

OFFICE OF STATEWIDE HEALTH PLANNING AND DEVELOPMENT

1600 9TH STREET
SACRAMENTO, CA 95814



October 27, 1983

Dr. J. Stephen Pascover
P.S. Associates
1916 Niodrara Drive
Glendale, CA 91208

SUBJECT: T-DRILL COPPER TUBE BRANCHING SYSTEM

Dear Dr. Pascover:

The T-Drill Copper Tube Branching System is approved by this Office for domestic water and heating and air conditioning piping systems in health related facilities but not for use in medical gas systems. In accordance with the manufacturer's recommendations the joints are to be brazed.

Sincerely,

A handwritten signature in cursive script, reading "M. Neal Hardman".

M. Neal Hardman
Supervising Architect
Division of Facilities Development

cc: Richard Bisnett
Hyman Meyer

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CALIFORNIA

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DEPARTMENT OF
BUILDING AND SAFETY
REPLY TO: MECHANICAL TESTING LABORATORY
2319 DORRIS PLACE
LOS ANGELES, CALIFORNIA 90031
TELEPHONE (213) 485-2314

JACK M. FRATT
GENERAL MANAGER

T-Drill, Incorporated
793 Airport Boulevard
Ann Arbor, MI 48104

REC'D JUN 17 1982

RESEARCH REPORT: RR 4162

Date: October 26, 1981

ATTN: Mr. James K. Jenkins

GENERAL APPROVAL - Renewal - "T-Drill" method of making branch connections to copper water tube.

The above method is approved until August 1, 1982.

DETAILS

This method of shop or field fabricating branch connections in water tube uses a special drill and gear head attached to a drill motor or drill press. A small hole is drilled into the tubing and then the walls of the tube are pulled out inside of a die to produce a branch connection sized for a brazed joint.

The approval is subject to the following conditions:

1. This method may be used only in copper water tubing conveying potable water.
2. This branch tubing shall be trimmed and dimpled to prevent the branch tube entering the extruded tee too deeply.
3. Joints shall be made with the use of a brazing alloy or silver solder with a melting temperature of over 850 degrees F.

DISCUSSION

Reports from outside testing laboratories and various tool combinations were examined. Sample joints were tested in the Mechanical Testing Laboratory. A field examination of various joints was made by the Plumbing Division.

RR 4162
Page 1 of 2

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RAYMOND CHAN
EXECUTIVE OFFICER

July 21, 2004

Richard D. Nelson
T-Drill, Industries, Inc.
1740 Corporate Drive, Suite 820
Norcross, GA 30093

RESEARCH REPORT: RR-4162
EFFECTIVE DATE: 08/01/04
EXPIRATION DATE: 08/01/05
Telephone: 800-554-2730

GENERAL APPROVAL - Renewal - "T-Drill" method of making branch connections to copper water tube using tool model numbers, T-D 35, T-60 and ND-54.

DETAILS

This method of shop or field fabricating branch connections in water tube uses a special drill and gear head attached to a drill motor or drill press. A small hole is drilled into the tubing and then the walls of the tube are pulled out inside of a die to produce a branch connection sized for a brazed joint.

The approval is subject to the following conditions:

1. This method may be used in copper water tubing conveying potable water and hot/cold water for mechanical equipment. However, it shall not be used for high steam pressures and temperatures or with ammonia products.
2. The branch tubing shall be trimmed and dimpled to prevent its making a deep entry into the extruded tee.
3. Joints shall be made with the use of an approved brazing alloy or silver solder.
4. The minimum collar height required for making branch connections in Type K, L and M copper water tube shall be as shown in the table of the attached sheet.
5. Each model used for making branch connections shall be permanently marked with manufacturer's name and appropriate model number.

