

SUPERPRESSURE

INSTRUCTION 809-F

**HIGH-PRESSURE TUBING PREPARATION
and
CONE-TYPE AND LENS RING CONNECTIONS
for
1/4, 3/8, and 9/16-inch TUBING and
9/16-inch HIGH-FLOW TUBING**

PART NO. 48-15013
48-15025
48-15033
48-15045
48-15063
48-15075

NEWPORT SCIENTIFIC, INC.
(formerly **AMINCO**)
8246-E SANDY COURT
JESSUP, MD 20794

(301) 498-6700 FAX (301) 490-2313

EMAIL: newport888@aol.com

WEBSITE: www.newport-scientific.com

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I INSPECTION

If damage is discovered upon unpacking equipment, an immediate request should be forwarded to the delivering carrier to perform an inspection and prepare a concealed-damage report. Concurrently, the nature and extent of damage should be reported to Newport Scientific, Inc., giving unit serial and catalog numbers, so that action may be initiated to repair or replace damaged parts or instructions issued of the apparatus if such is necessary.

II DESCRIPTION

A. It is frequently impractical to use powered machine tools to prepare the ends of metal tubing to fit various valve and fittings. This is especially true for cutting left-handed threads.

Newport Scientific, Inc. has developed a set of hand-operated tools for readily performing this work.

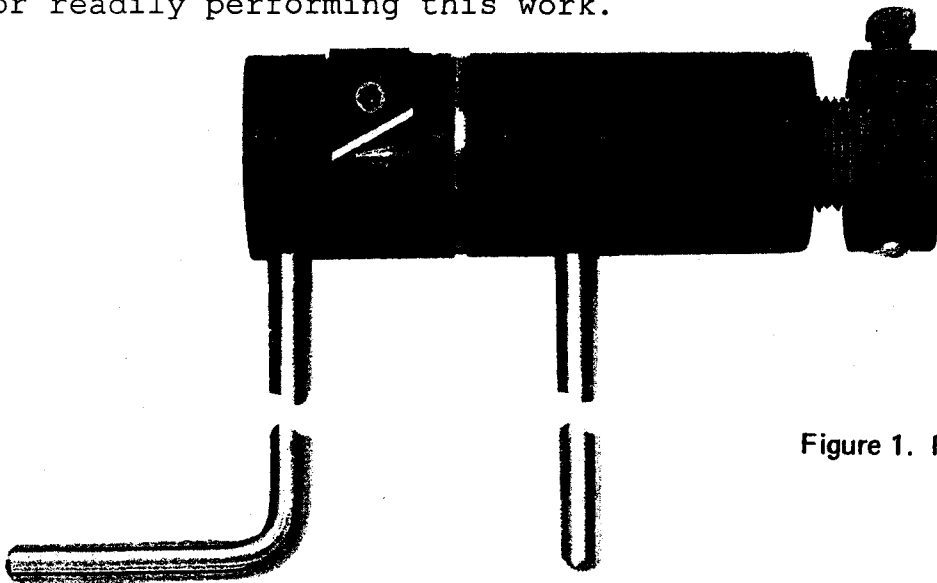


Figure 1. Forming Tool

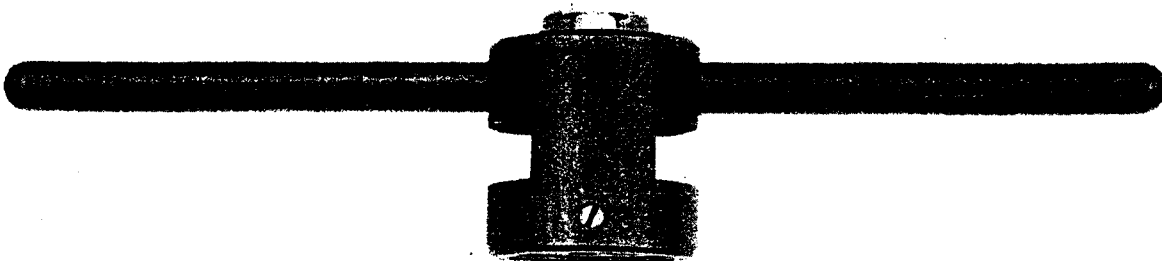


Figure 2. Threading Tool

B. Forming Tool (Figure 1, 3, and 6) provided with a reversible cutter, shapes the end of tubing to a conical or square shape, as required. The Threading Tool, Figure 2, cuts a left-handed thread on the tubing end, which tubing is now ready to accept standard NSI couplings. Figure 3 illustrates the Forming Tool set-up for the 3/8 and 9/16-inch OD NSI Tubing end, and Figure 6 the Forming Tool set-up for the 9/16-inch High-Flow Tubing end.

