DNV OFFSHORE CODES

AMENDMENTS AND CORRECTIONS

OCTOBER 2004

DET NORSKE VERITAS

FOREWORD

DET NORSKE VERITAS (DNV) is an autonomous and independent foundation with the objectives of safeguarding life, property and the environment, at sea and onshore. DNV undertakes classification, certification, and other verification and consultancy services relating to quality of ships, offshore units and installations, and onshore industries worldwide, and carries out research in relation to these functions.

DNV Offshore Codes consist of a three level hierarchy of documents:

— *Offshore Service Specifications.* Provide principles and procedures of DNV classification, certification, verification and consultancy services.
— *Offshore Standards.* Provide technical provisions and acceptance criteria for general use by the offshore industry as well as the technical basis for DNV offshore services.
— *Recommended Practices.* Provide proven technology and sound engineering practice as well as guidance for the higher level Offshore Service Specifications and Offshore Standards.

DNV Offshore Codes are offered within the following areas:

A) Qualification, Quality and Safety Methodology

B) Materials Technology

C) Structures

D) Systems

E) Special Facilities

F) Pipelines and Risers

G) Asset Operation

H) Marine Operations

Comments may be sent by e-mail to *rules@dnv.com*
For subscription orders or information about subscription terms, please use *distribution@dnv.com*
Comprehensive information about DNV services, research and publications can be found at *http*://www.dnv.com, or can be obtained from DNV, Veritasveien 1, N-1322 Høvik, Norway; Tel +47 67 57 99 00, Fax +47 67 57 99 11.

Computer Typesetting (FM+SGML) by Det Norske Veritas.
Printed in Norway

CONTENTS

SECTION 1
CURRENT DNV OFFSHORE CODES

DNV Offshore Codes		Date of issue	Date of amendment
Offshore Service Specifications			
DNV-OSS-101	Rules for Classification of Offshore Drilling and Support Units	October 2003	April 2004
DNV-OSS-102	Rules for Classification of Floating Production and Storage Units	October 2003	April 2004
DNV-OSS-103	Rules for Classification of LNG/LPG Floating Production and Storage Units or Installations	May 2001	October 2001
DNV-OSS-121	Classification based on Performance Criteria Determined from Risk Assessment Methodology	May 2001	–
DNV-OSS-201	Verification for Compliance with Norwegian Shelf Legislation	July 2003	–
DNV-OSS-202	Verification for Compliance with UK Shelf Regulations	March 2001	–
DNV-OSS-300	Risk Based Verification	April 2004	–
DNV-OSS-301	Certification and Verification of Pipelines	October 2000	–
DNV-OSS-302	Offshore Riser Systems	October 2003	–
DNV-OSS-305	Rules for Certification and Verification of Diving Systems	January 2004	–
DNV-OSS-306	Verification of Subsea Facilities	June 2004	–
DNV-OSS-307	Verification of Process Facilities	June 2004	–
Offshore Standards			
DNV-OS-A101	Safety Principles and Arrangement	January 2001	October 2001, October 2002
DNV-OS-B101	Metallic Materials	January 2001	–
DNV-OS-C101	Design of Offshore Steel Structures, General (LRFD method)	April 2004	–
DNV-OS-C102	Structural Design of Offshore Ships	April 2004	–
DNV-OS-C103	Structural Design of Column Stabilised Units (LRFD method)§	April 2004	–
DNV-OS-C104	Structural Design of Self-elevating Units (LRFD method)	January 2001	October 2001 April 2004
DNV-OS-C105	Structural Design of TLPs (LRFD method)	January 2001	–
DNV-OS-C106	Structural Design of Deep Draught Floating Units (LRFD method)	January 2001	–
DNV-OS-C201	Structural Design of Offshore Units (WSD method)	April 2002	April 2004
DNV-OS-C301	Stability and Watertight Integrity	January 2001	–
DNV-OS-C401	Fabrication and Testing of Offshore Structures	April 2004	–
DNV-OS-C501	Composite Components	January 2003	–
DNV-OS-C502	Offshore Concrete Structures	July 2004	October 2004
DNV-OS-C503	Concrete LNG Terminal Structures and Containment Systems	October 2004	October 2004
DNV-OS-D101	Marine and Machinery Systems and Equipment	January 2001	April 2002, October 2002, April 2003
DNV-OS-D201	Electrical Installations	January 2003	October 2003
DNV-OS-D202	Instrumentation and Telecommunication Systems	October 2000	October 2001
DNV-OS-D301	Fire Protection	January 2001	April 2002 April 2004
DNV-OS-E101	Drilling Plant	October 2000	–
DNV-OS-E201	Hydrocarbon Production Plant	October 2000	April 2002
DNV-OS-E301	Position Mooring	June 2001	October 2001
DNV-OS-E401	Helicopter Decks	March 2001	–
DNV-OS-E402	Offshore Standard for Diving Systems	January 2004	April 2004 October 2004
DNV-OS-F101	Submarine Pipeline Systems	2000	April 2002, April 2003, October 2003 April 2004
DNV-OS-F201	Dynamic Risers	2001	October 2001, October 2003
DNV-OS-J101	Design of Offshore Wind Turbine Structures	June 2004	October 2004
Recommended Practices			
DNV-RP-A201	Standard Documentation Types	November 2000	–
DNV-RP-A202	Documentation of Offshore Projects	January 2001	October 2001
DNV-RP-A203	Qualification Procedures for New Technology	September 2001	–

DNV-RP-B401	Cathodic Protection Design	1993	–
DNV-RP-C102	Structural Design of Offshore Ships	February 2002	–
DNV-RP-C103	Column Stabilised Units	October 2001	–
DNV-RP-C201	Buckling Strength of Plated Structure	October 2002	April 2003 April 2004 October 2004
DNV-RP-C202	Buckling Strength of Shells	October 2002	–
DNV-RP-C203	Fatigue Strength Analysis of Offshore Steel Structures	October 2001	April 2002
DNV-RP-E301	Design and Installation of Fluke Anchors in Clay	2000	–
DNV-RP-E302	Design and Installation of Drag-in Plate Anchors in Clay	2000	–
DNV-RP-E305	Onbottom Stability Design of Submarine Pipelines	1988	–
DNV-RP-E402	Naval Rescue Submersibles	April 2004	–
DNV-RP-F101	Corroded Pipelines	October 2004	–
DNV-RP-F102	Pipeline Field Joint Coating and Field Repair of Linepipe Coating	October 2003	October 2003 April 2004
DNV-RP-F103	Cathodic Protection of Submarine Pipelines by Galvanic Anodes	October 2003	April 2004
DNV-RP-F104	Mechanical Pipeline Couplings	1999	–
DNV-RP-F105	Free Spanning Pipelines	March 2002	October 2003
DNV-RP-F106	Factory Applied External Pipeline Coatings for Corrosion Control	October 2003	April 2004
DNV-RP-F107	Risk Assessment of Pipeline Protection	March 2001	October 2002
DNV-RP-F201	Design of Titanium Risers	October 2002	–
DNV-RP-F202	Composite Risers	May 2003	–
DNV-RP-G101	Risk Based Inspection of Offshore Topside Static Mechanical Equipment	January 2002	–
DNV-RP-H101	Risk Management in Marine and Subsea Operations	January 2003	–
DNV-RP-H102	Marine operations during Removal of Offshore Installations	April 2004	–
DNV-RP-O401	Safety and Reliability of Subsea Systems	April 1985	–

SECTION 2
OFFSHORE SERVICE SPECIFICATIONS

DNV-OSS-101: Rules for Classification of Offshore Drilling and Support Units, October 2003

Ch.2 Sec.1 Page 32 (Amended April 2004)

A new item C202 has been inserted as follows:

202 Rolled, forged or cast elements of steel and aluminium for structural application shall be supplied with DNV's material cetificates in compliance with the requirements given in DNV-OS-B101.

Ch.2 Sec.2 Page 36 (Amended April 2004)

In item E201, the reference has been corrected to DNV-OS-D301, Ch.2 Sec.6.

Ch.3 Sec.1 Page 52 (Amended April 2004)

*In Table C2, column "*Remarks*", row 6, the reference has been corrected to* Sec.2 J.

