Guide for

Dropped Object Prevention on Offshore Units and Installations

September 2017

GUIDE FOR

DROPPED OBJECT PREVENTION ON OFFSHORE UNITS AND INSTALLATIONS SEPTEMBER 2017

American Bureau of Shipping
Incorporated by Act of Legislature of
the State of New York 1862

ABS Plaza
1701 City Plaza Drive
Spring, TX 77389 USA

Foreword

The prevention of dropped objects is an important component of safeguarding personnel, property and the environment. The ABS *Guide for Dropped Object Prevention on Offshore Units and Installations* has been developed to provide users with specific guidance and criteria on the dropped object prevention program, which corresponds to a growing industry-wide development to mitigate and eliminate the hazards imposed by dropped objects.

This Guide specifies the ABS requirements for an onboard dropped object prevention program to be implemented on an offshore asset, and provides the design requirements for equipment primary securing, secondary retention methods and securing for specific equipment, etc. This Guide is intended for use by installation Owners, Operators, and Companies requesting an optional **DOPP** or **DOPP+** notation.

The following describes the general scope of the ABS **DOPP** and **DOPP+** notations:

i) The ABS **DOPP** notation is for ABS-classed offshore installations with an onboard dropped object prevention program approved, surveyed, and commissioned in full compliance with the applicable sections of this Guide.

ii) The ABS **DOPP+** notation is for ABS-classed offshore installations with an onboard dropped object prevention program integrating equipment designs that meet the requirements for primary securing, secondary retention, and specific equipment securing, which are approved, surveyed, and commissioned in full compliance with this Guide.

This Guide is to be used in conjunction with other Rules published by ABS and recognized international Regulations.

This Guide becomes 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 this Guide is the most current.

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

GUIDE FOR

DROPPED OBJECT PREVENTION ON OFFSHORE UNITS AND INSTALLATIONS

CONTENTS

CHAPTER 1 Scope and Conditions of Classification 1

Section 1 Classification 2
Section 2 Classification Symbols and Notations 3
Section 3 Rules for Classification 4
Section 4 Plans and Data to be Submitted for Review 5
Section 5 Alternatives 6
Section 6 Acronyms, Abbreviations, Definitions, and References 7

CHAPTER 2 Onboard Dropped Object Prevention Program 10

Section 1 General 13
Section 2 Roles and Responsibilities 18
Section 3 Risk Assessments for Dropped Object Hazards 20
Section 4 Implementation of Dropped Object Prevention Program 27
Section 5 Continual Improvement 35
Appendix 1 Examples of DROP Program Roles and Responsibilities 38
Appendix 2 Sample Zoning Area 42
Appendix 3 Recommended Practices for Working at Height 47
Appendix 4 Audit of a DROP Program 51

CHAPTER 3 Equipment Design for Dropped Object Prevention for DOPP+ Classification 53

Section 1 Introduction 55
Section 2 Risk Assessment for Dropped Objects Hazard for Equipment Design, Installation, and Maintenance 56
Section 3 Equipment Design 61
Section 4 Equipment Installation and Maintenance 67

CHAPTER 4 Surveys 72

Section 1 Surveys During Manufacture and Installation 74
Section 2 Surveys After Construction and Maintenance of Class 78

Appendix 1 Procedural Requirements for ABS Recognized Dropped Object Prevention Specialists..... 82

CHAPTER 1

Scope and Conditions of Classification

CONTENTS

SECTION 1 Classification....2

SECTION 2 Classification Symbols and Notations....3

1 Class Notations....3

1.1 DOPP Notation....3

1.3 DOPP+ Notation....3

SECTION 3 Rules for Classification....4

1 General....4

SECTION 4 Plans and Data to be Submitted for Review....5

1 Submission of Plans....5

SECTION 5 Alternatives....6

1 Novel Features....6

3 ABS Type Approval Program....6

3.1 Type Approval....6

3.3 Unit-Certification....6

SECTION 6 Acronyms, Abbreviations, Definitions, and References....7

1 List of Acronyms, Abbreviations, and Definitions....7

3 References....8

CHAPTER 1
Scope and Conditions of Classification

SECTION 1
Classification

The requirements for conditions of classification are contained in the separate, generic ABS *Rules for Conditions of Classification of Offshore Units and Structures (Part 1)*.

Additional requirements specific to the dropped objects prevention for offshore installations are contained in the following Sections of this Guide.

CHAPTER 1
Scope and Conditions of Classification

SECTION 2
Classification Symbols and Notations

1 Class Notations

Units with a dropped object prevention program that complies with this Guide and have been surveyed and commissioned to the satisfaction of the Surveyors in full compliance with this Guide and where approved by the Committee may be classed and distinguished in the *Record* by the appropriate notation for the intended service as follows.

1.1 DOPP Notation

Units with a dropped object prevention program approved in accordance with the requirements and criteria established in Chapter 2 and Chapter 4 of this Guide will be assigned a notation of **DOPP**.

1.3 DOPP+ Notation

Units that comply with **DOPP** and possess equipment designs that meet the requirements for primary securing, secondary retention, and specific equipment securing, and which are approved, surveyed, and commissioned to the satisfaction of the Surveyors in full compliance with this Guide, will be assigned a notation of **DOPP+**.

CHAPTER 1
Scope and Conditions of Classification

SECTION 3
Rules for Classification

1 General

This Guide is applicable to the optional classification of dropped object prevention programs and associated equipment used to control and prevent dropped objects from height, and supports dropped object prevention activities on mobile offshore drilling units, offshore installations, tendering vessels, mobile offshore units and other offshore units and installations that are classed with ABS. This Guide is intended for use in conjunction with the ABS *Rules for Building and Classing Mobile Offshore Units (MOU Rules)*, the ABS *Rules for Building and Classing Offshore Installations (Offshore Installations Rules)*, ABS *Rules for Building and Classing Floating Production Installations (FPI Rules)*, and the ABS *Guide for Drilling Tender Barges*, as well as other applicable ABS Rules and Guides.

If requested by the manufacturers, Owner/Operator, or designers, ABS can provide approval of individual equipment or components associated with a dropped object prevention program in accordance with the requirements of this Guide where the installation unit may not be classed with ABS.

CHAPTER 1
Scope and Conditions of Classification

SECTION 4
Plans and Data to be Submitted for Review

1 Submission of Plans

Typical documentation that is required to be submitted for review for the dropped object prevention program, equipment, and/or components for the ABS Classification process is provided in Chapter 2 and 3 of this Guide.

i) Detailed plans and documentation of the onboard dropped object prevention program in accordance with 2-1/5 is to be submitted.

ii) The documentation and plan for design, installation, and maintenance of equipment in accordance with 3-1/3 is to be submitted.

iii) Dropped object prevention program documentation, equipment and/or component-related drawings and related calculations are required to be submitted to ABS for review by the contracting party or the party assigned by the contracting party to substantiate that the dropped object prevention program and the design of the equipment and/or components are in compliance with this Guide, and applicable codes or standards, as listed in this Guide.

Upon satisfactory completion of ABS review of the submitted documentation, plans, and data, ABS will issue an approval letter verifying the completion of the review in accordance with the provisions of this Guide. This letter, in conjunction with ABS approved documentation, will be used and referenced during surveys. Subsequently, the ABS Surveyor will issue appropriate survey reports.

Upon satisfactory completion of all of the required engineering design review and survey processes, ABS may issue the Classification Certificate to the operating unit, including the Class notation **DOPP** or **DOPP +**.

CHAPTER 1
Scope and Conditions of Classification

SECTION 5
Alternatives

1 Novel Features

Dropped object prevention programs and related equipment which contain novel features of design or monitoring provisions to which the content of this Guide is not directly applicable may be classed, when approved by the Committee, on the basis that this Guide insofar as applicable has been complied with and that special consideration has been given to the novel features, based on the best information available at that time. The ABS *Guidance Notes on the Review and Approval of Novel Concepts* provides a methodology for requesting approval of a novel design.

3 ABS Type Approval Program

3.1 Type Approval

Products that are used as components for the dropped object prevention program and can be consistently manufactured to the same design and specification may be Type Approved under the ABS Type Approval Program. The ABS Type Approval Program is a voluntary option for the demonstration of compliance of a system or product with the Rules, Guides, or other recognized standards. It may be applied at the request of the designer or manufacturer.

Specific requirements and details regarding the ABS Type Approval Program can be found in 1-1-4/7.7 and Appendix 1-1-A3 of the ABS *Rules for Conditions of Classification (Part 1)*.

3.3 Unit-Certification

Unit-Certification is a review of individual materials, components, products, and systems for compliance with ABS Rules, Guides, or other recognized standards. This allows these items to be placed on a vessel, marine structure, or system to become eligible for classification. Certification is a "one-time" review. The process is:

i) A technical evaluation of drawings or prototype tests of a material, component, product, or system for compliance with the ABS Rules, Guides, or other recognized standards

ii) A survey during manufacture for compliance with the ABS Rules, Guides or other recognized standards and results of the technical evaluation

iii) Alternatively, a certificate of type approval will expedite the requirements of *i)* and *ii)* above

iv) Products found in compliance are issued "Individual Unit Certification"

CHAPTER 1
Scope and Conditions of Classification

SECTION 6
Acronyms, Abbreviations, Definitions, and References

1 List of Acronyms, Abbreviations, and Definitions

Assemble. Fit together the separate component parts of a machine or other object.

BOP. Blowout preventer.

BRC. Bridge racking crane.

Dropped Object [Dynamic]. Any object that falls from its previous position due to applied force. For example: collisions involving travelling equipment or loads, snagging on machinery or stacked items, motion, helicopter downdraft, or severe weather.

Dropped Object [Static]. Any object that falls from its previous position under its own weight (gravity) without any applied force. For example: a failure caused by corrosion, vibration, or inadequate securing.

DROP. The term used to indicate Dropped Objects Prevention.

DROPS. Dropped Object Prevention Scheme. The global, independent oil and gas industry initiative focus entirely on the prevention of dropped objects.

Service Supplier. A person or company recognized by ABS in accordance with ABS procedures for approval of Service Supplier. The results of their inspections are used by Surveyors in making decisions affecting classification or statutory certification.

Fastening. A device that closes or secures an object.

Fixing. Screws, bolts, or other items used to fix or assemble equipment.

HAZID: Hazard identification study is a process to find, list, and characterize hazards. This is the first step of a risk assessment.

Hierarchy of Controls. The dropped object control hierarchy from most effective to least effective is elimination, substitution, engineering controls, administrative controls, and personal protective equipment.

JSA. Job safety analysis.

Mitigating Controls. Methods, actions or policies that reduce the rate and/or consequences of an incident if preventive controls fail or are not effective.

Non-Through Bolted Connection. Connection type where screw/bolt is screwed into hole drilled and tapped directly in the material.

OEM. Original Equipment Manufacturer.

PHM. Pipe handling machine.

PLS. Position location system.

PPE. Personal protective equipment.

Preventive Controls. Preventing dropped object incidents by reducing the likelihood that an incident will occur by drop resistant design, reliable securing, management of change, training, etc.

Primary Securing Methods. The fixing methods by which an item is fixed so as to prevent it from dropping or falling by using primary securing devices, such as nuts, bolts, screws, claps, brackets, turnbuckles, welding, etc.

PRS. Pipe racking system (rig).

Risk Zones. Area on the offshore asset identified as having the potential for a dropped object incident.

Retain. To maintain in place; hold fixed.

Secondary Retention. The method for securing a part from unintended loosening resulting in loss of clamping force, pre-tension, backing out, displacement, or loss of any part.

Securing. Fixed or fastened so as not to give way, become loose, or be lost.

Securing Devices. Components part of drops preventive systems.

Through Bolted Connection. Connection where two or more mating surfaces are kept together by a bolt penetrating through the parts and locked by nut engaged on the thread.

WWW.DROPSONLINE.ORG. The online resource providing access to a broad range of DROPS Best Practice, Guidance, Campaigning and Presentation materials.

3 References

1) ABS *Rules for Building and Classing Floating Production Installations (FPI Rules)*

2) ABS *Rules for Building and Classing Mobile Offshore Units (MOU Rules)*

3) ABS *Rules for Building and Classing Offshore Installations (Offshore Installations Rules)*

4) ABS *Rules for Building and Classing Facilities on Offshore Installations (Facilities Rules)*

5) ABS *Guide for Drilling Tender Barges*

6) ABS *Guidance Notes on Job Safety Analysis for the Marine and Offshore Industries*

7) ABS *Guidance Notes on Accidental Load Analysis and Design for Offshore Structures*

8) ABS *Guidance Notes on Management of Change for the Marine and Offshore Industries*

9) Drops Reliable Securing Booklet, www.DROPSOnline.org/resources-and-guidance/

10) ABC Guide to Dropped Object Prevention, vol. 1 and 2, Shell

11) Design Guideline – Secondary retention and Prevention of Dropped Objects, internal report, National Oilwell Varco.

12) Dropped Object Prevention Program, internal report, Ensco.

13) Dropped Objects Prevention Programme (DOPP), OES Oilfield Services Group

14) Dropped Objects Prevention, Greater Gulf of Mexico, Chevron

CHAPTER 2

Onboard Dropped Object Prevention Program

CONTENTS

SECTION 1 General....13

1 Introduction....13

3 Objective....13

5 Application....13

5.1 Dropped Object Zones for Fixed Installations....14

5.3 Dropped Object Zones for Self-Elevating Units....14

5.5 Dropped Object Zones for Floating Units and Installations....15

5.7 Dropped Object Zones for Production Units....15

7 Dropped Object Prevention Program Elements....15

FIGURE 1 Basic Elements of a DROP Program....16

SECTION 2 Roles and Responsibilities....18

1 General....18

1.1 DROP Program Management System....18

1.3 Dropped Objects Prevention Awareness and Training....18

3 Roles and Responsibilities....19

SECTION 3 Risk Assessments for Dropped Object Hazards....20

1 Introduction....20

3 Dropped Objects Risk Assessment....20

3.1 Risk Identification....20

3.3 Risk Analysis....21

3.5 Risk Evaluation....21

5 Dropped Object Control Area Designation....24

5.1 General Guidance....24

5.3 Dropped Area Zoning Designation....25

5.5 Sample Zoning Area....25

5.7 Job Safety Analysis....26

7 Documentation....26

9 Management of Change..... 26

FIGURE 1 Classification Dropped Objects Potential Consequence (Source: dropsonline.org).....23
FIGURE 2 Hierarchy of Risk Controls..... 24
FIGURE 3 Demonstrative Guideline for Zone Designation..... 25

SECTION 4 Implementation of Dropped Object Prevention Program.....27
1 Introduction.....27
1.1 Dropped Object Prevention Inspection Plan.....27
3 Equipment and Outfitting Register Inspection Template.....28
3.1 Equipment and Outfitting Register for DROP Inspection Plans..... 28
3.3 Template and Inspection Book.....29
3.5 DROP Inspection Check Sheets.....29
3.7 Equipment Installation and Maintenance.....29
3.9 Inspection Findings and Incident Reporting.....29
5 Practices of Dropped Object Prevention program..... 30
5.1 Equipment and Practices that are prohibited.....30
5.3 Potential Barriers to Effective Inspection and Audit.....30
5.5 Practices for Working at Height..... 30
5.7 Managing New and Temporary Equipment.....31
5.9 Tethering Tools.....31
5.11 Housekeeping.....31
5.13 Material Handling, Packaging, and Shipping.....31
5.15 Tool Accountability.....32
5.17 Hardware Accountability.....32
5.19 Lost Items at Height.....32
5.21 Assembly Operations.....33
5.23 Controlling Access Guidelines to Risk Zones.....33

TABLE 1 Controlling Access to the Designated DROP Risk Zones....33

SECTION 5 Continual Improvement.....35
1 Introduction.....35
3 Monitor and Audit.....35
5 Documentation and Recordkeeping..... 36
5.1 Dropped Objects and Dropped Object Damage Reporting..... 36
7 Continual Improvement.....36

APPENDIX 1 Examples of DROP Program Roles and Responsibilities.....38
1 Examples of Roles and Responsibilities.....38

1.1 Roles and Responsibilities for Dropped Object Prevention Program Management....38
1.3 Roles and Responsibilities for Personnel and Safety Management....39
1.5 Roles and Responsibilities for Quality Assurance Management....39
1.7 Roles and Responsibilities for DROP Program Training Management....40
1.9 Roles and Responsibilities for Management of Changes....40
1.11 Roles and Responsibilities for Personnel....40
1.13 Roles and Responsibilities for Supply Chain Management....40

APPENDIX 2 Sample Zoning Area....42
1 Examples of Typical Dropped Object Zones....42
1.1 Typical Dropped Object Zones for Self-Elevating Drilling Units....42
1.3 Typical Dropped Object Zones for Column-Stabilized Drilling Units....43
1.5 Typical Dropped Object Zones for Surface-Type Drilling Units....44
3 A Sample of Dropped Object Risk Area Zoning in a Drilling Unit....45

FIGURE 1 Self-Elevating Drilling Unit (source: Ensco)....43
FIGURE 2 Column-Stabilized Drilling Unit (source: Ensco)....44
FIGURE 3 Surface Type Drilling Unit (source: Ensco)....45
FIGURE 4 Dropped Object Risk Area Zoning (source: Ensco)....46

APPENDIX 3 Recommended Practices for Working at Height....47
1 General....47
3 Working at Height....47
3.1 Securing of Personnel....47
3.3 Derrick Evacuation Equipment....48
3.5 Securing Tools Less Than 5 kg (11 lbs)....48
3.7 Securing Tools Greater Than or Equal to 5 kg (11 lbs)....48
3.9 Securing Other Portable Equipment....49
3.11 Securing Equipment and Parts....49
3.13 Tool Cabinets for Working at Height....50

APPENDIX 4 Audit of a DROP Program....51
1 Suggested Audit Items in DROP Program....51

CHAPTER 2

Onboard Dropped Object Prevention Program

SECTION 1

General

1 Introduction

Dropped objects have been identified as a potential hazard in a variety of offshore operational activities. In response, an industry-wide effort is underway to decrease the associated risks to health, safety, environment, and the facility itself. Statistical data shows that dropped objects are one of the leading causes of safety incidents. Dropped objects can occur due to design, manufacturing, installation, maintenance, operation, or dismantlement activities throughout the lifecycle of equipment installed at height. The major contributing factors to prevent dropped-object incidents are personnel awareness and training, work process, management, equipment design, environment, and securing of equipment and tools.

An effective dropped-objects prevention (DROP) program can reduce the risk of dropped-object related incidents by identifying potential dropped object hazards and risks, applying appropriate corrective actions, providing awareness through effective personnel training, and making use of good practices and lessons learned for continual improvement.

The requirements and acceptance criteria for a fundamental DROP program are outlined in this Chapter.

3 Objective

This Chapter provides requirements for the dropped object prevention program and intends to enable members of the offshore industry to take verifiable steps to protect personnel, assets, and the environment from dropped object incidents.

5 Application

This Chapter applies to the DROP program implementation of asset management for drops prevention on board an ABS classed offshore unit with the **DOPP** or **DOPP+** notation.

The DROP program on an offshore asset may be implemented in different location zones. The minimum locations for each type of offshore units are described in 2-1/5.1 through 2-1/5.7. The program may be extended to additional locations. Examples of typical dropped object zones on a drilling unit can be found in Appendix 2-A2.

