Guidance on the management of the hazard of vessel impact with offshore structures

energy institute

GUIDANCE ON THE MANAGEMENT OF THE HAZARD OF VESSEL IMPACT WITH OFFSHORE STRUCTURES

First edition

February 2022

Published by
Energy Institute, London
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Registered charity number 1097899

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The EI gratefully acknowledges the financial contributions towards the scientific and technical programme from the following companies:

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BP Exploration Operating Co Ltd
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ConocoPhillips Ltd
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TAQA Bratani
TotalEnergies
Uniper
Valero
Vattenfall
Vitol Energy
Woodside
World Fuel Services

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ISBN 978 1 78725 286 8

Published by the Energy Institute

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FOREWORD

The intention of this publication is to provide guidance for management of the hazard of vessel impact with offshore structures in the offshore oil and gas industry.

Whilst primarily written in the context of the United Kingdom (UK) legislative and regulatory framework, the principles set out in this publication can similarly be applied in other countries, providing national and local statutory requirements are complied with. Where the requirements differ, the more stringent should be adopted. A similar legislative and regulatory framework generally applies elsewhere in the European Community.

Although it is anticipated that following this publication will assist those involved in the management of the hazard of vessel impact, the information contained in this publication is provided as guidance only. While every reasonable care has been taken to ensure the accuracy of its contents, the EI, and the technical representatives listed in the acknowledgements, cannot accept any responsibility for any action taken, or not taken, on the basis of this information. The EI shall not be liable to any person for any loss or damage which may arise from the use of any of the information contained in any of its publications.

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Suggested revisions are invited and should be submitted to the Technical Department, Energy Institute, 61 New Cavendish Street, London, W1G 7AR.

ACKNOWLEDGEMENTS

The Energy Institute (EI) wishes to record its appreciation of the work carried out by the following individuals over the project duration:

Ageing and Life Extension Committee (ALECOM) members (Technical Partners)	
Nick Bentley	Chrysaor
Hugh Borland	BP
Linda Bremner	Spirit Energy
David Brett	Ithaca
Ingert Eicker	Aramco
Emmanuel Fakas	Shell
Ramsay Fraser	BP
Stuart Gosling (Deputy chair)	CNOOC International
Manolo Koolman	Aramco
Ian Manclark	Equinor
Iryna Mykhailova	Chrysaor
Farzan Parsinejad	Chevron
Kenny Robertson	Taqa
Don Smith	ENI
Steve Temple (Chair)	Total

In addition, thanks to the ALECOM Observer members for comment, feedback and review:

John Kent	Worley
Mohammad Nabavian	Wood
Alex Stacey	HSE
Fergus Stewart	Wood
Paul Tallett	Atkins Energy
Prof John Wintle	TWI

Technical drafting and editing by John Beattie, Anatec Limited.

This first edition guidance was project managed by Dr Cameron Stewart (EI) Upstream Technical Manager.

ABBREVIATIONS

AIS	automatic identification system
ALARP	as low as reasonably practicable
ALE	ageing and life extension
ALECOM	Ageing and Life Extension Committee
API	American Petroleum Institute
CHIRP	confidential human factors incident reporting programme
COMOPS	combined operations
CSV	construction support vessel
CTV	crew transfer vessel
DC	daughter craft
DoE	Department of Energy
DCR	Design and Construction Regulations
DGNSS	differential global navigation satellite system
DGPS	differential GPS
DP	dynamic positioning
DPO	dynamic positioning operator
DSV	dive support vessel
DWT	dead weight tonnage
EI	Energy Institute
ERRV	emergency response and rescue vessel
ESDV	emergency shutdown valve
FPSO	floating production storage and offloading
GOMO	Guidelines for Offshore Marine Operations
GPS	global positioning system
HLV	heavy lift vessel
HSE	Health and Safety Executive
HSW	health and safety at work
IMCA	International Marine Contractors Association
IMR	inspection, maintenance and repair
IOGP	International Association of Oil and Gas Producers
ISO	International Organization for Standardization
JSAH	joystick auto heading
LSTC	Livermore Software Technology Corporation
m	metre
MAH	major accident hazard
MAIB	Marine Accident Investigation Branch
MHN	Mumbai High North

