Agenda
B31.8 Gas Transmission and Distribution Piping Systems
Executive Committee

Charleston Marriott
170 Lockwood Blvd
Charleston, SC 29403
Tues., January 28, 2014
2:00PM to 4:00PM

1 Call to Order -
2 Introductions –

Quorum: In order to do business at this meeting a quorum of 5 members is required.

3 Adoption of Agenda-

4 Approval of Minutes – September 23, 2013 -

5 Announcements
5.1 Upon balloting B31.8 memberships, it was noted by some voters that some PF-1 forms on the system are blank.

This is a good opportunity for all members to review/update their profile information, this is needed such that when your membership is processed everyone has the ability to fully understand your background and vote appropriately on your membership (mainly an issue when memberships are balloted to the B31 Standards Committee). Please follow the simple steps for updating your profile.

Log onto the C&S Connect system. Once logged on please select the “My Profile” tab. Under this tab you will find your contact information listed on the bottom of the page,
to update your profile select “Update Professional Profile”. In the window please fill out the appropriate fields, you can also attach your resume under “attach additional credentials” if you do not feel like filling out all of the appropriate fields.

5.2 Mr. Hayden was present at the September meeting to discuss honors and awards with the committee. Mr. Hayden noted the large number of B31.8 members that have lengthy and dedicated themselves to the committee and ASME as a whole. From the discussion, Mr. Appleby requested that the staff secretary develop a list of possible ASME awards that could apply to B31.8 members.

January 2014 – The staff secretary would like to note that a listing of available awards can be viewed on the committee pages in C&S Connect under the “Codes & Standards Resources” section of the left hand toolbar of the committee pages as “B31 Honors & Awards Comm – List of Available Awards”, see pages 6-20.

5.3 Mr. Wendler provided an update in regards to new activity by the ISO Technical Committee 265 – Carbon Dioxide Capture, Transportation and Geological Storage (CCS). If any volunteers have interest in the activities and would like to participate, please see pages 21-30 for further information.

6 Membership
See pages 31-34 for the B31.8 committee memberships, and attendance.

Appointments
B31.8 Section Committee –

B31.8 Subgroup on Editorial Review –

B31.8 Subgroup on Design, Materials, and Construction –

B31.8 Subgroup on Operation and Maintenance –

B31.8 Subgroup on Offshore Pipelines –

B31.8 Subgroup on Distribution Pipelines – Junaid Faruq, and Frank Volgstadt

B31.8 India International Working Group –

B31.8 International –

Expressed interest in joining B31.8 Section Committee or related Subgroups – Noted on the list are members who have been in contact with the Staff Secretary and have filled out the appropriate forms.

<table>
<thead>
<tr>
<th>Julie Pischulla</th>
<th>Steve Burnley</th>
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</thead>
<tbody>
<tr>
<td>DMC</td>
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</table>
June 2013 – It was noted by Mr. Appleby that there are also two vacancies on the B31 Standards Committee that should be filled; one of the positions is reserved for the upcoming B31.8 Vice Chair.

Reappointments
The memberships that are scheduled to expire in 6/2014 for B31.8 and related Subtier Committees are shown below:

B31.8 Section Committee –
Jerry Fee        Mike Israni        William Walsh
Michael Gragg    Robert Appleby (Chair)

B31.8 Subgroup on Editorial Review –

B31.8 Subgroup on Design, Materials, and Construction –

B31.8 Subgroup on Operation and Maintenance –

B31.8 Subgroup on Offshore Pipelines –

B31.8 India International Working Group –
Arun Modi        L. Somasundaram        Ram Ballabha Singh
Ashwani Soni     Manjoj Jain            Samyak Sahani
D.S. Nanaware    P. Venu Gopalan        Sanjay Prakash
Jayachandran Sivaraman Prasoon Kumar Vipaul Randeria
Krishan Kumar Saini R. D. Goyal         Yogiraj Navathe

January 2014 – It was noted from the September 2013 B31 Standards Committee minutes that the following B31.8 Section Committee members were reappointed: Messrs Appleby (Chair), Gragg, Israni, and Walsh.

7 Publication Schedule – B31.8 and B31.8S
Items need to be B31 Standards Committee Approved by April 1, 2014 to appear in the next editions of B31.8 and B31.8S.

8 B31 Project Proposals
The general link to the ASME Standards Technology LLC Requests for Proposals is as follows:
http://stllc.asme.org/Requests_Proposals_RFPs.cfm

FY 2015 Project Proposals
- Enhanced Data and Recordkeeping Requirements for Effective Pipeline Integrity Management in ASME B31.8 and B31.8S (M. Rosenfeld)
  June 2013 – From the Board Research Evaluation Group (BREG) 3/29 minutes.
  “Recommended but needs further input regarding the PHSMA R&D proposal received from Lou Hayden. The BERG decided this project serves government needs rather serving the needs of the Committee and enhancing the ASME standards. HOLD, Wait for action from PHSMA.
  September 2013 - It seems that there was a little confusion in regards to the intent of the project as the BERG seemed to think that the title of the project does not really match the deliverable. There is a need to add more detail to what is anticipated to be done from the proposal (implementation) and what type of detail is being requested.
  Mr. Rosenfeld will review and update the proposal.
- Development of B31.8 Code Language to Address Mechanical and Acoustically Derived Vibration in Compressor Station Piping Systems (P. Dickinson)
  January 2014 – Proposal approved by B31 Standards Committee and submitted to Board Research Evaluation Group (BREG).
- Validation of Proposed RBDA Appendix to ASME B31.8 (R. Appleby)
  January 2014 - Proposal approved by B31 Standards Committee and submitted to Board Research Evaluation Group (BREG).
- ASME B31.8 and B31.8S Reorganization and Technical Gap Identification (D. Moore)
  January 2014 – Proposal not approved by B31 Standards Committee.
- Update to ASME’s “History of Line Pipe Manufacturing in North America” Research Report, CRTD-Vol. 43 (D. Moore)
  January 2014 – Proposal not approved by B31 Standards Committee.

9 Topics of Discussion
9.1 B31.4 and B31.8 Merger –

9.2 Section 24 of HR 2845 (DOT referencing of publicly available standards) – No report.

9.3 Inquiries
9.3.1 Inquiry on stress relieving heat treatment for girth welds (see pages 35-49) – Staff secretary noted that the suggested revisions under DMC item 02-3189 are going to address the inquirers concerns. If correct, staff secretary suggests an informal response to the inquirer.
9.4 Review of IPC for B31.8 and B31.8S Code Improvement (Item 12-1801)
An initial Ad Hoc team consisting of the Executive Committee and Mr. Rosenfeld as project team leader will initial review the 2012 IPC proceedings and develop suggestions for possible new work items. From this initial review it will then be determined if a permanent review team be developed and which proceedings would be reviewed by the team.

10 New Business

11 Executive Committee Item List (see page 50)

12 Future Meetings

<table>
<thead>
<tr>
<th>Date</th>
<th>Location</th>
<th>Hotel</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 17-19, 2014</td>
<td>Colorado Springs, CO</td>
<td>Antlers Hilton</td>
</tr>
<tr>
<td>Sept. 2014</td>
<td>San Diego, CA</td>
<td>Catamaran Resort Hotel</td>
</tr>
</tbody>
</table>

The list of upcoming GPTC meetings is shown below. For additional information, go to the AGA website at http://www.aga.org and click on Events.

<table>
<thead>
<tr>
<th>Date</th>
<th>Location</th>
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<tbody>
<tr>
<td>March. 3, 2014</td>
<td>Charleston, SC</td>
</tr>
</tbody>
</table>

13 Adjournment -

Respectfully submitted,

Adam Maslowski
Secretary, B31.8 Section Committee
Phone: 212-591-8017
E-mail: maslowskia@asme.org
LIST OF AVAILABLE ASME B31 HONORS AND AWARDS
ASME SOCIETY AWARDS
(www.asme.org/honors)

Any individual or group of members, or committee may nominate candidates for the ASME Society awards listed below. Nomination deadlines are absolute. Completed applications must have been received by that date.

(To nominate: Except for ASME Fellow, go to ASME.Org, click on Leadership dropdown, click on Honors and Awards and click on applicable award. A nomination form is located with award description. For ASME Fellow Program go to ASME-Org/Search for Fellows for procedure and nomination forms.)

