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Supplementary Specification to API Standard 537 for Flare Package

Public Review Draft



Revision history

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Acknowledgements

This IOGP Specification was prepared by a Joint Industry Programme 33 Standardization of Equipment Specifications for Procurement organized by IOGP with support by the World Economic Forum (WEF).

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Foreword

This specification was prepared under Joint Industry Programme 33 (JIP33) "Standardization of Equipment Specifications for Procurement" organized by the International Oil & Gas Producers Association (IOGP) with the support from the World Economic Forum (WEF). Companies from the IOGP membership participated in developing this specification to leverage and improve industry level standardization globally in the oil and gas sector. The work has developed a minimized set of supplementary requirements for procurement, with life cycle cost in mind, resulting in a common and jointly agreed specification, building on recognized industry and international standards.

Recent trends in oil and gas projects have demonstrated substantial budget and schedule overruns. The Oil and Gas Community within the World Economic Forum (WEF) has implemented a Capital Project Complexity (CPC) initiative which seeks to drive a structural reduction in upstream project costs with a focus on industry-wide, non-competitive collaboration and standardization. The CPC vision is to standardize specifications for global procurement for equipment and packages. JIP33 provides the oil and gas sector with the opportunity to move from internally to externally focused standardization initiatives and provide step change benefits in the sector's capital projects performance.

This specification has been developed in consultation with a broad user and supplier base to realize benefits from standardization and achieve significant project and schedule cost reductions.

The JIP33 work groups performed their activities in accordance with IOGP's Competition Law Guidelines (November 2020).

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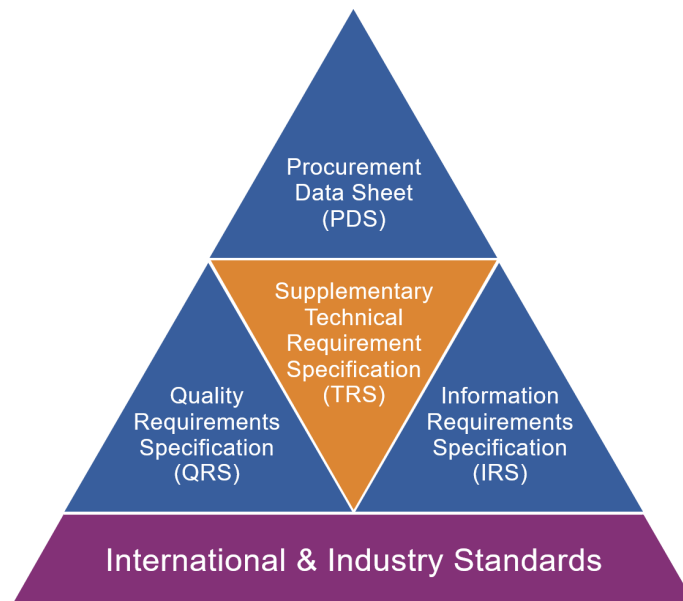
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Public Review Draft

Introduction

The purpose of the IOGP S-722 specification documents is to define a minimum common set of requirements for the procurement of flare packages in accordance with API Standard 537, Fourth Edition, Flare Details for Petroleum, Petrochemical, and Natural Gas Industries, published November 2024, for application in the petroleum and natural gas industries.

The IOGP S-722 specification documents follow a common structure (as shown below) comprising a specification, also known as a technical requirements specification (TRS), a procurement data sheet (PDS), an information requirements specification (IRS) and a quality requirements specification (QRS). These four specification documents, together with the purchase order, define the overall technical specification for procurement.



JIP33 Specification for Procurement Documents Supplementary Technical Requirements Specification (TRS)

This specification is to be applied in conjunction with the supporting PDS, IRS and QRS as follows.

IOGP S-722: Supplementary Specification to API Standard 537 for Flare Package

This specification defines technical requirements for the supply of the equipment and is written as an overlay to API Standard 537, following the API Standard 537 clause structure. Clauses from API Standard 537 not amended by this specification apply as written. Modifications to API Standard 537 defined in this specification are introduced by a description that includes the type of modification (i.e. *Add*, *Replace* or *Delete*) and the position of the modification within the clause.

NOTE Lists, notes, tables, figures, equations, examples and warnings are not counted as paragraphs.

IOGP S-722D: Procurement Data Sheet for Flare Package (API)

The PDS defines application-specific requirements. The PDS is applied during the procurement cycle only and does not replace the equipment data sheet. The PDS may also include fields for supplier-provided information required as part of the purchaser's technical evaluation. Additional purchaser-supplied documents may also be incorporated or referenced in the PDS to define scope and technical requirements for enquiry and purchase of the equipment.

IOGP S-722L: Information Requirements for Flare Package (API)

The IRS defines information requirements for the scope of supply. The IRS includes information content, format, timing and purpose to be provided by the supplier, and may also define specific conditions that invoke the information requirements.

IOGP S-722Q: Quality Requirements for Flare Package (API)

The QRS defines quality management system requirements and the proposed extent of purchaser conformity assessment activities for the scope of supply. Purchaser conformity assessment activities are defined through the selection of one of four generic conformity assessment system (CAS) levels on the basis of evaluation of the associated service and supply chain risks. The applicable CAS level is specified by the purchaser in the PDS or in the purchase order.

