American Petroleum Institute

NOTES ON MEETING OF
SUBCOMMITTEE 6 ON VALVES AND WELLHEAD EQUIPMENT

9:00 am – Noon TIEC Training Center – Imperial Room
Thursday, February 1, 2007 480 N Sam Houston Pkwy E, Suite 270
Houston, Texas
George G. Huntoon, Chairman
Roy W. Benefield, Secretary

I. Opening Remarks – George Huntoon

• Call to order
Orders of Business – Mute phones.
Safety – Exit procedures
Good attendance. 12 voting members. Record of Meeting Attendance (Attachment 1)

• Review agenda – Chairman reviewed items. Some new ones added.

• Summary Report (Attachment 2)

• Approval of minutes for 6/15/06 meeting in Atlanta. – add AWHEM report on material research work. Ries Langereis asked question about update of ISO 10423 to include AWHEM recommendations. This will be discussed. Motion made and seconded to approve minutes. Passed

II. Subcommittee Organization – George Huntoon

• Report from Executive Committee (ECS) Meeting, Scottsdale (Attachment 3)

III. Research Project Funding

• Proposed RP 6HP Status Report – George presented a quick summary. (Attachment 4) Work is progressing. Jonathan reported on status and work going on. Austin reported on last meeting and actions recently taken. This report and responsibility will eventually come back to SC6 in a few years.

• 15K Flange Project Status – Jonathan reported John Fowler has worked on this. Discussion on how to publish or include in documents.

• Metallic Material Limits Project Status – George reported that this would be published as a technical report. It will go out for ballot. Mike Miller to work with Jonathan to be sure it includes all the data.

• Update on SC6 Research Programs – George Huntoon - George and Jonathan reported on procedure and items that may be recommended. Request will be sent to TG chairs for input.
IV. Status of Publications under Review

- Publications for 5 year review:
  - 2007: None
- Jonathan reported on relocation of documents for assignment to appropriate Subcommittees for a better fit. [ECS initiative on standards reorganization - see report (previous Attachment 3)]

V. Pipeline Valve Issues – Rick Faircloth

- Spec 6D / ISO 14313 Progress – DIS voting comments are being resolved. Task Group will meet some time in April. Document will be sent to the editing committee in ISO. API will also vote to accept at the same time.

VI. Subsurface Safety Valve Issues –

VII. Wellhead Issues

- PSL-3G Revisions Ballot – George Huntoon – Supplemental gas requirements published in API 6A. A ballot report was given. Item passed with comments. Comments are being resolved. (Attachment 5) David Zollo had agreed to chair a Task Group on testing verification. David reported that some work has been done he is ready to discuss this item.
- Proposed 6AR Repair & Remanufacture Task Group – Sterling Lewis – No meeting has been called. Has identified four documents that might be affected. API 6DR, API 6AR, API 6A and ISO 10423. Suggestion to look at previous report. OEM was an issue with the API legal department. Could be resolved by applying the document to User owned equipment. API 6D repair document is model. This procedure needs to be universal for several documents, but focus around 6A core equipment. Chair said that this is important work that needs to go forward. First meeting planned for March 22nd.
- Spec 6A718 Report – Tim Haeberle – Task Group has been meeting. Status report was given. There was some discussion on forge ratio of 4:1 or 3.75:1. (Attachment 6) This item is closed.
- AWHEM Proposals (Attachment 7) – George Huntoon – Reviewed report from Jerry Longmire on errata to API 6A. Looks like all editorial changes not needed a ballot. Chair proposed a “line-item” veto type ballot that worked well before. Each item was reviewed and discussed. Drawing and more input needed from AWHEM on some items, i.e. L dimension in Annex K. Action by Anton Doch and Jonathan Jordan. David Zollo recommended changes to Table 76. It was agreed is these changes be made by errata (Attachment 7a).
• Heat Treat Furnace Calibration Annex – George Huntoon – Change suggested by Manuel Maligas. It was agreed that Annex H was dropped because of conflicts in wording with other sections of the document, but many miss the guidance of this Annex. It was agreed that an informative Annex be reinstalled in the document. Eric Wehner, George Huntoon and Chris Patriarca agreed to provide the new wording which will be balloted for inclusion in API 6A.
• Carry-over Items from 2005 (Attachment 8) – George Huntoon – This material needs to be addressed. Chairman will make assignment.
• 20k Flange Designs NWI (from RP 6HP) – George Huntoon – Reported on Task Group work from last meeting. (Attachment 9)
• Verification/Validation Report – Austin Freeman – Austin report on proposed changes. It was agreed leave document unchanged until ISO makes the change in ISO 10423. Jonathan said that information could be posted on the web-site. Chairman pointed out that we would be looking for a report on this in June. (Attachment 10)

VIII. One Worldwide Wellhead Standard – Reis Langereis – Minutes of ISO meetings can be included on the web-site. There will be a meeting March 20th. (See SC6 Hompage, link to “10423 Activities”)
• TC67/SC4/WG3 - ISO 10423 Status Update – Reported on meetings that have been conducted. A list of changes will be forth coming.
• Casting/Forgings Issue – Alfred Kruger - Issue is still working. Alfred presented a report on the ISO Task Group. The chairman requested that this item continue to be considered and input be received. We need to align the documents. Proposals will be made in June. (Attachment 11)
• NACE Implementations Question was raised on can we now use the new NACE document. Input is needed from manufacturers.
• Repair & Remanufacture Issue – A procedure is included in the ISO document, but there are still API legal issues to be resolved.

IX. Other Business
• Request from SC18 – Product Specification Review of “Processes Requiring Validation” – Benefield/Faircloth (SC18 Liaisons) – This item was discussed. How do we work this item? Chair said that API 6A and 6D are in alignment. Quick review report to be made by R Benefield and R Faircloth at June meeting.
• API Website Update – Jonathan Jordan – Use the following links from API.org: API Standards - Committee Information – ECS. (Presentation in Attachment 12)

• Future Meetings
  Summer 2007 – June 25-29 San Francisco Hyatt Embarcadero (SC6 Thursday AM)
  Winter 2008 – Texas Location

X. Adjournment
Motion made seconded passed to adjourn at 12:15.
## RECORD OF MEETING ATTENDANCE

**GROUP** Subcomittee C  
**CHAIRMAN** C. Houston  
**MEETING** Winter 2007  
**TIME** 9:00  
**DATE** Feb 1

Committee members should make changes to their personal record on the attached roster. Visitors adding names to roster will not automatically become members of the committee.

Indicate BEFORE YOUR NAME if you are:
(M) Member of the Committee in session  
(R) Representing a Committee Member (if so, state member's name)  
(V) Visitor – ONLY voting members or their Representatives may vote  
(S) Staff

<table>
<thead>
<tr>
<th>NAME (Please Print)</th>
<th>COMPANY/PHONE or email</th>
</tr>
</thead>
<tbody>
<tr>
<td>S Jonathan Jordan</td>
<td>API <a href="mailto:jordanj@api.org">jordanj@api.org</a></td>
</tr>
<tr>
<td>M George Houston</td>
<td>BP <a href="mailto:george_houston@bp.com">george_houston@bp.com</a></td>
</tr>
<tr>
<td>M Roy W Benefield</td>
<td>FMIC Tech Inc, <a href="mailto:benefield@nochurces.com">benefield@nochurces.com</a></td>
</tr>
<tr>
<td>V David A. Zullo</td>
<td>FMIC Tech Inc, <a href="mailto:david.zullo@smc.com">david.zullo@smc.com</a></td>
</tr>
<tr>
<td>M Kenneth Young</td>
<td>Stress Engineering, <a href="mailto:kyoung@stress.com">kyoung@stress.com</a></td>
</tr>
<tr>
<td>M Eric Wehner</td>
<td>CAMERON <a href="mailto:eric.wehner@cameron.com">eric.wehner@cameron.com</a></td>
</tr>
<tr>
<td>M Chris Patrascu</td>
<td>Shell, <a href="mailto:chris.patrascu@shell.com">chris.patrascu@shell.com</a></td>
</tr>
<tr>
<td>M Austin Freeman</td>
<td>Halliburton, <a href="mailto:austin.freeman@halliburton.com">austin.freeman@halliburton.com</a></td>
</tr>
<tr>
<td>M Jean Brunjes</td>
<td>VECO Gray, <a href="mailto:jean.brunjes@vecoco.com">jean.brunjes@vecoco.com</a></td>
</tr>
<tr>
<td>M John Ilconhower</td>
<td>FLOWSERVE, <a href="mailto:joicer@flowserve.com">joicer@flowserve.com</a></td>
</tr>
<tr>
<td>M Rick Faircloth</td>
<td>Cameron, <a href="mailto:rick.faircloth@cameron.com">rick.faircloth@cameron.com</a></td>
</tr>
<tr>
<td>M Sterling Lewis</td>
<td><a href="mailto:Sterling.f.lewis@exxonmobil.com">Sterling.f.lewis@exxonmobil.com</a></td>
</tr>
<tr>
<td>V Hugh Parker</td>
<td>Shell UK, <a href="mailto:Hugh.Parker@shell.com">Hugh.Parker@shell.com</a></td>
</tr>
<tr>
<td>V Tim Haebler</td>
<td>VECO Gray, <a href="mailto:tim.haebler@vecoco.com">tim.haebler@vecoco.com</a></td>
</tr>
<tr>
<td>V David Compeaux</td>
<td>VECO Gray, <a href="mailto:david.compeaux@vecoco.com">david.compeaux@vecoco.com</a></td>
</tr>
<tr>
<td>M Mike Miller</td>
<td>DRIL-QUIP, <a href="mailto:mike.miller@dril-quip.com">mike.miller@dril-quip.com</a></td>
</tr>
<tr>
<td>V Maarten Kuipers</td>
<td>Makveald, <a href="mailto:maarten.kuipers@makveald.com">maarten.kuipers@makveald.com</a></td>
</tr>
<tr>
<td>M Robert Barnett</td>
<td>WGP, <a href="mailto:bob.barnett@woodgroup.com">bob.barnett@woodgroup.com</a></td>
</tr>
</tbody>
</table>

**THIS FORM MUST BE RETURNED TO THE API STAFF**

API standards meetings are open to all interested parties. By participating in the standardization process, you agree: (1) to fully comply with API's policies and procedures governing standards, (2) that once balloted and approved by API, API shall have the sole and exclusive right to use any materials that are submitted by the participant for use in the standard, (3) you will not provide any material that will violate the rights of any third parties including, but not limited to, patents, copyrights, trade secrets, and trademarks, and (4) to disclose the existence of any patented technologies in the material that you provide.
<table>
<thead>
<tr>
<th>NAME (Please Print)</th>
<th>COMPANY/PHONE or email</th>
</tr>
</thead>
<tbody>
<tr>
<td>V Ries Langeneis</td>
<td>Cameron Ries Langeneis</td>
</tr>
<tr>
<td>V Alfred Kruger</td>
<td>Shell Alfred Kruger</td>
</tr>
</tbody>
</table>