For all dropped object zones, the following documents are to be submitted to ABS for review:

- Equipment and Outfitting Register listing items included in the DROP program
- Risk assessment reports for each listed item in the DROP equipment register

- An Onboard Drops Prevention Program that covers the required functions described in 2-1/7
- Implementation and audit of the onboard dropped objects prevention program by recognized service suppliers
- A system of record keeping that includes auditing, inspection, accidents reporting, feedback, and lessons learned

5.1 Dropped Object Zones for Fixed Installations

The following locations on a fixed offshore asset are required to be included in the DROP program as a minimum:

i) Derrick/mast equipment area 1 (A frame, crown block, water table)

ii) Derrick/mast equipment area 2 (derrick – crown to monkey board)

iii) Derrick/mast equipment area 3 (derrick – monkey board to driller)

iv) Derrick/mast equipment area 4 (traveling equipment, traveling block, top drive, kelly spinner, etc.)

v) Stabbing board

vi) Sub-structure, under cantilever area

vii) Moon pool

viii) Vent/flare masts and booms

ix) Cranes and associated equipment

The following locations are optional:

i) Machinery spaces

ii) Deck working and access areas with overhead equipment

iii) Accommodation block, all external levels

iv) Any other areas identified by the Owner

5.3 Dropped Object Zones for Self-Elevating Units

The following locations on a self-elevating drilling unit are required to be included in the DROP program as a minimum:

i) Derrick/mast equipment area 1 (A frame, crown block, gin pole, water table, etc.)

ii) Derrick/mast equipment area 2 (derrick – crown to monkey board)

iii) Derrick/mast equipment area 3 (derrick – monkey board to driller)

iv) Derrick/mast equipment area 4 (traveling equipment, traveling block, top drive, PRS, PHM, PLS, VDM, etc.)

v) Stabbing board

vi) Sub-structure, under cantilever area

vii) Cranes and associated equipment

The following locations are optional:

i) Jack houses

ii) Machinery spaces

iii) Accommodation block, all external levels

iv) Any other areas identified by the Owner

5.5 Dropped Object Zones for Floating Units and Installations

The following locations on a floating asset are required to be included in the DROP program as a minimum:

i) Derrick/mast equipment area 1 (A frame, crown block, gin pole, water table, etc.)

ii) Derrick/mast equipment area 2 (derrick – crown to monkey board)

iii) Derrick/mast equipment area 3 (monkey board platform)

iv) Derrick/mast equipment area 4 (derrick – monkey board to driller)

v) Derrick/mast equipment area 5 (traveling equipment, traveling blocks, top drives, PRS, PHM, PLS, BRC, VDM, etc.)

vi) Derrick/mast equipment area 6 (drill floor, iron roughneck, dog house, etc.)

vii) Stabbing board/basket

viii) Sub-structure

ix) Moon pool area, bop handling and service areas

x) Riser bridge cranes, cranes and associated equipment

The following locations are optional:

i) Shaker areas

ii) Machinery spaces

iii) Main deck area

iv) Raised catwalks/conveyors/walkways

v) Accommodation block, all external levels

vi) Columns, thruster compartments, ballast pump rooms

vii) Any other areas identified by the Owner

5.7 Dropped Object Zones for Production Units

The locations on a production unit are to be included in the DROP program as follows:

i) Any locations defined in 2-1/5.1 through 2-1/5.5.

ii) Locations of hydrocarbon production and/or processing facilities with high risk assessment identified in the *Facilities Rules*.

iii) Any high risk locations identified in the *FPI Rules*, the *MOU Rules*.

iv) Any other areas identified by the Owner.

7 Dropped Object Prevention Program Elements

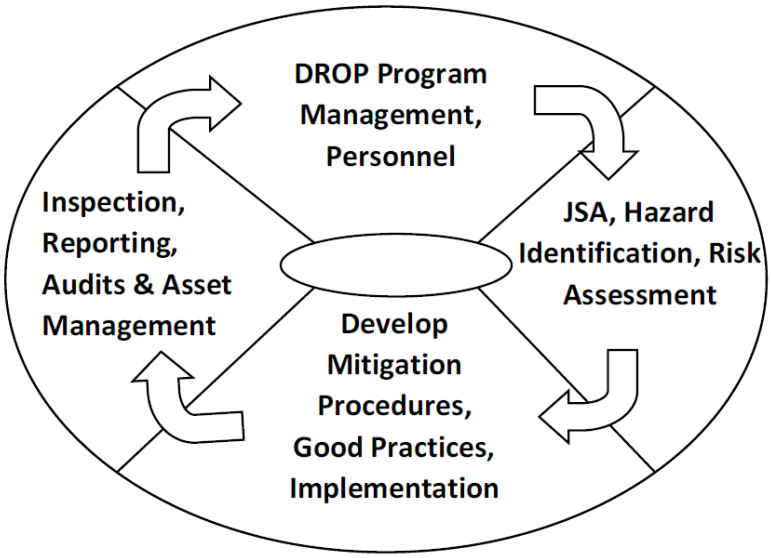
This Section identifies the basic aspects and functions required to establish a firm foundation for the DROP program. An organizational process can be built off this foundation incrementally based on safety needs, staff competencies and organizational maturity in the DROP program.

2-1/Figure 1 illustrates the primary functions that are required to build a dropped object prevention program. At the core of the program is the goal to protect personnel, property, and the environment. The functions are:

- Dropped object program management and personnel training

- Job safety analysis (JSA), hazard identification, and risk assessment
- Mitigation procedures and implementation
- Continual improvement through inspection, audit, reporting, and corrective actions

FIGURE 1
Basic Elements of a DROP Program



Within each basic function of a dropped object prevention program refined, detailed operations and procedures are essential. The completed program is to be developed and submitted to ABS for review, verified on site by an ABS-recognized Service Supplier, and surveyed by the attending Surveyor.

The basic functions shown in 2-1/Figure 1 are critical to establishing a reliable dropped object prevention program, and they are considered by ABS to be the minimum required to evaluate, analyze, and provide a measurable program on board offshore assets. These functions are required to be developed and implemented on board with results documented, approved work practices employed, and lessons learned implemented.

The basic functions are:

i) Define roles and responsibilities for DROP program management
  a) Define and exercise good practices
  b) Develop DROP program management
  c) Provide dropped objects prevention awareness and training

ii) Perform Risk assessment
  a) Develop Equipment and Outfitting Register
  b) Identify potential sources of dropped objects
  c) Perform risk assessment
  d) Establish and map out risk zones
  e) Management of Change

iii) Implementation of DROP program
  a) Exercise DROP program practices

b) Implement DROP inspection plan

iv) Continual improvement

a) Monitor and audit the established program

b) Enhance reporting and corrective action procedures

c) Continual improvement through lessons learned

CHAPTER 2

Onboard Dropped Object Prevention Program

SECTION 2

Roles and Responsibilities

1 General

The onboard dropped object prevention program is to be organized by the responsible person designated by the Owner/Operator. The responsible person is to exercise good dropped object prevention practices, develop the program management system, and provide to personnel dropped object prevention awareness and training. A description of the onboard dropped object program management system is to be submitted for ABS review.

1.1 DROP Program Management System

The dropped object program management system is to include:

i) A methodology to develop the dropped object prevention program to match tasks to required skills and build personnel skill for long-term development of experience

ii) Provisions for performing periodic capability assessments to confirm that the management leadership understands current dropped objects safety status, personnel and organizational capabilities, and plans for development

iii) Guidelines for carrying out all activities described within the dropped object prevention program

1.3 Dropped Objects Prevention Awareness and Training

The dropped object prevention program training for any personnel (employee, contractor, consultant, or visitor) that accesses the offshore asset is essential in order to enable personnel to identify dropped objects hazards and risks.

The dropped object prevention program management organization is to:

i) Maintain an acceptable use policy or dropped objects prevention manual that is designed to prevent harm to personnel and damage to offshore equipment from dropped objects in the execution of offshore activities

ii) Have enforcement mechanisms in place to confirm that acceptable use policies are applied, acknowledged, monitored, audited, and enforced throughout the worksite environment

iii) Conduct periodic dropped object prevention program awareness trainings so that personnel understand the program policies, procedures, inspections and safeguards needed to minimize dropped objects hazards

iv) Provide DROP program training

3 Roles and Responsibilities

Considering the functions of a dropped object prevention program and tasks, suggested roles, and responsibilities involved in the DROP program are as follows.

The onboard dropped objects prevention program is to define the roles and responsibilities for the following:

- DROP Program Management
- Personnel and Safety Management
- Quality Assurance Management
- DROP Training Management
- Management of Change
- Supply Chain Management

Examples of these roles and responsibilities can be found in Appendix 2-A1.

CHAPTER 2

Onboard Dropped Object Prevention Program

SECTION 3

Risk Assessments for Dropped Object Hazards

1 Introduction

Every offshore asset involves a large amount of equipment and outfitting devices. Risk assessments for dropped object hazards on an offshore asset mainly focus on the typical dropped objects zones described in 2-1/5 and areas identified by the Owner/Operator. The equipment and outfitting devices in these areas are to be identified, catalogued, and photographed to form an Equipment and Outfitting Register of all overhead equipment. This may include derrick pins, tong sheaves, turnbuckles, light fixtures, antennas, handrails, tools, etc. All items are collected with a risk profile including their weight and height, their exposure to energy sources (e.g., vibration effects, corrosion, etc.) and details of job activities and operations that may include the amount of time that personnel spend under them. All items in the Equipment and Outfitting Register are assessed for their dropped risk potential and consequence.

Furthermore, based on the risk assessment, the dropped object risk zones can be established to control the unauthorized access to the designed areas. The DROP inspection plans are to be developed to be carried out for routine inspections.

3 Dropped Objects Risk Assessment

The dropped object risk assessment is an overall process consisting of the following three steps:

i) Risk Identification

ii) Risk Analysis

iii) Risk Evaluation

The details regarding these three steps are presented in the following Paragraphs.

3.1 Risk Identification

An asset-specific dropped object HAZID is to be carried out to identify potential dropped object sources and corresponding scenarios. All items listed in the Equipment and Outfitting Register are to be considered. For further guidance on the hazard identification study, refer to Section 2 of the ABS *Guidance Notes on Accidental Load Analysis and Design for Offshore Structures*.

The scenarios considered are to include, but are not limited to, the following:

i) Dropped objects on lifting equipment due to lifting and hoisting

ii) Dropped objects during drilling operations

iii) Dropped objects during equipment installation and maintenance

iv) Falling objects such as hand tools used at height

v) Derrick temporary equipment

vi) Equipment securing at height, bolted connections

vii) Failure of equipment in operation causing parts to drop

viii) Collision or striking of equipment at height

ix) Vibration

x) Environment, rain, wind, snow, ice, hail, lightning, sea action, etc.

The dropped object incident is to be fully characterized, as far as practicable, by including:

i) On-going operations or jobs (e.g., moving equipment, drilling, or working at height)

ii) Dropped object description:

- Description of structure, location, and mass of object
- Drop characteristics (including location of anticipated impact, height of drop, impact angle, and velocity, as applicable)

iii) Dropped object scenario definition:

- Energy source or environmental conditions (e.g., weather and sea state)
- Prevention controls (including safety devices, securing design)
- Potential consequences with respect to personnel safety, asset damage or environmental damage
- Mitigating measures present (including structural and operational safeguards when impact occurs and safety/environmental barriers after event)

3.3 Risk Analysis

The dropped object risk analysis is the evaluation of the level of risk associated with the identified dropped object so that proper attention is given to prevent or mitigate the recurrence of high risk events. Additional dropped object prevention plans are to be developed as needed to avoid lower risk events as well. Risk is a function of the likelihood of a hazard to occur and the severity of the resulting consequence. The effectiveness and efficiency of the existing preventive controls and mitigating measures are also taken into account while determining the risk level. For the purpose of the dropped object prevention program, the risk evaluation can be a qualitative estimation.

The dropped object risk analysis evaluates the consequence severity with respect to personnel safety, asset damage, and environmental damage. For each dropped object incident identified, the risk assessment process is to determine the worst-case outcome that can result from the hazard. For example if the identified risk has potential consequences ranging from a minor first-aid treatment to a fatality, then the most severe case, the fatality, is to be selected and the risk identified according to this outcome. The likelihood of occurrence may be based on statistical data and/or current industry practice.

3.5 Risk Evaluation

The dropped object risk analysis results can be compared to the acceptable criteria approved by ABS to clarify what level of risk can be tolerated and what risks cannot; such as the Risk Matrix and Tolerability Criteria based on hazard severity. Reference can be made to 4/7.3 of the ABS *Guidance Notes on Job Safety Analysis for the Marine and Offshore Industries*.

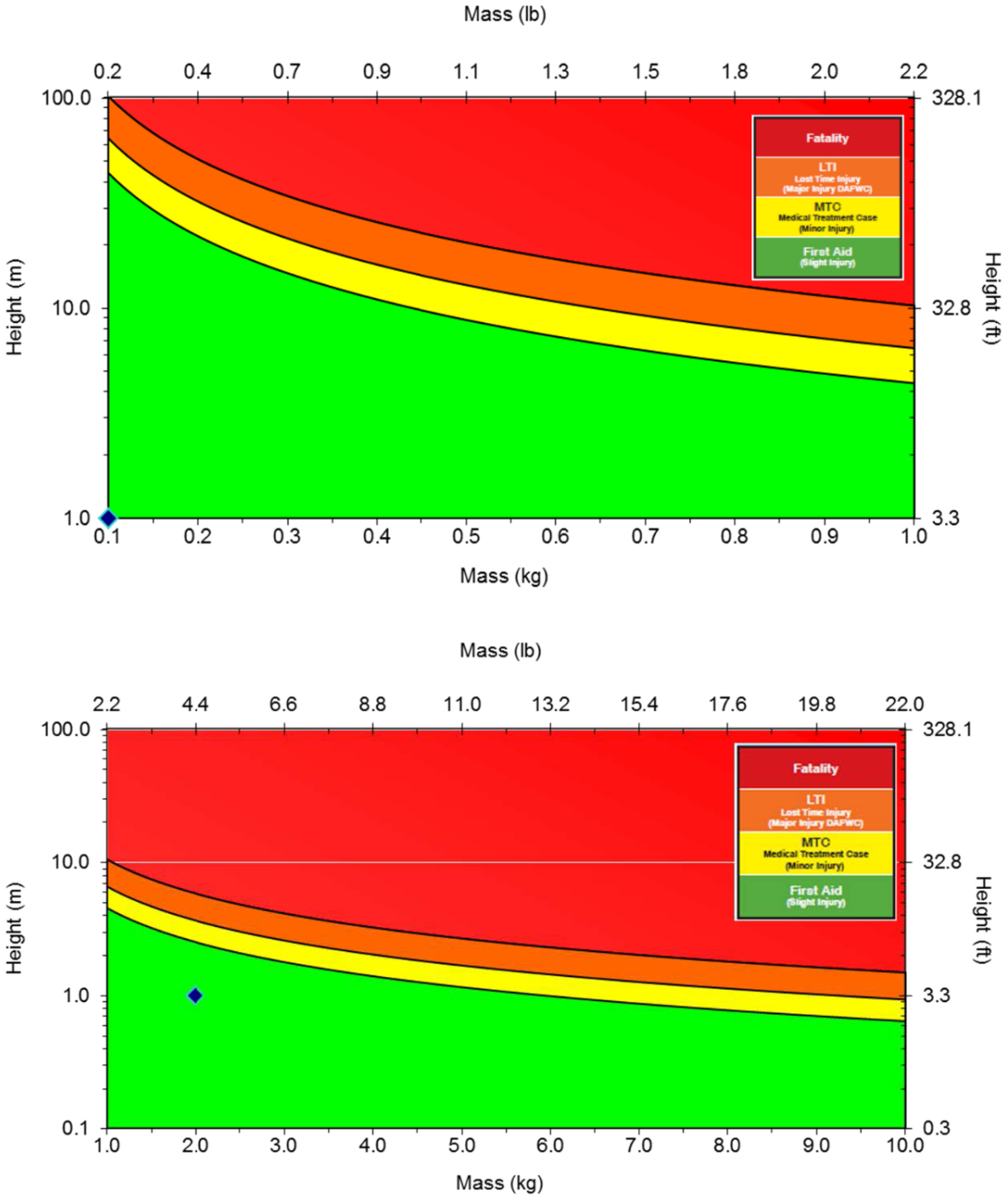
3.5.1 Acceptance Criteria

The dropped object acceptance criteria within the DROP program are to be defined by the Owner. The acceptance criteria define the acceptable risk level for a dropped object incident considering both the frequency and the consequence of the event. The acceptance criteria are to take into account the potential impact on personnel safety, environment, and the asset. The risk acceptance criteria defined by the Owner is to be submitted and approved by ABS prior to initiating the risk assessment.

The frequency of dropped object incidents can be estimated based on historical data. If applicable frequency data cannot be found, it may be necessary to estimate the frequency by analytical models (e.g., fault tree analysis). A common benchmark in the classification of potential consequence severity to personnel safety from a dropped object is provided by the DROPS calculator and shown in 2-3/Figure 1. This DROPS calculator as a consequence evaluation tool is endorsed by DROPS Workgroup (dropsonline.org). The DROPS calculator uses the mass of the dropped object and the height from which it falls to classify the potential consequence severity in terms of First Aid, Medical Treatment Case, Lost Time Injury, or Fatality. Dropped objects may also cause asset damage. Analytical methods (e.g., closed form equations and tabulated data or nonlinear finite element analyses) may be used to assess the damage to an asset.

Due to the large number of events likely to be identified, it is common to use a screening process to screen out low risk dropped object incidents that need not be analyzed further. The methodology and rationale for the screening process is to be documented as part of the risk assessment report. The remaining events are to be addressed for a detailed risk assessment (consequence analyses). This facilitates establishing dropped object risk zones, in addition to determining if existing mitigation measures are adequate or additional controls are needed to reduce the risk of the event. 4/3.5 of the ABS *Guidance Notes on Accidental Load Analysis and Design for Offshore Structures* provides further guidance on the consequence analyses of dropped objects on asset damage.

FIGURE 1
Classification Dropped Objects Potential Consequence
(Source: dropsonline.org)

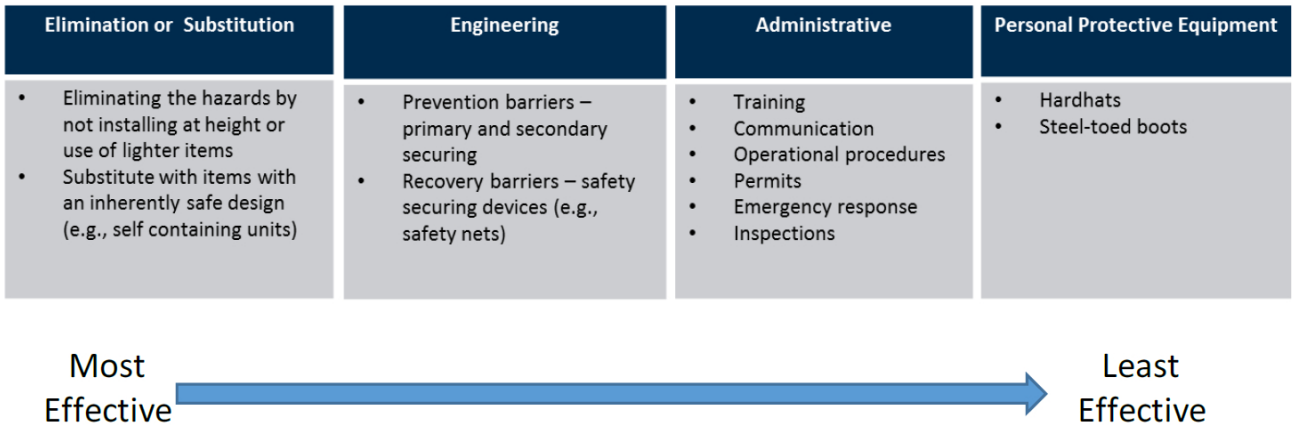


3.5.2 Risk Control Measures

Risk control measures refer to normal and available controls generically associated with the task by procedure, company policy, common practice, etc. When the existing controls have not lowered the risk to a tolerable level, then additional risk control measures are necessary to provide stronger, more reliable risk reduction strategies.

