



















### 3 OPERATORS MANAGEMENT SYSTEM

The operator has a management system that includes processes to ensure the Facility can be operated safely and reliably. Through these processes, the operator ensures that there is control over the Condition of the facilities, that the Barriers in place to protect the facilities function as required, and that changes that directly or indirectly affect the facilities are managed.

The management system should include a process to identify, if and when, the Design Life of the Facility, or parts of the Facility, is expected to be exceeded. The operator should then initiate a life extension process for the Facility, or the relevant parts of the Facility.

#### 3.1 Plans

The operator develops plans for activities that assure the Facility is operated safely and reliably. The plans include activities such as:

- Modifications that are needed to adapt the System to future needs
- Replacement of systems and equipment
- Requirement and strategic choices regarding maintenance

The activities in the plan can be at different maturity, and can be matured to initiate a repair, replacement or modification in time. The plans for maintaining the integrity throughout the life of the Facility are regularly reviewed and updated as a result of any changes.

#### 3.2 Assessment of technical lifetime of a System

The technical lifetime of a System can be determined by predicting when the Condition reaches the Acceptance Level. The assessment of technical lifetime of a System should be based on Degradation from operational use, prediction models, maintenance and inspection experience and Obsolescence.

Operators do not however always estimate a specific lifetime for each System. The lifetime of components in the System with significant Degradation, is normally evaluated to ensure replacement before the Condition deviates from the Acceptance Level.

Unexpected changes in the Condition of Critical Systems or equipment by damage or accidents should require an assessment of the implications for the lifetime of these Systems. Unexpected changes in the internal and external factors can also affect Degradation and Obsolescence.

New knowledge and/or technology may be relevant for Degradation and Obsolescence and should be evaluated in any assessment of technical lifetime. This may come from research and development, from experience from other facilities and operators and may be the result of incidents and accidents. Technology assessment and possible technology qualification(s) may need to be developed for the assessment of technical lifetime.

### 3.3 Design Life

There may be different Design Life periods stated for different parts of the Facility, e.g. pipelines, topsides etc. The Design Life for the load bearing structures is normally the basis for the assessment of the need for a life extension process on the Facility.

The operator should determine the start of the Design Life period and hence when the Design Life is exceeded. The start of the Design Life period is normally when the Facility becomes exposed to the factors that cause Degradation.

### 3.4 Initiation of Life Extension Process

In the event that the Design Life is likely to be exceeded then a life extension process should be initiated. In the event of different Design Life periods for different parts of the facilities, then the operator may need to initiate life extension processes for these parts at different times.

Experience indicates that the life extension should be initiated at least 2 years before the Design Life is exceeded. For simple facilities, or for some parts of the facilities (if there are different Design Life periods), the life extension process may be managed in a shorter time. For some facilities, it may be necessary to start the life extension process earlier for example if the facilities are complicated, there are poor records and documentation or there is a need for any technological development to assess technical lifetimes for some Systems. Life extension may also be required earlier if a significant change in the Facility Life is identified and/or there is a strategic need to determine an Extended Life.

## 4 MANAGEMENT OF LIFE EXTENSION

### 4.1 Introduction

The management of life extension needs to consider two levels, a Facility level and a System level. The Design Life and Facility Life, and hence the need for a life extension are related to the Facility level. The life extension assessments and methodologies are related the System level. Based on these assessments an Extended Life for the Facility is determined. This consideration is described in figure 1.

