Equipment Specifications based on Minimum Requirements - is this possible with IOGP JIP33?

Tim Griffin - Eni
Contents

- IOGP
- IOGP JIP33
- Shell & Tube Heat Exchanger Specification
- Air-Cooled Heat Exchanger Specification
- Working with IOGP
- Working with API
- Conclusions
- Useful Links
- Questions
IOGP - The International Association of Oil & Gas Producers

“The IOGP is the voice of the global upstream industry.”

Formed in 1974 - as of April 2020 it has 77 members, including...

**Upstream Members**
BP
Chevron
ConocoPhillips
Eni
Equinor
ExxonMobil
Petrobras
Petronas
Saudi Aramco
Shell
Total
Woodside

**National and other associations**
American Petroleum Institute (API)
Energy Institute (EI)
OGUK
Norwegian Oil & Gas Association

**IOGP Associate Members**
Aker Solutions
Baker Hughes
OPITO
SBM Offshore
Schlumberger
TechnipFMC plc

Offices in in London, Brussels and in Houston
Standards Committee objectives

- Development and use of international standards.
- Monitoring, coordinating and influencing the development of international standards to meet the needs of IOGP members.
- Working closely with national, regional and international standards bodies:
  - **ABNT, API, BSI, CEN, CSA, GSO, IEC, ISO, Rosstandart, TISI and many more.**
IOGP in Numbers

**Formed in 1974**
- 3 OFFICES WORLDWIDE
- 7 OPERATING REGIONS

**14 COMMITTEES**

**1700+ Participants on Committees**
- 80+ Members Worldwide
- 60+ Upstream Operators
- 40% of the World’s Oil and Gas

**1987**
- Published first report on SAFETY PERFORMANCE INDICATORS

**2010**
- Launched Global Industry Response Group (GIRG)

**40+ Number of reports published in 2019**

**9 Life-saving Rules**

IOGP
International Association of Oil & Gas Producers

www.iogp.org
Before JIP33

RFQ from EPC #1
Project A

RFQ from Operator #1
Project B

RFQ from Operator #2
Project C

Unique set of requirements developed for project

Industry Standard [e.g. API, ISO etc]

Supplier

Many designs to meet different customer requirements

Large inventory to accommodate all customers variations and spares

Many variations on procedures and documents for different customers

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IOGP JIP33 - After

After JIP33

Options selected for project
- JIP33 Specification, IRS
- QRS requirements
- Industry Standard (e.g. API, ISO etc)

Supplier
- Core set of standard designs meet majority of user needs
- Smaller inventory, shorter lead times, standard items
- Common and well developed procedures and documentation cater to majority of customers

RFQ from EPC #1 Project A
RFQ from Operator #1 Project B
RFQ from Operator #2 Project C
IOGP JIP33 – Journey so far

2016  JIP33 initiated with support from the World Economic Forum Capital Project Complexity Initiative
2017  Started [4] Subsea Xmas Trees [API], LV Switchgear [IEC], Piping Material [API], Ball Valves [API]
2018  Published [9] Shell & Tube Heat Exchangers [API 660], Pressure Vessels [None]
2019  Published [4]
2020  Published [21] Air-Cooled Heat Exchangers [API 661]; Welding [API 582]; Painting [NORSOK]
      Insulation (NORSOK)
2021  Published [7] Electric Heaters [None]

Equipment & Package Specifications:
Diesel Generator Package (S-714)
Firewater Pump Package (S-721)

As of 2021 June: Total: 42 specifications published covering....
Electrical Equipment / Instruments / Packages / Mechanical / Safety / Components / Subsea
IOGP JIP33 – How it works

- International & Industry Standards
- Information Requirements (IRS)
- Supplementary Technical Requirements
- Quality Requirements (QRS)
- Equipment Data Sheet Template

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Annex C
Shell-and-Tube Heat Exchanger Datasheets

Table C.1 defines supplemental data items that may be required in order to fully specify a shell-and-tube heat exchanger in accordance with this specification and to API Std 660 Shell-and-Tube Heat Exchangers.

