

Integrally Reinforced Forged Branch Outlet Fitting Welding Installation Guide



Introduction to Welding Forged Branch Outlets

There exists a need in the fabrication field with new employees and even with experienced personnel to give the proper welding installation guide to properly weld integrally reinforced forged branch outlet fittings whether they be socket welding, threaded, butt welding, nipple, elbow or lateral type products.

This training aid was developed for many fabricators to see first hand what proper welding practices should be maintained and what proper welds on branch outlet fittings should look like to properly have a reinforced fabricated product.

Weld Preparation of the Branch Outlet Product :

All branch outlet products are weld prepped to remove manufacturer's coating finishes, dirt, grease, oils, etc. on the contour end of the product. The prep process via a grinder (or flap wheel or grinding stone), sandpaper, etc. cleans the product surface to show bare metal. A good practice is to go slightly beyond where the actual welding will take place.



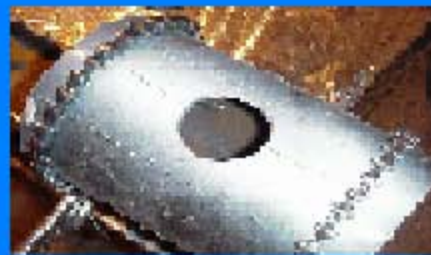
The Header Pipe receives a center line mark :

The area where the branch outlet fitting will be welded to receives a "center line mark". This mark on the header pipe is performed by bringing the point at which the branch outlet intersects the header pipe. Once the "center line mark" is completed, the welder may then template the hole for the header pipe.



Header Pipe Hole Preparation and Weld Prep :

The branch outlet is first placed on the header pipe at the desired area for branching from the header. The welder draws a chalk template from the inside diameter of the outlet. A recommended outlet welding practice is to template the hole a 1/16" to the inside of the diameter to get a better weld joint for the fitting to the base metal, i.e. the header pipe.



The branch outlet is then removed and a hole is cut into the header pipe with a hole saw, torch, plasma cutting, or even drilled. It is important to grind the hole once cut to prepare for a clean weld prep hence better fusion to the base metal.

Branch Outlet Weld Spacing Process

The outlet fitting must be raised off the header pipe for proper starting of the root weld. This is completed by having one place weld spacers between the branch outlet fitting and the header pipe. Normal field practice is to use a weld rod bent to a "V" shape or simply laying two weld rods equally spaced apart under the branch outlet when it is resting on the header pipe.



Tack Welding of the Branch Outlet to the Header Pipe

With the weld spacers resting beneath the branch outlet, the product is tack welded in four locations to assure the outlet is square and leveled to the center line. The welder should place a level before and after tack welding is performed. If after welding, the branch outlet is not level to the initial center line, remove the tack welds - re-level the branch outlet with the weld spacers to the header - and - re-tack weld the outlet to the header pipe.