(M) Member of the Committee in session
(R) Representing a Committee Member (If so, state member's name)
(V) Visitor – ONLY voting members or their Representatives may vote
(S) Staff
<table>
<thead>
<tr>
<th>Work Item</th>
<th>Item</th>
<th>Status</th>
<th>Vote</th>
<th>NWI</th>
<th>Contact</th>
</tr>
</thead>
<tbody>
<tr>
<td>6A-2001-06-3</td>
<td>Equivalent normative references</td>
<td>TBD</td>
<td></td>
<td></td>
<td>TG to map process, evaluate and develop list of equivalent references for 6A, 6D, 14A</td>
</tr>
<tr>
<td>6A-2002-06-3</td>
<td>Define Design Verification and Validation</td>
<td>TBD</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6A-2006-02-1</td>
<td>PSL 3 Testing Requirements</td>
<td>W</td>
<td>Huntoon</td>
<td></td>
<td>Item balloted, Ballot closed, comments being resolved.</td>
</tr>
<tr>
<td>14A-2001-06-2</td>
<td>Revision of API 14H, installations, maintenance and repairs of SSV &amp; USV</td>
<td>W</td>
<td>Yonker</td>
<td></td>
<td>API formatting and editing comments. Publication pending.</td>
</tr>
<tr>
<td>6D-2002-2</td>
<td>Evaluate ISO 14723, Subsea Pipeline Valves</td>
<td>W</td>
<td>Faircloth</td>
<td></td>
<td>Letter Ballot to adopt-back into API (no API equivalent) as Spec 6DSS, ballot closed on Feb 9, 2007</td>
</tr>
</tbody>
</table>
Current Status

There are a number of areas where the traditional model used to develop standards is not working well. API has attempted to remedy this situation by bolstering the industry volunteers with contracted experts, but even this method is not working to keep some of the problem areas active. The problem areas encompass the following:

- Drilling Equipment (excluding cements and drilling fluids)
- Production Equipment
- Completion Equipment

There are a number of reasons for this occurrence:

- Lack of volunteer time
- Lack of operator participation
- Lack of an industry “champion”
- Lack of international participation

The standards subcommittees that seem to be having the most difficult time with this resource challenge are the following:

**Drilling and Well Control**

- SC8, Drilling Equipment: Chaired by Mark Sibille with Frank’s Casing, this group has managed to maintain an identity with little or no operator involvement. Drilling contractors have stepped up to fill the void, but only in limited numbers. The subcommittee meets once a year in June and continues to refine its suite of standards. ISO coordination has become a problem because of the lack of international participation and limited resources with the result being divergent API/US and ISO standards. The Spec 4F (Derricks and Masts) group has benefited from added interest in its standards from the offshore arena as a result of data gathered during the recent hurricanes.

- SC16, Drilling Well Control Systems: Chaired by David Tannich recently retired from Cudd Well Control, this group has not met in at least four years. The group has managed to push forward new standards in the areas of managed-pressure drilling (document developed by an IADC group) and coiled tubing/wireline well control (a hybrid equipment/operations document soon to be published). However, support for the core SC16 documents, especially 16C (choke & kill) and 16Q (drilling riser design), has waned over the past years, and the last major activity took place in early 2004.

**Completion and Production**

- SC11, Field Production Equipment: Chaired by Sid Thomas with Weatherford, this group meets once a year in June if the venue is suitable and has continued to advance standards where the members have technical expertise (mainly gas lift and sucker rods). However, the scope of standards under the purview of the group continues to grow with the addition (a number of years ago) of tank-related and ISO-developed standards for which there is no natural home within our current API subcommittee structure.

- SC19, Completion Equipment: Chaired by Manny Gonzalez with Chevron (he has indicated a desire to step down), this subcommittee was essentially formed from two independently functioning task groups that were spun off from the ECDPO (Perforators and Proppants). The subcommittee does not meet regularly, but the individual task groups do meet on a regular basis.
Discussion and Items for Consideration

Drilling and Well Control Equipment

- The oil companies have reduced their presence in this area and drilling contractors are now the principal owners and users of drilling and well control equipment.
- The oil companies have retained expertise in drilling operations and API has been successful in developing operations-based drilling standards on an ad hoc basis.
- Coordination with ISO has proven difficult due to lack of international participation resulting in “API-only” revisions to what were once identical ISO and API documents (particularly within SC8).
- Approximately 500 facilities hold API Monogram licenses to produce equipment to the specifications covered by SC8 and SC16.

Questions for consideration:

- Would combining all the standards from SC8, SC16, and assorted ECDPO well control operations standards (RP53, RP59, RP64) provide a “critical mass” such that it would attract more diverse industry participation?
- Would approaching IADC and other drilling-focused industry groups and proposing a formal “partnership” to develop drilling standard be beneficial to the industry?
- Is there a demonstrated industry need to have these standards be ISO standards?
- Should these standards be worked on an ad hoc basis rather than trying to maintain a standing industry standards subcommittee?

Field Production Equipment

- SC11 expertise is focused on gas lift and sucker rods, but the SC is asked to address ISO-generated standards such as Packers/Bridge Plugs, Sand Control Screens, and Tubing Barrier Valves that are not a natural fit with any other API subcommittee.
- The 12-series standards covering tanks, separators and other lease production vessels receive little, if any, attention.
- Two major operating companies participate on SC11 (BP, Chevron)
- ISO SC4/WG4 currently very active in advancing standards in this area
- Approximately 211 facilities hold API Monogram licenses to produce equipment to the specifications covered by SC11.

Questions for consideration:

- Is the responsibility of SC11 too broad? Would transferring certain standards to Completion Equipment (see below) allow it to focus efforts on their area of expertise?
- How can we attract a group to work on the 12-series standards? Would an ad hoc model utilizing a contracted expert to draft standards be viable option?

Completion Equipment

- SC19 has never grown beyond the original task groups – perforating and proppants.
- Both groups have good operator participation.

Questions for consideration:

- Would transferring some standards from SC11 (packers/bridge plugs and proposed ISO standards for sand control screens and tubing barrier valves) and possibly from SC6 (14A-Safety valves, 14B-Safety valve operations, and 14L-locks and landing nipples) to SC19 provide a “critical mass” such that it would stimulate a more robust completion equipment subcommittee?
- Is there a common industry model for how major companies organize their production and completions groups? Is our committee structure out of alignment?
- Are there other industry trade groups we could partner with to develop a more comprehensive completion equipment subcommittee?
MINUTES
Executive Committee on Standardization of Oilfield Equipment & Materials
Ad hoc Task Group on Reorganization
January 23, 2007

Attendees:  Charlie Williams, Gary Devlin, Bill Hedrick, Manny Gonzalez, David Tannich, Charlie Truby, Austin Freeman, John Yonker, David Miller, Tim Sampson, Andy Radford
Via Conference Call:  Mark Sibille, Sid Thomas, Alan Spackman, Jonathan Jordan

Charlie Williams called the meeting to order and discussed the purpose of this team. The group then discussed their expected outcomes for this task group.  Andy Radford prepared an document that attempted to describe the current situation and posed some questions to the group regarding the areas that API staff sees as needing attention (see Attachment A).

The group discussed various aspects of the problem.  It seems that we are experiencing the most problems in the drilling area followed by the completion and production areas.  The problems manifest themselves in different ways, but can be characterized in the following manner:

- Resources – Do we have the right people active on our subcommittees?
- Organization – Do we have the right standards with the right subcommittees?
- Participation – How can we improve the level of active participation of those people we do have on board?

The group then discussed the need to identify which group is the true “user” of the document from a contractual standpoint.  This is the group that should take ownership of the document and ensure that it meets their needs.  Each subcommittee needs to evaluate their standards with this in mind.

The group also discussed the role of the Executive Committee on Drilling Operations and what options we might have with respect to the following:

- “Operations” standards currently under ECS that could be transferred to ECDPO
- ECDPO standards that could be transferred to ECS
- How to best capitalize on the operator presence in ECDPO to bolster the lack of operators in some ECS subcommittees.

Based on these discussions the group decided that each subcommittee should review their suite of standards with respect to the issues raised above.  Gary Devlin and Andy Radford agreed to develop a form that would guide the subcommittees through the evaluation process and help to answer the following questions:

- Which group is the primary stakeholder for the standard?
- For which standards should maintenance activities be “transferred” to other groups (either other ECS subcommittees, ECDPO, another industry group, etc.)?
- Which standards should be dropped?
- How should the standard be maintained going forward?

The group also touched additional items that they thought would be beneficial in attracting people to work on standards.  The group suggested that the ECS Recruitment and Retention Task Group develop a web-based training package for new participants in standards development activity.  The group also thought that a comprehensive communications plan to “sell” standards.  Bill Hedrick volunteered to work on this.
RECOMMENDED PRACTICE
FOR
PRESSURE CONTAINMENT EQUIPMENT
WITH
WORKING PRESSURES GREATER THAN 15 KSI
RP 6HP (Draft)
TASK GROUP COMMITTEE MEETING

Location: TEIC - Houston
January 30, 2007
Begin 9:00 AM
Task Group Committee Meeting
Jan 30, 2007

Agenda

• Welcome and Safety Issues
• Any Relevant API Issues
  – Re-Name to TG and WG
• API ECS Web Page
  – RP 6HP Web Listings
• Feedback From ECS on API RP 6HP (draft)
  – Winter Meeting Discussion
• Review Materials WG & Sub-Coms Meetings
• 20 KSI Flange Design
• Proposal of Position Paper as Committee Update
• Paul Cernocky Presentation
• Next Meeting Date
• AOB
MEETING SUMMARY

• ECS Meeting on 23 Jan 2007 – 6HP Agenda Item

Quote:

“The work of the Materials Task Group should continue in order to develop of the testing protocols needed for the materials pilot testing. The work on revision 5 of RP 6HP should continue in addressing the comments received to date, but revision 6 should not be circulated for comments in order to reduce the resource burden on reviewers, with work continuing only after the pilot materials testing has been successfully completed.”
Directions To Material Work Group

1. Change scope to focus on one homogeneous material to develop material testing protocols.
2. Exclude weldments, castings, and elastomers in developing the primary protocols.
3. Select the most practical material type to focus on based on most commonly used forgings in the drilling and development industry.

