

# Gas Industry Standard

GIS/E13.2: 2024

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Specification for

## Cartridge Type Filters for Use with Natural Gas at Operating Pressures Above 7 Bar

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## Foreword

Gas Industry Standards (GIS) are revised, when necessary, by the issue of new editions. Users should ensure that they are in possession of the latest edition. Contractors and other users external to Gas Transporters should direct their requests for copies of a GIS to the department or group responsible for the initial issue of their contract documentation.

Comments and queries regarding the technical content of this document should be directed in the first instance to the contract department of the Gas Transporter responsible for the initial issue of their contract documentation.

This standard calls for the use of procedures that may be injurious to health if adequate precautions are not taken. It refers only to technical suitability and does not absolve the user from legal obligations relating to health and safety at any stage.

Compliance with this engineering document does not confer immunity from prosecution for breach of statutory or other legal obligations.

## Mandatory and non-mandatory requirements

For the purposes of a GIS the following auxiliary verbs have the meanings indicated:

**can** indicates a physical possibility;

**may** indicates an option that is not mandatory;

**shall** indicates a GIS requirement;

**should** indicates best practice and is the preferred option. If an alternative method is used then a suitable and sufficient risk assessment needs to be completed to show that the alternative method delivers the same, or better, level of protection.

## Disclaimer

This engineering document is provided for use by Gas Transporters and such of their contractors as are obliged by the terms of their contracts to comply with this engineering document. Where this engineering document is used by any other party, it is the responsibility of that party to ensure that the engineering document is correctly applied.

## Brief history

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## 1. Scope

This Gas Industry Standard specifies the requirements for in-line filters, the pressure containing parts of which comply with GIS/PV3.

Filters to this specification are intended for use at ambient temperatures in the range -20 °C to 50 °C. If operating temperatures outside this range are required, this will be stated on the data sheet (see Appendix B, line 14).

The design of the filters is intended to meet the design pressure stated in the data sheet, at the temperatures stated in 1.2, up to a maximum of class 600. (Class ratings refer to those given in BS EN 1759-1 and MSS SP-44)

For Y Type Filter Strainers,  $\leq 50$  mm  $\varnothing$ , the requirements of this specification shall not apply. Instead, these components shall comply with the requirements in ASME B31.1, ASME B31.3 or ASME VIII, and shall have their carbon content and carbon equivalent value limited in accordance with GIS/PV3.

## 2. Normative references

The following referenced documents are indispensable for the application 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.

### 2.1 British and European standards

BS EN 1759-1, *Flanges and their joints. Circular flanges for pipes, valves, fittings and accessories, class-designated. Steel flanges, NPS 1/2 to 24*

PD 5500, *Specification for unfired fusion welded pressure vessels*

2014/68/EU, *Pressure Equipment Directive*

### 2.2 Manufacturers Standardization Society Standards

MSS SP-44, *Steel Pipe Line Flanges*

### 2.3 Gas Industry Standards

# GIS/CM2, *Specification for Internal Coating Materials for Steel Line Pipe and Fittings*

GIS/C9, *Specification for Carbon Steel Castings for Pressure Purposes Above 7 Barg (Supplementary to BS EN 10213)*

# GIS/F1, *Specification for Carbon and Carbon Manganese steel forgings and forged components for operating pressure greater than 7 bar*

# GIS/PV3, *Specification for Pressure Vessels in Carbon, Ferritic Alloy and Austenitic Stainless Steels Manufactured to PD 5500*

# At the time of publication these were under development and so, until published, refer to individual gas networks' equivalent specifications and requirements.

### 2.4 Gas Transporter Standards

\*/SP/CM/1, *Specification for Internal Coating Operations for Steel Line Pipe and Fittings*

\*/SP/TR/18, *Specification for Engineering of Pipelines and Installations Operating at above 7 Barg*

#### NOTE

Where no date is shown, the latest edition of each standard and specification shall apply.

\* Gas Transporters will each have their own procedures & specifications normally in the referenced format \*/SP/XX/No, where \* is replaced by the Gas Transporters reference e.g. T for National Gas Transmission, or

SGN, WWU etc. followed by the specification initials and number reference.

## 2.5 The American Society of Mechanical Engineers

ASME B31.1, *Power Piping*

ASME B31.3, *Process Piping* ASME VIII, Div. 1, *Pressure Vessels*

## 3. Terms and Definitions

For the purposes of this document, the following definitions apply:

**3.1 Contractor:** The person, firm or company with whom the Company enters into a contract to which this specification applies, including the Contractor's personal representatives, successors and permitted assigns.

