



GUIDANCE NOTES ON

LIFE EXTENSION METHODOLOGY FOR FLOATING PRODUCTION INSTALLATIONS

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**American Bureau of Shipping
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Foreword (1 May 2017)

The *Guidance Notes on Life Extension Methodology for Floating Production Installations* have been developed to provide guidance for assessment of existing floating production installations when the intended period of operation **at the original site or the cumulated operating time at both the original and relocated sites** is extended beyond the original design life period. These Guidance Notes supplement the requirements for life extension **and relocation** of floating production installations in accordance with the *ABS Rules for Building and Classing Floating Production Installations (FPI Rules)*.

These Guidance Notes outline the life extension process that includes a reassessment of the structure, mooring system, stability, and machinery and systems, etc., for the entire installation. This reassessment includes engineering and survey activities.

The following major changes are incorporated in this revision:

- In Section 2, two scenarios are considered separately when life extension is at the same location. For first life extension up to five years, an abbreviated approval procedure without reassessment may be followed. For life extension over five years, a general approval procedure is to be followed.
- New Section 7 introduces an alternative route for life extension when an installation is under Asset Integrity Management (AIM).

These Guidance Notes become effective on the first day of the month of publication.

Users are advised to check periodically on the ABS website www.eagle.org to verify that this version of these Guidance Notes is the most current.

We welcome your feedback. Comments or suggestions can be sent electronically by email to rsd@eagle.org.

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CONTENTS

SECTION 1	Introduction	1
1	General	1
SECTION 2	Life Extension Process Overview	2
1	General	2
3	Life Extension of Floating Production Installations	2
3.1	Procedure for Life Extension up to 5 Years at the Same Location	4
3.3	Procedure for Life Extension Over 5 Years at the Same Location	6
3.5	Life Extension Procedure for an Installation Relocating to a New Location	8
3.7	Remaining Fatigue Life	8
	FIGURE 1A Life Extension Process Flow Chart Based on Phases	3
	FIGURE 1B Life Extension Abbreviated Procedure (For life extension up to 5 years at the same location)	5
	FIGURE 1C Life Extension Procedure (For life extension of over 5 years at the same location)	7
SECTION 3	Baseline Information	9
1	General	9
1.1	Documentation to be Provided during Life Extension Process	9
1.3	Initial Assessment of Baseline Information	10
SECTION 4	Baseline Survey	11
1	General	11
3	Structures	11
5	Mooring Systems	11
7	Tendons	12
9	Machinery and Systems	12
11	Outfitting	12
13	Additional Scope of Survey and Analysis	13

SECTION 5	Reassessment	14
1	General	14
3	Environmental Conditions	14
5	Hull Structures	14
5.1	Ship-Type Installations	14
5.3	Non-Ship Type Installations	15
5.5	Cathodic Protection Reassessment	16
5.7	Stability Reassessment	16
5.9	Review of Reassessment Results	16
7	Hull Interface Structures	17
7.1	Strength Reassessment	17
7.3	Remaining Fatigue Strength Assessment	17
7.5	Review of Reassessment Results	17
9	Topside Structures	17
9.1	Strength Reassessment	17
9.3	Remaining Fatigue Strength Assessment for Non-Ship Type Installations	18
9.5	Review of Reassessment Results	18
11	Mooring Systems	18
11.1	Reassessment Analysis	18
11.3	Cathodic Protection Reassessment	18
11.5	Review of Reassessment Results	18
13	TLP Tendons and Tendon Connectors	19
13.1	Reassessment Analysis	19
13.3	Cathodic Protection Reassessment	19
13.5	Tendon Connectors with Nonmetallic Components	19
13.7	Tendon Tension Monitoring Systems	19
13.9	Review of Reassessment Results	19
15	Marine and Industrial Machinery and Systems	19
TABLE 1	Extent of Strength and Fatigue Analysis Scenarios for Life Extension	15
SECTION 6	Additional Survey/Repairs/ISIP	20
1	General	20
3	Additional Surveys	20
5	Repairs and Modifications	20
7	Revision of In-Service Inspection Plan (ISIP)	20
SECTION 7	Asset Integrity Management (AIM)	21
1	General	21
3	AIM Process	21
5	Life Extension in AIM Process	21
FIGURE 1	Assessment for Life Extension within the AIM Process	22