The specification documents follow the editorial format of API Standard 537 and, where appropriate, the drafting principles and rules of ISO/IEC Directives Part 2.

The PDS and IRS are published as editable documents for the purchaser to specify application-specific requirements. The TRS and QRS are fixed documents.

The order of precedence of documents applicable to the supply of the equipment, with the highest authority listed first, shall be as follows:

- a) regulatory requirements;
- b) contract documentation (e.g. purchase order);
- c) purchaser-defined requirements (e.g. PDS, IRS and QRS);
- d) this specification;
- e) API Standard 537.

1 Scope

Replace section with

This supplementary specification provides requirements and guidance for the selection, design, specification, operation, and maintenance of flares and related combustion and mechanical components used in pressure-relieving and vapor-depressurizing systems for petroleum, petrochemical and natural gas industries. This supplementary specification is intended for onshore and offshore facilities.

The following types of flares are outside the scope of this specification:

- liquid burner flares;
- burn pits;
- flare burners with assist media other than steam and air (e.g. high-pressure gas or water);
- temporary, mobile, trailer mounted flares.

Annex A, Annex B, Annex C and Annex D provide further guidance and best practices for the selection specification and mechanical details for flares and on the design, operation and maintenance of flare combustion and related equipment.

It is intended that IOGP S-722D is used to communicate and record design information. The datasheets in Annex F and instructions in Annex E are retained for information.

2 Normative References

Add to first paragraph

The following documents are referred to in this specification, the PDS (IOGP S-722D) or the IRS (IOGP S-722L) in such a way that some or all of their content constitutes requirements of these specification documents.

Add to section

ASME B16.47, *Large Diameter Steel Flanges*

ASTM A193/A193M, *Standard Specification for Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications*

EN 1092-1, *Flanges and their joints – Circular flanges for pipes, valves, fittings and accessories, PN designated – Part 1: Steel flanges*

ISO 1461, *Hot dip galvanized coatings on fabricated iron and steel articles — Specifications and test methods*

ISO 10684, *Fasteners — Hot dip galvanized coatings*

IOGP S-562, *Supplementary Specification to API Specification 6D for Ball Valves*

IOGP S-611, *Supplementary Specification to API 600 for Steel Gate Valves*

IOGP S-619, *Specification for Unfired, Fusion Welded Pressure Vessels*

IOGP S-703, *Supplementary Specification to IEC 60034-1 for Low-Voltage Three Phase Cage Induction Motors*

IOGP S-704, *Supplementary Specification to IEC 60034-1 for High-Voltage Three-phase Cage Induction Motors*

IOGP S-705, *Supplementary Specification to API Recommended Practice 582 for Welding of Pressure Equipment and Piping*

IOGP S-707, *Supplementary Specification to ISO 12490 Actuators for On-off Valves*

IOGP S-715, *Supplementary Specification to Norsok M-501 Coating and Painting for Offshore, Marine Coastal and Subsea Environments*

IOGP S-718, *Specification for Basic Process Measurement Instruments*

IOGP S-729, *Specification for Control Valves*

IOGP S-738, *Supplementary Specification to Norsok M-004 Insulation for Piping and Equipment*

3 Terms, Definitions, Acronyms, and Abbreviations

3.2 Specific Terms and Definitions

Add new term

3.2.67

Winterization

Set of design and operating provisions that protect equipment and piping from the effects of ambient temperatures lower than or equal to 0 °C (32 °F).

NOTE Typical measures include heat tracing, insulation, drain and vent provisions, low-temperature material selection, and freeze protection for instruments and pilots.

3.3 Acronyms and Abbreviations

Add to section

FCAW	flux-cored arc welding
HAZ *	heat affected zone
PMI	positive material identification

* Cited in IOGP S-722J only.

4 Design

4.2 System Design

4.2.1 General

Add to list item a) after "release"

and including a minimum continuous case;

4.2.2 Purging

4.2.2.1

In first sentence, replace "by utilizing a noncondensable flammable or inert gas" with

by utilizing the following:

- a) noncondensable inert gas when available;
- b) noncondensable flammable gas when noncondensable inert gas is not available.

4.4 Types of Flares

In second sentence of NOTE 1, replace "datasheets in Annex F and instructions on their use in Annex E" with

IOGP S-722D and Annex E

4.5 Flare Burners

Add new list section to list section a)

- The material of the flare burner shall be type 310 SS or other high-temperature alloy with mechanical and corrosion resistance properties at 900 °C (1650 °F) exceeding those of type 310 SS.

NOTE Properties affecting material selection are high temperature yield strength, creep rupture strength, thermal fatigue resistance, metallurgical stability, weldability and resistance to oxidation, sulfidation, chloridation, carburization and nitridation.

Add new list section to list section a)

- Attachments welded to the flare burner shall be of the same material as the flare burner.

Add new list section to list section a)

- The minimum thickness of the flare burner barrel shall be 6 mm (0.25 in.) for burners with a barrel diameter less than 0.914 m (36 in.) and 9 mm (0.35 in.) for burners with barrel diameters of 0.914 m (36 in.) and above.

Add new list section to list section a)

- Internal or external refractory lining shall not be used for elevated flare burners.

Add new list section to list section a)

- Pipe or tube used for the fabrication of the burner parts shall be seamless type.

