1.0 APPLICATION

This specification is based upon the Electrowinning Blaw Know (BK) PTH specification. It describes the minimum requirements for acidic slurry.

<table>
<thead>
<tr>
<th>Acidic Slurry – Titanium - up to 230 PSIG</th>
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<tbody>
<tr>
<td>Design Conditions</td>
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<table>
<thead>
<tr>
<th>Design, Fabrication, Installation, Approval Requirements</th>
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</thead>
<tbody>
<tr>
<td>ASME B31.3</td>
</tr>
<tr>
<td>O.Reg. 220/01</td>
</tr>
<tr>
<td>PGS-004555 (SPEC-35001)</td>
</tr>
<tr>
<td>PGS-004556 (SPEC-35002)</td>
</tr>
<tr>
<td>PGS-004601 (SPEC-35048)</td>
</tr>
<tr>
<td>71-115-F-A2720</td>
</tr>
</tbody>
</table>

2.0 PIPING MATERIALS

<table>
<thead>
<tr>
<th>Pipe</th>
<th>Diameter</th>
<th>Connection System</th>
<th>Schedule (ASME B36.10M or B36.19M)</th>
<th>Ends</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>½” – 6”</td>
<td>Welded</td>
<td>80S</td>
<td>Beveled</td>
<td>ASTM B861 Gr 2</td>
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</table>

<table>
<thead>
<tr>
<th>Fittings / Branch Connections Note A, B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diameter</td>
</tr>
<tr>
<td>½” – 6”</td>
</tr>
<tr>
<td>Up to 4”</td>
</tr>
</tbody>
</table>

Flanges Note A, B

<p>| Diameter | Connection System | Pressure Rating | Ends | Material |
| ½” – 6”  | Lap Joint          | Class 300 per ASME B16.5 | Lap Joint | ASTM A182 Gr. F316 |
|          |                   | Sch 80S ASME B16.9 | Beveled | ASTM B381 gr F2 Or ASTM B363 Gr WPT2 |</p>
<table>
<thead>
<tr>
<th>Flanged Joint Gasket</th>
<th>Durlon Style 9000, see Appendix B.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flange Bolt/Nut Lubricant</td>
<td>Loctite Heavy Duty Anti Seize.</td>
</tr>
</tbody>
</table>
| Flange Bolting | ASTM A193, Gr. B8M Class 2, coarse-thread series, heavy hex nuts, ASTM A194 Gr. 8M, Class 2A fit on bolts and Class 2B fit on nuts. Dimensions to ASME B18.2.1 and B18.2.2.  
Or  
ASTM F593 Alloy Group 1 or 2, Condition CW1 (markings F593C or F593G), or condition CW2 for diameters larger than ¾”, standard hex pattern, ASTM A594 alloy group 2, condition CW1 or CW2 hex nuts, Class 2A fit on bolts and Class 2B fit on nuts. Dimensions to ASME B18.2.1 and B18.2.2. |
| Flange Bolt Torque | The effectiveness of a gasket with a bolted flange connection is dependent on the field assembly technique, see ASME PCC-1 for details. See Appendix B in this SPEC for manufacturer’s recommended bolt torque values. |
| Valves | Selection by the Engineer. |
| Safety Relief Valves | Selection by the Engineer. |
| Pressure Reducing Valves | Selection by the Engineer |

**Notes**

A: All fittings, flanges, couplings, strainers, and valves shall have Canadian Registration Numbers (CRNs) valid in the province of Ontario.

B: Attachment to run pipe by full penetration welds. For connection type, see Appendix A – Branch Connections.

**Welding**

In accordance with ASME IX and PGS-004776 (SPEC-83056).

**Examination**

Examination and inspection must meet the requirements of ASME B31.3 normal fluid service, with the addition of 100% Radiography of all full penetration groove welds.

**Testing**

Testing shall conform to the requirements of ASME B31.3, PGS-004601 (SPEC-35048) and any additional instructions outlined on project / design drawings or in the Technical Description of Work.

**Classification Identification**

The piping system shall be classified and labelled in accordance with PGS-004555 (SPEC-35001). Do not coat titanium piping.
3.0 REVISION AND TRANSITION NOTES
Revision notes describe what was changed, and if applicable, why it was changed, and the plan to implement the change, including whether changes are retroactive.

Note: The revision notes are a summary of the changes and may not necessarily be a complete list.

A risk code is entered for each revision and if applicable, the revision notes will describe how risk was addressed for the revision.

