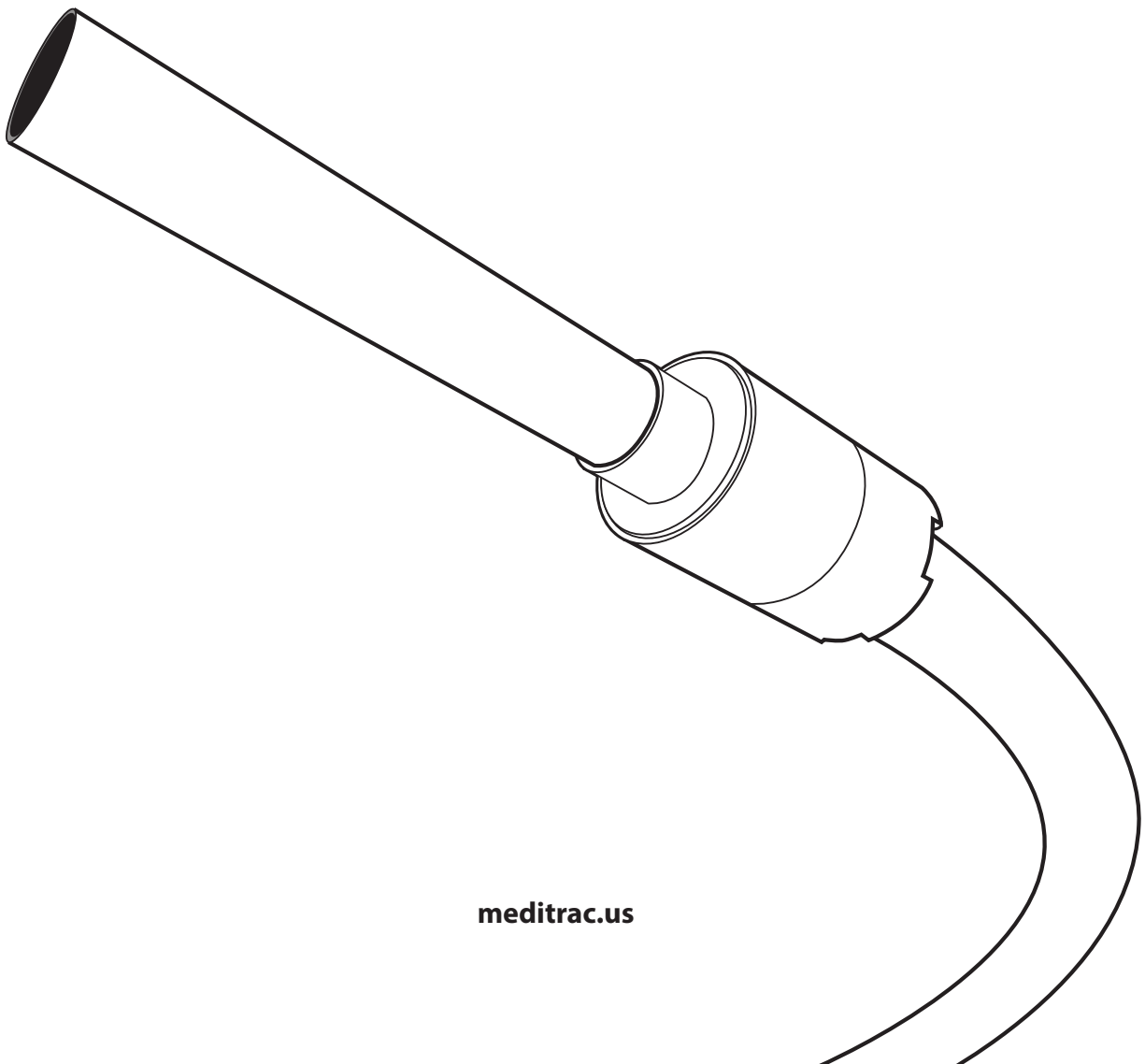




DESIGN & INSTALLATION INSTRUCTIONS

MediTrac[®] Medical Gas Piping System



meditrac.us

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1.0 User Warnings

Each installer must meet applicable qualifications in accordance with requirements as established by the administrative authority that enforces the health care facilities codes where medical gas piping is installed. The MediTrac® Corrugated Medical Tubing (CMT) must only be installed by a CSA Medical Gas Piping & Systems Installation Personnel or equivalent certified installer who has been successfully trained through the MediTrac® CMT installation program by a factory authorized trainer.

