

DIN EN ISO 19905-1:2012-11 (E)

Petroleum and natural gas industries - Site-specific assessment of mobile offshore units - Part 1: Jack-ups (ISO 19905-1:2012); English version EN ISO 19905-1:2012, only on CD-ROM

Inhalt	Seite
Foreword	8
Introduction.....	9
1 Scope	11
2 Normative references	11
3 Terms and definitions	12
4 Symbols and abbreviated terms	23
4.1 Symbols.....	23
4.2 Abbreviated terms	24
5 Overall considerations.....	25
5.1 General	25
5.1.1 Competency	25
5.1.2 Planning	25
5.1.3 Assessment situations and associated criteria	25
5.1.4 Reporting.....	26
5.1.5 Regulations	26
5.2 Assessment approach	26
5.3 Selection of limit states	28
5.4 Determination of assessment situations	28
5.4.1 General	28
5.4.2 Reaction point and foundation fixity.....	29
5.4.3 Extreme storm event approach angle	29
5.4.4 Weights and centre of gravity.....	29
5.4.5 Hull elevation	29
5.4.6 Leg length reserve.....	29
5.4.7 Adjacent structures.....	29
5.4.8 Other	30
5.5 Exposure levels	30
5.5.1 General	30
5.5.2 Life-safety categories.....	30
5.5.3 Consequence categories.....	31
5.5.4 Determination of exposure level.....	33
5.6 Analytical tools	33
6 Data to assemble for each site.....	34
6.1 Applicability	34
6.2 Jack-up data.....	34
6.3 Site and operational data.....	34
6.4 Metocean data.....	34
6.5 Geophysical and geotechnical data	35
6.6 Earthquake data.....	36
7 Actions	36
7.1 Applicability	36
7.2 General	36
7.3 Metocean actions	37
7.3.1 General	37
7.3.2 Hydrodynamic model.....	37

7.3.3	Wave and current actions	37
7.3.4	Wind actions.....	37
7.4	Functional actions	38
7.5	Displacement dependent effects.....	38
7.6	Dynamic effects	38
7.7	Earthquakes	38
7.8	Other actions.....	38
8	Structural modelling.....	38
8.1	Applicability.....	38
8.2	Overall considerations	38
8.2.1	General.....	38
8.2.2	Modelling philosophy.....	39
8.2.3	Levels of FE modelling.....	39
8.3	Modelling the leg.....	39
8.3.1	General.....	39
8.3.2	Detailed leg.....	39
8.3.3	Equivalent leg (stick model)	39
8.3.4	Combination of detailed and equivalent leg	40
8.3.5	Stiffness adjustment	40
8.3.6	Leg inclination.....	40
8.4	Modelling the hull	40
8.4.1	General.....	40
8.4.2	Detailed hull model.....	40
8.4.3	Equivalent hull model.....	40
8.5	Modelling the leg-to-hull connection	40
8.5.1	General.....	40
8.5.2	Guide systems	40
8.5.3	Elevating system.....	40
8.5.4	Fixation system.....	41
8.5.5	Shock pad – floating jacking systems.....	41
8.5.6	Jackcase and associated bracing.....	41
8.6	Modelling the spudcan and foundation.....	41
8.6.1	Spudcan structure	41
8.6.2	Seabed reaction point	41
8.6.3	Foundation modelling	41
8.7	Mass modelling.....	42
8.8	Application of actions	42
8.8.1	Assessment actions	42
8.8.2	Functional actions due to fixed load and variable load.....	44
8.8.3	Hull sagging	44
8.8.4	Metocean actions.....	44
8.8.5	Inertial actions.....	44
8.8.6	Large displacement effects	45
8.8.7	Conductor actions	45
8.8.8	Earthquake actions.....	45
9	Foundations	45
9.1	Applicability.....	45
9.2	General.....	45
9.3	Geotechnical analysis of independent leg foundations	46
9.3.1	Foundation modelling and assessment	46
9.3.2	Leg penetration during preloading	46
9.3.3	Yield interaction	47
9.3.4	Foundation stiffnesses	47
9.3.5	Vertical-horizontal foundation capacity envelopes.....	47
9.3.6	Acceptance checks	48
9.4	Other considerations.....	49
9.4.1	Skirted spudcans	49
9.4.2	Hard sloping strata	49
9.4.3	Footprint considerations	50
9.4.4	Leaning instability	50
9.4.5	Leg extraction difficulties	50

