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

Tim Griffin - Eni

Contents

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

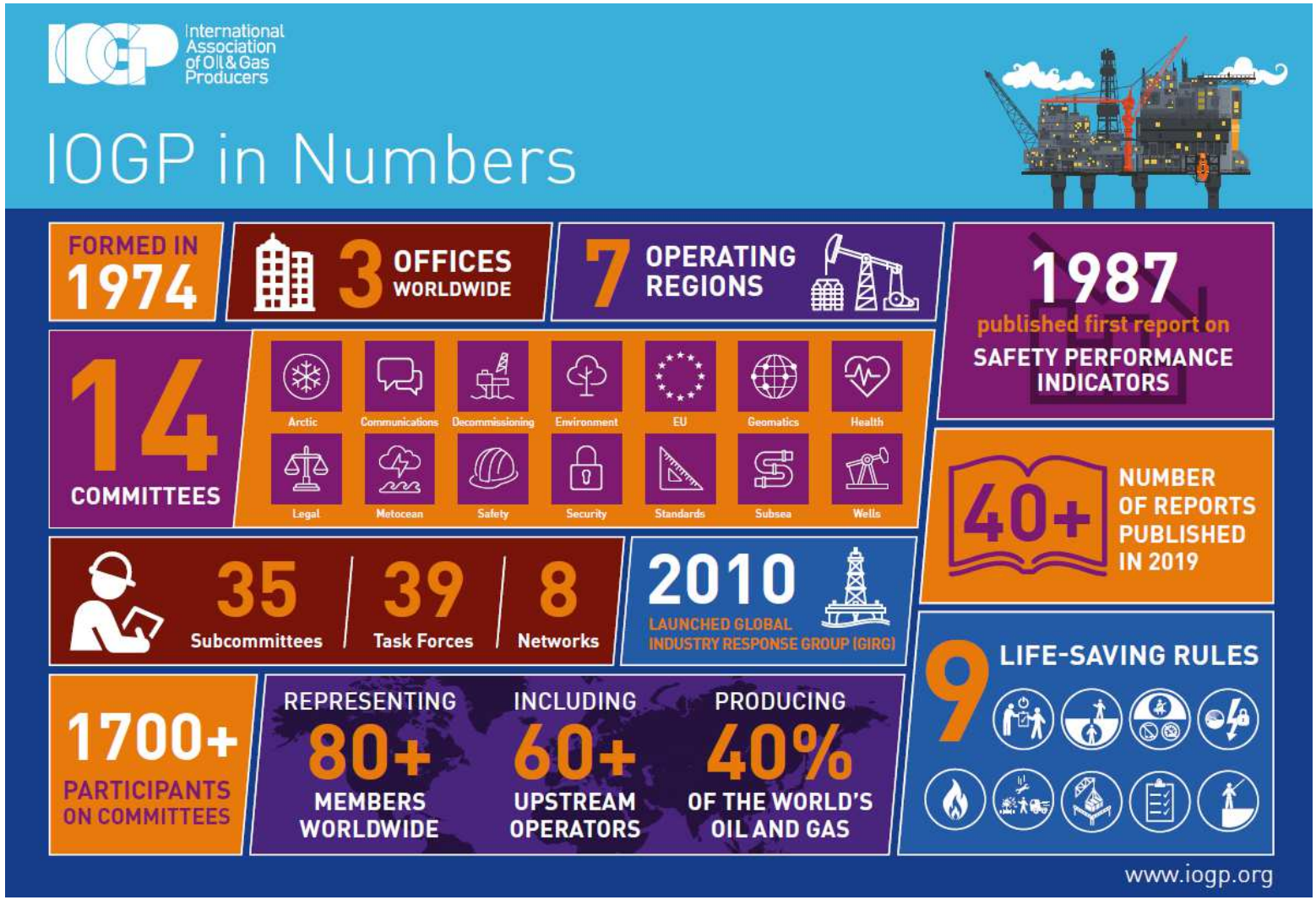
IOGP Committees

Standards Committee objectives

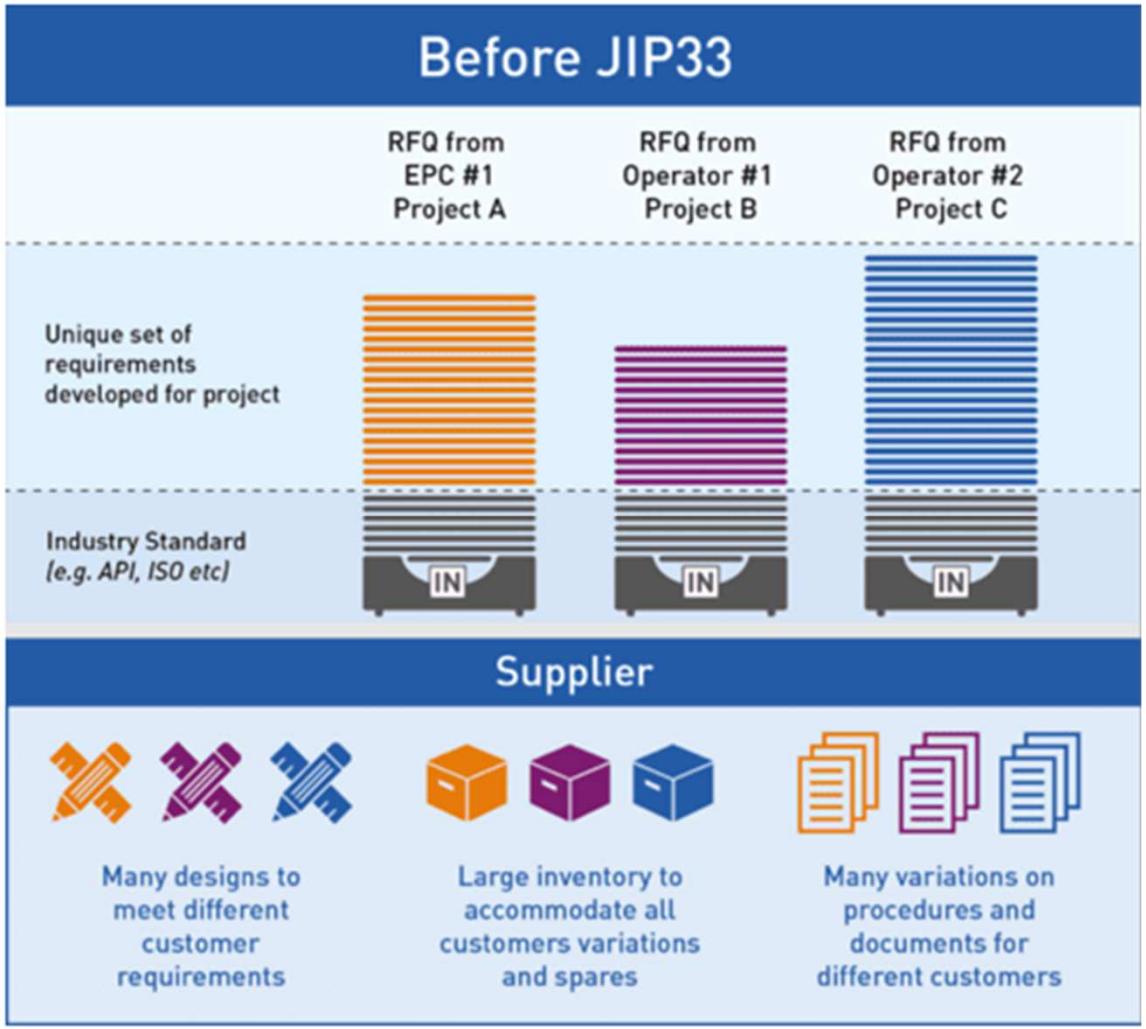
- *Development and use of international standards.*
- *Monitoring, coordinating and influencing the development of international standards to meet the needs of IOGP members.*
- *Working closely with national, regional and international standards bodies:*

  *ABNT, **API, BSI, CEN**, CSA, GSO, IEC, **ISO**, Rosstandart, TISI and many more.*

IOGP


International Association of Oil & Gas Producers
IOGP in Numbers
FORMED IN 1974
3 OFFICES WORLDWIDE
7 OPERATING REGIONS
1987
published first report on
SAFETY PERFORMANCE INDICATORS
14
COMMITTEES
Arctic
Communications
Decommissioning
Environment
EU
Geomatics
Health
Legal
Metocean
Safety
Security
Standards
Subsea
Wells
40+
NUMBER OF REPORTS PUBLISHED IN 2019
35 Subcommittees
39 Task Forces
8 Networks
2010
LAUNCHED GLOBAL INDUSTRY RESPONSE GROUP (GIRG)
9 LIFE-SAVING RULES
1700+
PARTICIPANTS ON COMMITTEES
REPRESENTING
80+
MEMBERS WORLDWIDE
INCLUDING
60+
UPSTREAM OPERATORS
PRODUCING
40%
OF THE WORLD'S OIL AND GAS
www.iogp.org

