

Guidance on the design, inspection, and use of water bags as test weights

Document reference LEEA 051 dated 01 October 2012

Introduction

This document outlines good practice of persons who design and manufacture water bags for use as test weights in the offshore and marine industries. It also outlines the measures duty holders who own or operate water bags should take to verify their continued integrity and to address the 'potential energy' hazard that exists when using water bags. The Lifting Equipment Engineers Association acknowledges the support given by the Health and Safety Executive in the production of this Guidance.

Background

Almost 30 years ago an incident occurred when a 45t water bag failed causing extensive damage to equipment on an offshore installation. An HSE Safety Notice was issued to the Offshore Industry following the incident and although withdrawn a number of years ago the contents of that Safety Notice have continued to form the basis for the design and inspection of water bags. Recently some manufacturers have questioned the continued validity of some of the contents. This has resulted from operational experience and advances in manufacturing quality standards.

Experience has shown that the best design is one where the load is carried by a webbing lifting set rather than through the material of the bag. This design was originally protected by patents which have now expired allowing all manufacturers to adopt this design.

More recently, two incidents have occurred whilst using water bags to proof load test lifting equipment. The lifting equipment under test failed resulting in extensive damage to both the lifting equipment and nearby equipment as the 'potential energy' in the system was dissipated. Irrespective of the type of test weights used, whenever a load test is to be conducted, the possibility that the item under test will fail should be addressed in the risk assessment and lift plan.

In these cases, the high 'potential energy' in the system was a consequence of positioning the water bags over the side of the installation and a large distance above the surface of the sea.





Product Report

Actions recommended for the Manufacturers of Water Bags

The LEEA have taken the view that the bag containing the water is the load and it is not a lifting accessory. This is consistent with the approach taken with offshore cargo containers and containers used in other industry sectors.

The LEEA have also taken the view that the lifting set is a lifting accessory. However, unlike offshore cargo containers there is no standard detailing the design, testing and inspection of water bags. Consequently the responsibility for the design and the applicable tests to verify the design and manufacture quality rests with the manufacturer. Building upon the contents of the old Safety Notice and following discussions with manufacturers the following criteria is recommended:

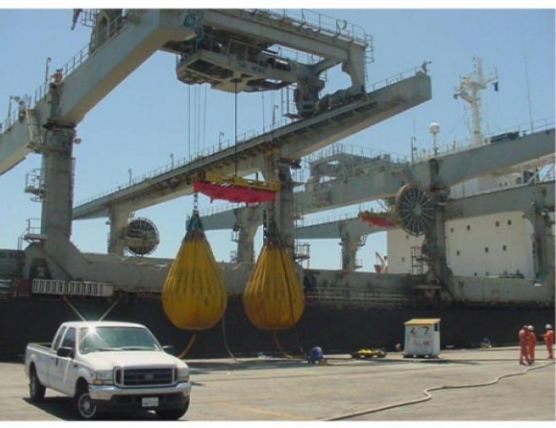
1) The water bag should be designed so that the lifting set is separate from the bag. The lifting set should comprise several elements which share the load.

Each element should be manufactured as a webbing sling in compliance with BS EN 1492-1. Metal fittings used to connect the elements should comply with the relevant standard of the BS EN 1677 series or of BS EN 13889 and meet the requirements of BS EN 1492-1 for interaction with the webbing elements.

The number and disposition of the webbing elements should be such that the failure of any one webbing element will not result in failure of the lifting set nor cause a local overload of the bag. The material and construction of the bag should be such that in the event of accidental rupture, it will resist propagation of the tear so as to minimize the rate at which water is discharged.

2) Each type and size of water bag should undergo a type test. The water bag should be capable of withstanding a load of at least 6 times the working load limit. Note: The accepted method of providing the overload is by means of a drop test. The elements of the lifting set should be subject to the manufacturing test regime specified in clause 6.3.3 of BS EN 1492-1.

Note: The lifting set may be identified and documented either as a complete assembly or as separate lifting accessories.





Product Report



Every bag manufactured should be verified by one of the following methods:

1) A proof load test equal to 2 times the working load limit. This test may be done using the lifting set to be supplied with the bag provided that the calculated average force imposed on each webbing element does not exceed one sixth of the designed minimum failure force of the webbing element. Alternatively a lifting set reserved for test purposes may be used.

Note: The accepted method of providing the overload is by means of a drop test.

2) An inflation test to a pressure in the range of 0.25 – 0.5 bar accompanied by inspection of seam welds for visual integrity and to detect leaks.

Note: This requires the facility to seal the fill and discharge openings in the bag.

Actions recommended for Duty Holders or Persons in control of Water Bags

Water bags are work equipment and are therefore subject to the requirements of PUWER. In addition, the lifting set is a lifting accessory and therefore subject to the requirements of LOLER. Use of a water bag for testing lifting equipment is a lifting operation and therefore subject to the requirements of LOLER.

Water bags can be subjected to damage and wear and the following inspection and thorough examination criteria are recommended. All inspections and thorough examinations should be done by a competent person.

Water bags should be inspected before each use paying particular attention to any damage which may have occurred during previous use, storage and transportation.

At suitable intervals, the bag should be inspected for wear and deterioration as well as damage. A competent person should determine the nature of these inspections and the frequency. These should be based upon use, the operating environment and advice from the manufacturer.





Product Report



The lifting set should be thoroughly examined at intervals not exceeding 6 months or in accordance with an examination scheme to meet the requirements of LOLER.