Add new list section to list section a)

- The material of steam injection nozzles and steam piping exposed to flame shall be type 316 SS or other 300 series stainless steel with equal or higher corrosion resistance.

Add new list section to list section a)

- The material of assist air distribution and injection parts exposed to the flame shall be type 310 SS or other high-temperature alloy with mechanical and corrosion resistance properties at 900 °C (1650 °F) exceeding those of type 310 SS.

NOTE Properties affecting material selection are high temperature yield strength, creep rupture strength, thermal fatigue resistance, metallurgical stability, weldability and resistance to oxidation, sulfidation, chloridation, carburization and nitridation.

Add new list section to list section a)

- For type 310 SS flare burners in offshore or coastal locations, the bolting for all flanged connections and attachments to the flare burner shall be ASTM A193/A193M Grade B8MLCuNA or high nickel alloy material.

Add new list section to list section a)

- For type 310 SS flare burners in onshore locations, excluding coastal, the bolting for all flanged connections and attachments to the flare burner shall be ASTM A193/A193M Grade B8M.

Add new list section to list section a)

- For high nickel alloy flare burners, the bolting for high nickel alloy flanged connections and attachments to the flare burner shall be of the same material.

Add new list section to list section a)

- The windshield and attachment of the windshield to the flare burner shall be designed for differential thermal expansion.

Add new list section to list section a)

- The material of construction for the flare burner windshield and windshield supports shall be the same as the flare burner material.

Add new list section to list section a)

- Velocity and venturi-type purge seals shall have drain holes incorporated at the bases.

Add new list section to list section a)

- The material of velocity and venturi-type purge seals shall be the same as the flare burner material.

Add new list section to list section b)

- Where heat tracing is specified, drains on the flare stack shall be routed to grade, heat-traced and insulated.

Add new list section to list section b)

- Separate steam risers and controls shall be provided for each steam injection system.

Add new list section to list section b)

- Where winterization is specified, the muffler shall have a condensate drain pan with the drain line to grade.

Add new list section to list section b)

- Where winterization is required, the muffler drain pan and condensate drain line shall be heat traced and insulated.

Add new list section to list section b)

- Where winterization is required and steam heat tracing on the surface of the muffler drain pan is selected, the tracing shall include the following:
 - 1) steam tracing, supplied from the smokeless steam supply line;
 - 2) thermo-dynamic steam trap with discharge to the drain line.

Add new list section to list section b)

- The owner shall specify whether the use of center steam is allowed.

Add new list section to list section b)

- Center steam shall be supplied from a separate line to enable closing the center steam in freezing conditions while steam for smoke suppression can still be in service.

Add new list section to list section b)

- Where winterization is required and the center steam is provided, the center steam line shall be isolatable at grade and drainable.

Add new list section to list section b)

- Where winterization is required, the steam supply line to the burner shall be insulated.

Add new list section d)

- d) For flare burners with a single variable orifice, a full flow bypass around the flare burner shall be provided.

Add new list section e)

- e) For flares with multiple variable orifices, the capacity of the flare burner shall be increased above the required design capacity by the maximum flow rate of a single variable orifice.

Add new list section f)

- f) Flare burner designs shall be proven in successful operation for at least five years in two or more installations.

NOTE New technologies can be accepted on a case-by-case basis, upon the owner's approval. Additional design verification and validation information such as prototype tests, functional, operational, performance, field test results and comparison to similar proven designs may be required from the supplier.

4.6 Mechanical Design

4.6.1

Replace second sentence of list section b) with

Structural components shall comply with the specified structural design code, the supplemental requirements in this standard and the site specific structural design specification.

4.6.5

Add new list item p)

- p) thermal cycling, flame-lick and low flows;

Add new list item q)

- q) constraints of the available shipping, receiving and handling facilities.

4.7 Pilots

Add to start of list section a)

For onshore applications,

Add new NOTE to list section a)

NOTE For offshore applications, pilots may be on demand when paired with a kinetic (ballistic) system (see 4.16).

Add to list section e)

The performance verification type-test shall be in accordance with A.6.

Add to list section f)

For multi-burner staged flares, at least two pilots shall be provided for each stage or for each row of burners.

Add reference to footnote ^a to Table 1 heading

Table 1— Number of Pilots for Single-point Flares ^a

Add footnote ^a

^a For elevated flares with multi-point or complex geometry burners, the inlet diameter of the flare burner shall be used instead of the flare burner outlet diameter.

Replace list section i) with

- i) The pilot burner head shall be a single cast piece or machined from a single (monolithic) piece of wrought material.

Replace list section k) with

- k) A settling chamber or a strainer with openings no larger than 25 % of the fuel orifice diameter shall be installed upstream of the gas orifice at the pilot.

Replace list section l) with

- l) The pilot tip and pilot components between the pilot tip and the air mixer shall be type 310 SS or other high-temperature alloy with mechanical and corrosion resistance properties at 900 °C (1650 °F) exceeding those of type 310 SS.

NOTE Properties affecting material selection are high temperature yield strength, creep rupture strength, thermal fatigue resistance, metallurgical stability, weldability and resistance to oxidation, sulfidation, chloridation, carburization and nitridation.

Delete list item o) NOTE

Replace list section q) with

- q) For flares with continuously lit pilots, individual fuel gas supply lines shall be installed to each pilot from a location that is accessible while the flare is in service.