## 4. Design

### 4.1 General requirements

**4.1.1** The filter shall be so designed that the degree of filtration stated in the data sheet (see Appendix A, line 19) is achieved under normal operating conditions. In the clean condition, the pressure loss across the flanges of the filter at maximum flow shall not exceed 0.1 bar unless otherwise specified in the data sheet (see Appendix A. line 20).

**4.1.2** Unless an alternative is proposed as a variant for consideration by the Company at the time of the tender, the filter shall be of the cartridge type having elements of glass fibre bonded by a phenolic resin, all supported by a suitable cage.

The elements shall be suitable for any reverse flow of gas. Cartridge design shall be such that only the element itself shall require replacement when blocked.

**4.1.3** Filter end closures shall meet the requirements of GIS/PV3.

**4.1.4** The design of the filter assembly shall take into account the following:

- a) Ease of replacement of baskets (i.e. the baskets should be bolted to a support ring).
- b) If welded to the pressure shell, the basket support ring shall be of such a design as to avoid shrinkage stresses (e.g. segmental construction), with a suitable gasket arrangement to prevent bypass.
- c) Horizontally positioned baskets shall be adequately supported. Baskets of cantilever design are not acceptable.
- d) All baskets/elements shall be designed to withstand the effects of any vibration under all operating conditions.

**4.1.5** The recommended differential pressure before cleaning or changing and the maximum differential pressure which the element can withstand before collapse shall be specified by the Contractor in the data sheet (see Appendix A, lines 29 and 30 respectively).

**4.1.6** The filter body shall be provided with supports when specified in the data sheet, (see Appendix A, line 21). Where saddle type supports are provided, these shall be either welded to the body or of the loose clamp type. Supports shall make allowance for 25 mm transverse movement in either direction, in addition to full axial movement to allow for movement of the pipework

**4.1.7** Vent and drain connections shall be provided on the body of the filter. Unless otherwise specified, differential pressure tapings shall also be provided on the body.

**4.1.8** All nozzle flanges shall conform to the requirements specified in GIS/PV3.

## **4.2 Mechanical design**

**4.2.1** The filter body shall be designed in accordance with GIS/PV3 and section 4.2 of this specification, in conjunction with the completed data sheet and any other information supplied with the enquiry or order.

4.2.1.1 The design pressure for the filter shall be stated in the data sheet, (see Appendix A, line 10), either:

a) The Safe Operating Limit (SOL) of the upstream system, where:

- $SOL = \text{Maximum Operating Pressure (MOP)} + 10\%$  for MOP up to 70 barg
- $SOL = \text{MOP} + 6\%$  for MOP above 70 barg

b) The maximum pressure rating of the filter flanges, based on the temperature and pressure dependent ceiling rating pressure in BS EN 1759-1.

4.2.1.2 The hydrostatic test pressure shall be in accordance with the requirements below, unless otherwise specified in the data sheet (see Appendix A, line 11):

- a) Where the design pressure is based on the SOL of the upstream system, the hydrostatic test pressure shall be 1.65 times the design pressure in accordance with \*/SP/TR/18.
- b) Where the design pressure is based on the maximum rating of the filter flanges, the maximum hydrostatic test pressure shall be 1.5 times the design pressure.

In all cases, the test pressure shall be limited to 90% of the Specified Minimum Yield Strength (SMYS) for the material.



4.2.1.3 The filter shall be designed to meet the requirements of PD 5500 Appendix C, with a fatigue life of 1000 cycles over a pressure range equal to the full design pressure (to allow for full depressurization during maintenance) and 15 000 cycles over a pressure range equal to the diurnal pressure variation (taken to be 50% of the design pressure, unless specified otherwise in the data sheet, (see Appendix B, line 12)).

**4.2.2** For the ambient temperature range of -20 °C to 50 °C, the lower design temperature for the determination of impact properties of metallic materials shall be taken as -10 °C. For other operating temperature ranges, the lower design temperature shall be as stated in the data sheet, (see Appendix B, line 15).

**4.2.3** For the purpose of design, the maximum membrane design stress shall be in accordance with PD 5500 unless otherwise specified on the data sheet, (see Appendix A, line 16). However, the design shall be such that during the hydrostatic pressure test (see 4.2.2.2), the general membrane design stress shall not exceed 90% of the specified yield stress..

## **5. Materials**

**5.1** Materials shall be accordance with GIS/PV3.

## **6. Manufacture**

**6.1** Manufacture shall be in accordance with GIS/PV3 and 6.2, 6.3 and 6.4 of this specification.

**6.2** All flanges left for connection by others shall be square to the centre line of the vessel within 0.25 mm per 100 mm of flange outside diameter.