9.4.6	Cyclic mobility	50
9.4.7	Scour.....	50
9.4.8	Spudcan interaction with adjacent infrastructure	50
9.4.9	Geohazards	51
9.4.10	Carbonate material	51
10	Structural response.....	51
10.1	Applicability	51
10.2	General considerations.....	51
10.3	Types of analyses and associated methods	52
10.4	Common parameters.....	52
10.4.1	General	52
10.4.2	Natural periods and affecting factors.....	52
10.4.3	Damping	54
10.4.4	Foundations	54
10.4.5	Storm excitation	54
10.5	Storm analysis	54
10.5.1	General	54
10.5.2	Two-stage deterministic storm analysis	55
10.5.3	Stochastic storm analysis	56
10.5.4	Initial leg inclination	56
10.5.5	Limit state checks	56
10.6	Fatigue analysis.....	57
10.7	Earthquake analysis.....	57
10.8	Accidental situations	58
10.9	Alternative analysis methods.....	58
10.9.1	Ultimate strength analysis.....	58
10.9.2	Types of analysis.....	58
11	Long-term applications.....	58
11.1	Applicability	58
11.2	Assessment data	59
11.3	Special requirements	59
11.3.1	Fatigue assessment	59
11.3.2	Weight control	59
11.3.3	Corrosion protection.....	59
11.3.4	Marine growth.....	59
11.3.5	Foundations	59
11.4	Survey requirements.....	60
12	Structural strength	60
12.1	Applicability	60
12.1.1	General	60
12.1.2	Truss type legs	61
12.1.3	Other leg types	61
12.1.4	Fixation system and/or elevating system	61
12.1.5	Spudcan strength including connection to the leg	61
12.1.6	Overview of the assessment procedure	61
12.2	Classification of member cross-sections	61
12.2.1	Member types	61
12.2.2	Material yield strength	61
12.2.3	Classification definitions	62
12.3	Section properties of non-circular prismatic members	62
12.3.1	General	62
12.3.2	Plastic and compact sections	62
12.3.3	Semi-compact sections	63
12.3.4	Slender sections.....	63
12.3.5	Cross-section properties for the assessment.....	63
12.4	Effects of axial force on bending moment.....	63
12.5	Strength of tubular members	63
12.6	Strength of non-circular prismatic members	63
12.7	Assessment of joints	64
13	Acceptance criteria	64

13.1	Applicability.....	64
13.1.1	General.....	64
13.1.2	Ultimate limit states	64
13.1.3	Serviceability and accidental limit states.....	65
13.1.4	Fatigue limit states	65
13.2	General formulation of the assessment check.....	65
13.3	Leg strength assessment	66
13.4	Spudcan strength assessment.....	66
13.5	Holding system strength assessment.....	66
13.6	Hull elevation assessment.....	66
13.7	Leg length reserve assessment	66
13.8	Overturning stability assessment.....	67
13.9	Foundation integrity assessment	67
13.9.1	Foundation capacity check.....	67
13.9.2	Displacement check	68
13.10	Interaction with adjacent infrastructure	68
13.11	Temperatures	68
Annex A	(informative) Additional information and guidance	69
A.1	Scope	69
A.2	Normative references	69
A.3	Terms and definitions	69
A.4	Symbols	69
A.4.1	Symbols used in A.1.....	69
A.4.2	Symbols used in A.2.....	69
A.4.3	Symbols used in A.3.....	69
A.4.4	Symbols used in A.4.....	69
A.4.5	Symbols used in A.5.....	69
A.4.6	Symbols used in A.6.....	70
A.4.7	Symbols used in A.7.....	71
A.4.8	Symbols used in A.8.....	73
A.4.9	Symbols used in Clause A.9.....	73
A.4.10	Symbols used in A.10.....	76
A.4.11	Symbols used in A.11.....	77
A.4.12	Symbols used in A.12.....	77
A.5	Overall considerations	81
A.6	Data assembled for each site	81
A.6.1	Scope	81
A.6.2	Jack-up data	81
A.6.3	Site data	81
A.6.4	Metocean data.....	81
A.6.5	Geophysical and geotechnical data.....	90
A.6.6	Earthquake data	93
A.7	Actions.....	93
A.7.1	Applicability.....	93
A.7.2	General.....	93
A.7.3	Metocean actions.....	93
A.7.4	Functional actions	112
A.7.5	Displacement dependent actions.....	113
A.7.6	Dynamic effects	113
A.7.7	Earthquakes	113
A.7.8	Other actions.....	113
A.8	Structural modelling	113
A.8.1	Applicability.....	113
A.8.2	Overall considerations	113
A.8.3	Modelling the leg.....	116
A.8.4	Modelling the hull	120
A.8.5	Modelling the leg-to-hull connection.....	120
A.8.6	Modelling the spudcan and foundation.....	129
A.8.7	Mass modelling.....	130
A.8.8	Application of actions	130
A.9	Foundations	134

