INTERNATIONAL STANDARD

ISO

23251

Second edition
2019-03

Petroleum, petrochemical and natural gas industries — Pressure-relieving and depressuring systems

Industries du pétrole, de la pétrochimie et du gaz naturel — Systèmes de dépressurisation et de protection contre les surpressions

Contents

Page

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 67, *Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries*, Subcommittee SC 6, *Processing equipment and systems*.

This second edition cancels and replaces the first edition (ISO 23251:2006), which has been technically revised. It also incorporates the Technical Corrigendum ISO 23251:2006/Cor.1:2007 and the Amendment ISO 23251:2006/Amd.1:2008.

This document supplements API Std 521, 6th edition (2014).

The technical requirements of this document and API Std 521 used to be identical. In the meantime API Std 521 has been technically revised as API Std 521, 6th edition (2014). The purpose of this document is to bring it up to date, by referencing the current edition of API Std 521 and adding supplementary content.

The main changes compared to the previous edition are as follows:

— Permission to use administrative controls such as car-sealing or chain-locking valves to prevent an over-pressure only if the corrected hydrotest pressures are not exceeded;

— Addition of requirements to cover choke valve failures and acoustic fatigue;

— Strengthening of the requirements to evaluate check valve reverse flow failures;

— Addition of guidance on the use of alternative method for fire relief and blowdown system design.

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.

Introduction

Users of this document are informed that further or differing requirements can be needed for individual applications. This document is not intended to inhibit a vendor from offering, or the purchaser accepting, alternative equipment or engineering solutions for the individual application. This can be particularly applicable where there is innovative or developing technology. Where an alternative is offered, the vendor needs to identify any variations from this document and provide details.

Petroleum, petrochemical and natural gas industries — Pressure-relieving and depressuring systems

1 Scope

This document is applicable to pressure-relieving and vapour depressuring systems. Although intended for use primarily in oil refineries, it is also applicable to petrochemical facilities, gas plants, Liquefied Natural Gas (LNG) facilities and oil and gas production facilities. The information provided is designed to aid in the selection of the system that is most appropriate for the risks and circumstances involved in various installations.

This document supplements API Std 521, 6th edition (2014), the requirements of which are applicable with the exceptions specified in this document.

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 4126 (all parts), *Safety devices for protection against excessive pressure*

ISO 15649, *Petroleum and natural gas industries — Piping*

ISO 25457, *Petroleum, petrochemical and natural gas industries — Flare details for general refinery and petrochemical service*

ISO 28300, *Petroleum, petrochemical and natural gas industries — Venting of atmospheric and low-pressure storage tanks*

API Std 521, *6th edition (2014), Pressure-relieving and depressuring systems*

EN 764-7, *Pressure equipment — Part 7: Safety systems for unfired pressure equipment*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in API Std 521, 6th edition (2014) 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
pressure-relief valve
safety valve
valve designed to open and relieve excess pressure and to reclose and prevent the further flow of fluid after normal conditions have been restored

[SOURCE: API Std 521, 6th edition (2014), 3.1.59, modified — Admitted term was added.]

Note 1 to entry: "Pressure-relief valve" is equivalent to 3.1.59 in API Std 521, 6th edition (2014). It is reproduced here for clarity.

3.2
rupture disc device
bursting disc safety device
nonreclosing pressure-relief device actuated by static differential pressure between the inlet and outlet of the device and designed to function by the bursting of a rupture disc

[SOURCE: API Std 521, 6th edition (2014), 3.1.71, modified — Admitted term was added.]

Note 1 to entry: "Rupture disc device" is equivalent to 3.1.71 in API Std 521, 6th edition (2014). It is reproduced here for clarity.

3.3
safety valve
pressure-relief valve
spring-loaded pressure-relief valve actuated by the static pressure upstream of the valve and characterized by rapid opening or pop action

[SOURCE: API Std 521, 6th edition (2014), 3.1.75, modified — Admitted term was added.]

Note 1 to entry: "Safety valve" is equivalent to 3.1.75 in API Std 521, 6th edition (2014). It is reproduced here for clarity.

4 Supplements to API Std 521, 6th edition (2014)

4.1 General requirements

The requirements specified in API Std 521, 6th edition (2014) shall apply, with the exceptions specified in 4.2 to 4.8.

4.2 Chemical reaction

The requirements specified in API Std 521, 6th edition (2014), 4.4.11.1 c) apply with the following exceptions.

An additional methodology for sizing an emergency vent for chemical reactions and other two-phase flow applications is given in ISO 4126-10.

4.3 Fires

The requirements specified in API Std 521, 6th edition (2014), 4.4.13.2.1, Paragraph 2 and 4.4.13.2.3, Table 4 apply with the following exceptions.

For the purpose of this provision, ISO 28300 shall be used in place of API Std 2000.

The requirements specified in API Std 521, 6th edition (2014), 4.4.13.2.4.3, Formula (9) with the following exceptions.

For the purpose of this provision, the ISO 4126 series shall be used in place of API RP 520-1.

The requirements specified in API Std 521, 6th edition (2014), 4.4.13.2.4.3, Formula (10) with the following exceptions.

The coefficient, C, in Formula (10) is different from the coefficient, C, given in ISO 4126-7. Users should ensure that whenever the coefficient, C, is used in this document, it is the C from Formula (10) that applies and not the one mentioned in ISO 4126-7.

The requirements specified in API Std 521, 6th edition (2014), 4.4.13.2.5.4 with the following exceptions.

An additional methodology for sizing PRV or emergency vent on mixed phase flow applications is given in ISO 4126-10.

4.4 Causes for vacuum

The requirements specified in API Std 521, 6th edition (2014), 4.5.2 c) and h) apply with the following exceptions.

For the purpose of this provision, ISO 28300 shall be used in place of API Std 2000.

4.5 Considerations for individual PRDs

4.5.1 General

The requirements specified in API Std 521, 6th edition (2014), 4.9.1 apply with the following exceptions.

For the purpose of this provision, the ISO 4126 series shall be used in place of API RP 520-1.

4.5.2 Multiple PRDs

The requirements specified in API Std 521, 6th edition (2014), 4.9.4.1 apply with the following exceptions.

For the purpose of this provision, EN 764-7 shall be used in place of ASME Code, Section VIII, Division 1.

The requirements specified in API Std 521, 6th edition (2014), 4.9.4.3 apply with the following exceptions.

For the purpose of this provision, EN 764-7 shall be used in place of API RP 520-1 and API RP 520-2.

4.6 Piping

4.6.1 General

The requirements specified in API Std 521, 6th edition (2014), 5.5.1 apply with the following exceptions.

For the purpose of this provision, ISO 15649 shall be used in place of ASME B31.3 and the ISO 4126 series shall be used in place of API RP 520-2.

4.6.2 Backpressure

The requirements specified in API Std 521, 6th edition (2014), 5.5.2 apply with the following exceptions.

For the purpose of this provision, the ISO 4126 series shall be used in place of API RP 520-1.

4.6.3 Line sizing

The requirements specified in API Std 521, 6th edition (2014), 5.5.3 apply with the following exceptions.

For the purpose of this provision, the ISO 4126 series shall be used in place of API RP 520-1.

4.6.4 Multiple relief scenarios

The requirements specified in API Std 521, 6th edition (2014), 5.5.4 apply with the following exceptions.

For the purpose of this provision, ISO 25457 shall be used in place of API Std 537.

4.6.5 Reaction forces

The requirements specified in API Std 521, 6th edition (2014), 5.5.14 apply with the following exceptions.

For the purpose of this provision, the ISO 4126 series shall be used in place of API RP 520-2.