C. Tools available from NSI for the preparation of 1/4, 3/8, and 9/16-inch OD tubing are listed on Page 7.

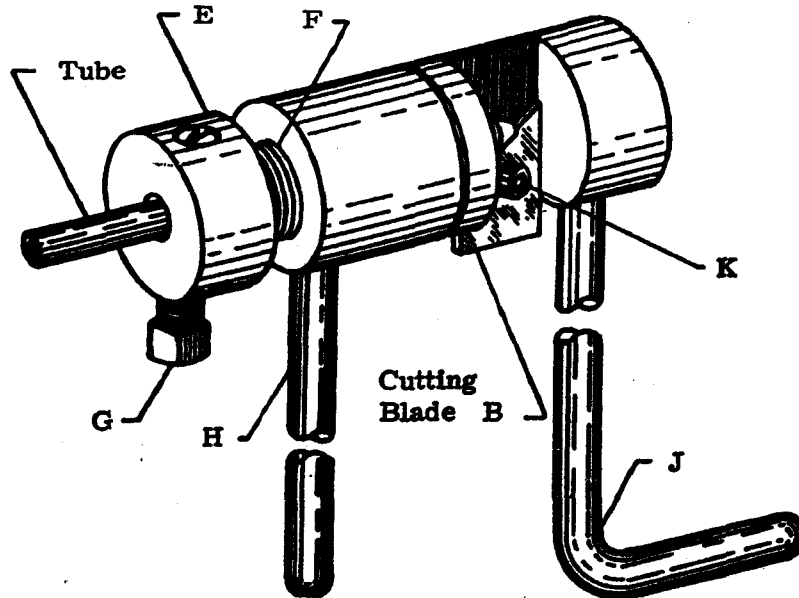


Figure 3. Forming Tool

III OPERATION OF FORMING TOOL

A. Unscrew clamping ring (E) to its most rearward position to expose the full length of thread (F).

B. Remove the Allen-head screw (K) and turn the cutting blade (B) 180° so that it is installed as in Figure 6.

C. Slide Forming Tool over the rigidly held tube until tube end butts the cutting blade (B). Lock tube in clamp with set-screw (G).

D. Lubricate cutting edge.

During use cutting edges and thread-cutting dies should be freely lubricated with the cutting oil supplied, or with a sulphur-base cutting oil*. (A good lubricant for this service is a 50/50 mixture of coconut oil and carbon tetrachloride; however, this mixture must be used under controlled conditions. Carbon tetrachloride vapor is a hazard to health.) For most situations a 50/50 mixture of coconut oil and a good grade of cutting oil is recommended.

E. Square the end of the tubing as indicated in steps F and G.

F. Rotate crank (J) rapidly clockwise. At the same time begin to continually feed the tube into the cutting edge by rotating the feed handle (H) clockwise. The cutting blade should be rotated at approximately one turn per second, with the feed continually advanced, to make a clean, even cut. Cutting blades will hold their edges much longer if a light, uniform cut is taken (just enough for the cutting edge to cut continuously). If too light a cut is taken, the surface will work-harden and make a smooth finish difficult; too heavy a cut may break the cutting edge.

G. At the termination of the cut, stop the feed and make several turns with the cutting blade to obtain a smooth finish.

H. Remove Allen-head screw (K) and rotate the cutting blade (B) 180° so that it is installed as in Figure 3. In cutting a cone end for Superpressure tubing, the cone must be a feather edge at the inside diameter of the tubing. See Figure 5 for recommended cone diameter (K). For high flow tubing see Figure 7.