<table>
<thead>
<tr>
<th>Name of Award</th>
<th>Nomination Deadline</th>
<th>Send To</th>
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<tbody>
<tr>
<td>Melvin R. Green Codes &amp; Standards Medal</td>
<td>January 1</td>
<td>SAC</td>
</tr>
<tr>
<td>J. Hall Taylor Medal</td>
<td>November 15</td>
<td>SAC</td>
</tr>
<tr>
<td>Dedicated Service Award (PTCS)</td>
<td>December 1</td>
<td>Society Officer-PTCS</td>
</tr>
<tr>
<td>ASME Fellow (<a href="http://www.asme.org/pdf/members/fellow">www.asme.org/pdf/members/fellow</a>)</td>
<td>March 1, June 1,</td>
<td>SAC</td>
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<td></td>
<td>September 1 and Dec. 1.</td>
<td>(Nominations considered quarterly)</td>
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SAC = Special Award Committee (Nominations may be sent to the ASME Honors Office or directly to the SAC)

**Melvin R. Green Codes and Standards Medal**
The Melvin R. Green Codes and Standards Medal recognizes outstanding contributions to: (1) the development, promulgation, or management of documents, objects, or devices used in ASME programs of technical codification, standardization, and conformity assessment, or (2) the acceptance of ASME Codes and Standards within the United States or internationally.

This medal was established in 1976 as the Codes and Standards Medal and renamed the Melvin R. Green Codes and Standards Medal in 1996 to honor the memory and extraordinary contributions of Melvin R. Green, an ardent supporter of industrial standards. He was a past recipient of the Codes and Standards Medal, ASME Fellow and longtime employee of the Society.

**J. Hall Taylor Medal**
The J. Hall Taylor Medal is presented for distinguished service or eminent achievement in the field of codes and standards pertaining to the broad fields of piping and pressure vessels which are sponsored or undertaken by ASME. The scope includes contributions to technical advancement and administration.

In 1965, by a bequest through the ASME activity in codes and standards, the Taylor Forge and Pipe Works established this award to commemorate the pioneering work of J. Hall Taylor in the field of standardization of industrial products and safety codes for their usage.
Dedicated Service Award
In 1983, the ASME Board of Governors approved the establishment of the Dedicated Service Award. It honors unusual dedicated voluntary service to the Society marked by outstanding performance, demonstrated effective leadership, prolonged and committed service, devotion, enthusiasm and faithfulness. The award may be presented to selected individuals who have served the Society for at least ten years in one or more of the following areas: Codes and Standards; Centers; Strategic Management; Knowledge & Community; Board of Governors; Institutes; The ASME Foundation; The AME Auxiliary, Inc.; Committees reporting to the Board of Governors. No more than 44 awards will be presented annually.

Recipients for Melvin R. Green C&S Medal since 2001:

<table>
<thead>
<tr>
<th>Year</th>
<th>Individual</th>
<th>Year</th>
<th>Individual</th>
<th>Year</th>
<th>Individual</th>
</tr>
</thead>
</table>

Recipients J. Hall Taylor Medal since 2001

<table>
<thead>
<tr>
<th>Year</th>
<th>Individual</th>
<th>Year</th>
<th>Individual</th>
<th>Year</th>
<th>Individual</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>Donald F. Landers</td>
<td>2008</td>
<td>Joel Feldstein</td>
<td>2009</td>
<td>Owen F. Hedden</td>
</tr>
</tbody>
</table>

Recipients for Dedicated Service Award since 2008:

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<thead>
<tr>
<th>Year</th>
<th>Individual</th>
<th>Year</th>
<th>Individual</th>
<th>Year</th>
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</thead>
</table>

COMMITTEE AWARDS
The following awards are granted to individual(s) based on the “Guide to Procedures for ASME Codes and Standards Development Committees” procedures for the ASME B31 Standards Committee.

<table>
<thead>
<tr>
<th>Name of Certificate</th>
<th>Recommendation</th>
<th>Granted/Approved</th>
</tr>
</thead>
<tbody>
<tr>
<td>Honorary Membership</td>
<td>Subcommittee/Standards Committee</td>
<td>ASME Staff</td>
</tr>
<tr>
<td>Certificate of Appreciation</td>
<td>Committee Chairman</td>
<td>Supervisory Board</td>
</tr>
<tr>
<td>Certificate of Acclamation</td>
<td>Standards Committee</td>
<td>Supervisory Board</td>
</tr>
<tr>
<td>Certificate of Achievement</td>
<td>Standards Committee</td>
<td>ASME Staff</td>
</tr>
<tr>
<td>B31 Leadership Award</td>
<td>Standards Committee</td>
<td>ASME Staff</td>
</tr>
<tr>
<td>ASME B31 Forever Medal for Excellence in Piping</td>
<td>By Nomination: March 31</td>
<td>ASME B31 Standards Committee</td>
</tr>
</tbody>
</table>
DESCRIPTIONS OF COMMITTEE HONORS AND AWARDS

HONORARY MEMBERSHIP AND CERTIFICATES OF APPRECIATION

A. Honorary Membership. The Standards Committee or Subcommittee may appoint a retiring member to honorary membership. Such member shall not have the right to vote and honorary membership on the Standards Committee or Subcommittee shall be continued for life.

Honorary membership shall be conferred upon a former Committee member only after ten years of dedicated service during which time the member shall have made significant contributions to the activities of the Committee. At least five of the ten years shall have been as a member of the Standards Committee.

Election to Honorary membership to the Standards Committee or Subcommittee shall be discussed in administrative session of the Standards Committee. Following discussion, the Chair shall determine if a secret ballot can be conducted at the meeting based on attendance of listed membership present at the meeting, or be conducted by letter ballot. A ninety percent affirmative vote of the listed membership is required for election to honorary membership.

Upon election, a Certificate is issued.

Honorary members may take part in, as applicable, the Standards Committee or Subcommittee affairs in accordance with their individual desires, under the following procedure:
(a) They are invited to submit individually or jointly to the Chair their recommendations on any matter, which they believe would benefit the activities of the Committee.
(b) They may be appointed to any special Committee, or constituted into a temporary advisory Committee to handle a special subject.
(c) Upon request, they will receive notices of meetings of the Standards Committee or Subcommittee and copies of minutes.

B. Certificate of Appreciation*. The Standards Committee may make recommendations to Board on Pressure Technology Codes and Standards for the issuance of Certificates of Appreciation to individuals who have given meritorious service to the Committee. The following guidelines, although not mandatory, should be used in making these recommendations:
(a) The wording of the Certificate should refer in a general way to service to the activities of the Committee, rather than to service on specific subtier Committee(s).
(b) The usual times for the Standards Committee to consider the recommendation of a Certificate should be either: (i) ten years after the date of an individual’s first formal appointment to a Committee activity, or (ii) at the time of his resignation from Committee activities.
(c) Factors to be considered in the decision of whether or not a recommendation should be made are length, continuity and diligence of service. Except for an unusually meritorious contribution, a Certificate should not be recommended at the time of the resignation of any person whose total service to the Committee has been less than one term (five years).

(d) No more than one Certificate for general service should be recommended for any individual. A Certificate for general service may be recommended for an individual who has already received a Certificate for a specific service, but only if it is believed that the specific service mentioned on the existing Certificate does not cover a significant portion of his actual contribution.

* Membership Service Award – Certificate of Appreciation - ASME Staff will be responsible for tracking those individuals’, and on concurrence from the Committee Chairman, will issue a Certificate of Appreciation and a pin with a rocker bar after 10 years as a member of a committee. Also, will issue a new rocker bar at intervals of 5 years thereafter.

** C. Certificate of Acclamation. **

(a) Annually, the Committee Chair of Standards Committee may make nomination to the Board on Pressure Technology Codes and Standards for issuance of Certificates of Acclamation.

(b) This award is intended to recognize excellence in development of a new or revised code standard or other work product. It is not intended to be a general service award. The form of the award consists of a Certificate and commemorative.

(c) The Committee Chair may solicit recommendations from the Committee membership, including subtier Committee Chairs.

(d) The nomination shall consist of the name(s) of an individual or a small group of individuals most responsible for the development of a specific Committee work product (e.g. new document, major revision).

(e) A member may receive more than one Certificate of Acclamation, if so deserving.

(f) Approval by the Board on Pressure Technology Codes and Standards, acting on behalf of the Council on Codes and standards, is required. The Board exercises control to maintain the integrity of the award.

** D. Certificate of Achievement **

(a) Annually, the Standards Committee may make recommendation to the Board on Pressure Technology Codes and Standards for the issuance of a Certificate of Achievement to an individual for significant personal achievement in the development and promulgation of codes, standards or other documents under the Committee’s jurisdiction. The nomination shall be unanimously voted by the Committee and forwarded to the Board on Pressure Technology Codes and Standards for final approval on behalf of the Council on Codes and Standards.

** E. Membership in the Society ** is not a requirement for Honorary Member, Certificates of Appreciation, Certificates of Acclamation or Certificates of Achievement.
F. ASME B31 Leadership Award

1. This award is given to an individual that has chaired a B31 Standards, Executive, Section Committee, Technical Committee or other subordinate Committee that has been created by the B31 Standards Committee.

2. The individual shall have served at least one full term in accordance with the B31 Committee’s Operation Procedures.

3. The individual shall receive a B31 Leadership Award and a pin or bar identifying that status as a Past Chair. The Award will be issued to an individual that has completed the services (stepping down) as Chair of a Standards, Executive, Section, Technical or newly created subordinate Committee.

