

Dual Laminate vs. Lined Steel



Advantages of Dual Laminate Piping

Dual Laminate pipe systems incorporate a thermoplastic liner in an FRP structure combining the enhanced corrosion resistance of thermoplastics with the higher strength and load carrying capabilities of FRP. Dual Laminate pipe offers many advantages over lined steel piping from intrinsic fabrication methods to overall atmospheric corrosion resistance. Consider these critical advantages:

- 1) **Longer Life:** All steel contains iron and carbon, and the iron will react easily with oxygen and other gases and liquids in your system. The internal and external corrosion resistance of dual laminate will extend piping system life 3x-5x over steel.
- 2) **Maintenance Free:** Steel pipe is susceptible to deformation and metal loss defects. It demands a pipeline integrity and rehabilitation plan that can include blast cleaning, re-painting, geometry inspections, ultrasound assessment, and more.
- 3) **No venting and collection system:** The RPS dual laminate system bonds the liner to the frp layers, which eliminates the need for weep holes and vents. Lined steel requires weep holes and a collection system so that permeant can escape the pipe, and be safely disposed of, thereby introducing additional life cycle costs.
- 4) **Liner options:** Dual Laminate can utilize most thermoplastic liners including vinyls (PVC, CPVC), olefins (PP, HDPE), and fluoropolymers (FEP, PVDF):

Typical Thermoplastic Materials for Use in Lined Piping Systems

Thermoplastics	IUPAC	Dual Laminate	Lined Steel
Fluorinated Ethylene Propylene	FEP	X	X
Perfluoroalkoxy	PFA	X	X
Polytetrafluoroethylene	PTFE		X
Ethylene Tetrafluoroethylene	ETFE	X	X
Ethylene Chlorotrifluoro Ethylene	ECTFE	X	
Polyvinylidene Fluoride	PVDF	X	X
Polypropylene	PP	X	X
Polyvinylchloride	PVC	X	
Chlorinated Polyvinylchloride	CPVC	X	

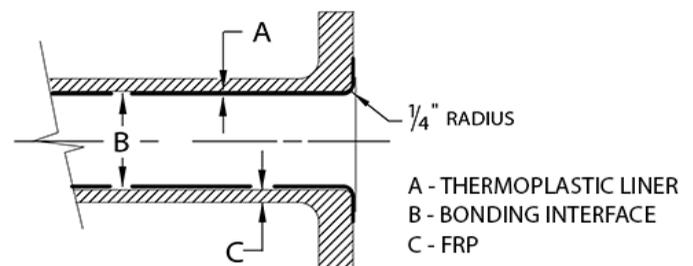
Fabrication Advantages

In dual laminate construction, the liner is BONDED to the FRP structural casing whereas lined steel has a “loose” or swagged liner leaving thermoplastic growing at 3x rate of steel structure.

Mechanically Bonded Format:

- A) Bonding greatly reduces the risk of mechanical damage by redistributing the concentration of stresses.
- B) Bonded pipe can withstand higher temperatures, vacuum and differential coefficients of thermal expansion.
- C) Dual Laminate can be rated to Full Vacuum at elevated temperatures and diameters.

See basic schematic of dual laminate construction below:



Minimally flanged installation for sulphuric acid in service since 1996.

Advantages of Dual Laminate Piping

Eliminates Flanges

Dual laminate piping systems will give you the option to reduce or eliminate flanged connections in your system. Dual Laminate offers 3 types of installations:

- 1) **Flanged:** All spools and fittings are flanged according to ANSI dimensions and specifications.
- 2) **Minimally Flanged:** Reduce the number of flanges by 40%-60% relying on all shop joints and retaining "bolt up" parts in field
- 3) **"Flangeless" construction:** All flanges are eliminated with exception of connections at valves, instrumentation, etc.

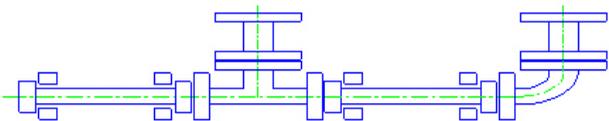
All 3 systems provide various advantages for installation depending on client needs and preferences.

Benefits of Flangeless Systems:

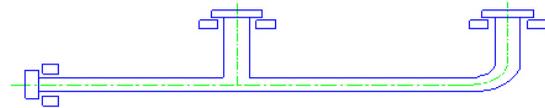
- cost savings in materials and labor
- faster installation
- reduced system weight
- fewer failure points
- streamlined profile
- no gaskets or flange protection required
- no risk of over-torquing or re-torquing
- fewer parts requiring mapping, assessment and maintenance

Following is a conventional flanges vs. minimally flanged drawing.

ANSI Flanged Design



RPS Minimally Flanged Design



Installation Advantages

- 1) **Less Weight:** Dual Laminate pipe is $\frac{1}{4}$ the weight of steel. This greatly reduces labor, time, and machinery required to install piping systems.
- 2) **Fewer Flanges:** Fewer flanges means less time and money spent on installation.
- 3) **No Painting:** Dual Laminate comes with UV resistant gel-coat which can be specified in various colors to match your service requirements.



Installed system for hypochlorite in service since 2000.

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