RR 4162
Page 1 of 3



Issued: February 15, 1985
 Renewed: February 15, 1987
 Renewed: February 15, 1989
 Expiration: February 15, 1991

General Approval No. 15063 T48.1A
 T-Drill Power Tools, Models T-30, T-50,
 and Tube End Notcher for Use in
 Fabrication of Copper Pipe Branching
 Outlets

PLUMBING

T-Drill
 4357-B Park Drive
 Norcross, GA 30093

Attention: James K. Jenkins

Gentlemen:

Approval for use is hereby granted for the subject product, as follows, for a period of two years. This General Approval supersedes Approval 800 T48.1.

DESCRIPTION:

- A. T-Drill Model T-50: Equipped with a UL Listed Model 1250-1 Electric Drill manufactured by Milwaukee Tool Division of Amstar Corp. Operational Capability: Branch Collaring sizes of 1/2", 5/8", 3/4", 1-1/4", 1-1/2" and 2" I.D.; Wall thickness range: .030" to .110"; Max. run pipe diameter: 4-1/8" O.D.
- B. T-Drill Model T-30: Operational Capability: Branch Collaring sizes of 1/4", 3/8", 1/2", 5/8", 3/4" and 1" I.D. Maximum run pipe diameter: 2-1/8" O.D.
- C. T-Drill Tube End Notcher Model (N-42): Tool which end forms the branch tube in a special way. In a single step, it shapes the pipe end and produces small dimples which positions the pipe as well as prevents over-insertion of the branch pipe into the run pipe.

The T-Drill device is similar in operation to a portable electric drill; it also incorporates means to convert a drilled hole in the run pipe into a braze-type branch outlet. The tool is equipped with retractable fingers in the drill bit which spreads out when the drill bit is being retracted from the drilled hole converting the hole into the braze-type outlet. After the outlet is formed the pipe end created by the End Notcher is inserted into the hole which is then brazed using an oxy-acetylene torch, the brazing rod being IAPMO approved SIL.PHOS 5% Silver; MB-5 PHOS. COPPER-5% SILVER, or ASIM equivalent ; a copper phosphorus brazing alloy class BCUP 3 or BCUP 4 only.

CITY OF OAKLAND



CITY HALL • 14TH AND WASHINGTON STREETS • OAKLAND, CALIFORNIA 94612

Office of Public Works

April 8, 1985

James K. Jenkins
National Marketing Manager
4357-B Park Drive
Norcross, Georgia 30093

Dear Mr. Jenkins,

The use of the T-Drill will be acceptable in the City of Oakland.

It is of course understood that all T-Drill joints will be brazed. In addition, it will be required, in the City of Oakland, that any person using T-Drill equipment and brazing such joints will possess a "Certificate of Training" Card. This person will be on job site at time of inspection.

Sincerely,

A handwritten signature in cursive script, appearing to read "John W. Carter".

John W. Carter
Supervising Plumbing Inspector



February 15, 1985

File No. 85-1
T-Drill Piping System
Models T-30, T-50 and
Tube end Notcher
Request for Product Approval

William H. Holyoak
T-Drill
4357-B Park Drive
Norcross, GA 30093

Dear Mr. Holyoak:

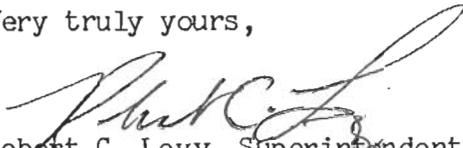
Your request for product approval of the T-Drill System Portable Tools was heard by the Board of Examiners at its meeting of 02/04/85.

The Board, by unanimous vote, approved your request subject to the following conditions:

1. A training procedure/program, to assure proper use of the tools on an on-going basis in San Francisco, is developed by T-DRILL that is acceptable to BBI.
2. For all installations except sprinkler systems, joints shall be brazed with materials per the IAPMO approval (currently SIL-PHOS 5% SILVER, MB-5 PHOS-COPPER-5% SILVER, or ASTM equivalent).
3. For sprinkler systems, joints shall be brazed with materials per the UL listing (currently BCUP-3 and BCUP-4).

To comply with Condition #1, submit your training procedure/program in writing to the Bureau for approval. Please note that the T-Drill System cannot be used until the Bureau, in writing, has agreed to your proposed training procedure/program.