Add new list section r)

- r) Pilots shall be self-inspiring pre-mix type burners with fixed heat release.

Add new list section s)

- s) Strainers shall be installed upstream of the pilot fuel gas regulator.

Add new list section t)

- t) Strainers shall be accessible for online cleaning without interruption of the fuel gas supply to the pilots.

Add new list section u)

- u) Strainers shall have a screen or wire mesh with openings that are 25 % or less than the diameter of the fuel orifice at the pilot.

Add new list section v)

- v) Pressure regulators shall be accessible for online maintenance without interruption of the fuel gas supply to the pilots.

Add new list section w)

- w) For offshore or coastal locations, the material for pilot fuel gas regulator strainers, regulators, valves, piping and fittings shall be type 316 SS or other material with higher corrosion resistance.

NOTE Valve and regulator material is for body material. Trim material may have greater corrosion or erosion resistant properties than those of the body material.

Add new list section x)

- x) For onshore locations, excluding coastal, the material for pilot fuel gas regulator strainers, regulators, valves, piping and fittings shall be type 304 SS or other material with higher corrosion resistance.

NOTE Valve and regulator material is for body material. Trim material may have greater corrosion or erosion resistant properties than those of the body material.

Add new list section y)

- y) If specified, the pilot performance test shall be carried out in accordance with A.6.

Add new list section z)

- z) Pilot tip connections shall be flanged.

Add new list section aa)

- aa) The pilot lines shall include a quarter turn isolation valve and pressure gauge.

Add new list section ab)

ab) Adjustable air doors for the pilots shall not be used.

Add new list section ac)

ac) The fuel pressure regulator station shall be provided with a flanged connection for pressure monitoring.

Add new list section ad)

ad) When winterization is required, the pilot gas venturi air mixers shall include a solution (e.g. electric heating elements) to prevent hoar frost build up at the pilot mixer.

4.8 Pilot Ignition Systems

4.8.1

Replace last sentence of list section a) with

The performance verification test shall be in accordance with A.6.

Add new list section c) NOTE

NOTE The flame front ignition panel can allow each pilot to ignite separately, through an individual flame front propagation line per pilot equipped with an isolation valve at the ignition panel outlet.

Add new list section f)

f) For flares that cannot be taken offline without impact on safety, two independent pilot ignition systems shall be provided.

Add new list section g)

g) For flares that cannot be taken offline without impact on safety, at least one of the pilot ignition systems shall have all parts requiring maintenance installed at a location that is accessible while the flare is in service.

Add new list section h)

h) The primary pilot ignition system shall have automatic pilot re-ignition upon detection of pilot flame failure.

Add new list section i)

i) High-tension type ignition systems shall not be used for spark ignition at the pilot.

NOTE High-tension and high-voltage type ignition systems utilize sparking devices with a dielectric insulator between the electrodes and an air gap between the ends of the electrodes. High-tension type systems typically require voltages above 8 kV to produce a spark. Refer to A.4.3 for further information.

Add new list section j)

j) Components of ignition systems shall be proven in successful operation for at least five years in two or more installations.

NOTE New technologies can be accepted on a case-by-case basis. Additional design verification and validation information such as prototype tests, functional, operational, performance, field test results and comparison to similar proven designs may be required from the supplier.

Add new list section k)

- k) The following functions shall be implemented in the local control panel:
- 1) power on/off selection and indication;
 - 2) pilot lit/unlit status indication for each pilot;
 - 3) automatic/manual ignition mode selection for the primary ignition system;
 - 4) manual spark pushbuttons for the primary and secondary ignition systems;
 - 5) pilot selection for the FFG system if automated valves are provided on the pilot lines.

Add new list section l)

- l) A functional test of ignition and flame detection system shall be performed at the supplier's facility.

Add new list section m)

- m) Unless otherwise specified, primary ignition shall be by high energy spark ignitor supplemented with manual FFG as back up.

Add new list section n)

- n) FFG piping shall have no pockets and be sloped to drain downstream of the mixing chamber.

Add new list section o)

- o) For flame front generators that need to be capable of lighting the pilots during a total power outage, a piezoelectric backup ignitor shall be added to the FFG ignition system.

Replace section with

4.8.2

The local control panel shall be installed at a location that is accessible while the flare is in service.

Add new section

4.8.3 High Energy Ignition

For a high energy ignition system, the following shall apply.

- a) The sparking device shall ignite the fuel/air mixture prior to the pilot tip.
- b) Ignition system electrical components shall be rated to withstand the highest temperature which they are exposed to during all flaring cases.
- c) The ignition cable connecting the ignition probe with the first junction box shall be protected from the flare flame radiation.
- d) The first junction box shall be installed in a sheltered location under the flare burner access platform or the other heat shield.
- e) The junction boxes installed local to the pilots shall be constructed of 310 stainless steel material with a high temperature gasket and ceramic connectors.

- f) The ignition system exciter shall be installed at a location that is accessible during flare service.

Add new section

4.8.4 Flame Front Generator (FFG)

For an FFG ignition system, the following shall apply.

