

## GENERAL SPECIFICATION

### SUBSEA SYSTEMS

#### GS EP SPS 031

#### Chemical Injection Throttling Valves

| 04   | 10/2016 | Update in line with Joint Operator Specification |
|------|---------|--------------------------------------------------|
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| 01   | 08/2013 | General Revision                                 |
| 00   | 01/2012 | First issue                                      |
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| General Specification                |                         | GS EP SPS 031 |
|--------------------------------------|-------------------------|---------------|
| Chemical Injection Throttling Valves |                         |               |
| Rev.: 04                             | Effective date: 10/2016 | Page: 2 of 23 |

## Contents

|                                               |           |
|-----------------------------------------------|-----------|
| <b>1. Scope .....</b>                         | <b>3</b>  |
| <b>2. Reference documents.....</b>            | <b>3</b>  |
| <b>3. Terms and Definitions.....</b>          | <b>4</b>  |
| 3.1 Abbreviated Terms.....                    | 5         |
| <b>4. System description .....</b>            | <b>6</b>  |
| <b>5. Design Requirements .....</b>           | <b>6</b>  |
| 5.1 General Functional Requirements.....      | 7         |
| 5.2 Fabrication and Materials.....            | 8         |
| 5.3 Mechanical Interfaces .....               | 9         |
| 5.4 Electrical Interfaces.....                | 11        |
| 5.5 Control System .....                      | 11        |
| 5.6 Control and Measurement.....              | 11        |
| 5.7 Installation & Retrieval .....            | 12        |
| 5.8 Ancillary Equipment .....                 | 12        |
| <b>6. Testing .....</b>                       | <b>13</b> |
| 6.1 Test Requirements.....                    | 13        |
| 6.2 Qualification and FAT Testing Scope ..... | 14        |
| 6.3 Test Definitions .....                    | 15        |
| <b>7. Documentation .....</b>                 | <b>21</b> |
| <b>8. Marking .....</b>                       | <b>21</b> |
| <b>9. Obsolescence.....</b>                   | <b>21</b> |
| <b>10. Storage and Transportation .....</b>   | <b>21</b> |
| <b>11. Maintenance / Inspection.....</b>      | <b>22</b> |
| Appendix 1 Documentation Requirements .....   | 23        |

| General Specification                |                         | GS EP SPS 031 |
|--------------------------------------|-------------------------|---------------|
| Chemical Injection Throttling Valves |                         |               |
| Rev.: 04                             | Effective date: 10/2016 | Page: 3 of 23 |

## 1. Scope

The purpose of this specification is to define the functional and design requirements for manual and remotely operated Chemical Injection Throttling Valves (CITV) for subsea use.

This specification has to be considered in conjunction with other technical or project specific specifications which describe the complete subsea system, interfacing equipment or more details regarding Subsea Production Control System (SPCS) equipment. These documents will give input to this specification with respect to scope of supply, water depths, pressure classes, detail testing, etc.

The precedence (= sequence of importance) of any technical documents containing conflicting requirements shall be as follows:

1. Company Project Specifications
2. Company General Specifications
3. API 17 series
4. Other recognised industry standards.

For the purpose of this Specification the term 'CITV' is used for all subsea chemical injection control and/or metering valves (CTV, CIMV, MDV, IRCD, etc).

## 2. Reference documents

The reference documents listed below form an integral part of this General Specification.

### External Documents

Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and addendums, is the latest revision published at the effective date of this document.

| Reference                      | Title                                                                                       |
|--------------------------------|---------------------------------------------------------------------------------------------|
| <a href="#">API RP 17H</a>     | Remotely Operated Vehicle Interfaces on Subsea Production Systems                           |
| <a href="#">API RP 17N</a>     | Recommended Practice for Subsea Production System Reliability and Technical Risk Management |
| <a href="#">API SPEC 17D</a>   | Design and Operation of Subsea Production Systems—Subsea Wellhead and Tree Equipment        |
| <a href="#">API SPEC 6A</a>    | Specification for Wellhead and Christmas Tree Equipment                                     |
| <a href="#">API STD 17F</a>    | Standard for Subsea Production Control Systems                                              |
| <a href="#">DNV-RP-F112</a>    | Design of Duplex Stainless Steel Subsea Equipment exposed to Cathodic Protection            |
| <a href="#">ISO 10474</a>      | Metallic products - Inspection documents                                                    |
| <a href="#">ISO/IEC 8802-3</a> | Standard for Ethernet                                                                       |

