

DIN EN ISO 19901-9:2019-12 (E)

Petroleum and natural gas industries - Specific requirements for offshore structures - Part 9: Structural integrity management (ISO 19901-9:2019); English version EN ISO 19901-9:2019

Contents

	Page
Foreword	vi
Introduction	vii
1 Scope	1
2 Normative references	1
3 Terms and definitions	2
4 Symbols	4
5 Abbreviated terms	5
6 SIM fundamentals	6
6.1 General	6
6.2 Limit states and performance levels	6
6.3 Fitness-for-service assessment	6
6.4 Management framework	7
6.5 Design	8
6.6 Topsides	9
6.7 Continued service	9
6.8 Structural integrity interfaces	9
7 SIM process	9
8 SIM data	10
8.1 General	10
8.2 Missing data	11
8.3 Data management	11
9 SIM evaluation	12
9.1 General	12
9.2 Data evaluation	12
9.3 Hazards, hazardous events and degradation mechanisms	12
9.4 Critical structure (CS)	12
9.5 Risk	12
9.5.1 General	12
9.5.2 Consequence	13
9.5.3 Likelihood	13
9.5.4 Risk presentation	13
9.6 Demonstrating fitness-for-service	13
9.7 Assessment	14
9.7.1 General	14
9.7.2 Assessment motive	14
9.7.3 Assessment initiators	15
9.8 Mitigation measures	15
9.8.1 General	15
9.8.2 Consequence reduction	16
9.8.3 Likelihood reduction	16

10	SIM strategy	16
10.1	General.....	16
10.2	Inspection strategy.....	17
10.2.1	General.....	17
10.2.2	Inspection motives.....	18
10.2.3	Inspection type.....	18
10.2.4	Inspection method.....	18
10.2.5	Inspection interval.....	18
10.2.6	Inspection scope.....	20
10.2.7	Pre-selected inspection areas.....	20
10.3	Maintenance strategy.....	21
10.4	Monitoring strategy.....	21
10.4.1	General.....	21
10.4.2	Weight and centre of gravity (CoG) monitoring.....	22
10.4.3	Deck elevation monitoring.....	22
10.4.4	Natural frequency monitoring.....	22
10.4.5	Corrosion protection monitoring.....	22
10.4.6	Metocean monitoring.....	22
10.5	Evacuation strategy.....	22
10.6	Marine site investigations.....	23
11	SIM Program	23
11.1	General.....	23
11.2	Inspection program.....	23
11.2.1	General.....	23
11.2.2	Specifications.....	23
11.2.3	Inspection method.....	24
11.3	Maintenance program.....	25
11.4	Monitoring program.....	25
12	Assessment	26
12.1	General.....	26
12.2	Assessment information.....	26
12.3	Assessment method.....	26
12.3.1	General.....	26
12.3.2	Qualitative method.....	27
12.3.3	Semi-quantitative method.....	28
12.3.4	Quantitative methods.....	29
12.3.5	Fatigue analysis.....	31
12.4	Assessment model.....	31
12.4.1	General.....	31
12.4.2	Tubular members.....	31
12.4.3	Connections.....	32
12.4.4	Conductors.....	32
12.4.5	Damage.....	32
12.4.6	Repaired and strengthened elements.....	33
12.4.7	Foundation model.....	33
12.4.8	Material strength.....	34
12.5	Assessment for gravity hazard.....	34
12.5.1	General.....	34
12.5.2	Design level method (DLM).....	35
12.5.3	Ultimate strength method (USM).....	35
12.6	Assessment for metocean hazard.....	35
12.6.1	General.....	35
12.6.2	Metocean criteria.....	35
12.6.3	Crest elevation.....	35
12.6.4	Metocean action combinations — Jacket.....	36
12.6.5	Metocean action combinations — Deck.....	36

12.6.6	Directionality of metocean hazards.....	36
12.6.7	Design level method (DLM).....	37
12.6.8	Linear-elastic redundancy method.....	37
12.6.9	Ultimate strength method (USM).....	37
12.7	Assessment for seismic hazard.....	38
12.7.1	General.....	38
12.7.2	Seismic criteria.....	38
12.7.3	Seismic action combinations.....	38
12.7.4	Directionality of seismic hazards.....	39
12.7.5	Design level method (DLM).....	39
12.7.6	Ultimate strength method (USM).....	40
12.8	Assessment for collision hazard.....	40
12.8.1	General.....	40
12.8.2	Collision zone.....	41
12.8.3	Collision criteria.....	41
12.8.4	Directionality of collision hazards.....	41
12.8.5	Collision assessment method.....	41
12.9	Assessment for ice hazard.....	41
12.10	Assessment for explosion hazard.....	42
12.11	Assessment for fire hazard.....	42
13	Reuse.....	42
13.1	General.....	42
13.2	Fatigue in reused structures.....	42
13.3	Steel in reused structures.....	42
13.4	Inspection of reused structures.....	43
13.4.1	General.....	43
13.4.2	Initial condition assessment of structural members and connections.....	43
13.4.3	Extent of weld inspection.....	43
13.4.4	Corrosion protection systems.....	44
13.5	Removal and reinstallation.....	44
14	Decommissioning and removal.....	44
14.1	General.....	44
14.2	Decommissioning process.....	44
14.3	Pre-decommissioning data gathering.....	44
14.4	Planning and engineering.....	44
14.5	Well decommissioning.....	45
14.6	Facilities decommissioning.....	45
14.7	Pipeline decommissioning.....	45
14.8	Conductor removal.....	45
14.9	Structure removal.....	45
14.10	Site clearance.....	45
	Annex A (informative) Additional information and guidance.....	46
	Bibliography.....	141