



MECHANICAL DATA SHEET: VESSEL

PLANT ITEM No. **R10637278**
24590-PTF-MV-FRP-VSL-00002D



| | | | |
|---------------|----------------------------------|----------------|---|
| Project: | RPP-WTP | P&ID: | 24590-PTF-M6-FRP-00002 |
| Project No: | 24590 | Calculations: | 24590-PTF-MVC-FRP-00001, 24590-PTF-MTC-FRP-00001 △ 10 |
| Project Site: | Hanford | Vessel Drawing | 24590-PTF-M2-FRP-00004 |
| Description: | Waste Feed Receipt Vessel | | |

Reference Data

ISSUED BY
HPP-WTP/PDC

| | |
|---|---|
| Charge Vessels (Tag Numbers) | FRP-PJM-00005, FRP-PJM-00006, FRP-PJM-00007, FRP-PJM-00008, FRP-PJM-00009, FRP-PJM-00010, FRP-PJM-00011, FRP-PJM-00012, FRP-PJM-00013, FRP-PJM-00014, FRP-PJM-00015, FRP-PJM-00016 |
| Pulsejet Mixers / Agitators (Tag Numbers) | |
| RFDs/Pumps (Tag Numbers) | |

Design Data

| | | | | | | |
|-----------------------------|---------------------------|--------------------------|-------------------|---------------------------------|---------------------------|------------------|
| Quality Level | See Drawing | | Fabrication Specs | 24590-WTP-3PS-MV00-T0001 | | |
| Seismic Category | SC-I | | Design Code | ASME VIII Div 1 | | |
| Service/Contents | Radioactive Liquid | | Code Stamp | Yes | | |
| Design Specific Gravity | 1.46 | | NB Registration | Yes | | |
| Maximum Design Volume | gal | 406,800 (Note 6) | Weights (lbs) | Empty | Operating | Test |
| Total Volume | gal | 474,000 (Note 6) | Estimated | 592,900 | 5,550,000 (Note 3) | 4,550,000 |
| Viscosity | cP | 1.58 min 21 max | Actual ** | 589,800 | 5,370,000 | 4,540,000 |
| Environmental Qualification | △ 10 | NIA | | | | |

| | | | | | | | |
|-------------------------|------|------------------|---------------|--------------------|-----------------------------|--|-------------------------|
| Inside Diameter | inch | 564 | | | Wind Design | Not Required | |
| Length/Height (TL-TL) | inch | 322 | | | Snow Design | Not Required | |
| | | Vessel Operating | Vessel Design | Coil/Jacket Design | Seismic Design | 24590-WTP-3PS-SS90-T0001 24590-WTP-3PS-MV00-T0002 | |
| Internal Pressure | psig | ATM | 15 | NA | Seismic Base Moment ** | △ 10 | ft*lb 46,070,000 |
| External Pressure | psig | 0.123 | 2.5 | NA | Postweld Heat Treat | Not Required | |
| Temperature | °F | 215 | 240 | NA | Corrosion Allowance | inch | 0.04 (Note 11) |
| Min. Design Metal Temp. | °F | 5 | | | Hydrostatic Test Pressure * | psig | 19.5 |

Materials of Construction

| Component | Material | Minimum Thickness / Size | Containment |
|---------------------|--|--------------------------|---------------------------------------|
| Top Head | SA 240 316 (Note 2) | See Drawing | Auxiliary (Note 1) |
| Shell | SA 240 316 (Note 2) | See Drawing | Primary (Note 1) |
| Bottom Head | SA 240 316 (Note 2) | See Drawing | Primary (Note 1) |
| Support | SA 240 304 (Note 2) | See Drawing | NIA |
| Internals | SA 240 316 SA 479 316 (Note 2) | See Drawing | Thermocouples Primary (Note 1) |
| Pipe | SA 312 TP316 Smls (Notes 2 & 7) | See Drawing | Note 1 |
| Forgings/ Bar stock | SA 182 F316 (Note 2) | See Drawing | NIA |