Very truly yours,


Robert C. Levy, Superintendent
Bureau of Building Inspection

Attachments: Minutes of meeting

cc: Board of Examiners
SFFD, Chief J. Medina
Plumbing Inspection Division



City of Palm Springs

Department of Community Development
Building Division
619-323-8242

May 9, 1985

Mr. James K. Jenkins
National Marketing Manager
"T"-Drill
4357-B Park Drive
Norcross, Georgia 30093

RE: PALM SPRINGS "T"-DRILL CONDITIONAL APPROVAL

Dear Mr. Jenkins:

This letter is to confirm the actions of the Palm Springs Board of Appeals concerning your "T"-Drill appeal. Their unanimous action was as follows:

"18 month conditional approval, which allows for use in fire sprinkler systems, mechanical systems and domestic water systems, subject to the submitted specification. Additionally, each proposed project must notify the Building Department of the proposed use. Lack of notice will subject any installation to immediate removal."

Thank you for your excellent presentation.

Sincerely,

ALLEN F. SMOOT
Building & Safety Director

ph

IAPMO RESEARCH AND TESTING, INC.

5001 E. Philadelphia Street, Ontario, CA 91761-2816
(909) 472-4100 • Fax (909) 472-4244 • www.iapmo.org



CERTIFICATE OF LISTING

Samples of the product described herein have been tested by an independent testing laboratory and have been reviewed and accepted for listing by the Product Research Committee of IAPMO Research and Testing, Inc. as meeting the requirements of the Uniform Plumbing Code™. This listing is subject to the conditions set forth in the characteristics below and is not to be construed as any recommendation, assurance or guarantee by IAPMO Research and Testing, Inc. of the product acceptance by local jurisdictions or authorities using the Uniform Plumbing Code™ or otherwise affiliated with IAPMO Research and Testing, Inc.

Accepted: March 2005 Void After: March 2006

PRODUCT: Metal Pipe & Tubing Branching Tools FILE NO. 1935

APPLICANT: T-Drill
1740 Corporate Dr Ste 820
Norcross, GA 30093-2934

IDENTIFICATION: Manufacturer's name or trademark, (Larikka, T/Drill), model number. The product shall also bear the UPC® certification mark.

CHARACTERISTICS: This drill-mounted precision tool creates an extruded cup-shaped collar and hole in a pipe or tube for connection to a branch in the following metals: copper, copper-nickel, brass, aluminum, carbon steel and stainless steel. Continuous lubrication is required. Manufactured in compliance with IAPMO PS 85-2003b. To be installed in accordance with the manufacturer's instructions and the latest edition of the Uniform Plumbing Code.

MODELS: TEC-150, T-D35, T-60 Tube End Notcher

This listing is for the period indicated herein and is void after date shown above. Any change in material, manufacturing process, marking or design without having first obtained the approval of the Product Research Committee or any evidence of non-compliance with applicable standards or of inferior workmanship, may be deemed sufficient cause for revocation of this listing. Reproduction of or reference for advertising purposes may be made only by specific written permission of IAPMO Research and Testing, Inc. This authorizes the use of the UPC® on products or packaging of products covered by this certificate.

Any alteration of this certificate could be grounds for revocation of the listing.

Robert R. Siemans
CHAIRMAN, PRODUCT RESEARCH COMMITTEE

Russ Chaney
EXECUTIVE DIRECTOR



INTERNATIONAL ASSOCIATION OF PLUMBING
AND MECHANICAL OFFICIALS

MATERIAL AND PROPERTY STANDARD

FOR

TOOLS FOR MECHANICALLY FORMED TEE CONNECTIONS IN COPPER TUBING

IAPMO PS 85-95

1. PURPOSE

- 1.1 The purpose of this standard is to establish a generally acceptable standard for mechanically formed tee connections for installations in copper tubing. Its purpose is to serve as a guide for producers, distributors, architects, engineers, contractors, installers, inspectors and users; to promote understanding regarding materials, manufacture and installation; and to provide for inspectable mechanically formed tee connections in copper tubing complying with this standard.
- 1.2 The provisions of this standard are not intended to prevent the use of any alternate material or method of construction, provided any such alternate meets the intent of this standard.