RP 6HP Committee to develop a plan to qualify a component using the selected material using the RP 6HP methodology. Propose the plan to the ECS for approval.
Material Work Group

• Work Group Chairman Report
  – Meetings Progress
  – Questions/Comments to Task Group

• Material WG Work Groups Reports
  – Design Properties
  – Manufacturing Materials
  – Design Environments
  – Material Testing
<table>
<thead>
<tr>
<th>Voter</th>
<th>Company</th>
<th>Comments</th>
<th>Affirmative</th>
<th>Negative</th>
<th>Abstain</th>
<th>Did Not Vote</th>
</tr>
</thead>
<tbody>
<tr>
<td>127880</td>
<td>Robert Barnett</td>
<td>Wood Group Pressure Control</td>
<td>No</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>127242</td>
<td>Roy Benefield</td>
<td>FMC Technologies</td>
<td>Yes</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>127251</td>
<td>Sidney Campbell</td>
<td>Murphy Exploration &amp; Production Company</td>
<td>No</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>127261</td>
<td>Anton Dach</td>
<td>Vetco Gray, Inc.</td>
<td>No</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>153144</td>
<td>Gene Downing</td>
<td>Downing Wellhead Equipment, Inc.</td>
<td>No</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>127274</td>
<td>John Fowler</td>
<td>On-line Resources</td>
<td>Yes</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>153495</td>
<td>Austin Freeman</td>
<td>Halliburton Energy Services/Carrollton Facility</td>
<td>Yes</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>127288</td>
<td>George Huntoon</td>
<td>BP p.l.c.</td>
<td>No</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>127294</td>
<td>John Icenhower</td>
<td>Flowserve</td>
<td>No</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>144605</td>
<td>Sterling Lewis</td>
<td>ExxonMobil</td>
<td>No</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>127628</td>
<td>David McCalvin</td>
<td>Schlumberger</td>
<td>No</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>127632</td>
<td>William McLean</td>
<td>Newco Valves</td>
<td>No</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>144520</td>
<td>Mike Miller</td>
<td>Dril-Quip, Inc.</td>
<td>No</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>127316</td>
<td>David O'Donnell</td>
<td>National Oilwell Varco</td>
<td>No</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>127202</td>
<td>David Ott</td>
<td>Baker Oil Tools/Emmott Road Facility</td>
<td>No</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>143739</td>
<td>Chris Patriarca</td>
<td>Shell Oil Products US</td>
<td>No</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>127334</td>
<td>Robert Schmidt</td>
<td>Trinity Fitting &amp; Flange</td>
<td>No</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>143741</td>
<td>Stephen Smith</td>
<td>Saudi Aramco</td>
<td>No</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>127355</td>
<td>Eric Wehner</td>
<td>Cameron</td>
<td>Yes</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>127367</td>
<td>Kenneth Young</td>
<td>Stress Engineering Services</td>
<td>No</td>
<td>X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
API Ballot Summary Sheet
1/23/2007

Ballot: Spec 6A PSL 3G Revisions

Start Date: 12/21/06
Closing Date: 1/22/07

Proposal:

AMS ID: 1,023
Associate: Jonathan Jordan
Coordinator: Carriann Kuryla

Balloting Totals:

<table>
<thead>
<tr>
<th></th>
<th>Affirmative</th>
<th>Negative</th>
<th>Abstain</th>
<th>Did Not Vote</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Responses</td>
<td>16</td>
<td></td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Total Ballots</td>
<td>20</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Response Rate</td>
<td>75%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Approval Rate</td>
<td>94%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consensus</td>
<td>YES</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Consensus: YES

Must be > 50%

Must be > 67%
### API Ballot Comments and Resolution

<table>
<thead>
<tr>
<th>Voter Name (Vote)</th>
<th>Clause No./ Subclause No./Annex (e.g. 3.1)</th>
<th>Type of Comment</th>
<th>Comment (justification for change) by the Voting Member</th>
<th>Proposed change by the Voting Member</th>
<th>Comment Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eric Wehner Cameron (Affirmative)</td>
<td>7.4.9</td>
<td>Technical</td>
<td>(1) The change proposed for 7.4.9.1 would delete the last sentence: &quot;The sequence of other tests shall be at the option of the manufacturer.&quot; This sentence was added to 6A to allow variation in the sequence of gas testing. Primarily, it was desired that a manufacturer be able to perform the gas back-seat test of PSL 3G or 4 before other gas testing. In many cases, the back-seat test is the most difficult to pass, so it may save time to do it first. Also, if a valve has to be disassembled to take remedial action in order to pass the back-seat test, the manufacturer would typically want to perform that gas test first before proceeding to the body and seat gas tests. This could avoid repeating testing unnecessarily. (2) The proposed wording: &quot;...a hydrostatic body test and a hydrostatic valve seat test...&quot; could be taken to imply that only one seat test need be performed prior to gas testing, due to the use of &quot;a.&quot; The intention was that all hydrostatic testing be performed prior to any gas testing, so this sentence should use &quot;all hydrostatic...testing&quot; instead of &quot;a hydrostatic...test.&quot;</td>
<td>Replace the last sentence of 7.4.9.1 with: &quot;All hydrostatic body testing and all hydrostatic valve seat testing shall be performed prior to any gas testing. The sequence of gas tests may be varied at the option of the manufacturer.&quot;</td>
<td></td>
</tr>
<tr>
<td>Roy Benefield FMC Technologies (Negative)</td>
<td>7.4.9</td>
<td>Technical</td>
<td>Discussion / Argument: 1- The wording changes below will bring ISO_DIS_13628-4_E and ISO 10423 in alignment. This promotes standardization. 2- When gas testing is to be conducted the true purpose of the hydrostatic testing is to stress the valve components while opening the valve against full differential. Hydrostatic tests with extended hold times, leakage monitoring or chart recording add no value when the gas testing is much more accurate to ensure that the acceptance criteria is met.</td>
<td>1- AS BALLOTED: 7.4.9.1 General Replace the last sentence with: &quot;A hydrostatic body test and a hydrostatic valve seat test shall be performed prior to any gas testing.&quot; 1- FMC PROPOSAL: Replace the last paragraph with: &quot;A hydrostatic body test and hydrostatic valve seat test shall be performed prior to any gas testing. The hydrostatic seat test may be conducted as described in subclause 7.4.9.4.5.a by opening the valve against full differential pressure to stress the...&quot;</td>
<td></td>
</tr>
<tr>
<td>Voter Name (Vote)</td>
<td>Clause No./ Subclause No./Annex (e.g. 3.1)</td>
<td>Type of Comment</td>
<td>Comment (justification for change) by the Voting Member</td>
<td>Proposed change by the Voting Member</td>
<td>Comment Resolution</td>
</tr>
<tr>
<td>-------------------</td>
<td>------------------------------------------</td>
<td>----------------</td>
<td>--------------------------------------------------------</td>
<td>-------------------------------------</td>
<td>--------------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3- Removal of “in place of” wording and defining an exact requirement is acceptable but should not be done with the motive of changing the writer’s original intentions.</td>
<td>sealing surfaces and drive train, in which case the requirements for hold times, monitoring of leakage, hydrostatic pressure test records, and use of a chart recorder are not applicable.”</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2- AS BALLOTED: 7.4.9.5.8 PSL3G gas seat test - Valves Delete the words “or in place of”</td>
<td>2- FMC PROPOSAL: Delete the words “or in place of”; delete the word (extended); change the wording “(in accordance with 7.4.9.5.6)” to “(in accordance with 7.4.9.4.5.a)”</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Change Table 20 as follows: Column PSL 36, Row Hydrostatic Test Seat, add “7.4.9.4.5. Same column, Row Extended Seat Test, Remove 7.9.9.5.6.”</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3- AS BALLOTED: 7.4.9.5.8 b) and 7.4.9.6.7 b) Revise the subclauses as follows: “A maximum reduction of the gas test pressure of 2.0 MPa (300 psi) for high pressure tests and 0.2 MPa (30 psi) for low pressure tests is acceptable as long as there are no visible bubbles in the water bath during the holding period.”</td>
<td>3- FMC PROPOSAL: 7.4.9.5.8 b), 7.4.9.5.9 b and 7.4.9.6.7 b)</td>
<td></td>
</tr>
<tr>
<td>Voter Name (Vote)</td>
<td>Clause No./Subclause No./Annex (e.g. 3.1)</td>
<td>Type of Comment</td>
<td>Comment (justification for change) by the Voting Member</td>
<td>Proposed change by the Voting Member</td>
<td>Comment Resolution</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>------------------------------------------</td>
<td>-----------------</td>
<td>--------------------------------------------------------</td>
<td>-------------------------------------</td>
<td>-------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Austin Freeman</td>
<td>7.4.9.5.8 b)</td>
<td>Editorial</td>
<td>The proposed text references a &quot;high pressure test&quot; and a &quot;low pressure test&quot; while the original text in the document calls the tests a &quot;primary test&quot; and a &quot;secondary test&quot;.</td>
<td>Revise the subclause as follows: A maximum reduction of the gas test pressure of 2,0 MPa (300 psi) for high pressure tests and 0,2 MPa (30 psi) for low pressure tests is acceptable as long as there are no visible bubbles in the water bath during the holding period.</td>
<td></td>
</tr>
<tr>
<td>Halliburton Energy Services/Carrollton Facility (Affirmative)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Austin Freeman</td>
<td>7.4.9.6.7 b)</td>
<td>Editorial</td>
<td>The proposed text references a &quot;high pressure test&quot; and a &quot;low pressure test&quot; while the original text in the document calls the tests a &quot;first pressure holding period&quot; and a &quot;second pressure holding period&quot;.</td>
<td>Change the subclause to read as follows: A maximum reduction of the gas test pressure of 2,0 MPa (300 psi) for the first pressure holding period and 0,2 MPa (30 psi) for the second pressure holding period is acceptable as long as there are no visible bubbles in the water bath during the holding period.</td>
<td></td>
</tr>
<tr>
<td>Halliburton Energy Services/Carrollton Facility (Affirmative)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>John Fowler On-line Resources (Affirmative)</td>
<td></td>
<td>Editorial</td>
<td>It looks to me like the new sentence should be inserted between the first and second sentences of the last paragraph of 7.4.9.1. The last sentence is, &quot;The sequence of other tests shall be at the option of the manufacturer.&quot; I don't see why that sentence should be removed. Alternatively, the new sentence could replace the first sentence of the paragraph. Also the</td>
<td>Insert the new sentence after (or instead of) the first sentence which states that the body hydrostatic test is to be the first test. Thus the entire paragraph would read:</td>
<td></td>
</tr>
<tr>
<td>Voter Name (Vote)</td>
<td>Clause No./Subclause No./Annex (e.g. 3.1)</td>
<td>Type of Comment</td>
<td>Comment (justification for change) by the Voting Member</td>
<td>Proposed change by the Voting Member</td>
<td>Comment Resolution</td>
</tr>
<tr>
<td>------------------</td>
<td>------------------------------------------</td>
<td>-----------------</td>
<td>------------------------------------------------------</td>
<td>-------------------------------------</td>
<td>-------------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>word &quot;valve&quot; should be replaced in the current second sentence, with &quot;equipment&quot;.</td>
<td>&quot;The hydrostatic body test shall be performed first. The hydrostatic body test and the hydrostatic valve seat test shall be performed before any gas testing. The drift test shall be performed after the equipment has been assembled, operated and tested. The sequence of other tests shall be at the option of the manufacturer.&quot;</td>
<td></td>
</tr>
</tbody>
</table>
There are no open action items or issues for the Materials Task Group related to API Spec 6A.
One action item was assigned at the 2006 Standardization Conference related to API Spec 6A718.

