Guidance on inspection and testing of safety critical equipment on retail filling stations
GUIDANCE ON INSPECTION AND TESTING OF SAFETY CRITICAL EQUIPMENT ON RETAIL FILLING STATIONS

First edition

March 2017

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 EI'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 EI 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](http://www.energyinst.org)

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

- Apache North Sea
- BP Exploration Operating Co Ltd
- BP Oil UK Ltd
- Centrica
- Chevron North Sea Ltd
- Chevron Products Company
- CLH
- ConocoPhillips Ltd
- DCC Energy
- DONG Energy
- EDF Energy
- ENGIE
- ENI
- E. ON UK
- ExxonMobil International Ltd
- Innogy
- Kuwait Petroleum International Ltd
- Maersk Oil North Sea UK Limited
- Nexen CNOOC
- Phillips 66
- Qatar Petroleum
- Repsol Sinopec
- RWE npower
- Saudi Aramco
- Scottish Power
- SGS
- Shell UK Oil Products Limited
- Shell U.K. Exploration and Production Ltd
- SSE
- Statkraft
- Statoil
- Tesoro
- Taqa Bratani
- Total E&P UK Limited
- Total UK Limited
- Tullow Oil
- Uniper
- Valero
- Vattenfall
- Vitol Energy
- Woodside
- 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 © 2017 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 994 9

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](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

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foreword</td>
<td>5</td>
</tr>
<tr>
<td>Acknowledgements</td>
<td>6</td>
</tr>
<tr>
<td><strong>1 Introduction</strong></td>
<td><strong>7</strong></td>
</tr>
<tr>
<td>1.1 Scope</td>
<td>7</td>
</tr>
<tr>
<td>1.2 Objectives</td>
<td>7</td>
</tr>
<tr>
<td>1.3 Responsibilities</td>
<td>8</td>
</tr>
<tr>
<td><strong>2 Assurance of filling station equipment</strong></td>
<td><strong>9</strong></td>
</tr>
<tr>
<td>2.1 Introduction</td>
<td>9</td>
</tr>
<tr>
<td>2.2 Conditions for safe operation</td>
<td>9</td>
</tr>
<tr>
<td>2.3 Electrical systems</td>
<td>9</td>
</tr>
<tr>
<td>2.4 Inspection requirements in L133, <em>Unloading petrol from road tankers</em></td>
<td>9</td>
</tr>
<tr>
<td>2.5 Competency of individuals carrying out inspection and testing</td>
<td>10</td>
</tr>
<tr>
<td>2.6 Actions on identifying defects</td>
<td>10</td>
</tr>
<tr>
<td>2.7 Assurance of safety critical systems</td>
<td>11</td>
</tr>
<tr>
<td>2.8 Inspection and test plans</td>
<td>28</td>
</tr>
<tr>
<td><strong>3 Documentation</strong></td>
<td><strong>30</strong></td>
</tr>
<tr>
<td>3.1 Other retail site equipment</td>
<td>30</td>
</tr>
</tbody>
</table>

### Annexes

<table>
<thead>
<tr>
<th>Annex</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annex A</td>
<td>Glossary of acronyms</td>
<td>31</td>
</tr>
<tr>
<td>Annex B</td>
<td>References and bibliography</td>
<td>32</td>
</tr>
</tbody>
</table>
LIST OF FIGURES AND TABLES

FIGURE
Figure 1: Summary of the inspection and maintenance process ................................... 29

TABLES
Table 1: Schedule for the assurance of safety critical systems ..................................... 11
FOREWORD

This publication provides guidance on the appropriate inspection and testing of safety critical equipment at filling stations. The guidance is complementary to both the Energy Institute (EI)/Association for Petroleum and Explosive Administration (APEA) *Design, construction, modification, maintenance and decommissioning of filling stations* (known as The Blue Book) and the Petroleum Enforcement Liaison Group (PELG) *Petrol filling stations Guidance on managing the risks of fire and explosion* (The Red Guide). The EI/APEA *Design, construction, modification, maintenance and decommissioning of filling stations* provides guidance to industry and regulators on best practices to be followed for the design, construction, installation and maintenance of equipment providing the safe storage and handling of fuels at retail filling stations. The PELG *Petrol filling stations Guidance on managing the risks of fire* provides guidance to operators on the processes and procedures to be followed to ensure the day to day safe operation of a petrol filling station including the safe use of the installed equipment.

The objective of this publication is to provide a consolidated reference guide for those involved with the storage and dispensing of vehicle fuels at either retail or commercial premises. The guidance provides an indication of levels of inspection and testing needed to provide assurance that equipment and systems, required for the safe storage and handling of fuels, remain in a condition which meets the system design intent, legal requirements and manufacturers recommendations throughout their operating life.

The inspection and testing schedules cover:

− Identification of the safety critical items and equipment.
− The nature of examinations comprising the:
  − type of faults that should be looked for;
  − typical frequency of inspections and who should do them, and
  − follow up actions that may be required.
− The nature of records to be kept.