Ch.3 Sec.2 Page 69 (Amended April 2004)

*In item J301, the reference to "*Appendix A*" has been corrected to "*Appendix B*".*

DNV-OSS-102: Rules for Classification of Floating Production and Storage Units, October 2003

Ch.2 Sec.1 Page 32 (Amended April 2004)

A new item C202 has been inserted as follows:

202 Rolled, forged or cast elements of steel and aluminium for structural application shall be supplied with DNV's material cetificates in compliance with the requirements given in DNV-OS-B101.

Ch.2 Sec.2 Page 37 (Amended April 2004)

A new item C202 has been inserted as follows:

202 Rolled, forged or cast elements of steel and aluminium for structural application shall be supplied with DNV's material cetificates in compliance with the requirements given in DNV-OS-B101.

Ch.3 Sec.1 Page 54 (Amended April 2004)

*In Table C2, column "*Remarks*", row 6, the reference has been corrected to* Sec.2 J.

Ch.3 Sec.2 Page 72 (Amended April 2004)

*In item J301, the reference to "*Appendix A*" has been corrected to "*Appendix C*".*

DNV-OSS-103: Rules for Classification of LNG/LPG Floating Production and Storage Units or Installations, May 2001

Sec.2 Page 7 (Amended October 2001)

In item E201 2) the references F200, F300 and F400 should be corrected to DNV-OS-D301 Sec.7 F200, DNV-OS-D301 Sec.7 F300 and DNV-OS-D301 Sec.7 F200, respectively.

SECTION 3
OFFSHORE STANDARDS

DNV-OS-A101: Safety Principles and Arrangement, January 2001

Sec.4 Page 14 (Amended October 2002)

Item B302 is corrected to read:

302 The number and release rate of primary grade sources shall be minimised as far as practicable. Location of a primary grade source within an enclosed area shall as far as practicable be avoided.

Sec.4 Page 15 (Amended October 2002)

A new item C104 is introduced:

104 For definition of Grade of release, reference is made to IP 15.

Sec.4 Page 15 (Amended October 2002)

In Table C1 zone references shall be deleted from 'Grade of release' column.

Sec.5 Page 18 (Amended October 2001)

Item A405 is corrected to read:

405 The ESD central control unit shall be powered from a monitored Uninterruptible Power Supply (UPS) capable of at least 30 minutes continuous operation on loss of its electrical power supply systems. The UPS shall be powered from both the main and the emergency power system.

Sec.8 Page 28 and 29 (Amended October 2002)

Item C501 is deleted.

DNV-OS-C104: Structural Design of Self-elevating Units (LRFD method), January 2001

Sec.4 Page 15 (Amended October 2001)

Item D304 is corrected to read:

304 For a deterministic wave analysis using an appropriate non-linear wave theory for the water depth, i.e. Stokes' 5th or Dean's Stream Function, the fluid velocity of the maximum long-crested 100 year wave may be multiplied with a kinematic reduction factor of 0.86. The scaling of the velocity shall be used only in connection with hydrodynamic coefficients as defined for mobile units in 503, i.e. $C_D = 1.0$ for submerged, cleaned jack-up members.

Sec.4 Page 15 (Amended April 2004)

Item D304 shall now read:

304 For a deterministic wave analysis using an appropriate non-linear wave theory for the water depth, i.e. Stokes' 5th or Dean's Stream Function, the fluid velocity of the maximum long-crested 100 year wave may be multiplied with a kinematic reduction factor of 0.86. The scaling of the velocity shall be used only in connection with hydrodynamic coefficients defined according to 503, i.e. $C_D \geq 1.0$ for submerged tubular members of self-elevating units.

Guidance note:

The kinematics reduction factor is introduced to account for the conservatism of deterministic, regular wave kinematics traditionally accomplished by adjusting the hydrodynamic properties.

---e-n-d---of---G-u-i-d-a-n-c-e---n-o-t-e---

DNV-OS-C201: Structural Design of Offshore Units (WSD Method), April 2002

Sec.12 Page 52 (Amended April 2004)

Item F604 shall now read:

604 For a deterministic wave analysis using an appropriate non-linear wave theory for the water depth, i.e. Stokes' 5th or Dean's Stream Function, the fluid velocity of the maximum long-crested 100 year wave may be multiplied with a kinematic reduction factor of 0.86. The scaling of the velocity shall be used only in connection with hydrodynamic coefficients defined according to 803, i.e. $C_D \geq 1.0$ for submerged tubular members of self-elevating units.

Guidance note:

The kinematics reduction factor is introduced to account for the conservatism of deterministic, regular wave kinematics traditionally accomplished by adjusting the hydrodynamic properties.

---e-n-d---of---G-u-i-d-a-n-c-e---n-o-t-e---

DNV-OS-C502: Offshore Concrete Structures, July 2004

Sec.6 Page 38 (Amended October 2004)

The reference in item B304 is corrected to read:

Sec.4 F.

The reference in item B305 is corrected to read:

Sec.4 G.

Sec.6 Page 45 (Amended October 2004)

The reference in item E113 is corrected to read:

E110.

Sec.6 Page 58 (Amended October 2004)

The reference in item O105 is corrected to read:

B607.

The reference in item O201 is corrected to read:

Sec.4.

Sec.6 Page 61 (Amended October 2004)

The reference in item P503 is corrected to read:

B607.

Sec.7 Page 81 (Amended October 2004)

The references to 'Sec.6, B407' *in item P503, is corrected to read:*

Sec.6, B607.

App.B Page 91 (Amended October 2004)

The reference in item A117 is corrected to read:

Sec.5 B900.

DNV-OS-C503: Concrete LNG Terminal Structures and Containment Systems, October 2004

Sec.6 Page 26 (Amended October 2004)

The reference in item B602 is corrected to read:

DNV-OS-C502 P500

App.D Page 52 (Amended October 2004)

The reference in item A402, list item b),ii), is corrected to read:

Sec.8 B

DNV-OS-D101: Marine and Machinery Systems and Equipment, January 2001

Ch.2 Sec.2 Page 22 (Amended April 2002)

In Table B3 an x *should be added in the Works Certificate column in the line for Bodies of valves and fittings etc. of Steel with Nominal diameter > 50 and Design temperature > 400 ℃.*

Ch.2 Sec.2 Page 23 (Amended April 2002)

In item C301 the first sentence should read:

301 Minimum nominal wall thickness for pipes of copper and copper alloys, steel and stainless steel are given in Table C1, Table C2 and Table C3, respectively.

Ch.2 Sec.3 Page 34 (Amended October 2002)

The formula under item B601 should read:

$$d = 2.15\sqrt{A} + 25 \quad \text{(mm)}$$

Ch.2 Sec.6 Page 52 (Amended April 2002)

In item B405 the reference should be corrected to: Table B3.

Ch.2 Sec.6 Page 54 (Amended April 2002)

In item E402 the first number should not read 105 ohm/m but be corrected to: 10^5 Ω/m.

Ch.2 Sec.6 Page 54 (Amended April 2003)

In Table B4, last cell in first column related to ClassIII piping class, the abbreviations **PSU** *and* **SU** *to be replaced with the full text:(***oil production and or storage units** *only).*

DNV-OS-D201: Electrical Installations, January 2003

Ch.2 Sec.2 Page 33 (Amended October 2003)

In item J702 d), the reference to Sec.10 item C508 has been corrected to read Sec.10 C506.

Ch.2 Sec.10 Page 67 (Amended October 2003)

In item C204 h), the reference to item C508 has been corrected to read C506.

DNV-OS-D202: Instrumentation and Telecommunication Systems, October 2000

Ch.1 Sec.1 Page 9 (Amended October 2001)

In Table C1 the explanation of UID should read: User input device.

Ch.2 Sec.2 Page 16 (Amended October 2001)

Item A302 should read:

302 One command location is to be designated as the main command location. The main command location is to be independent of other command locations.

Ch.2 Sec.4 Page 24 (Amended October 2001)

In item C103 the number should not read 200 kW but be corrected to: 200 kΩ.

Ch.3 Sec.1 Page 37 (Amended October 2001)

In item D102 the reference should be corrected to: C100.

In item D201 the reference should be corrected to: Ch.2 Sec.1 F500.

DNV-OS-D301: Fire Protection, January 2001

Ch.2 Sec.7 Page 30 (Amended April 2004)

In item B202, the reference to IEC standard for fire resistant cables has been corrected from IEC 60332 to IEC 60331.