4. The effective date of this award is January 2005.

ASME Staff will be responsible for tracking those individuals’ serving as Chair and on completion (stepping down) of the individual’s Chair will automatically issue the Certificate. The ASME B31 H & A Committee will prepare a citation if required. A bar or pin will be a one time issue.
SAMPLE

This Certificate is awarded by the
Boiler & Pressure Vessel Committee
to

Donald R. Frikken

In testimony of the high regard of your co-workers and
the deep appreciation of the Society for your valued
services in advancing the engineering profession as

Chair
B31 Standards Committee
Code for Pressure Piping Standards
2004 - 2007

Guido G. Karc
Chair, BPV Standard

Joel G. Feldstul
Vice Chair, BPV Standard

Joseph Bramble
Secretary, BPV Standard

B31 Leadership Award
ASME B31 Forever Medal for Excellence in Piping

Purpose and Criteria for Award
Medal is awarded for distinguished contributions in the field of pressure piping including but not limited to leadership, technical, research and development, and publication efforts that have had a significant impact on the content, development, promulgation and expansion of ASME B31 piping codes.

Type of Award
Committee Award: The candidate’s nomination shall be approved unanimously by the ASME B31 Standards Committee and be approved by the BPTCS on behalf of the C&S Board of Directors.

Who Qualifies for the Award
The award shall be presented to an ASME B31 Committee activities member who has made significant contributions to the ASME Piping Codes. Nominees for the award shall be a member or an honorary member of the B31 Standards Committee or any of its subordinate committees.

Restrictions of Award
No person shall receive more than one (1) ASME B31 Forever Medal for Excellence in Piping in his/her lifetime.

Who is Responsible for the Award
The overall administration of the ASME B31 Forever Medal for Excellence in Piping Award is the responsibility of the ASME B31 Standards Committee. The ASME B31 Honors and Awards Committee shall be responsible for detailed administration of award including announcement of award, review of the nominations, nominee selection and recommendation of selection to the ASME B31 Standards Committee, for B31 approval. Once approved the ASME B31 Standards Committee shall forward the selected nominee qualifications to BPTCS for approval on behalf of the C & S Board of Directors.

Funding and preparation of the Medal and Certificate shall be the responsibility of ASME BPTCS.

Who can Nominate a Candidate
Any ASME B31 Committee activities member or ASME Committee member outside B31 (such as Boiler and Pressure Vessel Code) with first hand knowledge of the nominee’s contribution to B31 activities may nominate a B31 member or honorary member for the award.
Who Qualifies for the Award

The criteria for the award shall be as follows:

- Demonstrated effective leadership role in ASME B31 Committee activities.
- Technical innovation and outstanding technical contributions included in B31 Codes and Standards.
- Potential for higher leadership and technical involvement in ASME Codes and Standards.
- Initiatives taken to enhance the ASME Vision and Mission in the field of pressure piping.
- Distinguished industry leadership and management role in area of pressure piping.
- Dedicated, prolonged and committed service to B31 Committee activities.
- Engineering statesmanship.
- Outstanding contributions to B31 Codes and Standards.
- Research and Development activities impacting ASME B31 Codes and Standards.
- Publications that impact B31 Codes and Standards universal acceptance.

Nominator’s Responsibility

The nominator shall submit a Letter of Nomination for the award to the Chair, B31 Honors and Award Committee, by the end of deadline period. The nominator may be a group such as a B31 Section Committee. The letter shall detail the nominee’s qualification under the criteria noted above. The nominator may seek up to 2 more letters from other individuals familiar with the nominee. The letter shall give a brief résumé of the nominee’s background including years of service to ASME Codes and Standards must be attached to the letter. The nominator shall also include in the letter a name of an individual willing to attest to the nominee’s qualifications and requirements for the award if called upon to do so.

Selection Process

The B31 Honors and Award Committee shall review the nominees and select the individual it proposes for the award. The proposal shall be presented to the ASME B31 Executive and B31 Standards Committee and be subject to the approval of the ASME B31 Standards Committee.
Award

Certificate and Vermeil Medal dipped in gold.

Preparation of Award

The ASME BPTCS shall prepare the Medal and a Certificate.

Presentation of Award

The award should be presented at an appropriate event at which time the awardee’s service to ASME B31 can be properly recognized. A normal date for this presentation would be during ASME B31 Code Week. Selection of the award recipient shall be announced eight weeks prior to presentation to allow for preparation and presentation of the award.

Deadline

Nomination letters for the ASME B31 Forever Medal for Excellence in Piping shall be submitted to the Chair, ASME B31 Honors and Awards Committee by March 31, 2009 following an announcement for nomination.
date

TO: Secretary, B16 Main Committee

Subject: Approval of ASME Certificate of Achievement for (Name), ASME B16 Subcommittee F (B16 SC-F))

Members,

The Chair, Mr. Guy A. Jolly, of ASME B16 SC-F, *Steel Threaded and Welding Fittings*, has nominated (Name), a long time member of B16 SC-F, to be awarded an **ASME Certificate of Achievement** upon his pending retirement from ASME B16 SC-F activities.

The following background information to support the recommendation is provided as follows:

(Name), Consultant, has been a member of B16 SC-F for close to 20 years. His education and experience in Metallurgy, experience as the QA and Engineering Manager of a well known ASME B16.9 and B16.28 Fitting Manufacturer, and a active 40 year Member, including leadership roles, of ASTM Committees AO1 (Steel and Alloy), BO2, (Nickel) and B07 (Aluminum) prepared him well to make significant personal contributions for the development and promulgation of ASME B16SC-F standards, B16.9, *Factory-Made Wrought Buttwelding Fittings*, B16.11, *Forged-Fittings, Socket Welding and Threaded*, B16.25, *Buttwelding Ends* and B16.49, *Factory-Made Wrought Steel Buttwelding Induction Bends*.

The B16 SC-F Committee has relied on (Name) knowledge, experience and leadership in the resolution of many “burning issues” during development and maintenance of the Committee’s standards. (Name) has also been an active member of ASME B16 SC-C, *Steel Flanges and Flanged Fittings*.

In recognition of (Name) long time contribution to the standard development activities of B16 SC-F for the widely distributed and credible ASME B16.9, B16.11, B16.25 and B16.49 standards the courtesy of awarding him a Certificate of Achievement would be greatly appreciated upon his pending retirement from the B16SC-F Committee.
Sincerely,

Guy A. Jolly, Chair, B16 SC-F
B16 Honors and Awards Committee

(Note to ASME Secretary)

BALLOT ACTION:
Ballot B16 SC-F, B16 Standards Committee, and BPTCS (Approval by B16 MC and BPTCS required.)

BALLOT QUESTION
Proposed Question: Do you approve Mr. Jolly's nomination to award an ASME Certificate of Achievement to (Name), for his more than 20 years of significant personal achievement and contributions in the development and promulgation of standards under the jurisdiction of the ASME B16 SC-F, Steel Threaded and Welding Fittings, Committee.
To: Noel Lobo  
Secretary, B31  

Subject: ASME CERTIFICATE OF ACCLAMATION  

The Chair of ASME B31 Mechanical Design Technical Committee and Chair of B31 Honors and Awards Committee recommend that (Name) be awarded an ASME Certificate of Acclamation for his dedicated services to the ASME B31 Mechanical Design Technical Committee, specifically, for his role as Project Manager for developing and publishing a new B31 Standard, ASME B31J-2008, “Standard Test Method for Determining Stress Intensification factors (i-Factors) for Metallic piping Components”.

The development of a new B31 Standard on this difficult and challenging subject was an extremely challenging task. The Standard addresses documenting the methodology and criteria for determining the stress intensification factors (SIF’s) for piping components by test. Manufacturers, Contractors, Designers, and Users have been testing piping components since the 1950’s to establish SIF’s for piping design without a standard to provide guidance. (Name) utilized his experience and knowledge of B31 piping systems, the information contained in the early publications by Markl and the extensive number of publications since Markl to pull the required information together. He devoted extensive time and energy in developing the basic technical requirements, preparing the draft, making presentations, resolving comments and finally getting the approval of the Code Committee. The successful completion of this project required understanding nearly 60 years of history. (Name) was persistent and dedicated in his efforts to overcome objections and comments moving this new B31 Standard to publication. The presence of this new Standard on our bookshelves is attributable to (name)’s outstanding efforts and he is very deserving of the ASME Certificate of Acclamation Award and the recognition that comes with it.

Sincerely,

Guy Jolly        William J. Koves, PhD, P.E.  
Chair, ASME B31 Honors and Award Committee       Chair, ASME B31 MDC
CC: Colleen O’Brien  
Secretary, ASME B31 MDC

**BALLOT QUESTION**

Proposed Question: Do you approve the Chairs of B31 MDC and B31 Honors and Awards Committees nomination to award an ASME Certificate of Acclamation to (Name), for his leadership role for developing and publishing a new B31 Standard, ASME B31J-2008, “Standard Test Method for Determining Stress Intensification factors (i-Factors) for Metallic piping Components”.  


