

HY-SERIES HYDRAULIC CRIMPING OUTFIT



Simonds
Manufacturer of Pneumatic and Hydraulic Tools

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SIMONDS INC. has developed the **HYDRAULIC CRIMPING OUTFITS** to produce a permanent, bilateral seal in ductile metal tubing by symmetrically collapsing, cold welding and severing tubulation with no loss of vacuum or pressure. Conditions for these cold welds must be correct. Materials of the highest purity, surfaces thoroughly machined and thoroughly cleaned should be used. With the correct conditions, even a small amount of exerted force would bring atoms close enough together to form a metallurgical bond, or cold weld.

TUBULATION SELECTION

The most commonly used metal for pinch-off is OFHC Copper (ASTM B68-83, B75-84, B133-83 and B170-82). This has the specifications, chemistry and state of ductility for billet-certified 99.99% pinch off grade copper. It is important that the material be bright annealed at 650° C to 850° C for 30 minutes in a dry hydrogen atmosphere. This is required because the material will undergo a deformation of approximately 350% during pinch-off.

High-Purity nickel (A Nickel, NI270, NI200 or 99.4% nickel ASTM-B161) is another commonly used material. High-purity nickel offers several advantages: minimal out gassing during bake out and pinch-off, minimal oxidation and higher temperature bake ability. Nickel tubulation must be fully annealed at 1150° C for 30 minutes before pinch-off.

Good results can also be obtained using aluminum (annealed 3003 H14, 98% classified non-heat treatable), pure iron, gold, platinum, silver and columbium. The cold welded area will be work hardened during the pinch-off. The size and length of the cold welded area will depend on material, type of annealing, cleanliness, wall thickness and radius of the pinch-off anvil inserts.

PINCH -OFF PREPARATION

The tubular material being used must be totally free of contamination at the weld point. Mechanical or sonic cleaning rather than chemical cleaning just prior to pinch-off yields the best cold welds.

The O.D. of the tubing should be polished with 320-grit emery cloth to remove oxide crystals.

The tungsten carbide inserts of the tools jaws must be cleaned before each pinch-off. Any contamination pressed into the metal at the weld point can injure the cold-welded seal. The pinch-off is a cold extrusion and a lubricant can be used to aid the material flow. Clean #10 machine oil works well on most metals. During the pinch-off, pressure must be applied evenly until the tubing severs suddenly. Any interruption of this process while the material is in a plastic state will result in an incomplete cold weld. Leaks are apt to occur if the pinch-off phase is incomplete and the tubing needs to be wiggled apart. The HY-187 Hydraulic outfit provides reliable service and assures the best results.

AFTER PINCH-OFF

There are a few methods for checking the finished crimp for leakage. Vacuum insulation time rates and electric resistance measurements can be avoided if a sample tube is carried through the entire process, then subjected to a helium test or microscopic examination, using the sample for comparative analysis. Process procedures should be duplicated precisely, changes as subtle as bending a piece of copper tubing will change its grain structure and work-harden the piece considerably. There could be significant changes in grain size, crystal structure and ductility during any thermal process such as brazing, bake-out, soldiering or welding.

The cold-welded stub should be protected with a plastic cap after pinch-off, as it is a delicate seal and very sharp.

PINCH-OFF TOOL SELECTION

The following chart shows typical tube deformation of the [Simonds](#) standard outfit's. [Simonds](#) has been a leader in developing more specific tools to meet the demands of the production line. Quotations for specialty tools are available on request.

TYPICAL TUBE DEFORMATION				
PRODUCT NUMBERS	TUBING DIA. (X .035" wall)	ELONGATION (per side)	FLARE (razor edge)	DISTORTION (min. stub length)
HY-125	1/8"	0.50" (1/8")	0.170"	0.125"
HY-187	3/16"	0.50 (1/8")	0.250"	0.187"
HY-250	1/4"	0.50" (1/8")	0.350"	0.250"
HY-500	1/2"	0.55" (3/16")	0.750"	0.500
HY-750	3/4"	0.75 (3/4)"	1.150"	0.750

Simonds Inc. is a leader in the design and manufacture of pneumatic hand tools for the production line. Selling tools for the automotive, aerospace, electronics, injection molding and light industrial markets. This hydraulic tool was the natural progression for Simonds Inc.

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Finished Crimp



Optional Electric Powered Hydraulic Pump
HYP-24E



Air Driven Hydraulic Pump
HYP-24



- For use with copper tubing up to 3/4" diameter
- For use with annealed tubing
- Hand-guided, one step crimp/seal
- Produces quick, airtight bonds
- Seals refrigerator/air conditioning tubing
- Laser manufactured tubing



HYX-508 Hydraulic Tubing Crimper
Above—Jaw Crimping Tubing
Right—Hydraulic Unit Powering Tubing Crimper

