OFFSHORE SERVICE SPECIFICATION

DNV-OSS-304

Risk Based Verification of Offshore Structures

OCTOBER 2006

This document has been amended since the main revision (October 2006), most recently in October 2011. See "Changes" on page 3.

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FOREWORD

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— *Service Specifications.* Procedual requirements.
— *Standards.* Technical requirements.
— *Recommended Practices.* Guidance.

The Standards and Recommended Practices 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
J) Cleaner Energy
O) Subsea Systems

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CHANGES

INTRODUCTION

This 'Service Specification' is a second tier document in a suite of DNV's Offshore Service Specifications (OSS) covering Verification and Certification for the oil and gas industry.

The suite of DNV-OSS documents consists of a general description of the verification systematic, DNV-OSS-300 Risk Based Verification, and object specific documents like the current document.

The idea is that the general document shall give the common frame work and processes that DNV can benefit from doing and documenting in the same manner. The object specific ones shall tie the frame work and processes to the relevant technical aspects.

The scope of the top tier document is to give an overview of DNV Verification Services within the oil and gas industry (offshore and onshore). It introduces a three-level description of verification involvement during all phases of an asset life. Depending on the overall risk associated with an asset or particular aspects or elements within it, the OSS facilitates a categorisation into risk levels High, Medium and Low. The document assists in evaluation of the risk level, planning the verification through the making of a Verification Plan, and describing the documentation of the process.

The scope of the present document is to give detailed descriptions of DNV's approach to verification of structures for the oil and gas industry. It describes the elements of verification and exemplifies the type and extent of verification involvement for each of the levels High, Medium and Low.

The value to DNV's customers and the stakeholders will be the existence of an international standard allowing a transparent and predictable verification scope definition, as well as a defined terminology of verification involvement. The value to DNV lies in enabling the making of its services and their delivery uniform world wide.

CHANGES

- **Amendments October 2011**

— A restricted use legal clause has been added on the front page.

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SECTION 1
GENERAL

A. General

A 100 Introduction

101 This DNV Offshore Service Specification (DNV-OSS 304) describes DNV services for risk based verification of structures. For structures subject to DNV classification services see DNV-OSS-101, 102 or 103.

102 This specification falls under the top level document DNV-OSS-300 Risk Based verification.

Guidance note:
The latest revision of all DNV documents may be found in the publications list in the DNV web site www.dnv.com.

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A 200 Objectives

201 The objectives of this specification are:

— to describe a method to define a verification scope
— give guidance on how to select the level of involvement of the verifier
— give guidance on how to establish a verification plan.

A 300 Scope of application

301 This specification is intended to be used for specifying verification services for total or part of the structure for offshore installations for all or selected project phases. The document is developed for structures to both fixed and floating platforms, but is also applicable for onshore structures if found relevant.

302 The verification may be done against DNV Offshore Standards or other recognized structural standards when applicable.

A 400 Structure of this document

— **Section 1** explains the overall principles of risk based verification.
— **Section 2** describes the activities for each project and the various project phases.
— **Appendix A** gives guidance to assist in the selection of verification level.
— **Appendix B** gives examples of verification scope of work for certification of fixed platforms.
— **Appendix C** gives example verification documents and describes the documents issued during and as a result of the verification process. The use of quality management systems is addressed here also.

B. Risk Based Verification

B 100 Elements of the service

101 The risk based verification concept is described in DNV-OSS-300 and shown in Figure 1.

102 The Verification Plan is the pivot element, with the Asset Specification, Risk Assessment and Definition of Involvement Level as input and the Verification Execution being the implementation process.

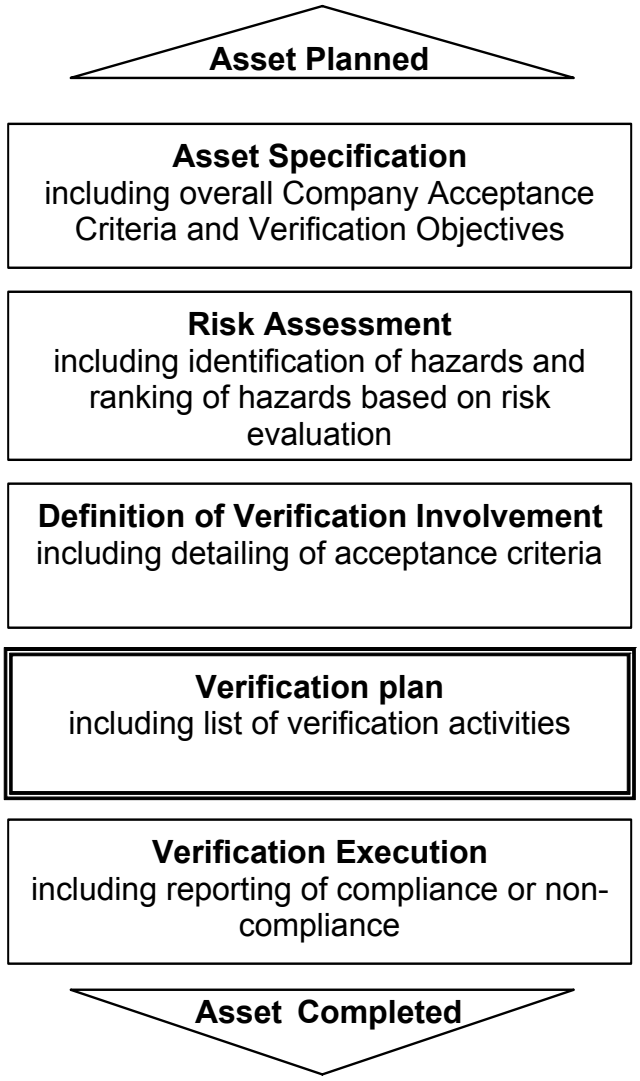

Figure 1
The DNV risk based verification flow chart

B 200 Asset specification (verification object)

201 The structure subject to verification need to be defined accurately and shall be agreed with the client. Definition of the verification object is usually made by reference to structural drawings. A list of drawings including revision number will be the main body of the specification.

202 In cases where the verification is limited to parts of what is shown on the referred drawings a precise description of which parts that are subjected to verification shall be given.

Guidance note:

The verification can be limited to e.g. the part of the structure that contribute to the global strength (main structure) or where failure will imply loss of life, major pollution or major business risk.

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203 The definition of verification object shall include accurate description of the design conditions that is covered by the service.

204 The objective of the verification shall be formulated as part of the description of the verification object.

205 The acceptance criteria to be applied during the verification shall be stated as part of the definition of the verification object.

Guidance note:

The acceptance criteria are for verification of structures usually defined by reference to structural standards and specifications.

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B 300 Risk assessment

301 Before making the verification plan the various risk for the structure subjected to verification shall be assessed.

302 The risk assessment may be given by the client, developed in cooperation with DNV or made solely by DNV.

303 The risk assessment shall identify and clearly specify the various risk elements for the structure. The risk assessment is usually done by a systematic review of the structure for all phases in order to identify the consequences and the probabilities of failures e.g. by use of HAZID techniques.

304 The risk assessment should be based on experience from similar structures and by giving due consideration to the requirements imposed on the structure in order to maintain the main safety functions of the installation.

305 The relevance of the experience of the designer and the fabricator will influence the probability of errors that may lead to structural failures. In cases where the experience of the designer is unknown technical audits can be used. In order to assess the relevance of the fabricator's experience, technical audits or the use of assessment techniques like MPQA may be used.

306 The risk assessment may be based upon results from Quantitative Risk Analysis.

307 The initial risk assessment may need to be updated as the verification work progresses and reveals that the judgements originally made prove to be inaccurate.

