

FABRICATION NEWS

October 1, 2025

BOARDMAN NEWSLETTER:

Your positive feedback to the newsletter we've sent out over the years is greatly appreciated. As STEWARDS for your Custom Fabrication needs, providing valuable education to the marketplace and building strong relationships is our primary focus. We promise to be your custom fabrication resource.

We hope you find this newsletter beneficial as we share tips in the pressure vessel design and construction process.

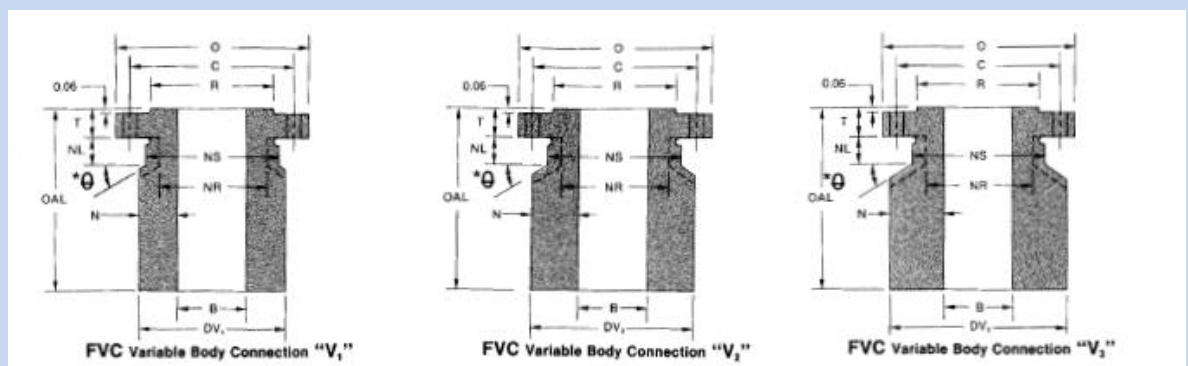
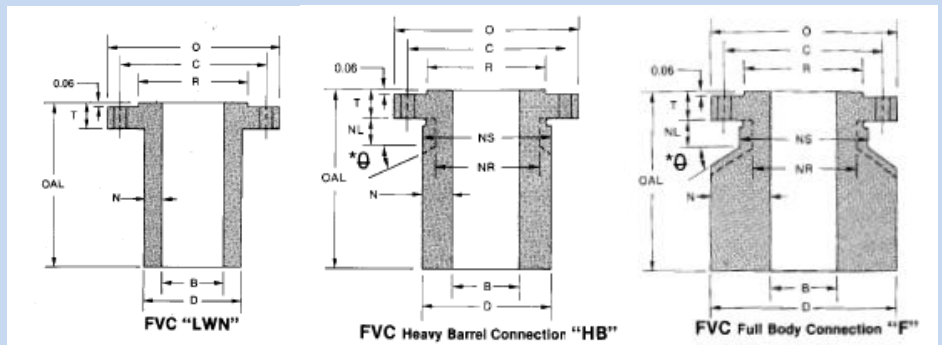
If there are any topics you would like us to address, please let us know

Nozzle Overview

Nozzles on a vessel can be used for many applications – access into the vessel, instrumentation, process, etc. When it comes to designing a nozzle there are multiple options you can choose based on what works best for your design and the specifications applied to the vessel. See below for types of nozzles and types of reinforcement.

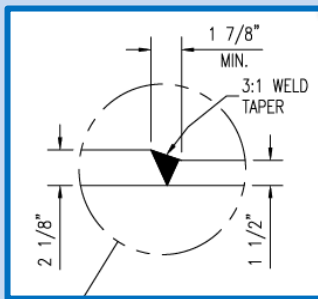
Types of Nozzle

- Pipe and Flange
- Forging Style
 - Long Weld Neck
 - Heavy Barrel
 - V1, V2, V3 / I1, I2, I3 (Intermediate Barrel)
 - F / E (Equal Barrel)
 - Custom Stub
- Special Nozzle Types
 - Q-Lip (Insert Lip Connection)