2. SCOPE

- 2.1 This standard serves to supplement the provisions of the Uniform Plumbing Code, Section 802 for joints as required on copper tubing.
- 2.2 This standard covers minimum standards for joints created by using a listed tool that mechanically forms tee connections and to prescribe minimum test requirements for the performance of mechanically formed tee connections, together with inspection and identification.

3. REFERENCE SECTION

- | | | |
|-----|--------------------------|--|
| 3.1 | The Copper Tube Handbook | Copper Development Association |
| | ANSI/ASME B31.5c | Addenda, ANSI/ASME B31.5, Refrigeration Piping |
| | ANSI/AWS A5.8 | Brazing Filler Metals |
| | ASTM B 88 | Seamless Copper Tube |

4. MATERIAL REQUIREMENTS

- 4.1 Mechanically formed tee connections covered under this standard shall meet the material requirements of ASME/ANSI B31.5c-92, Addenda to ASME/ANSI B31.5 and the chemical composition requirements of ASTM B 88.

- 4.2 Filler metals for brazing tee connections shall meet the material requirements of AWS/A5.8, BCup Series filler metal; and the requirements published by the Copper Development Association, Inc. (CDA) as referenced in Section 3.

5. PERFORMANCE REQUIREMENTS

- 5.1 The mechanically formed tee connections covered under this standard shall meet the following physical test requirements using Type M or L or K copper tubing.

- 5.1.1 **Leakage And Hydrostatic Strength Test.** Test samples shall be prepared using copper tubing, consisting of 25.4 mm (1 in.) or larger tubing having various sizes of smaller branches. On each sample, one branch end shall be brazed to a 12.7 mm (1/2 in.) NPT threaded adapter, and the remaining open ends capped. The samples shall be filled with water, vented of all air, and individually connected to a source of hydrostatic pressure.

Each sample shall be pressurized to 2413 kPa (350 psig) and held for one (1) minute while observations are made for evidence of leakage. The pressure is then slowly increased until rupture occurs. None of the samples shall leak at 2413 kPa (350 psig).

- 5.1.2 **Flexural Test.** Ten test samples shall be fabricated using tubing in 25.4, 38.1, 50.8 and 76.2 mm (1, 1-1/2, 2 and 3 in.) sizes and branches in sizes 19.05 through 50.8 mm (3/4 through 2 in.). The branches shall be individually flexed within the plane formed by the run and branch and perpendicular to that plane. The resultant distorted joints shall be examined for cracking or separation of the brazed surfaces. Prior to bending, eight of the samples shall be pressurized hydrostatically, four at 276 kPa (40 psig), and four at 1207 kPa (175 psig). Observations shall be made for leakage of the pressurized joints during the test.

In all cases, bending of the branch pipe results in kinking of the branch immediately adjacent to the joint and/or in the distortion of the run pipe wall at the joint. The overlapped, brazed surfaces at the joint shall not separate, and no leakage shall occur in the pressurized samples.

- 5.1.3 **Vibration Test.** The test sample shall consist of a 457.2 mm (1-1/2 feet) long, 25.4 mm (1 in.) copper tubing and a 304.8 mm (1 ft) long, 19.05 mm (3/4 in.) branch tube. A 0.91 Kg (2 lb.) weight shall be rigidly attached to the free end of the branch tube. The run tube is then fastened to the mounting plate of a vibration machine. A 19.05 mm (3/4 in.) band type pipe hanger shall be installed on the branch line approximately 152.4 mm (6 in.) from the joint. The pipe hanger rod shall be affixed to a stationary overhead support. The sample shall be subjected to one hundred (100) hours of vibration at 35 Hz with a minimum displacement of 1.6 mm (0.065 in.). Upon completion of the vibration exposure, the sample shall be subjected to a visual examination for signs of damage and then to the leakage and hydrostatic strength test.

