

Reckmann + Jung's core business is the safe and efficient repair and retubing of heat exchangers of any size. We are specialized in the repair of heat exchangers for at least 34 years.

Our customers are all the known names in European power and energy business like

- Siemens AG
- RWE Power
- Evonik / Steag AG
- E-On Energie
- EnBW

and many other leading companies like

- Bayer AG
- Air Liquide
- Ford AG
- Henkel KGaA
- Linde AG
- ThyssenKrupp Steel AG
- VW
- Sugar Industry Plants all over Europe

For retubing different **special tools** are needed. Here is a short overview about the fundamental tools that are used if retubing a condenser.

Internal Tube Cutters: This tool uses a cobalt blade to cut the tubes from behind the tube sheet prior to tube extraction.



The Push Type cutter is used to quickly cut tubes in large numbers, they are especially suited for tougher tube cutting applications such as Stainless Steel, Inconel, Monel, Titanium, etc...

The unit can be used with any drill or one of our driving units with the cutting speed regulated for your particular tube material to maximize the cutters life.

To operate adjust the collar depth, insert it into the tube, apply power, press inward and the tube will be cut in a few seconds.

Tube Pulling System consisting of

Hydraulic pump with according ram

and hydraulic operated **Gripper Type Tube Puller**



When retubing condenser and other similar types of vessel containing non-ferrous tubes this specially developed Hydraulic Gripper Tube Puller removes tubes or tube stubs without damaging the tube sheet holes.

The gripper is inserted in the tube until the collar reaches the tube sheet. When pulling back the mandrel the grippers open up and cling on the tube. Then the tube is pulled out of the tube sheet against the collar of the pulling system.

This unit can pull up to 4 to 6 tubes per minute. The hydraulic ram has a single cycle stroke of 6 inch and a pulling power of 7 or 11 tons.

Tube Expanding Unit

The Tube Expanding unit consists of the control unit and the driving motor.

The control unit is designed to give completely repeatable torque control of the motor. The motor is more or less a drill whose forward and reverse operation is managed by the control unit.

On top of the traction unit the tube expander is mounted.

Tube expansion can be compared to the cold rolling of steel sheets.

The tube to be expanded can also be equated like an endless Steel sheet which, during the rolling process, has been lengthened and enlarged to a point when the external diameter of the tube equals the diameter of the tube sheet hole. This first stage is called "metal to metal contact". Note that the expansion at this stage is not yet leak proof.



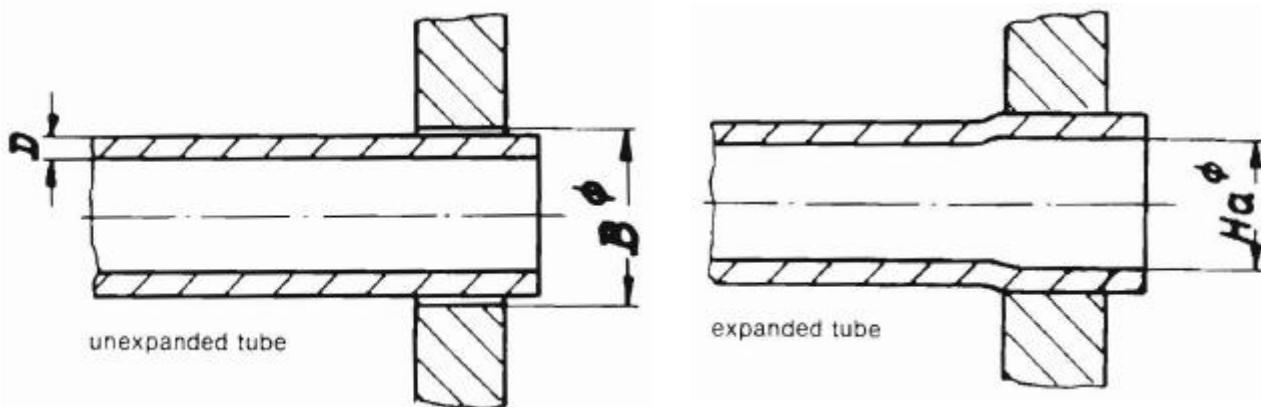
Further rolling is necessary to increase the expansion and reach the point when the material is deformed. This creates pressure tension because of the compression between the tube and the tube sheet. A leak proof expansion is assured if this pressure tension is realer than the service pressure, which arises from the heating, the lengthening and finally the tension of the medium, The difference of expansion between the "contact" and the final expansion is called "expansion limit". This "expansion limit" must never cause a rupture in the cohesion of the molecules of the tube material by an exaggerated deformation of the material. If this were the case the tube material could become damaged.

The contact pressure which the rollers of the tube expander exert on the tube is greater than the yield point of the tube material. The tube is thus shaped plastically and the external diameter enlarges. If the contact pressure is increased further, the rollers finally enlarge the bore of the tube sheet.

If, at this stage, the expansion stops, even though the yield point of the tube sheet material has not yet been reached, the bore of the tube sheet tends to spring back to its original dimension. It clamps the expanded tube and surrounds it like a steel chain. The result is a leak proof compound.

If the contact pressure is further increased and the yield point of the tube sheet material is exceeded, the tube sheet material does not only shape elastically but also plastically and it only partially spring back.

Too great an expansion of the tube has harmful side effects and does not, as one might think, increase the pressure for the required clamping. The tensile strength of the tube sheet material should be greater than that of the tube material. The amount of material between the bores, which has to be able to stand the expansion pressure, should be sufficient for this application, and this applies equally to the tube sheet thickness.



Steps of retubing a condenser

Step 1 Remove covers and prepare vessel for work.

Staging, remove plugs from tubes, etc.



Step 2 The 2nd step is to cut the tubes behind the sheet at one end of the condenser.

If there is a tube sheet coating, the coating in the area of the retubing must be removed first.



Step 3 The 3rd step is to pull the tube on the opposite end. It is pulled about 4 inches from the face of the tube sheet with the pulling system, than the whole tube is pulled manually.



Step 4 The 4th step is to pull the stubs from the tube sheets left in place from the first step.

After all tubes and stubs are removed, the tube sheet and boreholes are checked for damages.



- Step 5** The new tubes are plugged through the tube sheets and baffles.



- Step 6** Rolling in of the new tubes.



- Step 7** Facing of the overhang

For coating a overhang of 2 mm is necessary, without coating the tube ends will be even to the tube sheet



- Step 8** Static pressure test on the shell side with open covers to check for leaks on the new installed tubes

- Step 9** Repair of coating (if necessary)

Before sandblasting all tubes have to be protected with special sandblast plugs. Then cleaning and setting of the special coating plugs. Application of the primecoat, application of the thicklayer, grinding, application of the last layer, removing of the plugs.



- Step 10** Closing covers and pressure test water side

