Wisconsin Power Piping
April 13-14, 2016

12th Annual
DSPS \ WBIA 2016 Industry Days
Country Springs Hotel & Conference Center
2810 Golf Road
Waukesha WI  53187

Mike Verhagen
Chief Boiler Inspector
262-548-8617
Agenda for the Day

- Department of SPS
- Website Contacts, Codes & Info
- Safety Program Responsibilities
- Piping and Code Standards
- Contactor/Welder Responsibilities
- Question & Answer
Department Staff

- Section Chief, Kim Schmitt 608-266-3037
- Chief Boiler Inspector, Mike Verhagen
- District Boiler Inspectors: See Inspector Map
  - Duane Leetch 715-559-8817
  - Mike Schmidt 920-360-2193
  - Terry Waldbillig 414-303-8575
District Inspector Map

Get map from DSPS Website
Contacts & Website Info

Dept of Safety & Professional Services
http://www.dspswi.gov

National Board
http://www.nationalboard.org

ASME
http://www.asme.org
DSPS Chapters Involved

- SPS 305, Credentials
- SPS 340, Gas Systems,
  - LPG (Ref NFPA 58 + B31.3), H2 (Ref NFPA 52)
  - LNG (Ref NFPA 59A), CNG (Ref NFPA 52)
- SPS 341, Boilers (ASME + NBIC +B31.1)
- SPS 343, NH3 (Ref ANSI K61.1 + B31.3)
- SPS 345, Refrigeration (ASHRAE 15 + B31.5)
- SPS 362.2204, Structural Welds (AWS D1.1)
Boiler and Pressure Vessels

- SPS Chapter 341, B & PV Code
- ASME
  - Section I, Power Boilers
  - Section IV, Heating Boilers
  - Section VIII, Pressure Vessels
- Piping - ASME/ANSI B-31.1 Piping
POWER PIPING / NON EXTERNAL PIPING

341.04(28) “Power piping” means any steam piping system beyond the scope of section I of the ASME code and having a maximum allowable working pressure in excess of 15 psig, any hot water piping system beyond the scope of section I of the ASME code and subject to temperatures in excess of 250°F, or any piping system using an organic or synthetic fluid as a heat-transfer media and subject to temperatures in excess of 250°F.
"Boiler proper" EXTERNAL PIPING

Definition “Boiler external piping” means piping within the scope of ASME code section I and which requires ASME code stamping as specified in Section I.
SPS 341, Boiler Code

- SPS 341.10 (2) (b) Adoption of standards by reference. American Society of Mechanical Engineers (ASME), Power Piping, B31.1–2010.
“External” boiler piping requires ASME “S-PP” Stamp.
SPS 341.16 Installation inspections. (1) Boiler and Pressure vessel Inspections. (a) 1. Except as provided in par. (b), boilers and pressure vessels shall be inspected by a certified inspector before they are placed in operation.
SPS 341.16 (2) Power Piping Inspections.
(a) Except as provided in par. (b), all power piping systems not covered by ASME code section I and required to be constructed in accordance with ASME B31.1, shall receive an installation inspection by the department, authorized agent or a certified inspector.
SPS 341.16 (2) Installation inspections.
(b) The inspections specified in par.
   (a) are not required for:
1. Power piping of 2 inches nominal pipe size and smaller;
2. Power piping replacements, modifications and alterations to existing systems and for new installations, any of which do not exceed 50 feet in length; and
3. Underground power piping systems which are not located in a walk-in tunnel.
SPS 341.16 (2) Installation inspections.