There is the hierarchy of controls that can be implemented to reduce risk, presented in the preferred order of implementation in 2-3/Figure 2. The effectiveness of the controls in place is to be evaluated and justified as part of the risk assessment.

FIGURE 2
Hierarchy of Risk Controls



For further information on each type of hazard control, listed by its order of preference, refer to 2/5.15 of the ABS *Guidance Notes on Job Safety Analysis for the Marine and Offshore Industries*.

For each dropped object hazard identified, various risk controls may be implemented to reduce the likelihood or consequence of dropped object hazards. Some examples of preventive and mitigating controls include:

- Modifying or removing equipment and structural members at height to reduce the likelihood of a dropped object during operations
- Restricting operations during extreme weather events
- Reinforcing the facility's structure exposed to dropped objects with damage potential
- Adding structural protection devices to equipment
- Layout modifications and optimization for new designs (e.g., modifying the general arrangement)
- Additional means of secondary retention and application of safety securing methods

5 Dropped Object Control Area Designation

The dropped object control area designation is to be carried out for each typical dropped object zone defined in 2-1/5.1 through 2-1/5.5. The dropped object control areas are designated based on the results of the dropped object risk assessment in 2-3/3.

5.1 General Guidance

To determine the consequence of a dropped object incident, the following question should be answered: if the dropped object incident happens, what is the worst-case scenario? As an example, the DROPS calculator tool may be taken as a measure to the risk level of the dropped object incident.

To determine the likelihood that a dropped object incident will happen, the following factors may be considered:

i) Can a dropped object be easily located during planned future inspections?

ii) What is the risk of injury to personnel or damage to the structure/equipment by a dropped object or tool?

iii) Any kind of risk controls implemented and their effectiveness?

iv) Does the activity being performed have a planned route for the dropped object inspection?

v) Are the inspection personnel properly trained for dropped object prevention?

The evaluation of inspection adequacy may depend on several factors, such as the lighting and environment conditions during the inspection, the number of additional times inspection will occur, the locations of the potential dropped objects, and the physical access of conducting an inspection.

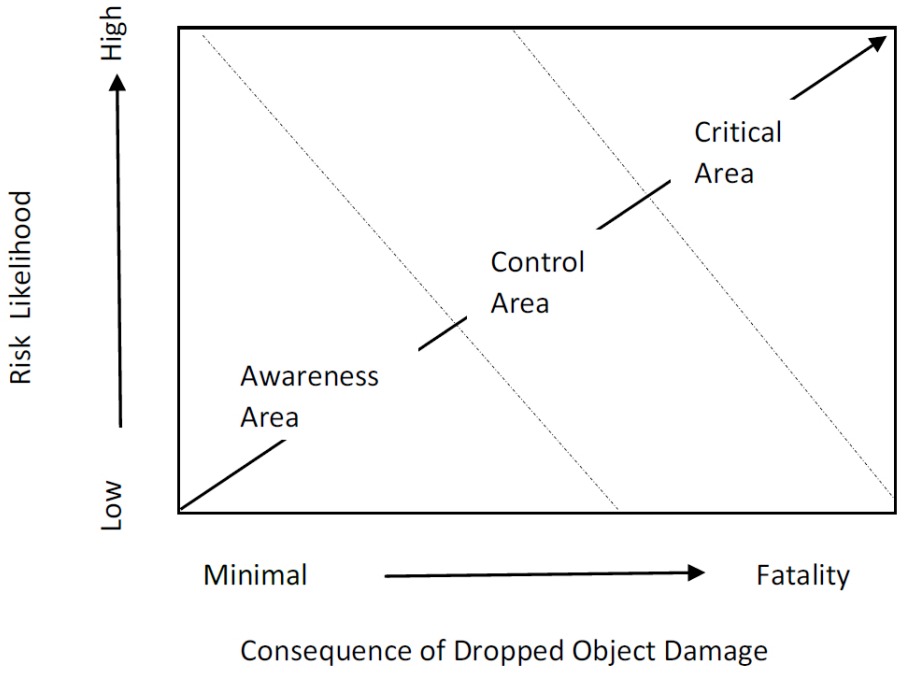
The dropped object risk assessment provides the quantitative or qualitative guidance to assist the dropped object control area designation.

5.3 Dropped Area Zoning Designation

2-3/Figure 3 as a guideline for combining the risk factors obtained can be used to designate the dropped object risk control zones as follows:

- *Dropped object awareness areas*. An area where the risk associated with dropped object incidents is considered low.
- *Dropped object control areas*. An area where the risk associated with dropped object incidents is considered medium.
- *Dropped object critical areas*. An area where the risk associated with dropped object incidents is considered high.

FIGURE 3
Demonstrative Guideline for Zone Designation



5.5 Sample Zoning Area

An example of the dropped object risk control zones on a drilling unit can be found in Appendix 2-A2.

5.7 Job Safety Analysis

It is required that a job safety analysis (JSA) be performed before entering into any risk zone. The purpose of doing a JSA is to eliminate or reduce the occurrence or the consequence of undesirable dropped objects incidents during working. A dropped object checklist may be used to check which objects have the potential to drop in the risk zone and what control measures are to be adopted to prevent or mitigate the dropped object hazards. Further guidance on the job safety analysis can be found in the ABS *Guidance Notes on Job Safety Analysis for the Marine and Offshore Industries*.

7 Documentation

The dropped object risk assessment report is to be submitted for ABS review. The risk assessment report is to include the following:

- Risk acceptance criteria (e.g., risk matrix)
- Hazard register or risk assessment worksheets with dropped object scenarios identified (potential dropped object hazards, energy source, type, cause, consequence and controls, etc.)
- Screening evaluation of all events identified
- Detailed risk assessment for events requiring additional assessment
- Identification of all required mitigation actions
- Established DROP risk zones

9 Management of Change

Change arises from responding and adapting to varying conditions. Whenever a change is made, the potential consequences of the change are to be assessed before implementation. A Management of Change (MOC) program is to be developed to confirm that changes are reviewed and approved in a responsible manner by the proper personnel. The MOC should be utilized to track and clear high risk items and be used to confirm the risk assessment process that is updated to reflect the change condition. Further guidance on MOC can be found in the ABS *Guidance Notes on Management of Change for the Marine and Offshore Industries*.

CHAPTER 2

Onboard Dropped Object Prevention Program

SECTION 4

Implementation of Dropped Object Prevention Program

1 Introduction

The successful implementation of a dropped object prevention program starts with a commitment from the company management to implement the process and enforce its use. This commitment has to be identified so that all levels of management and personnel understand their responsibility to go forward with the program.

An effective DROP program requires the following factors for successful implementation of the program:

i) *Policy*. A policy to outline the program, and demonstrate management's commitment to preventing dropped objects and minimizing dropped object hazards. This should be documented in the DROP program.

ii) *Inspection*. A well designed inspection plan is periodically monitored for overhead hazards being mitigated.

iii) *Equipment and Training*. Personnel are to receive proper training for dropped object prevention with regards to equipment/tools and inspection plans. They should know how to use tools when working overhead so they are well secured, and understand primary and secondary means of securing. Most importantly, they should understand exactly the procedure of the inspection plan and what they are looking for when inspecting a potential hazard. Appropriate training programs such as hands on training, a visual inspection guide and ongoing mentoring by a qualified party are to be included in the program.

iv) *Accountability*. Personnel are to understand and commit to the company's dropped object prevention program policy and maintain accountability for the procedures associated with the program.

1.1 Dropped Object Prevention Inspection Plan

The dropped object prevention inspection plan in the DROP program is to meet the following requirements as a minimum:

i) The dropped objects prevention program is to apply throughout the supply chain. All equipment is to be inspected before being transported to the operation site, for secure retention or removal of loose objects. The practices of packaging, handling, and shipping of materials, cargo, and equipment are to be inspected and verified.

ii) An independent dropped objects inspection of items contained in the approved Equipment and Outfitting Register that forms the DROP is to be performed and scheduled annually or more often

as specified in the DROP program. This inspection is to be performed by an ABS recognized Service Supplier. The independent inspections are to identify, assess and record all potential dropped object hazards, and recommend the applicable control measures and corrective actions. The inspection areas are to be specified in the independent dropped object inspection plan. The dropped object inspection report may produce the dropped object inventory or inspection book used for further routine inspections.

The general procedures of the independent dropped objects inspection are:

- Document equipment location for inspection area
- Take photographs of each item inspected, if possible
- Assign unique identification numbers to each item or tag numbers
- Describe each item inspected
- Inspect and document primary securing methods
- Inspect and document secondary retention methods
- Record equipment condition and whether it meets the safety criteria including comments (i.e., Satisfactory or Reason for Failure)
- Record inspection frequency (i.e., weekly, monthly) as recorded in the equipment inventory inspection criteria
- Generate final report and create a failed items list

iii) Routine dropped object prevention inspections are to be performed daily or weekly and be verified by the DROP Program Management. Clear guidelines for inspections are to be specified in the dropped object inspection book using the pictures or diagrams. The typical items during the inspection include securing method, secondary retention, loose objects, corrosion, damaged equipment, redundant equipment, etc.

iv) Specific equipment and unplanned event inspections are to be included in the dropped object prevention program. Examples are lifting equipment for pre-mast raising, post-mast raising and pre-mast lowering inspections; the areas affected by activities causing excessive vibration or subject to severe storm weather condition. The dropped object inspection plan is to be specifically documented and strictly followed.

v) All the risk zones are to be displayed on designated offshore assets. All personnel are to be aware of these zones and associated personnel requirements.

3 Equipment and Outfitting Register Inspection Template

3.1 Equipment and Outfitting Register for DROP Inspection Plans

In the DROP inspection plan, the dropped object prevention practices (2-4/5) are to be addressed and all items in the Equipment and Outfitting Register are to be considered. The Equipment and Outfitting Register inspection template in the DROP inspection plan is to be categorized by tasks, risk control zones, typical dropped object zones, etc. Items in the Equipment and Outfitting Register inspection template include, but are not limited to, the following:

i) Equipment and outfitting device items

ii) Item description, photograph if applicable

iii) Item weight and height

iv) Safety securing measures

v) Energy sources (e.g., gravity, motion, mechanical, electrical, pressure, temperature, vibration, weather, corrosion, collision, etc. that could lead to a dropped object incident)

vi) Controls and barriers

vii) Dropped risk probability or likelihood

viii) Dropped risk severity

ix) Resultant risk level

x) Inspection procedure

xi) Corrective actions

3.3 Template and Inspection Book

The Equipment and Outfitting Register template and inspection book is to be submitted to ABS for review. It can be maintained in soft or hard copies for inspector's easy access.

3.5 DROP Inspection Check Sheets

Generally, a DROP inspection plan is generated based on the risk assessment from the Equipment and Outfitting Register. The associated DROP inspection check sheets are to be created for the inspection plan. When setting up the inspection period, the basic judgment is that the level of risk determines the inspection frequency. In the DROP inspection check sheets, the following items are to be included:

i) Check items – detailed descriptions

ii) Inspection procedures

iii) Inspection results

iv) Corrective actions taken

v) Inspection frequency

vi) Inspector assignment

vii) DROP management supervision

viii) Lessons learned

3.7 Equipment Installation and Maintenance

The equipment installation and maintenance is to be included in the DROP inspection plan as well. The special equipment securing requirements refer to 3-4/3.

3.9 Inspection Findings and Incident Reporting

A Management of Change procedure is to be provided. An inspection and incident tracking system is to be included in the inspection plan and the Management of Change procedure.

Dropped object hazards found prior to, during, or after inspection are to be reported in the inspection tracking system, the appropriate preventive and corrective actions are to be documented, risk removal is to be confirmed, and the inspection plan is to be updated.

When an incident occurs, the following requirements for reporting are to be followed:

i) The personnel that discover the dropped objects and/or damage are to notify their immediate supervisor and report the incident in the inspection tracking system.

ii) The supervisor notifies management and initiates the Management of Change Procedure.

iii) The supervisor and the DROP Program Management determine a corrective action plan to prevent future occurrences.

- The corrective action plan is not the direction necessary to remove the dropped object and restore the operation.

- The details on removal of the dropped object and restoration of operation are situational and should be handled on a case-by-case basis.

iv) After the corrective action plan has been specified in the inspection plan, the supervisor is to notify the associated management through the Management of Change Procedure.

5 Practices of Dropped Object Prevention program

5.1 Equipment and Practices that are prohibited

The following equipment and practices are prohibited in the DROP program:

i) Uncertified lifting equipment including "homemade" lifting devices

ii) Use of untethered tools at height

iii) Bolts secured with a double nut arrangement

iv) Use of welding rods, wire and tie wraps instead of properly engineered split pins or safety pins

v) Use of hooks on any part of the rigging on winch lines and stabbing board

vi) Slings wrapped around derrick/mast beams

vii) Unsecured bottles, grease tubes and guns

5.3 Potential Barriers to Effective Inspection and Audit

To effectively carry out the inspection and audit process in the dropped object prevention program, the following common events are to be avoided:

i) No supervisor confirmation that inspections are being conducted

ii) No quality assurance process to check quality of performed inspections

iii) Unqualified inspector and auditor

iv) Insufficient time to conduct the inspection and audit

v) Inadequate frequency of the inspection and audit

vi) Poor quality or non-existent inspection support material (picture book, checklists, etc.)

vii) Inclement weather

viii) Operational delays

ix) Inspection and audit personnel not available

x) Lack of leadership and/or supervision commitment regarding the inspection and audit process

xi) Unclear expectations from leadership/supervision regarding the inspection and audit process

xii) Poor record keeping

xiii) Inadequate corrective action process

xiv) Delays in addressing findings from inspections and audits

xv) Inadequate auditing of the inspection process

5.5 Practices for Working at Height

Dropped object hazards caused by failure to secure tools and equipment used at height are a high potential risk. These dropped items can be small or large tools, equipment, or personal items (e.g., radios, detectors, pens, gauges, hard hats, water bottles, etc.). The risk of working at height can be distinguished between the securing of personnel working at height, the securing of permanent equipment, and the securing of tools and parts that are used at height during the operation.

Details of practices for working at height can be found in Appendix 2-A3.

5.7 Managing New and Temporary Equipment

All temporary equipment taken into the working site or installed or used at height, including all hand tools shall be maintained in a temporary equipment register. The temporary equipment register should be completed for all temporary equipment so that the items in the register are accountable during the operation. All temporary equipment is subject to risk assessment and inspection. The temporary equipment inspection plan or checklist is to be completed prior to installation of equipment.

The following requirements are applicable for managing new, temporary, and third party equipment:

i) All new, temporary, and third party equipment is to be inspected upon arrival on board to determine the potential for dropped object hazards.

ii) All new equipment to be installed at height is to be risk assessed per the Management of Change procedure.

iii) Any equipment installed overhead for less than 90 days is to be logged in the temporary equipment register and inspected routinely for potential dropped object hazards and for secondary retention.

iv) Any new equipment installed overhead for more than 90 days is to be documented in the Dropped Object Inspection Plans per the Management of Change procedure and inspected regularly for potential dropped object hazards and for secondary retention.

v) Any new equipment should be accompanied with appropriate Type Approval or similar manufacturer's certification documents, as applicable. Certification details are to be recorded in the temporary equipment register.

5.9 Tethering Tools

To prevent tools and equipment from falling, tethered tools are commonly used on offshore assets when working at high locations. The tethered tools used on offshore assets are required to be approved through the ABS Type Approval program.

5.11 Housekeeping

Effective housekeeping practices are to be implemented and maintained by personnel in order to protect all personnel, equipment, and structures from dropped objects and dropped object hazards.

A "Clean-As-You-Go" practice should be incorporated into the required training to prevent debris and waste from becoming a dropped object hazard. That is, before work starts and after work is completed, a detailed inspection is carried out to prevent any tools and equipment, redundant machinery, scaffolding components, and other loose materials from being left in the workplace.

5.13 Material Handling, Packaging, and Shipping

All equipment, production, and service operations are to have processes in place to prevent dropped object hazards.

For material handling, packaging, and shipping, including consumables and parts protection, controlled conditions are to be established to prevent the dropped object hazards, including:

i) Identify material items, assemblies, surfaces, areas, etc. to be protected from dropped object hazards.

ii) Verify cleanliness and process requirements.

iii) Sequence events for material handling, packaging, shipping and storage.

iv) Materials and accessories used in the packaging, handling, shipping and storage are to be verified free of dropped object hazards.

v) Components and assemblies are properly packaged to prevent damage during normal handling and shipping operations.

vi) Protective and packaging materials are to meet recognized international standards and regulations.

vii) Protective devices (e.g., edge protectors, caps, plugs, covers, filters, rub strips, etc.) are to be secured to prevent accidental damage from unintended dropped objects.

Training is to be provided and required for all associated personnel to follow the material identification, tracking, packaging, handling, shipping, and storage procedures.

5.15 Tool Accountability

Tool accountability methods are to be used in the dropped object risk areas based on the level of hazards. Some recommended methods include, but are not limited to, the following:

i) Use of a tools identification system (e.g., shadow boards, shadowboxing, bar coding, special canvas layouts with tool pockets, tool counters, chit system tool tags, or consolidated tool kits)

ii) Implementation of tool control methods to control special tools used in checkout, test, and operation environments

iii) Use of physical tool control methods, tethering or suitably restrained the tools/equipment to the user in the dropped object risk areas

iv) Restraining all loose tools in a tote tray, soft tool bag or other suitable spill-proof container

5.17 Hardware Accountability

Hardware accountability methods are to be used in the dropped object risk areas based on the level of hazards. Some recommendation methods include, but are not limited to, the following:

i) Packaging hardware by task (nuts, screws, cotter pins, rivets, etc.)

ii) Providing proper disposal containers to prevent dropped objects

iii) “Clean-As-You-Go” policy enforced: apply proper monitoring method for debris generated from hardware

iv) Use removal/installation documentation to track loose parts followed by project procedures

v) Furnish and specify tote trays

vi) Use of covered containers with spring-loaded or other lid securing devices

5.19 Lost Items at Height

The following practices or procedures for the lost items at height are recommended:

i) Any time an item is lost at height in the dropped object risk areas, job activity in the affected area is to cease and a thorough search for the item is to be initiated and continued until the item is found or adequate verifications are made that the item is not in the area.

ii) Parts removal or nondestructive inspections may be required to search for critical dropped objects or other items.

iii) If a thorough search cannot locate the lost item, facility/project management and DROP Prevention Management are to provide concurrence to resume the job activities.

iv) For any lost items at height, project specific or site-specific rationale and /or operational control procedures are to be developed, documented and followed.

