Design, construction and operation of workshops for petroleum road tanker maintenance

4th edition



DESIGN, CONSTRUCTION AND OPERATION OF WORKSHOPS FOR PETROLEUM ROAD TANKER MAINTENANCE

Fourth edition

March 2016

Published by **ENERGY INSTITUTE, LONDON**

The Energy Institute is a professional membership body incorporated by Royal Charter 2003 Registered charity number 1097899 The Energy Institute (EI) is the chartered professional membership body for the energy industry, supporting over 23 000 individuals working in or studying energy and 250 energy companies worldwide. The EI provides learning and networking opportunities to support professional development, as well as professional recognition and technical and scientific knowledge resources on energy in all its forms and applications.

The El's purpose is to develop and disseminate knowledge, skills and good practice towards a safe, secure and sustainable energy system. In fulfilling this mission, the El addresses the depth and breadth of the energy sector, from fuels and fuels distribution to health and safety, sustainability and the environment. It also informs policy by providing a platform for debate and scientifically-sound information on energy issues.

The EI is licensed by:

- the Engineering Council to award Chartered, Incorporated and Engineering Technician status;
- the Science Council to award Chartered Scientist status, and
- the Society for the Environment to award Chartered Environmentalist status.

It also offers its own Chartered Energy Engineer, Chartered Petroleum Engineer and Chartered Energy Manager titles.

A registered charity, the EI serves society with independence, professionalism and a wealth of expertise in all energy matters.

This publication has been produced as a result of work carried out within the Technical Team of the EI, funded by the EI's Technical Partners. The EI's Technical Work Programme provides industry with cost-effective, value-adding knowledge on key current and future issues affecting those operating in the energy sector, both in the UK and internationally.

For further information, please visit http://www.energyinst.org

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

BP Exploration Operating Co Ltd RWE npower
BP Oil UK Ltd Saudi Aramco
Centrica Scottish Power

Chevron SGS

CLH Shell UK Oil Products Limited

ConocoPhillips Ltd Shell U.K. Exploration and Production Ltd

DCC Energy SSE
DONG Energy Statkraft
EDF Energy Statoil

ENGIE Talisman Sinopec Energy (UK) Ltd

ENI Tesoro

E. ON UK
Total E&P UK Limited
ExxonMobil International Ltd
Total UK Limited
Total UK Limited
Tullow Oil
Maersk Oil North Sea UK Limited
Valero
Nexen
Vattenfall
Phillips 66
Vitol

Qatar Petroleum World Fuel Services

However, it should be noted that the above organisations have not all been directly involved in the development of this publication, nor do they necessarily endorse its content.

Copyright © 2016 by the Energy Institute, London.

The Energy Institute is a professional membership body incorporated by Royal Charter 2003.

Registered charity number 1097899, England

All rights reserved

No part of this book may be reproduced by any means, or transmitted or translated into a machine language without the written permission of the publisher.

ISBN 978 0 85293 784 6

Published by the Energy Institute

The information contained in this publication is provided for general information purposes only. Whilst the Energy Institute and the contributors have applied reasonable care in developing this publication, no representations or warranties, express or implied, are made by the Energy Institute or any of the contributors concerning the applicability, suitability, accuracy or completeness of the information contained herein and the Energy Institute and the contributors accept no responsibility whatsoever for the use of this information. Neither the Energy Institute nor any of the contributors shall be liable in any way for any liability, loss, cost or damage incurred as a result of the receipt or use of the information contained herein.

Hard copy and electronic access to EI and IP publications is available via our website, https://publishing.energyinst.org. Documents can be purchased online as downloadable pdfs or on an annual subscription for single users and companies. For more information, contact the EI Publications Team.

