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