The visual examination shall reveal no sign of damage. The sample shall withstand pres-

tures of 2413 and 6033 kPa (350 and 875 psig) for one (1) minute without leakage or rupture.

6. INSTALLATION AND INSPECTION REQUIREMENTS

- 6.1 **Mechanically Created Tee Connections.** Mechanically extracted collars as created by the proper tool are formed in a continuous operation consisting of drilling a pilot hole and drawing out the tube surface to form a collar having a height of not less than three times the thickness of the branch tube wall so as to comply with the American Welding Society lap joint weld. The collaring device shall be fully adjustable to insure proper tolerance and complete uniformity of the joint.

The branch tube is notched to conform with the inner curve of the run tube and have two dimple/depth stops (one 6.4 mm (1/4") atop the other) to insure penetration of the branch tube into the collar is of sufficient depth for brazing and that the branch tube does not obstruct the flow in the main line tube. Dimple/depth stops are in line with the run of the tube. The second dimple is 6.4 mm (1/4") above the first and serves as a visual point of inspection to assure proper alignment of the branch tube to the run tube.

All joints are brazed in accordance with the Copper Development Association Copper Tube Handbook using BCuP series filler metal. **NOTE:** Soft soldered joints are not permitted.

7. MARKINGS AND IDENTIFICATIONS

- 7.1 All tools creating the mechanically formed tee connections in copper tubing shall have the manufacturer's name or trademark.
- 7.2 All accessories to the tool creating mechanically formed tee connections in copper tubing shall be marked with the nominal size of the tee connection being created.
- 7.3 All mechanically formed tee connections shall have a dimple/depth stop resting atop the mechanically extracted collar. A second dimple shall be 6.4 mm (1/4") atop the first dimple for inspection purposes. The dimples shall be in line with the run of the tube. All mechanically formed tee connections as created by the tool shall be brazed. No soft solder allowed.
- 7.4 Tools listed by IAPMO that are covered by this standard shall be marked with the UFC certification mark with registration ® to show compliance with this standard.

Adopted: 1995

T-DRILL

SUBMITTAL DATA FOR MECHANICALLY FORMED TEE FITTINGS

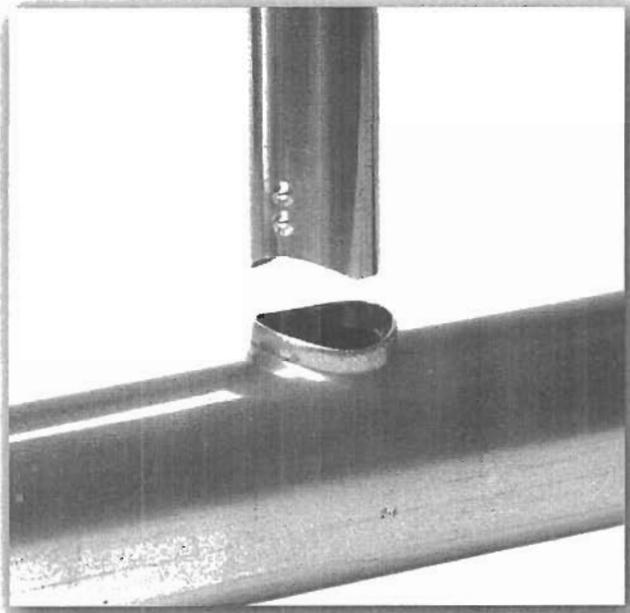
RECIPIENT OF
ASPE 2004 Industry Award for
Outstanding Service To The
Advancement Of Plumbing
Engineering Technology