e: pubs@energyinst.org

CONTENTS

	Pa	ge
Forew	vord	. 7
Ackno	owledgements	. 8
1	Scope	. 9
2	Introduction	10
_	2.1 Background	
	2.2 Risks associated with working on petroleum tankers	
	2.2.1 Background	
	2.2.2 Flammability of petroleum products	
	2.3 Releases of flammable vapour during maintenance	
	2.4 Release, capture and temporary containment of drained off residual product liquid .	
	2.5 Sources of ignition inside a workshop	
	2.6 Maintenance of service equipment mounted on the tank top	13
Dart A	Legislation and published guidance relative to workshops used for the	
I alt A	maintenance and repair of petroleum road tankers	14
	3.1 Introduction	
	3.2.1 Legal requirements	
	3.2.2 Recommended measures for compliance	
	3.3 Controls on the release of flammable vapour.	
	3.3.1 Legal requirements.	
	3.3.2 Risk assessment	
	3.3.3 Eliminating or reducing the risks from dangerous substances	16
	3.3.4 Hazardous areas – determination and precautions to be taken for them	
	3.3.5 Planning for emergencies	
	3.3.6 Training	
	3.3.7 Recommended measures for compliance	
	3.4 Controls on the handling and storage of flammable liquids	
	3.4.1 Legal requirements	
	3.4.2 Recommendations for compliance	
	3.5.1 Legal requirements	
	3.5.2 Recommendations for compliance	
	3.6 Further published guidance applicable to motor vehicle repair workshops	
	2 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -	
Part B	Workshop location, security, design, construction and equipment installation	20
4	Location and security	20
	4.1 Site location	
	4.2 Site layout	20
	4.3 Site security	21
	4.4 Vehicle security	21
_	Mouleshop design construction and agricus and	22
5	Workshop design, construction and equipment	
	5.1 General statutory requirements	
	5.3 Overall workshop design considerations	

Conte	ents co	ontinued	Page
	5.4	Risk assessment and hazardous area determination	25
		5.4.1 Risk assessment and determination of hazardous areas	25
		5.4.2 Hazardous area drawing	26
	5.5	The removal of vapour from tankers in the workshop	
	5.6	Electrical installation	26
	5.7	Access doors	27
	5.8	Inspection pits	27
	5.9	Work at height	28
	5.10	Facilities for collecting and storing residual products	29
		5.10.1 Collection	29
		5.10.2 Storage	
	5.11	Bulk storage tanks	30
	5.12	Drainage	
	5.13	Heating and artificial ventilation	
	5.14	Engine exhaust fume extraction	
	5.15	Compressed air	
	5.16	Work benches	
	5.17	Handheld/portable equipment	
	5.18	Facilities for personnel	
	5.19	Facility maintenance management	32
Part C	Petro	eleum road tanker maintenance and repair operations in workshops	33
6		th, welfare and protection of personnel	
	6.1 6.2	General	
	6.3 6.4	Control of legionella	
	6.5	Clothing and personal protective equipment (PPE)	
7		maintenance management	
	7.1	Introduction	
	7.2	In-house workshops	
	7.3	Contracted maintenance arrangements	
	7.4	Breakdowns and exceptional repairs	36
8	Train	ing and qualifications of workshop personnel	38
	8.1	Records	38
	8.2	Statutory requirements	38
	8.3	Working on tankers	38
	8.4	Safe use of equipment	38
	8.5	Road testing	38
	8.6	Emergency response	38
9	Admi	ission of tankers into workshops	. 30
-	9.1	Controls and procedures concerning flammable atmospheres and sources of ignition	
	9.2	Collecting residual liquid	
	9.3	Venting of tankers in workshops	
	9.4	Controls to minimise sources of ignition	

Cont	ents co	tinued Pag	е
	9.5	Controls on hot and cold work	3 4 4
10	Work	nop operations4	6
	10.1	Vorkshop inventory	
	10.2	ieneral housekeeping	
	10.3	ermit-to-work system	7
	10.4	arking and movement of tankers	
	10.5	Vorking on tankers – general precautions4	
	10.6	Vorking under tankers	
	10.7	Vork on tanker product containment systems	
	10.8 10.9	lectrical repairs to tankers	
11		eing procedure	
	11.1	General	
	11.2	Sas-freeing preparation	
		as-freeing procedure using an air eductor	
		bas-freeing procedure using wet, low pressure steam (only)	
		Sas testing and gas-free certification	
Anne	exes		
Anne	x A	Typical permit-to-work format5	5
Anne	x B	Typical gas-free certificate	6
Anne	x C	Glossary and acronyms	7
Annex D		References6	1

LIST OF FIGURES AND TABLES

FIGURES				
Figure 1	Example layout for a petroleum road tanker workshop	22		
Figure 2	Examples of safety containers (from HS(G)140, §20)	29		
Figure 3	Example of process for determining workshop controls/procedures	40		
TABLES				
Table 1	Intentional or unintentional releases of petrol (liquid or vapour) in workshops	12		
Table 2	Requirements for hot and cold work on tankers	42		

FOREWORD

This publication has been produced by the Energy Institute's (EI) Road Tanker and Distribution Contractors Panels, with assistance from several operators of workshops for the maintenance and repair of petroleum road tankers in the UK.

