



BSI Standards Publication

**Liquid cargo handling equipment — Crude oil
offloading system — Tandem mooring winches**

National foreword

This British Standard is the UK implementation of [ISO 24042:2020](#).

The UK participation in its preparation was entrusted to Technical Committee SME/32, Ships and marine technology - Steering committee.

A list of organizations represented on this committee can be obtained on request to its committee manager.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

© The British Standards Institution 2020
Published by BSI Standards Limited 2020

ISBN 978 0 539 04480 5

ICS 47.020.50

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 October 2020.

Amendments/corrigenda issued since publication

Date	Text affected
------	---------------

**INTERNATIONAL
STANDARD**

**ISO
24042**

First edition
2020-10-23

**Liquid cargo handling equipment —
Crude oil offloading system — Tandem
mooring winches**

*Équipement pour la manutention de cargaisons liquides — Systèmes
de déchargement de pétrole brut — Treuils d'amarrage en tandem*



Reference number
ISO 24042:2020(E)

© ISO 2020



COPYRIGHT PROTECTED DOCUMENT

© ISO 2020, Published in Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

Contents

Page

Foreword	iv
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Types	2
4.1 Left-hand winch.....	2
4.2 Right-hand winch.....	2
4.3 Bottom-side winch.....	2
4.4 Top-side winch.....	2
5 Design	4
5.1 General requirements.....	4
5.2 Material stresses.....	4
5.3 Basic calculations.....	4
5.4 Drum and hawser.....	4
5.4.1 Hawser.....	4
5.4.2 Drum diameter.....	4
5.4.3 Drum flange height.....	5
5.5 Quick release mechanism.....	5
5.6 Brake.....	5
5.7 Operating device.....	5
5.8 Auxiliary equipment.....	5
6 Acceptance tests	5
6.1 Test items.....	5
6.1.1 No-load test.....	5
6.1.2 Hawser deployment and recovery test.....	6
6.1.3 Braking test.....	6
6.1.4 SWL test.....	6
6.1.5 Quick release function test.....	6
6.1.6 Full load quick release test.....	6
7 Designation system	6
7.1 Designation of product models.....	6
7.2 Nameplate.....	7

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 8, *Ships and marine technology*, Subcommittee SC 4, *Outfitting and deck machinery*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Liquid cargo handling equipment — Crude oil offloading system — Tandem mooring winches

1 Scope

This document specifies requirements for the design, operation, performance, and acceptance tests of tandem mooring winches.

It is applicable to the design, manufacture and acceptance of tandem mooring winches for crude oil offloading systems of liquid cargo handling equipment.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

[ISO 3828](#), *Shipbuilding and marine structures — Deck machinery — Vocabulary and symbols*

[ISO 7825](#), *Shipbuilding — Deck machinery — General requirements*

[ISO 3730:2012](#), *Shipbuilding and marine structures — Mooring winches*

[ISO 7365:2012](#), *Shipbuilding and marine structures — Deck machinery — Towing winches for deep sea use*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in [ISO 3828](#) and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

3.1

mooring pull

pulling force from the receiving tanker to the tandem mooring winch during crude oil offloading

3.2

hawser deployment and recovery load

maximum pull of the rope measured at the drum exit as the tandem mooring winch starts to haul or veer at the *nominal speed* ([3.3](#)) with a hawser wound on the drum in a single layer