Table C.1 – Supplementary data items

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Equipment Data</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.1 Conformity Assessment Level (CAS)</td>
<td>A / B / C / D (Refer to S-614Q, Annex A)</td>
</tr>
<tr>
<td></td>
<td>1.2 Orientation</td>
<td>Horizontal / Vertical / Sloped</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(If sloped include angle and direction)</td>
</tr>
<tr>
<td>1.3</td>
<td>Thermal &amp; Hydraulic Design by Vendor</td>
<td>No / Design / Check Rate</td>
</tr>
<tr>
<td>1.4</td>
<td>Fluid Allocation changeable</td>
<td>Yes / No</td>
</tr>
<tr>
<td>1.5</td>
<td>Type of Cleaning Maintenance</td>
<td>Chemical / Mechanical</td>
</tr>
<tr>
<td>2</td>
<td>Shell Side and Tube Side / Inlet and Outlet</td>
<td></td>
</tr>
<tr>
<td>2.1</td>
<td>Performance of one unit</td>
<td></td>
</tr>
</tbody>
</table>
### Annex A  Purchaser conformity assessment requirements

This annex defines four CAS or levels of purchaser assessment.

The vendor shall provide for the specified CAS when developing quality plans and inspection and test plans in accordance with Clause 5.

<table>
<thead>
<tr>
<th>VENDOR CONTROL ACTIVITIES</th>
<th>CAS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
</tr>
<tr>
<td>1 Planning and Control Activities</td>
<td></td>
</tr>
<tr>
<td>1.1 Quality plan (ISO 5001, 8.1 and ISO 10005)</td>
<td>H H R</td>
</tr>
<tr>
<td>1.2 Inspection and test plan (ISO 9001, 8.1 and ISO 10005)</td>
<td>H H R</td>
</tr>
<tr>
<td>1.3 Technical kick-off meeting</td>
<td>H W W</td>
</tr>
<tr>
<td>1.4 Pre-production meeting and pre-inspection meeting</td>
<td>H H W</td>
</tr>
<tr>
<td>2 Design and Development Activities</td>
<td></td>
</tr>
<tr>
<td>2.1 Thermal design verification (see IOGP S-614L for scope) (ISO 9001, 8.3)</td>
<td>H H H R</td>
</tr>
<tr>
<td>2.2 General arrangement drawing, design calculation and detailed drawings. (ISO 9001, 8.3)</td>
<td>H H H R</td>
</tr>
<tr>
<td>2.3 Manufacture and test procedures (forming, tube expansion, pressure testing as indicated in S-614L and applicable code)</td>
<td>H H H R</td>
</tr>
<tr>
<td>2.4 Welding book (WPS and WPQR) (code requirement)</td>
<td>H</td>
</tr>
</tbody>
</table>

- **H** Hold Point
- **W** Witness Point
- **S** Surveillance
- **R** Review

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### IOGP JIP33 – Information Requirements Specification (IRS)

<table>
<thead>
<tr>
<th>Code</th>
<th>Requirement</th>
<th>Condition Invoking Requirement</th>
<th>Typical Deliverable</th>
<th>Submit At Proposal</th>
<th>First Issue Post Purchase Order</th>
<th>Required As Built</th>
<th>Fulfilled by Document Numbers</th>
<th>Translation Required</th>
<th>Remarks</th>
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</thead>
<tbody>
<tr>
<td>MD01</td>
<td>Supplier Master Information Schedule</td>
<td>Information Deliverables List</td>
<td>Information Deliverables List</td>
<td>No</td>
<td>For Acceptance</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>MD02</td>
<td>Delivery schedule</td>
<td>Delivery/Production Schedule</td>
<td>Delivery/Production Schedule</td>
<td>Yes</td>
<td>For Information</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>MD03</td>
<td>Progress report</td>
<td>Progress Report</td>
<td>Progress Report</td>
<td>No</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>MD04</td>
<td>Quality plan</td>
<td>Quality Plan</td>
<td>Quality Plan</td>
<td>No</td>
<td>For Information</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MD05</td>
<td>Sub-supplier delivery schedule</td>
<td>Sub-Supplier List</td>
<td>Sub-Supplier List</td>
<td>Yes</td>
<td>For Information</td>
<td></td>
<td></td>
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<tr>
<td>MD06</td>
<td>Inspection and test plan</td>
<td>Inspection and Test Plan (ITP)</td>
<td>Inspection and Test Plan (ITP)</td>
<td>No</td>
<td>For Acceptance</td>
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<tr>
<td>MD07</td>
<td>Handling, shipping, storage and presentation procedure</td>
<td>Handling, shipping and storage procedure</td>
<td>Handling, shipping and storage procedure</td>
<td>No</td>
<td>For Information</td>
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<td></td>
<td></td>
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<tr>
<td>MD08</td>
<td>Non-conformance history</td>
<td>Non-conformance History</td>
<td>Non-conformance History</td>
<td>No</td>
<td>For Acceptance</td>
<td></td>
<td></td>
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<tr>
<td>MD09</td>
<td>Concession request</td>
<td>Concession request</td>
<td>Concession request</td>
<td>Yes</td>
<td>For Acceptance</td>
<td></td>
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<tr>
<td>MD10</td>
<td>Surface Preparation and Coating Quality Plan</td>
<td>Needed when coating or painting is specified by Purchaser</td>
<td>Needed when coating or painting is specified by Purchaser</td>
<td>No</td>
<td>For Information</td>
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</table>