Ch.2 Sec.8 Page 34 (Amended April 2002)

Item D302 should be renumbered D401 and a sub heading should be inserted in front of it as follows:

D 400 Provision for helicopter facilities

Ch.3 Page 37 (Amended April 2002)

The following new chapter 3 is added after Ch.2:

CHAPTER 3 - CERTIFICATION AND CLASSIFICATION

SECTION 1 CERTIFICATION AND CLASSIFICATION

A. General

A 100 Introduction

101 As well as representing DNV's interpretation of safe engineering practice for general use by the offshore industry, the offshore standards also provide the technical basis for DNV classification, certification and verification services.

102 A complete description of principles, procedures, applicable class notations and technical basis for offshore classification is given by the DNV Offshore Service Specifications (OSS).

103 Classification procedures and requirements specifically applicable in relation to the technical requirements given in Ch.2 of this standard are given in this chapter.

A 200 Assumptions

201 Any deviations, exceptions and modifications to the design codes and standards given as recognised reference codes shall be approved by DNV.

202 Where codes and standards call for the extent of critical inspections and tests to be agreed between contractor or manufacturer and client, the resulting extent is to be agreed with DNV.

203 DNV may accept alternative solutions found to represent an overall safety level equivalent to that stated in the requirements of this standard.

SECTION 2 CERTIFICATION OF EQUIPMENT

A. General

A 100 General

101 Equipment shall be certified consistent with its functions and importance for safety.

102 Equipment referred to in this standard will be categorised as follows:

Category I:

— equipment related to safety for which a DNV certificate is required.

Category I equipment is subdivided into IA and IB categorisation.

Category II:

— equipment related to safety for which a works certificate prepared by the manufacturer is accepted.

103 For equipment category I, the following approval procedure shall be followed:

— design approval, followed by a design verification report (DVR) or type approval certificate
— fabrication survey followed by issuance of a product certificate.

104 Depending on the required extent of survey, category I equipment is subdivided into IA and IB with the specified requirements as given below:

Category IA:

— pre-production meeting, as applicable, prior to the start of fabrication
— class survey during fabrication
— witness final functional, pressure and load tests, as applicable
— review fabrication record.

Category IB:

— pre-production meeting (optional)
— witness final functional, pressure and load tests, as applicable
— review fabrication record.

The extent of required survey by DNV is to be decided on the basis of manufacturer's QA/QC system, manufacturing survey arrangement (MSA) with DNV and type of fabrication methods.

Guidance note:

It should be noted that the scopes defined for category IA and IB are typical and adjustments may be required based on considerations such as:

- complexity and size of a delivery
- previous experience with equipment type
- maturity and effectiveness of manufacturer's quality assurance system
- degree of subcontracting.

---e-n-d---of---G-u-i-d-a-n-c-e---n-o-t-e---

105 Equipment of category II is normally accepted on the basis of a works certificate prepared by the manufacturer. The certificate shall contain the following data as a minimum:

— equipment specification or data sheet
— limitations with respect to operation of equipment
— statement (affidavit) from the manufacturer to confirm that the equipment has been constructed, manufactured and tested according to the recognised methods, codes and standards.

Guidance note:

Independent test certificate or report for the equipment or approval certificate for manufacturing system may also be accepted.

---e-n-d---of---G-u-i-d-a-n-c-e---n-o-t-e---

B. Equipment Categorisation

B 100 General

101 Categorisation of safety critical equipment is given in Table B1. Equipment that is considered important for safety, which is not listed, shall be categorised after special consideration.

Table B1 Categories for fire protection equipment

Component	*Category*	
	IB	*II*
Fire dampers	X	
Fire water pumps	X	
Pressurised components in fire extinguishing system		X
Fire hose		X
Hose reels and associated equipment		X
Nozzles		X
Equipment for fixed fire fighting installations		X
Fire resisting divisions and materials		X
Doors		X
Windows		X
Fire and gas detectors		X
Wheeled and portable extinguishing system		X

DNV-OS-E201: Hydrocarbon Production Plant, October 2000

Ch.3 Sec.2 Page 40 (Amended April 2002)

In item B501 the references in items 1) to 4) should read:

B103, C202, C402 and C601.

DNV-OS-E301: Position Mooring, June 2001

Ch.1 Sec.1 Page 13 (Amended October 2001)

In item F203 e) the reference should be corrected to: Ch.2 Sec.1 C400.

In item F204 the reference should be corrected to: Ch.2 Sec.5 F.

Ch.2 Sec.1 Page 22 (Amended October 2001)

In item C505 the reference should be corrected to: Sec.2 B400.

Ch.2 Sec.3 Page 37 (Amended October 2001)

In item A209 the reference should be corrected to: Sec.2 A202.

Ch.2 Sec.4 Page 54 (Amended October 2001)

In item L302 the reference should be corrected to: Sec.2 G300.

Ch.3 Sec.2 Page 68 (Amended October 2001)

In item G102 the second reference should be corrected to: Ch.2 Sec.5 D.

In item J102 the reference should be corrected to: Ch.2 Sec.4 P.

DNV-OS-E402: Offshore Standard for Diving System, January 2004

Appendix A Page 54 (Amended April 2004)

Under sub-section element A200, add the following item:

202 Parameters applied for correction of units in empirical formulae:

$h_1 = 1\ m^{-1}$
$L_1 = 1\ m^{-1}$
$u_1 = 1$ m/s
$u_2 = 1$ m

Appendix A Page 54 (Amended October 2004)

Previous item B103 "Motions of ship shaped support vessels", *has been renumbered* 102.

Appendix A Page 55 (Amended October 2004)

In item B102, the formula for a_z has been corrected as follows:

$$a_z = \frac{(5\ h_1\ h_s - 0.02\ h_1\ h_s\ L_1\ L + 1) \cdot g}{100} \quad \{m/s^2\}$$

DNV-OS-F101: Submarine Pipeline Systems, 2000

Spine (Amended April 2002)

Replace spine with:
DNV-OS-F101 Submarine Pipeline Systems, 2000

Page iv, Acknowledgement (Amended April 2003)

The text concerning cooperative organisations should read:

The Standard has been circulated on extensive internal and external hearing. The following organisations have made major contributions to the hearing process:

Allseas Engineering
Andrew Palmer & Associates
BHP Steel
BP Amoco Exploration
British Steel
Brown & Root
Coflexip Stena Offshore
DSND
DST
EMC
Europipe
Exxon Prod. Research Company
ITOCHU
JP Kenny Ltd
Kawasaki Steel
Mentor Project Eng.
Navion
Niras
Norsk Hydro
NPD
Phillips Petroleum
Rambøll Oil & Gas
Reinertsen Engineering
Røntgen Technische Dienst bv
Saga Petroleum
Salzgitter
Seaflex
Shaw Pipeline Services Ltd.
Shell
SOFREGAZ
Statoil
Stolt Comex Seaway
Vallourec & Mannesman Tubes

DNV is grateful for the valuable co-operations and discussions with the individual personnel of these companies.

General (throughout the document) (Amended April 2002)

Yield strength should read yield stress.

Sec.1 Page 6 (Amended April 2002)

after C279 add:

279(b) *Pressure, shut-in:* The maximum pressure that can be attained at the wellhead during closure of valves closest to the wellhead (wellhead isolation). This implies that pressure transients due to valve closing shall be included.

Sec.1 Page 7 (Amended April 2002)

Replace C301 to C302 as follows:

301 *Splash Zone Lower Limit (LSZ)* is determined by:

LSZ = |L1| - |L2| - |L3|
L1 = lowest astronomic tide level (LAT)
L2 = 30% of the splash zone wave-related height defined in 303
L3 = upward motion of the riser, if applicable

302 *Splash Zone Upper Limit (USZ)* is determined by:

USZ = |U1| - |U2| - |U3|
U1 = highest astronomic tide level (HAT)
U2 = 70% of the splash zone wave-related height defined in 303
U3 = settlement or downward motion of the riser, if applicable.