3.3

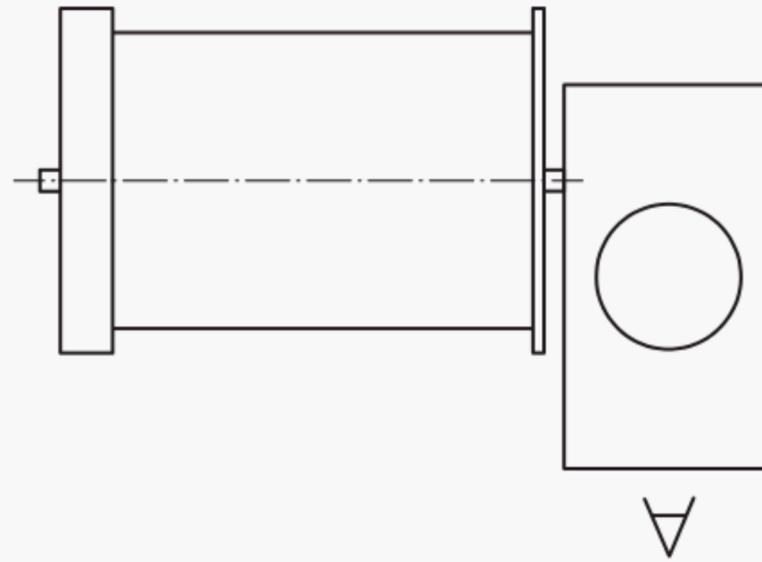
nominal speed

maximum rope speed that the tandem mooring winch can maintain when withstanding the *hawser deployment and recovery load* ([3.2](#))

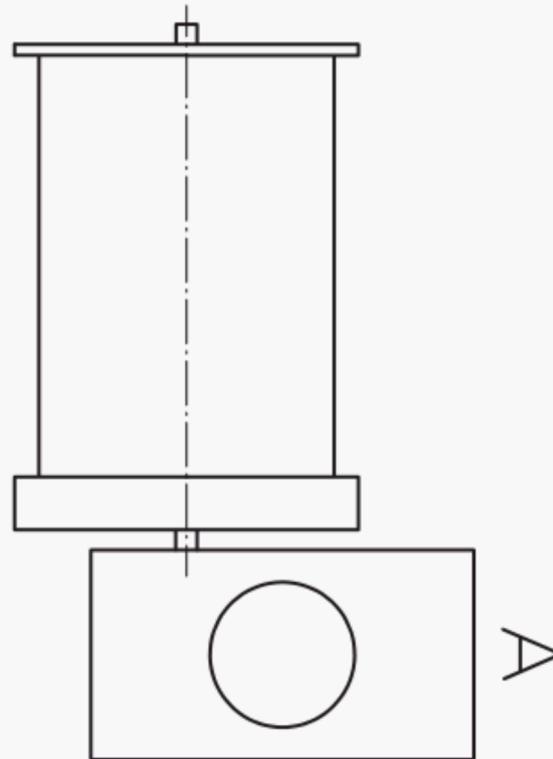
3.4

hawser quick release

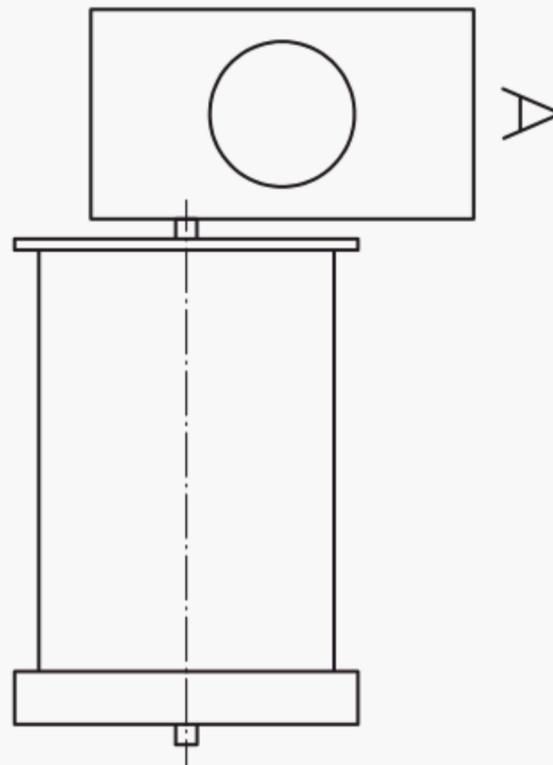
action of a quick release device to release the mooring hawser quickly with conventional or standby power, aiming to release the excessive mooring pull between the hawser winch and lifting vessel under special conditions, such as extreme sea conditions, so as to disconnect the lifting vessel and guarantee the safety of crude oil offloading



b) R type mooring winch



c) B type mooring winch



d) T type mooring winch

Figure 1 — Types of tandem mooring winches

5 Design

5.1 General requirements

The design of tandem mooring winches shall meet the requirements of [ISO 7825](#) and [5.2](#) to [5.8](#).