PROJECT _____

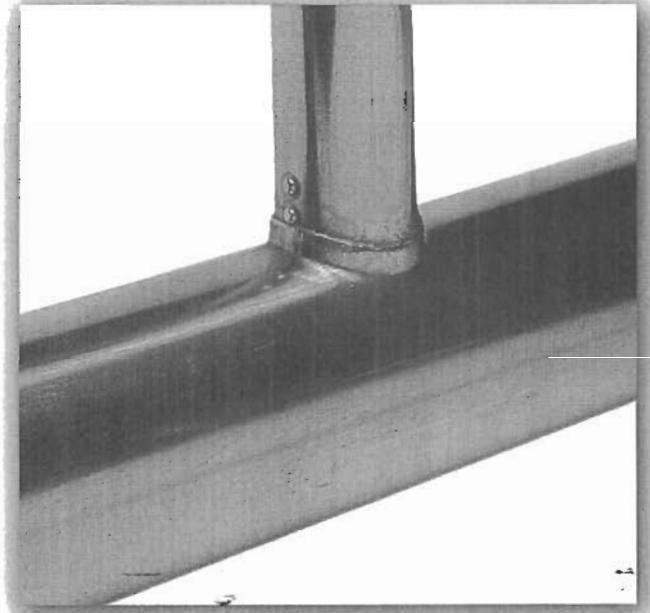
ARCHITECT _____

ENGINEER _____

CONTRACTOR _____



LAP JOINT SHOWN COMPLIES WITH AWS STANDARDS



ONE BRAZED JOINT INSTEAD OF THREE SOLDERED JOINTS

ASME/ANSI B31.9 Section 930.2 Mechanically formed tee connections in copper tube(2005 Publish Date)

ASTM Designation: F 2014-00

Standard Specification for Non-Reinforced Extruded Tee Connections for Piping Applications:
ASME CODE for PRESSURE PIPING

B31 an American National Standard ASME/ANSI B 31.5c - 1992 Addenda to ASME/ANSI B 31.5 -

IAPMO PS 85-95 Material and Property Standard for - Tools for Mechanically Formed Tee Connections in Copper Tubing.

International Plumbing Code, 2003, Section 605.6.1 (also the 1998 Supplement to the 1997 IPC)

International Mechanical Code, 2003, Section 1203.3.8 Mechanical Formed Tee Fittings (NEW)

Uniform Plumbing Code 2003, 2000 and 1997 Editions, Section 606.1.3 Mechanically Formed Tee Fittings.

Uniform Mechanical Code 2003, 2000 and 1997 Editions, Section 1201.2.1.4.2.1 Mechanically Formed Tee Fittings.

Canadian Plumbing Code, Section 3.3.2(1) Extracted Tees.

NFPA 99 4-3.2.2.2 Vacuum System Piping Network (F) Mechanical Formed Branched Connection

Master Spec. (American Institute of Architects) Basic 15060 - pipes and pipe fittings. Mechanically formed Tee Connectors - Mechanically formed couplings.

Epcot Plumbing Code 2002 Edition, Section 605.15.5 Mechanically formed tee connections.

ASPE Data Book-Volume 4 Chapter 2, Piping Systems
Mechanically Formed Tee Fittings for Copper Tube.

I.A.P.M.O. (International Association of Plumbing and Mechanical Officials). File #1935.

National Standard Plumbing Code Section 4.2.8.2
Mechanically Formed Tee Connections.

U.S. Department of Housing and Urban Development -
i.e., Minimum Property Standards, Washington, DC.
Effective July 27, 1983.

U.S. Army Corp of Engineers - Section 15P1, Plumbing General Purpose 12.43 Copper Tube Extracted Joint, Effective August 15, 1983. HVAC - Section 15601.2 Hot Water, Section 15601.3 Oil and Gas Heating, Section 15653 Air Conditioning. Fire Sprinkler T-Drill brazed joints meet Corps requirements.

Naval Facilities Engineering Command - Guide Specification Section NFGS15400 - Plumbing General Purpose 3.1.7 Copper Tube Extracted Joint, Effective June 30, 1990.