B 400 Definition of verification involvement

401 Based on the overall risk level for the structure the client should decide on the amount of resources to be used for the verification work by selecting among three different levels of verification. Guidance for selecting the levels of verification is given in Appendix A.

C. Defining a Verification Plan

C 100 Risk based verification planning

101 Based on the Asset Specification, the Risk Assessment and the Definition of the Verification Involvement, a verification plan shall be developed.

102 The verification plan shall describe the method to be applied for the different verification activities.

103 The verification plan shall be communicated to the client before verification work commences.

D. DNV Statements and Certificates

D 100 General on verification

101 Verification describes the individual activities undertaken by DNV at the various stages of design, construction and operation of the facility. The scope of the verification plan is ultimately determined by the Client.

102 A statement of Compliance may be issued by DNV to confirm that a specified asset complies with the acceptance criteria according to the agreed scope of work. See Appendix C for examples.

D 200 General on certification

201 Certification describes the totality of verification activities leading up to the issuance of a Certificate of Conformity. The scope of work and verification plan, called a Certification Plan, is set by DNV. All design and construction aspects, related to the structural integrity, must be covered by the Certification Plan. See Appendix C for examples.

E. Definitions / Abbreviations

E 100 General

101 Relevant definitions in ISO 10418 (API RP 14C) also apply to this OSS.

E 200 Abbreviations

ALS	Accidental Limit State
API	American Petroleum Institute
DNV	Det Norske Veritas
FE	Finite Element Analysis
FLS	Fatigue Limit State
HAZID	Hazard Identification
HAZOP	Hazard and Operability Review
OS	DNV Offshore Standard
OSS	DNV Offshore Service Specification
MPQA	Method and Product Quality Assessment
MPQT	Manufacturing Procedure Qualification Test
MPS	Manufacturing Procedure Specification
NDT	Non-destructive testing
QRA	Quantitative Risk Analysis
RP	Recommended Practice
SCF	Stress Concentration Factor
SHE	Safety, Health, Environment
ULS	Ultimate Limit State
VIV	Vortex Induced Vibration
WSD	Working Stress Design
WPS	Welding Procedure Specifications
WPQR	Welding Procedure Qualification Record

E 300 Verbal forms

301 *"Shall"*: Indicates requirements strictly to be followed in order to conform to this OSS and from which no deviation is permitted.

302 *"Should"*: Indicates that among several possibilities, one is recommended as particularly suitable, without mentioning or excluding others, or that a certain course of action is preferred but not necessarily required. Other possibilities may be applied subject to agreement.

303 *"May"*: Verbal form used to indicate a course of action permissible within the limits of the OSS.

E 400 Definitions

401 *Client:* DNV's contractual partner. It may be the Purchaser, the Owner or the Contractor.

402 *Certificate of conformity*: A document signed by a qualified party affirming that, at the time of assessment, the product or service met the stated requirements.

403 *Construction phase*: All phases during construction, including manufacture, fabrication, installation, testing and commissioning, up until the installation or system is safe and operable for intended use. In relation to fixed structures, this includes on-shore fabrication, lifting during fabrication, load out and transportation on barge assembly, installation, rectification.

404 *Design*: All related engineering to design the fixed structure as well items related to materials.

405 *Design phase*: An initial phase that takes a systematic approach to the production of specifications, drawings and other documents to ensure that the structure meets specified requirements (including design reviews to ensure that design output is verified against design input requirements).

406 *Fabrication*: Activities related to the assembly of objects with a defined purpose. In relation to fixed structures, fabrication typically refers to the process of assembly or transformation of e.g. plates, profiles and tubulars into a fixed structure.

407 *Hazard*: A deviation (departure from the design and operating intention) which could cause damage, injury or other form of loss (Chemical Industries Association HAZOP Guide).

408 *HAZID*: (HAZard Identification): A technique for the identification of all significant hazards associated with the particular activity under consideration.

409 *HAZOP*: The application of a formal systematic critical examination to the process and engineering intentions of new or existing facilities to assess the hazard potential of mal-operation or mal-function of individual items of equipment and their consequential effects on the facility as a whole (Chemical Industries Association HAZOP Guide).

410 *Installation* (activity): The operations related to installing the equipment or structure, e.g. marine operations related to placing equipment on seabed, tie-in, piling of structure etc., including final testing and preparation for operation.

411 *Manufacture*: Making of articles or materials, often in large volumes. In relation to process facilities, this typically refers to activities for the production of various components under contracts from one or more Contractor or Supplier.

412 *MPQA: Manufacturer Product Quality Assessment* A rating system developed by DNV, which measures the Client's capability to control product quality or to benchmark processes enabling:

— assessment of the capability levels of suppliers of products or potential partners
— choosing the best supplier for products and services
— MPQA may be used as a supplement to confirming the Client's quality management system and in Risk Assessment processes.

413 *Operations (phase)*: The phase when the process facilities are being used for the purpose for which it was designed.

414 *Risk*: The qualitative or quantitative likelihood of an accident or unplanned event occurring, considered in conjunction with the potential consequences of such a failure. In quantitative terms, risk is the quantified probability of a defined failure mode times its quantified consequence.

415 *Risk Reduction Measures*: Those measures taken to reduce the risks to the operation of process facilities and to the health and safety of personnel associated with it or in its vicinity by:

— reduction in the probability of failure
— mitigation of the consequences of failure.

Guidance note:

The usual order of preference of risk reduction measures is:

a) Inherent Safety
b) Prevention
c) Detection
d) Control
e) Mitigation
f) Emergency Response

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416 *Safety Objectives*: The safety goals for the design, construction, installation operation and abandonment the fixed offshore structure including acceptance criteria for the level of risk acceptable to the Owner.

417 *Statement of Compliance*: A statement or report signed by a qualified party affirming that, at the time of assessment, the defined facility, phase, or collection of activities, met the requirements stated by the Owner.

418 *Verification*: An examination to confirm that an activity, a product or a service is in accordance with specified requirements.

Guidance note:

The examination shall be based on information, which can be proved true, based on facts obtained through observation, measurement, test or other means.

ISO 8402: 1994: *Verification*: Confirmation by examination and provision of objective evidence that specified requirements has been fulfilled.

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SECTION 2
SERVICE OVERVIEW

A. General

A 100 Objectives

101 The objectives of this section are to describe the various verification activities for different phases of the life cycle of the structure.

B. Service Process

B 100 General principles

101 The description of the process of DNV's verification of offshore structures is based on distinct project phases and the recognition of key milestones.

102 Verification performed by DNV normally progresses through one or more of these project phases and may include all or selected aspects of the project.

103 The risk based verification process described in relation to the normal project phases, is as follows:

Project initiation:

— conceptual design.

Project realisation:

— detail design
— construction
— installation
— as-built/as-installed documentation, including Design Fabrication and Installation (DFI) resume.

Project operation:

— operation manuals
— operations, maintenance and repair.

Project abandonment:

— decommissioning
— removal.

C. Project Initiation

C 100 Verification of conceptual design

101 Verification during the conceptual and/or feasibility studies of a project and in the early stages of a project can reduce cost for the design, fabrication as well as costs during the long term operation, inspection and maintenance phases. Verification during conceptual design will also reduce the need for verification during the design and construction phases.

102 Structural verification of conceptual designs comprises:

— review of conceptual drawings
— review of conceptual design reports
— review of project specifications
— review of design procedures (Design Brief)
— review of weight estimates
— review of cost estimates.

103 The structural verification of the conceptual design will be a function of the state of development of the concept. The expected level of development should be stated as part of the Asset Specification.

Guidance note:
The level of development may be expressed as expected accuracy for cost and weight estimates or as the level to have been reached where the design documents are suitable as basis for placing steel order.

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Verification work carried out during this phase may be used to define the verification plan for later phases as well as to give input to evaluations of suitable verification level low, medium or high for later phases.