This guide must be used in conjunction with health care facilities codes. Applicable codes will take precedence in the event of a conflict between these instructions and the code. In the absence of codes, installation must be in accordance with the current edition of the Health Care Facilities code, NFPA 99 or Medical Gas Pipeline Systems, CSA Z7396.1:22 if applicable.

In addition to compliance with codes, sound engineering principles and practices must be exercised for the proper design of medical gas piping systems. The installation instructions and procedures contained in these Design & Installation Instructions must be strictly followed. All installations must pass inspections by the authority having jurisdiction prior to occupancy of the serviced areas of the health care facility. These instructions may be updated periodically. Installers must use the most current version which is available at <https://meditrac.us>.

DANGER

IF THIS SYSTEM IS USED OR INSTALLED IMPROPERLY, LIFE SUSTAINING / LIFE SUPPORT EQUIPMENT MAY BE IMPAIRED, LEADING TO POSSIBLE SEVERE MEDICAL COMPLICATIONS AND DEATH. APPLICABLE LOCAL CODES AND THESE INSTALLATION INSTRUCTIONS MUST BE STRICTLY FOLLOWED.

1. Applicable Codes and Standards

Model Codes:

NFPA-99 2018 Health Care Facilities Code

CSA Z7396.1:22 Medical Gas Pipeline Systems

Standard:

UL 1365 UL Outline of Investigation for Corrugated Medical Tubing (CMT) Systems

Listings:

UL:



UL Through Penetration Systems:

W-L-1604

C-AJ-1751

(see Appendix A for details)

ICC

Seismically Qualified per ICC-ES AC156

Testing Protocol per ICC-ES ESR-4565



Quality Management System:

The Quality Management System for Meditrac is certified to the ISO 9001.

2.0 Material Description

The Flex-Trac MediTrac® CMT consists of corrugated copper alloy tubing and non-removable mechanically axially swaged brass fittings. Fittings are supplied in a variety of transition connections for easy attachment to traditional copper tube systems and direct connection to piping system components.

Tubing is jacketed with fire-retardant plenum-rated polyethylene which enhances the mechanical properties of the copper alloy tubing and provides protection for the tubing when routing through building components. The jacket is marked at two-foot (0.6 meters) intervals with the manufacturer’s trademark, part number, maximum operating pressure and the length measurements.

3.0 Material Use and Limitations

These installation instructions are intended to aid the medical gas pipeline installer in the design, installation, and testing of corrugated medical tubing systems for hospitals and healthcare buildings. All medical gas piping systems must be installed per NFPA 99 or CSA Z7396.1:22 if applicable — this guide provides additional information for clarification. Flex-Trac MediTrac® CMT must be installed in accordance with the installation practices and procedures included in the MediTrac® Design and Installation Guide, by a valid CSA Medical Gas Piping & Systems Installation Personnel or equivalent certified installer, who has completed the MediTrac® installer training from a factory authorized trainer. Manufacturer’s training on the proper installation of MediTrac® CMT does not qualify the installer as a CSA Medical Gas Piping & Systems Installation Personnel Certification Program certified installer—it only demonstrates that the installer has been trained on the proper installation procedure for MediTrac® CMT.

Some of the special features of the MediTrac® CMT are outlined below and in Table 1.

1. MediTrac® CMT is used to provide safe, efficient, and timely installation in buildings such as hospitals, urgent care facilities, laboratories, or other facilities requiring medical grade piping.
2. MediTrac® CMT will be routed in the same locations that traditional copper gas piping materials are installed (i.e., plenum areas, within conduit, along or through floor joists, or in ceiling spaces).

3. For retrofit installations, MediTrac® CMT will be installed anywhere copper pipe has traditionally been installed. It has the benefit of reducing installation time and reducing or eliminating hot work (permitting, etc.), because MediTrac® CMT can be supplied in long continuous lengths, reducing the risk of possible leak paths due to the reduction in number of intermediate joints.

4.0 Description of System and Components

1. Material for corrugated medical tubing conforms to ASTM B103, copper alloy UNS No. C51000.
2. Jacket is, plenum rated, fire retardant polyethylene tested in accordance to CAN/ULC-S102 or CAN/ULC-S102.2; with a maximum 25 Flame Spread/50 Smoke Density rating.
3. Fittings are brass metallic copper alloy No. CA 360, cleaned to CGA G4.1, and compliant with NFPA 99 requirements.