I. Cone the end of the tubing as indicated in steps C, D, F, G, and J.

IV ASSEMBLY OF THREADING TOOL

A. Slip the tube guide bushing into place and align the curved slot with the bushing retaining screw hole Figure 4.

B. Screw the bushing retaining screw in place.

C. Unscrew the three (3) die-retaining screws sufficiently to permit the Button Die to be inserted into the recess, as shown in Figure 4.

NOTE

Be certain the relieved thread of the Button Die is at the bottom of the recess, i.e., facing the tube guide bushing. This surface of the Die usually has the thread size marked on it.

D. Insert the Die into the recess so that the two conical recesses and the slot in the circumference of the of the Die are aligned with the three screws in the circumference of the recess.

E. Tighten the three (3) Die-retaining screws.

F. To disassemble the Threading Tool, unscrew the three Die-retaining screws sufficiently to permit removal of the Die. Unscrew the Guide Bushing retaining screw and remove the tube Guide Bushing.

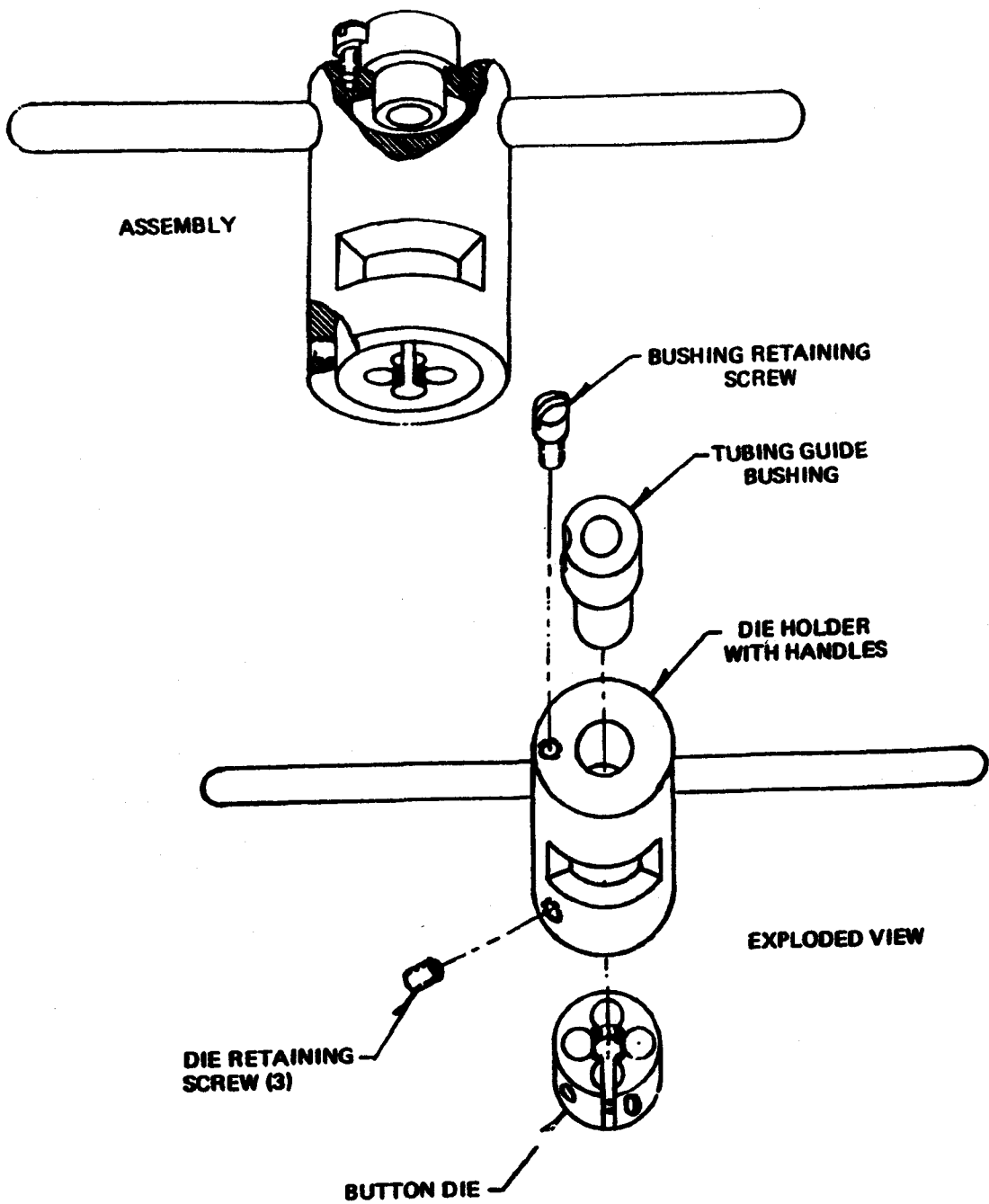


Figure 4. Threading Tool

V THREADING PROCEDURE

A. Fasten the tubing to be threaded so that it is held firmly without being crushed or deformed. Slide the Threading Tool over the tube (Guide Bushing first).

B. Lubricate the tube end and Die, using the supplied cutting oil or the lubricating oil recommended.

NOTE

NSI stocks the recommended cutting oil under Part# 1825-009.

C. Rotate the entire threading tool two (2) revolutions in a counter-clockwise direction; back off 30 degrees and lubricate the Die. Continue this procedure until the proper length of thread (L) has been obtained (see Figures 5 and 7).

D. After the first tube has been threaded, determine if the depth of thread is correct; this may be readily determined by threading the appropriate inner sleeve onto the tube.

If the depth of the thread is excessive, cut off the threaded portion of the tube and cut a new thread, after adjusting the Die.

Should the depth of the thread be shallow, adjust the split-type adjustable Die and repeat the cutting procedure.