To item D100 add:

BM	Base material
L	Load effect
PWHT	Post weld heat treatment
RT	Radiographic testing
ST	Surface testing
ToFD	Time of flight detection
UT	Ultrasonic testing

Sec.1 Page 7 (Amended April 2004)

To item D100 add:

DWTT	Drop Weight Tear Test
LBZ	Local Brittle Zones
WM	Weld Material

Sec.5 Page 32, (of the reprint January 2003 edition) (Amended April 2004)

Equations 5.1 and 5.2 have been corrected as follows:

$$p_{lt} \geq 1.05 p_{li} \qquad \textbf{(5.1)}$$

$$p_{lt} \geq 1.03 p_{li} \qquad \textbf{(5.2)}$$

Sec.5 Page 33, (of the reprint January 2003 edition) (Amended April 2003)

Table 5-2 page 33 should read

Table 5-2 Characteristic material strength, f_y,f_u

Property	*Value*
Characteristic yield stress	$f_y = (SMYS - f_{y,temp})\cdot\alpha_U$
Characteristic tensile strength	$f_u = (SMTS - f_{u,temp})\cdot\alpha_U\cdot\alpha_A$

Sec.5 Page 34 (Amended April 2002)

Add the following Guidance note to item D204:

Guidance note:

For the system pressure test condition, the local test pressure is considered as incidental pressure. In order to calculate the corresponding p_{ld}, included in Δ_{pd} above, the local test pressure shall be calculated as:

$$\Delta p_d = \gamma_p\left(\frac{p_t}{\gamma_{inc}} + \rho_t g h_{ref} - p_e\right)$$

where h_{ref} is the vertical distance between the point in question and the reference height and γ_{inc} should be 1.1. The same approach applies to when the shut-in pressure is used.

---e-n-d---of---G-u-i-d-a-n-c-e---n-o-t-e---

Sec.5 Page 35 (Amended April 2002)

In item D301, delete the following sentence:

The load effect factors apply to all design formats unless explicitly stated.

Sec.5 Page 36 (Amended April 2002)

In item D505, replace as follows:

$p_b(t_2)$ = Burst pressure Eq. (5.15)
α_c = Flow stress parameter accounting for strain hardening given by:

$$\alpha_c = (1-\beta) + \beta\frac{f_u}{f_y}$$

but maximum 1.20

$$\beta = \begin{cases} 0.4 + q_h & \text{for } D/t_2 < 15 \\ (0.4 + q_h)(60 - D/t_2)/45 & \text{for } 15 \le D/t_2 \le 60 \\ 0 & \text{for } D/t_2 > 60 \end{cases}$$

$$q_h = \begin{cases} \dfrac{(p_{ld} - p_e)}{p_b(t_2)}\dfrac{2}{\sqrt{3}} & \text{for } p_{ld} > p_e \\ 0 & \text{for } p_{ld} \le p_e \end{cases}$$

Sec.5 Page 37 (Amended April 2002)

Add the following Guidance note item D507:

Guidance note:

The maximum yield to ultimate stress ration, α_h, is found in Table 6-3 and Table 6-6. The increase of this factor with 0.02 in accordance with footnote 5 and 3 in these tables respectively does not apply since it is already included in the factor 0.78.

---e-n-d---of---G-u-i-d-a-n-c-e---n-o-t-e---

Replace item D510 as follows:

510 Propagation buckling cannot be initiated unless local buckling has occurred. In case the external pressure exceeds the criteria given below, buckle arrestors should be installed and spacing determined based on consequences of failure. The propagating buckle criterion reads:

$$p_{pr} = 35 f_y \alpha_{fab} \left(\frac{t_2}{D}\right)^{2.5}$$

$$p_e \le \frac{p_{pr}}{\gamma_m \gamma_{sc}}$$

Sec.5 Page 37 (Amended April 2004)

In the Guidance note in D508, d/t *has been replaces by* D/t.

Sec.5 Page 38 (Amended April 2004)

The list of references in D701 has been amended as follows:

— CN 30.5 *Environmental Conditions and Environmental Loads.*
— DNV-RP-C203 *Fatigue Strength Analysis of Offshore Steel Structures*
— DNV-RP-F105 *Free Spanning Pipelines*

In D710, the reference to "DNV Guideline No. 14" *has been replaced by* "DNV-RP-105".

Sec.5 Page 41 (Amended April 2002)

Add the following to Table 5-10:

10^{-2} - 10^{-3}	To be evaluated on a case by case basis

Sec.5 Page 43 (of the reprint January 2003 edition) (Amended October 2003)

In item E401, correct the definition for "μ" as follows:

μ = Lateral soil friction coefficient

Sec.6 Page 47 (Amended April 2002)

Replace item A404 as follows:

404 Linepipe formed from strip (skelp) and welded with one longitudinal seam, without the use of filler metal. The longitudinal seam is generated by high frequency current (minimum 100 kHz) applied by induction or conduction. The weld area (heat affected area) or the entire pipe shall be heat treated. The forming may be followed by cold expansion to obtain the required dimensions.

Sec.6 Page 48 (Amended April 2002)

Replace item C104 as follows:

104 If materials shall be used at a design temperature above 50°C, the yield strength at the T_{max} may be determined during the qualification of the manufacturing procedure specification. This information shall be obtained either by use of the curves in Sec.5 B600 or by testing.

Sec.6 Page 51 (Amended April 2002)

Replace (footnote reference) in Table 6-3 as follows:

Charpy V-notch energy (KVT) minimum J 6)

Sec.6 Page 51 (of the reprint January 2003 edition) (Amended October 2003)

In the heading of Table 6-6, replace "YS(Rr0.5)" as follows:

YS(Rt0.5)

Sec.6 Page 51 (Amended April 2004)

In the heading of Table 6-6, replace in the fourth column as follows:

$$\left[\frac{YS(R_{t0.5})}{UTS(R_m)}\right]_{max}$$

$(\alpha_h)^{3)}$

Sec.6 Page 53 (Amended April 2002)

Replace item C515 as follows:

515 The hardness of base material, cladding material, HAZ, weld metal and the metallurgical bonding area shall meet the relevant requirements of this standard (see Table 6-3 and 6-6).

Sec.6 Page 59 (Amended April 2002)

Replace item E504 as follows:

504 Plates and strip shall be subject to 100% visual examination on both sides. The inspection shall be performed in a sufficiently illuminated area (approximately 500 lx) by trained personnel with sufficient visual acuity (e.g. Jaegar J-w eyesight test at 300 mm within the last 12 months). The surface finish produced by the manufacturing process, shall ensure that surface imperfections can be detected by visual inspection.

Sec.6 Page 63 (Amended April 2002)

Replace part of Table 6-11 as follows:

Metallographic examination	Pipe body Weldment	Q(&P[9]) Q	Q&P Q&P	Q&P Q&P

Add footnote:

HFW, EBW and LBW pipes, only.

Sec.6 Page 60 (of the reprint January 2003 edition)

(Amended April 2004)

In table 6-13, the row starting with "Transverse imper ..." *shall read:*

Transverse imperfections in weld [3]	UT	100%	5%	100%

Sec.6 Page 64 (Amended April 2002)

In item E1003 replace the unit m *with* mm.

Sec.6 Page 65 (Amended April 2002)

Replace part of item E1011 as follows:

1011 Repair welding of the weld seam is allowed for SAWL and SAWH pipes only and shall be performed in accordance with qualified welding repair procedures. Requirements for welding repair procedures are given in Appendix C. Repair welding may only be performed subject to the following limitations:

Sec.6 Page 66 (Amended April 2002)

Replace part of item E1205 as follows:

1205 The out-of-roundness for pipe ends shall be calculated by the following formula:

Sec.6 Page 67 (Amended April 2002)

Replace part of Table 6-14 as follows:

Greatest difference in pipe diameter between pipe ends (each pipe measured)	R [2]	12.5% t

Sec.6 Page 68 (Amended April 2002)

Replace parts of Table 6-15 as follows:

Greatest difference in pipe diameter between pipe ends (each pipe measured)	10%	10% t, but maximum 3 mm

Diameter pipe body $310 < D$ [1] < 610 mm	10%	$\pm$ 0.75% D [1], but maximum $\pm$ 3.0 mm

Sec.7 Page 71 (Amended April 2004)

In B307, the title of the referenced DNV-RP-F104 has been changed from "Submarine Pipeline Couplings" *to* "Mechanical Pipeline Couplings".