FIGURE 1

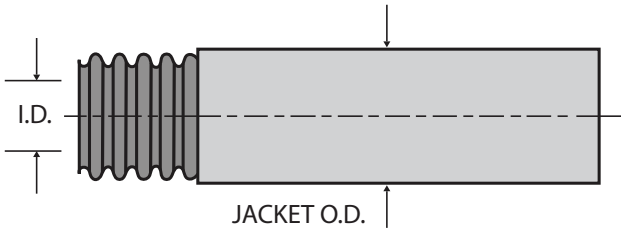


TABLE 1 - TUBING DIMENSIONS IMPERIAL

MediTrac® Size	1/2" (15mm)	3/4" (22mm)	1" (28mm)	1-1/2" (40mm)	2" (50mm)
Corrugated Tubing ID (nominal)	0.599" (15.2mm)	0.820" (20.8mm)	1.060" (26.9mm)	1.525" (38.7mm)	2.060" (52.3mm)
Jacket OD (nominal)	0.875" (22.2mm)	1.125" (28.6mm)	1.375" (34.9mm)	2.125" (53.9mm)	2.625" (66.7mm)

5.0 Installation Practices

Precautions must be taken to ensure that any exposed CMT is not damaged or abused during building construction. All system hardware should be stored in a secure, dry location prior to installation.

- 1. When MediTrac® CMT is installed underground or in a concrete slab, piping will be encased in a nonmetallic sleeve. Suggested minimum nonmetallic conduit sizes in Table 2.

TABLE 2 - SUGGESTED MINIMUM NONMETALLIC CONDUIT SIZES IMPERIAL

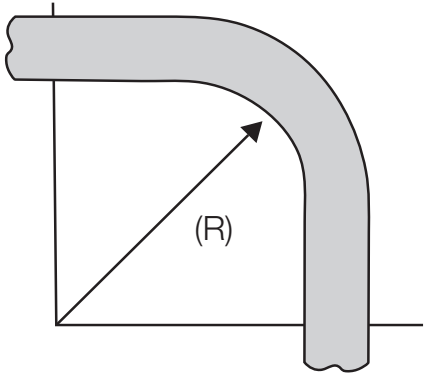
MediTrac® Size	1/2" (15mm)	3/4" (22mm)	1" (28mm)	1-1/2" (40mm)	2" (50mm)
Conduit Size	1-1/2" (381mm)	2" (50.8mm)	3" (76.2mm)	4" (101.6mm)	6" (152.4mm)

- 2. MediTrac® CMT is approved for use with non-flammable medical gases and medical support gases up to a max operating pressure of 185psi (1276 kPa). Both the MediTrac® tubing and fittings have been tested to be leak-free at pressure 3.5x greater than the maximum operating pressure of the system 647psi (4464 kPa).
- 3. MediTrac® CMT shall only use components provided by Flex-Trac for use with the MediTrac® CMT.
- 4. Ends of the piping are to be temporarily capped, plugged, or taped closed prior to installation and routing to prevent the entrance of dirt and/or other debris.
- 5. BENDING: Undue stress or strain on the tubing or fittings is to be avoided. Tight bends can restrict the gas flow and increase pressure drop. The tightest bend allowed for each size of MediTrac® CMT is shown in Table 3.

TABLE 3 - RECOMMENDED BEND RADIUS (R) IMPERIAL

MediTrac® Size	1/2" (15mm)	3/4" (22mm)	1" (28mm)	1-1/2" (40mm)	2" (50mm)
Recommended Bend Radius (inches)	6" (153mm)	8" (204mm)	10" (254mm)	24" (610mm)	30" (762mm)

FIGURE 1



- 6. MediTrac® CMT shall be supported from the building structure in a manner acceptable by code. Hangers and supports shall comply with CSA Z7396.1 (11.3.2 Pipeline Support) supports for MediTrac® CMT shall be sized for copper tubing. MediTrac® CMT will use the next size up copper pipe hanger to accommodate MediTrac®'s outside diameter (1/2" (15mm) MediTrac® uses 3/4" (22mm) copper pipe hanger). Maximum support spacing is defined in Table 4.