Although API Spec 6A718 has gained widespread acceptance since it was released in 2004, some major oil and gas companies are now imposing additional requirements above and beyond what is required by API Spec 6A718.

In recognition of this situation, George Huntoon, the Chairman of API C1-SC6, requested that the Materials Task Group evaluate the need for revisions to API Spec 6A718.
API Specification 6A718 Update

✓ An email was sent to all Task Group members in June 2006 requesting input on proposed technically justifiable revisions.

✓ The areas of the spec considered for possible revision included:

  • The processing requirements.
  • The testing requirements.
  • The test acceptance criteria.
API Specification 6A718 Update

✓ No proposed changes were submitted with accompanying technical justification to demonstrate why a change is necessary.

✓ George Huntoon agreed to close this issue in November 2006.
API C1-SC6
Materials Task Group
# AWHEM List of Errors to API Spec 6A, 19th Edition - Request for Errata

<table>
<thead>
<tr>
<th>Ref - 19th Ed</th>
<th>Issue Requiring Attention</th>
<th>Suggested Changes &amp; Comments</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Section 7 – Quality Control</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Table 17, page 76</td>
<td>The table should refer to 9.6a for PSL 1 and 2 and to 9.6b for PSL 3 and 4. The present table indicates that there is no difference in requirements for the various PSL’s and does not agree with the text of the document.</td>
<td>Revise table to show 9.6a for PSL 1 and 2 and 9.6b for PSL 3 and 4.</td>
<td>Changes as noted would eliminate errors and clarify requirements.</td>
</tr>
<tr>
<td>7.4.5</td>
<td>The title of this section states PSL-2 to PSL-4 and the requirements in the section apply to PSL-1 to PSL-4</td>
<td>Revise title to include PSL-1 to PSL-4.</td>
<td>Changes as noted would eliminate errors and clarify requirements.</td>
</tr>
<tr>
<td>7.5.2.1</td>
<td>Sub-paragraph d) 3) of this section indicates Heat Treatment Charts are required for Valve Bore Sealing Mechanisms. However, there is no such requirement in the text section of the document.</td>
<td>Change wording to read &quot;Actual heat-treatment temperature charts showing times and temperature (except valve bore mechanisms). Heat treatment records are not required, except for valve bore mechanisms not supported by the actual heat-treatment temperature charts&quot;.</td>
<td>Changes as noted would eliminate errors and match requirements covered in the text of the document for PSL-4 Valve Bore Sealing Mechanisms.</td>
</tr>
<tr>
<td><strong>Section 8 – Equipment Marking</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.6, page 104</td>
<td>This paragraph states that marking of PR levels in not required for loose connectors. However, Table 27 on page 101 shows the PR level as a required marking.</td>
<td>Remove &quot;OD of Connector&quot; form the &quot;loose connectors&quot; column for performance requirements level in Table 27.</td>
<td>Changes as noted would correct the error in the document.</td>
</tr>
</tbody>
</table>

8/2/2006 Page 1 of 4
<table>
<thead>
<tr>
<th>Ref - 19th Ed</th>
<th>Issue Requiring Attention</th>
<th>Suggested Changes &amp; Comments</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Section 10 – Equipment-Specific Requirements</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.21.3 &amp; 5.10</td>
<td>Section 10.21.3 states &quot;bullplug material shall conform to 5.2 and material requirements of PSL-3.&quot; Section 5.10 further defines material requirements for bullplugs.</td>
<td>Section 10.21.3 should be revised to state &quot;bullplug material shall meet the requirements of 5.2 and 5.10.&quot;</td>
<td>Changes as noted would correct the error in the document and align the wording with the wording used to describe the material requirements for &quot;valve-removal plugs&quot;.</td>
</tr>
<tr>
<td>10.22.4 &amp; 5.10</td>
<td>Section 10.22.4 states &quot;Valve-removal plug body material shall meet the requirements of 5.2 and 5.10, except no impact testing is required&quot;. Annex L, paragraph L.4 states &quot;Valve-removal plug body material shall meet the requirements of 5.2, PSL-2, except no impact testing is required.&quot;</td>
<td>Annex L, paragraph L.4, change wording to &quot;Valve-removal plug body material shall meet the requirements of 5.2 and 5.10, except no impact testing is required.&quot;</td>
<td>Changes as noted would correct the error in the document and align the requirements between Section 5 and Annex L.</td>
</tr>
<tr>
<td>10.4.1</td>
<td>“Types R and RX gaskets shall be used on 6B flanges.” was “Types R and RX gaskets are used on 6B flanges.” The change in the wording introduces confusion for this paragraph.</td>
<td>Change wording to “Types R or RX gaskets shall be used on 6B flanges.”</td>
<td>Changes as noted would correct the grammatical error in the document and eliminate confusion. Both types of the gaskets cannot be used simultaneously.</td>
</tr>
</tbody>
</table>
### AWHEM List of Errors to API Spec 6A, 19th Edition - Request for Errata

<table>
<thead>
<tr>
<th>Ref - 19th Ed</th>
<th>Issue Requiring Attention</th>
<th>Suggested Changes &amp; Comments</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table 46 &amp; B46</td>
<td>&quot;T&quot; dimension is drawn incorrectly. Should include the raised face as part of the flange thickness. API Specification 6A, 17th Edition drawings shown in Table 10.13 and Metric Table 10.13 include the raised face as part of the T dimension.</td>
<td>Revise drawings accordingly, reference the drawings shown for Table 10.13 and Metric Table 10.13 form Api Specification 6A, 17th Edition.</td>
<td>Correction of error in drawings will eliminate confusion and prevent interchangeability problems between equipment manufactured per the two different versions of the document.</td>
</tr>
</tbody>
</table>
## AWHEM List of Errors to API Spec 6A, 19th Edition - Request for Errata

<table>
<thead>
<tr>
<th>Ref - 19th Ed</th>
<th>Issue Requiring Attention</th>
<th>Suggested Changes &amp; Comments</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annex I – (Normative) Performance verification procedures for surface safety valves and underwater safety valves</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Annex K – (Informative) Recommended specifications for top connectors for Christmas trees</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Figure K.1.b &amp; K.2.b</td>
<td>The &quot;L&quot; dimension is not shown to the proper point in the drawing. Should be shown as the depth to the break out into the bore vs. the depth to the radius.</td>
<td>Revise figures to show proper relationship of the depth to the break out into the bore of the body.</td>
<td>Correct the error in both figures.</td>
</tr>
<tr>
<td><strong>Annex L – (Normative) Recommended specifications for valve-removal preparations and valve-removal plugs</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Figure L.8 &amp; L.9</td>
<td>Error in tolerance for groove detail.</td>
<td>Should be stated as 2 degrees, 30 minutes +/- 2 degrees, 30 minutes. This tolerance could also be stated as 0 degrees to 5.</td>
<td>Correct the error in both figures.</td>
</tr>
<tr>
<td><strong>Annex O – (Normative) Recommended specifications for top connectors for Christmas trees</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clause 2</td>
<td>The reference to ASTM E208 is transposed, should be ASTM E280 as shown in the API Spec 6A, 17th Edition.</td>
<td>Revise to show ASTM E280</td>
<td>Eliminate typographical error in the document.</td>
</tr>
</tbody>
</table>
## Table 76 (continued)
Dimensions in millimetres

<table>
<thead>
<tr>
<th>Nominal size and bore</th>
<th>Centre-to-face vertical run</th>
<th>Centre-to-face horizontal run</th>
<th>Nominal size and bore</th>
<th>Centre-to-face vertical run</th>
<th>Centre-to-face horizontal run</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vertical $B_V$</td>
<td>Outlet $B_O$</td>
<td>$H_{HV}$ = 0</td>
<td>$H_{HO}$ = 0</td>
<td>Vertical $B_V$</td>
<td>Outlet $B_O$</td>
</tr>
<tr>
<td>13.8 MPa</td>
<td>2000</td>
<td>103.5 MPa</td>
<td>1500</td>
<td></td>
<td></td>
</tr>
<tr>
<td>52</td>
<td>52</td>
<td>89.0</td>
<td>89.0</td>
<td>46</td>
<td>46</td>
</tr>
<tr>
<td>65</td>
<td>65</td>
<td>114.5</td>
<td>114.5</td>
<td>65</td>
<td>65</td>
</tr>
<tr>
<td>78</td>
<td>78</td>
<td>114.5</td>
<td>114.5</td>
<td>78</td>
<td>78</td>
</tr>
<tr>
<td>103</td>
<td>103</td>
<td>139.5</td>
<td>139.5</td>
<td>103</td>
<td>103</td>
</tr>
<tr>
<td>78</td>
<td>78</td>
<td>114.5</td>
<td>114.5</td>
<td>78</td>
<td>78</td>
</tr>
<tr>
<td>103</td>
<td>103</td>
<td>139.5</td>
<td>139.5</td>
<td>103</td>
<td>103</td>
</tr>
<tr>
<td>20.7 MPa</td>
<td>3000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>78</td>
<td>78</td>
<td>114.5</td>
<td>127.0</td>
<td>103</td>
<td>103</td>
</tr>
<tr>
<td>78</td>
<td>78</td>
<td>127.0</td>
<td>127.0</td>
<td>103</td>
<td>103</td>
</tr>
<tr>
<td>103</td>
<td>103</td>
<td>155.5</td>
<td>155.5</td>
<td>103</td>
<td>103</td>
</tr>
<tr>
<td>34.5 MPa</td>
<td>5000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>78</td>
<td>78</td>
<td>114.5</td>
<td>114.5</td>
<td>52</td>
<td>52</td>
</tr>
<tr>
<td>78</td>
<td>78</td>
<td>139.5</td>
<td>139.5</td>
<td>52</td>
<td>52</td>
</tr>
<tr>
<td>103</td>
<td>103</td>
<td>155.5</td>
<td>155.5</td>
<td>103</td>
<td>103</td>
</tr>
<tr>
<td>69.0 MPa</td>
<td>10000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>78</td>
<td>78</td>
<td>114.5</td>
<td>149.0</td>
<td>52</td>
<td>52</td>
</tr>
<tr>
<td>78</td>
<td>78</td>
<td>139.5</td>
<td>139.5</td>
<td>52</td>
<td>52</td>
</tr>
<tr>
<td>103</td>
<td>103</td>
<td>155.5</td>
<td>155.5</td>
<td>103</td>
<td>103</td>
</tr>
</tbody>
</table>

API Notes for Next Errata:
The 79mm dimensions circled above need to
correspond to 3-1/8" dimensions in US Customary Unit Table B.76
(78mm equates to 3-1/16", which is also used).
Similar changes will be made to Table 75.
Proposed Changes to API Spec 6A

- 1. Make provision for non-standard materials having yield strength less than 75,000 psi
- 4. Eliminate the nickel limit on alloys for sweet service.
Make provision for non-standard materials having yield strength less than 75,000 psi

Examples:
  » Austenitic Stainless Steels
  » API 5L Grade A, B, X42 and X46 Pipe
Permitting non-standard materials $< 75 \text{ K}$

- 4.3.3.1 Now: Non-standard materials are materials with specified minimum yield strength in excess of 517 MPa (75,000 psi) that do not meet the ductility requirements of Table 5 for standard 75K materials.
- Proposed: Non-standard materials are materials with properties that do not meet all requirements of Table 5 for a standard material.
- Reason: Permit the use of austenitic stainless steels and other materials having properties that do not all meet Table 5.
5.4.1 a) (last sentence) Now: All non-standard materials shall exceed a 75K minimum yield strength and meet a minimum of 15% elongation and 20% reduction of area.