5.21 Assembly Operations

During fabrication and assembly operations, the processes and procedures for controlling and removal of contamination and debris are to be documented and followed. Inspection plans and sequence maintenance/ manufacturing tasks are to preclude the dropped objects and entrapment of debris or contamination.

The following procedures are to be included in work instructions if applicable:

i) "Clean-As-You-Go" policy applies when final machining operations are completed. Specifically, protect exposed openings to prevent dropped objects.

ii) Hardware and equipment are adequately protected from splatter accumulation during brazing, soldering, welding, bonding, and other operations.

iii) Implement pre-installation damage inspection and repairing of components and equipment and verify part integration before installation.

iv) Verify required protective devices (such as dust covers, temporary seals, cushioning, etc.) are present and properly installed. Items with missing protective devices are to be documented and inspected in the inspection plan, and verified that corrective controls and protective devices are installed.

v) Dropped object inspection plans are to be included in the assembly operation steps. Removal and inspection of debris and extraneous material are to be included in the inspection plans.

vi) DROP inspection plans shall include the inspection of production tooling (such as jigs, fixtures, handling equipment, etc.) and working equipment (such as scaffolding, work stands, ladders, special test equipment, etc.) before installation or assemblies.

vii) If there are any caps or seals used for dropped object prevention that must be removed during installation, proper instruction and inspection are to be provided in work instructions and documented in the DROP inspection plan.

5.23 Controlling Access Guidelines to Risk Zones

All designated dropped object risk control zones are to be access controlled. There are many methods to control access to the risk zone area, such as Dynamic Red Zone method in which the critical red zone varies with operation.

2-4/Table 1 lists the general guidelines for accessing the dropped object risk zones. For different tasks and different environments, the table can be extended to cover the Owner or Designer's specific requirements.

TABLE 1
Controlling Access to the Designated DROP Risk Zones

Attribute	*DROP Critical Area*	*DROP Control Area*	*DROP Awareness Area*
Area Access	"DROP CRITICAL" signs posted or colored area. PPE required. Controlled entry and exit apply.	"DROP CONTROL" signs posted or colored area. PPE required. Limited area access applies.	"DROP AWARENESS" signs posted or colored area. PPE required.
Training	DROP general awareness training. DROP specific area training.	DROP general awareness training. DROP specific area training.	DROP general awareness training.
Housekeeping	Practice superior housekeeping standards; Practice "Clean-As-You-Go."; Perform scheduled walk downs.	Practice superior housekeeping standards; Practice "Clean-As-You-Go."; Perform scheduled walk downs.	Practice good housekeeping standards; Practice "Clean-As-You-Go."; Perform scheduled walk downs. Customary janitorial practices.

Attribute	*DROP Critical Area*	*DROP Control Area*	*DROP Awareness Area*
Tool Accountability	Enforce strict tool (temporary and personal) accountability. Accountability includes any items taken into the dropped object critical areas. All tools secured in tool boxes.	Enforce stringent tool accountability including temporary and personal tools.	Standard tool accountability applied.
Consumables	Have storage separate from point of use, carried in sealable containers; apply strict accountability of quantity and type during use. Unused or spent consumables have to return to storage or disposition after use.	Have storage separate from point of use, carried in sealable containers; use only items needed to accomplish task. Unused or spent consumables have to return to storage or disposition after use.	Use and account only items needed to accomplish task. Unused or spent consumables have to return to storage or disposition after use.
Material Handling, Packaging, Shipping (See 2-4/5.13)	Strictly follow the material handling, packaging and shipping controlled procedures; evaluate cleanliness and care requirements; establish and execute inspection plans to protect all products from dropped objects; use securing devices during movement, storage and packaging.	Strictly follow the material handling, packaging and shipping controlled procedures; evaluate cleanliness and care requirements; establish and execute inspection plans to protect all products from dropped objects; use securing devices during movement, storage and packaging.	Strictly follow the material handling, packaging and shipping controlled procedures; evaluate cleanliness and care requirements; establish and execute inspection plans to protect all products from dropped objects; use securing devices during movement, storage and packaging.
Overhead Equipment (See 2-4/3)	Strictly follow the operation procedures for overhead equipment; establish overhead equipment inventory and implement periodically inspection plans.	Strictly follow the operation procedures for overhead equipment; establish overhead equipment inventory and implement periodically inspection plans.	Strictly follow the operation procedures for overhead equipment; establish overhead equipment inventory and implement periodically inspection plans.
Attire and Personal Items	No personal items are allowed. No phones or communication devices (except safety communication requirement). Personal items should be accounted for upon exit of the critical area by using tool log sheets or checklist.	Personal items may be allowed if secured. Authorize use of phones or communication devices. Personal items should be accounted for upon exit of the control area by using tool log sheets or checklist.	Personal items may be allowed if secured. Authorize use of phones or communication devices.

CHAPTER 2

Onboard Dropped Object Prevention Program

SECTION 5

Continual Improvement

1 Introduction

The enforcement of the dropped object prevention program in the offshore industry presents a set of unique challenges. Personnel may also not use the correct procedures to perform onboard tasks that require its use. Reasons for not carrying out the procedures could include poor safety culture, lack of commitment from onboard management, lack of training, lack of oversight and commitment by shore-side management, complacency, etc.

Compliance with the approved program includes:

- Communication of the importance of the dropped object prevention process and support from top management
- Effective administration, training, monitoring, and tracking of the process
- Continual improvement to optimize the process

3 Monitor and Audit

To optimize a dropped object prevention program, it is important to audit and monitor the system routinely. To monitor program performance and compliance, a detailed audit checklist associated with the dropped object prevention program is to be included in the submitted plan and made available onboard.

The audit items include, but are not limited to, the following:

- Dropped Object Prevention Program Management Audit
- Risk Assessment Audit
- Inspection Plan Audit
- Equipment and Tools Audit
- Equipment and Outfitting Register Audit
- Risk Zoning Audit
- Dropped Object Incidents Reporting
- Audit of Contractors and third party personnel.

For detailed suggested items in each audit, refer to Appendix 2-A4.

5 Documentation and Recordkeeping

Records of all valid and current dropped object prevention program requirements are to be maintained at relevant locations, both on the offshore unit and shore-based. Documents are to be available to the ABS Service Supplier and the ABS Surveyor upon request.

In addition to the documentation of risk assessment and dropped object inspection plans, one important record is the dropped objects and dropped object damage reporting which is addressed in the following Paragraph.

5.1 Dropped Objects and Dropped Object Damage Reporting

The requirements for onsite dropped incident reporting and inspection reporting include, but are not limited to, the following:

5.1.1 Onsite Dropped Incident Reporting

Where any dropped object incident occurs, detailed descriptions of the incident such as the date, location, work function, category, activity, damage, narrative of the issue, etc. are to be reported in the dropped object tracking system. The incident is to be investigated immediately by dropped object program management. The risk acceptance criteria, inspection procedure, corrective actions, and control measures are to be developed for all such incidents. The DROP inspection procedure is to be established to include monitoring and measurement of the status and progress against corrective actions related to the program items on a regular basis to effective closure. The scheduled program of training for the awareness and dropped object inspection plan is to be agreed upon and tracked to effective closure. All updating of the dropped object inspection plan is to be incorporated into the relevant dropped object inspection plan in accordance with the appropriate management change process. Where, in the opinion of the attending Surveyor, significant changes have been found, and have been made to the approved dropped object prevention plan, submittal of changes will be required.

5.1.2 Inspection Reporting

Where any item of equipment or structure has been identified during the dropped object inspection, but has not been included in the equipment inspection plan, it is to be included in the dropped object inspection report. The risk acceptance criteria, inspection procedure and corrective actions and control measures are developed for all such items and are to be incorporated into the relevant dropped object inspection plan in accordance with the appropriate Management of Change process.

7 Continual Improvement

Continual improvement is an important element of the dropped object prevention program. Documented procedures are to note how the program is modified to incorporate improvements. Methods of data gathering are to be outlined so that all affected by the dropped object prevention program have the opportunity and the means by which to offer feedback for improvement.

For example, one possible improvement is to start with a simple paper-based system and refine the recordkeeping and distribution systems. Further areas for improvement are:

- Optimization of the form
- Adding checklists based on information gathered in completed forms
- Further refinement of hazard identification and hazard ranking
- Further refinement of company risk tolerability criteria
- Improvement in criteria/judgment on which activities are to be covered by the DROP program

- Improvement in distribution to relevant personnel
- Improvement in the assessment/review processes with more structured review approaches
- Assessment of electronic distribution and archiving of documents, development, monitoring
- Auditing of DROP program implementation
- Issuance/publication of lessons learned
- Expansion of the process to other areas of the business or other locations/units

The integration of the dropped object prevention program with the following management systems may have a positive effect on continual improvement of the dropped object prevention program:

- Dropped object prevention program updating procedures. The program can be effectively used to review steps of an activity and for identification of hazards and controls, particularly for new activities. The DROP inspection process can be instrumental in developing safer ways to conduct activity with better controls and work practices.
- Dropped object prevention program in incident investigation. The program documentation is valuable if an incident occurs while performing a job. By reviewing of the steps of the activity, the hazards, and the control measures identified in the program, the incident investigation can use this information to assess root cause. The result would be corrective actions such as improved controls and work practices, additional training needs, procedural revisions, and dissemination of the lessons learned.
- Dropped object prevention program and lessons learned. After the root causes of an incident have been identified, the corrective actions/lessons learned need to be disseminated throughout the program. If the incident occurred while performing a particular job task (or a similarly relevant task), having a flag of these lessons learned on the maintenance/ inspection form for the task highlights the hazard and needed controls.
- Dropped object prevention program as leading indicator. Statistics on the usage and implementation of the program are valuable leading indicators of a company's safety performance. In addition, review of completed program plans can provide valuable insight on hazards throughout the organization and contribute to continual improvement of the safety performance.
- Dropped object prevention program and a maintenance planning software. The use of an integrated asset management software solution can enhance the capabilities of the program. For example, the maintenance planning software can provide an automatic feature to flag those jobs due for an inspection or audit. The maintenance program can have a link to an associated inspection plan for that specific maintenance activity.

CHAPTER 2

Onboard Dropped Object Prevention Program

APPENDIX 1

Examples of DROP Program Roles and Responsibilities

1 Examples of Roles and Responsibilities

The following sections provide suggestions for roles and responsibilities of each individual DROP program management.

1.1 Roles and Responsibilities for Dropped Object Prevention Program Management

The roles and responsibilities of program management should include, but are not limited to, the following:

i) Oversees the program by interfacing within DROP Program Management, Quality Assurance Management, Program Personnel and Safety Management, Program Training Management and Management of Change, including personnel working in areas with dropped objects potential.

ii) Updates dropped objects prevention processes and procedures as needed.

iii) Conducts dropped object area assessments with program personnel, including evaluation of site-specific dropped object prevention program inspection checklists, tool control logs and dropped object prevention program incident reports. Assessment will also consist of sampling actual dropped object sensitive areas, using "Dropped Objects Prevention Inspection Checklist" and/or other assessment tools/checklist(s).

iv) Performs the risk assessments on work areas to determine the proper arrangement of the dropped objects prevention program for each associated work area.

v) Concurs on risk assessments and the proper level of areas with dropped objects potential.

vi) Records and evaluate results of assessments and maintain in the Quality Assurance document.

vii) Arbitrates dropped objects and dropped object damage issues arising within the dropped object prevention program management system.

viii) Identifies the proper dropped objects classification and requirements in the appropriate documentation.

ix) When additional or enhanced procedures need to be implemented, verifies project-specific dropped object prevention program requirements are provided to the appropriate implementing organization.

x) Verifies all dropped objects and dropped objects damages reported incidents being reviewed and that corrective actions are taken to prevent recurrence.

xi) Verifies all dropped objects and dropped objects damage incidents are documented properly.

xii) Evaluates the design considerations for dropped object control and their system engineering approach.

xiii) Performs continual improvement activities for the dropped objects prevention program by staying abreast of changes/improvements in dropped object prevention programs and techniques.

1.3 Roles and Responsibilities for Personnel and Safety Management

The roles and responsibilities of Personnel and Safety Management should include, but are not limited to, the following:

i) Determines, oversees and performs the dropped object prevention program controls, procedures, documentation and inspections for the dropped objects hazard areas.

ii) Verifies all personnel with access to dropped objects hazard areas possess the appropriate training and qualifications to perform work in the dropped objects hazard area.

iii) Verifies personnel performing work in dropped objects hazard areas follow the assigned dropped object prevention policies and procedures for each designed area.

iv) Reviews and audits dropped object prevention compliance with approved procedures.

v) Implements additional site-specific or project-specific requirements upon request by the third parties or other customers.

vi) Provides, maintains, and verifies the listing of all dropped objects hazard areas and their locations and any subsequent changes.

vii) Performs and documents periodic assessments of the execution of the dropped object prevention Program in their respective designed areas and keeps records for reviews and audits.

viii) Documents and verifies any found dropped objects and dropped object damage or any dropped objects related issues, incidents, or concerns.

ix) Supports and develops corrective action plans for dropped objects related issues, incidents, or concerns.

x) Verifies, documents and reports the corrective action plans completeness, submits “Dropped Objects and Dropped Object Damage Incident Report,” as applicable, for reviews.

xi) Provides support on reviewing and assessing the effectiveness of the dropped object prevention program.

1.5 Roles and Responsibilities for Quality Assurance Management

The roles and responsibilities of Quality Assurance Management should include, but are not limited to, the following:

i) Verifies the appropriate dropped object prevention program requirements, controls, and inspections that are included in project work packages and procedures.

ii) Inspects dropped object prevention program implementation and verifies dropped object controls are followed and performs and documents dropped object inspections as required by any project documentation.

iii) Verifies all dropped objects and dropped object damage incidents are documented in the appropriate project incident reporting and corrective action system.

iv) Performs dropped object inspections during receipt inspection and quality assurance testing of safety critical products or equipment as applicable.

v) Works with DROP Program Management on reviewing and assessing the effectiveness of the dropped object prevention program.

1.7 Roles and Responsibilities for DROP Program Training Management

The roles and responsibilities of Dropped Object Prevention Program Training Management should include, but are not limited to, the following:

i) Provides dropped object prevention program personnel training on the dropped object prevention program's content and changes, as needed.

ii) Provides general training materials for dropped object prevention awareness information and dropped object prevention program content training.

iii) Provides all personnel with access to dropped object designated areas having the appropriate training and qualifications to perform work in the respective area.

iv) Provides any specific dropped object control techniques, procedures, documentations, and inspections for the dropped object designated areas as part of the required training for personnel working in those areas.

v) Maintains records of all dropped object prevention program trainings for reviews and audits.

1.9 Roles and Responsibilities for Management of Changes

The working procedure change or equipment change may cause the management changes. Any management change due to the procedure or equipment changes is to be detailed in the dropped object prevention program management.

The requirements for the Management of Changes refer to the ABS *Guidance Notes on Management of Change for the Marine and Offshore Industries*.

1.11 Roles and Responsibilities for Personnel

The roles and responsibilities for Personnel should include, but are not limited to, the following:

i) Possesses an effective understanding of dropped object prevention program policies and requirements for project-specific and site-specific work.

ii) Completes required dropped object prevention program trainings and obtains qualifications to perform work in the respective area.

iii) Follows the requirements listed in the dropped object control requirements and procedures.

iv) Is responsible for conducting work in a manner that provides for the prevention, detection, and removal of dropped objects.

v) Performs scheduled walk-downs, as determined by management, using site-specific dropped object prevention program inspection checklists.

vi) Practices effective housekeeping techniques (2-4/5.11) and a "Clean-As-You-Go" work ethic.

vii) Immediately reports any dropped objects, dropped object damage, and dropped objects related issues and concerns to their immediate supervisors.

viii) Works with management to help develop specific inspections, control measures, and techniques for the dropped object designed areas.

1.13 Roles and Responsibilities for Supply Chain Management

Supply chain professionals play major roles in the management of dropped objects. The roles and responsibilities for Supply Chain Management should include, but are not limited to, the following:

i) Participates in aspects of dropped object prevention program that have a bearing on dropped object prevention products in supply chains, such as dropped object prevention design, quality management, strategy development, service inspection and system analysis.

ii) Is aware of changes in production and the dropped object prevention program that affects the supply chain and creates alternative means of supply as the need arises.

iii) For **DOPP+**, supply chain management is to assure that equipment ordered meets the requirements of this Guide.

CHAPTER 2

Onboard Dropped Object Prevention Program

APPENDIX 2

Sample Zoning Area

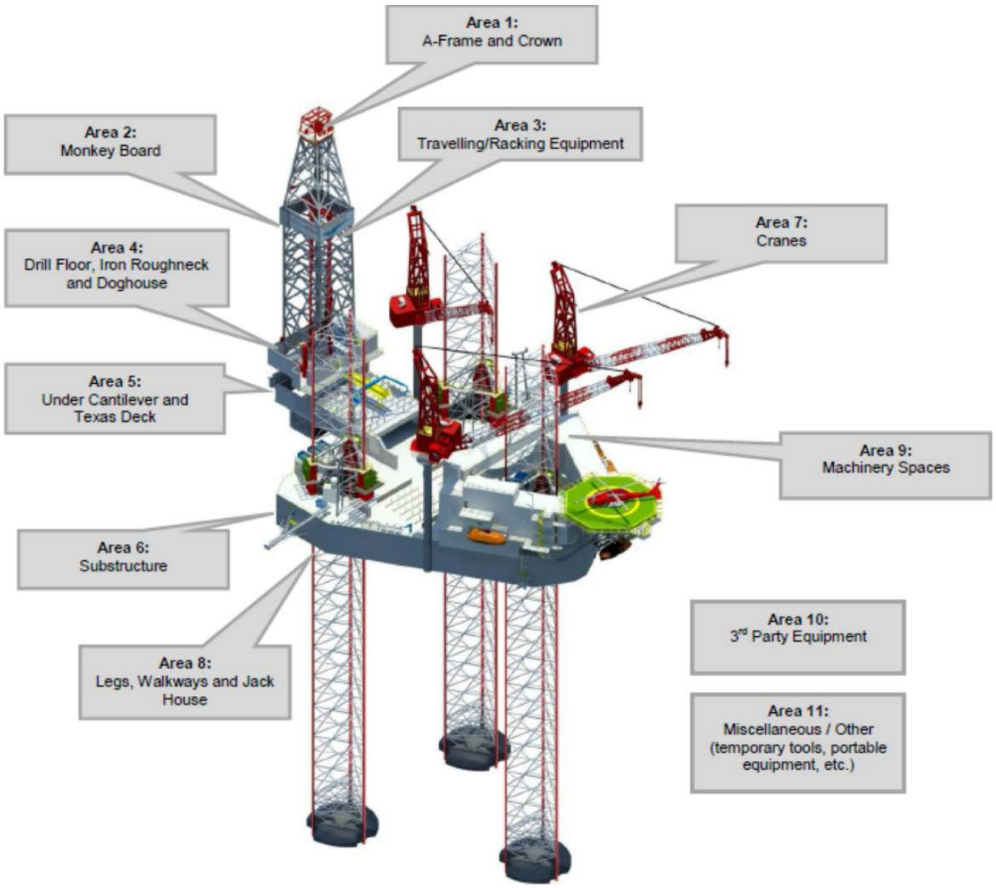
1 Examples of Typical Dropped Object Zones

The following examples show the typical dropped object zones demonstrated for a Jack-up, Semi-submersible and drilling ship.