D. Project Realization

D 100 General

101 Verification during the Project realization phase is divided into design verification and construction phases. In general the verification will use the same split between design and construction as the project.

102 The interface between design and construction phase should be accurately defined.

D 200 Verification of overall project management

201 Verification of the overall project management is the examination of the means of controlling the entire process facility development project, or the phase for which verification is undertaken.

202 This verification should confirm that the necessary controls are in place to ensure information flow across the various interfaces. It is especially important where separate contractors are employed for different phases of the project such as design and installation.

203 Typically the documentation is expected to be in line with ISO 9000 requirements.

204 Definition of scope of work for verification of overall project management shall follow Table D1.

Table D1 Scope of work for verification of overall project management

	Level		
Verification activity	*L*	*M*	*H*
Review of the project management process by			
— review of project quality management documentation.	x	x	x
— audit of project quality management system		x	x
— review of sub-contractor control		x	x
— review of interface controls		x	x
— review of methods of information flow			x

205 The verification of the overall project management quality system and documentation is optional. The reviews and audits should typically be performed if an extensive verification of a project is performed.

D 300 Verification during design

301 Design verification is the examination of the assumptions, methods and results of the design process and is performed at the specified level of verification to ensure that the specified performance requirements of the object will be achieved.

302 The verification is in general based upon the pre-requisite that the design is developed by an organisation having an implemented quality system. Confirmation of the designers QA system may be done as part of the verification of the overall management, by separate audits carried out as part of the structural verification, or by audits performed by the client or others.

303 Design verification shall consist of one, or some, of the following:

— audit of designers QA system
— review of specifications for design
— review of design premises or design briefs
— review of drawings
— review of design reports
— performance of independent calculations
— witness of model or laboratory test and
— review of specifications for construction and operation resulting from design.

304 Certain documents like design specifications may be subject to review that results in the issuance of specific comments while others like design reports are considered as background for the verification. Thus comments to design reports as such will in the general case not be given.

305 The thoroughness that will be employed during verification of the structural design will be defined in the Verification Plan using the following three levels of scrutiny.

— R1 Review of drawings and design principles
— R2 Review of drawings and design principles and spot check of calculations
— R3 Verification of structural integrity by performance of independent calculations.

306 For Verification Level Low, scrutiny level R1 will be dominating with use of R2 and R3 for the elements with the highest risk. For Verification Level High, R3 will be the main method for verification. Medium Verification Level will use a balance of all three scrutiny levels.

307 The selection of scrutiny level will in addition to the risk level also be made under consideration of the most suitable verification method in each case.

308 Scope of work for verification of design for various levels of involvement is given in Table D2. Details of the scope need to be established in each case.

Table D2 Scope of work for verification of design

Verification activity	*Level*		
	L	*M*	*H*
Designer's QA system			
— audit of designer's QA system	x	x	x
Review of structural specifications for design by			
— review of the design basis with emphasis on the design criteria	x	x	x
Review of design procedures by			
— review of design brief	x	x	x
Review of drawings by			
— review of drawings and main principles for the majority of the structure (scrutiny level R1) with review according to scrutiny level R2 and R3 only for the few elements with the highest risk	x		
— review of drawings and main design principles and spot check of design reports (scrutiny level R2) for the majority of the main structure, applying scrutiny level R1 for the least risk elements, and R3 for elements with the highest risk		x	
— review of drawings and main design principles and independent calculations (scrutiny level R3) for the majority of the main structure, applying scrutiny level R1 for the least risk elements and R2 for elements with moderate risk			x
Review of interfaces			
— check designer system for interface control		x	x
— independent check of the most important interfaces			x
Review of test			
— review of model or structural test		x	x
— witness of testing			x
Review of specifications for construction and operation by			
— spot check of critical aspects	x	x	x
— review of main specifications		x	x
— thorough review of main specifications			x

Guidance note:

Design verification activities may be split up between Basic Design and Detailed Design, or other sub-phases, depending on type of contract.

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D 400 Verification during fabrication

401 Verification during fabrication is to ensure that the specified requirements of the structure will be achieved by carrying out various verification activities to sufficient detail.

402 The verification is in general based upon the pre-requisite that the fabricator possesses an implemented quality system. Confirmation of the fabricators QA system may be done as part of the verification of the overall management, or by separate audits (e.g. MPQA) carried out as part of the fabrication verification or by audits performed by the client or others.

403 Verification during fabrication shall consist of one, or some, of the following:

— review of fabrication plans
— review of quality plans
— full time attendance of fabrication,
— surveillance of fabrication processes
— review of fabrication procedures
— method and product quality assessment (MPQA)

— failure mode and effect analysis (FMEA), inspection or spot checks audit of designers QA system
— review of specifications for fabrication
— review of interface controls
— review of procedure for design changes
— review of control of subcontractors
— coordination of vendor inspections
— vendor inspections
— review of fabrication documents.

404 The selected method for verification of different parts of the structure will be defined in the Verification Plan.

405 The selection of scrutiny level will in addition to the risk level also be made under consideration of the most suitable method in each case.

406 Scope of work for verification of fabrication for various levels of involvement is given in Table D3. Details of the scope need to be established in each case.

407 Verification of these activities relates not only to the contractor's work but also to the monitoring of the work carried out by others.

408 The following shall be used to describe the frequency if it is not specifically defined:

S1 = Surveillance on a visit basis, e.g. once per week or sample review 10-20%
S2 = Surveillance frequency at minimum once per day or review of 50-60%
S3 = Surveillance frequency at minimum once per shift or review of 100% of items.

409 Definition of scope of work for verification of fabrication should follow Table D3.

Table D3 Scope of work for verification of manufacturing and fabrication

Verification activity	*Level*		
	L	*M*	*H*
Review of the manufacturing and fabrication process			
— Review of: Quality system organisation Quality responsibilities and authority Resources and personnel Operational procedures and instructions	x	x	x
— Audit of: Human Resources Capability review Employee training Internal and external support functions Interface control Design and development Documentation and quality records		x	x
Review of manufacturing and fabrication procedures			
— Review manufacturing, fabrication and inspection procedures for confirmation of compliance with the manufacturing specification	x	x	x
— Review method statements		x	x
Review of qualification process			
— Review of the Manufacturing Procedure Specification, (MPS), Manufacturing Procedure Qualification Test (MPQT), as applicable	x	x	x
— Full time attendance during MPQT, as applicable, or first day production		x	x
Surveillance during manufacturing and fabrication activities			
— Audit-based attendance during manufacturing and testing, to ensure, based on spot checks (level S1 in majority), that the delivered products are produced in accordance with the manufacturing specification with attendance according to level S2 and S3 only for the few elements with the highest risk	x		
— Audit-based and/or part-time attendance during manufacturing and testing to ensure, based on spot checks (level S2 in majority), that the delivered products are produced in accordance with the manufacturing specification with attendance according to level S1 for the least risk elements and S3 for elements with the highest risk		x	
— Full-time attendance during manufacturing and testing for the majority of the structure (level S3) level S1 for the least risk elements and S2 for elements with moderate risk			x

Table D3 Scope of work for verification of manufacturing and fabrication (Continued)			
Verification activity	*Level*		
	L	*M*	*H*
Review of final documentation			
Final documentation received for information	x		
Review of principles (R1)		x	
Review of principles and spot check of correctness (R2)			x

Guidance note:
Materials may be ordered with certificates of varying degrees of independent third party verification This can be integrated into the overall verification activities, in order not to duplicate work.

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E. Project Operation

E 100 Verification during operation

101 Verification during operation shall be carried out by audit or spot check of the work in sufficient detail to ensure that the specified requirements of the structure continue to be achieved.