- a) The FFG ignition system shall be compressed-air type.
- b) The pilot shall have a dedicated flame front ignition line from the ignition control panel.
- c) For offshore or coastal locations, the material for front generator lines between the FFG panel and pilots shall be type 316 SS or other material with higher corrosion resistance.
- d) For onshore locations, excluding coastal, the material for front generator lines between the FFG panel and pilots shall be type 304 SS or other material with higher corrosion resistance.
- e) The FFG line size shall be DN 25 (NPS 1).
- f) The wall thickness for FFG lines shall be Schedule 40S.
- g) If specified, the flame front generator lines shall be heat-traced and insulated.
- h) Pressure regulators and pressure gauges that are downstream of the regulators shall be provided on the ignition fuel gas and the air supply lines to mixing chamber.
- i) Pressure gauges installed in fuel and air supply lines shall be able to withstand or be protected from pressure pulses occurring during ignition of the fuel-air mixture.
- j) Pressure regulators installed in the ignition fuel line and the air supply line shall have shut-off valves.
- k) The mixing chamber and view port shall be designed for the temperature and pressure experienced during ignition of the fuel/air mixture.
- l) When winterization is required, the FFG station shall have a 1 sm³/hr (35 SCFH) instrument air purge provided on each FFG line.
- m) Flow control to each line shall be one of the following:
 - 1) fixed set control type device;
 - 2) restriction orifice or equivalent.
- o) Flame front generator shall be designed for the specified air and fuel gas supply.

4.9 Pilot Flame Detection

Replace last sentence of section b) with

The performance verification test shall be in accordance with A.6.

Add new list section d)

- d) Thermocouples shall be provided for pilot flame detection.

Add new list section e)

- e) If specified, an independent backup flame detection system other than thermocouple shall be provided.

Add new list section f)

- f) Components of flame detection systems shall be proven in successful operation for at least five years in two or more installations.

NOTE New technologies can be accepted on a case by case basis. Additional design verification and validation information such as prototype tests, functional, operational, performance, field test results and comparison to similar proven designs may be required from the supplier.

Add new list section g)

- g) The pilot flame failure alarm shall be provided in the local control panel and plant central control system for each pilot.

Add new section

4.9.1 Thermocouples

For the thermocouple type pilot flame detection system, the following shall apply.

- a) Two single-circuit Type K thermocouples shall be provided for each pilot.
- b) The thermocouple tip weld shall be of ungrounded type.
- c) The thermocouple sheath shall be Hastelloy X (UNS N06002) or equal material packed with magnesium oxide insulation.
- d) The thermocouple shall be installed in a separate thermowell with internal diameter 1 mm (0.039 in.) greater than the thermocouple, incorporated into the pilot head.
- e) The thermocouple sheath shall be protected from flame impingement for a distance of at least 1.8 m (6 ft) or 125 % of the actual burner diameter (whichever is greater) from the top of the flare burner, using a thermocouple protection tube.
- f) The thermocouple protection tube (see 4.9.1.e)) shall be constructed of 310 stainless steel.
- g) A sleeve at the pilot tip shall provide a gradual transition from the thermocouple guide tube (4.9.1) to the pilot tip thermowell ID.
- h) The thermocouples sheathing shall extend to a termination head or junction box installed in a location protected from flare radiation.
- i) Thermocouples shall be locked in the guide tube.
- j) The thermocouple termination heads or junction boxes installed local to the flare burner shall be stainless steel material with ceramic terminals.
- k) The thermocouple extension cable or wire shall be rated to withstand the highest temperature that it is exposed to during all flaring cases.
- l) Thermocouple guide tubes shall be type 310 SS or alloy with higher temperature capability.
- m) Minimum outside diameter of thermocouple shall be 8 mm ($5/16$ in.).

- n) Thermocouple wiring shall be 0.5 mm² (20 AWG).
- o) Thermocouple junction box shall be minimum IP56 (NEMA 4X).
- p) The first junction box shall be installed in a sheltered location under the flare burner access platform or the other heat shield.
- q) The first junction box entry for the thermocouple shall not be top entry.
- r) The first junction box entry for the cable conduit shall not be top entry.
- s) Excess thermocouple lead wire shall not be coiled.

Add new section

4.9.2 Flame Ionization

For a flame ionization type pilot flame detection system, the following shall apply.

- a) The ionization cable shall be protected from flame impingement and radiation to the first junction box.
- b) The ionization cable shall be rated to withstand the highest exposure temperature at all flaring cases.
- c) The first junction box shall be installed in a location protected from flare radiation.
- d) The ionization system junction boxes nearest to pilots shall be stainless steel material with ceramic terminals.
- e) The ionization system transformer and electronics shall be installed at a location that is accessible while the flare is in service.

Add new section

4.9.3 Optical Systems

For an optical type pilot flame detection system, the following shall apply.

- a) The use of optical pilot flame detection systems shall be subject to approval by the owner.
- b) The optical-type pilot flame detection system shall be infrared (IR) type.

NOTE Refer to A.5.2.4 for optical systems use guidance.

- c) The optical sensors shall be installed on a vibration-free platform accessible while the flare is in service.

Add new section

4.9.4 Acoustic Systems

For an acoustic-type pilot flame detection system, the acoustic sensors shall be installed at a location accessible while the flare is in service.

4.10 Piping

Add new section

4.10.9

Steam piping termination points at the stack base shall be anchored.

Add new section

4.10.10

The flare header between the flare knockout drum and the riser shall slope back and drain into the flare knockout drum or liquid seal drum.

Add new section

4.10.11

Low point drains shall be provided on all auxiliary piping lines.