Proposed: All non-standard materials shall meet a minimum of 15% elongation and 20% reduction of area. Non-standard materials for applications shown in Table 4 shall have a design stress intensity $S_m$ per 4.3.3.6 at least equal to that of the lowest-strength standard material permitted for that application.

Reason: Provide rules for non-standard material applications with $S_y < 75K$ and eliminate “cheating” on $S_m$ values, i.e. $S_y=75$ ksi and $S_u=90$ ksi would give a 45 ksi $S_m$ vs. 50 ksi based on yield only.
Table 4  Remove all “NS” from the table.

Reason: The above revision spells out the rules for non-standard materials in all applications.

Table 4  Footnote b: Remove and renumber c to b

Reason: Footnote b is no longer needed.
Table 4 — Standard material applications for bodies, bonnets and end and outlet connections

<table>
<thead>
<tr>
<th>Part</th>
<th>Pressure ratings MPa (psi)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>13.8 (2 000) 20.7 (3 000) 34.5 (5 000) 69.0 (10 000) 103.5 (15 000) 138.0 (20 000)</td>
</tr>
<tr>
<td><strong>Material designation</strong></td>
<td></td>
</tr>
<tr>
<td>Body, bonnet</td>
<td></td>
</tr>
<tr>
<td>36K, 45K</td>
<td>36K, 45K</td>
</tr>
<tr>
<td>60K, 75K</td>
<td>60K, 75K</td>
</tr>
<tr>
<td>NS b</td>
<td>NS</td>
</tr>
<tr>
<td>Integral end connection</td>
<td></td>
</tr>
<tr>
<td>Flanged</td>
<td></td>
</tr>
<tr>
<td>60K, 75K</td>
<td>60K, 75K</td>
</tr>
<tr>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>Threaded</td>
<td></td>
</tr>
<tr>
<td>60K, 75K</td>
<td>60K, 75K</td>
</tr>
<tr>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>Other c</td>
<td></td>
</tr>
<tr>
<td>60K, 75K</td>
<td>60K, 75K</td>
</tr>
<tr>
<td>Other c</td>
<td></td>
</tr>
</tbody>
</table>

| Loose connectors            |                            |
| Welding neck                |                            |
| 45K                         | 45K                        | 45K                        | 60K, 75K                    | 75K, NS                     | 75K, NS                     |
| Blind                       |                            |
| 60K, 75K                    | 60K, 75K                   | 60K, 75K                    | 60K, 75K                    | 75K, NS                     | 75K, NS                     |
| Threaded                    |                            |
| 60K, 75K                    | 60K, 75K                   | 60K, 75K                    | 60K, 75K                    | NA                         | NA                          |
| Other                       |                            |
| 60K, 75K                    | 60K, 75K                   | 60K, 75K                    | 60K, 75K                    | NA                         | NA                          |

---

a If end connections are of the material designation indicated, welding is in accordance with clause 6 and design is in accordance with clause 4.

b NS indicates non-standard materials as defined in 4.3.3 and 5.4.1.a.

c As specified by manufacturer.
Cleanup of the allowable stresses at test pressure

- **4.3.3.2 (ASME Method)**
  - Now: \( S_T = 0.83 \, S_Y \)
  - Proposed: \( S_T = \frac{5}{6} \, S_Y \)

- **Reason:** To make this paragraph consistent with 4.3.3.6 and the original intent.

- It would also result in more convenient numbers for the allowable stresses, i.e. 50,000 psi for 60K material vs. 49,800 psi
Topic 2

- Make provisions for designing high temperature equipment using non-standard materials.
High temperature design rules, non-standard materials

- **G.5.2.1 (New Material)** Add to the end of the present G.5.2.1:
  - For non-standard materials, an $S_m$ value may be used that is the lower of $\frac{2}{3}$ of the elevated-temperature yield strength, one-half the minimum specified tensile strength, or $0.55$ times the elevated-temperature tensile strength.
  - Elevated-temperature tensile strength shall be determined in the same manner as the elevated-temperature yield strength.
  - **Reason:** Presently Annex G does not have rules for non-standard materials. This method is consistent with the ASME Code Section II Part D tables 2-100a and b.
Correct the metric conversion rounding rules in Annex B to the rules actually used for the revised dimensions of the 19th Edition.
Proposed Changes to Annex B

- **Paragraph B.1.1 Purpose:** The second paragraph is no longer true. The new dimensions are calculated directly from the decimal inch values.
Paragraph B.1.2 Conversion Rules: These rules are no longer correct. These rules were used to develop the dimensions in the 17th and 18th editions of 6A. The new dimensions have been converted directly from the decimal inch numbers in the 17th Edition without the additional step of converting the dimension to the original fractional value. This can be verified by comparing the numbers in the 14th Edition to the 17th and 18th Edition (they agree except for the 6B flange bolt holes – ref. paragraph B.2.3). They do not agree with the new 19th Edition numbers.
Paragraphs B.2.3 and B.2.4 Bolt holes and fasteners: These paragraphs are no longer correct. The new dimensions no longer agree with ANSI B16.5-1981, and therefore metric fasteners cannot be used on 6B flanges.

Also note: Meanwhile ASME has released a new metric version of ASME B16.5 wherein the bolt holes as well as the bolts are in inch sizes.
Topic 4

- Proposed Change to Materials Requirements
Proposed change to Table 8

- **Proposed change**: In Table 8, page 38, remove the restrictions on nickel content from the table.
- **Rationale**: These restrictions are appropriate for sour service only, and should not be imposed on all equipment. When equipment is made to NACE, these restrictions will automatically be imposed.
- Restricting nickel content in low alloy steels eliminates several important materials from being used as bodies, bonnets, and end connectors, in particular the 43xx deep-hardening low alloy steels, which are commonly used in OECs, and also several low-temperature low alloy materials such as ASTM A350-LF3 and LF9.
George Huntoon
BP plc
11700 Old Katy Road
Suite 150
Houston, TX 77079

Dear George:

**SUBJECT: PROPOSED CHANGES TO API 6A**

As a former design task group chairman, and on behalf of design engineers everywhere, I would like to propose the attached technical revisions to API Spec 6A.

First, I feel it is time to finish the unfinished business of providing rules for high-temperature design of equipment using non-standard materials. At the same time we can broaden the definition of non-standard materials and permit the use of austenitic stainless steels and other materials that have yield strengths of 75,000 psi and less but do not meet all the material property requirements of the standard materials.

Second, there are still several of my earlier "errors and inconsistencies" that have not been resolved.

And third, I would like to propose loosening the restrictions on nickel content, which are now imposed on all equipment, and which are only appropriate for sour service.

I will be attending the meeting in Calgary and would be glad to present these items myself. You may want to include them with the meeting agenda.

Best regards,

John H. Fowler, P.E.
cc: Jonathan Jordan, API
<table>
<thead>
<tr>
<th>Subclause</th>
<th>Present</th>
<th>Proposed</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.3.3.1</td>
<td>Non-standard materials are materials with specified minimum yield strength in excess of 517 MPa (75 000 psi) that do not meet the ductility requirements of Table 5 for standard 75K materials.</td>
<td>Non-standard materials are materials with properties that do not meet all requirements of Table 5 for a standard material.</td>
<td>Permit the use of austenitic stainless steels and other materials having properties that do not all meet Table 5.</td>
</tr>
<tr>
<td>4.3.3.2</td>
<td>( S_T = 0.83 , S_Y )</td>
<td>( S_T = \frac{5}{6} , S_Y )</td>
<td>To make this paragraph consistent with 4.3.3.6 and the original intent.</td>
</tr>
<tr>
<td>5.4.1 a)</td>
<td>All non-standard materials shall exceed a 75K minimum yield strength and meet a minimum of 15% elongation and 20% reduction of area.</td>
<td>All non-standard materials shall meet a minimum of 15% elongation and 20% reduction of area. Non-standard materials for applications shown in Table 4 shall have a design stress intensity ( S_m ) per 4.3.3.6 at least equal to that of the lowest-strength standard material permitted for that application.</td>
<td>Provide rules for non-standard material applications with ( S_Y &lt; 75K ) and eliminate &quot;cheating&quot; on ( S_m ) values, i.e. ( S_Y = 75 \text{ ksi} ) and ( S_u = 90 \text{ ksi} ) would give a 45 ksi ( S_m ) vs. 50 ksi based on yield only.</td>
</tr>
<tr>
<td>Table 4</td>
<td>&quot;NS&quot;</td>
<td>Remove all &quot;NS&quot; from the table</td>
<td>The above revision spells out the rules for non-standard materials in all applications. No longer needed.</td>
</tr>
<tr>
<td>Table 4</td>
<td>Footnote b (Not Addressed) The proposed material would be added to the end of the present G.5.2.1.</td>
<td>Remove and renumber c to b</td>
<td>Presently Annex G does not have rules for non-standard materials. This method is consistent with the ASME Code Section II Part D tables 2-100a and b.</td>
</tr>
<tr>
<td>G.5.2.1</td>
<td></td>
<td>For non-standard materials, an ( S_m ) value may be used that is the lower of 2/3 of the elevated-temperature yield strength, one-half the minimum specified tensile strength, or 0.55 times the elevated-temperature tensile strength. Elevated-temperature tensile strength shall be determined in the same manner as the elevated-temperature yield strength.</td>
<td>Presently Annex G does not have rules for non-standard materials. This method is consistent with the ASME Code Section II Part D tables 2-100a and b.</td>
</tr>
</tbody>
</table>
Table 17, page 76: for Storage and Age Control (last line): The table should refer to 9.6a for PSL 1 and 2 and to 9.6b for PSL 3 and 4. The present table indicates that there is no requirement for PSL 1 and 2. The requirement for the manufacturer to have a documented procedure is a requirement.