5.2 Material stresses

In accordance with material stresses given in [ISO 3730:2012](#), 4.2 and [ISO 7365:2012](#), 4.1, winch manufacturers shall determine the strength requirements of winch components to enable them to withstand the loads specified in [5.3](#).

5.3 Basic calculations

5.3.1 The allowable calculated stress of any affected part under the hawser deployment and recovery load shall not be greater than 0,4 times the upper yield strength of the material.

5.3.2 The allowable calculated stress of any affected part under the safe working load shall not be greater than 90 % the upper yield strength of the material.

5.3.3 In dynamical calculations, the required power of actuators on the drive chain shall not be greater than 80 % the rated power of actuators.

5.3.4 The hawser deployment and recovery load of the tandem mooring winch shall be not more than 33 % of the design breaking load of the hawser when it operates under the corresponding nominal speed.

5.3.5 The safe working load shall be not more than 80 % of the design breaking load of the hawser.

5.4 Drum and hawser

5.4.1 Hawser

5.4.1.1 The hawser is generally composed of a main rope, chafe chains, thimbles, shackles, a messenger rope and buoys. The chafe chains, main rope, thimbles and shackles withstand the mooring pull. The messenger ropes and buoys are mainly used to connect the lifting vessel before the mooring operation.

5.4.1.2 If the quick release device is independent, a chafe chain shall be provided at the head and tail of the main rope. The head chafe chain is used to connect the lifting vessel, while the tail chafe chain is used to connect the quick release device.

5.4.1.3 If the quick release device is integrated into a tandem mooring winch, only head chafe chains rather than tail chafe chains can be configured for the connection of the receiving tanker.

5.4.2 Drum diameter

5.4.2.1 For polyester and polyamide (nylon) hawser main ropes, the diameter of the drum shall be not less than six times the design diameter of the main rope.

5.4.2.2 For polypropylene hawser main ropes, the diameter of the drum shall be not less than four times the design diameter of the main rope.

5.4.3 Drum flange height

When all the rope is reeled on a drum, the flange shall project at least 1,5 times the main rope diameter above the outermost layer.

5.5 Quick release mechanism

5.5.1 The quick release device can be integrated into the hawser winch or be designed as a relatively independent device. There is no mutual interference between them in terms of functions during use.

5.5.2 After the hawser fully protrudes from the drum and the quick release device withstands the entire mooring pull, the crude oil offloading can be made.

5.5.3 The quick release device shall be able to monitor the mooring pull with a range of 1,1 to 1,3 times that of the safe working load.

5.5.4 When the mooring pull reaches 60 % and 75 % of the safe working load, the tandem mooring winch shall give an alarm signal to remind the operator to observe and decide whether it is necessary to action the hawser quick release.

5.5.5 There shall be an allowable maximum delay of 4 s from the quick release action to the complete release of the mooring hawser.

5.6 Brake

The tandem mooring winch shall be equipped with a drum braking device to prevent the drum from rolling. The braking force shall be able to withstand the hawser deployment and recovery load.

5.7 Operating device

5.7.1 Permanent signs shall be fixed or marked in the direction of movement of the operating device. When the handwheel or the crank cranks the clockwise rotation, or when the handle moves towards the operator, the tandem mooring winch shall recover the hawser.

5.7.2 Unless agreed between the manufacturer and the purchaser, no matter what kind of power source is used, the operating device shall be designed to automatically return to the stop position when the operator releases the controller.

5.8 Auxiliary equipment

The tandem mooring winch can be equipped with automatic or manually controlled hawser sorting devices.