Add new section

4.10.12

Low point drain valves shall be accessible while the flare is in service.

Add new section

4.10.13

The bolting materials for piping flanges at locations other than the flare burner shall comply with the piping design code and the piping and bolting specifications as specified.

Add new section

4.10.14

The flare gas piping diameter shall be greater than or equal to the flare header diameter.

4.11 Auxiliary Components

4.11.2

Replace section (including NOTE) with

Labyrinth type gas seals (e.g. molecular or buoyancy seal) shall not be used.

Add to section

Purge reduction seals shall be constructed of the same material as that of the flare tip.

Add new section

4.11.5

Air assisted flare blowers and drivers shall be proven in successful operation for at least five years in two or more installations.

Add new section

4.11.6

The type of driver for blowers shall be an electric motor.

Add new section

4.11.7

Belt drives shall not be used for an air-assist blower.

Add new section

4.11.8

A mechanical run test of the air-assist blowers shall be performed at the supplier's facility.

4.12 Control of Fluid Injection for Smoke Suppression

Delete second sentence of NOTE

Add new section

4.12.3

An optical-type smoke control system shall be installed for monitoring of smoke index in real time.

Add new section

4.12.4

The steam valves shall be automatically controlled by the flare manufacturer developed control philosophy using the measurements from the optical smoke control system.

4.13 Sizing

4.13.3 Flare Stack Height

4.13.3.4

Add new NOTE 4

NOTE 4 Identifying and specifying the elevation and distance from the flare of any points of interest where radiation levels are to be evaluated on a case-by-case basis (e.g. cranes, helideck, elevated platforms, other equipment) is beneficial information to be supplied by the purchaser.

Add new section**4.14 Noise****4.14.1**

For steam-assisted and air-assisted flares, noise generated by the assist media shall be included in the overall flare noise level calculations under normal and emergency operating conditions.

4.14.2

For emergency conditions, the noise level shall not exceed agreed levels at the following locations:

- a) base of the stack;
- b) platform level for stacks provided with derrick structures having a platform for coupling/uncoupling segments of the retractable stack;
- c) at areas normally manned;
- d) at other points of interest identified in IOGP S-722D.

4.14.3

For normal operation, the noise level shall be less than the agreed levels at the perimeter of the sterile area for flow rates up to 15 % of maximum flaring capacity or at the maximum relief rate that can occur during normal operation, whichever is higher.

Add new section**4.15 Liquid Seal****4.15.1**

For the liquid seal, the liquid seal configuration, sizing, internals and instrumentation shall be in accordance with Annex H.9 and the specified supplemental requirements.

4.15.2

Liquid seal mechanical design, materials, fabrication and testing shall comply with the design code and specification for pressure vessels.

4.16.1

When a kinetic (ballistic) ignition system is installed, low pressure propulsion of the projectile shall be prohibited.

4.16.2

When a kinetic (ballistic) ignition system is installed, pellets shall release the ignition load upon impact against striker plate near the flare burners.

4.16.3

When a kinetic (ballistic) ignition system is installed, a pilot shall be installed, unless specified by the owner.

4.16.4

Kinetic (ballistic) ignition systems shall only be used for offshore applications.

4.16.5

The guide tube of the kinetic (ballistic) system shall be purged and fitted with a drain connection at its low point.

5 Mechanical Details—Elevated Flares

5.1 Mechanical Design—Design Loads

Replace second sentence of list section 2) of list section d) with

The wall thickness for the flare gas riser of near-atmospheric pressure stacks, originating at either the inlet flange or at the outlet connection from any integral liquid seal, shall be determined in accordance with either of the following, whichever is greater:

- structural design code;
- pressure design code for 350 kPag (50 psig), including the corrosion allowance as specified in 5.2 d).

Add new list section 6) to list section i)

- 6) Lifting lugs or brackets provided on the flare burner for initial installation shall be removed prior to placing the flare burner in service.

Add new list section 7) to list section i)

- 7) Loads imposed by temporary lifting equipment or scaffolding during maintenance or replacement of the flare burner shall be included in the structural design calculations.

5.2 Design Details

Delete "Unless otherwise specified, " from first sentence of list section a)

In list section 2) of list section d), replace "1.6 mm ($1/16$ in.)" with

3.2 mm ($1/8$ in.)

Add new list section 5) to list section d)

- 5) For air-assist flare stacks with coaxial risers, the design shall consider the risk of corrosion of internal surfaces in contact with assist air.

Add new list section f)

- f) The heat radiation from the flare burners shall be considered for the following:
 - 1) the material selection of the structure with respect to the allowable stresses and environmental corrosion;
 - 2) the design of the structural steel joints under severe thermal cycling.

NOTE The design temperature for the structure can be established from radiation data and expected duration of flaring event.

Add new list section g)

- g) Double nuts and washers shall be provided for bolted connections used in flare support structure.

Add new list section h)

- h) If a single piece lift design is specified, the following shall be installed with all testing completed as applicable prior to the lift:
- 1) the flare burner (if specified by the purchaser);
 - 2) piping;
 - 3) insulation;
 - 4) ladders and platforms;
 - 5) accessories attached to the stack (e.g. junction boxes and cable trays).