The information contained in this publication is for guidance only, and while every reasonable care has been taken to ensure the accuracy of its contents, the EI, and its technical committees, cannot accept any responsibility for any actions taken, or not taken, on the basis of this information. The EI shall not be liable to any person for the loss or damage that may arise from the use of any of the information contained in any of its publications.
ACKNOWLEDGEMENTS

This guidance was commissioned by the EI Service Station Panel and prepared by a representative working group, who at the time comprised:

- Peter Prescott  Formerly Artelia (Shell)
- Phil Lambeth  BP
- Phil Monger  Petrol Retailers Association (PRA)/Petroleum Equipment Installers and Maintenance Federation (PEIMF)
- Doreen Pooley  Forecourt Equipment Federation (FEF)
- Annie Risbridger Hind  Forecourt Equipment Federation (FEF)

The working group was established by the EI Service Station Panel who at the time consisted of the following members:

- Peter Burrell  Artelia
- Phil Lambeth  BP
- Stuart Sealey  Certas
- Teresa Sayers  Downstream Fuel Association (DFA)
- Kerry Sinclair  EI
- Toni Needham  Energy Institute (EI)
- Heidi Cherry  Environment Agency (EA)
- Tony Brown  Federation of Petroleum Suppliers (FPS)
- Mike Melnyk  Forecourt Equipment Federation (FEF)
- John Anthony  Forecourt Equipment Federation (FEF)
- Phil Monger  Petrol Retailers Association (PRA)/Petroleum Equipment Installers and Maintenance Federation (PEIMF)
- Ray Blake  Petrol Retailers Association (PRA)
- Dorman Donnelly  Scottish Environment Protection Agency (SEPA)
- Rollo Wood  Shell
- Andy Berry  Tesco
- Jamie Walker  UK Petroleum Industry Federation (UKPIA)

The EI wishes to record its appreciation of the work carried out by the working group and also its gratitude for the valuable contribution made by the Service Station Panel during the course of the project.
1 INTRODUCTION

This publication identifies retail filling station equipment which is critical to safe operation and recommends suitable inspection and testing frequencies. The inspection and testing schedule in 2.7 shows best practice regimes for routine inspection of equipment including standard visual, more detailed visual and functional tests. Specific inspection and testing requirements for electrical equipment may be set by equipment manufacturers and/or the inspecting electrician. Site operators should also take account of any specific maintenance and inspection regimes recommended by the manufacturer or system designers. Records should be maintained by site operators indicating the inspection and testing regimes to be followed, the results of inspections and any follow up actions.

1.1 SCOPE

This guidance supports the type of equipment identified for use in the EI/APEA Design, construction, modification, maintenance and decommissioning of filling stations. Equipment within the scope of this publication includes:

- The retail site fuel system components involved in the following processes:
  - receiving fuel into the tanks;
  - storage of fuel in underground or above-ground storage tanks;
  - distribution of fuel from tanks to dispensers, and
  - dispensing of fuel to customer vehicles.
- Monitoring equipment.
- Retail site drainage and spillage control.
- Retail site water storage systems e.g. car wash/jet wash systems and foul water systems.
- Retail liquefied petroleum gas (LPG) systems including the following processes:
  - receiving LPG into pressure vessels;
  - storage of LPG in underground or above-ground pressure vessels;
  - distribution of LPG from vessels to dispensers, and
  - dispensing of LPG to customer vehicles.
- Principle civil structures on the retail site:
  - canopies;
  - high rise signage, and
  - buildings.
- Electrical equipment covering:
  - main switch panels;
  - electrical distribution systems;
  - earthing and bonding systems, and
  - vehicle charging systems.

1.2 OBJECTIVES

The objectives of inspection and testing are to:

- Protect the safety and health of site operators, site employees and the general public.
- Minimise potential for damage to property.
− Protect the environment.
− Confirm that equipment remains safe to operate.
− Verify that maintenance, repairs, and alterations are correctly executed.
− Comply with relevant occupational health and safety legislation e.g. Dangerous Substances and Explosive Atmospheres Regulations 2002 (DSEAR) (UK only). Further information can also be found in the PELG Petrol filling stations Guidance on managing the risks of fire and explosion.

1.3 RESPONSIBILITIES

Site operators are responsible for ensuring that an appropriate inspection and testing regime is in place and is carried out for equipment used in association with the storing and dispensing of fuel. A suitable regime should encompass the following:
− Establish and maintain inspection and testing policies, procedures, and schedules.
− Ensure that inspections and testing is carried out by competent and qualified personnel.
− Access to specialist advice and assistance as necessary.
− Planning and execution of inspection and testing of equipment.
− Maintenance of records to identify due dates for inspection and testing of equipment.

Processes should be put in place to:
− Monitor and advise on current or foreseeable defects in equipment function.
− Respond to alarms and take identified control action.
− Control inspection and testing works on site.
− Retain inspection and testing records.