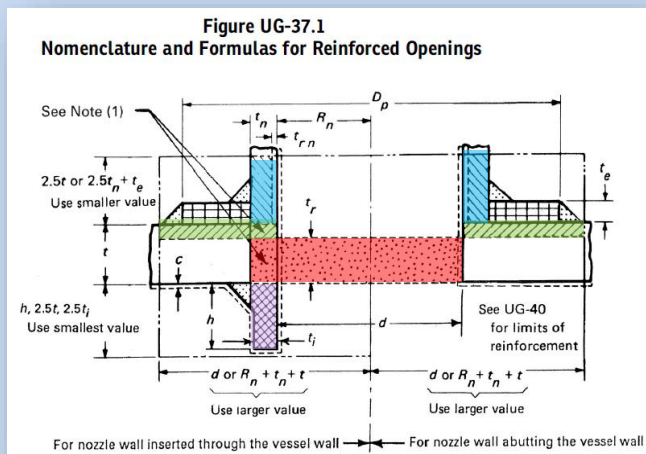
Q-Lip



Insert Plate

• Types of Reinforcement Elements

- Reinforcing Pad
- Insert Plate
- Excess in nozzle neck, shell thickness, and nozzle welds – See Fig UG-37.1



Without Reinforcing Element		
	$A = d t_r F + 2 t_n t_r F (1 - f_{r1})$	Area required
	$A_1 = d (E_1 t - F t_r) - 2 t_n (E_1 t - F t_r) (1 - f_{r1})$ $= 2 (t + t_n) (E_1 t - F t_r) - 2 t_n (E_1 t - F t_r) (1 - f_{r1})$	Area available in shell; use larger value
	$A_2 = \begin{cases} 5 (t_n - t_{rn}) f_{r2} t \\ 5 (t_n - t_{rn}) f_{r2} t_n \end{cases}$	Area available in nozzle projecting outward; use smaller value
	$A_3 = \begin{cases} 5 t t_i f_{r2} \\ 5 t_i t_i f_{r2} \\ 2 h t_i f_{r2} \end{cases}$	Area available in inward nozzle; use smallest value
	$A_{41} = \text{outward nozzle weld} = (\text{leg})^2 f_{r2}$	Area available in outward weld
	$A_{43} = \text{inward nozzle weld} = (\text{leg})^2 f_{r2}$	Area available in inward weld
Opening is adequately reinforced		
If $A_1 + A_2 + A_3 + A_{41} + A_{43} \geq A$		
If $A_1 + A_2 + A_3 + A_{41} + A_{43} < A$		
Opening is not adequately reinforced so reinforcing elements must be added and/or thicknesses must be increased		
With Reinforcing Element Added		
A	= same as A , above	Area required
A_1	= same as A_1 , above	Area available
A_2	$= \begin{cases} 5 (t_n - t_{rn}) f_{r2} t \\ 2 (t_n - t_{rn}) (2.5 t_n + t_e) f_{r2} \end{cases}$	Area available in nozzle projecting outward; use smaller area
A_3	= same as A_3 , above	Area available in inward nozzle
	$A_{41} = \text{outward nozzle weld} = (\text{leg})^2 f_{r3}$	Area available in outward weld
	$A_{42} = \text{outer element weld} = (\text{leg})^2 f_{r4}$	Area available in outer weld
	$A_{43} = \text{inward nozzle weld} = (\text{leg})^2 f_{r2}$	Area available in inward weld
	$A_5 = (D_p - d - 2 t_n) t_e f_{r4}$ [Note (2)]	Area available in element
If $A_1 + A_2 + A_3 + A_{41} + A_{42} + A_{43} + A_5 \geq A$		
Opening is adequately reinforced		

BOARDMAN'S ASME SECTION IX SEMINAR



We are excited to host our 4th annual ASME Section IX Seminar on October 22-23 at our fabrication facility in Oklahoma City. We will cover in-depth requirements & mechanics of ASME Section IX, welding, brazing & fusing qualification, review of welding processes/variables, and welder & operator requirements. This is a unique training combining shop and classroom time to provide the greatest value to each attendee. If you're interested in attending this course, or our Section VIII seminar in April, please let us know!

We would love to hear from you and have an opportunity to quote your next project

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BOARDMAN EMERGENCY FABRICATION

With fall turnaround season is upon us, keep Boardman's Emergency Fabrication team in mind. We are the premier solution when it matters most. You are guaranteed to receive a high-quality solution, safely, and in a timeframe that is unmatched to minimize your downtime!