To: Mohinder Nayyar  
Noel Lobo

From: Guy A. Jolly

Subject: ASME Certificates of Appreciation

From the current B31 Standards Committee roster it appears that the following members have been associated with B31 activities for at least 10 years and are deserving candidates for an **ASME Certificate of Appreciation** for General Service unless they have received such an award at a lower level B31 Subcommittee in the last 10 years:

Mohinder L. Nayyar, PE  
Robert J. T. Appleby  
Charles Becht IV  
John S. Chin  
David L. Coym, PE  
Phillip D. Flenner, PE  
Donald R. Frikken, PE  
Roy A. Grichuk, PE  
Ronald W. Haupt, PE  
Louis E. Hayden, PE  
Brian Holbrook, PE  
Guy A. Jolly, PE  
William J. Mauro, PE  
Jimmy E. Meyer, PE  
Ronald G. Payne, PE  
Michael Rosenfeld, PE  
Robert J. Silvia  
Walter J. Sperko, PE  
Fred W., Tatar, PE  
William Koves, PHD, PE

These members have been verified by reviewing copies of the 1990’s B31 Piping Codes. Some B31 SC may have been overlooked and need to be added to the list. The proposed Citation for the Certificate of Appreciation is as follows:

**CITATION:**

Member  
**ASME B31 Code for Pressure Piping Standards Committee and its associated Subcommittees**  
199?-2010
Eligibility and details for the award is indicated by the following attachment.

**CERTIFICATES OF APPRECIATION.**

Certificates of Appreciation are issued in accordance with Society Policy P-1.2 to selected individuals for outstanding leadership and/or significant service in the development of codes and standards. The Consensus Committee may make recommendations to the cognizant board for the issuance of Certificates of Appreciation to individuals who have given meritorious service to the committee. The following guidelines, although not mandatory, should be used in making these recommendations:

(a) The usual times for the committee to consider the recommendation of a Certificate should be either ten years after the date of an individual's first formal appointment to a committee activity, or at the time of the individual's resignation from committee activities.

(b) Factors to be considered in the decision of whether or not a recommendation should be made are length, continuity and diligence of service. Except for an unusually meritorious contribution, a Certificate should not be recommended at the time of the resignation of any person whose total service to the committee has been less than one term (5 years).

(c) An individual may receive more than one Certificate of Appreciation for different activities. However, no more than one Certificate for general service should be recommended for any individual. A Certificate for general service may be recommended for an individual who has already received a Certificate for a specific service, but only if it is believed that the specific service mentioned on the existing Certificate does not cover a significant portion of his actual contribution.

(d) The wording of a Certificate for general service should refer in a general way to service to the activities of the committee, rather than to service on specific subordinate group(s).
ISO Technical Committee 265 - Carbon Dioxide Capture, Transportation and Geological Storage (CCS) has published a business plan (copy attached). I’ve been advised that a working group on transport (WG-2) has been established.

If any of your volunteers are interested in contributing to this effort (e.g. to ensure harmonization with/cross reference to existing B31 standards), they can do so by applying to serve on the US Technical Advisory Group, which is administered by CSA.

Interested parties can contact Ms. Julie Weis (julie.weis@csagroup.org).

If they would like to have additional perspective from an ASME volunteer before engaging, they can contact Arnold Feldman at:

JJDS Environmental
40 Woodview Dr
Doylestown, PA 18901-2922
(o) 267-880-2325
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Joe
BUSINESS PLAN
ISO/TC 265
Carbon Dioxide Capture, Transportation and Geological Storage (CCS)

EXECUTIVE SUMMARY

Current levels of greenhouse gases (GHGs) in the atmosphere are equivalent to approximately 430 ppm of CO₂, and are rising by about 2 ppm per year. Pre-industrial levels were approximately 280 ppm. It is generally acknowledged that the increasing amount of GHGs in the atmosphere is resulting in an increasing global mean temperature.

CCS has been identified by leading organizations as a key technology to reduce the amount of emissions of CO₂ into the atmosphere and thus help control global warming. It is commonly accepted that by 2050 the global mean temperature rise should not exceed 2°C above pre-industrial levels, and CCS is targeted to prevent 7Gt per annum of CO₂ from being released into the atmosphere out of 42 Gt per annum that must not be emitted to the atmosphere if the 2050 scenario is to be achieved. Out of the 75 large-scale industrial CCS projects currently underway, only 16 of those projects are in the construction or operation phase and will provide for the capture and storage of about 36 Mt per annum by 2015. This is about 70% of the amount targeted by the International Energy Agency (IEA).

CCS is a dynamic and evolving technology, although some aspects of the technology (e.g., pipeline transport of CO₂) can be considered mature. All of the industrial projects that are currently in operation are considered to be still in the demonstration phase.

The intent of the ISO/TC 265 committee is to prepare International Standards for the design, construction, operation, environmental planning and management, risk management, quantification, monitoring and verification, and related activities in the field of carbon dioxide capture, transportation, and geological storage. The focus is on CO₂ being emitted from large stationary point sources. Existing standards will be utilized where possible.

The aim of international standardization is to facilitate the exchange of goods and services through the elimination of technical barriers to trade. For CCS, there are many aspects of this newly evolving field that are internationally diverse and may touch on all aspects of current and future civilizations, therefore ISO standards for CCS technology will help to provide a common basis for commercial and business transactions. Expected benefits of standardization include:

- Helping facilitate the deployment, integration and interoperability of procedures, systems, and technologies needed to safely implement and operate CCS projects.
- Enabling knowledge sharing, innovation, cooperation and coordination.
- Helping achieve public acceptance of CCS as a safe and reliable climate change mitigation strategy.
- Achieving greater consistency across multiple interests and different abilities of professional disciplines, sectors, and levels of administrative responsibility within the national and transnational context.
• Increasing preparedness, continuity management, culture and best practices within governments and organisations working in the field of CCS.
• Increasing awareness and enhanced capabilities amongst interested parties and stakeholders to share information and communicate.
• Reducing risks and consequences of accidental, intentional and natural events.

There are currently 16 participating member countries, 10 observing members, and 6 liaison organisations involved in ISO/TC 265. A preliminary scoping document has been developed and work is continuing to further develop and refine the scope of work. The scope of work is anticipated to include not only elements that require standardisation now, but also be forward looking and include elements that will require standardisation in the future. Five working groups have been established to initially complete the work and these groups will be led by participating member countries. Detailed strategies and priorities will be established for each of the working groups and the business plan will be updated as work progresses.
1 INTRODUCTION

1.1 ISO technical committees and business planning

The extension of formal business planning to ISO Technical Committees (ISO/TCs) is an important activity that forms part of a major review of business. The aim is to align the ISO work programme with expressed business environment needs and trends and to allow ISO/TCs to prioritize among different projects, to identify the benefits expected from the availability of International Standards, and to ensure adequate resources for projects throughout their development.

This business plan addresses the work of the ISO/TC 265 committee for the development of International Standards for the developing and dynamic fields of carbon dioxide capture, transportation and geological storage. The approved scope of work adopted by the technical committee is summarized as follows:

*Standardisation of design, construction, operation, environmental planning and management, risk management, quantification, monitoring and verification, and related activities in the field of carbon dioxide capture, transportation, and geological storage (CCS).*

The focus of the committee’s work is on the capture, transport and geological storage of anthropogenic CO₂ generated from large-scale industrial activity. Example industries include power generation, cement plants, gas plants, and iron and steel plants. The work of the technical committee does not encompass mobile and small-scale emitters of CO₂.

It should be understood that the ISO/TC 265 technical committee have adopted a working title that accurately reflects the focus of the committee’s work. CCS, or carbon dioxide capture, transportation, and geological storage, is a broadly used term that recognizes that GHGs are composed predominately of CO₂. For efficiency, the acronym CCS will be used throughout this document to represent the technical committee’s work.

1.2 International standardization and the role of ISO

The foremost aim of international standardization is to facilitate the exchange of goods and services through the elimination of technical barriers to trade. For CCS, there are many aspects of this newly evolving field that are internationally diverse and touch on all aspects of current and future civilizations, therefore ISO standards for CCS technology will help to provide a common basis for commercial and business transactions.

Three bodies are responsible for the planning, development and adoption of International Standards: ISO (International Organization for Standardization) is responsible for all sectors excluding Electrotechnical, which is the responsibility of IEC (International Electrotechnical Committee), and most of the Telecommunications Technologies, which are largely the responsibility of ITU (International Telecommunication Union).

ISO is a legal association, the members of which are the National Standards Bodies (NSBs) of some 140 countries (organizations representing social and economic interests at the international level), supported by a Central Secretariat based in Geneva, Switzerland.