Veterans Administration - Section 15400 Plumbing - Section 15501 Sprinkler - Section 15705 - HVAC Piping Systems Section 15651 Refrigeration Piping. Effective June, 1984

Associate Member-Copper Development Association

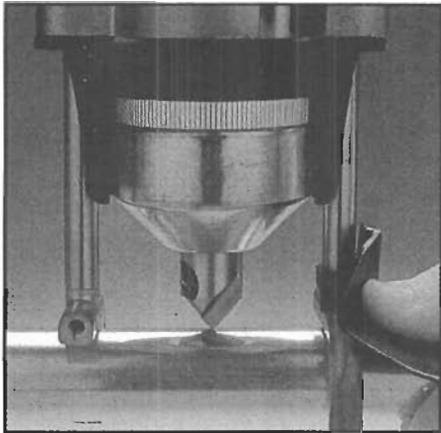
USABLE ON M, L, OR K COPPER AND STAINLESS STEEL

PLUMBING • HVAC • SPRINKLER • REFRIGERATION • MAINTENANCE • PROCESS PIPING

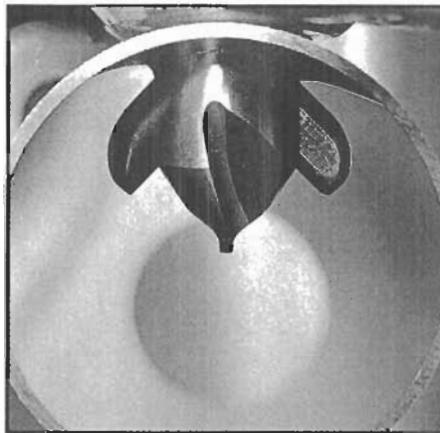
The T-DRILL process. Here's how it works . . .

The **T-DRILL** system is a proven, acceptable method that makes T-branching on copper tubing fast and simple. It eliminates expensive tee-fittings, is listed by I.A.P.M.O., N.S.P.C., ANSI, UPC, UMC, IPC, and IMC

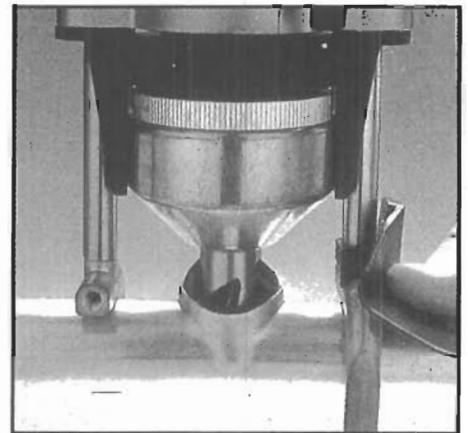
A **T-DRILL** branch requires only one brazed joint instead of three soldered joints for a tee-fitting. The **T-DRILL** system is faster, resulting in material/labor savings thru fewer, yet stronger, joints. Brazing filler metal has as much as 90,000 PSI tensile strength.



1 Power legs center the **T-DRILL** on main pipe. Pilot hole is drilled.



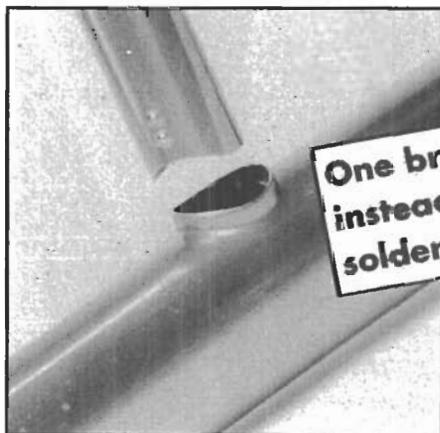
2 On the inside of the main pipe, special hardened steel formation pins are extended from the **T-DRILL** head. These cause a back flow of rigid metal at the root radius of the joint. The result is a 5.5% average thickening at the root radius.



3 As the **T-DRILL** head is extracted by power feed, the formation pins extrude a branch outlet around the pilot hole. Power legs absorb all rotational torque.