| General Specification                |                         | GS EP SPS 031 |
|--------------------------------------|-------------------------|---------------|
| Chemical Injection Throttling Valves |                         |               |
| Rev.: 04                             | Effective date: 10/2016 | Page: 4 of 23 |

| Reference                                                       | Title                                                                                                                                                                                                            |
|-----------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Joint Operator Specification for Obsolescence Management        | Obsolescence Management for Subsea Production Control Systems. Joint Operator Specification - <a href="http://www.subseaobs.com/index.php/documents">http://www.subseaobs.com/index.php/documents</a>            |
| Joint Operator Recommended Practice for Obsolescence Management | Joint Operator Obsolescence Management Specification. Recommended Practice for Obsolescence Management - <a href="http://www.subseaobs.com/index.php/documents">http://www.subseaobs.com/index.php/documents</a> |
| SAE AS 4059                                                     | Aerospace Fluid Power - Contamination Classification For Hydraulic Fluids                                                                                                                                        |

### Total General Specifications

Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and addendums, is the latest revision published.

| Reference      | Title |
|----------------|-------|
| Not applicable |       |

## 3. Terms and Definitions

For the purpose of this document, the following terms and definitions apply. The terms and definitions shall be as per [API SPEC 6A](#) with the additional abbreviated terms below.

|                        |                                                                                                                                                             |
|------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 'Can'                  | 'Can' is used for statements of possibility and capability, whether material, physical or capable.                                                          |
| Component              | The smallest part with a specific function and on which an Inspection can be performed.<br>For example: Stem, Stem seal, Ball, Bearing and Bolt.            |
| Company                | Project Owner. See Contract Definition                                                                                                                      |
| Contractor             | Contractor appointed by the Company for the supply of the equipment                                                                                         |
| Manufacturer           | The party(s) which manufactures and/or supplies materials, equipment, technical documents/drawings and services to perform the duties specified by Company. |
| 'May'                  | 'May' is used to indicate a course of action permissible within the limits of the specification. An optional course of action.                              |
| Rated working pressure | The maximum internal pressure that the equipment is designed to contain and/or control. Equivalent of "pressure rating" and "design pressure"               |

| General Specification                |                         | GS EP SPS 031 |
|--------------------------------------|-------------------------|---------------|
| Chemical Injection Throttling Valves |                         |               |
| Rev.: 04                             | Effective date: 10/2016 | Page: 5 of 23 |

|          |                                                                                                                                                                                                                                     |
|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 'Shall'  | 'Shall' is used to indicate requirements which are to be strictly followed in order to conform to the specification and acceptance by all parties.                                                                                  |
| 'Should' | 'Should' is used to indicate that among several possibilities one is the recommended as particularly suitable without mentioning or excluding others, or that a certain course of action is preferred but not necessarily required. |
| Unit     | Assembly of components on which an FAT can be performed                                                                                                                                                                             |

### 3.1 Abbreviated Terms

|           |                                                                     |
|-----------|---------------------------------------------------------------------|
| AISI      | American Iron and Steel Institute                                   |
| API       | American Petroleum Institute                                        |
| ATM       | Atmosphere                                                          |
| CAN       | Controller Area Network                                             |
| CIMV      | Chemical Injection Metering Valve                                   |
| CITV      | Chemical Injection Throttle Valve                                   |
| CP        | Cathodic Protection                                                 |
| CRA       | Corrosion Resistant Alloy as defined by <a href="#">API SPEC 6A</a> |
| CTV       | Chemical Throttle Valve                                             |
| EFAT      | Extended Factory Acceptance Test                                    |
| EFL       | Electrical Flying Lead                                              |
| EMC       | Electro-Magnetic Compatibility                                      |
| ESS       | Environmental Stress Screening                                      |
| FAT       | Factory Acceptance Test                                             |
| FCM       | Flow Control Module                                                 |
| FKM / FPM | Fluoroelastomer                                                     |
| GS        | General Specification                                               |
| HRC       | Rockwell Hardness C                                                 |
| HSC       | Hydrogen Stress Cracking                                            |
| ICSS      | Integrated Control and Safety System                                |
| IEC       | International Electrotechnical Commission                           |
| IRCD      | Injection Rate Control Device                                       |
| ISO       | International Organisation for Standardisation                      |

| General Specification                |                         | GS EP SPS 031 |
|--------------------------------------|-------------------------|---------------|
| Chemical Injection Throttling Valves |                         |               |
| Rev.: 04                             | Effective date: 10/2016 | Page: 6 of 23 |