102 Assessment of these activities will relate to the Owner's, as well as any contractor's, work.

103 During operations, these assessments should consist of:

— review of operations processes:

  — review of operations management systems
  — audit of the quality management system, if necessary

— review of operations specifications and procedures:

  — confirmation of design assumptions
  — method statements
  — inspection plans
  — inspection methods
  — procedures for evaluation of inspection results

— attendance during operations activities:

  — attendance during inspections

— review of inspection records.

104 In order to be able to carry out periodical surveys, the minimum documentation should include:

— personnel responsible for the operation of the process facility
— history of operation with reference to events that may have significance with respect to safety and functionality
— installation condition data as required
— inspection and maintenance philosophy, schedules and records
— inspection procedures and results as appropriate.

105 Definition of verification of the operations phase should follow Table E1.

Table E1 Scope of work for verification of operations			
	Level		
Verification activity	*L*	*M*	*H*
General review of the main document(s) to check compliance with applicable design documentation. Audit during repair and modification.	x	x	x
Audit attendance during start-up of periodical survey, modification and repair activities. For critical aspects, as identified by the requirement for maintenance of certificate, audit attendance throughout the activities. Review of contractors' documentation of the survey/modification.		x	x
Review of the main document(s) to check compliance with applicable codes and standards. Audit attendance during start-up and performance of periodical survey, modification and repair activities. For critical aspects, as identified by the requirement for maintenance of certificate, full attendance throughout the preparations of and the activities. Issuing of independent confirmation documentation of the survey/modification.			x

106 Verification during operations is carried out to confirm that the structure continues to meet the Owner's specified requirements for integrity.

107 Annual assessments may be carried out to confirm that any changes in the structural configurations (additional loads, damage etc.), are within acceptable limits and that the facility continues to be fit for the intended purpose.

Guidance note:

Annual assessments do not necessarily involve annual inspections as such regular inspections may not be required under a risk-based inspection strategy. Annual assessments may be limited to review of records confirming that the facility has operated within its design limits.

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108 Additional assessments should be carried out to confirm that any damage, deterioration or modification to the structure systems do not render the facility unsuitable for the intended purpose.

109 Verification of reassessments, design and fabrication of modifications or repair during the operational phase should be made according to D300 or D400.

F. Verification Documents

F 100 General

101 The hierarchy of verification document is given in DNV-OSS-300 Appendix B. The descriptions of the content of these documents as well as examples of document forms are given in Appendix C to this specification.

APPENDIX A
SELECTION OF VERIFICATION LEVEL

A. General

A 100 General principles

101 The purpose of selecting a verification level is to direct greatest effort at those elements of the asset where the risk is highest and whose failure or reduced performance will have the most significant impact on the project objective and goals, e.g.:

— safety risks
— environmental risks
— economic or business risks.

102 The selection of the level of structural verification should be made by assessment of the risk of structural failures. Risk is a function of both consequence of a failure and the probability of a failure occurring. Both consequence and probability need to be considered when selecting the verification level.

103 The consequences of structural failure should be related to the overall risk analysis of the development with regards to the importance of the structures for the main safety functions of the total installation. Consequences from structural failures on the business risk like impact on schedule and cost should also be considered.

104 The probability of failure is related to the complexity of the design, fabrication and installation of the structure.

105 When selecting the verification level it should also be considered the cost of verification in relation to the possible reduction of risk.

Guidance note:

Even if other hazards may have larger probability of occurrence than structural failure it may be meaningful to reduce the risk for structural failures through a thorough verification as the cost of this risk reducing activity often are small compared to other means of mitigation. (ALARP principle).

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B. Verification Levels for Design

B 100 Evaluation of consequences

101 The consequence of a structural failure should be evaluated on the basis of the safety objectives for the project or of the company.

102 The consequences of structural failures should be evaluated by consideration of the factors listed below among others:

— direct consequences for the safety of personnel
— indirect consequences for personnel or danger to the environment due to loss of support for process equipment or piping
— loss of structural support that may jeopardize safety functions as escape ways, fire walls etc.
— impact on project schedule due to redesign or rework.

B 200 Evaluation of probability

201 The evaluation of probability of failure that is relevant for determination of the appropriate verification level should be based upon consideration of the following factors:

— status of implementation of quality management systems of the contractors
— degree of technical innovation in the structure
— new use of well known design solutions
— the number of contractors involved
— experience of the contractors in carrying out the work
— tightness of the schedule
— level of complexity of the analyses involved
— confidence in load determinations
— degree of structural optimisation.

B 300 Selection of verification level for design

301 Low Verification Level will apply to well known types of structures that are designed by experienced designer and low or moderate consequences of failure.

302 High Verification Level should be selected for innovative designs, inexperienced designer or high consequences of failure.

303 Structures not categorised to be verified according to High or Low Verification Level should be verified according to Medium Verification Level.

C. Verification Levels for Fabrication

C 100 Evaluation of consequences

101 The consequence of a structural failure as a result of faulty fabrication should be evaluated on the basis of the safety objectives for the project or of the company.

102 The verification that are selected for fabrication should also consider the consequences identified for verification of design.

103 The consequences of structural failures should be evaluated by consideration of the factors listed below among others:

— direct consequences for the safety of personnel
— indirect consequences for personnel or danger to the environment due to loss of support for process equipment or piping
— loss of structural support that may jeopardize safety functions as escape ways, fire walls etc.
— impact on cost and schedule from repair of fabrication faults
— impact on project schedule due to redesign or rework.

C 200 Evaluation of probability

201 The evaluation of probability of failure that is relevant for determination of the appropriate verification level should be based upon consideration of the following factors:

— the contractors experience with the type of structure
— quality management systems of the contractors
— degree of technical innovation in the structure
— new use of well known design solutions
— sensitivity of the structure to fabrication faults. e.g. exposure to fatigue loading
— degree of optimization of the structure
— number of and experience of subcontractors
— the complexity of interfaces.

C 300 Selection of verification level for fabrication

301 The verification level selected for fabrication may differ from what is selected for design.

302 Low Verification Level will apply to well known type of structures that are fabricated by experienced fabricators and with low or moderate consequences of failure.

303 High Verification Level should be selected for innovative design solutions, inexperienced fabricator or high consequences of failure.

304 Structures not categorised to be verified according to High or Low Verification Level should be verified according to Medium Verification Level.

APPENDIX B
EXAMPLE VERIFICATION SCOPE FOR CERTIFICATION OF FIXED OFFSHORE STRUCTURES

A. Introduction

A 100 General

101 This annex presents an example verification scope for certification of a typical fixed platform (jacket). The certification project is assumed to be carried out according to the principles of risk based verification as described in Section 1 and 2 of this document. This implies preparation of a verification plan that will be specific to each project. The verification plan will in the general case differ from the scope given in the tables below, but the tables will serve as a starting point for the verification planning.

B. Description of Terms used in the Scope of Work Tables

B 100 Abbreviations

101 The following abbreviations are used. The definitions of which are given subsequently:

— A is audit
— S is surveillance
— H is hold point
— R is review
— I is for information.

102 These abbreviations are DNV's preferred terms and normally will be used in DNV-generated documents. However, other terms, for example monitoring or witnessing, will be used by DNV if these are the terms commonly used in documents, such as Inspection and Test Plans, generated by others. In that case, it is expected that such terms are defined in these documents.

B 200 Audit

201 Systematic and independent examination to determine whether quality activities and related results comply with planned arrangements and whether these arrangements are implemented effectively and are suitable to achieve objectives (ISO 8402:1994).

Guidance note:

This activity differs from the Surveillance by being focused on the adherence to and completeness and robustness of the procedures and not on the actual result of the procedure (although this is not ignored). Further, the audit is normally a 'one-off' activity as opposed to the continuity in monitoring.