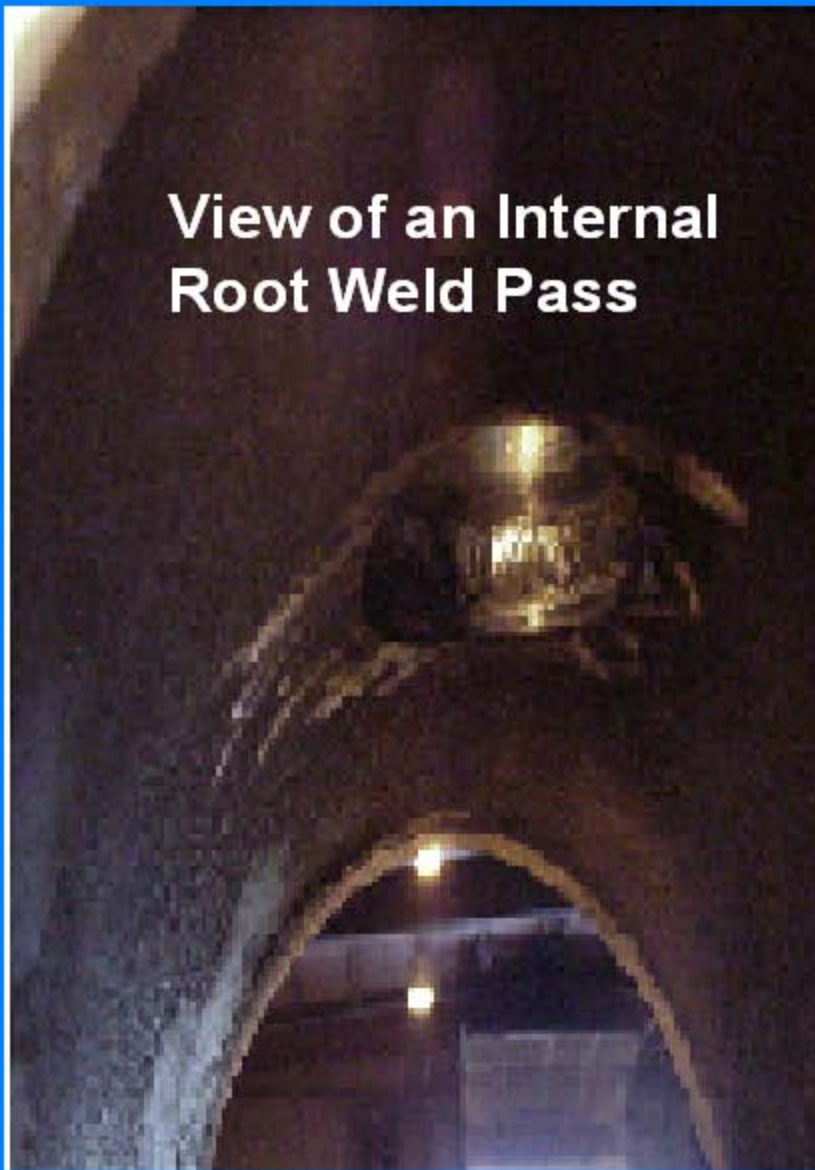


Full Root Weld to the Branch Outlet Product

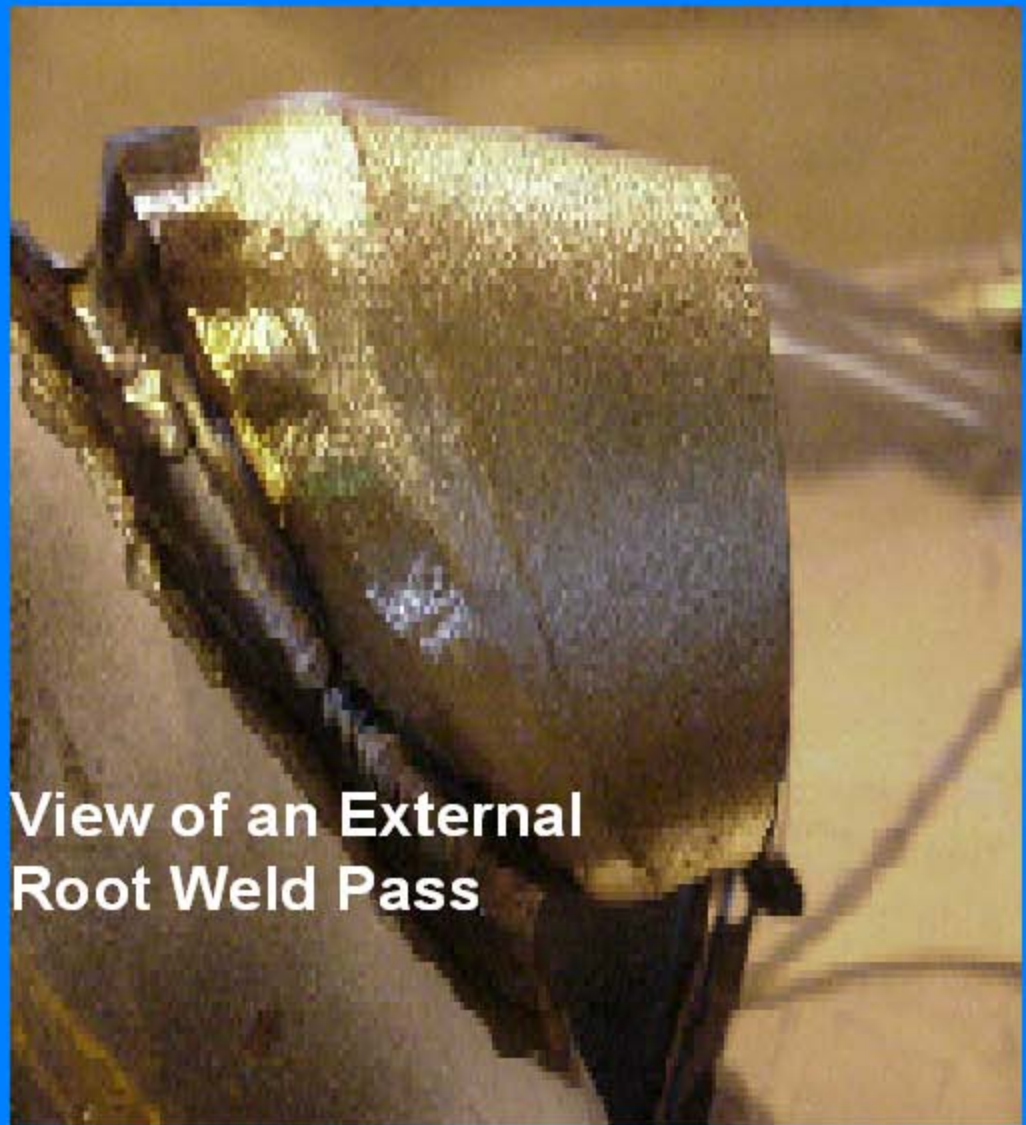
The Root Weld is essential to fuse the proper joint between the outlet and the header pipe. This is like having a strong foundation in building a house. If the foundation is not strong, the structure will cripple from the other weld on top of it. Once the root weld is completed and must be fully penetrated defined as the weld being fused all the way between the outlet and the pipe wall. Having this full penetration weld has created the root (i.e. foundation) to grow the other reinforcement weld to the product. It is strongly recommended that grinding be completed after the root weld has been penetrated both inside and outside for cleaning of the weld so weld slag and debris is removed in order to keep internal welding protrusions to a minimum.

Full Root Weld to the Branch Outlet Product

View of an Internal Root Weld Pass



View of an External Root Weld Pass



Reinforcement Weld Passes after "Root Weld"

The next weld passes are called a Reinforcement Pass (or "Hot Pass"). In these fill welding passes, it is essential to assure full fusion, i.e. the weld metal joining with the base metal. This step is building both the branch outlet and header pipe back to the original strength prior to the hole being placed into the header pipe.



The final "fillet weld" on the branch outlet product

The last welding step is to place a fillet weld completely around the product. This last step assures that the branch outlet fitting has the final passes of weld assuring compliance with applicable piping and fabrication codes.



The branch outlet product is now ready for other operations

At this point, the branch outlet fitting is normally covered at the branch side of the product or in case of a threaded branch side (i.e. inserted with a plug) to prevent dirt, debris, grease, etc. from entering into the header while waiting either inspection, testing, or painting of the header assembly system.



References to learn more about Branch Outlets :

MSS Standard Practice SP-97

Call 703-281-6613 or WWW.MSS-HQ.COM

ASME B31.1 Power Piping Code

Call 800-THE-ASME or WWW.ASME.ORG

ASME B31.3 Chemical Processing Code

Call 800-THE-ASME or WWW.ASME.ORG

Welding courtesy of :

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