(c) The installer shall notify the department or authorized agent or a certified inspector prior to the start of construction of the power piping system so that inspections may be arranged. The department or authorized agent or certified inspector shall be given a minimum of 5 business days notice to arrange for inspection.
SPS 341.16 (2) Installation inspections.
(d) A power piping inspection shall be made after the piping material is delivered to the job site and prior to the start of construction of the power piping system. The installer or an in-state shop fabricator shall complete department form SBD−5204−E prior to the inspection, and the form shall be retained at the job site for reference during the inspection. The department or authorized agent or certified inspector shall indicate acceptance of the power piping system design and installation by signing form SBD−5204−E. Power piping systems may not be insulated or placed in service without receiving that acceptance.
(e) Pre-fabricated piping that is part of a power piping system shall be inspected at the fabrication shop by the department or authorized agent or a certified inspector or an active National Board commissioned inspector for out-of-state manufacturers. The shop fabricator shall provide a copy of the certified inspector’s report or a copy of the completed department form SBD-5204-E to the installer at the job site verifying that the pre-fabricated piping complies with ASME B31.1. The owner or installer shall provide design calculations for the prefabricated piping if requested by an inspector.
Will Divide form into (3) Sections Top - Middle - Bottom
Inspector may indicate details and dates of his inspection: Checked mtrls, weld docs, welder fit-up, hangers, design calcs, witness satisf. hydro
<table>
<thead>
<tr>
<th>User or Owner's Name</th>
<th>Contractor's Name (Shop fabricator or installing contractor)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<tr>
<td>Street Address</td>
<td>Street Address</td>
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<td></td>
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<tr>
<td>City, State, Zip Code</td>
<td>City, State, Zip Code</td>
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<td>Telephone #</td>
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<table>
<thead>
<tr>
<th>Installation Designed By</th>
<th>Certified Inspector Signature</th>
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<table>
<thead>
<tr>
<th>In Accordance With Natl. Std. #</th>
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<tbody>
<tr>
<td>☐ ANSI / ASME B31.1</td>
</tr>
<tr>
<td>☐ ANSI / ASME B 31.5</td>
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<table>
<thead>
<tr>
<th>Employed By</th>
<th>Date Inspected</th>
<th>State/N.B.-Cert./ID. #</th>
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<tbody>
<tr>
<td></td>
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<td>WI Cert #</td>
</tr>
</tbody>
</table>

Boiler Registration Form SBD-5204 Form Middle

M.J. Verhagen
Employer- WI DSPS

4-13-16
WI Cert #
SPS 341, Boiler Code

Boiler Registration Form  SBD-5204  Form Bottom
SPS 341.41 Installation registration. (1) Boiler or Pressure Vessel Installation Registration. 
(a) Except as provided in par. (b), the installation of any boiler or pressure vessel shall be registered with the Department by the installer before the operation of the boiler or pressure vessel. Registration shall be on form SBD−6314−E.

Note: Get copies of form SBD−6314 from our website www.dspswi.gov
SPS 341.41 Installation registration. (1) (b) Registration with the department is not required for any of the following:

- 1. Boilers and pressure vessels exempted from periodic inspections in s. SPS 341.18.
- 2. Installations in cities of the first class “MILWAUKEE” if an installation registration form has been filed with the appropriate city official.
SPS 341, Boiler Code

Boiler Pressure Vessel Registration Form

SBD-6314
SPS 341.41 Installation registration.

(2) POWER PIPING INSTALLATION REGISTRATION. 
(a) Except as provided in par. (b), the installation of any power piping system shall be registered with the department by the installer before the operation of the piping system. Registration shall be in writing on form SB–5204.

Note: Get copies of form SB–5204 from website
Adopted Piping Standards

- Chapter SPS 341, Steam piping, ANSI B31.1
- Chapter SPS 340, Gas piping, ANSI B31.3
- Chapter SPS 345, Refrigeration piping, ANSI B31.5
B-31.1 Piping Code

- Design criteria
  - Material specifications listed Table 126.1
  - Pressure & temperature ratings
  - Pressure design calculations
  - Joints welded, threaded, brazed
  - Piping supports, hangers
  - Specific piping valves/fittings-Section 122 ....... ~ Boiler external Piping
B-31.1 Piping Code

- Fabrication, assembly and erection
  - Materials, base and filler metal, backing
  - Weld design, process, fillet, butt
  - Branch connections, seal, attachment welds
  - Heat treatment, preheat & PWHT
  - Pipe hangers ... “Structural welding”
B-31.1 Piping Code

- Weld qualification (ASME, Section IX)
  - Responsibility = contractor/employer
  - Welding Procedure Specification “WPS”
  - Procedure Qualification Record “PQR”
  - Welder Performance Qualification “WPQ”
  - Welder continuity
  - Welder symbols, marking
"WPS" ASME QW-482 Form ..... Find in ASME Section IX, Appendix B
Procedure Qualification Record

"PQR" ASME QW-483 Form
Welder Performance Qualification

"WPQ"
ASME
QW-484
Form

QW-484 SUGGESTED FORMAT FOR MANUFACTURER'S RECORD OF WELDER OR WELDING OPERATOR QUALIFICATION TESTS (WPQ)
(See QW-301, Section IX, ASME Boiler and Pressure Vessel Code)