TABLE 4 - SUPPORT INTERVALS IMPERIAL

MediTrac® Size	1/2" (15mm)	3/4" (22mm)	1" (28mm)	1-1/2" (40mm)	2" (50mm)
Copper Tube Size for Hanger	3/4" (22mm)	1" (28mm)	1-1/4" (32mm)	2" (54mm)	2-1/2" (65mm)
Maximum Spacing (m)	6' (1.8m)	7' (2.1m)	8' (2.4m)	10' (3.0m)	10' (3.0m)

- 7. When MediTrac® fittings are installed outdoors fittings shall be wrapped/protected in a manner adequate to prevent exposure to the elements.
- 8. When MediTrac® CMT is installed outdoors in a non metallic conduit the ends of the conduit shall be sealed to prevent the entrance of water and debris after installation. Proper care shall be taken to prevent water build up near fitting components and entering conduit to prevent damage due to freezing and other outdoor conditions.

6.0 Fitting Assembly

1. CUT-TO-LENGTH:

Determine the proper length of MediTrac® CMT. Cut through the exterior jacket and copper corrugated tubing using a tubing cutter with an oversized sharp wheel. Use full circular strokes in one direction and tighten roller pressure roughly $\frac{1}{4}$ turn per revolution.

DO NOT OVERTIGHTEN CUTTER:

OVERTIGHTENING CUTTER MAY CAUSE DEFORMATION TO THE COPPER ALLOY TUBING AND CAUSE ISSUES DURING FITTING ASSEMBLY.

⚠ NOTICE

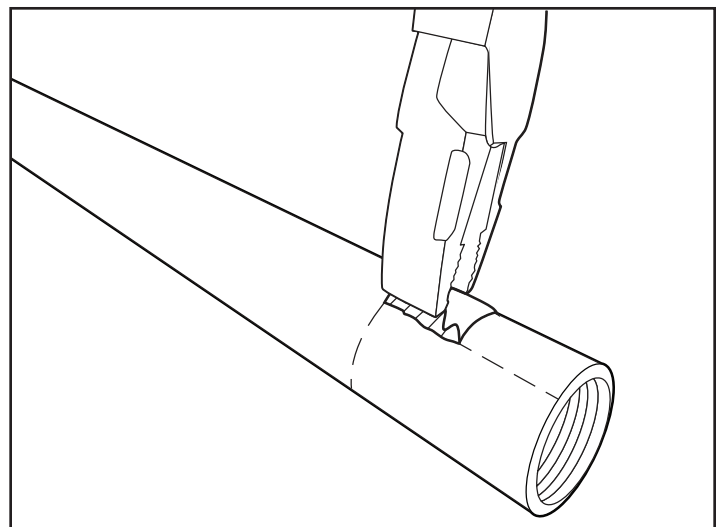
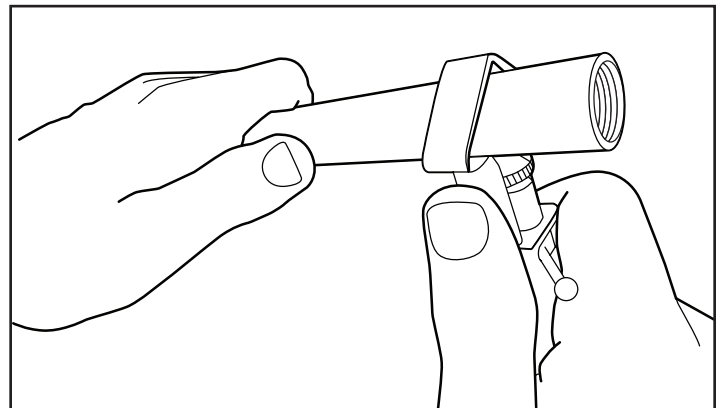
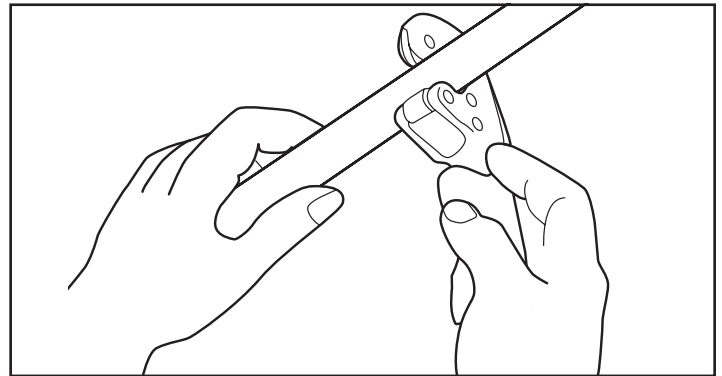
DUE TO THE LARGE DIAMETER AND DEPTH OF CORRUGATION, TUBING MUST BE CUT WITH A STANDARD TUBING CUTTER RIDGID™ 151/153 OR EQUAL USING A MEDITRAC® CUTTING WHEEL NO. MT-E-5272.