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B 300 Surveillance

301 Continual monitoring and verification of the status of an entity and analysis of records to ensure that specified requirements are being fulfilled (ISO 8402:1994).

Guidance note:

Other commonly used terms for Surveillance are Monitoring or Witnessing.

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302 The amount of work involved in surveillance is not described in detail in the tables. This shall be part of the final contractual scope of work which shall define the frequency of surveillance based on the overall surveillance and the quality control performed by other parties as well as DNV's experience.

303 The following shall be used to describe the frequency if it has not been specifically defined:

S1 = Surveillance on a visit basis, e.g. once per week or sample review 10-20%
S2 = Surveillance frequency at minimum once per day or review of 50-60%
S3 = Surveillance frequency at minimum once per shift or review of 100% of items

Guidance note:

These surveillance frequencies may be modified to correspond with production work flow.

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B 400 Design review

401 Documents that are reviewed and specifically commented upon like a design specification are marked with R in the table.

402 The review of the design will be performed according to one among the three levels of scrutiny. In the table the following abbreviations are used for the different level of scrutiny:

— R1 Review of drawings and design principles
— R2 Review of drawings and design principles and spot check of calculations
— R3 Verification of structural integrity by performance of independent calculations.

C. Overall Project Management

C 100 General

101 The project quality management documentation, if part of scope, should be available for review at the early stages of the project, preferably before design is underway, to ensure that the necessary controls are in place.

Table C1 Overall Project Management

Item	*Description*	*Level*		
		Low	*Medium*	*High*
1	review of project quality management documentation	X	X	X
2	audit of project quality management system			X
3	review of sub-contractor control			X
4	review of interface controls		X	X
5	review of methods of information flow			X

D. Design

D 100 General

101 An example scope of work for the structural design verification of a fixed offshore platform (jacket) is given in the following. For selection of verification level see Appendix A. For abbreviations used in the table see Appendix B Section B.

Table D1 Scope of work for verification of structural design

				Verification level		
				Low	*Medium*	*High*
Substructure						
	Designers quality documents			-	R	A
	Structural design specification			R	R	R
	Design Brief			-	R	R
				R1	R2	R2
			Ultimate Limit states	R1	R2	R2 and R3
			Fatigue Limit States	R1	R2	R2 and R3
			Accidental Limit States	-	R1	R2
			Seismic Limit States	-	-	R1
		Fabrication	Structural integrity in critical operations	-	R1	R2
		Load out	Ultimate Limit states	-	R1	R2
		Transportation	Ultimate Limit states	R1	R2	R2 and R3
			Fatigue Limit States	-	R1	R2
		Installation	Ultimate Limit states	R1	R2	R2 and R3
	Foundation					
	Mud mats, skirts				R1	R2

Table D1 Scope of work for verification of structural design (Continued)						
				Verification level		
				Low	*Medium*	*High*
	Piles		Ultimate limit states	R1	R2	R2 and R3
			Fatigue Limit States	R1	R2	R2 and R3
			Accidental Limit States		R1	R2
			Seismic Limit States			R1
			Pile drivability			R1
			Pile fatigue from driving		R1	R3
	Soil data					R
	Corrosion protection system					R1
	Caissons					R1
	Conductor guide details, riser guide details					R1
	Other permanent appurtenance (Boat fenders etc.)					R1
	Other temporary structures, Buoyancy tanks, pad eyes, etc.				R1	R2
Deck and topside modules						
			Ultimate Limit States	R1	R2	R2 and R3
			Fatigue Limit States		R1	R2
			Accidental Limit States		R1	R2
			Seismic Limit States			R1
		Fabrication	Structural integrity in critical operations			R1
		Load out			R1	R2
		Transportation			R1	R2 and R3
		Lifting			R1	R2 and R3
	Crane support		R1	R2	R2	

E. Fabrication

E 100 General

101 An example scope of work for verification of the fabrication of a fixed offshore platform (jacket) is given in the following. For selection of verification level see Appendix A. The verification level selected for fabrication may in the general case differ from what is used for design. For abbreviations used in the table see Appendix B Section B.

Table E1 Scope of work for verification of fabrication					
			Verification level		
			Low	*Medium*	*High*
Substructure					
Steel making					
1		Review quality management system documents.	R1	R2	R2
2		Quality system audit at relevant manufacturers and sub-suppliers.	-	A	A
3		Review of specifications and procedures	R1	R2	R2
4		Technical meeting / kick-off meeting and review of manufacturing documents	R1	R2	R2
5		Verify the performance and testing during the procedure and personnel qualification testing	-	S1	H
6		Steel making and slab casting.	S1	S2	S3
7		Slab inspection macro, non-metallic inclusion verification.	-	S1	S2
8		Slab identifications heat number.	-	S1	S2
9		Chemical analysis (ladle).	-	S1	S2
	Final activities				

Table E1 Scope of work for verification of fabrication (Continued)					
			Verification level		
			Low	*Medium*	*High*
Substructure					
10		Review of manufacturing and testing records.	R1	R2	R2
11		Issue of DNV visit report.	H	H	H
Plate rolling					
	Initial activities				
1		Review quality management system documents	R1	R2	R2
2		Quality system audit at relevant manufacturers and sub-suppliers.	-	A	A
3		Review of specifications and procedures	R1	R2	R2
4		Technical meeting / kick-off meeting and review of manufacturing documents	R1	R2	R2
5		Verify the performance and testing during the procedure and personnel qualification testing	-	S1	H
	Inspection activities				
6		Slab re-heating, rolling and accelerated cooling processes	S1	S2	S3
7		Calibration of equipment	R1	R2	R2
8		Automatic ultrasonic inspection	-	S1	S2
9		Automatic ultrasonic re-test inspection	-	S1	S2
10		Manual ultrasonic inspection	-	S1	S2
11		Visual inspection	S1	S2	S3
12		Cutting and identification of test coupons (per heat)	S1	S2	S3
13		Mechanical testing of test coupons	S1	S2	S3
14		Review of Chemical analysis tests	R1	R2	R2
	Final activities				
15		Review of manufacturing and testing records	R1	R2	R2
16		Issue of DNV visit report	H	H	H
Production of tubulars					
	Initial activities				
1		Review of quality management system documents (ref. Appendix C B400)	R1	R2	R2
2		Quality system audit at relevant manufacturers and sub-suppliers	-	A	A
3		Review of specifications and production procedures (incl. performance testing if applicable)	R1	R2	R2
4		Review of personnel qualifications	R1	R2	R2
5		Technical meeting/kick-off meeting and review of manufacturing documents	R1	R1	R2
6		Verify the performance of procedure and personnel qualification testing	-	S1	H2
	Inspection activities				
7		Base material identification (plate list) and tracking	S1	S2	S3
8		Check plate forming, alignment and bevelling	S1	S2	S3
9		Production Welding including consumable handling	S1	S2	S3
10		Expanding, review record of expansion ratio (if required)	-	S1	S2
11		End facing and square ness, visual and record review	-	S1	S2
12		Calibration of Non Destructive Testing equipment	R1	R2	R2
13		Verification of Non Destructive Testing	S1	S2	S3