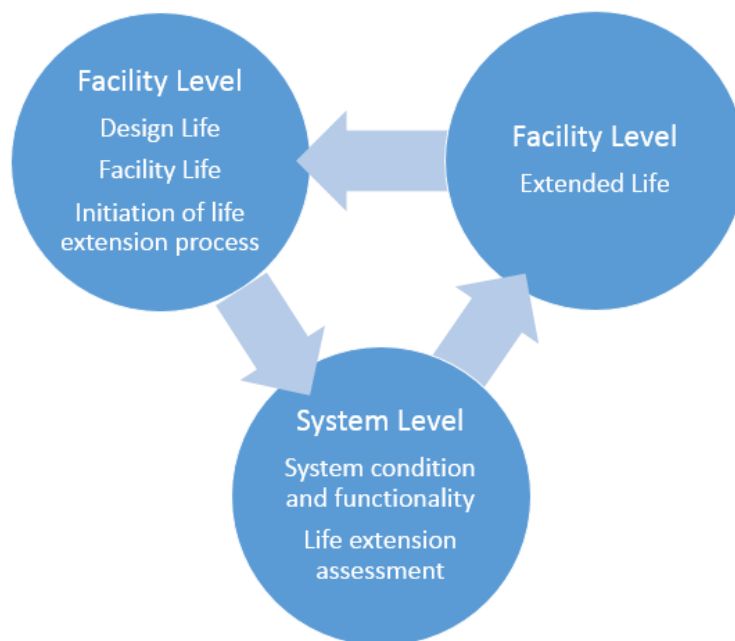


Figure 1. – Relationship between Facility and System level

The initiation of, the process for, and the approval and verification of life extension are described in sections 4.2, 4.4 and 4.6 and shown in the corresponding figures. For each of these the operator should define and refer to governing documents relevant to life extension and should specify any records required to document the life extension.

### 4.2 Initiation of Life Extension

A life extension process is required when the Facility Life exceeds the Design Life and there is an intention to operate the Facility beyond the Design Life. As stated in the introduction to section 3 the operator initiates the life extension process and as stated in section 2.2 the licence management committee endorses this process. The initiation of the life extension is included in the process to develop a plan for life extension as described in figure 2.