The bag should be inspected and the lifting set thoroughly examined following major modifications, refurbishment, repair or exceptional circumstances which are liable to jeopardize the safety of the bag.

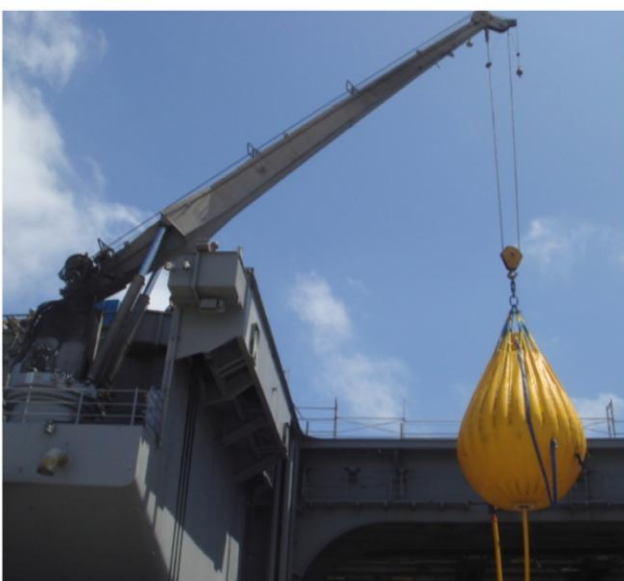
Actions recommended for Duty Holders using Water Bags

Whenever a load test is to be conducted, the possibility that the item under test will fail should be addressed in the risk assessment and lift plan. This risk assessment must include the following specific hazards:

- a) The hazard of the 'potential energy' in the system and the control measures to ensure this energy can be released in a safe manner in the event of the failure of the equipment under test. This 'potential energy' will be minimized by positioning the water bags just above the deck of an offshore installation or just above the surface of the sea.
- b) The hazard of bag failure during the filling and emptying process with such control measures as remote filling, remote emptying and the monitoring of the load in the bag during these stages.

Relevant legal requirements
The relevant legal requirements are contained within:

- a) The Health and Safety at Work Act
- b) The Management of Health and Safety at Work Regulations 1999 (SI 1999/3242)(MHSWR)
- c) The Provision and Use of Work Equipment Regulations 1998 (SI 1998/2306) (PUWER)
- d) The Lifting Operations and Lifting Equipment Regulations 1998 (SI 1998/2307) (LOLER)

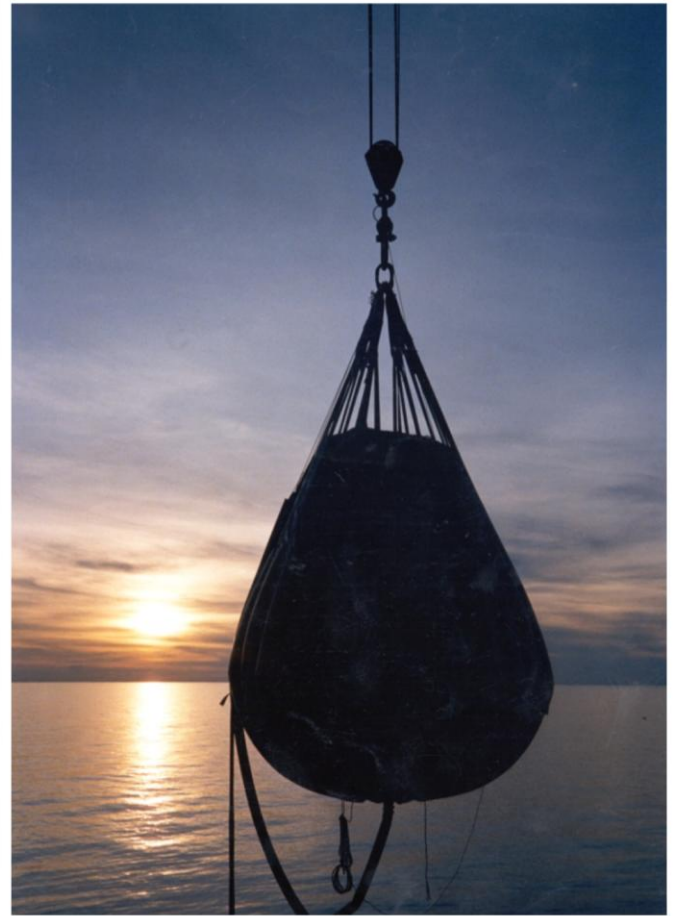




References

You can find more relevant information in the following publications:

- Management of health and safety at work. Management of Health and Safety at Work Regulations 1999. Approved Code of Practice and guidance L21 (Second edition) HSE Books 2000 ISBN 0 7176 2488 9
- Safe use of work equipment. Provision and Use of Work Equipment Regulations 1998. Approved Code of Practice and guidance L22 (Second edition) HSE Books 1998 ISBN 0 7176 1626 6
- Safe use of lifting equipment. Lifting Operations and Lifting Equipment Regulations 1998. Approved Code of Practice and guidance L113 HSE Books 1998 ISBN 0 7176 1628 2



ISO9001:2008
FS 96689



GSA Contract Holder
GS-07F-0287J



ABS
TYPE APPROVED PRODUCT
95-AD10820-X



Originators of the water bag, we provide specialist proof load testing products & services for lifting equipment and structures. Our core commitment remains the provision of products and services to the highest standards in industry.