The principal deliverable of ISO is the International Standard.
An International Standard embodies the essential principles of global openness and transparency, consensus and technical coherence. These are safeguarded through its development in an ISO Technical Committee (ISO/TC), representative of all interested parties, supported by a public comment phase (the ISO Technical Enquiry). ISO and its Technical Committees are also able to offer the ISO Technical Specification (ISO/TS), the ISO Public Available Specification (ISO/PAS) and the ISO Technical Report (ISO/TR) as solutions to market needs. These ISO products represent lower levels of consensus and have therefore not the same status as an International Standard.

ISO offers also the International Workshop Agreement (IWA) as a deliverable that aims to bridge the gap between the activities of consortia and the formal process of standardization represented by ISO and its national members. An important distinction is that the IWA is developed by ISO workshops and fora, comprising only participants with direct interest, and so it is not accorded the status of an International Standard.

2 BUSINESS ENVIRONMENT OF THE ISO/TC

2.1 Description of the Business Environment

The following political, economic, technical, regulatory, legal and social dynamics describe the business environment of the industry sector, products, materials, disciplines or practices related to the scope of this ISO/TC, and they may significantly influence how the relevant standards development processes are conducted and the content of the resulting standards.

The global scientific community working in the field of climate change generally acknowledges that the emission rate of greenhouse gases (GHGs) such as CO₂ must be reduced if global warming is to be controlled. It is commonly accepted that by 2050 the targeted global temperature rise should be limited to no more than 2°C above pre-industrial levels (referred to as the 2°C scenario, or 2DS). It is further understood that no single technology can achieve this goal and the International Energy Agency¹ (IEA) estimates that emission reductions of 42 Gt per annum are required to achieve the 2DS scenario, with CCS providing 7 Gt per annum of the total.

The Global CCS Institute (GCCSI) has identified 75 large-scale CCS projects that are underway², with only 16 of these currently operating or in construction. These 16 projects will have a combined capture capacity of 36 Mt per annum of CO₂ by 2015, which is only 70% of IEA’s target for CCS. In addition, while being below target, the deployment of CCS is primarily in OECD member countries, but the IEA has predicted that by 2050, non-OECD countries should account for 70% of the CO₂ stored if the 2DS scenario is to be realised.

Developing the business case for a CCS project is complex and challenging because adding CCS to any industrial process increases capital costs as well as operating and maintenance costs. While CCS can be commercially competitive when compared to large-scale technologies that reduce or avoid CO₂ emissions, CCS is often not considered due to:

- The early stage of the technology’s development and the subsequent associated risk.
- Market prices for CO₂ that are too low to support the investment.
- The lack of incentives for CO₂ abatement.
- Government policy and funding support mechanisms that do not treat CCS equivalent to other low-carbon technologies.

¹ IEA 2012b. Energy technology perspectives 2012: Perspectives to a clean energy system. OECD/IEA France.
² Global CCS Institute, The Global Status of CCS: 2012, Canberra, Australia.
The IEA\textsuperscript{2}, the GCCSI\textsuperscript{3} and the GEA\textsuperscript{3} provide comprehensive analyses of the need to implement CCS as a climate change mitigation strategy, the current status of the technology, and the challenge associated with its implementation.

It is also acknowledged by each of these organisations that the development of International Standards will support the implementation and safe operation of CCS. Standards will incent positive policy development by governments and regulating bodies, as well as encourage the funding of CCS projects. This in turn will motivate industry to undertake CCS demonstration projects, and subsequently lead to the development of an experience base that will drive innovation and ultimately reduce capital and operating costs.

2.2 Quantitative Indicators of the Business Environment

The following quantitative indicators describe the business environment in order to provide adequate information to support actions of the ISO/TC.

In section 2.1, the IEA, the GCCSI and the GEA organisations were identified as having completed comprehensive work that identifies the role CCS must play in achieving CO\textsubscript{2} emission reductions. These works provide broad and deep quantitative indicators of the business environment supporting CCS as a technology that must be implemented. Given the accessibility of these references, a summary is not provided here given the volume of work that has been completed. Interested readers are encouraged to follow-up with the references provided.

3 BENEFITS EXPECTED FROM THE WORK OF THE ISO/TC

The benefits expected from the work of ISO/TC 265 include helping enable the implementation of CCS as a mitigation strategy for global warming by:

- Facilitating the deployment, integration and interoperability of procedures, systems, and technologies needed to safely implement and operate CCS projects.
- Enabling knowledge sharing, innovation, cooperation and coordination.
- Helping achieve public acceptance of CCS as a safe and reliable climate change mitigation strategy.
- Achieving greater consistency across multiple interests and different abilities of professional disciplines, sectors, and levels of administrative responsibility within national and transnational context.
- Increasing preparedness, continuity management, culture and best practices within governments and organisations working in the field.
- Increasing awareness and enhanced capabilities amongst interested parties and stakeholders to share information and communicate.
- Reducing risks and consequences of accidental, intentional and natural events.

4 REPRESENTATION AND PARTICIPATION IN THE ISO/TC

4.1 Countries/ISO members bodies

The following 16 countries are participating members (P-members) of ISO/TC 265:

Australia         Italy         Norway         United States
Canada            Japan         South Africa
China             Korea, Republic of Spain
France            Malaysia       Switzerland
Germany           Netherlands    United Kingdom

The following 10 countries are observing members (O-members) of ISO/TC 265:

Argentina         India
Brazil            Iran
Czech Republic    New Zealand
Egypt             Serbia
Finland           Sweden

The following international organisations/institutions are liaison members of ISO/TC 265

Carbon Sequestration Leadership Forum (CSLF)
European Industrial Gases Association (EIGA)
Global CCS Institute (GCCSI)
International Energy Agency (IEA)
International Energy Agency GHG R&D Programme (IEAGHG)
World Resources Institute (WRI)

A liaison member is a member of the ISO/TC 265 committee that offers expertise, support and connections to facilitate the work of the committee. A liaison member does not have voting status.

4.2 Analysis of the participation

P- and O-members of ISO/TC 265 reflect a meaningful global representation of developed and developing countries. Each of the members has a strong stakeholder interest in the development of standards for CCS due to one or more of the following reasons:

- A demonstrated commitment to reducing the impact of CO₂ emissions
- A strong reliance on hydrocarbons (e.g., coal, natural gas, etc.) as a basis for power generation and industrial manufacturing
- The production and export of hydrocarbons provide significant revenue to a country’s economy
- Expertise and experience with aspects of CCS

The number of countries and organisations participating in the development of International Standards for CCS is relatively low given the importance of CCS as a climate change mitigation strategy. It is
expected that additional countries will become P-members of ISO/TC 265 as the work progresses. Countries with high per capita GHG emissions are especially encouraged to become P-members.

Funding for work and travel is a major issue for many members and inhibits participation in the development of International Standards.

5 OBJECTIVES OF THE ISO/TC AND STRATEGIES FOR THEIR ACHIEVEMENT

5.1 Defined objectives of the ISO/TC

The objective for ISO/TC 265 is to prepare standards for the design, construction, operation, environmental planning and management, risk management, quantification, monitoring and verification, and related activities in the field of carbon dioxide capture, transportation, and geological storage.

The intent is that the International Standards will include all aspects related to the capturing of CO₂ from large stationary point sources to storing it in suitable underground formations so as to prevent it from entering the atmosphere.

Excluded from the work of the ISO/TC 265 will be:

- Ocean carbon dioxide storage by direct injection
- Mineral carbonation storage
- Industrial uses of CO₂ not related to CCS
- Terrestrial storage
- International Maritime Organization (IMO) aspects
- Legal liability and permitting
- Modification of rigs

5.2 Identified strategies to achieve the ISO/TC’s defined objectives

ISO/TC 265 has proposed that the committee will use an internal scoping document that contains the desired level of detail to describe the activities of the committee. The guiding principles for the scoping document are:

- The document is a living document and will be revised as new technologies or innovations emerge.
- The document is not intended to contain only elements that are ready for standards today, and will be forward looking and include elements that could require standards in the future.

ISO/TC 265 has also decided that the committee would initially not have sub-committees. Rather, work will be completed within working groups that will report directly to the technical committee. Five working groups have been initially established:

1. Capture
2. Transportation
3. Storage
4. Quantification and Verification
5. Cross Cutting Issues
Each working group will be lead by Conveners/Co-Convenors, each provided by a P-member. Each working group will have a secretariat that will come from a P-member providing a Convener. The names and number of working groups may be changed at a later date by resolution.

Each of the working groups will establish strategies and priorities for delivering on the objectives of this ISO/TC once the leadership and representation of the committees is established. The ISO/TC 265 committee will meet at a minimum annually, with intermediate action items handled electronically between meetings. Working groups will typically meet more often and will utilize teleconferencing and e-mail as the main method of communication and the dissemination of information.