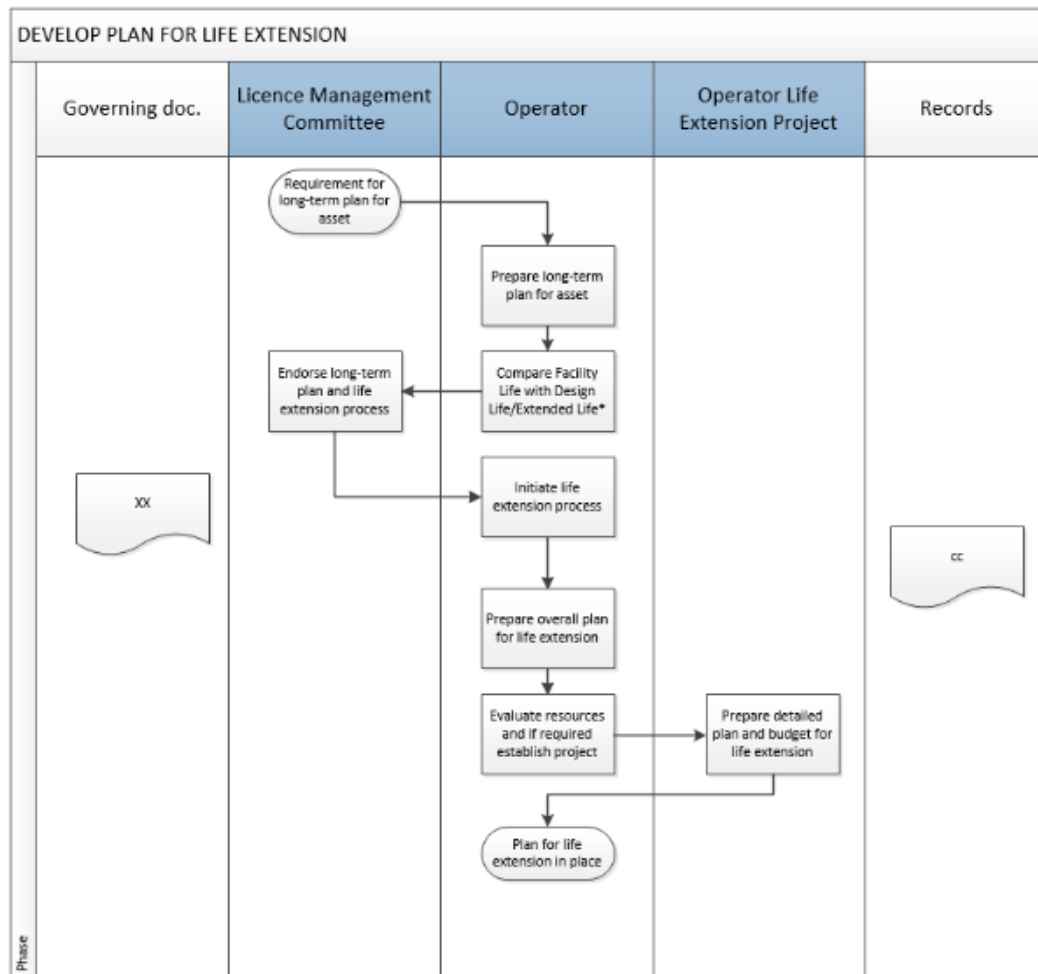


Figure 2 Develop plan for life extension

\*Extended Life applies if a life extension process has previously been carried out.

### 4.3 Uncertainty in Life Extension Management

Prediction of the lifetime of individual Systems on a Facility is challenging, and there are uncertainties related to these predictions that need to be recognized and managed as part of the life extension process. The operators should recognize that further information on the Condition of some Systems cannot be obtained with existing technology and techniques. Sometimes a judgement has to be made on the technical lifetime of these Systems that in turn provides input to the determination of the Extended Life. The life extension process should identify information that is required to reduce the uncertainty related to the assessments carried out. This is a key factor in the risk management of the life extension.

### 4.4 Life Extension Process

Life extension assessments may be required on many Systems and it may be appropriate to establish a project. A project for life extension may require significant resources, both internally and externally and this needs to be addressed in the planning of the life extension process.

The life extension process is part of the development of the business case for life extension described in figure 3.