Sec.7 Page 71 (Amended April 2002)

Replace Table 7-2 as follows:

Table 7-2 Bolts and nuts for subsea use		
Bolt	Nut	Size range
ASTM A320, Grade L7	ASTM A194, Grade 4/S3 (Low-temperature requirement for Grade 4 and Grade 7 nuts)	< 50 mm
ASTM A320, Grade L43	ASTM A194, Grade 7	< 100 mm

Sec.7 Page 74 (Amended April 2002)

Replace item D203 as follows:

203 The chemical composition, taken from the product analysis, of material for hot-formed components, castings and forgings, shall not exceed the values given in Table 7-4. The notes given in Table 7-5 shall apply, except Note 9 and Note 10.

Replace item D205 as follows:

205 For material to be quenched and tempered, the content of hardening elements Cr, Mo, Cu and Ni shall be sufficient to obtain the desired microstructure in the centre of the component. The selected chemical composition shall have adequate hardenability to ensure through thickness hardening of the respective component.

Sec.7 Page 79 (Amended April 2002)

Replace item G107 as follows:

107 Mother pipe in C-Mn steels shall be delivered in the normalised, quenched and tempered or TMCP condition.

Sec.7 Page 80 (Amended April 2002)

Replace item G301 as follows:

301 In general all the requirements given in Sec.6 D100 shall apply. The chemical composition of pipe for bends shall comply with Table 6-7 and Table 6-8 as relevant.

Sec.7 Page 81 (Amended April 2002)

Replace item G401 as follows:

401 In situations where dedicated mother pipes are not available for manufacturing of bends, the factors given in G100 and G200, especially G108, should be considered in order to select the most appropriate pipe for bend manufacturing.

Sec.7 Page 83 (Amended April 2002)

Replace in item G905 as follows:

Tensile testing:

— Base material in the arc outer radius longitudinal and transverse (total 2 specimens)
— Base material in the start transition area outer radius longitudinal and transverse (total 2 specimens) unless 903 is applicable.

Charpy V-notch impact testing:

— Base material in the arc outer radius longitudinal and transverse (total 2 sets)
— Base material in the start transition area outer radius longitudinal and transverse (total 2 sets) unless 903 is applicable.

Sec.7 Page 84 (Amended April 2002)

Replace in item G906 as follows:

Tensile testing:

— Cross weld tensile testing in the arc area (one specimen)
— Cross weld tensile testing in the start transition area (one specimen) unless 903 is applicable

Charpy V-notch impact testing:

— Weld metal, FL, FL + 2 mm and FL + 5 mm in the arc (4 sets)
— Weld metal in the start transition area (1 set) unless 903 is applicable.

Sec.8 Page 92 (Amended April 2002)

Replace existing F204 with the following:

204 The concrete coating shall be reinforced by steel bars welded to cages or by wire mesh steel. The following recommendations apply: For welded cages, the spacing between circumferential bars should be maximum 120 mm. Steel bars should have a diameter of 6 mm minimum. The average cross sectional area of steel reinforcement in the circumferential direction should be minimum 0.5% of the longitudinal concrete cross section. The corresponding cross sectional area of steel reinforcement in the longitudinal direction should be minimum 0.08% of the transverse concrete cross section.

Sec.12 Page 127 (Amended April 2002)

Replace Table 12-1 as follows:

Table 12-1 Index and cross references		
Key word	Reference	Comment or aspect
Characteristic material strength	Sec.5 B600	f_k
	Sec.5 B604	Relation to supplementary requirement U
	Sec.5 B604 Guidance note	Proposed (conservative) de-rating stresses
	Sec.5 B606	Reduction due to the UO/UOE process
	Sec.5 D505 and Sec.5 D506	Reduction in longitudinal direction
Crossing	Sec.2 B303	Evaluation of risks
	Sec.3 C204	Survey
	Sec.5 B102	Minimum vertical distance
	Sec.9 B300	Specification
Golden weld	Sec.9 A807	Requirements
Installation	Sec.2 C400	Safety class
	Sec.5 H100(D)	Design criteria
	Sec.5 H200	Pipe straightness
	Sec.9	Installation phase
Linepipe NDT Level	Sec.5 B500	Design – general
	Sec.6 B100	General introduction and designation
	Table 6-13	NDT requirements
Mill pressure test	Sec.1 C200	Definition
	Sec.5 B200	Link between mill pressure test and design
	Sec.5 D401	Reduced mill test pressure implication on pressure containment capacity
	Sec.6 E1104	Basic Requirement
	Sec.6 E1105	Maximum test pressure
	Sec.6 E1108	Waiving of mill test – UOE-pipes, conditions
Minimum wall thickness	Sec.5 B400	Minimum 12 mm and when it applies
	Sec.5 C300	When to use minimum wall thickness, relation to nominal thickness and corrosion allowance
Ovality	Eq. (5-18) and Eq. (5-21)	Minimum allowed ovality for collapse
	Sec.5 D800	Maximum allowed ovality, as installed
	Table 6-14 and Table 6-15	Maximum allowed ovality, line pipe specification
Pressure - general	Sec.1 C200	Definitions
	Sec.3 B300	Pressure control system Table 3-1 Choice of Pressure
	Table 5-7	Pressure load effect factors Table 3-1 Choice of Pressure
	Sec.4 B202, Sec.4 B203	Characteristic values
Pressure - incidental	Sec.12 F600	Benefit of lower incidental pressure
	Sec.3 B300	Pressure control system
	Table 3-1	Selection of incidental pressure during pressure test and for full shut-in pressure
Reeling	Sec.5 D1006	Fracture assessment – when supplementary requirement P comes into force
	Sec.5 D1100	Engineering criticality assessment
	Eq. (5-25)	Capacity formula
	Table 5-8	Condition factor
	Sec.6 D300	Supplementary requirement P
	Sec.6 D400	Supplementary requirement D
	Sec.9 E	Testing
Spiral welded	Sec.5 A204	Requirements
Strain hardening	Eq. 5.26	In capacity formula; strain
	Eq. 5.24	Capacity formula SMYS/SMTS - (in α_c)
	Table 6-3	SMYS and SMTS
	Table 6-3	α_h (YS/UTS)

Table 12-1 Index and cross references (Continued)		
System pressure test	Sec.1 C200	Definition
	Sec.5 B200	Link to design
	Sec.5 B202	Requirements
	Sec.5 B203	Waiving of system pressure test
	Sec.5 B204	Safety class during system pressure test
	Sec.5 D400	Limit state check - pressure containment
	Sec.5 D500	Limit state check -local buckling
	Sec.9 O500	Execution of the test(filling, holding time etc)
Weld onto pipe	Sec.7 B1203	Requirements for doubler plates etc.

Add the following new Table 12-1 b:

Table 12-1 b Characteristic material properties for design							
Symbol	*Description*	*Reference*	*Pressure containment*	*Local buckling*			
				Collapse	*Load Controlled*	*Displacement Controlled*	*Propagating buckling*
Elastic properties							
E	Young's modulus		X				
ν	Poisson's ratio		X				
α	Temperature expansion, as function of the temperature (within the actual temperature range)		X				
Plastic properties							
SMYS	Specified minimum yield stress	Table 6-3 and Table 6-6	X	X	X	X	X
$f_{y,\,temp}$	Yield stress temperature derating value	Sec.5 B603, Table 5-2 and Fig. 5-1	X	X	X	X	X
SMTS	Specified minimum tensile strength	Table 6-3 and Table 6-6	X	-	X	-	-
$f_{u,\,temp}$	Tensile strength temperature derating value	Sec.5 B603, Table 5-2 and Fig. 5-1	X	-	X	-	-
α_A	Ultimate strength anisotropy factor	Table 5-2 and Table 6-3 Note 4	-	-	X	-	-
α_{fab}	Fabrication factor	Table 5-3	-	X	(X)	(X)	X
Plastic properties depending on additional requirements							
α_u(U)	increased utilisation	Table 5-2	X	X	X	X	X
α_h(P)1	Strain hardening value	Table 6-3, Table 6-6 and Sec.6 D304	-	-	-	X	-
α_c(U)	Flow stress parameter	Eq. 5.23	-	-	X	-	-

Sec.12 Page 109 (of the reprint January 2003 edition) (Amended April 2004)

Equation 12.1 shall read as follows:

$$(p_{li} - p_e) \cdot \frac{D - t_1}{2 \cdot t_1} \leq \frac{2 \cdot \alpha_U}{\sqrt{3} \cdot \gamma_m \cdot \gamma_{SC}} \cdot (SMYS - f_{y,\,temp}) \quad \textbf{(12.1)}$$

Equation 12.4 shall read as follows:

$$p_d \cdot \frac{D - t_1}{2 \cdot t_1} \leq \eta \cdot (SMYS - f_{y,\,temp}) \quad \textbf{(12.4)}$$

Sec.12 Page 128 (Amended April 2004)

In E100, the definition of p_t has been changed as follows:

p_t = 1.05 p_{inc} (if defined in the highest point of the pipeline system)

Sec.12 Page 132 (Amended April 2002)

Replace item F1100 as follows:

Even though the safety factor is provided in the propagating pressure formula, it is recommended to decrease this with 15% (from 35 to 30) for the propagating pressure resistance of the buckle arrestor. This to decrease the failure probability to the unconditioned safety level in line with normal ULS checks.