<table>
<thead>
<tr>
<th>Welder’s name</th>
<th>Clerk number</th>
<th>Stamp no.</th>
<th>Welding process(es) used</th>
<th>Type</th>
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<tbody>
<tr>
<td>Identification of WPQ followed by welder during welding of test coupon</td>
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<tr>
<td>Base material welded</td>
<td>Thickness</td>
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<table>
<thead>
<tr>
<th>Manual or Semiautomatic Variables for Each Process (QW-350)</th>
<th>Actual Values</th>
<th>Range Qualified</th>
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<tbody>
<tr>
<td>ASME P No. to ASME P No. (QW-400)</td>
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<tr>
<td>Filler metal specification (SAF)</td>
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<tr>
<td>Filler metal F No.</td>
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</tr>
<tr>
<td>Consumable insert for GTAW or PAW</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weld deposit thickness for each welding process</td>
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<td></td>
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<tr>
<td>Welding position (1G, 5G, etc.) (QW-405)</td>
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<td></td>
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<tr>
<td>Proportion of welds</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Backing gas for GTAW, PAW, or GMAW</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GMAW transfer mode (QW-400)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GTAW welding current type/polarity</td>
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<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Machine-Welding Variables for the Process Used (QW-350)</th>
<th>Actual Values</th>
<th>Range Qualified</th>
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</thead>
<tbody>
<tr>
<td>Directcurrent visual control</td>
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</tr>
<tr>
<td>Automatic voltage control (GTAW)</td>
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<td></td>
</tr>
<tr>
<td>Automatic joint tracking</td>
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<td></td>
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<tr>
<td>Welding position (1G, 5G, etc.)</td>
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<td></td>
</tr>
<tr>
<td>Consumable insert</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Backing (metal, weld metal, welded from both sides, flux, etc.)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Quibrated Bend Test Results</th>
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<tr>
<td>Quibrated Bend Test Type</td>
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<tr>
<td>QW-462.2 (Gage) Results</td>
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<tr>
<td>QW-462.3 SPEC. Elaste. II &amp; III Type</td>
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<td>GQW-462.3 SPEC. Long. II &amp; III Results</td>
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<table>
<thead>
<tr>
<th>Visual examination results (QW-302.4)</th>
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<tr>
<td>Radiographic test results (QW-304 and QW-395)</td>
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<tr>
<td>Fracture toughness test results (QW-305)</td>
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<tr>
<td>Length and percent of defects (in.)</td>
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<tr>
<td>Macro test fracture (filler) (in.)</td>
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<tr>
<td>Macro test fracture (filler) (in.)</td>
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<tr>
<td>Mechanically tested by (Laboratory test no.)</td>
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</tbody>
</table>

We certify that the statements in this record are correct and that the test coupons were prepared, welded, and tested in accordance with the requirements of Section IX of the ASME Code.

Organization

Date

By
Chapter V, Fabrication Assembly & Erection

127.5 Qualification

127.5.1 General. Qualification of the WPS to be used, and of the performance of welders and welding operators, is required and shall comply with the requirements of the ASME Boiler and Pressure Vessel Code (Section IX)
127.5.2 **Welding Responsibility.** Each employer (see para. 100.2) shall be responsible for the welding performed by his organization and the performance of welders or welding operators employed by that organization.
QW-322 Expiration and Renewal of Qualification. The performance qualification of a welder or welding operator shall be affected when one of the following conditions occurs:

a. When he has not welded with a process during a period of 6 months or more, his qualification for that process shall expire; unless... 2 paragraphs explain / allow an extension.

b. When there is specific reason to question his ability to make welds that meet the specification, the qualifications which support the welding he is doing shall be revoked. All other qualifications not questioned remain in effect.
127.6 **Welding Records.** The employer shall maintain a record, signed by him / her and available to the purchaser or his agent and the inspector, of the WPSs used and the welders or welding operators employed by him, showing the date and results of procedure and performance qualifications, and the identification symbol assigned to each performance qualification. (cont.)
127.6 **Welding Records.** (cont.) The employer shall use this identification symbol to identify the welds performed by a welder or welding operator. This may be accomplished by the application of the welder’s or welding operator’s symbol on the joint in a manner specified by his employer. Alternatively, the employer shall maintain records which identify the joint with the welder or welding operator.
122.1.4 (B.3) **Blow-off piping.** All pipe shall be steel. Galvanized steel pipe and fitting shall not be used for blowdown piping. When the value of P does not exceed 100 psig, the fittings shall be bronze, cast iron, malleable iron, ductile iron, or steel. When the value of P exceeds 100 psig, the fittings shall be steel and the thickness of pipe and fittings shall not be less than that of Schedule 80 pipe.
Other Welding Code Items

- **Structural Steel Welding**… SPS 362.2204
  - AWS D1.1, D1.2, D1.3 & D1.6

- **Pipe Welding**….. SPS 340, 341, 343 & 345
  - All Reference ASME, Section IX
    - SPS 340, ASME/ANSI B31.3
    - SPS 341, ASME/ANSI B31.1
      - External Piping…requires “S-PP” Stamp
      - Non external Piping…requires welding docs
    - SPS 343, ASME/ANSI B31.3
    - SPS 345, ASME/ANSI B31.5
Contractor Responsibility