1.1 Typical Dropped Object Zones for Self-Elevating Drilling Units

The following is an example of the typical dropped object zones on a Jack-up rig. The actual zones may vary.

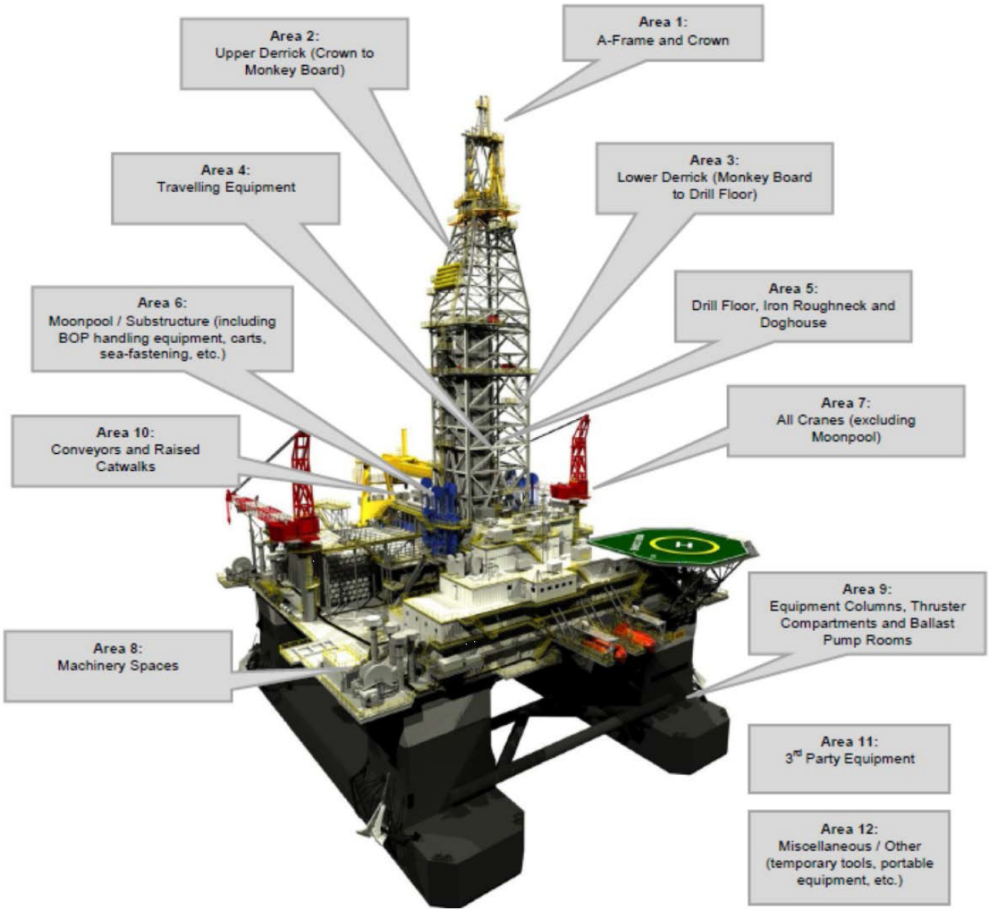
FIGURE 1
Self-Elevating Drilling Unit
(source: Ensco)



1.3 Typical Dropped Object Zones for Column-Stabilized Drilling Units

The following is an example of the typical dropped object zones on a Semi-Submersible rig. The actual zones may vary.

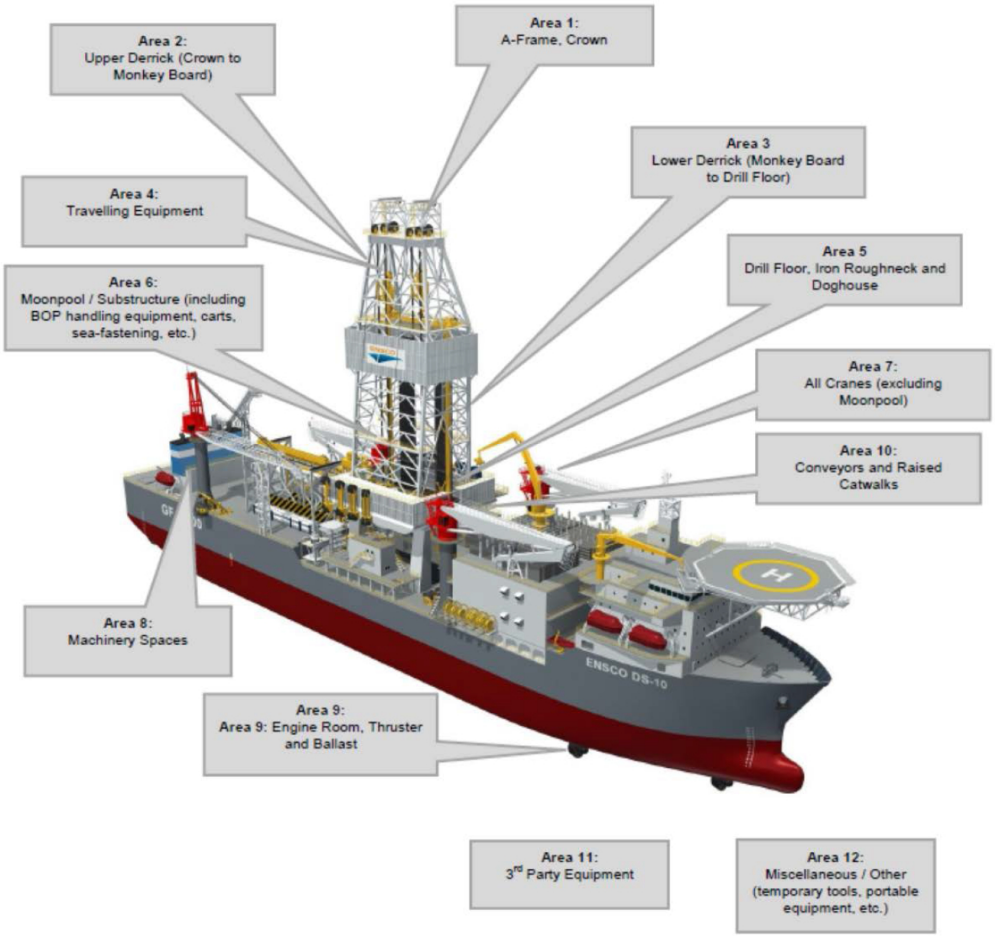
FIGURE 2
Column-Stabilized Drilling Unit
(source: Ensco)



1.5 Typical Dropped Object Zones for Surface-Type Drilling Units

The following is an example of the typical dropped object zones for a drilling ship. The actual zones may vary.

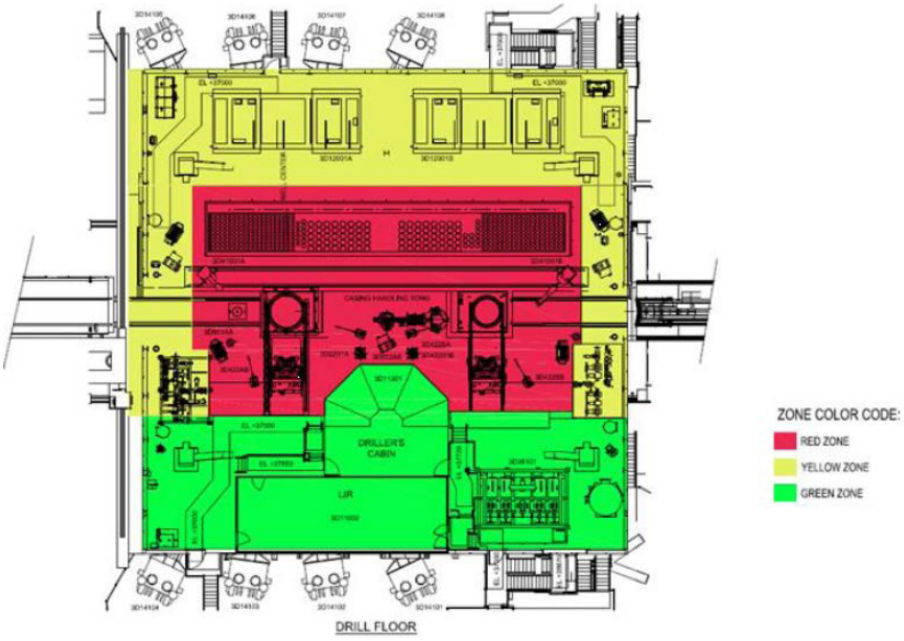
FIGURE 3
Surface Type Drilling Unit
(source: Ensco)



3 A Sample of Dropped Object Risk Area Zoning in a Drilling Unit

The following is a sample of dropped object risk area zoning in one dropped object zone for a drilling unit.

FIGURE 4
Dropped Object Risk Area Zoning
(source: Ensco)



CHAPTER 2
Onboard Dropped Object Prevention Program

APPENDIX 3
Recommended Practices for Working at Height

1 General

It is best if all work can be carried out on the ground or at a level where all edges and openings can be secured to prevent persons or objects from falling to a lower level. Where working at height is unavoidable, in addition to the Employer's Working at Height Policy and Procedures, the following practices are recommended: procedures that comply with relevant legislation on securing of personnel, erection of working platforms, over-the-side work, ladders, hoists, tools and other devices, etc.

3 Working at Height

3.1 Securing of Personnel

The recommended practices for securing of personnel include, but are not limited to, the following:

i) Evaluation and satisfaction with the choices of equipment to be used for the work place.

ii) Compliance with established control procedures before, during and after use.

iii) Qualified training for anyone using personal protective equipment (including rescue method training).

iv) Prohibition of working alone or unattended when using fall arrest equipment.

v) Required of everyone involved in the work scope to have sufficient training and awareness of the equipment and safety procedures.

vi) A 'Buddy' check system of all fall arrest, rigging and other equipment should be enforced.

vii) The necessary rescue equipment and trained personnel are to be available at the workplace.

viii) Fall arrest equipment is to be approved and incorporate an anti-trauma safety device and comply with an accepted standard.

ix) The equipment is to be inspected before each use, regularly at least every 6 months by a competent person, and documented in DROP inspection plan. Manufacturer's recommendations are also to be followed.

x) The date for next inspection is to be clearly denoted on the equipment.

xi) The anchor point for suspension is required to be rated to 22 kN (5000 lbs).

3.3 Derrick Evacuation Equipment

Derrick evacuation equipment is a potential high risk dropped object source. The recommended practices for securing derrick evacuation equipment include, but are not limited to, the following:

i) Riding belts and blocks are to be certified, controlled, inspected, and labelled in line with other anti-fall equipment.

ii) The guide line, its attachment points and connectors are also defined as anti-fall equipment and are to be certified, controlled, inspected, and labelled accordingly.

iii) Riding belts are required to be connected to guide lines and blocks and stored so as to protect them from damage from external factors.

iv) It must be possible to use the equipment for the safe performance of entry and evacuation operations.

v) The equipment is required to be inspected every 6 months by a competent person and is to be marked with the next inspection date.

vi) Verify evacuation equipment boxes to be secured and that lids and catches are in good condition. Unnecessary items that may have been left in boxes are to be removed following the equipment handling procedures.

3.5 Securing Tools Less Than 5 kg (11 lbs)

The recommended practices for securing light tools include, but are not limited to, the following:

i) All tools used at height are to be risk assessed and inspected routinely.

ii) All tools are to be secured against being dropped while they are being carried to the worksite, used or stored at height (use tool bag with internal loops when several and/or heavy tools are required).

iii) If an anchor point other than the belt or bag is required, use an appropriate part of the surrounding structure, preferably above the work level.

iv) Tools heavier than 2 kg (4.5 lbs) are not allowed to be secured to the body. They are to be secured to the adjacent worksite structure.

v) For work on or near rotating machinery or travelling equipment, all tools are always to be secured to the adjacent structure.

vi) Attachment points on tools and bags are to be documentable (not all apertures on handles are actually rated tie-off points).

vii) All connectors (e.g., snap hooks, carabiners) are to be made of acid proof steel (refer to AISI 316), and include screw lock or self-lock gates and include captive eyes.

viii) Lanyards on tools attached to the body should ideally be energy-absorbing (fall damper).

ix) The standard use of wrist lanyards is discouraged; however, it is recognized that they may be appropriate to specific tasks (e.g., within confined spaces).

x) Velcro wrist lanyards are discouraged as the integrity of the fastening can be affected by the work environment.

xi) Tools used at height are to be checked-out and checked-in to verify that tools are accounted for.

3.7 Securing Tools Greater Than or Equal to 5 kg (11 lbs)

The recommended practices for securing heavy tools include, but are not limited to, the following:

i) All use of heavy tools and hand-held machinery where equipment may fall to an underlying level are to be risk assessed and inspected routinely.

ii) All heavy tools and hand-held machinery used at height are to be secured against being dropped, both when in use and while being transported.

iii) Securing points for tools and machinery are to be in place above the work site, attached to the surrounding structure, not to scaffolding.

iv) Tools heavier than 2 kg (4.5 lbs) are not allowed to be secured to the body, secure them to the adjacent worksite structure.

v) One piece sledge hammers (forged construction with secured head) are recommended to be used at height.

vi) The attachment points on tools are to be documented and all securing wires inspected in accordance with the manufacturers recommendations.

vii) The securing wires are to be as short as possible to reduce shock loading effect.

viii) Energy absorbing lanyards and tethers can stretch beyond the safe calculations or drop distance, therefore fixed securing wires should be used on heavy tools at height, according to the work environment.

ix) Only certified lifting equipment is to be used as securing devices, when appropriate.

x) Tools used at height are to be checked-out and checked-in to verify that no tools are left behind.

3.9 Securing Other Portable Equipment

The recommended practices for securing other portable equipment include, but are not limited to, the following:

i) All portable equipment used where there is a risk of the equipment falling to an underlying level is to be secured against being dropped.

ii) Carrying pouches are always required to be used for radios and any other portable equipment without certified securing points.

iii) Locks on pouches must have a double securing mechanism to prevent unintentional opening.

iv) Belt clips that allow equipment to become detached when turned 180º are not allowed to be used.

v) Belts with snap fasteners are not allowed for securing equipment at height.

vi) Battery compartments and covers on portable equipment are to be secured to prevent internal components from falling.

vii) All personal equipment (tally books, pens, calipers, cameras, water bottles, etc.) is to follow the risk zoning policy and be secured in a fastened pocket or carry pouch if it is necessary to carry in the work place.

3.11 Securing Equipment and Parts

The recommended practices for securing equipment and parts include, but are not limited to, the following:

i) All equipment used where there is a risk of the equipment falling to an underlying level are required to be secured against being dropped.

ii) All repairs and maintenance work carried out at height are to be risk assessed and inspected.

iii) All parts, equipment, and materials that are used at height are required to be secured against being dropped.

iv) Smaller parts are to be stored in suitable storage boxes, bags, etc., and follow the material handling procedure.

v) In restricted areas (e.g., the derrick, flare boom, and cranes), tools used at height are to be logged out and in to verify that nothing is left behind.

vi) When the work is finished, a final check and inventory count are to be carried out to verify that no tools, equipment or materials are left behind at height.

3.13 Tool Cabinets for Working at Height

The recommended practices for securing tool cabinets for work at height include, but are not limited to, the following:

i) All tools stored in high cabinets are required to be appropriate for use at height and they must have documented attachment points.

ii) All tools are required to be adequately secured within the cabinets.

iii) In addition to the necessary tools, the following items are required to be equipped within cabinets:

- A sufficient number of correctly dimensioned safety wires/lanyards
- A sufficient number of connectors, snap hooks, carbineers with screw locks and eyelets
- Special belts for fastening tools and bag
- A sufficient number of tool bags with internal fastening devices
- Weak links/weak link systems (where required).

iv) Each cabinet must have a list of certified and traceable contents and be kept locked, and one person must be designated as responsible for the cabinet.

v) The responsible person must register all tools taken from and returned to the cabinet. The contents of the cabinet and the log are to be checked at the end of each shift.

CHAPTER 2
Onboard Dropped Object Prevention Program

APPENDIX 4
Audit of a DROP Program

1 Suggested Audit Items in DROP Program

Suggested items for each audit include, but are not limited to, the following:

i) DROP Prevention Program Management Audit

- DROP Prevention program organization
- Communication between DROP management
- Management of change procedures

ii) Risk Assessment Audit

- Performance of risk assessment
- Acceptance criteria of risk assessment
- Finding and report of risk assessment
- Dropped object prevention inspection plans

iii) Inspection Plan Audit

- Training of dropped object prevention inspection plans
- Management of the implementation of DROP program mandatory requirement at the worksite
- Management of packaging, handling and transportation of material and loads to prevent dropped objects
- Performance of routine dropped object prevention inspections
- Verification and audit of dropped object prevention inspection plan
- Performance of independent dropped object inspection of permanent asset structures
- Management and verification of inspections for pre-mast raising, post-mast raising and pre-mast lowering
- Performance of arrangement of non-routine dropped object inspections

iv) Equipment and Tools Audit

- Training procedures for equipment and tool devices
- Check procedure prior to tubular handling activities

- Securing procedure for handling tubular with forklifts or loaders
- Securing inspection of non-integral equipment
- Verification of permanently installed equipment and secondary retention
- Equipment condition inspection
- Secondary retention lines installed underneath winch, tong hanging and other load bearing lines
- Safety lines securing
- Equipment maintenance activities
- Management of temporary equipment

v) Equipment and Outfitting Register Audit

- Equipment and Outfitting Register
- Equipment and Outfitting Register inspection plans
- Management of register update
- Procedures for mounting fixtures to existing structures or new equipment installation at height
- Record and management of permanent equipment at height
- Equipment maintenance management
- Record and management of temporary equipment at height
- Requirements of tethering tools

vi) Risk Zoning Audit

- Training plans for risk zoning areas
- Definition and controlling procedures for designated risk zonings
- Risk zoning local area compliance audit

vii) Dropped Object Incidents Reporting

- Onsite dropped object incident reports
- Inspection dropped object finding reports

viii) Contractor/Site, Operation Audit

- Schedule and management to perform contractor/site audits
- Schedule and management of completion and well intervention operation audits
- Compliance management of contracts for the provision of drilling, completion and well intervention for the DROP program
- Documentation for contracts personnel requirements with DROP program

CHAPTER 3

Equipment Design for Dropped Object Prevention for DOPP+ Classification

CONTENTS

SECTION 1 Introduction 55

1 Purpose 55

3 Scope 55

5 Exclusions 55

SECTION 2 Risk Assessment for Dropped Objects Hazard for Equipment Design, Installation, and Maintenance 56

1 General 56

3 Inherently Safe Equipment Design Philosophy 56

5 Application of Inherently Safe Design Through Risk Assessment 57

5.1 General 57

5.3 Methodology 57

7 Specific Equipment 59

FIGURE 1 Inherently Safer Design through Risk Assessment 58

SECTION 3 Equipment Design 61

1 General 61

3 Material Selections for Securing Connections 61

5 Equipment Design Considerations 62

7 Primary Securing: Bolts, Nuts, and Screws 63

7.1 General Securing Requirements 63

9 Use of Secondary Retention 64

9.1 General Procedure 64

9.3 Secondary Retention Methods 64

9.5 Additional Securing Hardware 66

9.7 Unauthorized Secondary Retention 66

FIGURE 1 Metals Arranged by Nobility (Source: DropsOnline.org) 62

SECTION 4 Equipment Installation and Maintenance..... 67
1 Introduction.....67
3 Specific Equipment Securing.....67
3.1 Electrical Equipment and Outfitting.....67
3.3 Hydraulic Outfitting..... 69
3.5 Wire Sheaves..... 69
3.7 Walkway.....70
3.9 Other Outfitting..... 71
5 Inspection and Maintenance.....71

CHAPTER 3

Equipment Design for Dropped Object Prevention for DOPP+ Classification

SECTION 1

Introduction

1 Purpose

This chapter provides requirements for the **DOPP+** notation which addresses equipment design, including primary securing methods and secondary retention for equipment being fastened together, securing for specific equipment, equipment installation, etc.