Miscellaneous Data

| | | | |
|-----------------------------|-----------------------|---------------------|-------------------------------|
| Orientation | Vertical | Support Type | Skirt |
| Insulation Function | Not Applicable | Insulation Material | Not Applicable |
| Insulation Thickness (inch) | Not Applicable | Internal Finish | Note 4 |
| | | External Finish | Welds Descaled as Laid |

* As determined by the vendor. △ 10

** The actual weights and seismic moment, shown herein are based on the original seismic data and these figures are subject to change, based on the new loads, obtained from the seismic redesign. △ 10



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Remarks

- Note 1:** All welds forming part of the primary and auxiliary containments, including the nozzle attachment welds shall be subjected to 100% volumetric examination.
- Note 2:** Maximum carbon content of 0.030% for all welded components.
- Note 3:** Operating weight includes weight of liquid filled to top of overflow nozzle.
- Note 4:** Descale all internal welds as laid, grind smooth and blend all starts/stops, high spots, and crevices, finish welds as required for NDE purposes.
- Note 5:** Revised PJM operating pressure and number of cycles per CCN 053810, specified content viscosity.
- Note 6:** Vessel volumes are approximate and do not account for manufacturing tolerances, nozzles, and displacement of internals.
- Note 7:** Welded pipe may be used for 14" NPS PJM supports per 24590-WTP-SDDR-PROC-03-0154.
- Note 8:** This vessel is located in a Black Cell.
- Note 9:** Contents of this document are Dangerous Waste Permit affecting (internal use only).
- Note 10:** Piping and piping support configurations shall be designed to preclude natural frequencies less than 7.0 Hz.
- Note 11:** Seller shall ensure that an additional 0.044" is available for erosion in the spherical portion of the bottom head and shall report the minimum thickness required for all specified loading conditions, exclusive of erosion and corrosion allowances. ^{AND 128549}
- Note 12:** Revision 10 of this data sheet incorporates the CCN 129149. ^{11/10/2015} The CCN added the words "in the form of overblow pressures", to the note shown above the overblow loads graph and further revised the note below the graph, as noted herein on sheet 3 of 5. Added calculation 24590-PTF-MTC-FRP-00001 and Environmental Qualification on Sheet 1. Added the note identified by ** on sheet 1.



Please note that source, special nuclear, and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA) are regulated at the U. S. Department of Energy (DOE) facilities exclusively by DOE acting pursuant to its AEA authority. DOE asserts that pursuant to AEA, it has sole and exclusive responsibility and authority to regulate source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.



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Equipment Cyclic Data Sheet

| | |
|------------------------------|------------------------------------|
| Component Plant Item Number: | 24590-PTF-MV-FRP-VSL-00002D |
| Component description | Parent Vessel |

The information below is provisional and envelopes operational duty for fatigue assessment. It is not to be used as operational data.

| | |
|---|--|
| Materials of Construction | SA 240 316 with maximum carbon content of 0.030% |
| Design Life | 40 years |
| Component Function and Life Cycle Description | This vessel receives and stores waste in a batch transfer from off-site tanks. It shall be designed to be filled to the maximum content level over a period of one day. Additionally, this vessel will be subjected to fluid dynamic forces from the operation of the pulse jet mixers during the process of suspending the solids in the waste feed. This vessel is washed down not more than once per year. |