### Technical Information Deliverables

<table>
<thead>
<tr>
<th>Code</th>
<th>Requirement</th>
<th>Condition Invoking Requirement</th>
<th>Typical Deliverable</th>
<th>Submit At Proposal</th>
<th>First Issue Post Purchase Order</th>
<th>Required As Built</th>
<th>Fulfilled by Document Numbers</th>
<th>Translation Required</th>
<th>Remarks</th>
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<tbody>
<tr>
<td>API650R1</td>
<td>Design Calculations</td>
<td>Calculations</td>
<td>Calculations</td>
<td>Yes</td>
<td>For Information</td>
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<tr>
<td>S61401</td>
<td>Calculations to support the design</td>
<td>Needed when thermal and hydraulic design is in the scope of the vendor</td>
<td>Needed when thermal and hydraulic design is in the scope of the vendor</td>
<td>Yes</td>
<td>For Information</td>
<td></td>
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<tr>
<td>S61402</td>
<td>Material Procurement Specifications</td>
<td>Needed when specified by the purchaser</td>
<td>Needed when specified by the purchaser</td>
<td>No</td>
<td>For Acceptance</td>
<td></td>
<td></td>
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<tr>
<td>S61403</td>
<td>Production weld testing / Destructive Test procedures</td>
<td>Needed when specified by the purchaser</td>
<td>Needed when specified by the purchaser</td>
<td>No</td>
<td>For Acceptance</td>
<td></td>
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<tr>
<td>API650R2</td>
<td>General Arrangement Drawing</td>
<td>General Arrangement</td>
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<tr>
<td>API650R3</td>
<td>Detailed Drawings</td>
<td>Detailed Drawing</td>
<td>Detailed Drawing</td>
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<td>API650R4</td>
<td>Completed Data Sheet</td>
<td>Data Sheet</td>
<td>Data Sheet</td>
<td>Yes</td>
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<tr>
<td>API650R5</td>
<td>Deviation List</td>
<td>Needed when vendor requests a deviation</td>
<td>Needed when vendor requests a deviation</td>
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<td>For Information</td>
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<td>API650R6</td>
<td>Design Calculations</td>
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<td>No</td>
<td>For Acceptance</td>
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<tr>
<td>S61405</td>
<td>Non-Destructive Examination</td>
<td>Non-Destructive Examination Procedures</td>
<td>Non-Destructive Examination Procedures</td>
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<td>For Acceptance</td>
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<tr>
<td>S61406</td>
<td>Forming Procedure (Heads, U-Blends, etc.)</td>
<td>Forming Procedure</td>
<td>Forming Procedure</td>
<td>No</td>
<td>For Acceptance</td>
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<td></td>
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<tr>
<td>API650R7</td>
<td>Positive Material Identification (PMI) procedure</td>
<td>Needed when material of construction is stainless steel</td>
<td>Needed when material of construction is stainless steel</td>
<td>Positive Material Identification (PMI) procedure</td>
<td>No</td>
<td>For Information</td>
<td></td>
<td></td>
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<tr>
<td>S61407</td>
<td>Pickling and passivation procedure (if applicable)</td>
<td>Pickling and passivation procedure</td>
<td>Pickling and passivation procedure</td>
<td>No</td>
<td>For Information</td>
<td></td>
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<tr>
<td>S61408</td>
<td>Heat Treatment Procedure</td>
<td>Needed when heat treatment is required</td>
<td>Needed when heat treatment is required</td>
<td>Heat Treatment Procedure</td>
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<td>For Information</td>
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<td>S61409</td>
<td>Pressure test procedure</td>
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<td>No</td>
<td>For Acceptance</td>
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</tbody>
</table>
Shell & Tube Heat Exchanger Specification Development (S-614)

2018 02 Working Group:
Chair, LSME (Lead Subject Matter Expert), SME (Subject Matter Expert) x 8
Aker Solutions, BP, Chevron, Eni, Equinor, Saudi Aramco, Shell, Total, Woodside