3 Scope

The requirements provided in this chapter are to prevent static dropped objects. A list of equipment and the Equipment and Outfitting Register in 2-4/1.1, which have the potential to be dropped objects, is to be submitted for review. This list includes the specific equipment listed in Section 3-2, and all other equipment fastened together, that is identified by the risk assessment described in Section 3-2.

For the items in the submitted list, ABS Type Approval for drop-resistant designs including equipment installation and maintenance are required and to be submitted for ABS review. The risk assessment documentation for each piece of equipment as required in Section 3-2 is also to be submitted. The primary securing and secondary retention design in accordance with the requirements described in Section 3-3 are also to be submitted for review.

5 Exclusions

Equipment possessing potential dynamic dropped objects, such as hoisters, cranes and other moving parts onboard are not addressed in this chapter, nor are temporary equipment used during operations. However, the items mounted on the potential dynamic dropped object and considered as potential static dropped objects are within the scope of this Chapter. These potential dynamic dropped objects and temporary equipment used during operation is to be properly handled during operations as required in the drops program described in Chapter 2.

CHAPTER 3

Equipment Design for Dropped Object Prevention for DOPP+ Classification

SECTION 2

Risk Assessment for Dropped Objects Hazard for Equipment Design, Installation, and Maintenance

1 General

This Section provides the safe equipment design philosophy and risk assessment techniques to identify equipment that has the potential to be a dropped object hazard due to failure of primary securing and secondary retention. Typical equipment to be considered for dropped object hazards are listed in 3-2/7. A risk assessment, as described in 3-2/5, is to be carried out at the equipment design stage to identify and address dropped objects hazards through engineering design. All equipment including details of the fastening design is to be submitted for review as per the requirements provided in Section 3-3.

3 Inherently Safe Equipment Design Philosophy

Inherently safe design exists in some specific equipment as a permanent and inseparable element. In other words, the safety mechanisms in place are "built in" by virtue of the design and not "added on". When considering the basic hierarchy of risk control measures (elimination/substitution, engineering, administrative, personal protective equipment), inherently safe design takes minimization of the drop hazard as the preferred approach, rather than considering other control options.

In general, it is more of a philosophical way of thinking rather than a specific set of tools or methods. For example, a dropped object hazard might be considered "safe" because it has specific risk reducing measures in place (primary and secondary retention, safety securing devices, etc.). Inherently safe design asks the question, *"can it be safer?"*

The goals of inherently safe design can be summarized by the following:

- Fewer and smaller dropped object hazards (sources)
- Complete inspection access
- Fewer causes that could result in dropped objects
- Reduced dropped object consequence severity (e.g. fatalities, lost time incidents, asset damage)
- More effective management of residual risk

Traditionally, the approach to safe design considers preventive controls and/or mitigation measures as options to minimize hazardous events. Examples of these two approaches include the following:

- Prevention – primary and secondary securing, safety interlocks, inspection, procedures, training, etc.

- Mitigation – safety securing, safety nets, emergency response systems, and procedures.

The inherently safe design approach to achieve goals of safer design is to consider minimization or substitution to significantly reduce drop object hazards. The following questions are to be asked when considering the design of equipment items with the potential to become dropped objects:

i) Can the dropped object hazard be minimized by altering the design?

ii) If not, then can the magnitude of the dropped object hazard be reduced?

iii) Do the alternative designs identified in question *i)* and *ii)* increase the magnitude of other dropped object hazards or present new hazards?

iv) What other risk control measures are required to manage the residual risk of dropped objects?

5 Application of Inherently Safe Design Through Risk Assessment

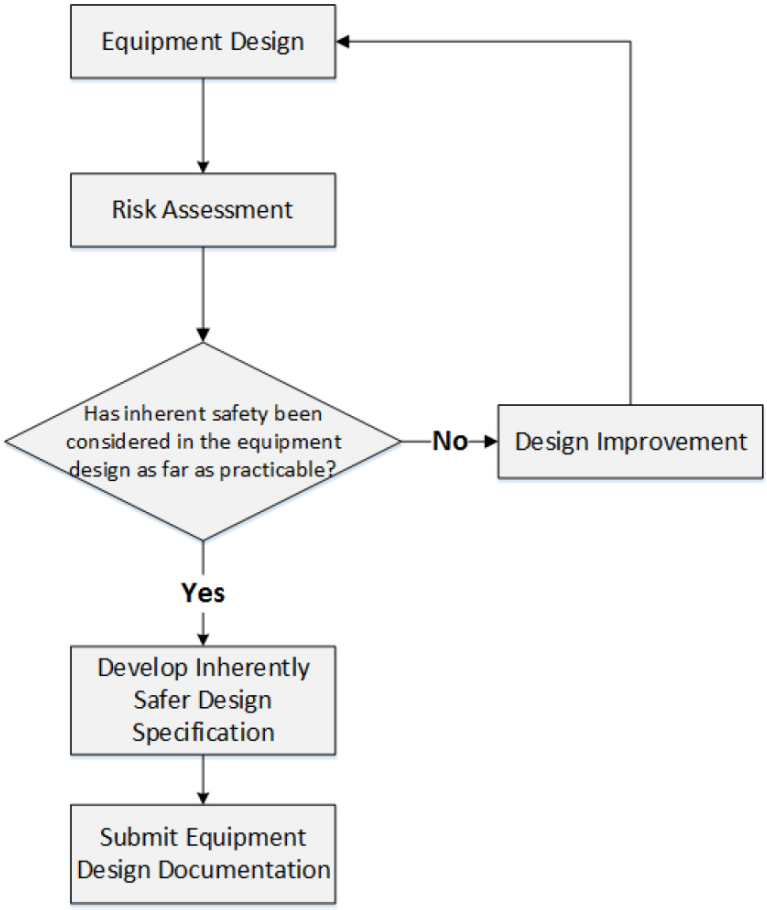
5.1 General

Generally, all equipment items installed at height identified in 2-3/3 or other identified items assembled through fastening methods, which have the potential to drop from their original position, are to be identified and evaluated using the risk assessment method(s) described herein. The list of items included in the Equipment and Outfitting Register in 2-4/3 and other items identified in 3-2/7 are all to be evaluated.

5.3 Methodology

The general methodology for the completion of the application of risk assessment techniques is to be a systematic approach in order to identify all significant hazards associated with dropped objects. Inherently safe design techniques outlined in 3-2/3 are to be used when evaluating the potential dropped object hazard. A simple example of this process is provided in 3-2/Figure 1.

FIGURE 1
Inherently Safer Design through Risk Assessment



5.3.1 Risk Assessment

As part of the design process each piece of equipment should be evaluated for potential dropped object hazards through a risk assessment. The objective is to identify the potential sources, cause(s) leading to a dropped object incident, and resulting consequences. The effectiveness of existing engineering risk control measures are also taken into consideration. Evaluation of the risk should consider both the likelihood (frequency) of occurrence and the severity of the consequence arising from the dropped object.

Various risk assessment techniques can be used and the most appropriate technique may depend on the maturity of the equipment design and the available information. A component level failure mode, effects and criticality analysis (FMECA) is recommended. The FMECA serves as an equipment design review process to analyze components in the design with potential of being dropped object hazards along with corresponding failure modes, failure mechanisms/causes and effects. Existing risk control measures in the design are also evaluated for their effectiveness. FMECA includes a criticality analysis that defines the significance of each failure event quantitatively. The criticality analysis may be based on the probability that the failure mode will result in a dropped object incident, or the level of risk associated with the failure mode, or a risk priority number. The designer may choose other techniques to do the risk assessment. If other risk assessment techniques are to be used, the proposed technique is to be discussed with ABS prior to initiating the study. A risk assessment report is to be submitted for ABS review after carrying out the study. This is to include, but is not limited to, the following:

- Scope of the risk assessment (e.g., operational modes, operating environment, level of indenture)

- Description of the risk assessment team
- Description of the risk assessment technique used
- Description of the risk acceptance criteria used (e.g., risk matrix)
- Any supporting documentation (e.g., engineering drawings, bill of materials)

5.3.2 Risk Acceptance Criteria

Risk acceptance criteria are the targets or standards used to evaluate the tolerability of dropped object incidents. The risk acceptance criteria may be developed by using appropriate parameters in codes and standards or created by the company. When the risk acceptance criteria are compared to the results of the risk analysis, it provides the basis for risk management decision making. If the risk associated with a failure event exceeds the tolerability criteria then risk control measures should be implemented.

5.3.3 Risk Control Measures

Risk control measures used to manage risks can be methods, actions, or equipment to control the hazard. From the inherently safe design perspective, the risk controls for equipment design should focus on the elimination or minimization of risk. The effectiveness of the controls in place is to be evaluated and justified. Some examples of inherently safe design control measures include:

- Eliminating or minimizing potential vibration which may cause a fastener to become loose
- Verify sufficient distance between moving and fixed parts of machines to avoid risk of contact

If any residual risk remains after the application of inherently safe design practices as far as practicable then this risk should be further managed. Managing residual risk using preventive control measures is considered acceptable. For example, when use of fasteners is unavoidable, the use of secondary retention methods is allowed. The reliability of the systems that manage residual risk is to be considered when determining the effectiveness of the controls implemented.

5.3.4 Inherently Safer Design Specification

An inherently safer design specification should be prepared to describe all the risk control measures (inherently safe design principles or measures) incorporated into the equipment design to prevent dropped object hazards. This should align with the risk mitigation control strategy identified from the results of the risk assessment. The inherently safer design specification may be incorporated as part of the technical specification or design basis documents and is to be submitted to ABS for review.

7 Specific Equipment

The following list contains specific equipment commonly used on offshore assets that may lack design factors that prevent dropped objects:

i) Electrical Equipment/Outfitting

- Floodlight
- Light fittings
- Navigation lights
- Lamp with cable
- Emergency light with battery pack
- Helicopter light
- Junction box and cabinet
- Cable trays and cable ladders
- Drag chain

- Loudspeakers
- CCTV cameras
- Antennas
- Sensors
- Loose gear

ii) Hydraulic outfitting

- Valve handles
- Hydraulic lines plugs
- Pipe clamps

iii) Wire sheaves

- Sheave blocks
- Snatch blocks
- Deflector sheaves
- Umbilical roller sheaves (Banana sheaves)

iv) Walkway

- Grating
- Equipment feedthrough
- Piping and equipment feedthroughs
- Railings
- Toe boards
- Swing gates
- Wind walls

v) Other outfitting

- Name plates, logo, signs etc.
- Mast and Travelling Assembly
- Locks on insulation cladding
- Snatch blocks
- Loop hoses
- Racks and storage

CHAPTER 3

Equipment Design for Dropped Object Prevention for DOPP+ Classification

SECTION 3

Equipment Design

1 General

This Section provides requirements for proper securing methods to prevent dropped objects. For all equipment items which are fastened together and have the potential to drop off, the following issues are to be considered during design stage:

- Material selection for fastening
- Primary fastening
- Secondary retention to prevent loosening of connected items
- Special requirements for specific equipment
- Design and installation factors minimizing dropped object potential

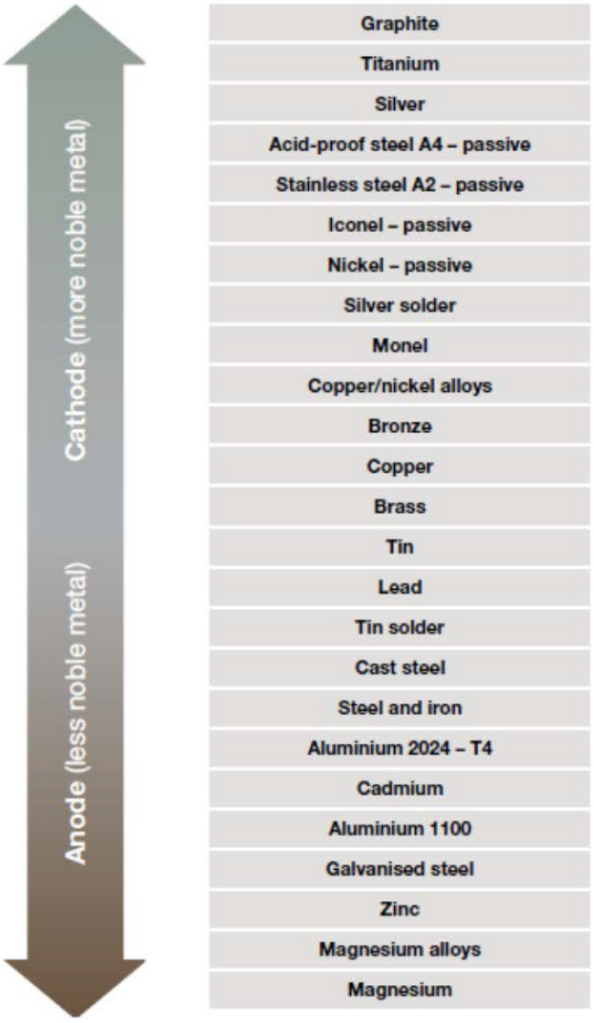
3 Material Selections for Securing Connections

The materials for securing connections, including bolts and nuts, are to meet the requirement in this section to prevent galvanic corrosion. The corrosion of fastening components such as bolts and nuts will lead to loosening of the fastened equipment and can eventually result in a dropped object incident. To prevent galvanic corrosion, only metals of the same or almost same nobility should be in contact with each other in a corrosive environment.

3-3/Figure 1 is the typical metal nobility chart that can be used by designers to select proper material for bolts and nuts and other connection components.

The materials used for securing connections, including the bolts and nuts, are to be submitted to ABS for review and approval.

FIGURE 1
Metals Arranged by Nobility
(Source: DropsOnline.org)



5 Equipment Design Considerations

To eliminate potential drops hazard during the design process, the following factors are to be considered for equipment used on board:

- Equipment vibration
- Overhead equipment and components
- Risk of collision
- Equipment and components exposed to strong wind
- Movement (completely or parts) of equipment and components
- Any unplanned release of stored energy
- Dropping of parts due to inherent functionality or required maintenance activities
- The mass of the product

Good design practice will have the following priorities for dropped objects prevention. The first priority is to take inherently safe design measures following the design philosophy described in 3-2/3.1, including the following:

- Minimize the number of parts for assembling
- Assembly of all parts in an enclosed housing
- Securing the housing with effective primary securing and secondary retention methods - the requirements for primary fixing and secondary retention are provided in 3-3/7 and 3-3/9
- Using securing methods of housing to allow easy visual inspection and integrity check
- Eliminate or minimize potential vibration
- Verify a sufficient distance between moving and fixed parts of machines to avoid risk of contact

The second priority is to consider technical protective measures, such as use of additional methods for mitigation of hazards, including lanyards, safety nets, etc., to catch dropped objects in case the primary measures fail.

The third priority is to provide information for users, in the form of warnings, signs and plates on the machinery and in the instructions so that the necessary precautions and measures can be taken by the users.

7 Primary Securing: Bolts, Nuts, and Screws

In general bolts, nuts, and screws are the common type of connections used on offshore structures for primary securing. At present, bolts are being produced to at least 85 different industrial standards and the requirements for bolted connections vary for the different sectors depending on design, operational and maintenance requirements. Achieving a stable bolted connection will therefore require a qualified evaluation of the following factors:

- Load design
- Choice of materials considering mechanical properties and corrosion resistance as specified in 3-3/3
- Application of lubricant
- Pre-loading (pre-tensioning) and use of the correct torque equipment

7.1 General Securing Requirements

7.1.1 Fasteners (Bolts, Nuts, and Screws)

The major causes of the damage to fasteners (bolts, nuts, and screws) are:

- Inadequate pre-tensioning
- Over-tension (over torque)
- Overload
- Fatigue as a result of dynamic load

Bolts, nuts, and screws are to be selected based on their loading specifications. Secondary retention methods described in 3-3/9 are to be used to prevent loosening of the bolts, nuts, and screws. The effectiveness of secondary retention is dependent upon the primary fixing being properly in place (i.e., bolts and screws are tightened and torqued as per specifications, and there is no play between the mating elements).

7.1.2 Bolt Head Position Marking for Visual Inspection

After applying torque on the bolt connection, marking the bolt head position with paint allows periodical visual inspection of the bolt connection. This may also be considered for other retention methods that have no visual means for confirming the integrity of the connection.

This marking method can be used for both non-through bolted connections and well as through bolted connections.

9 Use of Secondary Retention

9.1 General Procedure

Equipment that is not an integral part of the structure on which it is mounted is to have a suitable secondary method of retention to the structure using the methods allowed in this section. The correct installation and secondary retention of all permanent equipment in the inventories is to be shown in an equipment and outfitting register that is available onsite. The equipment condition is to be visually inspected against the requirement in the picture book during routine DROP inspections, as stated in the onboard dropped object prevention program described in Chapter 2. Appropriately rated secondary retention lines are to be installed as a minimum underneath all winch, tong hanging and other load bearing lines in such a manner as to catch the line in the event it 'jumps' the sheave or one of the components of the sheave rigging system fails. The safety line is to be secured to an independent point and not to the same suspension point as the sheave itself. Ideally, the safety line will also be secured integrally through the sheave cheek plates. The safety line shall not interfere with the effective operation of the sheave mechanism.

9.3 Secondary Retention Methods

All assemblies using bolts and nuts as described in 3-3/7.1 are required to have secondary retention using one or more of the methods listed in this section.

9.3.1 Non-through-bolted Connection

For non-through-bolted connections, one of the following second retention methods is required with preference in the following order.

i) *Lock Wire/Cable*. Use of lock wire/cable to prevent rotation of fasteners is a safe and primarily secondary retention method for screws. This method involves threading a wire through holes in the screw head to lock it against being rotated loose. The wire is twisted before being threaded and is locked to the next bolt or to dedicated holes for locking the other end of the wire. Lock wire/cable should be placed in and around the bolt head to maintain the pre-load.

Wire ties are frequently used as a locking device for bolted connections to prevent loosening due to vibration and loading conditions, or tampering. It is a preferred method because it not only prevents fasteners from loosening but also keeps them from falling in case of primary retention failure (bolt head breaks off) and effectively prevents dropped objects.

ii) *Tab Washers and Tab Plates*. Tab washers and tab plates can be used to prevent bolts from rotating and secure fasteners against inadvertently loosening. The screws used on tab plates should be lock-wired for secondary retention if tab washers/plates cannot be replaced by another method.

iii) *Wedge Lock Washers*. In wedge lock washer bolt securing systems, a pair of washers is used to lock bolted joints in the most critical of applications and keep the connection safe by utilizing a wedge geometry design. These washers are commonly used in connections exposed to vibrations, as grating panels, speakers, cable trays, guiderails, piping clamps, lamps and so on.