SECTION 8	Risk Assessment	23
1	Risk Assessment	23
APPENDIX 1	Procedure for Fatigue Reassessment of Floating Production Installations (Except for Hull Structures of Ship-Type Installations)	24
1	Remaining Fatigue Strength of Hull Structures and Hull Interface Structures – Non-Ship Type Installations	24
1.1	Accumulated Fatigue Damage D_p	24
1.3	Safety Factors for Fatigue Life of the Accumulated Damages.....	24
1.5	Predicted Damage for Life Extension	25
1.7	Remaining Fatigue Strength Check.....	25
1.9	Calculation Example of Non-inspectable Critical Areas.....	26
3	Remaining Fatigue Strength of Topside Structures – All FPIs and Major Hull Interface Structures – Ship-Type Installations.....	26
APPENDIX 2	Procedure for Strength and Fatigue Reassessment of Ship-Type FPIs	27
1	General	27
3	Initial Scantling Evaluation (ISE) for Life Extension.....	27
3.1	Strength Evaluation	27
3.3	Simplified Fatigue Evaluation	27
5	Total Strength Assessment (Simplified Fatigue Analysis) for Life Extension	27
5.1	Model Requirements and Assessment Procedures for Life Extension.....	27
5.3	Use of As-gauged Scantlings	28
5.5	Loads and Load Cases	28
5.7	Fatigue Acceptance Criteria	28
7	Dynamic Loading Approach and Spectral Fatigue Analyses for Life Extension	29
7.1	Model Requirements and Reassessment Procedures	29
7.3	Loads and Load Cases	29
7.5	Acceptance Criteria	29
APPENDIX 3	References.....	30
1	Application of Codes and Standards	30

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SECTION 1 Introduction

1 General (1 May 2017)

Floating production installations (FPIs) are facilities designed for site-specific application based on a design life usually defined by the Owner/Operator. A typical default structural design life is 20 years, though there are installations with other specified design lives. For different reasons, Owner/Operators may seek to keep the unit in operation beyond the original design life, either in the same location or at a different site. In these instances, the Owner/Operator is advised to initiate a life extension process with the assistance of the Classification Society. This process includes a reassessment of the structure, mooring, tendon systems, stability, machinery and systems, etc., for the entire installation. This reassessment includes engineering and survey activities as outlined in Section 2 of this document.

These Guidance Notes highlighting the process and methodology for life extension are applicable to floating production installations of all hull forms (i.e., ship-type installations, column stabilized installations, tension leg platforms (TLPs), Spar Installations (Spars) and hybrid designs, etc.) with the **Floating Production and Storage System, Floating Production, Storage and Offloading System, Floating Storage and Offloading System** and **Floating Offshore Installation** notations. It is not applicable to mobile offshore drilling units.

These Guidance Notes cover the following life extension scenarios:

- i) Life extension for continued services at the same location
 - Option 1: Life extension of up to five years for an installation remaining at the same location. This option presents an abbreviated procedure per 2/3.1.
 - Option 2: Life extension of over five years for an installation remaining at the same location. This procedure is presented in 2/3.3.
- ii) Life extension procedure for continued services at a different area of operation (See 2/3.5)

The requirements for the Life Extension of an installation that remains at the same site are specified in 1-1-2/5.11.5 of the *ABS Rules for Building and Classing Floating Production Installations (FPI Rules)*. The procedure in these Guidance Notes provides further details regarding the steps to be followed in order to assess an installation for a possible life extension, and also covers those cases where there are changes in the original design parameters or arrangements, for continued operations.

These Guidance Notes are not intended to serve as a design standard, but rather to highlight the primary activities relating to the life extension procedure for floating production installations.

These Guidance Notes present a methodology that can be applied in the life extension for continued services process. As such, it may be applied to units classed by ABS, not classed by ABS or without class.



SECTION 2 Life Extension Process Overview

1 General

Floating installations designed and built to the requirements in the Rules and maintained in accordance with the applicable ABS requirements are typically intended to have a structural design life of 20 years. Many are designed for uninterrupted operation onsite without any dry docking. When a floating installation exceeds the original design life, an evaluation is to be made and appropriate actions are to be taken to extend the life up to the new operating life of the installation under the site-specific environmental conditions.