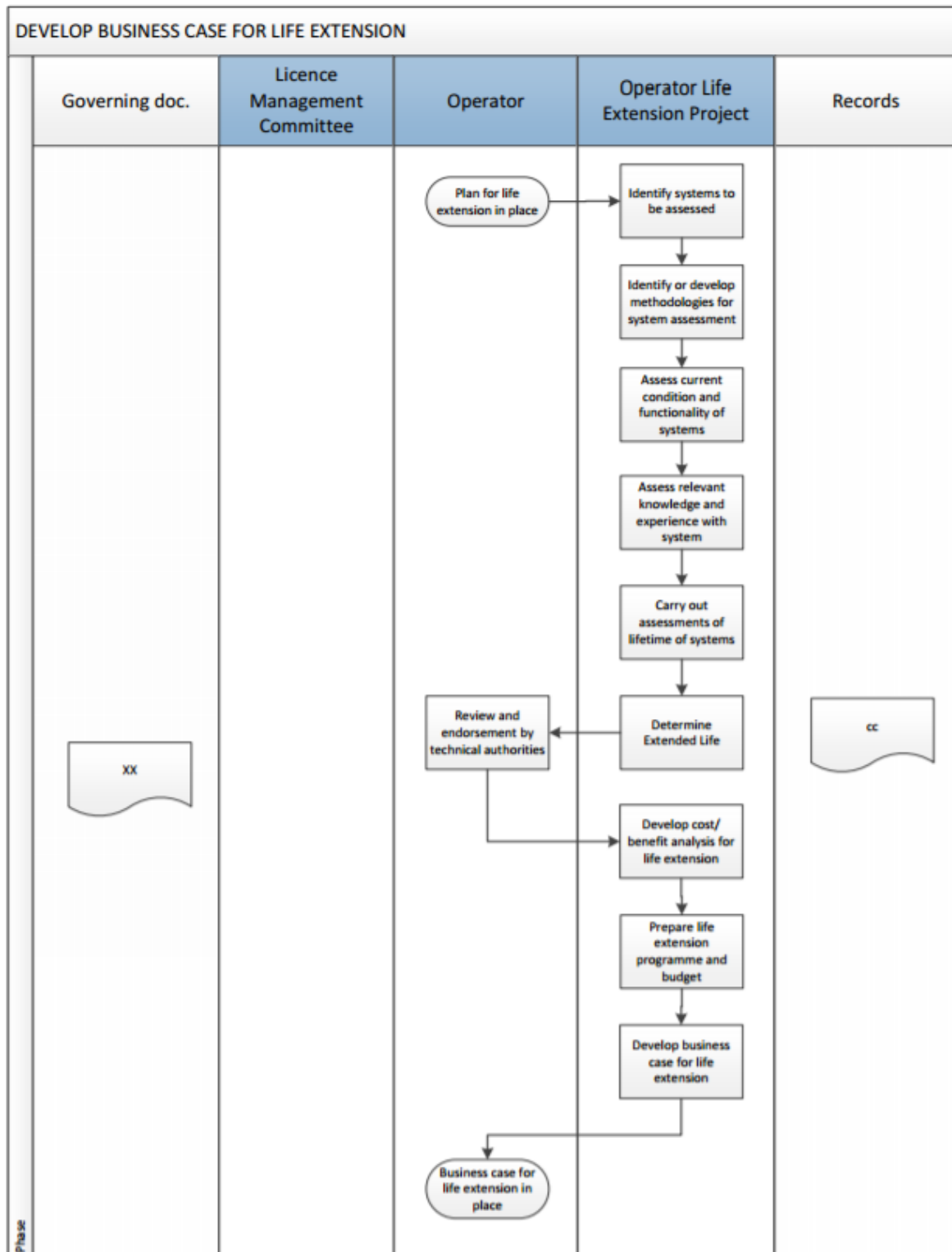


Figure 3. Develop Business Case for Life Extension.

The operator should develop a plan for the life extension activities.

The operator should identify Systems that should be assessed in the life extension process. This will normally include Systems required for safe and reliable operation, and Systems where Degradation and Obsolescence have already been identified as issues.

The operator should define the methodologies and/or standards to be used to assess the life of each System, see Appendix 2 Applicable standards for life extension. If there is not a recognized methodology/standard for life extension of a particular System, then the operator should develop one.

#### 4.4.1 Assessment of System condition and functionality

The operator should assess the current condition and functionality of the systems. The following activities should be considered, but not limited to, in this assessment:

- Review of operational history and maintenance and inspection records to assess condition for life extension.
- Assessment of the need for further inspections and/or condition measurements needed to supplement and/or complete maintenance and inspection records.
- The need to consult the Original Equipment Manufacturers of, and/ or service providers for, the Systems and equipment to identify the information relevant to the life extension.
- Review of the operational limits for the Facility and assess the need to change these.
- The assessment of life extension for wells should include waste injection wells and temporary abandoned wells. A review of the well barriers should be carried out with reference to NORSOK D-010.
- Life extension on drilling facilities and development of any specific methodology for life extension of a drilling system should be carried out with reference to NORSOK D-001.
- Review the deviations and exemptions related to the System and determine if these are still valid for the life extension.
- Review the assumptions in the Facility Total Risk Assessment (TRA) to assess the impact on life extension.

The operator should carry out a review of new information and knowledge, and technology development that may be relevant to the Condition of the Systems.

#### 4.4.2 Assessment of technical lifetime of Systems

The operator should carry out the life extension assessments on the selected systems. The following activities should be included in this assessment:

- Review of maintenance strategies to ensure they are suitable for an extended period.
- For Systems where predictable degradation mechanisms are dominating, quantitative analyses should be carried out.
- Assess the need for modifications, upgrades or downrating of the Systems or to the components in the Systems.
- Assess the need to change operational limits for the Facility.
- Development of a strategy for how the well integrity is secured for the future use of wells including plug and abandonment.
- Highlight key assumptions that influence the uncertainty related to the life extension.

The operator should consider new information and knowledge, and technology development that may be relevant to the life extension of the Systems and the Facility as a whole.

