Non Standard Flange Calculation

BPVC ASME VIII DIV.1 - Appendix 2
Eqpt: PV-01 Nozzle: M - 30" NPS

Design Conditions

1. Design Temperature: Td [ºC] = 425
2. Internal Pressure: Pi [MPa] = 4.71
3. Ambient Temperature: Ta [ºC] = 25
4. Specific Gravity: SG (g) = 0.036
5. Liquid Level: LL [mm] = 0
6. Design Internal Pressure: P [MPa] = 4.71
7. Corrosion Allowance: CA [mm] = 0.036
8. Bolt Corrosion Allowance: bCA [mm] = 0.0

Materials & Allowable Stresses

- Shell Material Designation: SA-387 Gr.11 Cl.2
  - Allowable Stress @ Design Temp: Sso [MPa] = 148
  - Allowable Stress @ Ambient Temp: Ssa [MPa] = 148
- Flange Material Designation: SA-182 Gr.F11 Cl.2
  - Allowable Stress @ Design Temp: Sfo [MPa] = 133
  - Allowable Stress @ Ambient Temp: Sfa [MPa] = 138
- Bolts Material Designation: SA-193 Gr.7
  - Allowable Stress @ Design Temp: Sb [MPa] = 146
  - Allowable Stress @ Ambient Temp: Sa [MPa] = 172

Flange Design

- Type of Flange: Integral Flange
- Type of Face: RF - Raised Face
- Type of Bolt: Metric Series
  - Flange Inside Diameter: B [mm] = 735.0
  - Flange Outside Diameter: A [mm] = 1,025.0
  - Flange Thickness: t [mm] = 70.0
  - Corroded Flange ID: Bcor [mm] = 741.0
  - Number of Bolts: N° [bolts] = 28
  - Diameter of Bolt Circle: C [mm] = 922.5
  - Nominal Bolt Diameter: a [mm] = 42
  - Root Area: ar [mm²] = 9.45
  - Gasket Facing OD: Fod [mm] = 825.0
  - Gasket Facing ID: Fid [mm] = 755.0
  - Thickness of Hub at Small End: g0 [mm] = 30.0
  - Thickness of Hub at Large End: g1 [mm] = 60.0
  - Length of Hub: h [mm] = 130.0
  - Code R Dimension: R [mm] = 33.75
  - Dist. to Gasket Load: hG [mm] = 62.3
  - Dist. to Pressure Reaction: hD [mm] = 62.7

Gasket Design:

- Type of Gasket: Spiral Wound
- Type of Seating: Column II
- Gasket Sketch: Sketch 1b

<table>
<thead>
<tr>
<th>Type</th>
<th>Value</th>
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<tbody>
<tr>
<td>Spiral Wound</td>
<td>3.0 m [dless] - gasket factor</td>
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<tr>
<td>Gasket Seating Stress</td>
<td>69.0 y [MPa]</td>
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<tr>
<td>Gasket Outside Diameter</td>
<td>815.0 G0 [mm]</td>
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<tr>
<td>Gasket Inside Diameter</td>
<td>765.0 G1 [mm]</td>
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<tr>
<td>Gasket Thickness</td>
<td>4.5 tg [mm]</td>
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<tr>
<td>Contact Width 1</td>
<td>25.0 N [mm]</td>
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<td>Contact Width 2</td>
<td>0.0 w [mm]</td>
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<td>Basic Contact Width</td>
<td>12.50 b0 [mm]</td>
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<tr>
<td>Effective Width</td>
<td>8.91 b [mm]</td>
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<tr>
<td>Reaction Ø</td>
<td>797.2 G [mm]</td>
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