4 **T-DRILL** Tube End Notcher cuts and double dimples branch tube to assure free flow and limit depth of insertion into main line providing an inspection aid.



5 The branch tube is inserted into the outlet and brazed to provide a solid, free-flow joint. Double dimples are in line with the flow of the tube



6 The branch outlets are as strong as the tube. One lead-free brazed joint replaces three soldered joints needed for a tee-fitting.

One brazed joint instead of three soldered joints!

OVER 25,000 T-DRILLS HAVE BEEN USED IN TENS OF THOUSANDS OF PROJECTS SUCH AS THESE...

- SCHOOLS / UNIVERSITIES**
 University of Alaska
 Brigham Young University
 University of Nebraska
 University of Pittsburgh
 University of Tampa
 University of Pacific
 University of Georgia
 University of California
 Notre Dame Stadium
 Ball State University
 Purdue University
 Indiana University
 University of Oklahoma
- CORRECTIONAL FACILITIES**
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 Fed. Corr. Fac.-TX
 Allenwood Fed. Pen.-PA
 Minersville Fed. Pen.-PA
 DeKalb Co. Jail-GA
 Fulton Co. Jail-GA
 Wayne Co. Jail-MI
 Cumberland Co. Jail-PA
 York Co. Prison-CA
 Folsom Prison-CA
 Cobb Co. Jail-GA
 Fed. Corr. Ctr.-CO
 Avenal Prison-CA

- Sacramento Co. Jail-CA
 Corcoran Corr. Fac.-CA
 Hillsborough Co. Jail-FL
 Broward Co. Jail-FL
 Pinellas Co. Jail-FL
 Seminole Co. Jail-FL
 Shawnee Co. Jail-KS
 Nevada St. Prison-NV
- SPORTS ARENAS**
 MCI Stadium- Wash D.C.
 Georgia Dome - Atlanta
 Raptor Stadium - Toronto
 Florida Suncoast Dome
 Camden Yards/Baltimore
 Joe Robbie Stadium
 Coors Field Denver
 Olympic Stadium Atlanta
 Carolina Panther Stadium
 Gator Bowl- Jacksonville
 Core States Ctr/Philadelphia
 Ted Turner Field- Atlanta
 Jack Kent Cooke- Wash D.C.
 San Jose Arena
 Oakland Coliseum
 Tampa NFL Stadium
 Diamondback Stadium
 Bristol Raceway-NASCAR
 Paul Brown Stadium

- Minute Maid Park-Houston
 Steelers Stadium-Pittsburgh
 NASCAR Track - Joliet
 Eagles Stadium-Philadelphia
 Soldier Field-Chicago
 Ford Field - Detroit
 Phillies Stadium-Philadelphia
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 Bellagio - Las Vegas
 New York New York - Las Vegas
 MGM Grand - Las Vegas
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 Hyatts
 Hiltons
 Sheratons
 Stouffers
 Hampton Inn
 Marriotts
 Luxor
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 Taj Mahal
 Soaring Eagle Casino
 Borgato Casino
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 China Lake Naval

- Camp Lejeune
 CNET-Pensacola NAS
 Ft. Drum
 Ft. Bragg
 Ft. Benning
 Ft. Gillem
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 Ft. Riley
 Ft. Rucker
 Ft. Polk
 Grissom AFB
 Patrick AFB
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 Groton Naval Station
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 Valley Med. Ctr.-CA
 Baptist Med. Ctr.-FL
 Queens Hospital-Honolulu
 Marion General-IN
 Charter Beacon-IN
 North Memorial-MN
 Mayo Clinic-MN
 Univ. of MN Hosp.-MN

- Hutchinson Hosp.-MN
 Mpls. Children's-MN
 Bothwell Reg.-MO
 Duke Univ. Med. Ctr.-NC
 Med. Univ. of SC
 Pascack Valley Hosp.-NJ
 Jamaica Hosp.-NY
 Mini Kane Hosp.-PA
 York Hosp.-PA
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