Table E1 Scope of work for verification of fabrication (Continued)					
			Verification level		
			Low	*Medium*	*High*
Substructure					
14		- Review of calibration of post weld heat treatment equipment (if required)	R1	R1	R2
15		- Post weld heat treatment (if required)	S1	S2	S3
16		Weld repairs	S1	S2	S3
17		Non Destructive Testing of weld repairs	-	S1	S2
18		Dimensional and tolerances inspection as per specification	S1	S2	S3
19		Surface treatment (if applicable)	S1	S2	S3
20		Weighing of structural sections	-	S1	S2
21		Bevel protectors (if applicable)	-	S1	S2
22		Marking – checking of track records, Die stamp, paint marking etc.	S1	S2	S3
23		Final visual internal and external inspection	S1	S2	S3
24		Transport, Storage and handling of finished sections	-	S1	S2
25		Cutting and identification of production test coupons (if required)	S1	S2	S3
26		Mechanical testing of production test pieces	S1	S2	S3
	Final activities				
27		Documentation review of manufacturing records and testing records etc.	R1	R2	R2
28		Issuance of DNV visit report	H	H	H
Production of nodes (See Note 1)					
	Initial activities				
1		Review of quality management system documents (ref. Appendix C B400)	R1	R2	R2
2		Quality system audit at relevant manufacturers and sub-suppliers	-	A	A
3		Review of specifications and production procedures (incl. performance testing if applicable)	R1	R2	R2
4		Review of personnel qualifications	R1	R2	R2
5		Technical meeting/kick-off meeting and review of manufacturing documents	R1	R1	R2
6		Verify the performance of procedure and personnel qualification testing	-	S1	H2
	Inspection activities				
7		Base material identification (plate list) and tracking	S1	S2	S3
8		Check plate forming and bevelling	S1	S2	S3
9		Production Welding including consumable handling	S1	S2	S3
10		Expanding, review record of expansion ratio	-	S1	S2
11		End facing and square ness, visual and record review	-	S1	S2
12		Calibration of Non Destructive Testing equipment	R1	R2	R2
13		Verification of Non Destructive Testing	S1	S2	S3
14		- Review of calibration of post weld heat treatment equipment (if required)	R1	R1	R2
15		- Post weld heat treatment (if required)	S1	S2	S3
14		Weld repairs	S1	S2	S3
15		Non Destructive Testing of weld repairs	-	S1	S2
16		Dimensional and tolerances inspection as per specification	S1	S2	S3
17		Surface treatment (if applicable)	S1	S2	S3

Table E1 Scope of work for verification of fabrication (Continued)					
			Verification level		
			Low	*Medium*	*High*
Substructure					
18		Weighing of structural sections	-	S1	S2
19		Bevel protectors (if applicable)	-	S1	S2
20		Marking – checking of track records, Die stamp, paint marking etc.	S1	S2	S3
21		Final visual internal and external inspection	S1	S2	S3
22		Transport, Storage and handling of finished sections	-	S1	S2
23		Cutting and identification of production test coupons (if required)	S1	S2	S3
24		Mechanical testing of production test pieces	S1	S2	S3
	Final activities				
26		Documentation review of manufacturing records and testing records etc.	R1	R2	R2
27		Issuance of DNV visit report	H	H	H
28		Calibration of equipment	R1	R2	R2
29		Review cast analysis when the casting is poured	R1	R2	R2
30		Identification of production test coupons (if required) hereunder size, number and location on the heat treatment furnace	S1	S2	S3
31		Mechanical testing of production test pieces	S1	S2	S3
32		Review initial dimensional reports	-	R1	R2
33		Production Welding including consumable handling	S1	S2	S3
34		- Review of calibration of post weld heat treatment equipment (if required)	R1	R1	R2
35		- Post weld heat treatment (if required)	S1	S2	S3
36		Calibration of Non Destructive Testing equipment	R1	R2	R2
37		Verification of Non Destructive Testing	S1	S2	S3
38		Weld repairs	S1	S2	S3
39		Non Destructive Testing of weld repairs	-	S1	S2
40		Dimensional and tolerances inspection as per specification	S1	S2	S3
41		Surface treatment (if applicable)	S1	S2	S3
42		Bevel protectors (if applicable)	-	S1	S2
43		Final visual inspection	S1	S2	S3
44		Identification of production test coupons (if required) hereunder size, number and location on the heat treatment furnace	S1	S2	S3
45		Mechanical testing of production test pieces	S1	S2	S3
Production of piles					
	Initial activities				
1		Review of quality management system documents (ref. Appendix C B400)	R1	R2	R2
2		Quality system audit at relevant manufacturers and sub-suppliers	-	A	A
3		Review of specifications and production procedures (incl. performance testing if applicable)	R1	R2	R2
4		Review of personnel qualifications	R1	R2	R2
5		Technical meeting/kick-off meeting and review of manufacturing documents	R1	R1	R2
6		Verify the performance of procedure and personnel qualification testing	-	S1	H2
	Inspection activities				

Table E1 Scope of work for verification of fabrication (Continued)

			Verification level		
			Low	*Medium*	*High*
Substructure					
7		Base material identification (plate list) and tracking	S1	S2	S3
8		Check plate forming, alignment and bevelling	S1	S2	S3
9		Production Welding including consumable handling	S1	S2	S3
10		Expanding, review record of expansion ratio (if required)	-	S1	S2
11		End facing and square ness, visual and record review	-	S1	S2
12		Calibration of Non Destructive Testing equipment	R1	R2	R2
13		Verification of Non Destructive Testing	S1	S2	S3
14		- Review of calibration of post weld heat treatment equipment (if required)	R1	R1	R2
15		- Post weld heat treatment (if required)	S1	S2	S3
16		Weld repairs	S1	S2	S3
17		Non Destructive Testing of weld repairs	-	S1	S2
18		Dimensional and tolerances inspection as per specification	S1	S2	S3
19		Surface treatment (if required)	S1	S2	S3
20		Weighing of piles	-	S1	S2
21		Final visual inspection	S1	S2	S3
22		Transport, Storage and handling	-	S1	S2
23		Cutting and identification of production test coupons (if required)	S1	S2	S3
24		Mechanical testing of production test pieces	S1	S2	S3
	Final activities				
25		Documentation review of manufacturing records and testing records etc.	R1	R2	R2
26		Issuance of DNV visit report	H	H	H
Construction of Jacket (See Note 2)					
	Initial activities				
1		Review of quality management system documents (ref. Appendix C B400)	R1	R2	R2
2		Quality system audit at relevant manufacturers and sub-suppliers	-	A	A
3		Review of specifications and production procedures (incl. performance testing if applicable)	R1	R2	R2
4		Review of personnel qualifications	R1	R2	R2
5		Technical meeting/kick-off meeting and review of manufacturing documents	R1	R1	R2
6		Verify the performance of procedure and personnel qualification testing	-	S1	H2
	Inspection activities				
7		Material receiving and tracking	S1	S2	S3
8		Material preparation	S1	S2	S3
9		- Cutting, machining and bevelling	-	S1	S2
10		- Material traceability	S1	S2	S3
11		- Calibration of UT equipment	R1	R2	R2
12		- Lamination check (if applicable)	S1	S2	S3
		Construction			
14		- Fit-up and tack welding	S1	S2	S3
15		- Production welding	S1	S2	S3
16		- Welding consumable handling	S1	S2	S3

Table E1 Scope of work for verification of fabrication (Continued)