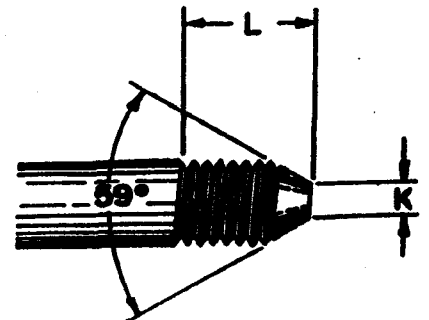
NOTE

It is suggested that a piece of tube, other than that intended for installation, be threaded to verify the accuracy of the Die. Remember that high pressures are involved in the equipment and poor connections present a hazard.

E. To obtain the best threads and longest Die life, threads should be cut in two passes, two-thirds of the metal being removed in the first cut. Time is saved by having two Threading Tools, one Tool to make the first cut, the other to make the second, or finishing cut.

Figure 5.

Tubing Size inches	L inches	K inches
1/4 x 1/16	9/16	3/32
1/4 x 3/32	9/16	1/8
3/8	3/4	7/32
9/16 x 3/16	15/16	9/32
9/16 x 5/16	15/16	11/32



VI PREPARING INNER-DIAMETER RECESS FOR HIGH-FLOW LENS-RING CONNECTIONS

A. The Forming Tool (Figure 6) is used as a jig in the preparation of lens-ring connections.

Remove the Allen-head screw (K) and the cutting blade (B) from the body of the tool.

B. Insert the drill bushing (L), Figure 6, into the end of the body and use the set-screw (M) to fasten the drill bushing in place.

C. Insert the tubing into the other end of the body as far as it will go so that the surface to be drilled is approximately on line with the cutting blade screw hole. Fasten the tubing with clamping screw (G).

NOTE

NSI does not, at this time, stock or supply tools for the preparation of the inner diameter of tubing. Necessary dimensions are given in Figure 7. Any machinist may easily prepare the radius on the end of a No. 25 drill bit for the standard method or prepare adequate cutters for the optional method.

D. The appropriate drill bit for lens-ring connection may now be inserted through the hole in the center of the drill bushing. With adequate lubrication applied to the cutting surface, the drill bit is fed into the inner diameter of the tubing to the proper depth (Figure 7). Best results are obtained if a relatively slow cutting speed is used, and the drill bit is withdrawn occasionally to clear it of chips.