|        |                                                   |
|--------|---------------------------------------------------|
| LDHI   | Low Dosage Hydrate Inhibitor                      |
| MCM    | Manifold Control Module                           |
| MDV    | MEG Dosing Valve                                  |
| MEG    | Monoethylene Glycol                               |
| PEEK   | Polyether Ether Ketone                            |
| PMI    | Positive Material Identification                  |
| PSL    | Product Specification Level                       |
| PTFE   | Polytetrafluoroethylene                           |
| ROT    | Remotely Operated Tool                            |
| SAE    | Society of Automotive Engineers                   |
| SCM    | Subsea Control Module                             |
| SIIS   | Subsea Instrument Interface Standardization       |
| SIT    | Site Integration Test                             |
| SPCS   | Subsea Production Control System                  |
| SS     | Stainless Steel                                   |
| TCP/IP | Transmission Control Protocol / Internet Protocol |
| TRL    | Technical Readiness Level                         |
| WOROV  | Workclass Remotely Operated Vehicle               |

## 4. System description

Subsea injection & metering valves are typically used for projects where control of chemical flow into each injection point at the local subsea location is required (e.g. distributed systems, long step-out systems and deepwater systems). The chemicals to be controlled are typically, but not limited to, scale, corrosion and asphaltene inhibitors, Low Dosage Hydrate Inhibitor (LDHI) and large volume hydrate inhibitors such as Methanol or MEG.

The mechanical, material and interface specifications in this document shall apply for manual valves however in the case of WOROV manually operated CITV the requirements for the electrical interfaces, control system and control and measurement detailed in this document shall not apply

## 5. Design Requirements

The CITV and receptacle shall conform to the design and operating requirements defined in the project specification and/or datasheet.

The method of CITV retrieval (either WOROV or as part of a larger integrated package) will be defined in project valve datasheet.

| General Specification                |                         | GS EP SPS 031 |
|--------------------------------------|-------------------------|---------------|
| Chemical Injection Throttling Valves |                         |               |
| Rev.: 04                             | Effective date: 10/2016 | Page: 7 of 23 |

For WOROVS retrievable valves, allowance shall be made for suitable access for the inspection, installation, retrieval of the CITV and parking of the EFL as required.

Manually operated CITV which are not remotely controlled shall have a WOROVS interface to allow manual adjustment of the valve flowrate subsea.

## 5.1 General Functional Requirements

- The design of the subsea valves and flushing units shall be in accordance with the requirements defined in this specification, [API SPEC 6A](#) PSL3 requirements and the referred design codes [API STD 17F](#) and [API SPEC 17D](#).
- The valve shall have a flow adjustment method to maintain the actual flow within a set flowrate, regardless of upstream and downstream pressure fluctuations, with an accuracy of  $\pm 5\%$  of the required setting over the specified flow range.
- The valve flowrate measurement accuracy shall be better than  $\pm 5\%$  of reading over the specified flow range and provide the required accuracy to meet the injection rate accuracy requirements stated above. All inaccuracies resulting from temperature and pressure variations, hysteresis, non-linearity, long-term drift and other factors affecting accuracy of both the measurement and adjustment systems shall be taken into account.
- The valve shall provide a secondary flow measurement system with a minimum accuracy of  $\pm 25\%$  of reading over the specified flow range.
- In the event of a loss of electrical power and/or communications the valve shall fail as-is and/or maintain the current rate of injection.
- The valve shall be designed and qualified to operate with the maximum operating differential pressure (as defined by the project) across the inlet and outlet ports.
- The valve shall be capable of controlling and measuring the maximum and minimum chemical dosing injection rates defined in the project specifications and/or datasheet.
- The valve shall include the facility for flushing any debris trapped inside its flow path. This feature shall typically be at the valve fully open position. Alternatively, a contamination filter may be proposed. For a filter solution, a method of determining the filter blocked status (e.g. use of DP measurement across filter) shall be provided and a filter replacement philosophy shall be presented to Company for approval.
- The valve shall be designed such that a single seal failure will not compromise valve pressure integrity.
- The valve shall be designed for a chemical fluid of cleanliness level [SAE AS 4059](#) Class 6B-F. The design of the valve shall be such that the potential for blockage is minimised and the valve is capable of handling fluids with a cleanliness level of [SAE AS 4059](#) Class 12B-F
- Design analysis shall include calculations to verify suitability of any pressure compensating system as applicable. The analysis shall include test, storage, transportation, installation, retrieval and operational conditions