



Production Process of Stainless Steel Seamless Pipes

In the production process of stainless steel seamless pipes, a series of complex procedures need to be carried out. These procedures include: starting from round steel, going through re-inspection, peeling, blanking, centering, heating, piercing, pickling, facing, inspection and grinding, cold rolling (cold drawing), degreasing, heat treatment, straightening, pipe cutting (fixed length), re-pickling/passivation, until the final finished product inspection (including eddy current, ultrasonic, hydrostatic pressure) and packaging for storage. Each link is crucial to ensure the quality and performance of the final product.

Centering:

On the radial drilling machine, first find the center point of one end of the round steel and drill a pilot hole. Then fix it vertically on the workbench for centering operation. After centering is completed, classify and stack the round steel according to steel grade, furnace number, specification and production batch number.

Peeling:

The peeling process includes lathe turning peeling and cyclone cutting. During lathe turning peeling, a processing method of one clamp and one support is adopted; while cyclone cutting is carried out by hoisting the round steel onto the machine tool.

Surface inspection:

The peeled bright round steel will undergo strict quality inspection to detect and mark any surface defects, and then hand it over to the grinding personnel for processing until it is qualified. The qualified round steel also needs to be classified and stacked according to steel grade, furnace number, specification and production batch number.

Heating of round steel:

Use a gas-fired sloping hearth furnace or a gas-fired box-type furnace to heat the round steel. During the heating process, old outer films need to be used to separate round steels of different steel grades, furnace numbers and specifications to ensure uniform heating.

Hot piercing:

Perform piercing operations on the heated round steel through a piercing mill and an air compressor. The pierced billet will randomly enter the water pool for sufficient cooling.

Inspection and grinding:

Inspect the surface smoothness of the inner and outer surfaces of the pierced billet to ensure that there are no defects such as scabs or cracks. If surface defects are found, local grinding methods will be used for treatment. The qualified billets need to be bundled as required and stacked by category according to relevant markings.

Straightening:

Perform straightening treatment on the bent billets. The equipment used includes vertical straighteners, horizontal straighteners and vertical hydraulic presses. During the straightening process, in order to prevent the steel pipe from jumping, nylon sleeves will be used to restrict it.

Pipe cutting:

According to the production plan, perform head and tail cutting on the straightened billets. The equipment used is a grinding wheel cutting machine.

Pickling treatment:

The straightened steel pipes need to be pickled to remove the oxide scale and impurities on their surfaces. This process is carried out in the pickling workshop. The steel pipes are slowly hoisted into the pickling tank by an overhead crane. After pickling, the steel pipes first enter the water washing tank for cleaning, and then high-pressure clean water is used to flush the inner holes and outer surfaces of each steel pipe separately.

Subsequent Processing:

Steel pipes that pass the pickling process enter the outer surface grinding stage. After grinding, the steel pipes will undergo a strict inspection by an endoscope to ensure their quality. For non-conforming products found during the inspection or processes requiring special treatment, internal polishing is necessary.

Cold Rolling and Cold Drawing Processes:

Steel pipes are rolled by the rollers on the cold rolling mill, and their dimensions and lengths are adjusted through continuous cold deformation. The characteristics of the cold rolling process are fast forming speed, large deformation amount, and high output.

The cold drawing process is an important step for expanding the diameter and reducing the wall thickness of steel pipes, aiming to precisely adjust their dimensions and lengths without heating. The advantage of this process lies in its high dimensional accuracy and excellent surface finish. However, it has a significant drawback, namely that it generates relatively large residual stresses, and the production of large-diameter cold-drawn pipes requires multiple passes, resulting in a slower forming speed for the finished products. The specific process of cold drawing includes the following three steps:

Heading and Welding the Head: Before cold drawing, corresponding treatments need to be carried out according to the diameter of the steel pipe. For small-diameter steel pipes, heading treatment is performed; for large-diameter steel pipes, the head is welded to prepare for the subsequent drawing process. It should be noted that when processing certain special-specification steel pipes, heading may need to be carried out after heating.

Lubrication and Baking: After heading (or welding the head), the inner hole and outer surface of the steel pipe must be fully lubricated before entering the cold drawing process. The lubricated steel pipe needs to undergo drying treatment to ensure smooth progress during cold drawing.

Cold Drawing: The steel pipe that has undergone lubricant drying treatment will enter the actual cold drawing process. The equipment mainly used in this process includes chain cold drawing machines and hydraulic cold drawing machines. Through these machines, operations such as expanding the diameter and reducing the wall thickness of the steel pipe are carried out to precisely adjust its dimensions and lengths.

Degreasing treatment:

The purpose of degreasing is to remove the rolling oil attached to the inner wall and outer surface of the steel pipe during the rolling process by rinsing. This can prevent these oil stains from contaminating the steel surface during annealing, thereby avoiding carburization.

Heat treatment:

The aim of heat treatment is to restore the plasticity of the material through recrystallization and reduce the deformation resistance of the metal. This process is completed in a natural gas solution heat treatment furnace.

Finished product pickling:

After pipe cutting, the steel pipe will undergo finished product pickling. The purpose is to passivate the surface of the steel pipe, thus forming an oxide protective film on it to further enhance the performance of the steel pipe.

Finished product inspection:

The process of finished product inspection and testing includes multiple steps such as visual inspection, eddy current testing, ultrasonic testing, hydrostatic testing and pneumatic testing. Visual inspection mainly involves manual inspection of the defects, length and outer wall dimensions of the steel pipe surface; eddy current testing and ultrasonic testing use eddy current flaw detectors and ultrasonic flaw detectors respectively to check whether there are holes or internal and external cracks in the steel pipe; while hydrostatic testing and pneumatic testing use corresponding equipment to test the tightness of the steel pipe to ensure that it is intact.

Packaging and warehousing:

Qualified steel pipes that have passed strict inspections will enter the finished product packaging area for packaging. Packaging materials include plug caps, plastic bags, snake skins, boards and stainless steel strips, etc. During the packaging process, small wooden boards will be padded on the outer surfaces of both ends of the steel pipe and tightened with stainless steel strips to prevent collisions during transportation. The packaged steel pipes finally enter the finished product stacking area.

More Info : <https://www.sinosteel-pipe.com/en/production-process-of-stainless-steel-seamless-pipes.html>