			Verification level		
			Low	*Medium*	*High*
Substructure					
17		- Transport on site and handling of constructed sections/lifting operations	-	S1	S2
18		- Calibration of Non Destructive Testing equipment	R1	R2	R2
19		- Verification of Non Destructive Testing	S1	S2	S3
20		- Review of calibration of post weld heat treatment equipment	R1	R1	R2
21		- Post weld heat treatment (if required)	S1	S2	S3
22		- Weld repairs	S1	S2	S3
23		- Non Destructive Testing of weld repairs	-	S1	S2
24		- Weld toe grinding (if required)	S1	S2	S3
25		- Verification of Non Destructive Testing of grounded welds	S1	S2	S3
26		- Verification of weld toe moulding	S1	S2	S3
27		- Verification of anode installation	S1	S2	S3
28		- Verification of non welded appurtenances	S1	S2	S3
29		- Calibration of pre-stressing tools and/or torque equipment	-	R1	R2
30		Cutting and identification of test coupons (if required)	S1	S2	S3
31		Mechanical testing of production test pieces	S1	S2	S3
32		- Dimensional and tolerances inspection as per specification/drawings	S1	S2	S3
33		Final visual inspection	S1	S2	S3
34		Cutting and identification of test coupons (if required)	S1	S2	S3
35		Mechanical testing of production test pieces	S1	S2	S3
36		Review of Chemical analysis tests	R1	R2	R2
	Final activities				
37		Documentation review of manufacturing records and testing records etc. (As-built)	R1	R2	R2
38		Issuance of DNV visit report	H	H	H
Surface treatment (See Note 3)					
	Initial activities				
1		Review of quality management system documents (ref. Appendix C B400)	R1	R2	R2
2		Quality system audit at relevant manufacturers and sub-suppliers	-	A	A
3		Review of specifications and production procedures (incl. performance testing if applicable)	R1	R2	R2
4		Review of personnel qualifications	R1	R2	R2
5		Technical meeting/kick-off meeting and review of manufacturing documents	R1	R1	R2
6		Verify the performance of procedure and personnel qualification testing	-	S1	H2
	Inspection activities				
7		Testing of coating materials	-	R1	R2
8		Coating qualification tests	-	S1	S2
9		Examination of construction prior to application	-	S1	S2
10		Examination of grit	-	S1	S2
11		Pre-treatment/temperature, humidity and surface condition (degreasing and salt deposit removal)	-	S1	S2
12		Visual inspection after blasting	S1	S2	S3

Table E1 Scope of work for verification of fabrication (Continued)					
			Verification level		
			Low	*Medium*	*High*
Substructure					
13		Coating application (temperature, humidity and surface condition)	S1	S2	S3
14		Curing conditions	-	S1	S2
15		Thickness measurements	S1	S2	S3
16		Coating repair	-	S1	S2
	Final activities				
17		Documentation review of manufacturing records and testing records etc. (As-built)	R1	R2	R2
18		Issuance of DNV visit report	H	H	H
Load out					
	Initial activities				
1		Review of quality management system documents (ref. Appendix C B400)	R1	R2	R2
2		Quality system audit at relevant contractors and sub-suppliers	-	A	A
3		Review of specifications and production procedures (incl. performance testing if applicable)	R1	R2	R2
	Inspection activities				
4		Review of lifting gear / device certificates	-	R1	R2
5		Verification of lifting gear / device	-	S1	S2
6		Installation of lifting gear	-	S1	S2
7		Verification of site foundation (if required)	-	S1	S2
8		Review of foundation analysis reports (if required)	-	R1	R2
9		Weighing of jacket construction incl. verification of CoG.	-	S1	S2
10		Welding of sea fastenings to jacket structure	S1	S2	S3
11		Transport and handling of jacket construction	S1	S2	S3
	Final activities				
12		Documentation review of manufacturing records.	R1	R2	R2
13		Issuance of DNV visit report	H	H	H
Tank testing					
	Initial activities				
1		Review of testing plan and specifications	R1	R2	R2
2		Review of testing procedures	-	R1	R2
	Inspection activities				
3		Testing of watertightness	-	S1	S2
4		Structural test	-	S1	S3
	Final activities				
5		Review of testing report.	-	R1	R2
6		Issuance of DNV visit report	-	H	H

Notes

1) Additional activities exists with respect to manufacturing of cast nodes.
2) Production welding includes welding of mud mats, pile sleeves, boat landing, fenders, anode doubler plates, riser clamp doubler plates, riser/conductor guides, caissons and installation related items hereunder pad eyes for load out/handling etc.
3) Additional requirements may exist for neoprene, PFP, etc.

APPENDIX C
EXAMPLES OF VERIFICATION DOCUMENTS

A. Verification Documents

A 100 Validity of verification documents

101 Verification documents are, in principle, documents confirming that an examination has been carried out, and are valid only at the date of issue.

A 200 Statement of compliance

201 A Statement of Compliance can be issued on completion of each particular project phase, or natural part thereof, and shall be based on a dedicated verification report.

202 A Statement of Compliance shall be issued as a formal statement confirming that verification of documents and/or activities, has found that the process facility, a part thereof, or a verification activity, complies with the requirements applicable for that particular project phase.

203 The technical information on a Statement of Compliance shall contain:

— fixed offshore facility description and item number, if relevant
— application (operational limitations and conditions of use) for which the facility is intended
— codes and standards with which the fixed structure has been found to comply
— level of verification
— an appendix containing the accompanying dedicated verification report.

204 A Statement of Compliance shall be signed by the DNV Project Manager.

An example of a typical Statement of Compliance is shown at the end of this appendix.

A 300 Verification reports

301 Verification reports are issued to confirm that the relevant product or service was completed in accordance with specified requirements.

302 The report shall include information such as:

— product or service description and item number, if relevant
— application (operational limitations and conditions of use) for which the product or service is intended
— codes and standards against which the product or service is verified
— a clear statement of the conclusion from the verification (stating weather the product or service does or does not meet the specified requirements)
— codes and standards used as reference
— documentation on which the verification report is based (documents, drawings, correspondence, including revision numbers)
— project-specific scope of work tables
— any comments
— identification of any non-conformances.

303 The verification report shall always be dated and have two signatures, the originator and the DNV internal verifier.

A 400 Verification comments

401 Reviews of documents shall be reported using Verification Comment Sheets (often called VerComs). These documents give the client details of the aspects of the fixed offshore structure facilities design and construction that DNV:

— considers as not meeting the specified requirements
— considers as not having enough information to make a decision
— offers advice based on its own experience.

402 Only in the first two instances does DNV expect a response from the client or its contractors.

403 An example of a typical Verification Comment sheet is shown at the end of this appendix.

A 500 Audit report

501 Audit reports are issued to document that a company's quality management system has been reviewed and its compliance (or not) with the nominated standard and project requirements. In addition, the audit reports documents the compliance of the system with the documented procedures and whether these procedures are effective.

502 Audit reports shall contain information such as whether:

— the company has a documented quality system
— this quality system been certified by an accredited Certification Body *for the product (or service) in question*
— the quality system covers the following quality assurance elements adequately for the product:

  — organisation
  — authority/responsibility
  — job descriptions for key persons
  — internal quality audits
  — documentation change control
  — job instructions/procedures
  — non-conformance/corrective action.

— there are adequate procedures for activities such as:

  — calibration of equipment
  — material identification and marking
  — control of special processes such as welding, NDT, PWHT
  — non-conformance identification and handling
  — inspection status
  — final inspection.

— the company's facilities are, in general, considered adequate for the scope of supply
— a quality plan have been prepared for the order concerned
— the purchaser or their appointed inspection agency have planned to attend the works
— there are any problem areas identified.

503 An example of a typical audit report is shown at the end of this appendix.

A 600 Visit reports

601 Visit reports are documentation/recording of attendance activity by DNV.

Guidance note:

Visit reports can be called by different names. Examples are Inspection Release Note, Survey Report, Inspection Certificate, Site Report, etc.

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602 A visit report shall contain enough information to identify clearly the product or service that has been examined, the operating conditions or specifications to which it was examined and the conclusion reached by DNV.

603 The visit report shall be printed on the relevant form and shall contain as much information as possible in accordance with the standard headings in the form. In addition, the report number shall be shown.

604 An example of a typical Visit Report is shown at the end of this appendix.

B. Use of Quality Management Systems

B 100 General

101 The assurance of structural integrity requires that gross errors during design, construction and operation be minimised. The likelihood of gross errors shall be reduced in a systematic manner by the operation of a quality management system which shall be adequate for the work being carried out.

102 Quality management systems frequently are documented at three levels:

— the quality manual and related procedures document how the organisation, as a whole, manages the quality of all its products and services
— the quality plan documents the specific procedures related to a particular project
— the inspection and test plan documents how the quality control activities for a particular project shall be carried out and recorded.