6 Acceptance tests

6.1 Test items

6.1.1 No-load test

The tandem mooring winch shall operate continuously for 30 min at no less than the nominal speed. Operate in the forward and reverse directions each for 15 min.

6.1.2 Hawser deployment and recovery test

Under the deployment and recovery load of the hawser, the tandem mooring winch shall be continuously operated for 30 min at not less than the nominal speed.

6.1.3 Braking test

Each winch shall be equipped with a drum brake device to enable the drum to withstand hawser retraction loads without rotation.

6.1.4 SWL test

Apply the SWL on the tandem mooring winch or the independent quick release mechanism for 30 min. There shall be no significant plastic deformation.

NOTE This test can be conducted onboard with agreement between the order owner and the manufacturers.

6.1.5 Quick release function test

Apply 1 % of the SWL on the quick release mechanism for 5 min and then quickly release. The release time shall meet the requirements of 5.5.5.

6.1.6 Full load quick release test

Apply 100 % of the SWL on the quick release mechanism for 5 min and then quickly release. The release time shall meet the requirements of 5.5.5.

NOTE This test can be conducted in factory or onboard.

7 Designation system

7.1 Designation of product models

The designation shall be as shown in the example in Figure 2.

EXAMPLE Tandem mooring winch with hydraulic drive, deployment and recovery load of 150 kN, and safe working load of 2 000 kN: **Tandem mooring winch ISO 24042-H-150-2 000-R**

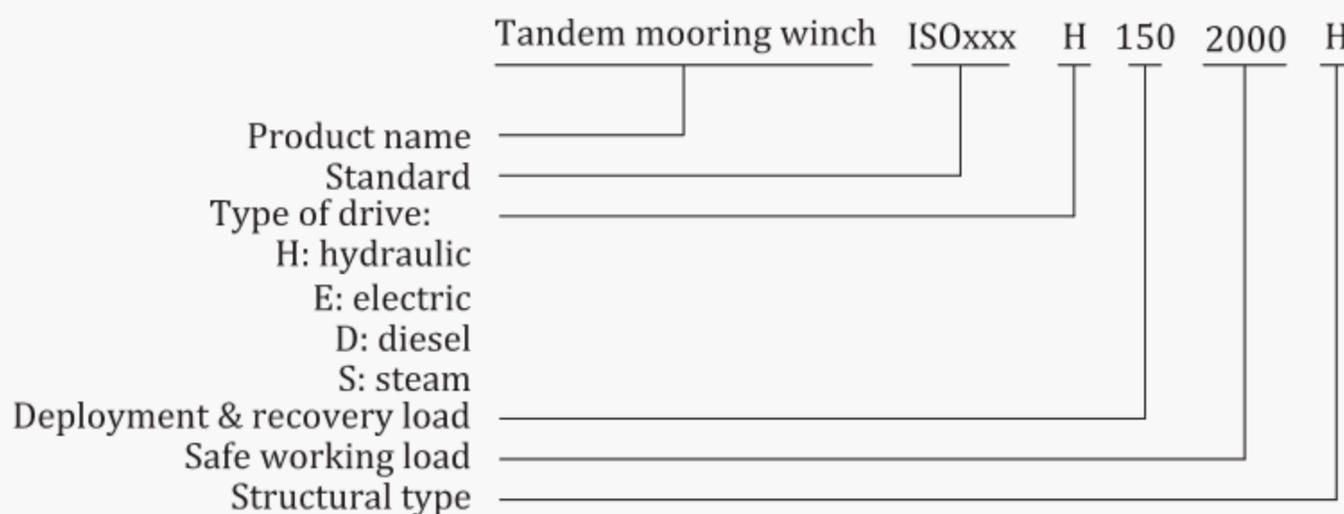


Figure 2 — Product model designation example

7.2 Nameplate

A nameplate shall be permanently affixed on an open area of the tandem mooring winch, with anti-corrosive bolts or rivets, containing at least the following information:

- a) product name;
- b) product model;
- c) designation;
- d) product weight;
- e) inspection stamp;
- f) manufacturing number;
- g) manufacturing date;
- h) manufacturer name.