IOGP JIP33 - Before



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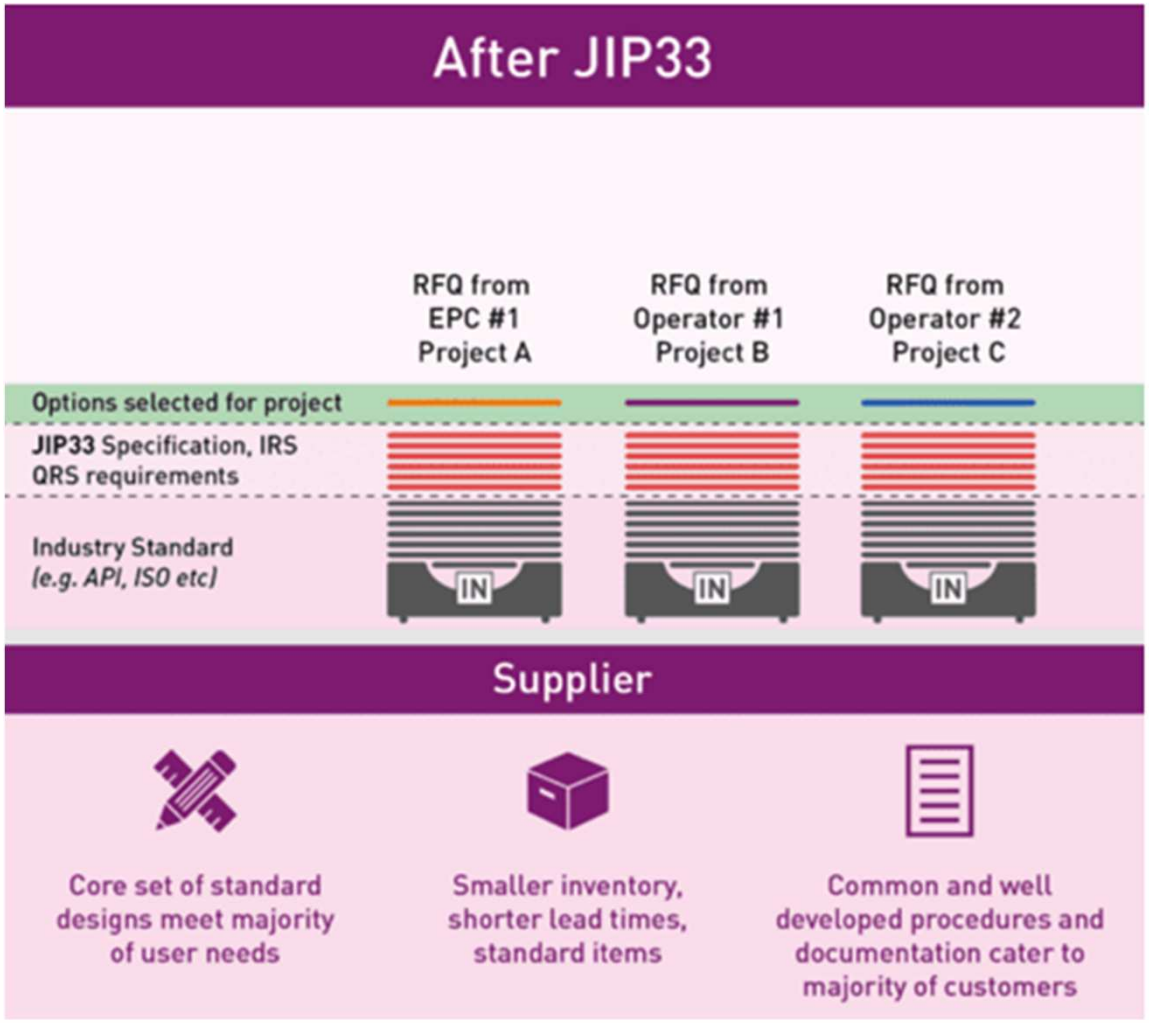
IOGP JIP33 - After



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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

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IOGP JIP33 – Data Sheet

Company	SHELL-AND-TUBE HEAT EXCHANGER DATA SHEET (SI UNITS)	Engineering contractor
P.O. No.:	Doc. No.:	Page 1 of