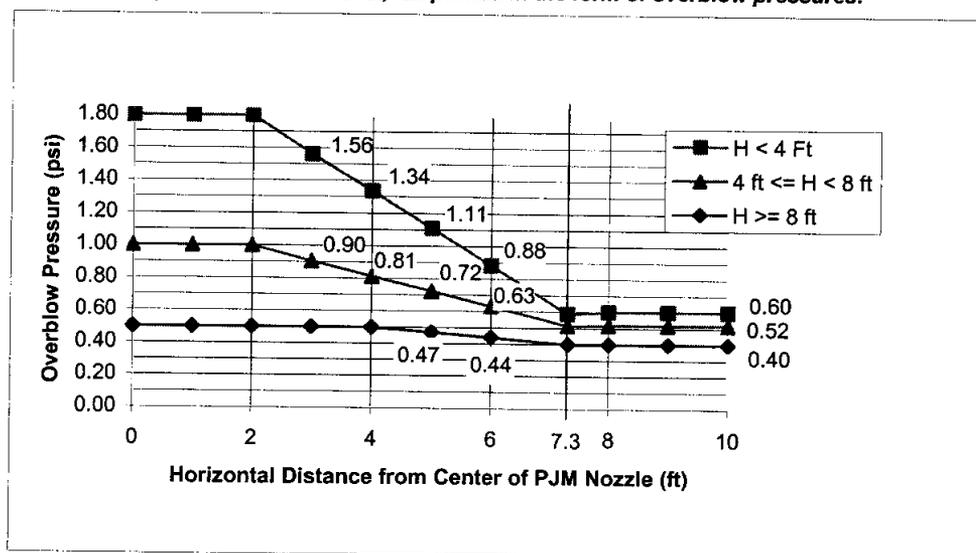
| Load Type | Min | Max | Number of Cycles | Comment | |
|---------------------------|-----------------------|---------------|--|-------------|--|
| Design Pressure | psig | -2.5 | 15 | 10 | Nominal assumption for testing |
| Operating Pressure | psig | -0.123 | 0 | 5100 | |
| Operating Temperature | °F | 50 | 215 | 5100 | |
| Contents Specific Gravity | | 1.0 | 1.46 | 5100 | |
| Contents Level | inch | 32 | 402 | 5100 | Liquid level measured from crown of bottom head |
| Localized Features | | | | | |
| Nozzles | | | | | |
| Supports | Same as Vessel | | Number of cycles same as vessel | | |

Hydrodynamic Loading

In normal operation, pulse jet mixers discharge liquid into the parent vessel imposing a cyclical hydrodynamic load on all internal components. Occasionally, an upset condition designated 'overflow' causes air to be discharged from any single pulse jet mixer. All internal components shall be designed for the combination of the normal operational hydrodynamic loads and overflow loads, and this load combination is also to be assumed to act concurrently with seismic loads.

Normal operation imposes a cyclical load ranging between -0.05 and 0.12 psi in the radial direction and -0.01 to 0.10 psi in the vertical direction for 8.0×10^6 cycles. The hydrodynamic pressure applies across the projected area of the component. Positive hydrodynamic forces act in the radial, outward direction and the vertical, upward direction. Seller shall apply the radial load simultaneously in the radial direction and normal to the radial direction in the horizontal plane.

Overflow loads vary as a function of the distance from the center of the overflowing pulse jet mixer nozzle and the elevation 'H' above the overflowing pulse jet mixer nozzle up to the overflow level, as plotted in the form of overflow pressures:



For all vessel internal components other than the overflowing pulse jet mixer, the overflow forces shall be applied a) in the vertical direction, and b) in the horizontal direction, radiating from the centerline of the overflowing pulse jet mixer. For the overflowing pulse jet mixer, the force shall be applied in the vertical upward direction only. The overflow force on all components, including the structures and supports, shall be calculated by applying the overflow pressure at the location of the nearest surface of the component and to the projected area of the component, facing the appropriate direction. The normal force component, specified for the normal pulse jet mixer operation condition, is not applicable to the overflow condition. Any single pulse jet mixer may overflow 1000 cycles. Reference CCN 125541 dated 07/27/05.



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Notes

Cycle increase: The Seller must increase the numbers of operational cycles given above by 10% to account for commissioning duty unless otherwise noted.

Equipment Cyclic Data Sheet

| | |
|------------------------------|--|
| Component Plant Item Number: | 24590-PTF-MV-FRP-PJM-00005, 24590-PTF-MV-FRP-PJM-00006, 24590-PTF-MV-FRP-PJM-00007, 24590-PTF-MV-FRP-PJM-00008, 24590-PTF-MV-FRP-PJM-00009, 24590-PTF-MV-FRP-PJM-00010, 24590-PTF-MV-FRP-PJM-00011, 24590-PTF-MV-FRP-PJM-00012, 24590-PTF-MV-FRP-PJM-00013, 24590-PTF-MV-FRP-PJM-00014, 24590-PTF-MV-FRP-PJM-00015, 24590-PTF-MV-FRP-PJM-00016 |
| Component Description | Pulse Jet Mixers |

The information below is provisional and envelopes operational duty for fatigue assessment. It is not to be used as operational data.