Paragraph 8.6, page 104: Marking of loose connectors. This paragraph states that marking of PR levels is not required for loose connectors. However, Table 27 on page 101 shows the PR level as a required marking. Suggested fix: Remove “OD of Connector” from the “loose connectors” column for Performance requirements level in Table 27.

Appendix B

Paragraph B.1.1 Purpose: The second paragraph is no longer true. The new dimensions are calculated directly from the decimal inch values.

Paragraph B.1.2 Conversion Rules: These rules are no longer correct. These rules were used to develop the dimensions in the 17th and 18th editions of 6A. The new dimensions have been converted directly from the decimal inch numbers in the 17th Edition without the additional step of converting the dimension to the original fractional value. This can be verified by comparing the numbers in the 14th Edition to the 17th and 18th Edition (they agree except for the 6B flange bolt holes – ref. paragraph B.2.3). They do not agree with the new 19th Edition numbers.

Paragraphs B.2.3 and B.2.4 Bolt holes and fasteners: These paragraphs are no longer correct. The new dimensions no longer agree with ANSI B16.5-1981, and therefore metric fasteners cannot be used on 6B flanges.

Appendix F

Paragraph F.2.35.3, page 331: Bending Moments: This paragraph is vague. What is the “highest stress case” for a connector? API 6AF shows that there are an infinite number of combinations of tension, pressure, and bending moment that are all equally “highest stress cases.”
**Proposed Change to Materials Requirements**

**Proposed change:** In Table 8, page 38, remove the restrictions on nickel content from the table.

**Rationale:** These restrictions are appropriate for sour service only, and should not be imposed on all equipment. When equipment is made to NACE, these restrictions will automatically be imposed.

Restricting nickel content in low alloy steels eliminates several important materials from being used as bodies, bonnets, and end connectors, in particular the 43xx deep-hardening low alloy steels, which are commonly used in OECs, and also several low-temperature low alloy materials such as ASTM A350-LF3 and LF9.

In addition, NACE lists three martensitic stainless steels with more than 4.5% nickel as being comparable to S41000 stainless. If NACE doesn’t care, why should we?

Proposed by John H. Fowler P E, member, SC6
20 KSI FLANGE DESIGNS

API TG FORMATION
JANUARY 24, 2007
MOHR ENGINEERING
Hydril Preliminary 20K XHPHT BOP Design
Hydrl Preliminary 20K XHPHT Flange Design

Flange Configurations

<table>
<thead>
<tr>
<th>Flange Designation</th>
<th>Flange O.D.</th>
<th>Flange Thickness</th>
<th>Flange Hub Diameter</th>
<th>Bolt Circle Diameter</th>
<th>No. of Bolts</th>
<th>Size of Bolts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrl's 19-3/4&quot; 20 ksi</td>
<td>54.50</td>
<td>12.00</td>
<td>37.06</td>
<td>47.50</td>
<td>20</td>
<td>3-3/4&quot;-8UN</td>
</tr>
<tr>
<td>API 13-5/8&quot; 20 ksi</td>
<td>45.75</td>
<td>11.50</td>
<td>31.94</td>
<td>40.00</td>
<td>20</td>
<td>3&quot;-8UN</td>
</tr>
<tr>
<td>API 18-3/4&quot; 15 ksi</td>
<td>45.75</td>
<td>10.00</td>
<td>31.94</td>
<td>40.00</td>
<td>20</td>
<td>3&quot;-8UN</td>
</tr>
</tbody>
</table>
DISCUSSION ISSUES
FLANGE SIZES OF INTEREST

• 18 3/4” – 20 KSI IS BEYOND EXISTING STDS
• EXISTING 13 5/8” – 20 KSI NEEDS REVIEW FOR SUBSEA APPLICATION
• SHOULD THERE BE DIFFERENT DESIGNS FOR SUBSEA VS SURFACE
• SHOULD OTHER SIZES BE INVESTIGATED
DISCUSSION ISSUES
API RP 6HP (draft)

• RP TO ADDRESS EQUIPMENT > 15 KSI WORKING PRESSURE

• DESIGN VALIDATION CODE FOR HPHT EQUIPMENT USING ASME Sec VIII Div 3

• SPECIFICALLY PRESSURE CONTAINING DEVICES (BODIES)

• SC’s TO DETERMINE APPLICATION
DISCUSSION ISSUES
COMPARISON 6A & 6HP

Example of Plane Strain Fracture
DISCUSSION ISSUES
COMPARISON 6A & 6HP

- API Spec 6A (Div 2)
  - Static analysis
  - Based upon surface conditions only (in air)
  - No external loads
  - No fatigue analysis
  - No requirement to include stresses due to thermal gradient through wall
  - No structural de-rating
  - Beyond 250 ° to 350 ° F

- API RP 6HP (Div 3)
  - Static limit load analysis
  - Cyclic fatigue analysis (fracture mechanics analysis)
  - Should take into consideration environmental exposure
  - Include all applicable loads
  - Thermal
  - Pressure
  - External/Internal loads
DISCUSSION ISSUES
DEFINITION OF WORKING PRESSURE

• SURFACE EQUIPMENT
  WP = PRESS ABSOLUTE

• SUBSEA EQUIPMENT
  WP = DIFFERENTIAL OR ABSOLUTE?
  PRESENTLY DEFINED ABSOLUTE

• Should There Be Different Classes for Equipment?
SUBSEA WP ABSOLUTE OR DIFFERENTIAL

- PSIG
- PSIA
- BOP Internal Pressure Absolute
- Shear Ram Closed
- Mud Weight in Riser, BOP, & C&K Lines
- Test Ram or WH Plug
- Water Depth
RESULTS OF FIRST MEETING

Work Group Chairman: Shyam Patel

It was agreed this effort was necessary to begin the Standardization process.

Two Priorities were Identified

- 18 ¾” – 20 ksi Flanges are Presently Outside Existing API Docs
- 13 5/8” – 20 ksi Flanges are in Specs, but, Need Review for Subsea Applications for Tension and Bending

It was Agreed other Sizes and Types of Flanges May Need Review

Mission Statement and Scope of Work to Issued Next Meeting

Work Group Members and Attendees on Separate Spreadsheet
Workgroup on Verification/Validation in API Spec 6A

Definitions from API Spec Q1

3.1.6 design validation
process of proving a design by testing to demonstrate conformity of the product to design requirements

3.1.7 design verification
process of examining the result of a given design or development activity to determine conformity with specified requirements

Requirements from API Spec Q1

7.3.5 Design and development verification

ISO 9001:2000, Quality management systems—Requirements
7.3.5 Design and development verification

Verification shall be performed in accordance with planned arrangements (see 7.3.1) to ensure that the design and development outputs have met the design and development input requirements. Records of the results of the verification and any necessary actions shall be maintained (see 4.2.4).

Note: Design verification activities can include one or more of the following:

a. Confirming the accuracy of design results through the performance of alternative calculations.
b. Review of design output documents independent of activities of 7.3.4.
c. Comparing new designs to similar proven designs.

7.3.6 Design and development validation

ISO 9001:2000, Quality management systems—Requirements
7.3.6 Design and development validation

Design and development validation shall be performed in accordance with planned arrangements (see 7.3.1) to ensure that the resulting product is capable of meeting the requirements for the specified application or intended use, where known. Wherever practicable, validation shall be completed prior to the delivery or implementation of the product. Records of the results of validation and any necessary actions shall be maintained (see 4.2.4).

Note: Design validation can include one or more of the following:

a. Prototype tests.
b. Functional and/or operational tests of production products.
c. Tests specified by industry standards and/or regulatory requirements.
d. Field performance tests and reviews.
Language from API Spec 14A

6.4 Design verification

Design verification shall be performed to ensure that each SSSV design meets the supplier's/manufacturer's technical specifications. Design verification includes activities such as design reviews, design calculations, physical tests, comparison with similar designs and historical records of defined operating conditions.

6.5 Design validation

6.5.1 General

The SSSVs produced in accordance with this International Standard shall pass the validation test required by this subclause.

a) SSSVs shall pass the applicable validation test specified in Annex B and shall be performed by a test agency.

b) Seals shall meet the requirements of 6.3.4.3.

The validation testing requirements in this International Standard are not represented as well conditions.

Language from API Spec 14L

6.4 Design verification

Design verification shall be performed to ensure that each lock mancrel and landing nipple design meets the supplier's/manufacturer's technical specifications. Design verification includes activities such as design reviews, design calculations, physical tests, comparison with similar designs and historical records of defined operating conditions.

6.5 Design validation

6.5.1 General

This International Standard specifies three grades of design validation for which the product shall be supplied. The user/purchaser shall specify the grade of design validation required. Products shall be supplied to at least the design validation grade specified. Landing nipples are provided in grades V2 or V3 only.

Products previously qualified in accordance with ISO 10432 or API Spec 14A, prior to the publication of this International Standard, shall be considered as meeting the design validation requirements at their relevant grade of this International Standard.

Review of API Spec 6A for the word “verification”; the word “validation” does not occur in the document. It is proposed to change verification to validation if highlighted yellow. Other highlights require discussion.

4.7 Design verification

Manufacturers shall document their design verification procedures and the results of performance verification of designs. The performance verification procedures including acceptance criteria for SSVs and USVs are given in Annex I. Additional verification procedures, including acceptance criteria, are given in Annex F to be used if specified by the manufacturer or purchaser.

10.20.2.2 SSV valve design
A multiple or block-type valve qualifies as a wellhead SSV for performance requirement PR2 standard service and Annex I class I or II service, without verification testing, if it is of the same internal design as an SSV valve within the manufacturer's product line which has passed the verification test in Annex I. Such valves shall be manufactured and supplied in accordance with all other applicable requirements of this International Standard.

10.20.4.3 Verification testing
a) PR2 class I and II service
To verify a specific PR2 standard service valve for a SSV/USV design, the manufacturer shall satisfy the class I or class II test in accordance with Annex I.
b) Test requirements
Any significant change in the design or materials of construction which would affect the SSV/USV valve bore sealing mechanism shall require re-qualification by verification testing. Qualification of an SSV qualifies a USV with the same SSV valve-bore sealing mechanism and vice versa. The valve may be tested with or without the actuator.

