

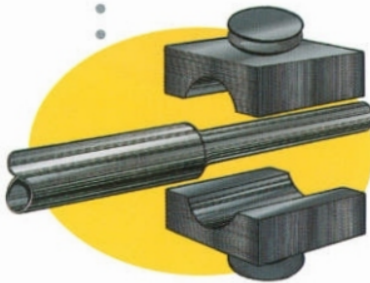
PRODUCTION PROCESS DIAGRAM FOR COLD DRAWN TUBES

The cold drawn process starts with a mother hollow that PRECITUBO obtains from:

- Welded mother hollows manufactured by PRECITUBO using ERW process in Plant 2.
- Seamless "hollows" supplied by other companies.

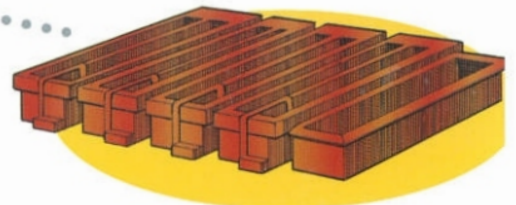


1. Raw material. The manufacturing process in PRECITUBO starts with the raw material, seamless, hot made tubes hollows draw tubing, or can be a welded "hollow" with appropriate thickness and diameter.

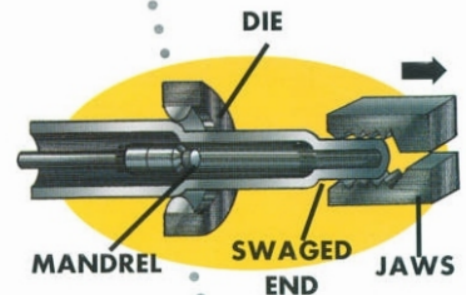


2. Pointing. Tubes that will be cold drawn, must have one end swaged or deformed. This operation allows the equipment to hold the tube during the drawing process.

3. Chemical treatment. Tubes are chemically treated using successive degreasing, pickling, phosphating and lubricating processes. After these treatments, the tube is ready to be cold drawn.

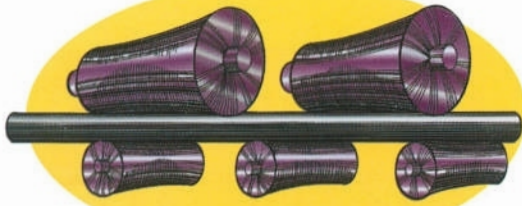


4. Cold drawing. Duly lubricated tubes are placed on the draw benches, where they are drawn through a die to size the outside diameter. While in the interior there is a mandrel held in place by a spindle. The mandrel allows the sizing of the internal diameter as required. In some cases at customer's request, the tubing can be drawn without using the interior mandrel.

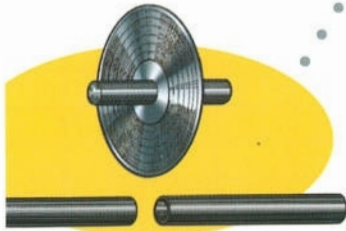


5. Heat treatment. When the tubes have been drawn to their final dimension, or when —by effects of the drawing itself— they have been hardened such that it is difficult to continue the process, a heat treatment is applied to restore the desired mechanical properties.

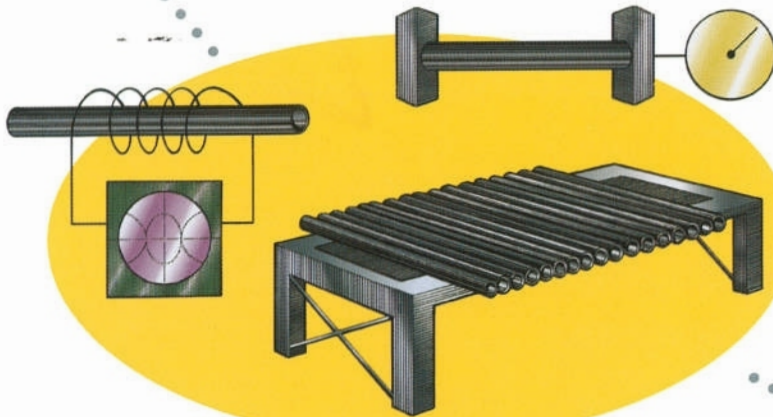




6. Straightening. In this step, if the tubing is in its final dimensions, or as an intermediate step so as to continue the drawing process, straightening is needed in the hyperbolic roller machine.

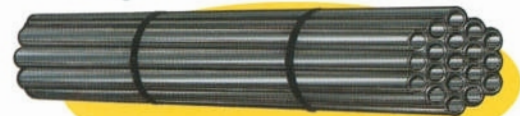


7. Cutting. The cutting process is done in semi-automatic machines that use abrasive cut off discs.



8. Inspection. The finished tube is subject to several inspections: Eddy Current and/or hydrostatic test and visual inspection. In this way it is ensured that the finished product will comply with the most demanding quality standards.

9. Packaging and shipping. Quality control is not limited to this last stage. Sampling and testing is carried out during the whole process to guarantee that the scheme, work methods, tooling and instrumentation insure the optimum quality levels to meet the international standards.



RECOGNIZED QUALITY

The PRECITUBO product quality is recognized with international certification of its quality control system, in accordance with ISO 9002 standards, and world organizations like Lloyd's Register.