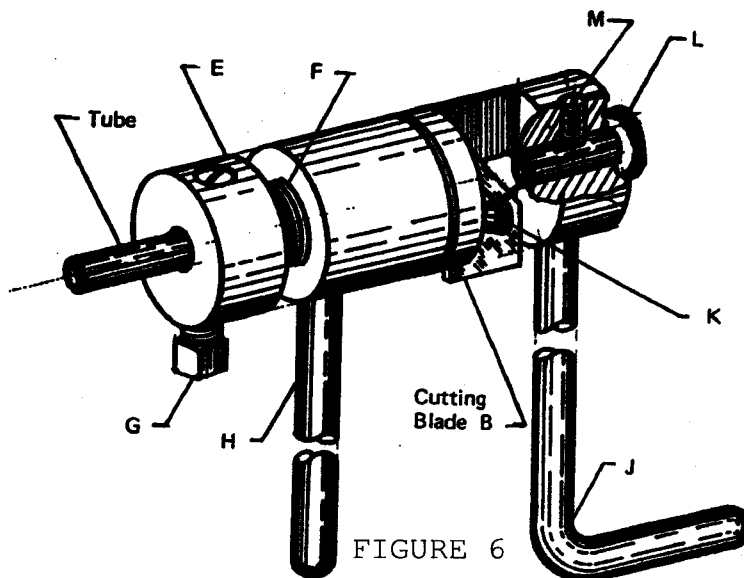


FIGURE 6

VII MAINTENANCE

A. Threading Tools should be stored in a clean, dry location.

B. After use, the Threading Tools should be washed free of metal chips. Use any commercial solvent normally used for this purpose.

C. Tubing should be held in a vise or clamp with a soft jaw during coning or threading. Avoid scratches and nicks, as these seriously impair the integrity of the tubing.

VIII PARTS INDEX

Threading Tool for 1/4-inch OD Tubing

<u>CAT. NO.</u>	<u>DESCRIPTION</u>
48-15000	Assembly, Die Holder; includes Die Holder with handles, Die 48-15021, and all screws.
48-15013	Tool, Forming, 1/4-inch; includes Cutting Blade 48-15014 and Cutting Oil 1825-009.
48-15014	Blade, Cutting; for Forming Tool 48-15013.
48-15020	Bushing, Guide; for 1/4-inch Tubing.
48-15021	Die, Button; for 1/4-inch Tubing.
48-15025	Tool, Threading, for 1/4-inch tubing; includes Die Holder Assembly 48-15000, Guide Bushing 48-15020, Die Button 48-15021, and Cutting Oil 1825-009.
1825-009	Oil, Cutting; 4 fluid-ounce can

Threading Tool for 3/8-inch OD Tubing

48-15000	Assembly, Die Holder; includes Die Holder with handles, Die 48-15041 and all screws.
48-15033	Tool, Forming, 3/8-inch; includes Cutting Blade 48-15014 and Cutting Oil 1825-009.
48-15014	Blade, Cutting; for Forming Tool 48-15033.
48-15040	Bushing, Guide; for 3/8-inch Tubing.
48-15041	Die, Button; for 3/8-inch Tubing.

48-15045 Tool, Threading, for 3/8-inch tubing; includes Die Holder Assembly 48-15000, Guide Bushing 48-15040, Die Button 48-15041, and Cutting Oil 1825-009.

1825-009 Oil, Cutting; 4 fluid-ounce can

Threading Tool for 9/16-inch OD Tubing

<u>CAT. NO.</u>	<u>DESCRIPTION</u>
48-15000	Assembly, Die Holder; includes Die Holder with handles, Die 48-15041 and all screws.
48-15063	Tool, Forming, 9/16-inch; includes Cutting Blade 48-15014 and Cutting Oil 1825-009.
48-15014	Blade, Cutting; for Forming Tool 48-15063.
48-15070	Bushing, Guide; for 9/16-inch Tubing.
48-15071	Die, Button; for 9/16-inch Tubing.
48-15075	Tool, Threading, for 9/16-inch tubing; includes Die Holder Assembly 48-15000, Guide Bushing 48-15070, Die Button 48-15071, and Cutting Oil 1825-009.
1825-009	Oil, Cutting; 4 fluid-ounce can