The purpose of this publication is to provide guidance for the design, construction and operation of workshops for the maintenance of road tankers that transport main petroleum fuels products (petrol, kerosene, diesel/gas oil and aviation fuels) and which have not been certified gas-free beforehand. In this publication, 'maintenance' includes inspection, test and repair activities, but excludes repairs to the tank shell and product pipework.

This fourth edition of *Design*, construction and operation of workshops for petroleum road tanker maintenance includes more clearly the identification of the legislation relevant to road tanker workshops and provides guidance for compliance with the associated requirements and recommendations. This legislation includes site security, the creation of a potentially explosive atmosphere, the control of substances hazardous to health and working at height. Reference to certain other relevant recommendations published by the UK Health & Safety Executive in connection with vehicle workshops is included.

This publication also provides general guidance for the operation of such workshops. It should be noted that in determining any required safe procedure the effect of any unusual circumstances, on which it is impossible to generalise, should receive due consideration.

This publication is not intended to be a comprehensive guide for general aspects of the design and operation of workshops that are not specific to petroleum road tankers.

Attention is drawn to the fact that in countries other than the UK, there may exist statutory requirements, both local and national, pertaining to the design and construction of buildings in general and premises where petroleum products may be present. This publication is intended to be complementary to such requirements.

It may be noted that the section on petroleum road tanker maintenance and repair operations in workshops remains unchanged from that in the third edition.

Although it is anticipated that the adoption of the guidance in this publication will help to reduce the risk of accidents, the El cannot accept any responsibility, of whatever kind, for damage or alleged damage arising or otherwise occurring in or about premises, areas or tankers, to which this guidance has been applied.

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

ACKNOWLEDGEMENTS

This publication was prepared by Mr. R. J. W. Harris (Amber Engineering Consultancy Ltd) on behalf of the Road Tanker and Distribution Contractors Panels, with the assistance of Toni Needham, Technical Manager, (EI). It was subsequently reviewed by representatives of the following companies and organisations:

BP Oil UK Ltd
DHL – Exel
Federation of Petroleum Suppliers
Hoyer Petrolog
MAN UK Ltd
Phillips 66 Ltd
Scania (Great Britain) Ltd
Shell U.K. Oil Products Ltd
Suckling Transport
The Freight Transport Association Ltd
Wincanton Ltd

1 SCOPE

This publication:

- Identifies the specific additional requirements for a heavy goods vehicle workshop intended to be used for maintaining road tankers used for the carriage of the main petroleum fuels products petrol, kerosene, diesel/heating and aviation fuels and which have not first been certified gas-free.
- Provides guidance for the design, equipping and operation of workshops used for maintaining such petroleum road tankers.
- References the relevant UK legislation for which compliance is essential.

The publication is divided into three parts:

- Part A provides references to relevant legislation for the designing and equipping of workshops associated with maintaining petroleum road tankers inside them which have not been gas-freed.
- Part B provides guidance related to the design and construction of the workshop structure and installed equipment; it is intended to complement general statutory requirements pertaining to the design and construction of buildings and those specific to vehicle workshops and premises where petroleum products may be present.
- Part C provides guidance on procedures and good practice for typical routine maintenance and repair operations in workshops.

This publication does not:

- Apply to the maintenance and repair of road tankers designed and used for the transport of liquefied petroleum gases (LPG) or bitumen, although certain of its provisions may be applicable to such operations.
- Extend to repairs of the tank shell itself or entry into the tank or its compartments.
- Provide a comprehensive guide for all aspects of the design and operation of a workshop for large goods vehicles.