**6.3** The peripheries of the flanges shall be machined within the following tolerances:

- a) Up to and including 200 mm nominal size:  $\pm 0.5$  mm.
- b) Greater than 200 mm nominal size:  $\pm 1.0$  mm.

**6.4** Ring type joint groove side faces on flanges shall have a surface finish in accordance with GIS/F1.

## **7. Inspection and Testing**

**7.1** Inspection and tests shall be in accordance with GIS/PV3 and 7.2 of this specification.

**7.2** The completed vessel, including the end closure, shall be pressure tested hydrostatically to the requirements specified in 4.2 prior to any protective treatment, including shot blasting, as specified in 9.3.

## **8. Marking**

**8.1** Marking shall be in accordance with GIS/PV3.

## **9. Documentation, Protection, Packaging and Transport**

**9.1** Documentation, protection, packing and transport shall comply with GIS/PV3.

**9.2** The instructions for operation and maintenance as required by GIS/PV3 shall include a description of the elements (including the number and type) and the method for detecting and removing clogged elements.

- 9.3** Internal treatment of the filter shall be one of the following as stated in the data sheet, (see Appendix A, line 23):
- a) Cleaned and free from loose scale.
  - b) Coated in accordance with \*/SP/CM/1 using epoxy resin to GIS/CM2.
  - c) Cleaned and free from loose scale followed with an oil based preservative.

**10. Variants**

- 10.1** A contractor shall only propose variants to this specification where the text indicates that variants would be considered by the Company.

## Annex - A Data Sheet

STANDARD DATA SHEET FOR FILTERS TO GIS/E13.2		Ref: .....
		Date:..... Issue No:.....
1. Drawn	Checked	Approved
2. Project		Filter number
3. Location		Number off
4. Title		Gas Network Order number
5. Manufacturer		Gas Network Drawing number
6. Design calculations reference		Gas Network flow sheet number
INFORMATION TO BE SUPPLIED BY GAS NETWORK (tick boxes as appropriate)		
7. Preferred construction category (PD 5500) .....		
Contractor to advise Gas Network if alternative category is available		
8. Nominal size of inlet .....mm		
9. Nominal size of outlet .....mm		
10. Design Pressure (see 4.2.1.1):.....bar		
11. Hydrostatic test pressure: (see 4.2.2.2):.....bar		
12. Cyclic Pressure (see 4.2.2.3):		
a) 1000 cycles over the design pressure range to PD 5500 <input type="checkbox"/> or.....bar range		
b) 15000 cycles over the diurnal pressure to PD 5500 <input type="checkbox"/> or..... bar range		
13. Flange class rating and facing type (see 4.1.8)		
Class 150 RF <input type="checkbox"/> Class 300 RF <input type="checkbox"/>		
Class 600 RF <input type="checkbox"/> Class 600 RTJ <input type="checkbox"/>		
14. Operating temperature range; as 1.2 <input type="checkbox"/> or ..... °C max ..... °C min		
15. Lower design temperature: either as GIS/PV3 <input type="checkbox"/> or ..... °C max		
16. Maximum membrane design stress: either to PD 5500 (see 4.2.2) <input type="checkbox"/> or ..... %SMY		
17. Gas flow ..... m <sup>3</sup> (st)/s		
18. Gas density ..... Kg/m <sup>3</sup>		
19. Degree of filtration (see 4.1.1) ..... µm at 95% efficiency		
20. Pressure drop clean: as 4.1.1 <input type="checkbox"/> or ..... bar		
21. Support: (see 4.1.6) Required <input type="checkbox"/> Not required <input type="checkbox"/>		
22. Support Type Saddle Welded <input type="checkbox"/> Saddle type loose <input type="checkbox"/>		
Leg type <input type="checkbox"/>		
23. Internal Protection: (see 9.3) either a) <input type="checkbox"/> b) <input type="checkbox"/> or c) <input type="checkbox"/>		

**INFORMATION TO BE SUPPLIED BY THE CONTRACTOR**

- 24. Drawing reference .....
- 25. Design calculations reference .....
- 26. Elements: Number .....
- Size .....
- Type .....
- 27. Degree of filtration .....  $\mu\text{m}$  at ..... %  
efficiency
- 28. Pressure drop (clean) ..... bar
- 29. Differential pressure (element changed or cleaned) (see 4.1.5) ..... bar
- 30. Differential pressure maximum (see 4.1.5) ..... bar
- 31. Shell material .....
- 32. End Closure: (see 4.3) Type/makers reference .....
- 33. End Closure: (see 4.3) Operating force ..... N
- 34. End Closure: (see 4.3) Operating gear type .....

**GENERAL NOTES**