Sec.12 Page 132 (Amended April 2002)

Replace item F1400 as follows:

$$f_0' = \frac{f_0 + \left[0.030\left(1 + \frac{D}{120t}\right)\left(2\varepsilon_c \frac{D}{t}\right)^2\right]}{1 - \frac{P_e}{P_c}} \quad (12.12)$$

Sec.12 Page 133 (Amended April 2002)

Replace item G100 as follows:

Assessment at Level 2 is considered safe provided that the girth welds will not be subjected to conditions during operation that may lead to failure by fatigue crack growth or unstable fracture.

Sec.12 Page 134 (Amended April 2002)

Replace part of item G301 as follows:

If the total displacement, V_g, is measured at a distance $z \leq 0.2a$ from the physical crack mouth then the CMOD can be calcu-

lated from:

Sec.12 Page 134 (Amended April 2002)

Replace formula for δ in item G302 as follows:

$$\delta = \frac{J}{m\frac{\sigma_{YS} + \sigma_{TS}}{2}}$$

Sec.12 Page 134 (Amended April 2002)

In item H101 replace footnote to Table 12-4 as follows:

ksi = 6.895 MPa; 1 MPa = 0.145 ksi; ksi = 1000 psi (lb f/in^2)

Sec.12 Page 134 to 135 (Amended April 2002)

Delete second, fourth, fifth and second last paragraphs in item I200 (are given in Sec.5 G200)

Sec.12 Page 136 (Amended April 2002)

Replace the text in Fig. 12-3 as follows:

Displacement controlled condition = NDT level 1

Sec.12 Page 137 (Amended April 2002)

Replace in **MDS** *sheet, 3rd line:*

DNV-OS-F101 Submarine Pipeline Systems

Sec.12 Page 138 (Amended April 2002)

Add after first paragraph in item K300 text as follows:

In addition to the simplified stress criteria given below, the limit states for Concrete Crushing (K200), Fatigue (Sec.5 D700) and Rotation (Sec.5 H203) shall be satisfied. Reference is further made to Endal et. al. (1995) for guidance on the Rotation limit state.

Sec.12 Page 138 (Amended April 2002)

Replace the first paragraph after sub-heading "Overbend" in item K300 as follows:

For static loading the calculated strain shall satisfy Criterion I in Table 12-5. The strain shall include effects of bending, axial force and local roller loads. Effects due to varying stiffness (e.g. strain concentration at field joints or buckle arrestors) need not be included.

Sec.12 Page 138 (Amended April 2002)

Replace the first paragraph after sub-heading "Sagbend" in item K300 as follows:

For combined static and dynamic loads the equivalent stress in the sagbend and at the stinger tip shall satisfy the allowable stress format ASD as given in F1200, however, η shall be 0.87.

Appendix A Page 142 (Amended April 2002)

Add:

B 1000 Mill pressure test

1001 The mill test pressure is lower in ISO than in this standard. The ISO requirement is:

$$p = 0.95\,\frac{2t_{min}}{D}\,SMYS$$

This hoop stress formula for the ISO mill pressure test is different from the formula in ISO 13623 and DNV (which are identical). Hence, the mill test pressure difference compared to this standard depends on D/t.

Appendix B A402 Page 143 (Amended April 2002)

Add the following Guidance note:

Guidance note:

This conversion is not applicable to API 5L type specimens

---e-n-d---of---G-u-i-d-a-n-c-e---n-o-t-e---

Appendix C C400 Page 156 (Amended April 2002)

Replace:

C400 Batch testing – Girth welds

(Clarification)

Appendix C Page 165 (Amended April 2004)

The last sentence in F309 has been corrected to:

"Any requirement for fracture arrest properties as listed in Table 6-9 shall not apply for the weld and HAZ."

Appendix D Page 178 (Amended April 2002)

Replace item D205 as follows:

205 The type and number of ultrasonic probes shall be sufficient to ensure that the base material, or the weld and the area adjacent to the weld, is:

- scanned from both sides of the weld for flaws oriented parallel to the longitudinal weld axis
- scanned from both directions approximately parallel to longitudinal weld axis for flaws oriented transverse to the longitudinal weld axis
- fully covered by ultrasound beams that are approximately perpendicular to the surface of flaws that are reflecting the ultrasound.

It may be necessary to include tandem, TOFD and/or focused probes in order to enhance the probability of detection or characterisation of flaws.

Appendix D Page 180 (Amended April 2002)

Replace last paragraph of item E205 as follows:

The maximum allowable flaw sizes from the ECA shall be reduced in length and height with a flaw sizing error, that based on the data from the qualification testing will give a 95% confidence against under sizing of flaws.

Appendix D Page 180 (Amended April 2002)

Replace item F105 as follows:

105 Equipment and procedures used for the ultrasonic testing shall comply with the requirements of subsection D. The requirements for automated NDT processes given in subsection D are additional to the requirements of any code or standard referred to in this subsection where automated NDT methods are prescribed or optional.

Appendix D Page 181 (Amended April 2002)

Replace item F301 as follows:

301 For ultrasonic testing of the base material the requirements of F100 and F200 shall apply.

Appendix D Page 182 (Amended April 2002)

Replace the second bullet point in item G503 as follows:

- a sample pipe shall be fitted with one 3.0 mm Ø through drilled hole at each end. The distance from the pipe end to the hole shall be equal to the length not covered by the ultrasonic testing equipment during production testing. Prior to start of production the pipe shall be passed through the ultrasonic testing equipment at the operational scanning velocity. For acceptance of the equipment both holes need to be detected by all probes. At the manufactures option these holes may be included in the reference block.

Appendix D G614 Page 185 (Amended April 2002)

Replace the last part of item G614 as follows:

The acceptance criteria are:

— Table D-4 and lack of fusion and lack of penetration are not permitted.

Appendix D Page 185 (Amended April 2002)

Replace item G710 as follows:

The length of the N5 notches shall be 1.5 times the probe (crystal) element size or 20 mm, whichever is the shorter. The length does not include any rounded corners. The width of the N5 notches shall not exceed 1 mm.

Appendix D, Table D-3 Page 190 (Amended April 2002)

Replace Table D-3 as follows:

Undercut, if measured by mechanical means	Individual Depth d d > 1.0 mm 1.0 mm ≥ d ≥ 0.5 mm 0.5 mm ≥ d ≥ 0.2 mm < 0.2 mm	 Permitted length Not permitted 50 mm 100 mm unlimited
	Accumulated length in any 300 mm length of weld: < 4 t, maximum 100 mm	

Appendix D Page 193 (Amended April 2002)

In item I301 replace N5 notches *with* N3 (3% of thickness) notches

Appendix E Page 196 (Amended April 2002)

Replace item B408 as follows:

408 The recording or marking system shall clearly indicate the location of imperfections relative to the 12 o'clock position of the weld, with a ± 1% accuracy. The system resolution shall be such that each segment of recorded data from an individual inspection channel does not represent more than 2 mm of circumferential weld distance.

DNV-OS-F201: Dynamic Risers, 2001

Sec.4 Page 24 (Amended October 2003)

Replace item B501 as follows:

B501 Design based on response statistics is generally the recommended procedure for consistent assessment of characteristic load effects.

Sec.4 Page 25 (Amended October 2003)

Replace item C201 as follows:

C201 Fatigue analysis of the riser system shall consider all relevant cyclic load effects including:

Sec.5 Page 29 (Amended October 2003)

In Table 5-2, the NOTES and subscripts 1) and 2) refer to the ULS condition only. Replace Table 5-2 as follows:

Table 5-2 Load effect factors

Limit state	*F-load effect*	*E-load effect*	*A-load effect*
	γ_F	γ_E	γ_A
ULS	1.1[1)]	1.3[2)]	NA
FLS	1.0	1.0	NA
SLS & ALS	1.0	1.0	1.0

NOTES

1) If the functional load effect reduces the combined load effects, γ_F shall be taken as 1/1.1.

