
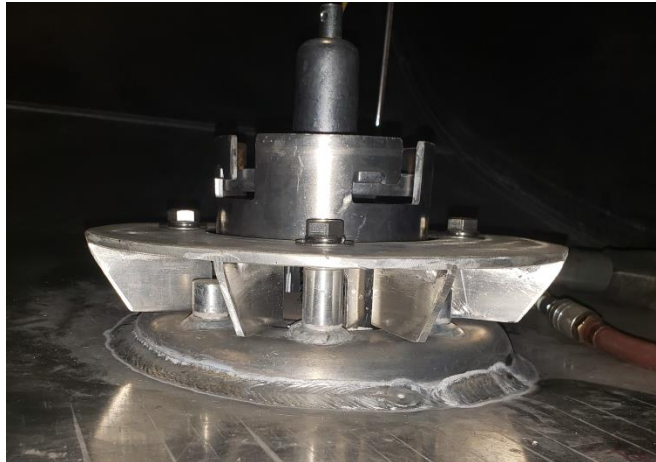

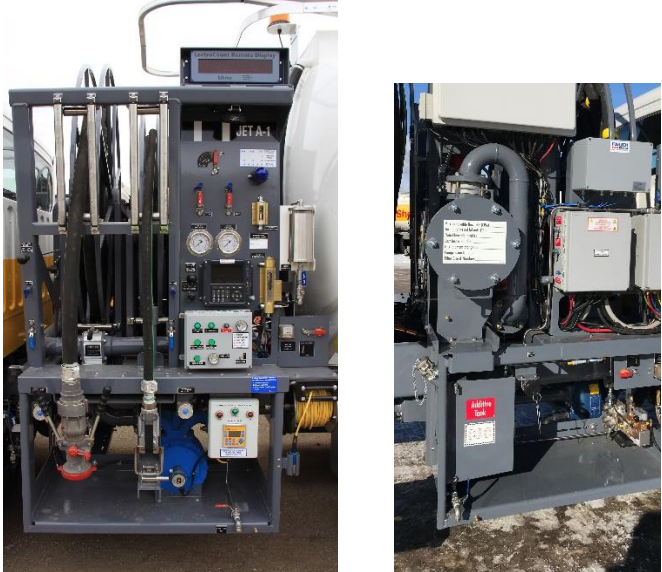
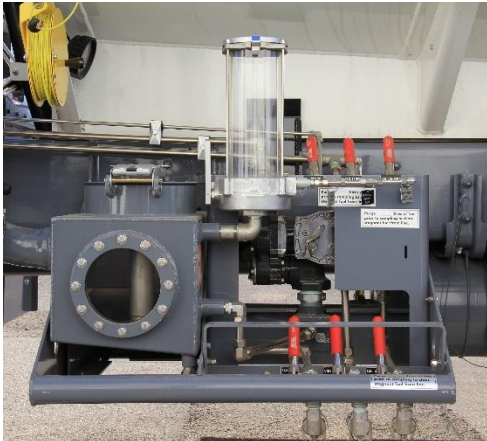