Forming Tool for 9/16-inch OD Tubing - High Flow

48-15093	Tool, Forming, 9/16-inch High-Flow; includes Cutting Blade 48-15014 and Cutting Oil 1825-009.
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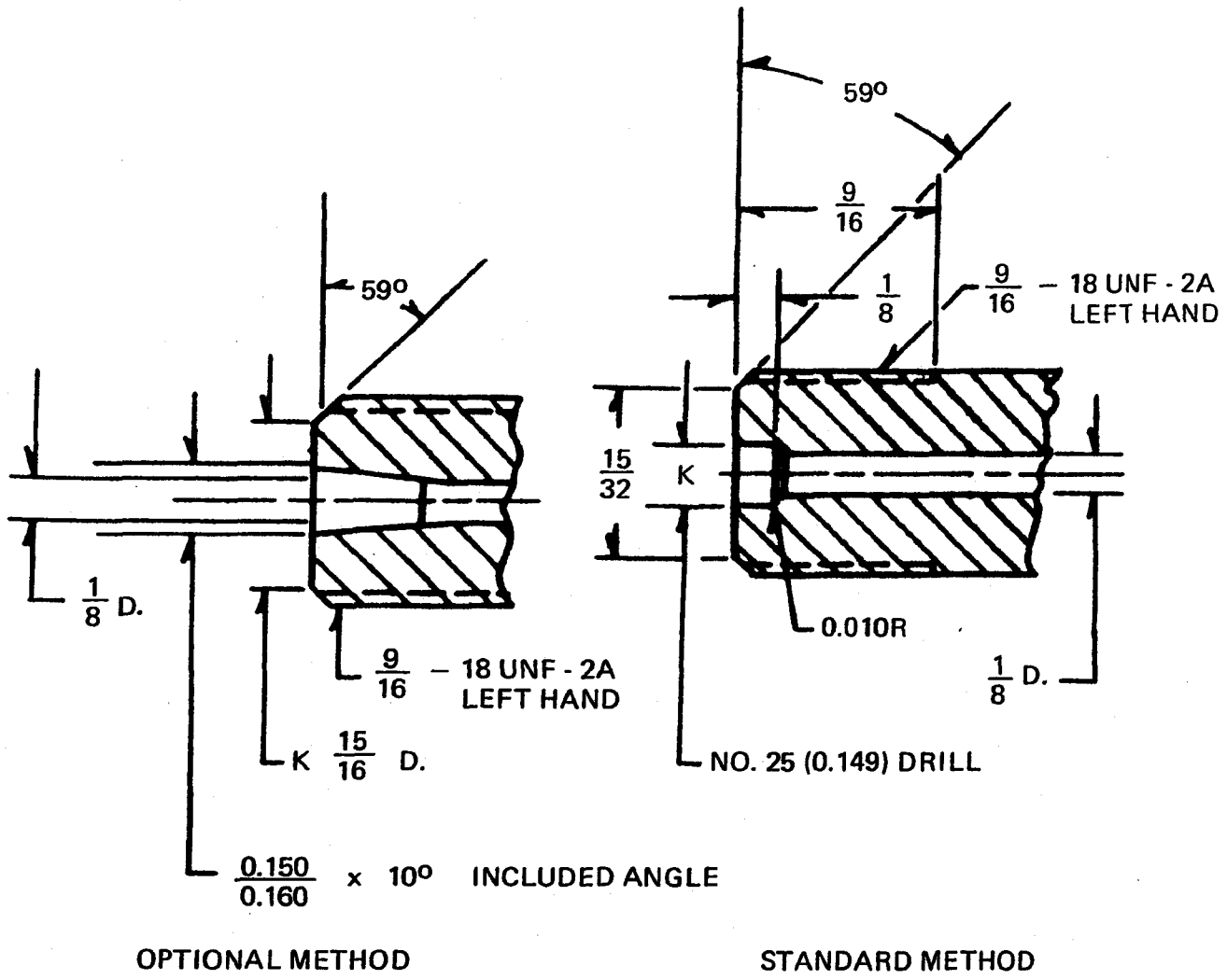


Figure 7. High-Flow Tube End Dimensions