<table>
<thead>
<tr>
<th>Risk Code</th>
<th>Risk Category</th>
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<tbody>
<tr>
<td>A</td>
<td>This revision is a minor change and/or introduces no risk.</td>
</tr>
<tr>
<td>B</td>
<td>Risk has been addressed for this revision by the reviewer and approver. Low risk or no new hazards identified.</td>
</tr>
<tr>
<td>C</td>
<td>For this revision, a PHR or other risk management tool has been used to address risk and minimize hazards. This risk assessment has been documented and is available through Central Engineering.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rev</th>
<th>Revision Notes</th>
<th>Risk Code</th>
<th>Approved by</th>
<th>Reviewed by</th>
<th>Issue Date YYYY/MM/DD</th>
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<tbody>
<tr>
<td>1a</td>
<td>New Specification</td>
<td>---</td>
<td>BN</td>
<td>BN</td>
<td>2014/10/21</td>
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<tr>
<td>2a</td>
<td>2016 Review – Reformatted – Regional approvals removed - minor technical changes Drawing 71-115-F-A2720 is now part of this Specification</td>
<td>A</td>
<td>M.Fogarty</td>
<td>B.Morris</td>
<td>2017/01/16</td>
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<tr>
<td>3a</td>
<td>4 year review. Added other diameters to coincide with EW PTH specification, removed thermal oxide treatment, reference SPEC-83056, added 100% RT requirement.</td>
<td>B</td>
<td>K.L.Robin</td>
<td>T.Palmquist</td>
<td>2021/01/21</td>
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<tr>
<td>00</td>
<td>Updated for move to SISPAV. Only changes include formatting and reference to PGS/ SPEC numbers.</td>
<td>A</td>
<td>K.L.Robin</td>
<td>T.Palmquist</td>
<td>2021/06/07</td>
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4.0 APPENDICES

Appendix A: Branch Connections
Appendix B: Bolt Torque Values for Durlon 9000

APPENDIX A:

BRANCH CONNECTIONS

<table>
<thead>
<tr>
<th>Inches</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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<tbody>
<tr>
<td>Equal Tee</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reducing Tee</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Half Coupling (Thread or Socket Weld)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Threadolet / Sockolet</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Weldolet</td>
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<table>
<thead>
<tr>
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<th>1</th>
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<tbody>
<tr>
<td>R</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>A</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>N</td>
<td>2.5</td>
<td>2</td>
</tr>
<tr>
<td>C</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>H</td>
<td>1.5</td>
<td>2</td>
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<table>
<thead>
<tr>
<th>Inches</th>
<th>3/4</th>
<th>1/2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>1.5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>2.5</td>
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<td>5</td>
</tr>
<tr>
<td>3</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td>5</td>
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</table>

Inches 6 4 3 2.5 2 1.5 1 3/4 1/2
APPENDIX B:

Bolt torque values for X The torque values assume the gasket is used with Class 300 raised face flanges and a suitable bolt/nut lubricant and provided by Durlon. The effectiveness of seal on a bolted flange connection is strongly dependent on field assembly technique, see ASME PCC-1 for details. Retorque after 12-24 hours.

<table>
<thead>
<tr>
<th>Pipe Size (NPS)</th>
<th>Bolt Diameter (in)</th>
<th>Number of Bolts</th>
<th>Minimum Lubed Torque (ft-lbs) F593</th>
<th>Preferred Lubed Torque (ft-lbs) B8M Class 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>½”</td>
<td>0.500</td>
<td>4</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>¾”</td>
<td>0.625</td>
<td>4</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>1”</td>
<td>0.625</td>
<td>4</td>
<td>70</td>
<td>70</td>
</tr>
<tr>
<td>1¼”</td>
<td>0.625</td>
<td>4</td>
<td>78</td>
<td>100</td>
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<tr>
<td>1½”</td>
<td>0.750</td>
<td>4</td>
<td>90</td>
<td>150</td>
</tr>
<tr>
<td>2”</td>
<td>0.625</td>
<td>8</td>
<td>78</td>
<td>110</td>
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<tr>
<td>2½”</td>
<td>0.750</td>
<td>8</td>
<td>90</td>
<td>140</td>
</tr>
<tr>
<td>3”</td>
<td>0.750</td>
<td>8</td>
<td>90</td>
<td>200</td>
</tr>
<tr>
<td>3½”</td>
<td>0.750</td>
<td>8</td>
<td>90</td>
<td>200</td>
</tr>
<tr>
<td>4”</td>
<td>0.750</td>
<td>8</td>
<td>90</td>
<td>200</td>
</tr>
<tr>
<td>6”</td>
<td>0.750</td>
<td>12</td>
<td>90</td>
<td>200</td>
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