10.20.4.4 Verification testing of heat-sensitive lock-open devices
Tests to confirm the design requirements of 10.20.2.5 shall be done in an air environment with air velocity past the SSV actuator due to natural air convection only. The manufacturer shall have data available to show that the device has been sufficiently tested to ensure that it is capable of satisfying the design requirements.

A.2 Data sheets
The following pages contain questions and information that can be used to select wellhead equipment, including chokes and actuators. Table A.2 contains general information which pertains to the entire well. Tables A.3 to A.12 are designed to be used for each type of equipment.
The effects of external loads (e.g. bending moments, tensions, etc.) on the assembly of components are not explicitly addressed by this International Standard (see 4.2.1.3). The purchaser should specify any exceptional loading configuration.
The purchaser should specify whether the performance verification procedures in Annex F are applicable.

Annex F
(informative)
Performance verification procedures

F.I Performance verification - General requirements

F.I.I General
This annex provides performance verification procedures for qualification of equipment specified by this International Standard, which shall be applied if specified by the manufacturer or purchaser.
The performance requirements apply to all products being manufactured and delivered for service (see 4.1). The performance verification procedures in this annex are to be applied to designs of
products, including design changes. Verification testing specified in this annex is intended to be performed on prototypes or production models (see also 4.7).

F.1.1.3 Other verification tests
Verification tests that have been completed in accordance with verification testing requirements of API Spec 6A, during its validity, will satisfy the requirements of this annex.

F.1.2 Effect of changes in product
a) Design changes
A design that undergoes a substantive change becomes a new design requiring performance verification. A substantive change is a change identified by the manufacturer which affects the performance of the product in the intended service condition. This may include changes in fit, form, function or material.

b) Metallic materials
A change in metallic materials may not require new performance verification if the suitability of the new material can be substantiated by other means.

c) Non-metallic seals
A change in non-metallic materials may not require new performance verification if the suitability of the new material can be substantiated by other means. Substantive changes in the original documented design configuration of non-metallic seals resulting in a new design, shall require performance verification in accordance with F.1.13.

F.1.3 Compliance
All products evaluated in performance verification tests shall comply with the applicable design requirements of this International Standard. Test articles shall be hydrostatically tested to PSLI prior to verification testing.

F.1.4 Products for verification testing
F.1.4.1 General
Performance verification testing, if applicable, shall be performed on prototypes or production models of equipment made in accordance with this International Standard to verify that the performance requirements specified for pressure, temperature, load, mechanical cycles and standard test fluids are met in the design of the product.

F.1.4.2 Testing product
Performance verification testing shall be conducted on full-size products or fixtures that represent the specified dimensions for the relevant components of the end product being verified, unless otherwise specified in this Annex.

F.1.4.3 Product dimensions
The actual dimensions of equipment subjected to verification testing shall be within the allowable tolerance range for dimensions specified for normal production equipment. Worst-case conditions for dimensional tolerances should be addressed by the manufacturer, giving consideration to concerns such as sealing and mechanical functioning.

F.1.6 Acceptance criteria
F.1.6.1 General
Verification testing of the product shall include all of the testing requirements of the applicable PR level in this annex.

F.1.13 Testing of non-metallic seals
F.1.13.1 Non-metallic seals
Non-metallic seals which are exposed to fluids, either produced from or injected into a well, shall undergo the performance verification procedure described in this subclause.

F.1.13.2 Intent of procedure
The intent of this procedure is to verify the performance of the seal for the standard test fluid rating as specified in F. 1.13.4, not the performance of products containing the seal. The full-size
seals shall be tested as specified in F.1 or F.2 to determine temperature and pressure performances.

**F.1.14.3 Limitations of scaling**

**F.1.14.3.1 Verification by pressure rating**
The test product may be used to qualify products of the same family having equal or lower pressure ratings.

**F.1.14.3.2 Verification by size**
Testing of one size of a product family shall verify products one nominal size larger and one nominal size smaller than the tested size. Testing of two sizes also verifies all nominal sizes between the two sizes tested.

**F.1.14.3.3 Verification by temperature rating**
The temperature range verified by the test product shall verify all temperature classifications that fall entirely within that range.

**F.1.14.3.4 Verification by standard test fluid rating for non-metallic seals**
The standard test fluid rating verified by the test product shall verify all products of the same product family and material properties as the test product. See Table F.3.

**F.1.14.3.5 Verification by PSL**
Verification of equipment is independent of the PSL of the production equipment.

**F.1.15 Documentation**

**F.1.15.1 Verification files**
The manufacturer shall maintain a file on each verification test.

**F.1.15.2 Contents of verification files**
Verification files shall contain or reference the following information, if applicable:

**F.1.16 General**
This subclause describes the calibration requirements for equipment which is necessary to conduct the verification tests described in this annex. Test equipment which requires calibration includes: pressure-measuring equipment, load-measuring equipment, temperature-measuring equipment, torque-measuring equipment, elastomer physical and mechanical property-measurement equipment, and any other equipment used to measure or record test conditions and results.

Except for specific requirements in the following subclause, the manufacturer’s instructions shall provide all the requirements for the identification, control, calibration, adjustment, intervals between calibrations, and accuracy of all the testing equipment to which this International Standard is applicable.

**F.1.16.3 Status**
When used for verification testing, equipment shall be calibrated in accordance with the requirements of the manufacturer and this International Standard.

**F.2 Product-specific verification testing**

**F.2.1 General**

**F.2.1.1 Verification testing**
This subclause contains procedures which are specific and unique to the product being tested. The procedures shall be in addition to the procedures of F.1 unless otherwise specified in this annex. There are two performance verification levels, corresponding to performance requirement levels PRI and PR2.

**F.2.1.5 Actuated valves, chokes or other actuated products**
Valves, chokes or other products designed for actuators shall have the same performance verification as the manually actuated products. Verification of a manual valve or choke shall
verify an actuated valve or choke if the basic design is the same, provided that functional differences between manual and actuated designs are subjected to appropriate verification through fixture testing or product testing. These functional differences to be considered shall include, but may not be limited to:
- stem seal design;
- stem size;
- stem movement (linear vs. rotary);
- bonnet design;
- relative speed of operation (hydraulic vs. pneumatic).
The manufacturer shall have documentation and/or verification to support the application of the actuated valve, choke or other product to the type of actuator, hydraulic or pneumatic.

F.2.2 Performance verification testing for PRI valves (see Table F.4)
F.2.2.1 General
Acceptance criteria, unless noted otherwise for specific steps in this subclause, shall be in accordance with F.1.

F.2.2.2 Verification test procedure
Table F.4 - Performance verification tests for valves

F.2.3 Performance verification testing for PR2 valves (see Table F.4)
F.2.3.3 Verification test procedure

F.2.4 Performance verification for PRI actuators (see Table F.5)
Table F.5 — Performance verification tests for actuators

F.2.5 Performance verification for PR2 actuators (see Table F.5)
Actuators including electric actuators shall be subjected to a functional test to demonstrate proper assembly and operation. Testing medium for pneumatic actuators shall be a gas. Testing medium for hydraulic actuators shall be a suitable hydraulic fluid. The actuator shall be tested either on a valve/choke or on a fixture which simulates the opening/closing dynamic force profile of a valve/choke. A fixture test of a valve operator shall include the reduction in resisting force and resulting motion of the stem which occur when the valve is opened against differential pressure. If the bonnet assembly is part of the actuator, verification of stem seal and bonnet design shall be performed to verify these design elements to the requirements for valves.

F.2.6 Performance verification for PRI chokes (see Table F.6)
F.2.6.1 General
Verification of an adjustable choke also verifies a positive choke that has the same body design and seat seal design.

F.2.7 Performance verification for PR2 chokes (see Table F.6)
F.2.7.1 General
Verification of an adjustable choke also verifies a positive choke which has the same body design and seat seal design. For testing of a positive choke, the dynamic test cycles (F.2.7.4, F.2.7.5 and F.2.7.7) are not required.

Table F.6 - Performance verification tests for chokes
F.2.8 Performance verification testing for PRI casing-head housings, casing-head spools, tubing-head spools, cross-over connectors, and adapter and spacer spools (see Table F.7)

Table F.7 — Performance verification for casing-head housings, casing-head spools, tubing-head spools, cross-over connectors and adapter and spacer spools

F.2.9 Performance verification testing for PR2 casing-head housings, casing-head spools, tubing-head spools, cross-over connectors and adapter and spacer spools (see Table F.7)

F.2.10 Performance verification testing for PRI Group 1 slip hangers (see Table F.8)
Load cycling capacity shall be verified by objective evidence.

F.2.11 Performance verification testing for PR2 Group 1 slip hangers (see Table F.8)
Table F.8 - Performance verification for Group 1 slip hangers

F.2.12 Performance verification testing for PRI Group 2 slip hangers (see Table F.9)
Table F.9 - Performance verification for Group 2 slip hangers
F.2.13 Performance verification testing for PR2 Group 2 slip hangers (see Table F.9)

F.2.14 Performance verification testing for PRI Group 3 slip hangers (see Table F.10)

F.2.15 Performance verification testing for PR2 Group 3 slip hangers (see Table F.10)
Table F.10 - Performance verification for Group 3 slip hangers

F.2.16 Performance verification testing for PRI Group 4 slip hangers (see Table F.11)
Same as PRI Group 3 hangers. Retention of the hanger shall be verified by objective evidence.

F.2.17 Performance verification testing for PR2 Group 4 slip hangers (see Table F.11)
Table F.11 — Performance verification for Group 4 slip hangers

F.2.18 Performance verification testing for PRI Group 1 mandrel hangers (see Table F.12)

F.2.19 Performance verification testing for PR2 Group 1 mandrel hangers (see Table F.12)
Table F.12 - Performance verification for Group 1 mandrel hangers
F.2.20 Performance verification testing for PRI Group 2 mandrel hangers (see Table F.13)
Table F.13 - Performance verification for Group 2 mandrel hangers

F.2.21 Performance verification testing for PR2 Group 2 mandrel hangers (see Table F.13)

F.2.22 Performance verification testing for PRI Group 3 mandrel hangers (see Table F.14)

Table F.14 — Performance verification for Group 3 mandrel hangers

F.2.23 Performance verification testing for PR2 Group 3 mandrel hangers (see Table F.14)

F.2.24 Performance verification testing for PRI Group 4 mandrel hangers (see Table F.15)

F.2.25 Performance verification testing for PR2 Group 4 mandrel hangers (see Table F.15)

Table F.15 — Performance verifications for Group 4 mandrel hangers

F.2.26 Performance verification testing for PRI Group 5 mandrel hangers (see Table F.16)

Table F.16 - Performance verification for Group 5 mandrel hangers

F.2.28 Performance verification testing for packing mechanisms for PRI lock screws, alignment pins and retainer screws (see Table F.17)

Table F.17 - Performance verification for packing mechanisms for lock screws, alignment pins and retainer screws

F.2.30 Performance verification testing for PRI Group 1 tubing head adapters (see Table F.18)

Table F.18 — Performance verification for Group 1 tubing head adapters

F.2.31 Performance verification testing for PR2 Group 1 tubing head adapters (see Table F.18)

F.2.32 Performance verification testing for PRI Group 2 tubing head adapters (see Table F.19)
Table F.19 — Performance verification for Group 2 tubing head adapters

F.2.33 Performance verification testing for PR2 Group 2 tubing head adapters (see Table F.19)

F.2.33.1 Load cycling
The load cycle test shall be performed as specified in F.2.11

F.2.33.2 Internal pressure test
Internal pressure test of the tubing head adaptor shall be performed, including the end connections, as specified in F.2.31.