This application of wedge lock washers is to be carefully examined for surface roughness and hardness, coating thickness, contamination, mounting position of parts and torque. Prior to selecting a washer, the washer's material/type should be verified from OEM data sheets and match the bolt connection typical metal nobility. The washer's installation is to comply with OEM instructions.

iv) *Locking Compounds*. Use of thread locking compounds (thread glue) can be an effective method of thread retention, under carefully controlled conditions. However, this method lacks inspection techniques that verify locking compounds have been sufficiently applied. Inspection personnel may not easily differentiate between fasteners with and without locking compounds in an assembly.

9.3.2 Through-bolted Connection

i) *Castellated Nuts, Split/Cotter Pin, Drilled Hole in Bolt*. Castle and slotted nuts provide a visual and reliable method for locking bolted connections. The nut has radial slots and is locked by non-corrosive split pins that are inserted through a hole in the bolt. They are used for critical connections or components that are disconnected frequently. It is required to split the legs of the cotter-pin and fold these legs around the outer contour of the castle nut to directly prevent a rotation of the castle nut relative to the bolt.

ii) *Self-locking Counter Nuts*. The self-locking counter nut locks by "cutting" itself into the threads on the bolts when it is tightened. It is to be used over a standard nut with washers in the bolted assembly. The self-locking counter nut should be tightened over the standard nut after the standard nut is properly and completely torqued to the bolt.

iii) *Bent-pin Lock Nut*. Bent-pin lock nuts are all metal. It is a kind of self-locking nut with a stainless steel ratchet pin in the top of the nut. The stainless steel pin is locked in position with controlled lock indention, which confirms consistent locking torque, while enabling the pin to ratchet properly without turning, lifting, falling out, or breaking.

iv) *Metal Lock Nuts*. All-metal lock nuts can be used on all bolt dimensions. This type of nut locks through the threaded section or top of the nut being deformed, the top of the nut being split or the nut having a toothed ring under the collar. It provides greater friction between the bolt/underlay and nut, providing a secure connection.

The metal lock nuts are one time use nuts and should be used in situations where the fastener is seldom disassembled for use or maintenance. After every disassembly, new nuts are required.

v) *Wedge Lock Washers*. Wedge lock washers bolt securing system can be used in through-bolted connections. The application of wedge lock washers follows the same requirements of non-through-bolted connection.

For through-bolted connections, two sets of washers must be used.

vi) *Nylon/Plastic Insert Nuts*. Plastic locking nuts are used in some applications which experience without or limited vibration and an operating temperature range from –70°C to +120°C.

These insert nuts are susceptible to minor loss of pre-tension due to vibration and/or heat.

vii) *Locking Compounds*. Use of thread locking compounds like thread glue in through-bolted connections is an effective method of thread retention only under carefully controlled conditions due to the limited inspection techniques.

viii) *Recessed Metal Lock Nut*

ix) *Wedged Ramp Thread*

9.5 Additional Securing Hardware

9.5.1 Pins

Split/cotter pin is most commonly used for securing bolts and nuts. This type of pin must be chosen adequately to size item (bolt/shaft /axle). Pin legs have to bend around bolt. It is required not to re-use cotter pins to avoid risk of preaching after multiple bents.

Ball locking pins are required for secondary retention where the connection has to be connected and disconnected frequently. Ball locking pins can be quickly installed and removed without tools.

9.5.2 Retaining Plate and Lock Nut

Use of retaining plate and lock nut is an approved method of secondary retention for pin/shaft connections.

Retaining ring is locked against a shaft retaining grove while the locking nut is retained by bending one of the wings from the retaining ring into recess in the locking nut. They are widely used for securing bearings, pins, and shafts.

9.5.3 Safety Shackles

In safety shackles, threaded pin (bolt) and nut is considered as primary securing, secondary retention is provided by split pin. Shackle application has to comply with the safe working load. Split pin have to be stainless steel and always properly attached (bend around pin).

9.5.4 Securing Wires

Securing wire can be considered as secondary retention only in special cases where it is not possible to apply recognized methods of secondary retention over primary fixing as described in 3-3/9.3.

Securing wires of are to be of acid-proof material and comply with AISI 316, type 7x19 IWRC. The breaking strength of the wire is not to be less than the calculated maximum tension in the wire multiplied by a safety factor of at least 3. The safe working load of the wire is to be equal or greater as the static weight of secured components. All wire rope is to have a certificate of test, furnished by the manufacturer or the certificating authority, showing the breaking test load of a sample. All running wires are to be visually inspected at each Annual and Special Periodic Surveys.

9.5.5 Safety Net

In addition to all methods mentioned in this section, safety nets, or other means of capturing parts may be considered. A safety net cannot remove the risk of a dropped object. It only reduces the risk of injury of people and/or damage to equipment. Use of safety nets is in most cases outside the scope of the product designer and is usually installed after vessel delivery.

9.7 Unauthorized Secondary Retention

The following commonly used secondary retention methods are not allowed on offshore facilities:

- Double nut/dual nutting
- Dimpling threads

In addition, reuse of items of secondary retentions such as nuts, cotter or split pins, wires is not allowed except those designed for reusable.

1 Introduction

This Section provides requirements for securing specific equipment listed in 3-2/7 that are commonly installed on offshore assets. Equipment not listed in this Section is to receive special consideration following general design considerations described in 3-3/5, which require proper primary fixing, secondary retention to prevent dropped objects, and additional safety measures to minimize potential damage/injury by dropped objects.

3 Specific Equipment Securing

3.1 Electrical Equipment and Outfitting

3.1.1 Floodlight

i) Floodlights are to be positioned to prevent impact with equipment/loads. If there is a potential of the floodlights being hit by mobile equipment/loads, they should be protected with reinforced cages.

ii) Floodlights are to be equipped with two independent barriers. The attachment points should be integrated, for example with eyebolts threaded into the floodlight housing. Strength of attachment points and securing devices, related to the relevant fall energies are to be evaluated.

iii) Fastening devices for securing of equipment to bracket or structure are to be fitted with secondary retention requirement.

iv) Hatches for replacement of light bulbs are to be hinged or secured with wires to the floodlight housing/frame.

v) For new assets or for installing securing devices on existing equipment, a user manual and maintenance instructions should be available. The instructions should also cover securing devices.

3.1.2 Lamp with Cable and Emergency Light with Battery Pack

i) Lamps are to be positioned to avoid collision with moving equipment and/or load being handled. Lamps are to be equipped with drop preventive securing lanyards mounted to dedicated attachment point in light housing.

ii) All bolts attaching light fixture bracket and light housing are to be equipped with a recognized method of secondary retention.

- For emergency light fixture with battery pack, the battery unit is to be secured by either:
- OEM integrated solution (e.g., internal securing lanyard)
- Externally mounted tie wrap around battery pack
- Application of the drops preventive lanyard in accordance with assembly drawing
- If the existing drawing is not showing one, an additional securing lanyard is required so that it does not interfere with function, integrity and rating of the equipment to be secured

3.1.3 Helicopter Light

i) Helicopter lights are to be equipped with a drop preventive lanyard. Lanyard shall be connected to integrated securing points or tightly wrapped around light body. Light and protection cage are to be secured using a safety lanyard.

ii) Bracket/mast for helicopter lights shall have holes for fastening safety wires.

iii) All bolts attaching helicopter light brackets and light housings are to be equipped with a recognized method of secondary retention.

3.1.4 Junction Box and Cabinet

Junction box and cabinet shall be mounted in the location where:

i) They do not interfere with passage.

ii) Risk of collision with moving equipment/load is minimal.

iii) Bolts used for fastening Junction box and cabinet are to be equipped with a recognized method of secondary retention.

iv) Doors and lids/covers are to be secured by external securing lanyard.

v) Securing lanyard should be part of OEM solution for Junction boxes and cabinets.

vi) Bolts used for securing removable lids or doors are to be equipped with a recognized secondary retention method.

vii) Application of the drops preventive lanyard is to be in accordance with assembly drawing.

viii) If existing drawings do not show one, an additional securing lanyard is required so that it does not interfere with function, integrity, and rating of the equipment subjected to be secured.

3.1.5 Cable Trays and Cable Ladders

Galvanic corrosion is to be assessed during assembling cable trays system as required in 3-2/5. All bolts attaching cable trays to supports and structures are to be equipped with recognized method of secondary retention.

3.1.6 Loudspeakers

i) Mounted position for the loudspeakers is to be chosen where the risk of being hit by moving equipment or load is minimal. Loudspeakers located at height or in the place where is a risk of being hit by mobile equipment/load are to be equipped with securing wire or protective cage.

ii) The lanyard is to be connected to integrated securing points or tightly wrapped around the speaker body and be verified that the speaker cannot slide off with the looped cable when retention fails. When equipment allows verification with OEM modification, it is acceptable to drill a hole through the speaker without affecting integrity of the system for installation of a lanyard.

iii) If the existing drawing does not show one, an additional securing lanyard is required so that it does not interfere with function, integrity, and rating of the equipment subjected to be secured.

3.1.7 CCTV Cameras

i) Mounted location for the camera is to be chosen in a way where the risk of being hit by moving equipment/load is minimal. Cameras located in the place where is a risk of being hit by mobile equipment/load are to be equipped with protective cage.

ii) Bolts used for fastening the camera are to be equipped with a recognized method of secondary retention.

iii) The lanyard to be connected to integrated securing points or tight wrapped around the camera body is to be verified that the camera cannot slide off with the looped cable when retention is failing.

iv) In the case of securing non-integrated camera (where pan-tilt unit, camera casing, wiper unit, etc., are separate), all components are to be equipped with securing lanyards.

3.1.8 Antennas/Sensors

i) This kind of equipment is to be placed where the risk of being hit by moving equipment/load is minimal.

ii) All fasteners are to be equipped with recognized method of secondary retention

iii) Integrity for the sensor shall be assessed. It is preferred not to use sensors with moving parts.

3.3 Hydraulic Outfitting

3.3.1 Valve Handles

When handles are not required during normal operation, they shall be removed and stored in a safe place. In case the handle is required for normal operation (controlling a tool or safety shut purposes), the handle has to be mounted. Two independent barriers are to be present to secure valve handle/ valve wheel against self-loosening/being dropped down.

Preferred method is to secure handle to the valve stem by use of:

i) Nut and split pin through drilled valve stem

ii) Bolt drilled for locking and lock wired

If it is impossible to secure the handle in one of above mentioned way it is also acceptable to attach a drop preventive lanyard to the valve handle / wheel and surrounding structure.

3.3.2 Pipe Clamps

Pipe clamps are widely used for attaching hydraulic pipes. Occasionally they are used for clamping electrical cable. For both it is recommended to use recognized secondary retention methods to secure bolted connections against self-loosening and becoming dropped objects.

3.5 Wire Sheaves

3.5.1 Sheave Blocks/Snatch Blocks

i) A sheave block is required to have two integrated barriers in the suspension (head fitting) and in the shaft.

ii) For head fitting and Shaft/sheave axle, the manufacturers' provided primary fixing and secondary securing are required.

iii) Sheave blocks and snatch blocks are to possess side plates to contain/enclose entire block together in case of center pin failure to catch failure components and avoid jumping off.

iv) Split pins are to be used and other type of pins is to be avoided.

v) If installed, the safe working loads of drop preventive slings are to be equal to or greater than safe working loads of the corresponding tugger line.

3.5.2 Deflector Sheaves

i) Deflector sheaves are used to guide wire along the derrick. The number and location of these sheaves on an offshore unit depends on the wire routing arrangement.

ii) It is required that the bracket of the sheave be firmly attached to the structure by welding or bolting.

iii) If a bolted solution is in use all bolts are to be equipped with a recognized method of secondary retention.

iv) The shaft of the sheave is to have primary and secondary retention.

v) It is preferable that side plates be used to contain/ enclose the entire sheave in case of center pin failure due to shear or disengaging.

vi) Installation of dropped preventive slings is not mandatory; instead, a bolt or pin can be added to capture the load of the cable in case of a sheave failure.

vii) When using a lanyard it is required to have a proper anchor point/pad eye for secondary retention, instead of wrapped around the beam.

3.7 Walkway

3.7.1 Grating *(1 September 2017)*

Grating is to be firmly fixed to structure, using the preferred methods of fixing, such as a bolted through connection where means of secondary retention are in use.

For securing walkways, the following considerations are to be accounted for:

i) Grating or platform is to be surrounded by a kick plate

ii) The loosening of a single clip will not lead to loosening entire grating plate

iii) Clips are to be regularly inspected

iv) Evaluation to verify if adhesive compound should be used for securing these connections

v) Maximum opening in the grating does not exceed 20 mm (0.79 in.)

vi) Maximum distance between grating plates does not exceed 15 mm (0.59 in.)

vii) Consideration shall be made when selecting the grating fastening connection methods concerning accessibility and ease of installation

3.7.2 Walkway Railing *(1 September 2017)*

Walkway railings are to comply with the following:

i) Height of rails is to be at least 1000 mm (39.5 in.) and integrated toe boards at least 100 mm (4 in.) high

ii) There is to be no deformation or cracks that affect their functionality and strength

iii) It is to be possible to insert movable guard rails into the fastenings and insert a securing through-bolt

iv) The safety bolt are to be adequately locked using a securing pin, snap hook (with eyelet) or a split pin

v) Both the safety bolt and locking mechanism are to be secured in the immediate vicinity of the fastening

vi) All connections between elements in the railing are to be secured with a through-bolt and locking nut

vii) No use of setscrews in permanent railings

viii) Guard rails and attachment points for collapsible and movable guard rails are to be inspected on a regular basis to maintain their security and functionality

ix) Safety barricades and mesh system are to be installed as required (loading areas) in accordance with manufacturer's specification.

3.7.3 Piping and Equipment Feedthrough

i) All openings for pipes and other equipment through decks and gratings are to have a maximum clearance between the parts of 15 mm (0.59 in.).

ii) Keep kick plate around opening of the same height or higher compared to surrounding kick plate.

iii) To cover the hole or reduce opening, top cover made form steel or other material (canvas is accepted) may be used.

3.9 Other Outfitting

3.9.1 Name Plates, Logo, Signs, etc.

Where possible, adhesive signs (sticker type) should be used, if this method does not survive through the expected life of the sticker versus service life of the equipment another method can be used.

5 Inspection and Maintenance

The primary fixing and secondary retention for the items identified in Section 3-2 are to be inspected regularly and replaced as necessary to maintain their purpose. The records of inspections and replacements are to be included in the onboard drops prevention program described in Chapter 2.

CHAPTER 4
Surveys

CONTENTS

SECTION 1 Surveys During Manufacture and Installation....74

1 General....74

3 Surveys at Manufacture and During Assembly....74

3.1 General Survey Requirements....74

3.3 Documentation for Surveyor Review....76

5 Onboard Surveys During Installation....77

5.1 General....77

5.3 Service Supplier....77

SECTION 2 Surveys After Construction and Maintenance of Class....78

1 General....78

1.1 Survey Intervals....78

1.3 DROP Management System and Equipment Maintenance Records....79

1.5 Use of Temporary Equipment....79

3 Surveys Onshore for Repairs and Modifications....79

5 Survey of DROP Equipment and Systems....80

5.1 Annual Surveys....80

5.3 Special Periodical Surveys....80

7 Modifications, Damage, and Repairs....81

APPENDIX 1 Procedural Requirements for ABS Recognized Dropped Object Prevention Specialists....82

1 Terminology....82

3 Objective....82

5 Application....82

7 Procedure for Approval and Certification....82

7.1 Documentation Requirements....82

7.3 General Requirements....83

7.5 Auditing of the Drops Specialist....84

7.7 Certification....84

7.9 Quality Assurance System....84

9 Certificate of Approval..... 85
9.1 Renewal.....85
11 Alterations.....85
13 Cancellation of Approval.....85

CHAPTER 4
Surveys

SECTION 1
Surveys During Manufacture and Installation

1 General

The provisions of this Section are requirements for the Classification of the DROP management system and equipment which constitute the **DOPP** or **DOPP+** Classification. These requirements are in addition to the provisions noted in other ABS Rules for offshore units and assets where a DROP classification is being applied.

When ABS is authorized to perform surveys on behalf of a governmental authority, or when requested by the Owner, items as specified by the governmental authority or Owner/Operator will be surveyed. Reports indicating the results of such surveys will be issued.

For purposes of this Section, the commissioning date of the approved DROP Management system will be the date on which a Surveyor issues an Interim Class Certificate for the offshore asset with the applicable **DOPP** classification notation.

Survey of a classed DROP system is based on the classification designation and the listing of the equipment included in the approved DROP Management Manual. Where a **DOPP+** class designation is applied, the surveys will be expanded to include the compliance of the listed equipment in accordance with the equipment design and applicable manufacturing provisions of this Guide.

Before being fully implemented, the DROP management program and all associated equipment are to be examined and tested as required by an ABS approved Service Supplier. The person performing the testing and examination is to be a fully certified member of the ABS approved Service Supplier program.

During the installation and commissioning process and/or during startup of a class program for the prevention of dropped objects per the provisions of this Guide, the ABS approved Service Supplier together with the ABS Surveyor will verify compliance with this Guide, and the installation of the equipment follows the approved drawings.

3 Surveys at Manufacture and During Assembly

3.1 General Survey Requirements

All equipment forming a **DOPP+** classification are required to be design approved and subject the applicable manufacturing surveys in accordance with the requirements of this Guide. The ABS Type approval program may be applied by the manufacturer of equipment in accordance with the ABS Type

Approval Program (Appendix 1-1-A3 of the ABS *Rules for Conditions of Classification (Part 1)*). Where specialized equipment will be installed at height, Unit Certification may be required (Tier 4 or 5).

An equipment list is to be provided to ABS for review for application of classification requirements.

When unit certification is required, surveys of the equipment during construction are required to the extent necessary for the Surveyor to determine that the details, material, welding and workmanship are acceptable to ABS and are in accordance with the approved drawings.

When the Surveyor's attendance at the manufacturer's plant and at the assembly site is required for unit certification of the equipment, the manufactured/assembled system, equipment, and/or component will be verified for satisfactory compliance with this Guide including the following:

i) A prefabrication or kick-off meeting/discussion between the manufacturer/fabricator and ABS-designated Surveyor(s) is to be carried out and documented in order, but not limited to:

- Confirm and/or establish the main point of contacts for the manufacturer and ABS
- Review the project quality plans
- Review proposed manufacturing specification
- Review project manufacturing and delivery schedules
- Review and confirm Surveyor examination requirements including but not limited to monitoring, hold points and documents review
- Confirm plans for testing during and after fabrication and testing to be carried out after installation.
- Confirm the process for handling major non-conformances and major engineering changes

ii) Manufacturing plans, specifications and/or fabrication details are to include, but not limited to, as applicable:

- Quality plan and specifications
- WPSs and PQRs and weld maps
- NDE procedures and NDE maps
- Detailed Inspection and Test Plans (ITPs) as applicable during:
  - Manufacturing (Factory acceptance testing)
  - Installation
  - Commissioning
- Procedures for the disposition of major manufacturing non-conformances and major engineering changes

iii) Design validation tests required by the design standard, testing associated with the ABS requirements for equipment certification, factory acceptance and commissioning tests are to be carried out to the satisfaction of the attending Surveyor. At the discretion of the Surveyor, test procedures may be required to be submitted for technical review.

