PurePro®

INSTRUCTION MANUAL

Copper & Lead Free Brass Press Fittings

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1. Main Features

PurePro Press Fittings are the new press system for copper tubing, designed to meet the main requirements of the plumber and make their daily work easy, safe and in compliance with the regulations required.

All fittings included in the press assortment shown in this document are manufactured on behalf of F.W. Webb in Italy.

Please read instructions in full before beginning installing the PurePro Press Fittings

1.1 Press Solutions

PurePro Press Fittings are available in sizes 1/2" to 4"

For a complete view of all available products, please refer to the PurePro Specification Sheet or fwwebb.com/purepro

1.2 Advantages

- Easy and quick installation - no time-consuming operation required (brazing, soldering, grooving)
- Safe installation - no flames or heavy tools required
- High hydraulic and mechanical seal - pressure rating suitable for all major requirements
- Noble and bacteriostatic material - high quality and durability
- Large assortment
- Fittings feature leakage detection, ensuring each fitting is installed correctly
- Fittings are made in Italy with high quality level

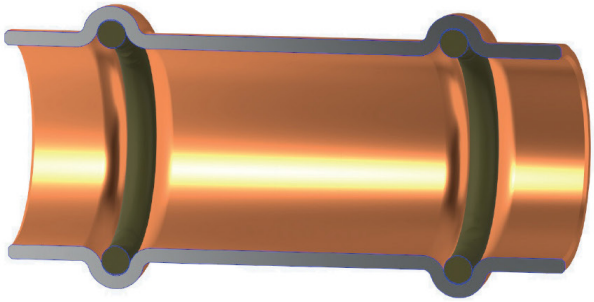
1.3 Materials

High purity copper Cu-DHP and lead-free DZR brass press fittings with high performance EPDM seals, suitable for drinking water applications and many other applications, ranging from 1/2" to 4".

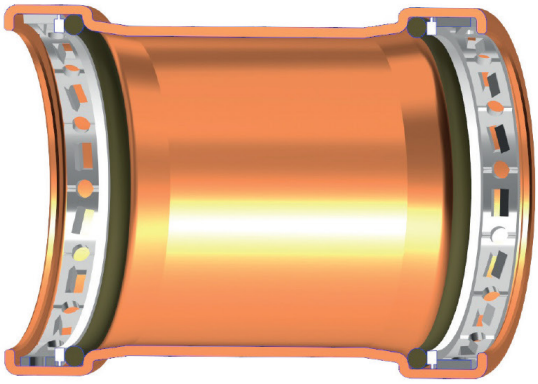
These materials ensure a solution that complies with the main market standards and is universally recognized for many applications:

- All Press Fittings with 2 or more press sides or threaded ends included between 2 1/2" to 4" are made of high quality copper Cu-DHP (C12200). Phosphorus-Deoxidized Copper-Cu-DHP, with a nominal composition of 99.9% minimum copper and 0.02% phosphorus, is the most widely used copper for tube and fittings in plumbing applications.
- **Lead Free DZR brass** (C27453), used for threaded ends through 2", is compliant with the requirements of the US market with limits placed on lead for materials in contact with potable water. The pliability and the high copper content make the C27453 alloy an excellent material for press fittings, with truly modest dezincification values.
- PurePro Press Fittings are equipped with a **high-quality black EPDM sealing element** installed at the factory. EPDM (Ethylene Propylene Diene Monomer) is a synthetically manufactured material. The high performance and excellent behavior of this material against aging allow its safe and durable use in most commercial and industrial applications. Considering the traditional use with water, the EPDM gasket can be used in a temperature range between -0 and +250°F; for any other limit condition, please contact F.W. Webb.

1.4 Fittings Profile

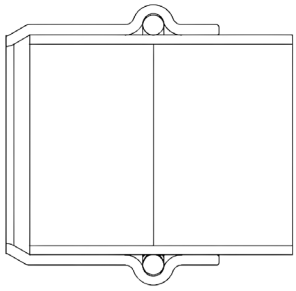


Small Diameter Profile 1/2" to 2"



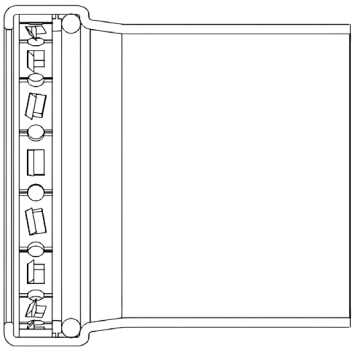
Large Diameter Profile 2-1/2" to 4"

The small diameter profile, adopted for fittings up through 2", is recognizable by its safety cylindrical guides that ensure the proper insertion of the tube and protects the sealing element against the possible damage.



Small Diameter Profile 1/2" to 2"

The Large Diameter profile, typical of the dimensions between 2 1/2" and 4", includes an internal steel ring nut (placed upstream of the O-ring following the direction of insertion of the pipe) useful for making the pressing operation stronger. A further plastic separation ring, placed between the ring nut and the O-ring, protects the sealing element, making the pipe insertion operation safer.