#### 4.4.3 Identification of life extension measures

The life extension process may identify major modifications that will require a review and update of the TRA. The need for a review is dependent on the operator's system for managing changes. The life extension assessments and identified measures should be reviewed and verified by the relevant technical authorities in the operator's organization.

The operator should identify changes to procedures and other working documents and implement these at the appropriate time.

#### 4.4.4 Life Extension Programme

The operator should develop a programme and budget for the measures identified in the life extension process. Based on this programme the operator should develop a business case for the life extension for presentation to the licence management committee.

### 4.5 Extended Life

The life extension process should result in a recommendation from the operator on an Extended Life for the Facility.

The Extended Life should be based on the following criteria:

- Compliance with the applicable regulations.
- Compliance with Operators own requirements for safe and reliable operations.
- Acceptable control of Condition throughout the Extended Life.

- Acceptable management of the Barriers throughout the Extended Life.
- Acceptable safety level throughout the Extended Life.
- Maintaining acceptable risk levels throughout the Extended Life.
- Acceptable monitoring and control of degradation through maintenance management.
- Acceptable management of change throughout the Extended Life.
- Operational limits as specified for the Facility.

The operator shall ensure the Extended Life and the main assumptions for the Extended Life are approved and documented before the Design Life is exceeded.

The recommendation may specify different Extended Life periods for different parts of the Facilities. For example, the life of infield pipelines may be predicted to be less than the rest of the facilities. The operator should ensure that the Extended Life of these parts is not exceeded without a further life extension process.

The Operator is responsible for ensuring the Facility is not used beyond the Extended Life until a further life extension process has been completed.

#### 4.6 Approval and Verification

The approval and verification of the Extended Life is described in figure 4. This also includes the implementations of measures identified in the life extension.