2018 02 Framing (Parent Standard Selection – API 660 and Scope)
2018 03 LSME Company Specification Review (LSME) [Excel]
2018 03 Data Sheet, Quality & Information Requirements
2018 04 Review of Draft
2018 05 Supplier Review of Draft
2018 07 Review of Supplier Comments
2018 09 Preparation of Final Draft
2018 11 Close out – Lessons learned
2018 12 Specification Package Published
Shell & Tube Heat Exchangers

- **Design Code** – ASME VIII Div 1 / EN 13445 / PD 5500 / etc.
- **Equipment Standard** – TEMA
- **Equipment Standard** – API 660
- **Supplementary Specification** – IOGP S-614
- **Quality Control Requirements (QRS)** – IOGP S-614Q
- **Information Requirements (IRS)** – IOGP S-614L
- **Equipment Data Sheet** – Project Requirements
Air-Cooled Heat Exchanger Specification Development (S-710)

2019 04 Working Group:
LSME, Core SME x 4 (Chair), SME x 13
Aker Solutions, BP, Chevron, ConocoPhillips, Eni, Equinor, ExxonMobil,
Petrobras, Saudi Aramco, Shell, Total, Woodside

2019 04 Framing (Parent Standard Selection)
2019 04 LSME (JAMA – Requirements Management Software = Requirements + Justification)
2019 04 LSME (Data Sheet, Quality & Information Requirements)
2019 05 Core SME review & comment in JAMA
2019 06 Supplier Review of Draft (Available on IOGP website for review and comment)
2019 12 Review of Supplier Comments (Meetings with suppliers)
2020 02 Preparation of Final Draft
2020 05 Close out – Lessons learned
2020 06 Specification Package Published (Requirements Justification shared with Working Group)
Air-Cooled Heat Exchangers

- **Design Code** – ASME VIII Div 1 / EN 13445 / PD 5500 / etc.
- **Equipment Standard** – API 661
- **Supplementary Specification** – IOGP S-710
- **Quality Control Requirements (QRS)** – IOGP S-710Q
- **Information Requirements (IRS)** – IOGP S-710L
- **Equipment Data Sheet** – IOGP S-710D
Working with IOGP JIP33

- **12 Operators:**
  - BP, Chevron, ConocoPhillips, Eni, Equinor, ExxonMobil
  - Petrobras, Petronas, Saudi Aramco, Shell, Total, Woodside
  - > 300 SMEs

- **Equipment Specifications:**

- **Horizontal Specifications:**

- **Requirements Development:**
  - Software Tools – JAMA (Requirements Specification), Qvscribe (Requirements Structure)
  - Methods – IOGP 604 Guidance on requirement development
  - Digitising requirements

- **Specification Maintenance:**
  - Feedback from Industry – via website / questionnaires
  - Time is required (Operator – Contractor – Supplier)
Working with API

- API 660 (Ninth Edition) + IOGP S-614 (V.1) Shell & Tube Heat Exchangers
- API 661 (Seventh Edition) + IOGP S-710 (V.1) Air-Cooled Heat Exchangers
- API 582 (Third Edition) + IOGP S-705 (V.1) Welding of Equipment and Piping

- API standards updated generally every 5 years
- API 660 – Working on Tenth Edition – will consider IOGP S-614 Requirements
- API 661 – Working on Eighth Edition – will consider IOGP S-710 Requirements

- IOGP specifications need to align
- Core set of engineers on API + IOGP committees
Conclusions - IOGP JIP33

- **Long-term:**
  - CEOs committed to JIP 33 – top down objective

- **Fresh Start:**
  - A chance to question the value/application of existing requirements

- **Personal Development:**
  - Bringing in new engineers, working alongside established engineers (>300 Engineers involved so far)
  - New tools/skills/methods for requirements definition

- **Challenge:**
  - 42 specifications published therefore 42 specifications to be maintained and developed

- **Boost to existing Standard’s Bodies:**
  - API, BSI, CEN, ISO, IEC, IEEE, ISO

If you want to get involved, HTS Committee Members could help – email: membership@hts.org.uk
Useful Links

**JIP33 Background Information**
- https://www.iogp.org/
- https://www.iogp-jip33.org/
- https://www.weforum.org/communities/oil-field-services

**JIP33 Specifications under Development**
- https://www.iogp-jip33.org/development/

**JIP33 Specifications Published**
- https://www.iogp-jip33.org/library/

**Requirements Definition**
- JAMA – https://www.jamasoftware.com/platform/jama-connect/
- QV+Scribe – https://gracorp.com/qvscribe/
- IOGP 604 Guidance on requirement development
Any Questions.......