3 Life Extension of Floating Production Installations (1 May 2017)

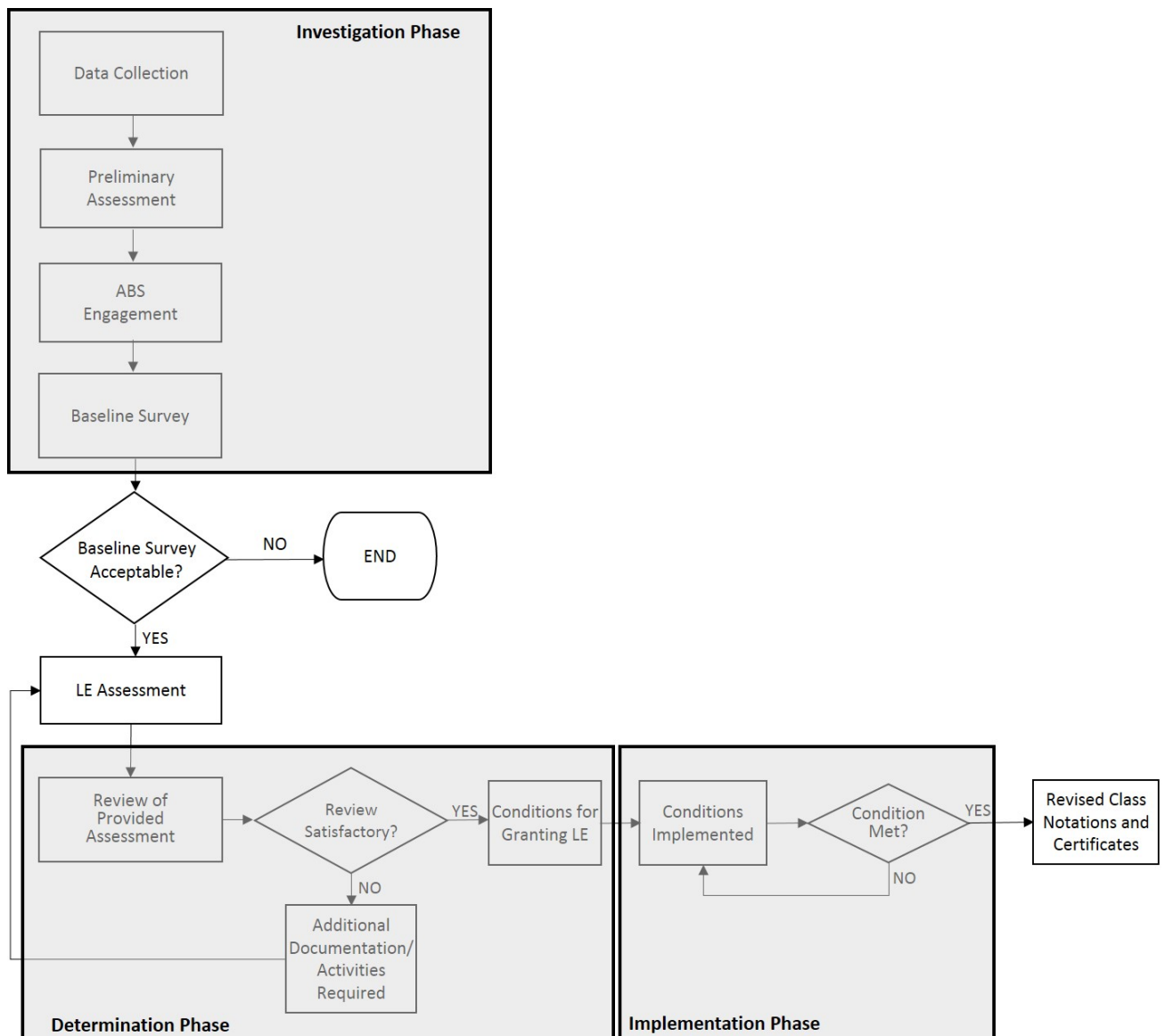
The requirements for the life extension of an installation that remains in the same site are given in 1-1-2/5.11.5 of the *FPI Rules*. In general, the classification or continuance of classification of an existing installation for extension of service beyond the design life requires special considerations with respect to the review, surveys and structural analyses in order to re-verify the adequacy of the installation for its extended services. The following procedure will provide more details regarding the steps to be followed in order to assess an installation for a possible life extension, in particular for those cases where there are changes in the original design parameters and/or arrangements. The general reviews and surveys procedures are described in 2/3.1 and 2/3.3.