2. STRIP JACKET:

Using a MediTrac® jacket stripper (MT-JST) or utility knife, score the jacket approximately 3" (76mm) back from the end. Using pliers or similar tool, pinch the jacketing material on either side of the score mark to remove. Care must be taken when scoring the jacket to prevent damage to the copper alloy core. When using the MediTrac® jacket stripping tool set the blade depth so it only scores the jacket. It does not need to cut all the way through the jacket material.

⚠ CAUTION

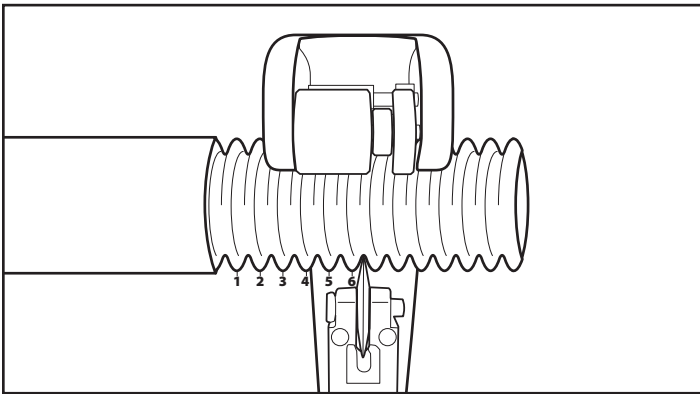
FOR YOUR PERSONAL SAFETY—KNIFE BLADE AND CUT TUBE ENDS ARE BOTH SHARP. USE CARE WHEN CUTTING THE JACKET AND HANDLING THE TUBE. TAKE CARE TO ONLY SCORE THE MEDITRAC JACKET. IT IS NOT NECESSARY TO CUT ALL THE WAY THROUGH THE JACKET TO REMOVE. IMPROPER SCORING OF THE JACKET CAN LEAD TO DAMAGE OF THE COPPER ALLOY CORE.



3. PRECISION CUT:

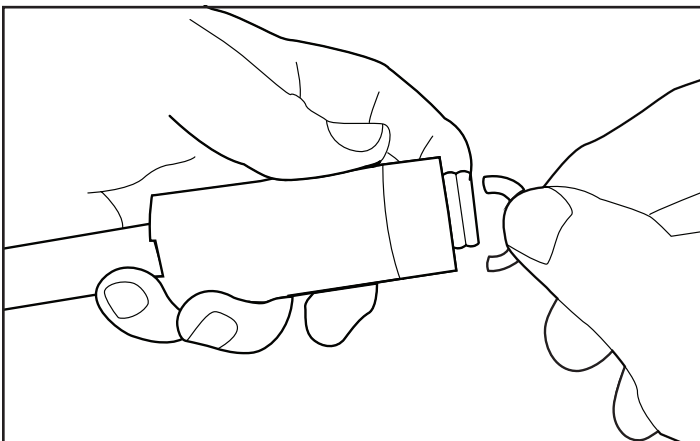
Using a tubing cutter with MediTrac® cutting wheel, make final cut exposing six full corrugations (counted on tops of corrugation). Cut must be aligned in the root between two corrugations. Use full circular strokes in one direction and tighten roller pressure slightly after each revolution. Visually inspect finished cut to ensure an even cut free from burrs and/or tears. In the event of an unacceptable cut remove additional jacket material and re-cut leaving six full corrugations exposed.

DO NOT OVERTIGHTEN ROLLER. BE SURE TO WIPE CLEAR ANY RESIDUAL COPPER PARTICLES FROM CUTTING.