In general, the ISO/TC 265 will avoid the duplication of standards through close coordination with ISO/CEN and other NSB’s, and the use of existing standards is being encouraged. For example, many published pipeline standards already define the parameters to be understood for the transportation of CO₂. In addition, liaisons with other ISO/TC’s will be utilized as appropriate. Current liaisons are:

- ISO/TC 67 Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries
- ISO/TC 207 Environmental management
- CEN/TC234

The business plan for ISO/TC 265 will be updated once more details on strategies and priorities have been established. This is anticipated with the formation and kick-off of the working groups.

The ISOTC 265 recognizes that not all of the subject matter in CCS is ready for standardization. The ISO/TC 265 further recognizes that CCS is a dynamic and evolving subject, so care will be taken to ensure that standards remain up to date and do not impede innovation. There are different kinds of standards for different situations and the ISO/TC 265 will monitor the development of standards to ensure that requirements are appropriate for the intended circumstances.

6 FACTORS AFFECTING COMPLETION AND IMPLEMENTATION OF THE ISO/TC WORK PROGRAMME

The number of member bodies, liaisons and, consequently, experts in the various working groups, will likely challenge the time required to complete the work of ISO/TC 265 because:

- A common understanding of the priorities for the standards has to be realized by all members of the working groups. New work items may also challenge the member bodies in providing appropriate resources.
- New participants are anticipated and they may have difficulty in sustaining the necessary technical expertise and funding.

Other factors affecting the completion and implementation of the work include:

- The cost of attending and hosting meetings can limit the ability of many member bodies, delegates, and liaisons to participate in and host meetings. Thus teleconferencing and web meetings are utilized to the maximum extent possible, even though this is generally less efficient than face-to-face meetings.
Participants who have the necessary expertise are commonly busy in their normal work, and thus the time available to work on the development of standards may be limited.

7 STRUCTURE, CURRENT PROJECTS AND PUBLICATIONS OF THE ISO/TC

This section gives an overview of the ISO/TC’s structure, scopes of the ISO/TCs and any existing subcommittees and information on existing and planned standardization projects, publication of the ISO/TC and its subcommittees.

7.1 Structure of the ISO committee

http://www.iso.org/iso/home/standards_development/list_of_iso_technical_committees/iso_technical_committee.htm?commid=648607

7.2 Current projects of the ISO technical committee and its subcommittees

http://www.iso.org/iso/home/store/catalogue_tc/catalogue_tc_browse.htm?commid=648607&development=on

7.3 Publications of the ISO technical committee and its subcommittees

http://www.iso.org/iso/home/store/catalogue_tc/catalogue_tc_browse.htm?commid=648607

Reference information

Glossary of terms and abbreviations used in ISO/TC Business Plans

General information on the principles of ISO’s technical work
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<td>AP (Pipeline Operator/Owner)</td>
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<td>0.13</td>
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<td>AA (Constructor)</td>
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<tr>
<td>Member</td>
<td>B31.8 (IC)</td>
<td>Exec</td>
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<tr>
<td>AH (Insurance/Inspection)</td>
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<td>Total</td>
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**Key**

- Chair
- Concern
- Contributing Member
- Delegate
- Ex-Officio Member
- B31.8 SC Member Present
- SG Member Present
Dear,

According to the ASME website guidance, I would like to submit the following revision suggestion based in some field experience that we had when we followed the code requirement.

The item 825.2 of ASME B31.8 requires a stress relieving heat treatment for girth welds when the wall thickness of the pipe is greater than 1.25 inches. The same requirement is applied for sour gas service according to item B825.

Currently we have a designed pipeline of 1.5 inches of wall thickness (diameter 24" and grade API 5L X65) where we have already started the welding procedure qualification program for the construction phase.

When we follow the code requirement and apply the prescribed heat treatment, the yield strength of the base metal drops to a value below the minimum required for X65 grade. The same happens with the tensile strength of the girth weld.

We would like to suggest the committee to revise the item 825.2 and adopt the same text defined for the stress relieving heat treatment of offshore gas transmission (item A825), that allows waive the stress relieving.
The attached file is a paper presented in Rio Pipeline Conference 2013 that summarizes all results that we had with the heat treatment.

As a reference, there are also two papers from PRCI written by Groeneveld about the heat treatment effects on pipe properties. He also found loss in yield strength for API 5L pipes after stress relieving heat treatment.

Thank you!

Best regards,
Gilmar.

Gildar Zacca Batista
Metallurgical Engineer
Petrobras/Pipeline Engineering
Phone: + 55 21 2166-3024
E-mail: g.zacca@petrobras.com.br

(See attached file: IBP-1184.pdf)
Abstract

In the design of the onshore part of the export gas pipeline from pre-salt, due to the high design pressure, it will be necessary to apply pipes with wall thickness of 1.452 inches, that is much higher than the thicknesses traditionally used in onshore pipelines, which rarely exceed 1 inch. According to the design code ASME B31.8 and the Brazilian standard NBR 12712, when the wall thickness exceeds 1.25 inches, it is necessary to perform a stress relieving heat treatment after welding. The mandatory requirement of the standard raises some concerns, such as the difficulty of carrying out this treatment in field conditions, the heating effect in mechanical properties of pipe body and the stresses imposed by thermal expansion, particularly in the tie-in welds where the restrictions are significant. In the gas to be transported by these pipes, there is also the presence of H$_2$S which can result in sulfide stress cracking. To avoid this, it is necessary to use pipes and welding procedures suitable for sour service, including sulfide stress cracking test and hardness test. Due to the particularities of this project, it was decided to conduct a comprehensive welding study that serves as the basis for the use of this material in the field. In this study, the girth weld and pipe body were evaluated in the heat treated and without heat treatment conditions. The methodology of analysis included tensile, nick-break, side bend, Charpy, CTOD, hardness, HIC and SSC tests. Additionally, the CTOD results were compared with the results from a fracture mechanics study that was done considering the residual stress not relieved because the absence of heat treatment. The results demonstrated that the heat treatment decreases the yield and tensile strength of the API 5L X65 sour service pipe. On the other hand, all requirements were fulfilled in the as welded condition.

1. Introduction

The current needs to export gas from the pre-salt fields have created a new challenging scenario for the pipeline construction techniques and materials specifications. For the onshore part of the pipeline, due to the high design pressure and H$_2$S presence, it was necessary to specify pipes with wall thickness higher than the ones traditionally used and with good resistance to sulfide stress corrosion cracking and hydrogen induced cracking. For steel and pipe manufacturers it is not an easy task to produce thicker pipes and also meet sour service requirements. A good process control is required to prevent segregation and ensure the formation of a sour service resistant microstructure. Few manufacturers in the world are able to produce this type of pipe.

Another point that has to be considered is that, according to the design code ASME B31.8 [1] and the Brazilian standard NBR 12712 [2], when the wall thickness exceeds 1.25 inches, it is necessary to perform a stress relief heat treatment after welding. The mandatory requirement of the standard raises some concerns, such as the difficulty of carrying out this treatment in field conditions, the heating effect in mechanical properties of pipe body and the stresses imposed by thermal expansion, particularly in the tie-in welds where the restrictions are significant. Besides, there is not much information available about onshore pipeline construction using stress relief heat treatment and the chemistry of the sour service pipe is not suitable for this process. In order to face this scenario, Petrobras decided to conduct a comprehensive welding and heat treatment study that serves as the basis for the use of this material in the field. This paper shows the results obtained from two different welding processes with and without performing heat treatment.
2. Material and Experimental Procedure

2.1. Pipe Material

The X65 sour service pipes used in this study were produced by the SAW UOE process according to API 5L specification [3]. The diameter and the wall thickness were 24 inches and 1.452 inches respectively. The chemical composition can be seen in Table 1 and it results in a carbon equivalent IIW of 0.33% and Pcm of 0.14%.

Table 1. Chemical composition.

<table>
<thead>
<tr>
<th>C</th>
<th>Mn</th>
<th>Si</th>
<th>Nb</th>
<th>V</th>
<th>Ti</th>
<th>Cr</th>
<th>Cu</th>
<th>Mo</th>
<th>Ca</th>
<th>Al</th>
<th>N</th>
<th>P</th>
<th>S</th>
<th>Ni</th>
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</thead>
<tbody>
<tr>
<td>0.04</td>
<td>1.42</td>
<td>0.30</td>
<td>0.044</td>
<td>0.001</td>
<td>0.014</td>
<td>0.046</td>
<td>0.027</td>
<td>0.0013</td>
<td>0.032</td>
<td>0.0046</td>
<td>0.01</td>
<td>0.001</td>
<td>0.264</td>
<td>0.0003</td>
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</tr>
</tbody>
</table>

The plates used to make the pipes were produced by the well-known thermo mechanical controlled rolling process (TMCP) followed by accelerated cooling that produces a fine grain microstructure that provides high strength, toughness and good weldability. It is important to mention that the alloy design and the rolling process parameters were established to produce a 1.452 inches plate suitable for sour service. They were not designed to keep the X65 properties after post weld heat treatment.