The purpose of the Surveyor's attendance typically includes, but is not limited to, the following:

- To confirm that the facilities to manufacture, fabricate or repair DROP approved equipment (**DOPP+**) have an accredited and maintain an effective quality assurance program (ISO 9000 or equivalent) covering design, procurement, manufacturing and testing, as applicable, and meeting the requirements of a recognized standard applied to their product

- To qualify or verify welder's qualifications to the extent deemed necessary by the attending ABS Surveyor
- To qualify or verify ABS approved welding procedure specifications and corresponding weld procedure qualification records to the extent deemed necessary by the attending ABS Surveyor
- To verify material certificates/documentation
- To monitor in-process welding, survey fit-up prior to major weldments and witness weld startup operations
- To survey final weldments and witness repair welding
- To verify the non-destructive testing program and personnel qualifications in accordance with this Guide and witness, as far as deemed necessary, non-destructive examination tests of welds and to review records of non-destructive examinations
- To review records of post-weld heat treatment, where applicable
- To review major non-conformances and major engineering changes
- To verify dimensions are as shown on approved drawings or engineering drawing and design specifications submitted for review
- To check dimensional tolerances and alignment of mating surfaces
- To witness design validation testing of equipment or components in accordance with the applicable requirements
- To witness pressure and/or proof-load testing of equipment and as a unit, as applicable and as specified in the fabrication procedures and tests required for DROP compliance per approved plans
- To witness final testing and functional testing of subassemblies and completed units, as specified in the fabrication procedures
- To carry out other examinations as agreed upon during prefabrication meeting
- To confirm compliance with the associated ABS Product Design Assessment
- To verify provisions for primary and secondary securing per the approved design

iv) Materials test reports (MTRs) are to be made available to the attending Surveyor during the manufacturing process. In general, materials associated with equipment and/or components that require Surveyor's attendance in accordance with are to have complete traceability with MTRs. As a minimum, MTRs are to be provided for the following:

- Materials for primary structural-load bearing components
- Materials for primary mechanical-load bearing components
- Materials for primary pressure-retaining equipment/components
- All piping, valves and fittings with an ANSI B16.5 Class 150 or greater
- Bolts and nuts for fastening and/or connections used in primary fixing and secondary retention applications.

3.3 Documentation for Surveyor Review

Traceability through the fabrication process is to document materials associated with primary and secondary securing provisions in the approved design. The manufacturers are responsible for maintaining this documentation on file and, upon request, are to provide this information to the ABS Surveyor's satisfaction.

5 Onboard Surveys During Installation

5.1 General

Onboard installation of all equipment approved in association with the DROP system classification is to be examined by an Service Supplier with verification of accessible areas by the attending Surveyor as follows:

i) Installation of equipment including sheaves, wire rope, turn down guides, hang off tools and compensation devices listed in the DROP prevention management program is to be visually examined, nondestructively examined and tested, as required by the Manufacturers approved installation plans.

ii) Piping installation is to be verified in accordance with approved plans including verification of secondary retention measures.

iii) Electrical cabling installation is to be verified in accordance with approved plans including verification of secondary retention measures.

iv) All outfitting items including light fixtures, pipe manifolds, control panels, fans, and bug blowers are to be verified to be installed in accordance with the manufacturer's approved installation plans.

v) Derrick/mast:

- Assembled and installed derricks and masts are to be visually examined, including welding and bolting, torqueing, its water table, crown block and turnover sheaves assembly, guide rails for hoisting equipment, derrick-mounted equipment, and outfitting items.

vi) Fitting of secondary retention and safety securing devices required by the design is to be verified in accordance with approved plans.

vii) Installation of equipment (top drive, pipe-handling machinery, cranes, and other approved equipment) that travels to height is to be examined in accordance with the approved installation plans associated with equipment forming **DOPP** class.

5.3 Service Supplier

The Service Supplier is required to verify the installation and securing of equipment per 4-1/5.1 above to the satisfaction of the attending Surveyor as follows:

i) A kick-off discussion is to be held between the Service Supplier, ABS Surveyor and Yard/Owner to review the inspection scope associated with the approved DROP management plan.

ii) Periodic progress discussions are to be carried out to the satisfaction of the attending Surveyor.

iii) A close-out discussion with the Service Supplier, ABS Surveyor and Yard/Owner is to be carried out to the satisfaction of the attending Surveyor.

CHAPTER 4
Surveys

SECTION 2
Surveys After Construction and Maintenance of Class

1 General

The provisions of this Section are requirements for the maintenance of Classification of the DROP management systems. These requirements are in addition to the provisions noted in other ABS Class Rules and Guides applicable to the related asset.

When ABS is authorized to perform surveys on behalf of a governmental authority, or when requested by the Owner, items as specified by the governmental authority or Owner/Operator will be surveyed. Reports indicating the results of such surveys will be issued.

For purposes of this Section, the commissioning date of the DROP prevention system will be the date on which a Surveyor issues an Interim Class Certificate for the drilling unit with the **DOPP** or **DOPP+** notation.

Surveys of classed systems are based on the classification designation and the listing of the equipment in the approved management plan. The system is to include specified initial and periodic examination by an ABS recognized Service Supplier. The ABS Surveyor will attend with the Service Supplier to carry out document reviews and examination of selected accessible areas to verify the continued satisfactory application of the approved DROP management system.

1.1 Survey Intervals

All Annual and Special Periodical Surveys of the classed DROP systems/Equipment are to be carried out at the same time and interval as the periodical Classification survey of the unit in order that they are recorded with the same crediting date.

i) An Annual Survey of the DROP management system and associated equipment is to be carried out by a Surveyor within three months before or after of each annual anniversary date of the initial Classification survey.

ii) A Special Periodical Survey of the DROP management system and associated equipment is to be carried out within five (5) years of the initial Classification certification survey and at five-year intervals thereafter.

iii) Required surveys are to be completed within three (3) months of their due dates.

- Annual and Special Periodical Surveys may be carried out during a scheduled maintenance of the DROP management system within the allowable time frames

- Annual Surveys are to be scheduled to coincide with the planned to allow for access to the equipment installed at height.
- Special Periodical Surveys are to be scheduled to coincide with the Owner/Operator's planned major maintenance periods
- Surveys are to be prearranged with the Service Supplier at the kick-off discussion per 4-1/5.3i).
- Close-out discussion per 4-1/5.3iii) is to be completed.

1.3 DROP Management System and Equipment Maintenance Records

Computer or paper-based inspection plans and associated maintenance records for all equipment in the approved DROP management system register are to be kept on board and made available to the Service Supplier and attending Surveyor. Records are to include tracking of inspection activities, maintenance activities, repairs, failures, dropped object incidents, replacements, and modifications.

i) Inspection records by the service supplier and unit personnel will be reviewed by the attending Surveyor together with repair and replacement documentation to establish the scope and content of the required Annual and Special Periodical Surveys.

ii) Records of changes or additions made to equipment in the DROP management program are to be available to the attending Surveyor for review and verification.

iii) The Surveyor may determine during the periodic survey if the changes are sufficient to warrant review by the ABS Engineering staff.

1.5 Use of Temporary Equipment

Where provisions have been made in the DROP management system for the installation of temporary equipment, the status of fitted temporary equipment is to be verified together with the associated inspection reports by the service supplier. The fitting, maintenance and removal of temporary equipment are to be in accordance with the provisions of the approved DROP management plan.

3 Surveys Onshore for Repairs and Modifications

For **DOPP+** classification, when equipment, previously certified by unit certification and associated with the classed DROP management system is returned ashore for maintenance, repair, or modification purposes, it is the responsibility of the Owner to inform Surveyors of the scope of work at the shore facility/plant.

i) Repairs and Modifications of systems, equipment or components comprising the equipment in the DROP equipment register is to be in accordance with the Manufacturer's drawings and specifications and ABS requirements.

ii) A kick-off meeting between the manufacturer/fabricator and ABS-designated Surveyor(s) is to be scheduled for the maintenance, repair or modification purposes prior to commencement of the work in order, but not limited to:

- Assess the proposed repairs/modifications
- Assess the need for ABS technical review of proposed repairs or modifications
- Confirm and/or establish the main point of contacts for the manufacturer and ABS
- Review the project and/or manufacturer's quality plans
- Review test procedures
- Review manufacturing specifications
- Review project manufacturing and delivery schedules
- Review and confirm project "hold-points"

iii) Surveyors are to attend the facility/plant for the required function, load, and/or pressure testing carried out on the equipment. Tests conducted are to follow guidelines outlined in related design standards.

iv) Upon completion of approved repairs/modifications, review of applicable documentation and satisfactory completion of tests, a report will be issued by the attending Surveyor.

v) All survey reports are to be maintained onboard the unit as part of the Owner/Operator's maintenance record and for verification by the attending Surveyor during Classification surveys of the unit.

5 Survey of DROP Equipment and Systems

5.1 Annual Surveys

At each Annual Survey, the Surveyor is to verify the satisfactory condition of the applicable classed DROP management system and equipment by visual examination and testing, as appropriate. As a minimum, the following is to be carried out to the satisfaction of the attending Surveyor:

i) A kick-off discussion between the Service Supplier, Owner and attending Surveyor to establish the survey requirements.

ii) Review of Owner/Operator's DROP management system and relevant logs/records to confirm that:

- The approved DROP management program is in place and in use
- Periodic verification by an Service Supplier has been carried out
- Any repairs, replacements, reconditioning or renewals of applicable equipment, as defined in the scope of this Guide, were carried out according to the approved DROP management plan
- Verification of the approved control measures for use of tools at height and examination of the applicable records
- Examination of records involving dropped objects and verification that effective measures have been taken in accordance with the approved DROP management plan

iii) Review of ABS-issued survey reports for onshore repairs and modifications on unit certified equipment.

iv) Review of the DROP equipment register for approved changes made and examination and testing to the extent deemed necessary by the attending Surveyor.

v) Where applicable to the equipment associated with the **DOPP** class designation, accessible areas of the designated drops risk zones are to be examined and placed in satisfactory condition, as found necessary.

vi) Verification that examination of mounting hardware and associated secondary and safety securing has been carried out by an Service Supplier and found or placed in satisfactory condition.

5.3 Special Periodical Surveys

The Special Periodical Survey is to include all items listed under the Annual Survey, and, in addition, the following is to be carried out to the satisfaction of the attending Surveyor:

i) Review of Owner/Operator's maintenance records to review and confirm that:

- Periodic testing requirements have been carried out, as applicable.
- Any repairs, replacements, reconditioning or renewals of equipment in the DROP equipment register, as defined in the scope of this Guide, were carried out according to the applicable codes and standards and the requirements of this Guide.

- Verification by an ABS recognized Service Supplier has been completed per the approved DROP management plan.

ii) Examination of accessible piping and electrical systems and associated foundations and attachments installed at height that form part of the DROP equipment register.

iii) Examination of accessible rotating machinery installed at height that is included in the DROP Register to verify that the associated foundations and drops prevention features remain effective.

iv) Visual examination of the condition of accessible joints on the derrick and associated structure, in order to verify that means of securing remains effective and conditions do not exist that could result in a dropped object.

7 Modifications, Damage, and Repairs

When it is intended to carry out any modifications to the machinery, piping, equipment, etc., which form part of the equipment register in the approved DROP program and that may affect Classification, the details of such modifications are to be submitted for approval and the work is to be carried out to the satisfaction of the Surveyor.

i) When equipment that is unit certified by ABS has suffered any damage which may affect Classification, ABS is to be notified and the damage examined by a Surveyor.

ii) Details of intended repairs are to be submitted to the Surveyor and the work is to be carried out to the satisfaction of the attending Surveyor. Repair details may be required to be submitted for technical review at the discretion of the Surveyor.

iii) Where component parts suffer a premature or unexpected failure, and are subsequently repaired or replaced without Surveyor attendance, details of the failure, including the damaged parts where practicable, are to be retained onboard for examination by the Surveyor during the next scheduled survey/visit.

iv) Alternatively, the component(s) may be taken ashore for examination and testing, as required. If failures are determined to be a result of an inadequacy of the DROP management plan, the onboard plan is to be amended and the changes noted for verification by the Surveyor.

CHAPTER 4
Surveys

APPENDIX 1
Procedural Requirements for ABS Recognized Dropped Object Prevention Specialists

1 Terminology

ABS Recognized Dropped Object Prevention Specialists. Companies providing inspection, audit and assessment on behalf of the Owner of an offshore vessel or unit for the purposes of meeting the ABS Dropped Object Prevention **DOPP** or **DOPP+** notation requirements.

Calibration Checks. Field adjustment and tuning of a measuring instrument, conducted before and after a field test, using a reference calibrated signal or through zero calibration.

Reference Calibration. Adjustment and tuning of a measuring instrument, conducted by an accredited Testing and Calibration Laboratory, with traceability to a national or international standard.

3 Objective

The objective of this procedure is to set basic standards for qualifying and certifying specialists performing dropped object prevention program initial and periodic audits, equipment examinations, and assessments required to enhance the Survey process.

5 Application

This procedure applies to the approval of Specialists that provide the following services related to the classification for dropped object prevention on offshore installations:

i) Drops program development

ii) Drops program initiation

iii) Initial equipment examinations and risk assessment

iv) Audits of Drops Programs including subsequent equipment examinations and risk assessments

7 Procedure for Approval and Certification

7.1 Documentation Requirements

The following documents are to be submitted to ABS for review:

i) An outline of the company (e.g., organization and management structure) including subsidiaries or subcontractors to be included in the approval/certification

ii) A list of company experience in the dropped object programs

iii) A list of inspection personnel documenting training and experience in Drops program development, program initiation, initial equipment examinations and risk assessment and subsequent drops prevention system audits.

The following documents will be reviewed during the initial approval audit (See 4-A1/7.5, "Auditing of the Specialist"):

i) A guide for operators of testing equipment

ii) Training programs for personnel

iii) Draft checklists and data recording sheets for recording results of the services referred to in 4-A1/5, "Application"

iv) Quality Manual and/or documented procedures covering requirements in 4-A1/7.9, "Quality Assurance System"

v) Documented procedures for communication with the crew prior to commencing work in order to provide a safe system of work in place as necessary

vi) Evidence of approval/acceptance by certifying bodies, if any

vii) Record of customer claims and of corrective actions requested by certification bodies for the past year

viii) Where relevant, list and documentation of licenses associated with the companies procedures.

ix) Example test/audit/assessment reports

7.3 General Requirements

7.3.1 Extent of Approval

The Testing Specialist is to demonstrate, as required by 4-A1/7.3.2 "Training of Personnel" through 4-A1/7.3.9, "Reporting", that they have the competence, quality control, and quality assurance needed to perform the test and analysis services for which approval is sought.

7.3.2 Training of Personnel

The Specialist organization is responsible for the qualification and training of its personnel to a recognized national, international, or industry standard as applicable. Where such standards do not exist, the Specialist organization is to define standards for the training and qualification of its personnel relevant to the functions each is authorized to perform. The personnel are also to have adequate experience and familiarity with the operation of any necessary equipment. Where it is not possible to perform internal training, a program of external training may be considered as acceptable.

7.3.3 Supervision

The Specialist organization is to provide supervision for all services provided. The responsible supervisor is to have had a minimum of one (1) year of experience in supervising Drops program development, program initiation, initial equipment examinations and risk assessment and subsequent drops prevention system audits.

7.3.4 Personnel Records

The Specialist organization is to keep records of personnel performing and supervising audits. The records are to contain information about formal education, training, and experience.

7.3.5 Equipment and Facilities

The Specialist organization is to have the necessary equipment and facilities for carrying out items per Chapter 3. The record is to contain information about maintenance and calibration.

7.3.6 Control of Data

When computers are used for the acquisition, processing, recording, reporting, storage, measurement assessment and monitoring of data, the ability of computer software to satisfy the intended application is to be documented and confirmed by the Specialist.

7.3.7 Procedures

The Specialist is to have documented work procedures covering all aspects of the work associated with the services provided.

7.3.8 Subcontractors

The Specialist is to give information of agreements and arrangements if any parts of the services provided are subcontracted. Particular emphasis is to be given to quality management by the Testing Specialist in following-up of such subcontracts. Subcontractors providing anything other than subcontracted personnel or equipment are also to meet the requirements of 4-A1/7.3, "General Requirements" and 4-A1/7.9, "Quality Assurance System".

7.3.9 Verification

The Specialist is to verify that the services provided are carried out in accordance with approved procedures.

7.3.10 Reporting

The report is to be prepared in a form acceptable to the ABS Surveyor and as approved as part of the Specialist approvals. The report is to include a copy of the Certificate of Approval.

7.5 Auditing of the Drops Specialist

Upon reviewing the submitted documents with satisfactory result, the Specialist is to be audited for the initial certification process and then every three (3) years in order to ascertain that the Testing Specialist is duly organized and managed in accordance with the submitted documents and that they are considered capable of conducting the services for which approval/certification is sought.

7.7 Certification

Certification is conditional on a practical demonstration to ABS or its agent of the specific service performance, as well as a sample of a satisfactory report.

7.9 Quality Assurance System

The Testing Specialist is to have a documented system covering at least the following:

i) Operating instructions for the test equipment

ii) Maintenance and reference calibration of equipment

iii) Training programs for test personnel

iv) Supervision and verification to verify compliance with test procedures

v) Recording and reporting of information

vi) Quality management of subsidiaries and subcontractors

vii) Job preparation

viii) Periodic review of test process procedures, complaints, corrective actions, and issuance, maintenance, and control of documents.

ix) Code of conduct for the relevant activity

A documented Quality Assurance system complying with the applicable ISO 9000 standard or equivalent and including the above items would be considered acceptable.

9 Certificate of Approval

Upon satisfactory completion of both the audit of the Drops Specialist and practical demonstration, ABS will issue a Certificate of Approval stating that the Specialist's audit and analysis service operation system has been found to be satisfactory and that the results of audit and analysis services performed in accordance with that system may be accepted and utilized by ABS in making decisions affecting optional Dropped Object Prevention classification notations. The Certificate will clearly state the type and scope of services and any limitations or restrictions imposed. The Drops Specialist will also be included in ABS' records of recognized Service Suppliers.

9.1 Renewal

The Certificate of Approval is subject to renewal or endorsement at intervals not exceeding three (3) years per the Service Supplier procedure. The renewal or endorsement is to be accomplished by verification through audits to verify that approved conditions are maintained.

11 Alterations

When any alteration to the certified service operation system of the Drops Specialist is made, ABS is to be immediately notified. Re-audit may be required when deemed necessary by ABS.

13 Cancellation of Approval

Approval may be cancelled in the following cases:

i) Where the service was improperly carried out or the results were improperly reported

ii) Where deficiencies are found in the recognized services of the Specialist and appropriate corrective action is not taken

iii) Where the Specialist fails to inform ABS of any alteration, as in 4-A1/11, "Alterations"

iv) Where a renewal audit, if requested per 4-A1/9.1, "Renewal", has not been carried out

v) Where willful acts or omissions are ascertained

ABS reserves the right to cancel the approval if any of these cases are met.

A Drops Specialist whose approval was cancelled may apply for re-approval provided the nonconformities, which resulted in cancellation, have been corrected and that ABS is able to confirm that the corrective action has been effectively implemented.