The life extension process generally follows the three phases listed below and is also shown in Section 2, Figure 1A:

- i) Investigation phase
 - Data collection and engineering assessment
 - Baseline survey
- ii) Determination phase
 - Reassessment
 - Provision of conditions for life extension
- iii) Implementation phase
 - Conditions implemented

The **detailed** life extension process is shown in Section 2, Figures 1B and 1C. Details pertaining to the life extension process are given in Sections 3 through 8.

FIGURE 1A
Life Extension Process Flow Chart Based on Phases (1 May 2017)



3.1 Procedure for Life Extension up to 5 Years at the Same Location

If the first life extension request for an installation remaining at the same location is five years or less, the following abbreviated approval procedure is to be followed. If a baseline survey is performed and all required structural repairs are completed, the life extension may be granted without the need for data collection. The life extension process is shown in Section 2, Figure 1B.

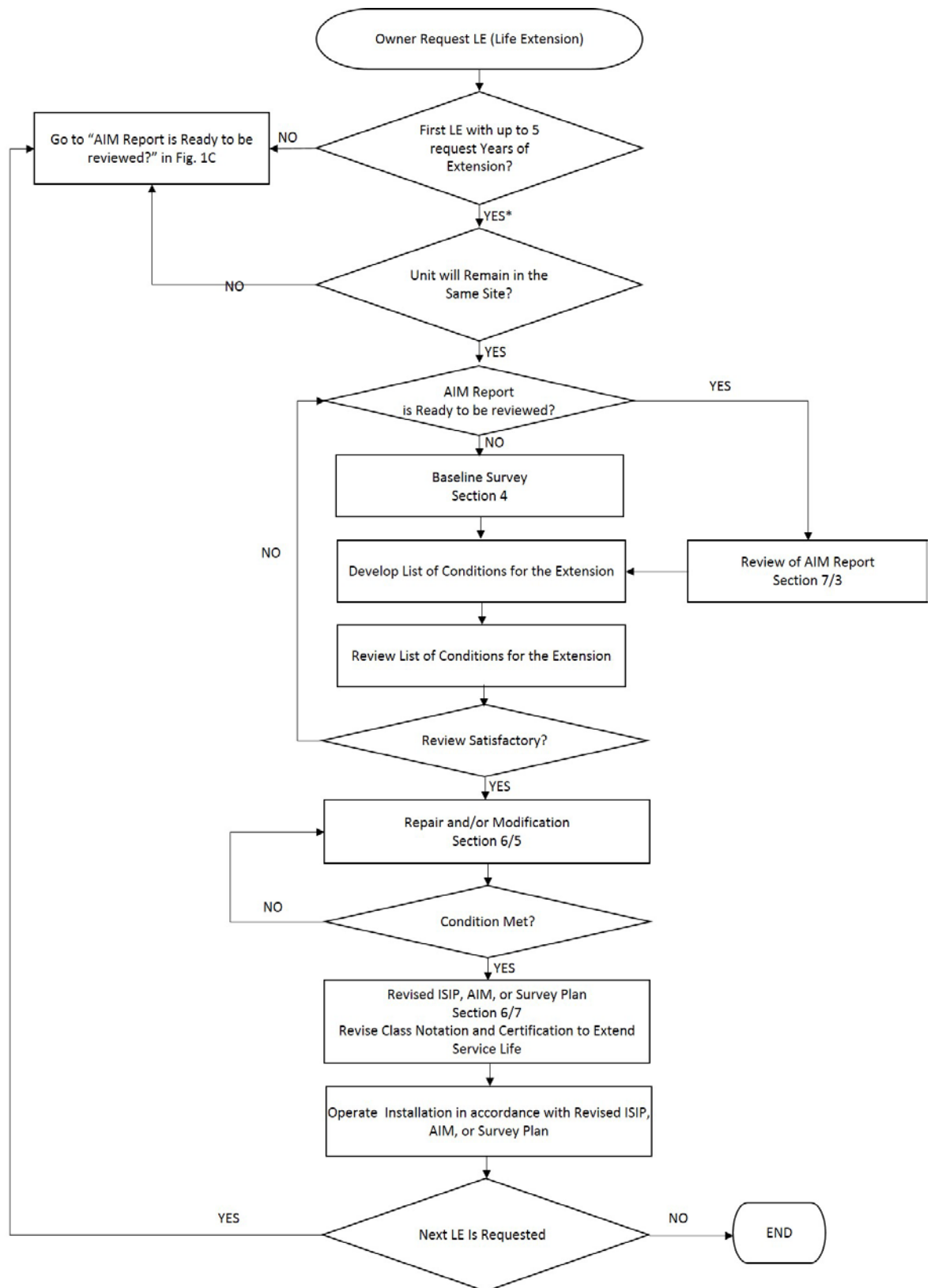
To be granted life extension under these terms, the following conditions are to be satisfied:

