly interpolated between these two positions
1		Table C.1.2	Stress range combination factors for inner side shell below D/2 and above D/2 in both full load and ballast condition have been updated
1		1.4.4.20	Stress range combination factors within cargo hold area have been updated as: (a) Zone M: Midship region. This zone extends over the full length of all tanks where the tank LCG lies between 0.35L and 0.8L from AP. (b) Zone A: Aft region. This zone starts at the middle of the tank immediately aft of Zone M and extends aftwards to include all the aftmost tanks. (c) Zone F: Forward region. This zone starts at the middle of the tank immediately forward of Zone M and extends forwards to include all the foremost tanks. (d) Zone AT: Aft transition region between Zone M and Zone A. The stress range combination factors are to be calculated by linear interpolation between the stress range combination factors for Zones M and A. (e) Zone FT: Forward transition region between Zone M and Zone F. The stress range combination factors are to be calculated by linear interpolation between the stress range combination factors for Zones M and F. Note where ballast tanks, centre and wing cargo tanks do not have the same lengths e.g. if slop tank is present, the middle position is to be taken at the middle of the longer tank.
1		1.4.5.10	Rule is updated to use the actual still water bending moment
NA		1.4.5.14	Rule has been clarified to explain when toe grinding can be adopted and what is needed to submit to Class for approval
1		2.4.2.7	Total stress combination has been updated as:

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			$S = f_{\mathrm{mod}\,el}\lvert 0.85(S_{e1} + 0.25S_{e2}) - 0.3S_i \rvert$ for full load condition $S = f_{\mathrm{mod}\,el}\lvert 0.85(S_{e1} - 0.2S_{e2}) \rvert$ for ballast load condition
1	C/1.4.4.19		Updated to: $S = f_{SN}\lvert f_1 S_v + f_2 S_h + f_3 S_{ev} + f_4 S_i \rvert$
1	Table C.1.2		Added absolute value on y-values.
1	1.4.4.11		Implement computation of fatigue lifetime on bulkheads and swash bulkheads
1	1.4.4.20		Compute fatigue lifetime for all zones
1	Table C.1.6		Include end connection 32
	Appendix D	**Appendix D**	**Buckling Strength Assessment**
1 (FEM) 1 (Prescriptive)		D/5.3	Table D.5.1 and Figure D.5.1; the assessment method has been changed from *buckling strength* to *ultimate strength* for the following two structural elements: • web of double bottom longitudinal girder connected to hopper tank side • web of horizontal girder in double side tank connected to hopper tank side
1		D/6.2	Table D.6.1; the assessment method has been changed from *buckling strength* to *ultimate strength* for the following two structural elements: • web of double bottom longitudinal girder connected to hopper tank side. • web of horizontal girder in double side tank connected to hopper tank side
1		D/6.2.3	Figure D.6.5 is added; defining equivalent plate panel for capacity model for web plate.
			Erratas

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1 / NA	2.1.2.1	2.1.2.1	$M_{sw\text{-}min\text{-}sea} = -\underline{0.05185}\, f_{sw}\, C_{wv}\, L^2\, B\, (C_b + 0.7)$
1	3.5.4.3	3.5.4.3	$P_{in\text{-}lng} = \sout{f_{ull\ lng}}\ \rho \underline{a_{lng}}\ \lvert x_0 - x \rvert$
3	7/4.3.2.1	7/4.3.2.1	c_{av} dynamic load coefficient, is to be taken as 1.25
3	7/4.4.2.1	7/4.4.2.1	f_{im} 0.55 at ~~collision bulkhead~~ 0.1L aft of F.P. 0.9 at 0.0125L aft of F.P. 1.0 at and forward of F.P. intermediate values to be obtained by linear interpolation
1	Table 7.6.1	Table 7.6.1	$P_{in\text{-}tk} + \underline{P_{valve}}$
1	6.3.6.2	6.3.6.2	$z_{dk\text{-}T}$ distance from deck at side to still waterline, in m
1	Table 7.6.3	Table 7.6.3	**Loaded DLCF** *Table 7.6.8* *Table 7.6.4* *Table 7.6.6* *Table 7.6.8* **Ballast DLCF** *Table 7.6.9* *Table 7.6.5* *Table 7.6.7* *Table 7.6.9*
3	Table 7.6.8	Table 7.6.8	**Dynamic Load Case** 1 2 3a 3b 4a 4b 5a 5b 6a 6b 7a 7b
3	Table 7.6.9	Table 7.6.9	**Dynamic Load Case** 1 2 3a 3b 4a 4b 5a 5b 6a 6b 7a 7b