5.3 Flanges

5.3.1

Replace first sentence with

The elevated flare burner and auxiliary connections at the flare burner (e.g. pilot fuel gas, FFG lines, steam, air) to the respective risers shall be flanged as follows:

Replace list item a) with

- a) for flanges for DN 600 (NPS 24) and smaller burners: ASME B16.5, Class 150 RFSO / RFWN or EN 1092-1, PN 25 Type 01 / Type 11 or fabricated plate flanges drilled in accordance with the specified code;

Replace list item b) with

- b) for flanges for burner sizes greater than DN 600 (NPS 24): forged flanges or fabricated plate flanges drilled to ASME B16.47 or dimensions specified in Table 3;

NOTE For flange sizes greater than those shown in Table 3, follow the flare manufacturer's standard.

Replace list item c) with

- c) for DN 600 (NPS 24) and smaller size auxiliary connection: ASME B16.5 RFWN type or EN 1092-1 Type 11.

5.3.5

Replace section with

The bolted connection of the flare burner to the stack and bolted attachments mounted on the flare burner (e.g. pilots, windshield, muffler) shall have double nuts.

Add new section

5.3.6

Flanged joints at the flare burner shall use metallic gaskets.

Add new section

5.3.7

Bolt tightening torque values for the flare burner flange and auxiliary piping flanges at the burner shall be provided.

5.4 Materials of Construction

5.4.2

Replace section (including NOTE) with

The flare burner inlet flange material shall be the same as the flare burner.

Add new section

5.4.8

Where alloy steels (e.g. stainless steel, alloy 625) are used for derrick structures, the steel shall be galvanically isolated from structural steel grade materials (e.g. carbon steel).

NOTE This applies to gas risers, ladders, platforms and stairs that could be in contact with the speciality steel.

5.5 Welding

5.5.1

Replace "the structural design code or the pressure design code" with

the pressure design code and IOGP S-705

5.5.2

Replace "the structural design code or the pressure design code" with

the pressure design code and IOGP S-705

5.5.3

Replace "either the structural design code or the pressure design code" with

the structural design code

Add new section

5.5.4

Welding consumables with filler metal matching base material shall be used for flare burner welding.

Add new section

5.5.5

Attachment welds to the flare burner shall be full penetration.

Add new section

5.5.6

For welding at flare burner, the welding heat input shall be controlled at less than 1.5 kJ/mm (38.1 kJ/in.) without preheat.

Add new section

5.5.7

The flux-cored arc welding (FCAW) process shall not be used for welding of attachments to the flare burner.

NOTE This is due to the risk of high heat input in relation to hot cracking and the criticality of attachments (e.g. lifting lugs, pilots, windshield).

5.5.8

Root pass shall be done with gas tungsten arc welding (GTAW).

5.5.9

The first three passes of corrosion resistant alloys (CRAs) full penetration welds shall be performed with gas backing protection (with Ar or N₂).

5.5.10

Ceramic or metallic backing strips shall be forbidden for butt welds.

5.6 Inspection

5.6.1

In list section a), replace "The structural design code or pressure design code" with

The pressure design code, pressure vessels and welding specifications

Add new section

5.6.3

Flare burner welds shall be visually inspected during the welding operation and again after the work is completed to determine satisfactory penetration of weld metal fusion and satisfactory operator performance.

Add new section

5.6.4

Butt welds in the flare burner shall be 100 % radiographed.

Add new section

5.6.5

Fillet welds in the flare burner shall be 100 % examined by dye penetrant testing.

Add new section

5.6.6

Positive material identification (PMI) shall be performed on all flare burner parts materials and welds.

Add new section

5.6.7

Parts of the structure intended for assembly at site shall be trial-assembled and match-marked before shipping.

Add new section

5.6.8

Butt welds in the flare burner shall be 100 % examined by dye penetrant testing.

Add new section

5.6.9

When a hydrostatic test is performed on the applicable parts, the tested part shall be fully drained and dried.

5.7 Surface Preparation and Protection

Replace entire section (5.7.1 through 5.7.4) with

Add new section

5.7.1

The corrosion protection for pressure-containing parts and structural parts shall be in accordance with the coating specification as specified.

Add new section

5.7.2

The flare support structure coating system shall be suitable for the expected exposure temperature due to flare flame radiation but not less than 200 °C (392 °F).

Add new section

5.7.3

Carbon steel tubular members shall be protected against internal and external corrosion, closed and sealed.

Add new section

5.7.4

Galvanizing shall be in accordance with ASTM A123/A123M, ASTM A143/A143M, ASTM A153/A153M, ASTM A384/A384M, ASTM A385/A385M or ISO 1461.

Add new section

5.7.5

Bolts joining galvanized sections shall be galvanized in accordance with ASTM A153/A153M or ISO 10684.

5.9 Aircraft Warning Lighting

Add new section

5.9.3

If a retractable flare stack system is selected, aviation warning lights shall be retractable without shutting down the flare relief system.

5.10 Platforms and Ladders

5.10.4

Replace section with

The material of construction for platforms, ladders and safety gates shall be suitable for the expected exposure temperature due to flare flame radiation.

5.10.6

Delete section 5.10.6

Add new section

5.10.7

If specified, a 360° platform shall be provided below the flare burner mounting flange for inspections, maintenance, and replacement of the flare burner and auxiliaries.

Add new section

5.10.8

The flare burner maintenance platform shall have a clearance width of at least 0.9 m (3 ft) from the flare burner and its appurtenances.