4. MECHANICALLY AXIALLY SWAGE FITTING INSTALLATION:

Remove fitting from packaging and remove the threaded axial swaging tool from the fitting assembly. Take care not to drop the two split-rings—an oxygen compatible grease has been applied to the split-rings to help prevent them from falling during disassembly. Slide the axial swaging tool assembly over the tubing and place the split-ring into the first corrugation closest the cut end of the tubing, then slide the swaging assembly over the split-ring to hold them in place. At this time the adapter should be joined to the traditional piping system or outlet using approved methods.



- Once the adapter is installed, thread the axial swaging assembly onto the adapter and tighten using the appropriate wrenches on the wrench flats located on the brass swaging tool. Tighten the swaging tool until the tightening torque increases greatly. See Table 4 or 5 for minimum assembly torque requirements.
- It is recommended that the system is low pressure tested at 50 to 55 psi (340 to 380 kPa) prior to proceeding to the next step.

TABLE 5 - FITTING TORQUE IMPERIAL

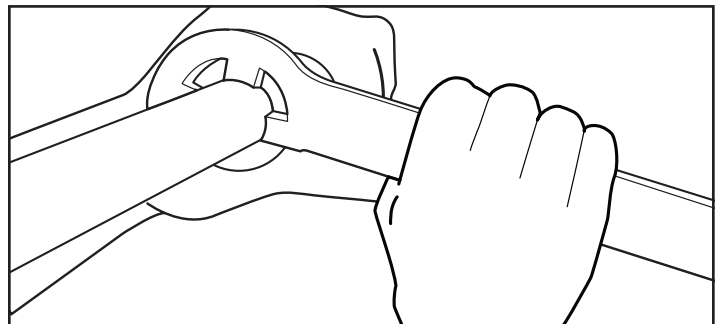
MediTrac® Size	CMT Designator	Torque Value
1/2" (15mm)	MT-0500-CMT	42 ft-lbs 57 Nm
3/4" (22mm)	MT-0750-CMT	45 ft-lbs 61 Nm
1" (28mm)	MT-1000-CMT	75 ft-lbs 102 Nm
1-1/2" (40mm)	MT-1500-CMT	200-250 ft-lbs 271 Nm to 339 Nm
2" (50mm)	MT-2000-CMT	300-350 ft-lbs 407 Nm to 475 Nm

7. AXIALLY SWAGED JACKET LOCK AND ANTI-TAMPER SLEEVE INSTALLATION:

Turn the MediTrac® threaded driver down by hand until resistance is met, using the special MediTrac® driver wrench continue engaging the anti-tamper sleeve until it has covered the adapter wrench flats. Maximum test pressure shall not exceed 1.5x rated max operating pressure 278 psi (1914 kPa).

▲ CAUTION

THE FITTING CANNOT BE TIGHTENED ADDITIONALLY OR REMOVED FOR REUSE ONCE THE ANTI-TAMPER SLEEVE IS ENGAGED.



7.0 Capacity Tables

MediTrac® CMT Flow Capacities in L/min

Supplied Gas: Medical Air Supply Pressure (kPa): 4 Pressure Drop (kPa): 0.07
Length (m)

	3	6	9	12	15	18	23	30	45	60	75	100	125	150
15mm	292	202	163	140	124	113	99	86	69	60	53	45	40	37
22mm	612	438	360	313	282	258	229	202	166	144	130	113	101	93
28mm	1140	811	664	577	517	473	419	368	301	262	235	204	183	167
40mm	5670	3994	3254	2814	2514	2292	2025	1771	1443	1247	1114	964	861	785
50mm	12773	9047	7395	6409	5735	5238	4636	4062	3320	2877	2575	2232	1997	1824

Supplied Gas: Medical Air Supply Pressure (kPa): 4 Pressure Drop (kPa): 0.14
Length (m)

	3	6	9	12	15	18	23	30	45	60	75	100	125	150
15mm	421	292	235	202	180	163	143	124	100	86	76	66	58	53
22mm	855	612	503	438	393	360	320	282	232	202	181	158	141	130
28mm	1602	1140	934	811	727	664	589	517	424	368	330	286	257	235
40mm	8048	5670	4619	3994	3568	3254	2875	2514	2048	1771	1582	1368	1222	1114
50mm	18032	12773	10440	9047	8097	7395	6546	5735	4687	4062	3635	3151	2820	2575

Supplied Gas: Medical Air Supply Pressure (kPa): 4 Pressure Drop (kPa): 0.21
Length (m)