2) If the environmental load effect reduces the combined load effects, γ_E shall be taken as 1/1.3.

Sec.5 Page 33 (Amended October 2001)

In item D604 an absolute value operator is missing for the moment value, M in the equation (5.29). Replace equation (5.29) as follows:

$$\left(\left(\frac{|M|}{M_k}\right)+\left(\frac{T_e}{T_k}\right)^2\right)^2+\left(\frac{p_e-p_{\min}}{p_c(t_2)}\right)^2\le\eta^4 \qquad \textbf{(5.29)}$$

Sec.5 Page 34 (Amended October 2003)

The denominator of the second term on the right hand side of equation (5.30) should read 2 t_3 instead of t_3. Replace equation (5.30) as follows:

$$\sigma=\frac{T_e}{\pi\cdot(D-t_3)\cdot t_3}+\frac{32\cdot M\cdot(D-t_3)}{\pi\cdot\left(D^4-(D-2\cdot t_3)^4\right)} \qquad \textbf{(5.30)}$$

Appendix A Page 55 (Amended October 2003)

In item B401, the list numbering has been updated as follows:

1) Geometric stiffness (i.e. contribution from effective tension to transverse stiffness). Tension variation is hence a nonlinear effect for risers;
2) Hydrodynamic loading. Nonlinearities are introduced by the quadratic drag term in the Morison equation expressed by the relative structure-fluid velocity and by integration of hydrodynamic loading to actual surface elevation;
3) Large rotations in 3D space;
4) Material nonlinearities, and
5) Contact problems in terms of seafloor contact (varying location of touch down point and friction forces) and hull/slender structure contact.

Appendix B Page 70 (Amended October 2003)

The $s^{\beta-1}$ term in equation (B.19) should read $s_a^{\beta-1}$. Replace equation (B.19) as follows:

$$f_S(s_a)=\alpha^{-\beta}\beta\, s_a^{\beta-1}\exp\left(-\left(\frac{s_a}{\alpha}\right)^{\beta}\right) \qquad \textbf{(B.19)}$$

Appendix B Page 70 (Amended October 2003)

The denominator in equation (B.21) should read 2α, instead of α. Replace equation (B.21) as follows:

$$D=\frac{f_0\cdot(2\alpha)^{m_1}}{\bar{a}_1}G_1\left\{\left(1+\frac{m_1}{\beta}\right);\left(\frac{S_{sw}}{2\alpha}\right)^{\beta}\right\}+\frac{f_0\cdot(2\alpha)^{m_2}}{\bar{a}_2}\cdot G_2\left\{\left(1+\frac{m_2}{\beta}\right);\left(\frac{S_{sw}}{2\alpha}\right)^{\beta}\right\} \qquad \textbf{(B.21)}$$

Appendix B Page 71-73 (Amended October 2003)

Delete items E100, E101, E102, E103 and equation (B.25) and Table B-2. Reference is made to DNV-RP-C203 for relevant SN curves and applicable SCF.

DNV-OS-J101: Design of Offshore Wind Turbine Structures, June 2004

Sec.3 Page 26 (Amended October 2004)

The first equation in item C302 has been corrected as follows:

$$S(f) = \frac{\alpha g^2}{(2\pi)^4} f^{-5} \exp\left(-\frac{5}{4}\left(\frac{f}{f_p}\right)^{-4}\right)\gamma^{\exp\left(-0.5\left(\frac{f-f_p}{\sigma \cdot f_p}\right)^2\right)}$$

The last equation in item C302 has been corrected as follows:

$$\gamma = \begin{cases} 5 & \text{for} \quad \frac{T_p}{\sqrt{H_S}} \le 3.6 \\ \exp(5.75 - 1.15\frac{T_p}{\sqrt{H_S}}) & \text{for} \quad 3.6 < \frac{T_p}{\sqrt{H_S}} \le 5 \\ 1 & \text{for} \quad 5 < \frac{T_p}{\sqrt{H_S}} \end{cases}$$

Sec.7 Page 66 (Amended October 2004)

Item J203 is amended to read:

203 The maximum vertical deflection is:

$$\delta_{\max} = \delta_1 + \delta_2 - \delta_0$$

$\delta_{\max}$ = the sagging in the final state relative to the straight line joining the supports

δ_0 = the pre-camber

δ_1 = the variation of the deflection of the beam due to the permanent loads immediately after loading

δ_2 = the variation of the deflection of the beam due to the variable loading plus any time dependent deformations due to the permanent load.

App.A Page 101 (Amended October 2004)

A new item A105 has been added as follows:

105 For joints with ratio $\beta = 1$ between diameter of brace and diameter of chord, a modified β value is defined as

$$\beta = 1 - \left(\frac{\tau}{\gamma}\sin^{0.65}(\psi)\right)$$

in which ψ is the degree of weld cut-back. When ψ is not defined, the suggested default value of ψ is 20°. The modified β value is used in some of the Lloyd's Register equations for K and TY joints as specified in Tables A6 and A8.

App.A Page 106 (Amended October 2004)

A new Table A8 has been added as follows:

Table A8 Lloyd's Register T joint factors for use in K and KT joint equations

The modified β value applies when predicting SCFs at the saddle on $\beta = 1$ joints under axial load or out-of-plane bending, i.e. in the expressions for T1, T3, T5 and T6.

$T1 = \tau\gamma^{1.2}\beta(2.12 - 2\beta)\sin^2\theta$

$T2 = \tau\gamma^{0.2}(3.5 - 2.4\beta)\sin^{0.3}\theta$

$T3 = 1 + \tau^{0.6}\gamma^{1.3}\beta(0.76 - 0.7\beta)\sin^{2.2}\theta$

$T4 = 2.6\beta^{0.65}\gamma^{(0.3-0.5\beta)}$

$T5 = \tau\gamma\beta(1.4 - \beta^5)\sin^{1.7}\theta$

$T6 = 1 + \tau^{0.6}\gamma^{1.3}\beta(0.27 - 0.2\beta^5)\sin^{1.7}\theta$

$T7 = 1.22\tau^{0.8}\beta\gamma^{(1-0.68\beta)}\sin^{(1-\beta^3)}\theta$

$T8 = 1 + \tau^{0.2}\gamma\beta(0.26 - 0.21\beta)\sin^{1.5}\theta$

App.G Page 120 (Amended October 2004)

The equation in item B101 has been corrected as follows:

$$H' = \frac{2 \cdot M_z}{l_{eff}} + \sqrt{H^2 + \left(\frac{2 \cdot M_z}{l_{eff}}\right)^2}$$

SECTION 4
RECOMMENDED PRACTICES

DNV-RP-A202: Documentation of Offshore Projects, January 2001

Sec.1 Page 6 (Amended October 2001)

Insert in Table 1-1, between LIFT *and* NSP*:*

MODU		1989 MODU Code as amended 1991

Sec.2 Page 7 (Amended October 2001)

In Table 2-1, item 26, change first word in text to: Openings

Sec.2 Page 10 (Amended October 2001)

Insert new headline between headlines 70 and 701:

700 Drilling general

Sec.3 Page 53 (Amended October 2001)

Under headline 362.0 Bilge general, item Z090:

Change contents of third column from: Y, FI *to:* Y, R, FI

Sec.3 Page 54 (Amended October 2001)

Under headline 363.0 Ballast general, item Z090:

Change contents of third column from: Y, FI *to:* Y, R, FI

Sec.3 Page 56 (Amended October 2001)

Under Code 371.1, change all entries in columns: 'Ship', 'Column-stab.' *and* 'Self-elevating' *from:* 1A1 (NSP) *to:* MODU.

Under Code 371.2, change all entries in columns: 'Ship', 'Column-stab.' *and* 'Self-elevating' *from:* 1A1, OI *to:* MODU.

Under Code 371.2, change all entries in columns: 'Tension-leg' *and* 'Deep-draught' *from:* OI *to:* MODU.