British Standards Institution (BSI)

BSI is the national body responsible for preparing British Standards and other standards-related publications, information and services.

BSI is incorporated by Royal Charter. British Standards and other standardization products are published by BSI Standards Limited.

About us

We bring together business, industry, government, consumers, innovators and others to shape their combined experience and expertise into standards-based solutions.

The knowledge embodied in our standards has been carefully assembled in a dependable format and refined through our open consultation process. Organizations of all sizes and across all sectors choose standards to help them achieve their goals.

Information on standards

We can provide you with the knowledge that your organization needs to succeed. Find out more about British Standards by visiting our website at bsigroup.com/standards or contacting our Customer Services team or Knowledge Centre.

Buying standards

You can buy and download PDF versions of BSI publications, including British and adopted European and international standards, through our website at bsigroup.com/shop, where hard copies can also be purchased.

If you need international and foreign standards from other Standards Development Organizations, hard copies can be ordered from our Customer Services team.

Copyright in BSI publications

All the content in BSI publications, including British Standards, is the property of and copyrighted by BSI or some person or entity that owns copyright in the information used (such as the international standardization bodies) and has formally licensed such information to BSI for commercial publication and use.

Save for the provisions below, you may not transfer, share or disseminate any portion of the standard to any other person. You may not adapt, distribute, commercially exploit or publicly display the standard or any portion thereof in any manner whatsoever without BSI's prior written consent.

Storing and using standards

Standards purchased in soft copy format:

- A British Standard purchased in soft copy format is licensed to a sole named user for personal or internal company use only.
- The standard may be stored on more than one device provided that it is accessible by the sole named user only and that only one copy is accessed at any one time.
- A single paper copy may be printed for personal or internal company use only.

Standards purchased in hard copy format:

- A British Standard purchased in hard copy format is for personal or internal company use only.
- It may not be further reproduced – in any format – to create an additional copy. This includes scanning of the document.

If you need more than one copy of the document, or if you wish to share the document on an internal network, you can save money by choosing a subscription product (see 'Subscriptions').

Reproducing extracts

For permission to reproduce content from BSI publications contact the BSI Copyright and Licensing team.

Subscriptions

Our range of subscription services are designed to make using standards easier for you. For further information on our subscription products go to bsigroup.com/subscriptions.

With **British Standards Online (BSOL)** you'll have instant access to over 55,000 British and adopted European and international standards from your desktop. It's available 24/7 and is refreshed daily so you'll always be up to date.

You can keep in touch with standards developments and receive substantial discounts on the purchase price of standards, both in single copy and subscription format, by becoming a **BSI Subscribing Member**.

PLUS is an updating service exclusive to BSI Subscribing Members. You will automatically receive the latest hard copy of your standards when they're revised or replaced.

To find out more about becoming a BSI Subscribing Member and the benefits of membership, please visit bsigroup.com/shop.

With a **Multi-User Network Licence (MUNL)** you are able to host standards publications on your intranet. Licences can cover as few or as many users as you wish. With updates supplied as soon as they're available, you can be sure your documentation is current. For further information, email cservices@bsigroup.com.

Revisions

Our British Standards and other publications are updated by amendment or revision.

We continually improve the quality of our products and services to benefit your business. If you find an inaccuracy or ambiguity within a British Standard or other BSI publication please inform the Knowledge Centre.

Useful Contacts

Customer Services

Tel: +44 345 086 9001

Email: cservices@bsigroup.com

Subscriptions

Tel: +44 345 086 9001

Email: subscriptions@bsigroup.com

Knowledge Centre

Tel: +44 20 8996 7004

Email: knowledgecentre@bsigroup.com

Copyright & Licensing

Tel: +44 20 8996 7070

Email: copyright@bsigroup.com

BSI Group Headquarters

389 Chiswick High Road London W4 4AL UK