MHSWR	Management of Health and Safety at Work Regulations
MJ	mega-joule
MODU	mobile offshore drilling unit
MOU	mobile offshore unit
MTD	Marine Technology Directorate
NLFEA	non-linear finite element analysis
NORSOK	Norsk Sokkels Konkurranseposisjon
NTNU	Norwegian University of Science and Technology
NUI	normally unmanned installation
OGUK	Oil & Gas UK
OIM	offshore installation manager
PFEER	Prevention of Fire and Explosion, and Emergency Response
PSA	Petroleum Safety Authority Norway
ROVSV	remotely operated vehicle support vessel
SIMOPs	simultaneous operations
SMS	safety management systems
SOLAS	Safety of Life at Sea
SOV	service operation vessel
SPC	semi-permanent circular
STCW	Standards of Training, Certification, and Watchkeeping
UK	United Kingdom
UKCS	United Kingdom Continental Shelf
VLCC	very large crude carriers
W2W	walk-to-work (note: wtw is also used)
WOAD	World Offshore Accident Database
WTG	wind turbine generator

1 INTRODUCTION AND SCOPE

1.1 INTRODUCTION

The objective of this publication is to provide guidance on the management of the hazard of vessel impact with offshore structures.

Originally, the guidance was intended for ageing and life extension (ALE) structures. This is because many offshore installations are due to exceed, or have already exceeded, their design or original anticipated service life, as operators use them for longer than expected, e.g. beyond a nominal design life of (say) 20 to 25 years, based on the predicted producing life of the field. Such installations continue to require vessel support throughout their life, including close proximity work, but the support vessels may have changed compared to those anticipated in the original design.

However, in the course of the work, it was recognised that any offshore structure can be exposed to a different collision risk profile than anticipated during the design stage. Therefore, it was agreed to broaden the guidance to make it applicable to other offshore structures.

Throughout the offshore industry, there has been a trend towards the use of larger vessels, some of which may perform multiple roles which in the past were performed by separate, dedicated vessels. Vessel design has also evolved, such as the bow shape and the technology used for holding position alongside an installation.

Regulatory requirements and industry practices/procedures to manage vessel impact hazards have also developed, along with techniques for assessing the capacity of offshore installations to withstand such impacts. Many of these changes have been influenced by historical incidents of vessels colliding with offshore installations. For example, two of the 20 largest property damage losses in the hydrocarbon industry worldwide between 1974 and 2015 were caused by infield vessel collisions (Marsh, 2016). A detailed review of the latest incident data informs this guidance.

1.2 SCOPE

This guidance is considered relevant to managing vessel impact hazards with any offshore installation worldwide.

The main focus is on vessels that visit/attend/support offshore installations (also known as infield vessels), as these are directly under the management of the installation operators and are responsible for the vast majority of impacts (approximately 98 %). These represent the vessels that installations are typically designed to withstand impacts from, since they work inside the safety zone at close quarters to the installation and at restricted speeds.

Examples of the most common visiting vessels to offshore installations are listed here. It is noted these can vary depending on the field. The names used can also vary in different regions:

– supply;
– emergency response and rescue vessel (ERRV) (standby/multirole/watchdog);
– dive support vessel (DSV);

- remotely operated vehicle (ROV) support vessel (ROVSV);
- crew transfer vessel (CTV);
- walk-to-work (W2W), and
- other/ad hoc (e.g. inspection, maintenance and repair (IMR), service operation vessel (SOV), surfer).

Much of the guidance is relevant to shuttle (offtake) tankers visiting offshore installations, but these have their own separate guidance, e.g. on tandem loading, and therefore are not a particular focus. Similarly, units that are fixed or moored in position alongside installations for longer periods, such as flotels and rigs, rather than holding position temporarily via dynamic positioning (DP), etc. are not a key focus. These are usually subject to special, simultaneous operations (SIMOPs) procedures and have different causes and outcomes.

Third-party vessels (passing commercial, fishing, recreation and military) are outside the control of operators provided they respect legal exclusions, such as 500 m safety zones. It is generally seen as unrealistic to design an offshore installation to withstand a (much rarer) passing commercial ship impact at transiting speed. Hence, these vessels are not central to the work, but some of the guidance is applicable to all types of collisions.

The guidance is primarily concerned with permanent installations which typically are fixed steel or concrete structures, but could include any type of offshore installation visited by infield oil & gas industry vessels. Much of the guidance is also relevant to managing collision hazards with other offshore installations, such as floating installations (e.g. floating production storage and offloading (FPSOs)), and mobile offshore drilling units (MODUs), such as semi-submersibles and jack-up rigs, especially where the type and/or size of vessels visiting the installation has changed from those assumed in the original design.