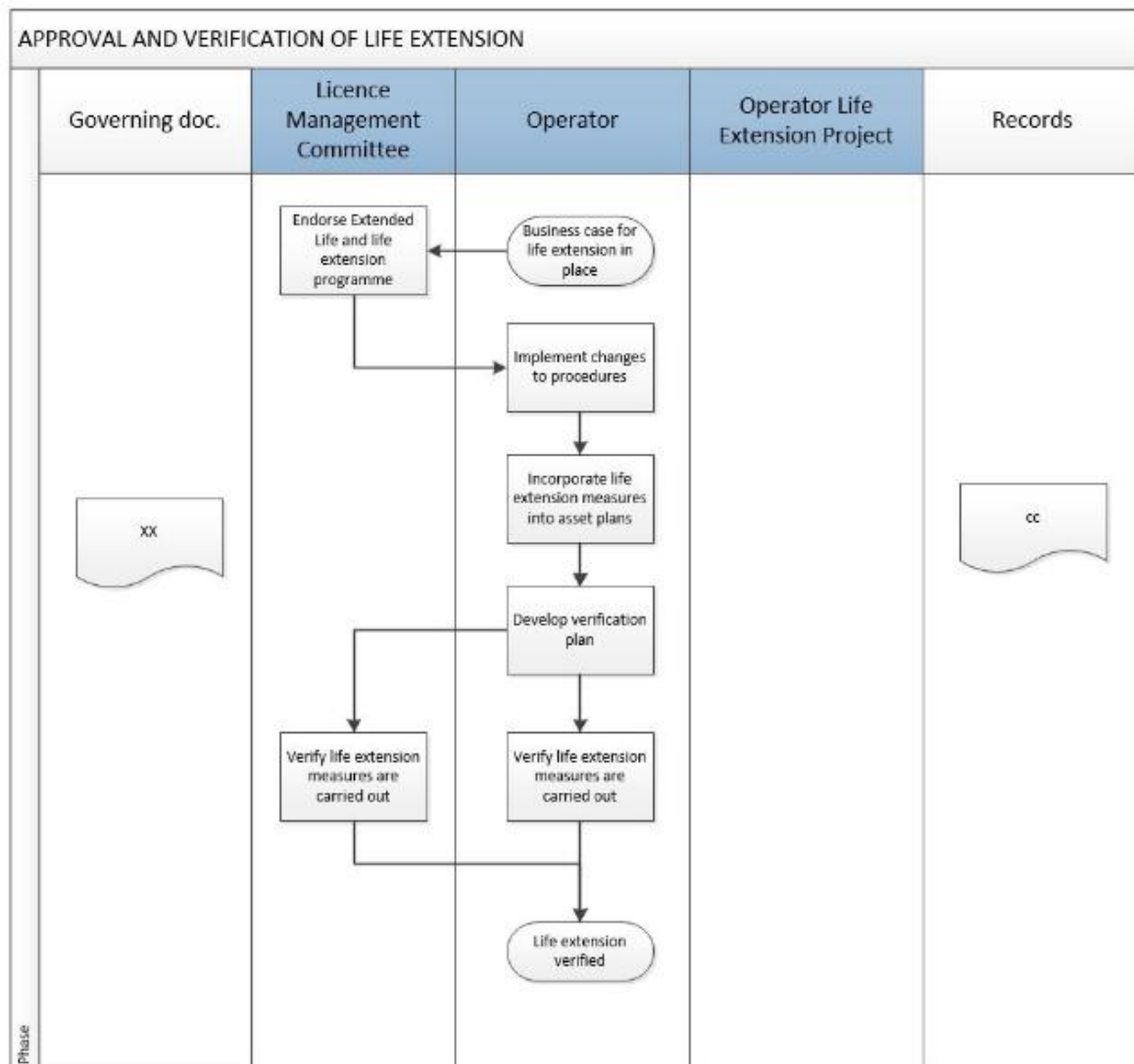


Figure 4. Approval and Verification of Life Extension

The licence management committee approves the business case for the life extension, including the operators' recommendations on the Extended Life and the programme for the measures identified in the life extension process.

Measures in the life extension programme should be incorporated into the existing plans for the Facility. These measures should be tagged as life extension activities in order to make it easier for internal and external parties to audit the life extension process.

The operator should determine the need for and scope of verifications, as well as the verification method and its degree of independence. The verifications should ensure that:

- The measures identified in the life extension process are followed up and implemented.
- Operational processes and procedures, related to any changes identified in the life extension process are updated.
- The assumptions in the life extension process are still valid.

The operator should also carry out an overall assessment of the results of the verifications that have been carried out.

The operator will continue to develop long-term plans for the Facility and these plans may indicate a further change to the Facility Life. As part of this process, the Extended Life should be compared to the Facility Life and a further life extension process initiated if the Facility Life is likely to exceed the Extended Life.

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## APPENDIX A - SPECIFICATION OF AMENDMENTS TO THE GUIDELINES

Guidelines 122 was originally developed to describe the methodology for how the operator should carry out a life extension process to prepare an application for consent for lifetime extension.

These guidelines have been updated to describe the process for life extension and the processes and decisions relevant to life extension in licence management and in the operator's management system. The guidelines contains new text compared to the previous version.

## APPENDIX B - APPLICABLE STANDARDS FOR LIFE EXTENSION

The following standards and methodologies are relevant for life extension:

Drilling Systems	NORSOK D-001, rev. 3, December 2012 NORSOK D-010, rev. 4, June 2013
Production assurance and reliability management	ISO 20815:2008
Collection of reliability and maintenance (RM) data	ISO 14224:2016
Risers and Pipeline Transportation Systems	NORSOK Y-002, rev. 1, September 2010
Risk Based Maintenance and Inspection	NORSOK Z-2008, Rev. 3, June 2011 If criticality assessment is considered necessary as part of the life extension.
Obsolescence of Systems	IEC 62402:2007
Offshore cranes	ISO 12482:2014. NORSOK R-002:2012
Offshore Load bearing Structures	NORSOK N-006, edition 2, April 2015
Subsea Systems	NORSOK U-009, Edition 1, March 2011
Wells	NORSOK D-010, rev. 4, June 2013