- Forms, (SBD-5204 also SBD-34 & SBD-6314)
- Material Specifications
  (Materials, Invoice, pipe & fittings marked)
- Welder Documentation
  (WPS, PQR, WPQ, Continuity)
- Inspection
  (Five days advance notice, prior mtrl delivery)
- Fabrication Approval
  (from Certified Inspector)
- Pressure Test
  (may be witnessed by Inspector)

NOTE: Design Calc’s available, pipe drawings referenced at the job site.
Guide to Power Piping
State of Wisconsin
SPS 341
Gas Systems & Anhydrous Ammonia Brochure

SBD-10790

GAS SYSTEMS AND Anhydrous Ammonia (CNG - H₂ - LNG - LPG - NH₃)

Division of Industry Services
1400 E. Washington Avenue
Madison WI 53703

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BROCHURES available from our WEBSITE @ dspws.wi.gov

PROGRAMS
- Gas Systems
- Boiler & PV
- Solid fuel
- Refrigeration
- Structural Welding
Boiler & Pressure Vessel Brochure

SBD-7833

BROCHURES available from our WEBSITE @ dспs.wi.gov

PROGRAMS
- Gas Systems
- Boiler & PV
- Solid fuel
- Refrigeration
- Structural Welding
Mechanical Refrigeration Brochure
SBD-10811

BROCHURES available from our WEBSITE @ dspw.wi.gov

PROGRAMS
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PROGRAMS
• Gas Systems
• Boiler & PV
• Solid fuel
• Refrigeration
• Structural Welding
DSPS Website - Quick Tour

- Department Safety & Professional Services
- Division Industry Services, & Online Services
- Search of Boiler-PV Records (WI Tags B, U, R#)
- Division’s List of Programs
- Boiler Program Details
- “Contacts” List of various Inspector Maps
Website Tour

- Department Web-page
Website Tour

- Industry Services Division Web Page with Online Services
Website Tour

Regulated Object Record Search

Click Regulated Object Search
Website Tour

Regulated Object Record Search

Enter “Boiler” from menu

Click detail search
Website Tour

- Search Regulated Object “Boilers & PV”
### Boiler and Pressure Vessel Systems Detail

**Site and Owner**
- **Site Information:** COLUMBIA FOREST PRODUCTS, 650 WILDERNESS DR, MELLEN WI 54546
- **County & Municipality:** ASHLAND, CITY OF MELLEN
- **Owner:** ED RUGER
- **Regulated Object ID:** 612540
- **Tag Number:** B940347
- **Contact:** REBELLA, BRIAN
- **Last Investigation Date:** 07/14/2015
- **Permit Expires Date:** 07/30/2016
- **Contact Phone:** 715-274-4810

**Boilers, 1 Year PTO Cycle (Power)**
- **Location on Property:** Elm
- **Boiler Type:** Water
- **Use:** Process
- **Year Built:** 1994
- **Capacity:** 20000
- **National Board Number:** 5524
- **Manufacturer:** KEELER
- **Manufacture Date:** 07/14/2015
- **Firing Method:** BUNN
- **Fuel Source:** Wood
- **Max Working Pressure Allowed:** 165
- **Safety Valve Set:** 165
- **Valve Capacity:** 50075
- **Internal Inspect Date:** 07/14/2015
- **Hydro Test Date:** HYDRO PSI
- **Inspection Agency:** ZURICH AMERICAN INS CO

**Inspection History**

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<th>Req Obj Status</th>
<th>Date Created</th>
<th>Actual Ins Date</th>
<th>Investigation Type</th>
<th>Investigation Source</th>
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<td>07/14/2015</td>
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<td>07/08/2008</td>
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</table>
Website Tour

Division’s Program Page

Click Boilers - PV

Gas Systems

Refrigeration
Website Tour

- Boilers and Pressure Vessel Program

See Next slide
Website Tour

- Boilers and Pressure Vessel Program
- Administrative Codes & Statutes
- Forms
- Publications
- FAQ
- Training - CEUs
- Contacts – Inspector maps
- Links = NB- Milwaukee- WBIA websites
Website Tour

- Boilers and Pressure Vessel Contacts

Inspector Map for Boiler & Pressure Vessels
Map per slide #4
Other Dept. Info & Contacts

- Please visit the DSPS Website
  http://dsps.wi.gov
- Other Program websites are very similar to Boiler and Pressures.
- Questions ..... ?
THANK YOU
For the Opportunity

State of Wisconsin
Department of Safety and Professional Services
Division of Industry Services
Gas Systems-Boiler-NH3-Refrigeration-Welding

Mike Verhagen
262-548-8617
mike.verhagen@wi.gov