A.9.1	Applicability	134
A.9.2	General	134
A.9.3	Geotechnical analysis of independent leg foundations	134
A.9.4	Other considerations	179
A.10	Structural response	184
A.10.1	Applicability	184
A.10.2	General considerations	184
A.10.3	Types of analyses and associated methods	184
A.10.4	Common parameters	186
A.10.5	Storm analysis	195
A.10.6	Fatigue analysis	209
A.10.7	Earthquake analysis	209
A.10.8	Accidental situations	211
A.10.9	Alternative analysis methods	211
A.11	Long-term applications	212
A.11.1	Applicability	212
A.11.2	Assessment data	212
A.11.3	Special requirements	212
A.11.4	Survey requirements	216
A.12	Structural strength	217
A.12.1	Applicability	217
A.12.2	Classification of member cross-sections	218
A.12.3	Section properties of non-circular prismatic members	226
A.12.4	Effects of axial force on bending moment	231
A.12.5	Strength of tubular members	234
A.12.6	Strength of non-circular prismatic members	239
A.12.7	Assessment of joints	251
A.13	Acceptance checks	251
Annex B	(normative) Summary of partial action and partial resistance factors	252
Annex C	(informative) Additional information on structural modelling and response analysis	254
C.1	Guidance on 8.5 — Modelling the leg-to-hull connections	254
C.2	Guidance on A.10.5.3.4 — Methods for determining the MPME	255
C.2.1	Guidance on the first method of Table A.10.5-1 — Fitting Weibull distributions to the results of a number of time domain simulations to determine responses at the required probability level and average the results	255
C.2.2	Guidance on the second method of Table A.10.5-1: Fitting Gumbel distribution to histogram of absolute maximum responses from a number of time domain simulations to determine responses at required probability level	257
C.2.3	Guidance on the third method of Table A.10.5-1 — Application of Winterstein's Hermite polynomial method to the results of time domain simulation(s)	258
C.2.4	Guidance on the fourth method of Table A.10.5-1: Application of drag-inertia method to determine the base shear and overturning moment DAF from time domain simulation	260
Annex D	(informative) Foundations — Recommendations for the acquisition of site-specific geotechnical data	264
Annex E	(informative) Foundations — Additional information and alternative approaches	270
E.1	Guidance on A.9.3.2.2: — Penetration in clays — Bearing capacity factors of Houlsby and Martin	270
E.2	Guidance on A.9.3.2.4 — Penetration in silica sands	277
E.3	Guidance on A.9.3.2.6.4 — Punch-through — Sand overlying clay — Further details on alternate methods	279
Annex F	(informative) Informative annex on Clause A.12 — Structural strength	283
F.1	Guidance on A.12.6.2.4 — Axial compressive column buckling strength	283
F.2	Guidance on A.12.6.3.2 — Interaction equation approach — Determination of η	284
F.3	Guidance on A.12.6.3.3 — Interaction surface approach	285
Annex G	(informative) Contents list for typical site-specific assessment report	297
Annex H	(informative) Regional information	304
H.1	General	304
H.2	Norway	304

H.2.1	Description of region.....	304
H.2.2	Regulatory framework.....	304
H.2.3	Technical requirements	304
H.2.4	Technical commentary.....	306
H.2.5	Additional national requirements.....	306
H.3	US Gulf of Mexico	306
H.3.1	Description of region.....	306
H.3.2	Regulatory framework.....	307
H.3.3	Metocean conditions	307
	Bibliography.....	313