Sec.3 Page 57 (Amended October 2001)

Under Code 372.5, change all entries in columns: 'Ship', 'Column-stab.' *and* 'Self-elevating' *from:* 1A1 (NSP) *to:* MODU.

Sec.3 Page 69 (Amended October 2001)

Under Code 388.1, change all entries in columns: 'Ship', 'Column-stab.' *and* 'Self-elevating' *from:* 1A1, OI *to:* MODU.

Under Code 388.1, change all entries in columns: 'Tension-leg' *and* 'Deep-draught' *from:* OI *to:* MODU.

Under Code 388.2, change all entries in columns: 'Ship', 'Column-stab.' *and* 'Self-elevating' *from:* 1A1, OI *to:* MODU.

Under Code 388.2, change all entries in columns: 'Tension-leg' *and* 'Deep-draught' *from:* OI *to:* MODU.

Sec.3 Page 75 (Amended October 2001)

Insert new headline between headlines 70 and 701:

700 Drilling general

Insert under the headline 700 Drilling general:

Z030	Local arrangement plan - Drilling area	Y	DRU	DRU	DRU	DRU	DRU

Under Code 701, change all entries in columns: 'Ship', 'Column-stab.' *and* 'Self-elevating' *from:* 1A1, OI *to:* DRU.

Under Code 701, change all entries in columns: 'Tension-leg' *and* 'Deep-draught' *from:* OI *to:* DRU.

Under Code 703, change all entries in columns: 'Ship', 'Column-stab.' *and* 'Self-elevating' *from:* 1A1, OI *to:* DRU.

Under Code 703, change all entries in columns: 'Tension-leg' *and* 'Deep-draught' *from:* OI *to:* DRU.

DNV-RP-C201: Buckling Strength of Plated Structures, October 2002

Part.1 Sec.3 Table 3.1 Page 9 (Amended April 2003)

*In Table 3.1, line for 'Longitudinal stiffened plate panel', column 'Clause reference' replace "*7*" with "*5 and 7*".*

*In Table 3.1, line for 'Girder supporting stiffened panel', column 'Clause reference' replace "*8*" with "*5 and 8*".*

Part.1 Sec.6 Page 11 (Amended April 2004)

*In the paragraph above figure 6-1, "*Chapter 0*" has been changed to "*Chapter 10*".*

Part.1 Sec.6 Page 12 (Amended October 2004)

In item 6.5, after the sentence: $\sigma_{x,Rd}$ is given by eq. (6.1) and $\sigma_{y,Rd}$ is given by eq. (6.5)., *a new sentence has been added as follows:*

In case of tension, apply f_y/γ_M.

Part.1 Sec.7 Page 16 (Amended April 2004)

*In item 7.2, right column, line 4, "*Chapter 0*" has been changed to "*Chapter 10*".*

Part.1 Sec.7 Page 16 (Amended October 2004)

In item 7.2, after equation 7.10, the following sentence has been added:

$p_0 = 0$ in case $\sigma_{y,Sd}$ is in tension along the whole length of the panel.

Part.1 Sec.7 Page 17 (Amended October 2004)

In item 7.4, equation 7.18 has been changed as follows:

$$\tau_{Sd} \le \tau_{Rd} = \frac{f_y}{\sqrt{3} \cdot \gamma_M}$$

Part.1 Sec.7 Page 20 (Amended April 2004)

*In item 7.7.1, right column, last paragraph, "*Chapter 0*" has been changed to "*Chapter 10*".*

Part.1 Sec.7 Equation 7.63 Page 20 (Amended April 2003)

In " limitation for use" just ahead/ introducing formula (7.63) substitute the balancing sign within the mathematical expression from "greater or equal to" i.e.≥ , replacing it with "less than" i.e. < .

Part.1 Sec.8 Page 23 (Amended October 2004)

The text in the paragraph before equation 8.21, has been changed as follows:

If the σ_y stress in the girder is in tension due to the combined girder axial force and bending moment over the total span of the girder C_{yG} may be taken as:

Part.1 Sec.8 Page 24 (Amended October 2004)

Equation 8.21 has been changed to: $C_{yG} = 1.0$

DNV-RP-C203: Fatigue Strength Analysis of Offshore Steel Structures, October 2001

Inside cover (Amended April 2002)

Under the first item under **CHANGES***, add:*

See Section 2.6, 2.8.7 and 2.12.

Sec.2.2 Page 7 (Amended April 2002)

In Fig 2.2-1, replace K with SCF.

Sec.2.6 Page 14 (Amended April 2002)

In Fig 2.6-2, replace K, the unit of the axis of ordinate, with SCF.

DNV-RP-F102: Pipeline Field Joint Coating and Field Repair of Linepipe Coating, October 2003

General (Amended October 2003)

Hot water soak test (FJC only)	GBE/CW6 Part 1, App. E or other agreed procedure	according to standard	by agreement	by agreement

DNV-RP-F103: Cathodic Protection of Submarine Pipelines by Galvanic Anodes, October 2003

Sec.1 Page 5 (Amended April 2004)

In item 1.2.2, the following sentence has been added after the first sentence:

Subsea manifold systems connected to pipelines are, however, not included in the scope of this recommended practice.

Sec.5 Page 8 (Amended April 2004)

After Table 5-1, a new Guidance note has been added:

Guidance note:

The design current densities in Table 5-1 are applicable independent of geographical location and depth but should be considered as *minimum* values. Based on special considerations, the pipeline owner may chose to specify higher design values than those in Table 5-1.

---e-n-d---of---G-u-i-d-a-n-c-e---n-o-t-e---

Sec.5 Page 10 (Amended April 2004)

The equation in item 5.6.3, that wrongly has the number "7"(same as the equation in 5.5.3), has been renumbered "8". The succeeding equations has been renumbered accordingly.

Sec.5 Page 10 (Amended April 2004)

In item 5.6.4, the Guidance note has been amended to read:

Guidance note:

The length of cut-back refers to the corrosion protective coating. For cutbacks with length < 0.20 m, a default value of 0.20 m is recommended. With this default value, and for a pipeline section with all joints of 12 m length approximately,
$r = 0.033$ and $f'_{cf} = f'_{cf}$ (linepipe) + 0.033 f'_{cf} (FJC).

---e-n-d---of---G-u-i-d-a-n-c-e---n-o-t-e---

Sec.5 Page 11 (Amended April 2004)

*In item 5.6.9, the 2nd last paragraph, the text "*becomes 4L in stead of 2L*" is corrected to "*becomes L in stead of 2L*".*

Sec.8 Page 16 (Amended April 2004)

A new row has been added at the bottom of table A.1 with the text:

Note that the values for 'a' and 'b' in the two columns to the right have been multiplied by a factor 100.

In all references involving Section 4 in the printed issue, Section 4 shall be corrected to Section 5.

FJC/CFR Data Sheet No. 1B Page 17 (Amended April 2004)

In item 2.1, Lap shear strength has been corrected to:

≥ 30 N/cm^2

FJC/CFR Data Sheet No. 3A Page 26 (Amended April 2004)

*In item 3.2, row starting with "*Hot water soak test*" has been corrected as follows:*

Sec.8 Page 16 (Amended April 2004)

*In Table A.2, FJC Type 1A, 3rd column from right, the text "*CDS no. 5 and 6*" is corrected to "*CDS no. 5 and 6 with concrete*".*

Sec.8 Page 16 (Amended April 2004)

*In Table A.2, FJC Type 2A, 3rd column from right, the text "*CDS no. 5 with concrete*" is corrected to "*CDS no. 2 with concrete*".*

DNV-RP-F105: Free Spanning Pipelines, March 2002

Sec.4 Page 21 and 22 (Amended October 2003)

The abscissa title in Figures 4-1 and 4-4 shall be:

Reduced Velocity V_{rd} $(=V_r * \gamma_f)$

DNV-RP-F106: Factory Applied External Pipeline Coatings for Corrosion Control, October 2003

Sec.5 Page 10 (Amended April 2004)

*In the Guidance note in item 5.2.3, the text "*line spread*" has been changed to "*line speed*".*

DNV-RP-F107: Risk Assessment of Pipeline Protection, March 2001

Equation (22) Page 27 (Amended October 2002)

The equation should read:

$$F_{Coll\_Riser} = F_{Hit\_Platform} \times \left(\frac{1}{4} \sum_{j = Riser\_i} P_j \right)$$

(The righthand factors are to be multiplied rather than added.)