One internal pressure test at room temperature shall be performed with a hold period of 15 min at rated working pressure. Documentation for the end-connection pressure testing may be obtained from a thread manufacturer or appropriate international industry standard if the wellhead product meets the dimensional (including the connection outside diameter) and material strength requirements of that standard. If the product does not meet the thread manufacturer’s dimensional and material strength requirements, then the threaded connection shall be tested. The test may be performed in a fixture separate from the hanger.

F.2.34 Performance verification testing for PRI other end connectors (see Table F.20)

Table F.20 — Performance verification for other end connectors

F.2.35 Performance verification testing for PR2 other end connectors (see Table F.20)

F.2.35.1 PR2 verification test

F.2.36 Performance verification testing for PRI fluid sampling devices (see Table F.21)
PRI fluid sampling devices shall be verified by objective evidence.

Table F.21— Performance verification for fluid sampling devices

F.2.37 Performance verification testing for PR2 fluid sampling devices (see Table F.21)
The complete assembly shall be tested as specified in F.1.11

F.2.38 Performance verification testing for ring gaskets, bolting and other specified products
Verification testing is not required for specified flanged or studded end and outlet connections, threaded end and outlet connections, studs and nuts, ring joint gaskets, bullplugs, tees and crosses, test and gauge connections, and other specified products that are completely specified (dimensions and materials) by this International Standard.

F.2.39 Summary of product-specific verification
Table F.22 provides a summary of the product-specific cycle requirements.

Table F.22 — Summary of product-specific verification

NOTE 1
Per manufacturer's rating.
Performance verification testing is not required for specified designs or features that are completely specified (dimensions and materials).
This table is for reference information only. All requirements are in the text and associated tables.
Pressure cycles, temperature cycles, and endurance cycles are run as specified in the text and are not cumulative.

Annex I
Performance verification procedures for surface safety valves and underwater safety valves

1.1.1 Purpose
This annex provides requirements to
a) verify that a valve designed and manufactured to satisfy the PR2 requirements of 10.5 can be used as a surface safety/underwater safety (SSV/USV) valve according to one or both of the following classes:
1) Class I: This performance requirement level is intended for use on wells that do not exhibit the detrimental effects of sand erosion.
2) Class II: This performance requirement level is intended for use if a substance such as sand could be expected to cause an SSV/USV valve failure.
b) demonstrate that the verification testing covered by this annex qualifies specific valve-bore sealing mechanisms which are manufactured in accordance with this International Standard for PR2 class II valves.

1.1.2 Performance requirements
To qualify a SSV/USV for class I service, the valve shall pass the verification test specified in 1.3.
To qualify a SSV/USV for class II service, the valve shall pass the verification test specified in 1.4.
A valve qualified for class II also satisfies the requirements of class I.

1.1.3 Verification testing
The verification testing requirements in this annex are not represented as duplicating actual well conditions. Verification tests that have been completed in accordance with verification testing requirements of API Spec 14D or API Spec 6AV1, during their validity, will satisfy the requirements of this annex.

1.2.1 General
The typical piping arrangement and test section detail of a test facility for PR2 class II SSV/USV verification testing are shown in Figures 1.1 and 1.2.

1.2.2 Design considerations
a) The test facility shall be designed to permit the verification tests to be made as detailed in 1.3 and 1.4.

1.3 PR2 class I SSV/USV valve verification testing

1.3.2 Verification test requirements
A flanged nominal 2 52 mm 343 MPa (5 000 psi) rated working pressure SSV/USV valve shall be used for the qualifying test. The valve to be tested shall be hydrostatically and functionally tested in accordance with 7.4.9 and be PR2-verified. The successful completion of the test shall qualify all sizes and all pressure ratings of that manufacturer’s SSV/USV of the same basic design and materials of construction for class I service. Any significant change in the design or materials of construction which would affect the SSV/USV valve-bore sealing mechanism shall require requalification by verification testing.

1.3.3 Documentation (verification files)

1.3.4 Verification test procedure
The following procedures are general and are intended to show the limits and extent of the class I service SSV/USV verification test.

1.4 PR2 class II SSV/USV verification testing

Table 1.1 - Example of a PR2 class II SSV/USV valve test form
Several references in the form to verification

Figure 1.1 - Example of piping arrangement test facility for PR2 class II sandy service SSV/USV verification testing

Figure 1.2 - Example of SSV/USV verification test section detail

Table M.3 - List of all figures in this International Standard
Table M.4 - List of all tables in this International Standard

Regional Annex: Test Agency
any independent third party which provides a test facility and administers a testing program which meet the Class II SSV/USV valve verification testing requirements of Annex I of this specification and API Specification 6AV1.

10.20.4.3 Add the following requirements at the end of the subclause:
"c) Test Agency
To verify a specific Class II SSV/USV design, the manufacturer must submit an SSV/USV of the same basic design and materials of construction to a Test Agency, as defined below. Verification testing at a Test Agency is not required for SSV/USV equipment other than valve bore sealing mechanisms, PR2 Class II, Sandy Service.


ANNEX F (informative) Performance verification procedures ........................................................ 299
ANNEX I (normative) Performance verification procedures for surface safety valves and underwater safety valves ................................................................. 341

7.4.2.1.4 Dimensional verification

Prepared by Austin Freeman
8-4-2006
ISO 10423 revision: Castings vs. Forgings

API SC6 meeting - Houston, 1 Feb 2007
The issue

- ISO 10423 requires forgings for PSL 3 and PSL 4, whereas API 6A allows castings for all PSLs.

- Some principals call for products outside the range of API 6D or API 6A being manufactured to API 6A PSL requirements.

- Under ISO 10423 PSL 3/4, these would have to be forgings, whereas some manufacturers would want to supply castings, or size/complexity/quantity demands castings.

- The problem is also related to products outside the scope of ISO 10423 or API 6A.
API requirements for alignment with ISO

- Persuasive technical and/or safety justification is provided by users, rather than manufacturers.

- Justification does not necessarily have to show forgings as clearly superior to, or safer than castings.

- It may be sufficient to show that there are sufficient technical differences that the two are not interchangeable in all applications.
Product Specification Levels

PSL 3, 3G and 4 currently require forgings in ISO:

- $\geq 15000$ psi
- $>5000$ psi gas applications, or high sour oil

- PSLs are risk mitigation measures for escalating consequences by reducing inherent probability of failure

Diagram:

- Gas
- Oil
- $\geq 15000$ psi
- $>5000$ psi
- $\leq 5000$ psi
- High sour
- Sweet & mod sour

Shell Global Solutions
Flaws and Defects

• Both castings and forgings can suffer from flaws and defects as a result of the manufacturing process:
  - **Surface discontinuities** (laps, seams, cold shuts, tears, oxides, slivers, chips, foreign materials)
  - **Subsurface discontinuities** (porosity, voids, cracks, bursts, inclusions) often originating from the casting process

• Exposed to in-service conditions, these flaws and defects may affect the expected life of a part
Inherent differences between forgings & castings

- A major problem associated with casting is the development of porosity, cavities and inclusions.
- Forgings improve internal quality due to compressive deformation.
- Forgings tend to eliminate casting porosity and break up macro-segregation patterns.
- The decrease of voids and porosity in forgings is often a function of the reduction ratio. However, fragmentation of hard non-metallic inclusions can be detrimental, whereas more deformable inclusions may contribute to (desired) anisotropic properties.
ASM Metal Handbook:

“Although wrought materials have their own weaknesses, they are free of many of the defects that may be associated with casting”.

Inspectability for internal defects

- NDE methods to detect defects all have their own characteristic:
  - Detection threshold (lower size of defect not disclosed)
  - Detection hit-rate (% of detectable defects not found)

- This implies:
  - Many defects present = defects may remain after acceptance
  - Few defects present = few defects may remain after acceptance
Does it matter?

- For both castings and forgings:
  - Surface breaking flaws and defects can be detected with sufficient accuracy.
  - For sub-surface flaws and defects:
    - (Semi) coarse grained materials might have problems with inspectability (CRA more so than CS)
    - With increasing thickness, sensitivity for RT becomes lower. On the other hand, for UT surface condition is of prime importance.

- Many services are typically for CO2 and/or H2S containing wells
- In sour service, H2S enhances corrosion fatigue
- ISO 15156 almost exclusively calls for forgings in high sour application

- Therefore, there is a preference to use forgings
HP low CO2 low H2S services

Allowing castings could be considered
• API 6A NDE amendments are suitable
  but...
    • May not be a commercially attractive niche
    • Complicates the decision tree
    • Requires additional information to be submitted
      (NDE quality levels and acceptance criteria)
Proposed solution

- Implicitly allow castings in some PSL3/3G/4 cases:
  - 5.3.2.1 c) Wrought products shall be used for primary parts in all services greater or equal than 15000 psi, or gas services or high H2S concentration oil services greater than 5000 psi
  - 5.4.3.1 c) identical to above

- In line with Figure A.3

- Allows castings for (extended) API 6D valves where principals specify PSL3/3G/4 quality
API has two websites

1) Public www.api.org
   - Newly redesigned in 2006 - easier to navigate
   - Open to the public
   - Has general information about all areas of API (i.e. Certifications, Publications, Meetings)
API has two websites

2) Committee Pages
http://committees.api.org/standards/ecs/index.html

- Committee and Subcommittee pages open to the public
- Contains information specific to each committee, subcommittee or working group.
Navigating the Committee Site

- Black Navigation Bar
- “My API” Bar
- Gray Navigation Bar
  - Quick Direct Links to Useful Sites
- Sub-Navigation Areas
  - Main Subcommittee Activities
Gray Navigation Bar

- Contains **direct** links to other sites in API relevant to ECS
- This bar is the same on every web page of the ECS Committee site.
Sub-Navigation Areas

- Beneath the title in black is an additional sub-navigation. This changes per committee or subcommittee, but always contains:
  - Meeting Materials
  - Ballots
- It may also contain:
  - Link to Subordinate groups listing
  - Links to other organizations