	3	6	9	12	15	18	23	30	45	60	75	100	125	150
15mm	523	362	292	251	223	202	177	154	124	107	95	81	72	66
22mm	1039	744	612	533	478	438	389	342	282	245	220	192	172	158
28mm	1955	1391	1140	990	887	811	719	631	517	449	402	349	313	286
40mm	9879	6959	5670	4902	4380	3994	3529	3085	2514	2173	1942	1679	1500	1368
50mm	22063	15628	12773	11070	9906	9047	8009	7017	5735	4970	4448	3855	3450	3151

Supplied Gas: Medical Air Supply Pressure (kPa): 4 Pressure Drop (kPa): 0.28
Length (m)

	3	6	9	12	15	18	23	30	45	60	75	100	125	150
15mm	609	421	340	292	259	234	207	180	145	124	110	95	84	76
22mm	1194	842	683	583	519	473	417	363	297	257	228	198	178	161
28mm	2251	1583	1283	1104	981	896	791	697	571	496	442	381	337	306
40mm	11425	8114	6557	5670	5065	4619	4081	3568	2907	2514	2246	1942	1735	1582
50mm	25458	18114	14738	12773	11431	10440	9241	8097	6618	5735	5133	4448	3981	3635

Supplied Gas: Medical Air Supply Pressure (kPa): 4 Pressure Drop (kPa): 0.35
Length (m)

	3	6	9	12	15	18	23	30	45	60	75	100	125	150
15mm	685	474	383	328	292	265	233	202	163	140	124	107	95	86
22mm	1329	952	783	681	612	560	498	438	360	313	282	245	220	202
28mm	2251	1602	1313	1140	1021	934	828	727	595	517	463	402	361	330
40mm	12789	9009	7340	6347	5670	5171	4568	3994	3254	2814	2514	2173	1942	1771
50mm	28447	20150	16469	14273	12773	11665	10326	9047	7395	6409	5735	4970	4448	4062

Conversion Factors:

	SG	Multiplier
Medical Air	1.0000	1.00
Oxygen (O2)	1.1044	0.95
Nitrogen (N2)	0.9669	1.02
Carbon Dioxide (CO2)	1.5189	0.81
Nitrous Oxide (N2O)	1.5300	0.81

NOTE: Multiply the value given in the flow capacity tables by the multiplier shown for the gas being used to correct flow capacity.

APPENDIX A
UL CLASSIFICATION
Through-penetration Firestop Systems

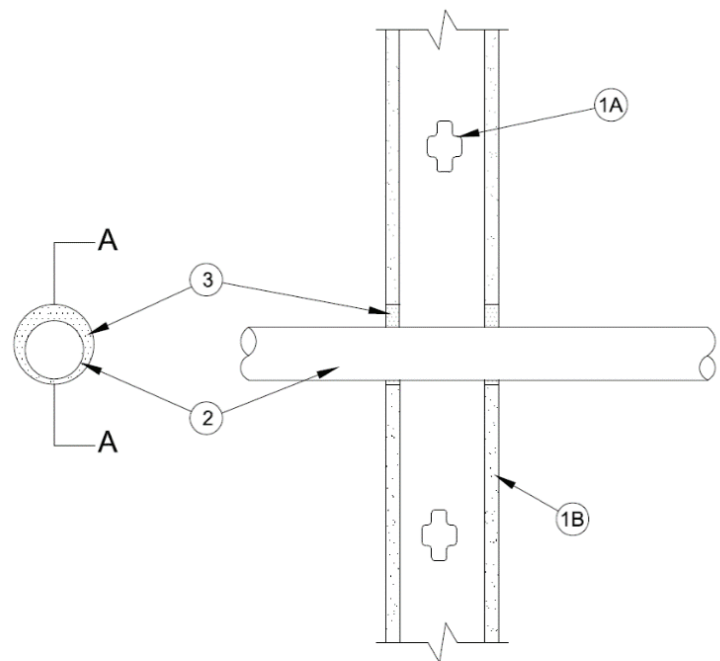
SYSTEM NO. W-L-1604

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 1 Hr	F Rating — 1 Hr
T Rating — 3/4 Hr	FT Rating — 3/4 Hr
	FH Rating — 1 Hr
	FTH Rating — 3/4 Hr

1. Wall Assembly - The 1 hr fire-rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300, U400, V400 or W400 series Wall and Partition Design in the UL Fire Resistance Directory and shall include the following construction features:

A. Studs - Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced 16 in. (406 mm) OC. Steel studs to be min 3-5/8 in. (92 mm) wide and spaced max 24 in. (610 mm) OC.