| | | | | |
|---|---|-----------------------------|------------------------------|--|
| Materials of Construction | SA 240 316 with maximum carbon content of 0.030% | | | |
| Design Life | 40 years | | | |
| Component Function and Life Cycle Description | <p>These PJMs are cyclically loaded using vacuum to fully fill the PJM with process liquid and compressed air to fully empty the PJM. The PJMs are contained within a parent vessel with varying liquid level. They shall be designed to cycle between the maximum pressure and the minimum pressure plus the external static head imposed by the parent vessel.</p> <p>The PJM supports shall be designed to cycle between the following loading conditions depending on the liquid level in the parent vessel:</p> <p>Fully Buoyant Parent vessel full and PJM empty</p> <ul style="list-style-type: none"> • Design for buoyancy + PJM thrust - PJM weight <p>PJM Weight Parent vessel full and PJM full or Parent vessel nearly empty and PJM empty</p> <ul style="list-style-type: none"> • Design for PJM weight <p>Fully Loaded Parent vessel nearly empty and PJM full</p> <ul style="list-style-type: none"> • Design for PJM weight + liquid weight | | | |
| Load Type | Range | | Number of Cycles | Comment |
| Design Pressure | psig | FV 80 | 10 | Nominal assumption for testing |
| Operating Pressure | psig | FV 30 | 8.0 X 10⁶ | Operating pressure = 22 psig + 8 psig design margin |
| Operating Temp | °F | 50 215 | <100 | |
| Contents Specific Gravity | | 1.0 1.46 | <1000 | |
| Contents Level | inch | Empty Flooded | 8.0 X 10⁶ | |
| PJM Thrust | lbf | 0 330 | 8.0 X 10⁶ | |
| Localized Features | | | | |
| Supports | Fully Buoyant | PJM Weight | 3.31 x 10⁶ | The parent vessel is operating at greater than 75% capacity and the PJMs are cycling between empty and full for the indicated number of cycles. |
| | Fully Buoyant | Fully Loaded | 1.38 x 10⁶ | The parent vessel is operating at between 25 and 50% capacity and the PJMs are cycling between empty and full for the indicated number of cycles. |
| | PJM Weight | Fully Loaded | 3.31 x 10⁶ | The parent vessel is operating at less than 25% capacity and the PJMs are cycling between empty and full for the indicated number of cycles. |

Notes

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Approval

| Rev | Description | System Engr | Vessel Engr | Checked | Approved | Date |
|-----|---|-------------|-------------|----------------------|-------------|----------|
| 0 | Issue for Purchase | Y. Hovanski | R. Simmons | C. Slater/CEC | S. Kirk | 4/18/02 |
| 1 | Revised as Noted | Y. Hovanski | R. Simmons | C. Corriveau | S. Kirk | 6/02/02 |
| 2 | Revised Cyclical Data | Y. Hovanski | R. Simmons | C. Slater | S. Kirk | 8/29/02 |
| 3 | Revised as Noted, Deleted Charge Vessels | Y. Hovanski | R. Simmons | CS / JJ | M. Hoffmann | 12/13/02 |
| 4 | Revised per Note 5 | Y. Hovanski | R. Simmons | CS / JJ | M. Hoffmann | 5/16/03 |
| 5 | Revised per Note 7 | Y. Hovanski | R. Simmons | CS / JJ | M. Hoffmann | 11/3/03 |
| 6 | Added Black Cell Requirements | R. Rider | R. Simmons | YH/CS/JJ | M. Hoffmann | 4/5/04 |
| 7 | Added Material Specification for Internal Supports and Hydrodynamic Loads | R. Rider | R. Simmons | YH/RT/JJ D. Adler | M. Hoffmann | 6/23/04 |
| 8 | Revised Hydrodynamic Loading Criteria | R. Rider | R. Simmons | YH/CS/JJ | M. Hoffmann | 7/13/04 |
| 9 | Revised Hydrodynamic Loading Criteria | R. Rider | R. Simmons | CS/JJ | M. Hoffmann | 7/20/04 |
| 10 | Revised per Note 12 on sheet 2 of 5. | | | | | |

RRR *RS* *WASR* *D. Adler* *10/28/05*