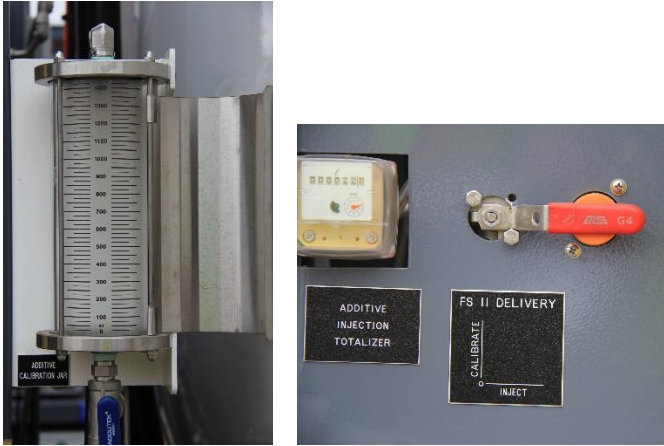

| ITEM / DESCRIPTION   | ADVANTAGES   | COMMENTARY   |
|--|--|--|
| <p><b>1</b>      <b><u>Cargo Tank</u></b></p> <p>1.1      <u>Tank Construction</u><br/>                     Double-conical tank floor, with centrally located, low point sump</p> <p>1.2      <u>Inverted Sumps</u><br/>                     Inverted sumps for bottom load entry point and pump supply outlet valve</p> <p>1.3      <u>Vortex Breaker</u><br/>                     High efficiency vortex breaker provided at outlet valve that supplies pump suction</p> | <p>Tank floor maintains substantial slope, both transverse and longitudinal, toward central sump.</p> <p>Provides for positive movement of contaminants to sampling sump, while providing a stronger tank structure than external trough.</p> <p>The elevated height of the sump position, versus an external trough, allows downward slope of sampling line, from sump to sampling station.</p> <p>Water and particulate are never forced to flow uphill.</p> <p>Inverted sumps avoid creating low-point traps for water or particulate that settles from the fuel cargo, and which would not be easily accessible from the sampling sump.</p> <p>Inverted sumps are offset from tank centreline, to provide unobstructed path for contaminants to migrate to the low-point, sampling sump.</p> <p>Vortex breaker stops vortices from forming at tank outlet.</p> <p>Unit can delivery fuel at maximum flow, all the way down to the low-level shutoff, without ingesting air into the delivery system.</p> |   |

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|---|--|---|
| <p>1.4 <u>Bottom Load Spray Baffle</u><br/>Spray baffle provided at tank valve that receives bottom load flow</p>                                       | <p>Deflects incoming flow onto tank floor.<br/>Prevents “fountain splash” when cargo level is low and incoming flow rate is high.<br/><br/>Keeps any incoming contaminants close to tank floor, reducing the settling time</p> |  |
| <p>1.5 <u>Tank Warranty</u><br/>7-year warranty against manufacturing or structural defects when used in aircraft refueling application, on airport</p> | <p>Advance tanks have a long-standing and well-deserved reputation for being structurally superior to most tanks in the industry.</p>  |   |