Add new section

5.10.9

For flares equipped with a buoyancy-type air seal, a platform shall be provided for access to the inspection and clean-out nozzles.

Add new section

5.10.10

Access platform(s) shall be provided for inspection and maintenance of fixed, non-retractable type aircraft warning lights.

Add new section

5.10.11

For flare systems equipped with a liquid seal, platforms shall be provided for access to instruments and valves.

Add new section

5.10.12

Ladder and platform attachments to the flare stack shall be by bolting to the welded support clips.

Add new section

5.10.13

If specified, a stairway with a width of at least 0.9 m (3 ft) shall be provided from grade to riser mounting/demounting working platforms.

Add new section

5.10.14

Ladders shall have a side exit to the arrival area.

Add new section

5.10.15

If specified, a 360° access platform shall be provided at each guy wire fixing elevation.

6.1 Combustion Chamber

6.1.4

Replace "when surface temperatures exceed 80 °C (175 °F) for areas for personnel access during operation" with

in areas for personnel access during operation when surface temperatures exceed the specified value

Add new section

6.1.5

The refractory design hot-face temperature shall be the calculated hot-face temperature plus 165 °C (300 °F) based on the maximum flaring case with the maximum ambient temperature and zero wind velocity.

Add new section**6.1.6**

The refractory design cold-face temperature shall be calculated based on the maximum flaring case at the maximum ambient temperature and with zero wind velocity.

Add new section**6.1.7**

If refractory ceramic fiber (RCF) material is used, the supplier shall provide procedures to mitigate health hazards caused by ceramic fibers during installation, operation and maintenance activities.

NOTE RCF lining material is a potential health hazard classified in Europe as Category 2 carcinogen. The purchaser may require the flare supplier and flare manufacturing shop to follow the purchaser's internal policy that outlines requirements for personnel working with and exposed to RCF materials.

Add new section**6.1.8**

The combustion chamber design shall prevent water ingress between refractory and casing.

6.4 Pilots**6.4.1**Add to section

The first stage shall be equipped with at least two pilots.

6.5 Wind FenceAdd new section**6.5.7**

View ports shall allow observance of all pilots and burners while the flare is in service.

Annex H (informative)

Migration of Technical Content from API Standard 521, Seventh Edition

Add new section H.0 before section H.1

H.0 Normative Requirements

Where clauses are modified or added, only these become normative. This includes where "should" is replaced with "shall" to change the recommendation text to a requirement.

H.2 Freezing and Icing in Flare Tips

H.2.1 Steam-assist Flares in Cold Climates

Replace first sentence of second paragraph with

The flare burner, stack and flare header shall be designed to prevent blockages. Options to prevent blockages of the flare stack/flare header include the following:

H.2.2 Low-pressure Forced-air Flares in Cold Process Service

Replace first sentence of second paragraph with

The flare gas flow paths shall be designed to prevent blockages. Options to prevent blockages of the flare gas flow paths include the following:

H.6 Thermal Radiation

H.6.1 Effect on Human Skin

H.6.1.1

Add to section

For demountable derricks with multiple risers (see A.1.2.4 for definition), a heat shield at the first platform and temporary shelters at grade shall be provided within the sterile area to protect personnel.

H.6.2 Effect on Equipment

Add to section

The flare burner davit, when installed, shall be retractable underneath a heat shield.

Bibliography

Add to start of Bibliography

The following documents are informatively cited in the text of this specification, API 537, the PDS (IOGP S-722D) or the IRS (IOGP S-722L).

Add to Bibliography

- [68] ASME Boiler and Pressure Vessel Code, Section VIII, *Rules for Construction of Pressure Vessels*
- [69] ASME Boiler and Pressure Vessel Code, Section IX, *Welding, Brazing, and Fusing Qualifications*
- [70] API Specification Q2, *Quality Management for Service Supply Organizations for the Petroleum and Natural Gas Industry*
- [71] API Standard 521:2020, *Pressure-relieving and Depressuring Systems*
- [72] API Recommended Practice 582 *, *Welding Guidelines for the Chemical, Oil, and Gas Industries*
- [73] API Standard 673 *, *Centrifugal Fans for Petroleum, Chemical, and Gas Industry Services*
- [74] EN 1011 (all parts), *Welding – Recommendations for welding of metallic materials*
- [75] EN 1090-2, *Execution of steel structures and aluminium structures – Part 2: Technical requirements for steel structures*
- [76] EN 10204, *Metallic products – Types of inspection documents*
- [77] ISO/IEC Directives, Part 2, *Principles and rules for the structure and drafting of ISO and IEC documents*
- [78] ISO 9001:2015, *Quality management systems — Requirements*
- [79] ISO 10005, *Quality management — Guidelines for quality plans*
- [80] ISO 10474, *Steel and steel products — Inspection documents*
- [81] ISO/IEC 17000:2020, *Conformity assessment — Vocabulary and general principles*
- [82] ISO/IEC 17025:2017, *General requirements for the competence of testing and calibration laboratories*
- [83] ISO 19901-5:2021, *Petroleum and natural gas industries — Specific requirements for offshore structures — Part 5: Weight management*
- [84] IEC 60721-2-1, *Classification of environmental conditions – Part 2-1: Environmental conditions appearing in nature – Temperature and humidity*

* Cited in IOGP S-722J only.



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