2.2. Welding

The pipe was cut in small rings of around 400 mm each to produce the welded coupons. The girth welding was done representing a real field situation with the tube fixed in the horizontal position. Figure 1 shows the type of bevel used in the preparation of pipe ends.

![Figure 1. Bevel geometry.](image)

With the intention to assure good quality and avoid repairs in the root pass, a welding procedure using TIG process was established for root and hot passes. For filling and cap passes a semi-automatic flux cored arc welding process with shielding gas protection (FCAW-G) was used.

In order to maximize productivity in welding, a second procedure was also tested using the semi-automatic MAG CSC process (controlled short circuit) for the root pass and a semi-automatic flux cored arc welding process with shielding gas protection (FCAW-G) for the filling and cap passes.

Six coupons were welded (3 for each welding procedure) and then immediately tested and six other coupons were welded (3 for each welding procedure) and heat treated. Two rings, one in as received condition and another one after heat treatment, were also tested in order to evaluate the pipe properties. Table 2 summarizes the number of coupons and rings used in the study.
Table 2. Number of rings and coupons tested.

<table>
<thead>
<tr>
<th>Procedure Identification</th>
<th>Welding Process</th>
<th>Number of Coupons (Welds)</th>
<th>Number of Rings</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>As welded</td>
<td>TIG (root pass) + FCAW-G (filling passes)</td>
<td>3</td>
</tr>
<tr>
<td>B</td>
<td>Heat treated</td>
<td>TIG (root pass) + FCAW-G (filling passes)</td>
<td>3</td>
</tr>
<tr>
<td>C</td>
<td>As welded</td>
<td>MAG CCC (root pass) + FCAW-G (filling passes)</td>
<td>3</td>
</tr>
<tr>
<td>D</td>
<td>Heat treated</td>
<td>Pipe body</td>
<td>-</td>
</tr>
<tr>
<td>E</td>
<td>Original pipe</td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>F</td>
<td>Heat treated pipe</td>
<td></td>
<td>-</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td>12</td>
</tr>
</tbody>
</table>

Twelve welded coupons and two rings were used to evaluate the welding procedures and the effect of the heat treatment. The welding was performed with two welders at the same time (Figure 2a). The weld profiles for both procedures are shown in Figure 2b) and c) and the welding data can be seen in Table 3.

![Welding activity](image1)
![TIG + FCAW](image2)
![MAG + FCAW](image3)

Figure 2. Welding activity.

Table 3. Welding data.

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td><strong>Welding direction</strong></td>
<td>TIG: vertical up</td>
<td>FCAW: vertical down</td>
<td>MAG: vertical down</td>
<td>FCAW: vertical up</td>
</tr>
<tr>
<td>Shielding gas</td>
<td>Root: 100% Ar (10 l/min)</td>
<td>Filling: 100% CO₂(15 l/min)</td>
<td>Root: 75%Ar / 25%CO₂ (15 l/min)</td>
<td>Filling: 100% CO₂ (15 l/min)</td>
</tr>
<tr>
<td><strong>Preheat and interpass</strong></td>
<td></td>
<td></td>
<td>100 ºC / 175 ºC</td>
<td></td>
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<tr>
<td><strong>Consumables</strong></td>
<td>TIG: AWS A 5.18, ER 70S-6</td>
<td>FCAW: AWS A5.20, E71T-1CJ</td>
<td>MAG: AWS A 5.18, ER 70S-6</td>
<td>FCAW: AWS A5.20, E71T-1CJ</td>
</tr>
<tr>
<td><strong>Polarity</strong></td>
<td>TIG: CC− / FCAW: CC+</td>
<td>MAG: CC− / FCAW: CC+</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Wire speed (inch/min)</strong></td>
<td>TIG: Not applicable</td>
<td>FCAW: 284.21</td>
<td>MAG: 175</td>
<td>FCAW: 287.36</td>
</tr>
<tr>
<td><strong>Welding speed (cm/min)</strong></td>
<td>TIG: 6.85</td>
<td>FCAW: 14.20</td>
<td>MAG: 11.05</td>
<td>FCAW: 14.55</td>
</tr>
</tbody>
</table>
After welding, all coupons were inspected and approved by radiographic examination according to API 1104 [4] requirements.

### 2.3. Stress Relieving Heat Treatment

After girth welding, six coupons, three welded with TIG + FCAW and three welded with MAG+FCAW, were heat treated. Additionally, one ring of pipe body, including the SAW longitudinal weld, was also heat treated to evaluate its influence in the pipe properties.

Figure 3 shows the pipe preparation for stress relieving heat treatment. The heating method applied was electric resistance.

The stress relieving heat treatment was performed according to the following parameters:

- Soaking temperature: 595 °C ± 15 °C.
- Soaking time: 90 minutes.
- Heating rate: 55 °C/h to 150 °C/h.
- Cooling rate: 55 °C/h to 185 °C/h.

Figure 4 shows the heat treatment arrangement.

### 2.4. Metalographic and Mechanical Tests

Specimens were sampled from the welded coupons to perform the mechanical tests required by API 1104 (tensile, nick-break and bending) and also Charpy, hardness, metallography and stress corrosion test. Additionally, CTOD testes (Crack Tip Opening Displacement) were done to compare the results with the critical value defined by the fracture mechanics study.

One heat treated pipe ring including the SAW longitudinal seam was also evaluated with mechanical tests and compared with another ring representing the pipe original condition, without heat treatment. In this case, tensile, Charpy, hardness, metallography, SSC (Sulfide Stress Cracking) and HIC (Hydrogen Induced Cracking) tests were performed.
All tests were done in the as welded and heat treated conditions in the girth weld as well as pipe body and SAW longitudinal weld.

The test methods and samples for tensile, nick-break and bending tests of the girth welds were done according the API 1104 requirements. Figure 5 and Figure 6 shows the specimens geometry and dimensions.

![Figure 5. Tensile specimen dimensions.](image)

Figure 6. Nick-break and bending specimens.

The Vickers hardness specimens were prepared according to ISO 15156-2 [5] (Figure 7a) for girth weld and according to API 5L for the SAW longitudinal weld (Figure 7b).

![Figure 7. Hardness profile.](image)

Charpy impact test specimens of the girth weld were sampled at 2 mm from the inner surface (close to the root pass) and 2 mm from the outside surface (close to the cap pass) of the pipe for both weld metal and HAZ. Figure 8 a) shows the notches position for girth weld Charpy test.

For pipe body and longitudinal weld seam, the specimen orientation and the HAZ notch location are shown in Figure 8 b).
The specimen preparation and test method were performed according to ASTM A370 [6]. Three full size specimens of 10 x 10 x 55 mm were tested for each position and the test temperature was 0 °C.

Tensile tests of pipe body and longitudinal seam were done according to API 5L requirements. For each ring, with and without heat treatment, two round bar specimens were sampled from the pipe body and two strip specimens were sampled from the SAW longitudinal weld. Figure 9 shows the tensile specimen dimensions.

The HIC test was performed in the pipe body for both conditions, with and without heat treatment. The test methodology and specimens preparation were done in accordance with NACE TM 0284 [7] standard and the test solution defined for the test was solution B of NACE TM 0177 [8] standard. Three specimens were removed according to the orientation shown in Figure 10. During the test, all samples were exposed to the test solution for 96 hours with continuous bubbling of H2S.

The sulfide stress corrosion cracking test was performed in the girth weld, base metal and SAW weld seam according to the ISO 7539-2 [9] standard using the four point loading method (Figure 11). Three specimens were tested for each region (base metal, SAW weld and girth weld). During the test, a stress level correspondent to 72% of the specified minimum yield strength of the pipe was applied. The stressed samples were exposed to the test solution B of NACE TM 0284 standard for 30 days with continuous bubbling of H2S. The girth weld root was preserved during the test as can be seen in Figure 12.
Figure 11. Four point loading.

Figure 12. Girth weld specimens.

For CTOD tests, SEB specimens were used according to BS 7448 [10] and oriented so that its length is parallel to the pipe axis and its width is in the circumferential direction. The weld metal test was conducted on through thickness specimen of rectangular sections (Bx2B) with orientation correspondent to NP in the notation of BS 7448. The HAZ test was conducted on surface notched specimens of square sections (BxB) with orientation corresponding to NQ in the notation of BS 7448. Nine fracture toughness tests, three from 6 o’clock position, three from 12 o’clock position and three from 3 o’clock position were carried out in both weld metal and HAZ.

3. Results and Discussion

The stress relieving heat treatment affected the tensile properties of API 5L X65 pipe manufactured to meet sour service requirements. The decrease in yield and tensile strength for specimens sampled from pipe body (Figure 13a), and tensile strength for specimens sampled from girth weld (Figure 14) confirms that the heat treatment is not indicated for this type of material. For girth weld tests, the specimen fracture occurred at base metal (Figure 15), showing that the weld strength was not strongly affected by heat treatment and that the pipe base material is susceptible to stress relieving heat treatment. Figure 13b) shows that the tensile strength of the SAW longitudinal weld was affected by heat treatment but, in this case, it is above the minimum value required by API 5L.