B. Gypsum Board* - Min 5/8 in. (16 mm) thick, 4 ft (1.2 m) wide with square or tapered edges as specified in the individual Wall and Partition Design. Max diam of opening is 4 in. (102 mm).



SECTION A-A

2. Through Penetrating Product* - CMT — One nom 2 in. (51 mm) diam (or smaller) semi-rigid copper alloy medical tubing to be installed either concentrically or eccentrically within the firestop system. The annular space shall be min 1/4 in. (6 mm) to max 1-1/8 in. (28.6 mm). Tubing to be rigidly supported on both sides of wall assembly.

FLEX-TRAC, INC.— MediTrac® Corrugated Medical Tubing

3. Firestop System - The firestop system shall consist of the following:

A. Fill, Void or Cavity Material* — Caulk — Min 5/8 in. (16 mm) thickness of fill material applied within the annulus, flush with both surfaces of wall.

RECTORSEAL — Metacaulk 1000

** Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.*

UL CLASSIFICATION Through-penetration Firestop Systems

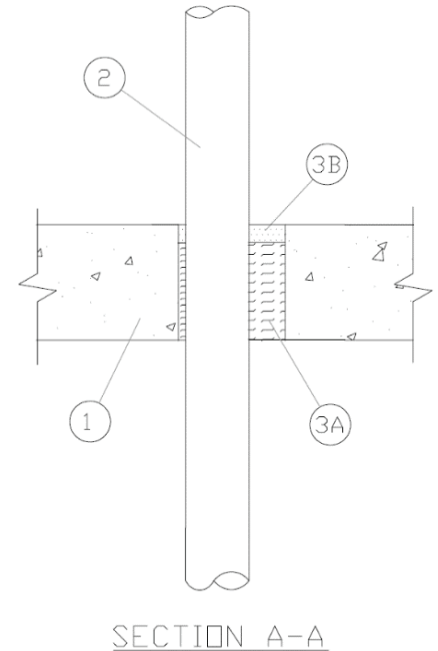
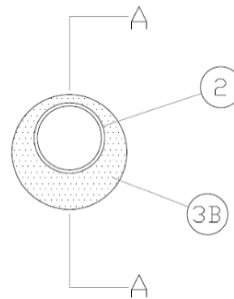
SYSTEM NO. C-AJ-1751

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 1 Hr	F Rating — 1 Hr
T Ratings — 3/4 and 1 Hr (See Item 2)	FT Ratings — 3/4 and 1 Hr (See Item 2)
	FH Rating — 1 Hr
	FTH Ratings — 3/4 and 1 Hr (See Item 2)

1. Floor or Wall Assembly - Min 4-1/2 in. (114 mm) thick floor, or min 5-1/8 in. (130 mm) thick wall, constructed of reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m³) concrete. Wall may also be constructed of any UL Classified **Concrete Blocks***. Max diam of opening is 4 in. (102 mm).

See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. Through Penetrating Product* - CMT — One nom 2 in. (51 mm) diam (or smaller) semi-rigid copper alloy medical tubing to be installed either concentrically or eccentrically within the firestop system. The annular space shall be min 1/4 in. (6 mm) to max 1-1/8 in. (28.6 mm). Tubing to be rigidly supported on both sides of floor or wall assembly.
The T, FT and FTH Ratings are 1 hr except that for tubing exceeding nom 1 in. (25 mm) diam, the T, FT and FTH Ratings are 3/4 hr.



FLEX-TRAC, INC.— MediTrac® Corrugated Medical Tubing

3. Firestop System - The firestop system shall consist of the following:

A. Packing Material — Min 3-7/8 in. (98.4 mm) thickness of min 4 pcf (64 kg/m³) mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or from both surfaces of wall as required to accommodate the required thickness of fill material.

B. Fill, Void or Cavity Material* — Caulk — Min 5/8 in. (16 mm) thickness of fill material applied within the annulus, flush with top surface of floor or with both surfaces of wall.

RECTORSEAL — Metacaulk 1000

** Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.*

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