1	Client:			Location:							
2	Process unit:			Item No.:							
3	Job No.:			Fabricator:							
4	Service of unit:			No. of units:							
5	Size:	TEMA Type:		Connected in:	Parallel		Series				
6	Effective surface per unit (plain/finned):	m²	Shells/unit:		Effective surface per shell:	m²					
7	**PERFORMANCE OF ONE UNIT**		SHELL SIDE				TUBE SIDE				
8			Inlet		Outlet		Inlet		Outlet		
9	Fluid name:										
10	Fluid quantity, total:	kg/h									
11	Vapor (relative molecular mass):	kg/h									
12	Liquid:	kg/h									
13	Steam:	kg/h									
14	Water:	kg/h									
15	Non-condensable (relative molecular mass):	kg/h		/				/			
16	Temperature:	°C									
17	Density (vapor/liquid):	kg/m³									
18	Viscosity (vapor/liquid):	mPa·s									
19	Specific heat (vapor/liquid):	kJ/(kg·K)									
20	Thermal conductivity (vapor/liquid):	W/(m·K)									
21	Specific latent heat:	kJ/kg @ °C		@				@			
22	Inlet pressure:	kPa (ga)									
23	Velocity:	m/s									
24	Pressure drop (allowable/calculated):	kPa		/				/			
25	Fouling resistance:	m²·K/W									
26	Average film coefficient:	W/(m²·K)									
27	Heat exchanged:	kW		Mean temperature difference (MTD):		°C		corrected/weighted			
28	Heat transfer rate:	W/(m²·K)	Required:		Fouled:			Clean:			
29	ρV²:	kg/(m·s²)	Inlet nozzle:		Bundle entrance:			Bundle exit:			
30	Hydrogen Service:	Tube Side (Y/N)	Shell Side (Y/N)	Sour Service:	Tube Side (Y/N)	Shell Side (Y/N)		Cydic Service: (Y/N)			

Annex C
(informative)
Shell-and-Tube Heat Exchanger Datasheets

Add to section after third paragraph

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

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

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IOGP JIP33 – Quality Requirements Specification (QRS)

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.

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

Conformity Assessment System

High A-B-C-D Low

H	Hold Point
W	Witness Point
S	Surveillance
R	Review

IOGP JIP33 – Information Requirements Specification (IRS)

Col A	Col B	Col C	Col D	Col E	Col F	Col G	Col H	Col I	Col J	Col K	Col L
Code	Requirement	Condition Invoking Requirement	Typical Deliverable	Submit At Proposal	First Issue Post Purchase Order			Required As Built	Fulfilled by Document Number(s)	Translation Required	Remarks
				(Yes/No)	Purpose	(Weeks)	(Period)	(Yes/No)			
Contract Management Information Deliverables											
MD#01	Supplier Master Information Schedule		Information Deliverables List	No	For Acceptance						
MD#02	Delivery schedule		Delivery/Production Schedule	Yes	For Information						
MD#03	Progress report		Progress Report	No	For Information						
MD#04	Quality plan		Quality Plan	No	For Information						
MD#05	Sub-supplier delivery schedule		Sub-Supplier List	Yes	For Information						
MD#06	Inspection and test plan		Inspection and Test Plan (ITP)	No	For Acceptance						
MD#07	Handling, shipping, storage and preservation procedure		Handling, shipping and storage procedure	No	For Information						
MD#08	Non-conformance records		Non-conformance History	No	For Acceptance						
MD#09	Concession requests		Concession request	Yes	For Acceptance						
MD#10	Surface Preparation and Coating Quality Plan	Needed when coating or painting is specified by Purchaser	Painting procedure	No	For Information						
Technical Information Deliverables											
API660#01	Sketches to describe the shell and tube heat exchanger			Yes	For Information						
S614#01	Calculations to support the design	Needed when thermal and hydraulic design is in the scope of the vendor		Yes	For Information						
S614#02	Material Procurement Specifications	Needed when specified by the purchaser		No	For Acceptance						
S614#03	Production weld testing / Destructive Test procedures	Needed when specified by the purchaser		No	For Acceptance						
API660#02	General Arrangement Drawing		General Arrangement	No	For Acceptance						
API660#03	Detailed Drawings		Detailed Drawing	No	For Acceptance						
API660#04	Completed Data Sheet		Data Sheet	Yes	For Acceptance						
API660#05	Deviation List	Needed when vendor requests a deviation	Deviations List	Yes	For Information						
API660#06	Design Calculations		Calculations	No	For Acceptance						
S614#05	Non-Destructive Examination		Non-Destructive Examination Procedures	No	For Acceptance						
S614#06	Forming Procedure (Heads, U-Bends, etc.)		Forming Procedure	No	For Acceptance						
API660#07	Positive Material Identification (PMI) procedure	Needed when material of construction is stainless steel	Positive Material Identification (PMI) procedure	No	For Information						
S614#07	Pickling and passivation procedure (If applicable)	Needed when material of construction is stainless steel	Pickling and passivation procedure	No	For Information						
S614#08	Heat Treatment Procedure	Needed when heat treatment is required	Heat Treatment Procedure	No	For Information						
S614#09	Pressure test procedure		Pressure test procedure	No	For Acceptance						

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:*
  - *Air-Cooled Heat Exchangers [API 661] / Electric Heaters / Pressure Vessels / Shell & Tube Heat Exchangers [API 660]*
- *Horizontal Specifications:*
  - *Welding of Piping & Equipment [API 582] / Painting [NORSOK M-501] / Insulation [NORSOK M-004]*
- *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/
QVScribe – https://qracorp.com/qvscribe/
IOGP 604 Guidance on requirement development

Any Questions…….