Figure 13. Yield and tensile strength results from pipe body and SAW weld seam.
Groeneveld [11] analyzing the effect of stress relieving heat treatment in a X70, 20 inches x 0.5 inch pipe, manufactured by the HFW process, observed an increase in yield strength after the pipe has been subjected to a heat treatment of 45 minutes at 594 °C. The time difference between Groeneveld’s treatment and the treatment applied in the pipe of this study can be explained by the wall thickness difference between these two pipes. The ASME B31.8 states the time of the treatment according to the wall thickness of the pipe, specifying the value of 1 hour per inch of wall thickness.

One factor that may help to understand the difference between the increase in yield strength obtained by Groeneveld [11] in contrast with the decrease of yield strength observed in this study may be the difference in chemical composition between these two steels. Table 4 shows the chemical compositions found in both cases.

<table>
<thead>
<tr>
<th>Pipe</th>
<th>C</th>
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<th>Si</th>
<th>Nb</th>
<th>V</th>
<th>Ti</th>
<th>Cr</th>
<th>Cu</th>
<th>Mo</th>
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<th>Al</th>
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<th>S</th>
<th>Ni</th>
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<tbody>
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<td>1,42</td>
<td>0,30</td>
<td>0,044</td>
<td>0,001</td>
<td>0,014</td>
<td>0,046</td>
<td>0,204</td>
<td>0,027</td>
<td>0,0013</td>
<td>0,032</td>
<td>0,0046</td>
<td>0,01</td>
<td>0,001</td>
<td>0,264</td>
<td>0,0003</td>
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<td>1.452&quot;</td>
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<tr>
<td>X70</td>
<td>0,038</td>
<td>1,48</td>
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<tr>
<td>0,5&quot;</td>
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</tbody>
</table>

The main alloying element that could explain the increase in yield strength occurred in the study done by Groeneveld [11] is the Vanadium. Yong et al [12] showed that during the cooling of the steel in the rolling process, the V carbides start to form at the temperature of 719 °C, so that around this temperature, most of the V may still be in solid solution in the austenitic matrix. As the final rolling temperature is around 720 °C, it may be possible that the cooling rate was high enough to keep part of the V in solid solution. Meireles [13] comments that when a steel containing vanadium in solid solution is subjected to tempering (which is the same case of the stress relieving heat treatment), a refined and dispersed carbonitrides precipitation is generated, resulting in an increase of the yield strength.
Meireles [13] also observed an increase in yield strength after a heat treatment at 400 °C for one hour in a X80 pipe containing V, manufactured by controlled rolling without accelerated cooling.

Muthmann [14] explains that the V begins to form carbonitrides in the temperature range between 450 °C and 500 °C and reach the peaks of precipitation between 550 °C and 650 °C. As the treatment described by Groeneveld [11] was carried out at a temperature of 594 °C in a steel containing V, it can be assumed that V was responsible for the increase in yield strength after the heat treatment.

The absence of V in the steel of this study may explain why the yield strength did not increase, but does not explain why the yield was reduced by heat treatment. One reason may be the loss of work hardening due to the heating.

During the pipe production by the UOE process, the pipe is cold expanded, that increases the yield strength by work hardening mechanism, which consists in increasing the dislocation density. With the heating of the heat treatment, the dislocation density decreases and the yield strength is reduced. It is important to mention that the pipe studied by Groeneveld [11] that had the yield strength increased after treatment, contain V in its chemical composition and was produced by the HFW process that does not use cold expansion.

Another case that is closer to the X65 of 1.452 inches evaluated in this study was also studied by Groeneveld [15], using X70 and X80 pipes made from plates. In this case, all pipes that were cold expanded had the yield strength decreased, or kept close to the original value, after stress relieving heat treatment, even those containing V. On the other hand, the only one pipe that had the yield and tensile strength increased, was a pipe containing V produced without cold expansion. Another point that may also be mentioned is that the pipes that had the yield strength decreased had very low carbon content (0.02% to 0.07%) whereas those that had the yield strength increased after heat treatment had higher carbon content (0.12%). Carbon is one of the elements responsible for the phenomenon of strain aging, which tends to increase the yield strength through its diffusion into dislocations regions.

Groeneveld [15] concluded that pipes manufactured from plates produced by controlled rolling processes with accelerated cooling, can have the yield and tensile strength reduced around 10 to 14% by the stress relieving heat treatment.

It is possible to conclude from the literature [11, 12, 13, 14 and 15] that the cold expansion and the presence of vanadium are important factors for pipes that are heat treated for stress relief, where V contributes to increase the yield strength and cold expansion for reduction. Furthermore, the carbon content is another factor that may have a strong influence. As the X65 evaluated in this study have low carbon content, is not alloyed with vanadium and is cold expanded, the expected result is the reduction of yield and tensile strength as noted.

The hypothesis that the yield strength is reduced by grain growth was discarded in this study because the heat treatment temperature is around 600 °C and the ferrite to austenite transformation begins at Ac1 temperature that is around 700 °C. If there was not phase transformation, the grain size remains the same as can be seen in Figure 16.

![Figure 16. Microstructure before and after heat treatment.](image)

With the exception of tensile properties, all other properties met the requirements specified in both conditions, with and without heat treatment. The hardness and Charpy tests did not show differences for girth weld in both conditions (Figure 17). Only the Charpy test of SAW longitudinal weld showed a reduction in the impact energy values after heat treatment, but still remaining above the minimum required value (Figure 18). No significant improvement in mechanical properties due heat treatment was observed.
Eight side bending specimens for each joint were tested, two in each quadrant. No one specimen presented crack or other discontinuity greater than 3 mm, so that all specimens of all girth welds were approved in the bending test.

In the nick-break test, four specimens for each joint were tested, one for each quadrant, and all of them were approved according to API 1104 acceptance criteria.

In some cases, the heat treatment may be employed as a solution to reduce the hardness and make the material suitable for H₂S service. In the case of this study, the hardness values were below the limit of 250 HV and there was no difference with and without heat treatment (Figure 19 and Figure 20). Moreover, in the HIC and SSC tests, cracks were not detected (Figure 21), confirming the suitability of this material for sour service with no need to perform a heat treatment.
Figure 19. Hardness results of girth welds.

Figure 20. Hardness results of SAW longitudinal weld.
Table 5 summarizes the results of CTOD test and compares them with the results from the fracture mechanics study that was done considering the presence of residual stresses (considering that the stress relieving heat treatment was not performed). Besides the residual stresses, all other stresses presented in the pipeline construction and operation were considered in the fracture mechanics study.

All test results from CTOD tests showed values above the minimum required by the fracture mechanics study. The results showed Table 5 are the lower results of all specimens of that girth weld.

Table 5. CTOD results.

<table>
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<th>CTOD minimum required from fracture mechanics study (mm)</th>
<th>TIG + FCAW CTOD results (mm)</th>
<th>MAG + FCAW CTOD results (mm)</th>
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<tr>
<td>As welded</td>
<td>0,24</td>
<td>0,531</td>
<td>0,525</td>
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<td>Heat treated</td>
<td>0,18</td>
<td>0,428</td>
<td>0,544</td>
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4. Conclusions

The stress relieving heat treatment, performed as specified by the design code ASME B31.8 and the Brazilian standard NBR 12712, results in a reduction of yield and tensile strength of the API 5L X65 sour service pipe, to values below the specified. According to the papers discussed in this study, pipes manufactured by UOE process with a chemical composition designed for sour service, are not suitable for stress relieving heat treatment.

The evaluation of girth welding without performing the stress relieving heat treatment showed that the required properties are within the specified limits. The welding procedure without heat treatment was qualified satisfactorily using two different processes and representing the same situation that will be faced in the field.

The use of heat treatment did not result in mechanical properties improvement. The Charpy test showed values of absorbed energy very close in as welded and treated condition (only the SAW longitudinal weld showed a reduction in absorbed energy after heat treatment). There was no significant change in hardness and no cracks were observed in the SSC and HIC tests.

The fracture mechanics analysis showed that the residual stresses existing due to the absence of heat treatment did not affect the integrity of the pipeline. Furthermore, the values of CTOD required with and without heat treatment are close and lower than that actually found in the girth welds tested.

The stress relieving heat treatment required by ASME B31.8 and NBR 12712 is not suitable for all types of pipes and is not essential for pipes with wall thickness above 1.25 inches. A comprehensive study shall be made before starting a pipeline construction with heat treatment in order to avoid low strength base metal properties around the girth weld.
5. References


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**Interpretation**
- Item approved for publication
- Item currently at Board
- Item currently at Standards Committee
- Item opened but not yet to Standards Committee