- Any modifications to the structure have class approval.
- Critical areas of the original design have been re-examined using NDT techniques and verified to be satisfactory.
- Additional items to be determined on a case-by-case basis during the life extension process have been resolved.

Life extension is a continuous process that extends the original life. This abbreviated process can only be applied once in the lifecycle of a Floating Production Installation. Once a unit has been granted life extension under this option (abbreviated process), additional requests for life extension will be considered as the total additional life beyond the original design life in accordance with the full procedure as described in 2/3.3. For example, if the design life of an installation is 20 years and it receives a life extension of five years, a second five-year life extension will be a ten-year extension to the original design life.

If **FL** or **RFL** notation was granted for the unit under consideration, to use this abbreviated procedure, the original fatigue analysis is to show that the fatigue lives of all joints/critical details are sufficient to cover the extension of use. When the original fatigue analysis show insufficient remaining fatigue life for the requested extension, the **FL** or **RFL** notation needs to be specially considered.

FIGURE 1B
Life Extension Abbreviated Procedure
(For life extension up to 5 years at the same location) (1 May 2017)



* The extension period ends before the first special survey scheduled after the conclusion of the original life

3.3 Procedure for Life Extension Over 5 Years at the Same Location

The general procedure, which is shown in Section 2, Figure 1C, for the classification of an existing installation for extended service is as follows:

- i) For life extension, the operator collects and reviews original design documentation, plans, modification records, if any, and In-Service Inspection Plan (ISIP), Risk Based Inspection (RBI), survey reports, etc. Asset Integrity Management (AIM) document, if available, can be submitted in lieu of a data collection, baseline survey, and reassessment for the following items: hull structure, hull interface structure, topside, mooring, riser, systems and machinery.
- ii) ABS performs a baseline survey of the structure, mooring and machinery to establish condition of installation. The structural surfaces are to be made accessible and cleaned to the Surveyor's satisfaction to enable inspection.
- iii) If the baseline survey is acceptable, a reassessment is performed.
- iv) ABS reviews the submitted AIM documents or the results of the reassessment utilizing results of survey, original plans, metocean data and proposed modifications which affect the dead, live, and environmental loads, if applicable, on the structures.
- v) ABS surveys the installation to verify that any item identified during the review of the AIM documents or reassessment has been addressed.
- vi) If the review and additional survey are satisfactory, the operator makes any required repairs and modification for extending the service of the installation.
- vii) ABS verifies completion of conditions for granting the life extension. The operator revises the required documents to reflect any changes for approval (i.e., ISIP, AIM, RBI, Survey Plan, operations manual, loading manual, etc.).
- viii) ABS reviews the scope of the ISIP, AIM or RBI program to verify the plan modifications as necessary to address results obtained in ii) through v) above that may be necessary to verify the adequacy of the continued service of the installation.

ABS records including ISIP, AIM or RBI are to be updated to reflect the extended life condition. Class certificate is to be issued for life extension. Where applicable, the existing spectral fatigue analysis (SFA), fatigue life (FL) or remaining fatigue life (RFL) notation with year of maturation is to be updated accordingly.

ABS has a tiered set of Structural Integrity Management software tools included in Nautical System (NS) Hull Manager (HM), which allows the operator to manage the condition data of their asset. NS Hull Manager fully integrates structural integrity management into the maintenance, purchasing and repair planning or drydock process. The software has capability of inspection scheduling, anomaly reporting, trending future condition, rapid assessment of hull structures, etc. While the purpose of Hull Manager is to provide lifecycle management, this tool will help and benefit the life extension process for the unit under consideration, since it contains asset specific information required for baseline information and survey, reassessment and re-inspection for hull structures.