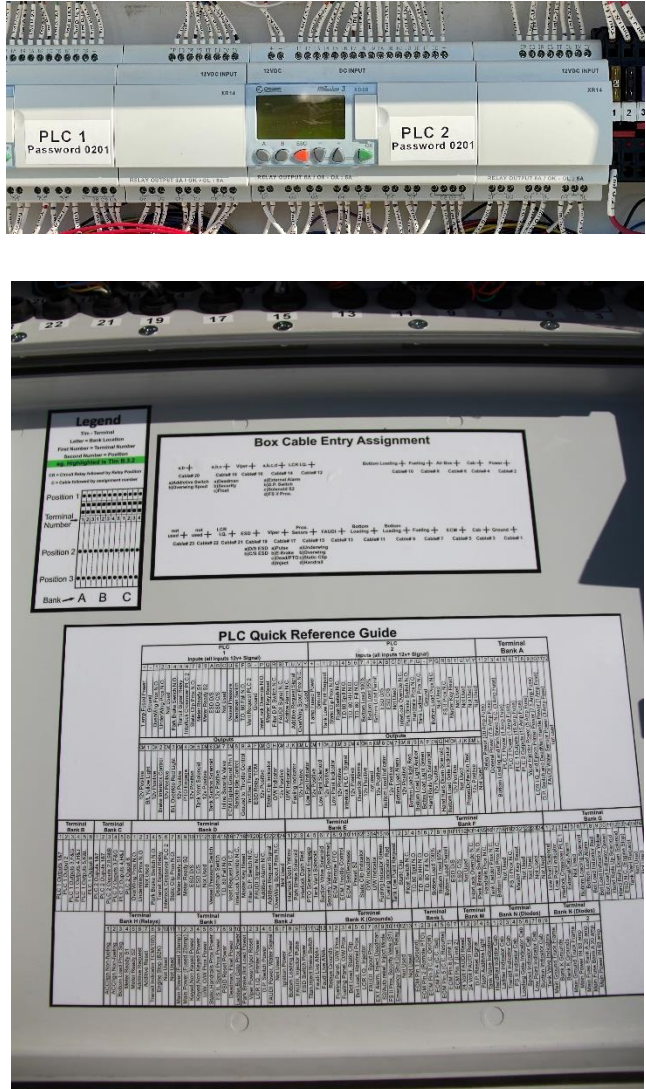
ADVANCE AVIATION REFUELER DESIGN

| ITEM / DESCRIPTION |  | ADVANTAGE  | COMMENTARY  |
|--------------------|--|--|---|
| <b>2</b>           | <b><u>Fuel Delivery Systems</u></b>  |  |   |
| 2.1                | <u>Piping Design</u>   |  |   |
| 2.1.1              | Piping is schedule 40, seamless aluminum.  | Provides lightweight 150psi design with factor of safety   |   |
| 2.1.2              | Pipe diameter selected to limit flow velocities to maximum of 2 m/s on pump suction and 6.4 m/s on pump discharge.   | Avoids cavitation at pump inlet and limits flow restriction to maintain high rates of flow   |   |
| 2.1.3              | Advance does not use belled fittings on aircraft refuelers.  | Avoids the particulate trap that is created by the pipe end inside the belled fitting  | All joints are full-penetration, butt weld, creating smooth inner surface within the piping runs.   |
| 2.1.4              | Piping section and equipment connections are flanged or threaded.<br>Groove-clamp fittings (Victaulic®) are not used unless specifically required.             | Provides full strength of the piping wall by maintaining full thickness<br><br>Groove clamp gaskets create particulate trap and are also not as resistive to vacuum that may occur on pump suction or in a defuel circuit.                 | Groove clamp fittings will only be used if there is no other option for connection to specific component.   |
| 2.2                | <u>Fuel Sense &amp; Gauge Lines</u><br><br>All fuel pressure sensing and gauge lines are stainless steel tubing.<br>Synthetic airbrake line not used for fuel. | Stainless steel tubing has fire rating significantly higher than synthetic airbrake line.<br>Synthetic airbrake line is compatible with jet fuel, and may be used for fuel, but only inside the cargo tank, where flexibility is required. | Some manufacturers use airbrake line for control panel gauges, to permit panel to be opened. Advance design provides gauge test ports and secure, fire-rated sensing lines. |
| 2.3                | <u>Isolation Valves</u><br><br>Ball valves used for control and pressure isolation   | Provides positive shut-off   | Seal is superior to that of butterfly valves  |

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|--|---|---|
| <p><b>3</b>      <b><u>Modular Layout</u></b></p> <p>3.1      <u>Fuel Delivery Module</u></p> <p>3.1.1    Ergonomic, user-friendly positioning of equipment and controls</p> <p>3.1.2    Open design of equipment layout</p> <p>3.1.3    Filter vessel mounted as high point in delivery system</p><br><p>3.2      <u>Fuel Sampling Station</u></p> <p>All fuel sampling points connect to closed-circuit sampler and fuel collection tank</p> | <p>Provides visibility and access for operators that classify within the 5<sup>th</sup> to 95<sup>th</sup> height percentiles. Rollers guide hoses onto reels with minimal handling.</p> <p>Provides open access to equipment for servicing layout</p> <p>Provides enhanced air and vapour elimination. Height of vessel opening provides easy access for maintenance by personnel standing on ground.</p><br><p>Sampling station is visible from fueling station and easily accessible to operator.</p> <p>On-board pump returns fuel from collection tank back to cargo tank.</p> | <br> |

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| <p>3.3 <u>Additive Calibration Station</u></p> <p>Closed-circuit calibration for additive injection system</p>   | <p>Calibration station is visible from fueling station and easily accessible to operator.</p> <p>Transparent calibration jar graduated from 0-1450 ml and is fitted with protective UV shield.</p> <p>Drain and overflow lines connect to the additive supply tank.</p> <p>Calibration selector valve is linked to the brake interlock system. Interlock will trigger the brakes if valve is not in the <i>INJECT</i> position.</p> |   |
| <p>3.4 <u>Storage Cabinet</u></p> <p>Cabinet design has “sweep out” floor as well as shelves to accommodate fuel sampling equipment and spill containment kit.</p> | <p>Cabinet floor can be cleaned and washed without retaining any water.</p> <p>Doors are fitted with gas struts to hold open or closed, as well as lockable handles.</p>  |  |



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|--|--|--|
| <p><b>4</b>      <b><u>Controls Systems</u></b></p> <p>4.1      <u>Programmable Logic Circuit</u></p> <p>4.1.1    PLC controls fuel delivery, brake interlock and emergency shut down systems</p> <p>4.1.2    PLC software is free download.</p> <p>4.2      <u>Service-Friendly Labelling</u></p> <p>Labels provided in control boxes to identify all circuits by function, as well as cable entry points and connection terminal numbering</p> | <p>Systems operation can be modified or updated to accommodate changes or additions to the vehicle systems.</p> <p>Logic is protected by password. Updates or changes can be sent as email attachment for upload by any qualified service technician with a laptop computer, who has downloaded the software.</p> <p>Provides for simple circuit tracing and servicing, whether our Advance technician is on site or is communicating with equipment operator or non-Advance technician on site.</p> |  <p>The top photograph shows two PLC units, PLC 1 and PLC 2, with a small screen on PLC 2. The bottom photograph shows a control panel with a 'Box Cable Entry Assignment' legend and a 'PLC Quick Reference Guide' table.</p> |