B 200 Quality plans

201 The basic function of a quality plan is as an aid in the management of a project. In an organisation with many quality procedures for a variety of functions the quality plan states those that are applicable to that particular project. The quality plan acts as a route map through the complexities of management of the project and highlights those activities relevant to quality management.

202 The project quality plan normally consists of two parts; firstly, a narrative description of the means of controlling the project, and secondly, a tabular description of the inspections and tests to be carried out during the work.

203 The quality plan should address:

— organisational details of the project
— authorities and responsibilities of key personnel
— interfaces between the client, contractors, sub-contractors and third parties
— quality assurance activities placed on sub-contractors
— cross references to existing company procedures.

204 The narrative part of the quality plan should include a description of:

— the applicable standards
— project organisation and responsibilities
— review of the contractual requirements
— project planning and progress reporting
— procedures for such activities as design control, purchasing, construction, installation, commissioning, interface control and auditing
— procedures for inspection and maintenance as well as normal operation
— emergency response issues

205 Additionally, the narrative part of the plan should describe the documentation requirements. It should be specified:

— what documents are required
— at what stage these documents are required
— who is responsible for preparing the documents
— relevant parties to whom documents are submitted
— how any necessary approvals are acquired
— who has the originals and who has copies
— whether copies have to be certified copies
— the length of time documents are to be retained and by whom.

B 300 Inspection and test plans

301 The tabular description of the inspections and tests to be carried out during the work is frequently known as the inspection and test plan.

302 The following items should be checked for inclusion within the inspection and test plan:

— each inspection and test point and its relative location in the production cycle should be shown
— the characteristics to be inspected and tested at each point should be identified
— the use of sub-contractors should be indicated and details of how the verification of sub-contractor's quality shall be carried out should be shown
— hold points established by the constructor, the operator or a third party, where witness or review of the selected inspection or test is required, should be shown.

B 400 Review of quality management programme

401 The contractor's quality manual shall be reviewed for compliance with ISO 9001 or 9002 as appropriate. The contractor's operations should be audited to establish compliance with the documented system.

402 If the contractor has a quality system certified by an accredited third party certification body, this may be taken as evidence of a satisfactory quality system provided the certificate is relevant to the contractor's scope of work for the project. However, the last two years' periodical audit reports shall be reviewed to identify if any recurring non-conformities exist.

403 Any weaknesses revealed during this audit, or through the review of periodical audit reports, shall be considered when planning the contractor monitoring activities.

404 Surveillance of the continuing acceptability of the contractor's quality management system is carried out by observing a selection of audits carried out by the contractor as part of its internal audit system. The audits to be observed should be selected over the length of the project at suitable intervals and should cover as wide a selection of activities as possible.

405 Contractors' inspection and test plans for the various activities undertaken during their scope of work shall be reviewed and accepted after they are found to be adequate.

C. Document Forms

C 100 Introduction

101 The end of this appendix includes example forms for use by DNV in verification.

102 The following forms are included:

— Statement of Compliance
— Verification Comments Sheet
— Audit Report
— Visit Report.

C 200 Statement of Compliance

Statement No.:
…..

DET NORSKE VERITAS

STATEMENT OF COMPLIANCE

NAME OF OWNER: …..

NAME OF INSTALLATION: **…..**

LOCATION: …..

DESCRIPTION: …..

OPERATIONAL LIMITATIONS:

THIS IS TO STATE THAT: The above mentioned ….. has been verified, by appropriate methods, to comply with the requirements of the (code reference). , for the operational limits stated above, with the exceptions noted in DNV Verification Report Number …..

VERIFICATION INVOLVEMENT: The verification of the above mentioned ….. has been performed in accordance with DNV Offshore Service Specification Risk Based Verification of Offshore Structures, DNV-OSS-304 at Level ….. with the detailed scope of work described in DNV Verification Report Number …..

This verification level has been accepted by DNV to be satisfactory for the risk to the …(integrity or other project goals) of the structural system identified for the above mentioned ….. .

REFERENCE DOCUMENTS: DNV Verification Report Number: …..

PLACE: _____ **DATE:** _____

_____
Project Manager

C 300 Verification Comments Sheet

VERIFICATION COMMENTS SHEET				
Project Title:				DNV Project No.:
	Prepared by:	Date:	Sign:	Document No.:
	Verified by:	Date:	Sign:	Revision:
Have all previous comment to this document been satisfactory solved or repeated below?				YES / NO / N/A

VERIFICATION COMMENTS:

VerCom. No.:	Description:	**Category** [1]	**Status** [2]
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

Notes:

Category [1]	**Status** [2]
NC = Non-Conformance The information contained in the document is not accepted as complying with the applicable requirements due to outstanding areas of concern. **TQ = Technical Query** The review of this document cannot be completed until the information requested is submitted. **A = Advice (reply not needed)** The information contained in the document is accepted as complying with the applicable requirements but DNV offers certain advice based on its experience	O = Open C = Closed (requires a reference)

C 400 Audit Report

DNV Work Order No.:	Report No.:
Vendor:	Date of Visit:
Item:	Purchase Order No.:

This form is to be used as checklist and report for reviewing the quality system of companies supplying items subject to inspection by DNV. It should be appended to the first visit report.

1	Does the organisation have a documented quality system? Quality Manual: Ref.....Rev. No..... Based upon: ISO 900.. /Other standard	Yes/No
2	Has the quality system been certified by an accredited Certification Body for the product (range) in question? Body..... Certificate No..... Valid to date..... Most recent periodical audit carried out on (date)..... N.B.If the answer to this question is YES go to item 5.	Yes/No
3	Based on reviews and checks, does the quality system cover the following quality assurance elements adequately for the product in question: — organisation — authority/responsibility — job descriptions for key persons — internal quality audits — documentation change control — job instructions/procedures — non-conformance/corrective action. For areas that are inadequate give brief details attached.	 Yes/No Yes/No Yes/No Yes/No Yes/No Yes/No Yes/No
4	Are there adequate procedures for following activities as appropriate: — calibration of equipment — control of special processes like welding, NDT, PWHT — material identification and marking — non-conformance identification and handling — inspection status — final inspection — others - specify. For procedures found to be inadequate give brief details attached.	 Yes/No Yes/No Yes/No Yes/No Yes/No Yes/No Yes/No
5	Are organisation's facilities in general considered adequate for the scope of supply?	Yes/No
6	Has Quality Plan been prepared for the order concerned? Ref:.....rev.....	Yes/No
7	Are ..... or their appointed inspection agency in attendance? Which inspection agency?.....	Yes/No
8	Are any problem areas identified? Give details	

NAME:	STATION:
SIGN:	DATE:
Separate sheets attached Yes/No	

C 500 Visit Report

DNV Work Order No.:	Report No.:
Vendor:	Date of Visit:
Item:	Purchase Order No.:

A visit report is to be prepared after every surveillance visit. It shall be faxed to DNV ..... within 3 days of the visit. If required, please give further details on separate sheet.

1	Are quality system procedures adhered to? If no, please give details.	Yes/No
2	Are fabrication/inspection requirements defined in vendor's quality plan being met -By the vendor? -By ..... or their appointed inspection agency? -Other parties, if any (specify.....) If no, please give details.	
3	Is documentation being completed and collated as required? If no, please give details.	
4	Are there any outstanding non-conformances/corrective action required? If yes, please give details.	
5	Give brief details of completion status and purpose of visit: Vendor Q-Plan reference:	
6	Give brief details of work anticipated for next visit: Vendor Q-Plan reference:	
7	Indicate areas of concern or information requested from other parties not yet available:	

NAME:	STATION:
SIGN:	DATE:
Separate sheets attached Yes/No	