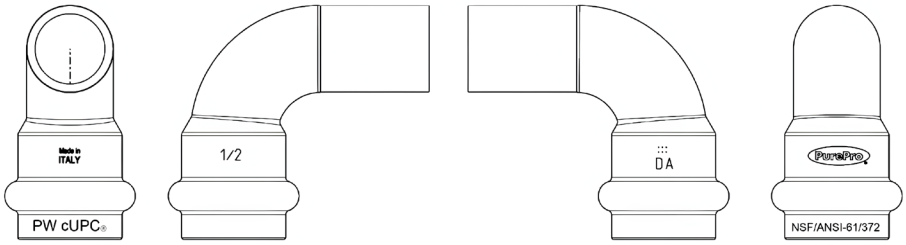


Large Diameter Profile 2 1/2" to 4"

1.5 Fittings Markings

PurePro Press fittings markings:

- PurePro name and logo
- Manufacturer name and logo
- Made in Italy
- Size of fitting
- Manufacturing date
- NSF/ANSI 61 and 372
- cUPC
- PW mark (potable water)



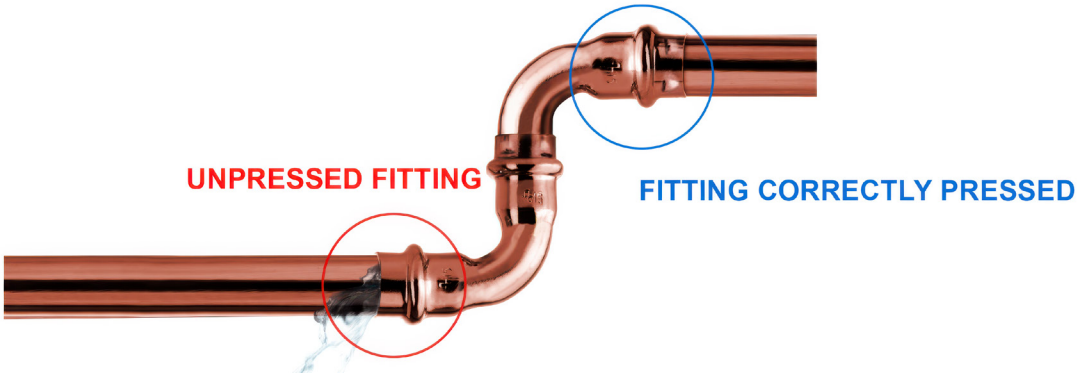
1.6 Listing and Certifications

- BAA - Buy American Act Compliant
- ASME B16.51 Compliant
- IAPMO PS-117: press and nail connections
- NSF/ANSI/CAN 61: drinking water system components-health effects
- NSF/ANSI/CAN 372: drinking water system components-lead content
- ICC-ES LC1002 - press-connection fittings for potable water tube and radiant

The symbol is placed over the package.

1.6.1 Leak Detection

PurePro Press Fittings up to 4" are equipped with a Leakage Detection safety system, which allows any unpressed fittings to be detected. The device works both when testing with water (in the range between 15 and 85 psi) and when using air (between 1/2 and 45 psi). **The elastomeric gasket's shape allows liquid to leak out if the junction has not been pressed completely and properly for fittings up to 2"; for fittings between 2 1/2" to 4" the Leakage Detection is obtained thanks to optimized radial space between pipe and fitting.** Any un-pressed joints can be quickly identified and pressed.



1.6.2 Applications

PurePro Press Fittings are ideal commercial and residential applications, offering solutions for:

- Potable water, meeting the requirements of NSF/ANSI/CAN 61 and lead-free specific through testing under NSF/ANSI/CAN 372 (0.25% or less maximum weighted average lead content).
- Heating and cooling, including glycols used as antifreeze in standard percentages
- Oil-free compressed air (residual oil < 5 mg/m³, according to ISO 8573-1)
- Non-potable and treated water

PUREPRO PRESS FITTINGS MAIN APPLICATIONS - EPDM SEALS			
Application	**Comments**	**Max. Pressure (psi)**	**Operating Temperature (°F)**
Drinking Water	-	300	32°- 250°
Heating / Cooling	Up to 50% Ethylene or Propylene Glycol as Additive	300	0°- 250°
Rain Water / Grey Water	-	300	32°- 250°
Non-Potable and Treated Water	-	300	32°- 250°
Low-Pressure Steam	-	Up to 15 psi	Max. 248°
Ethanol	-	200	Up to 140°
Compressed Air	Oil Residual < 5 mg/m3	200	Up to 140°
Oxygen-O2	Not for Medical Use	140	Up to 140°
Nitrogen-N2	-	200	Up to 140°
Argon	Welding Use	200	Up to 140°
Hydrogen-H2	-	125	Up to 140°
Vacuum	Rough Vacuum	29.2 inch Hg	Up to 140°
Carbon Dioxide-CO2	Dry	200	Up to 140°

For any other application not indicated in the table, higher concentration of a substance or any applications outside listed temperatures and pressure ranges, please consult F.W. Webb.

2. Product Instructions

Always follow all steps in this instructions manual to ensure a leak-proof press connection.

2.1 Pipe Selection

PurePro Press Fittings may only be pressed onto copper tubing in accordance with ASTM B88 (types K, L and M)

- Potable water, meeting the requirements of NSF/ANSI/CAN 61 and lead-free specific through testing under NSF/ANSI/CAN 372 (0.25% or less maximum weighted average lead content).
- Heating and cooling, including glycols used as antifreeze in standard percentages
- Oil-free compressed air (residual oil < 5 mg/m³, according to ISO 8573-1)
- Non-potable and treated water

ASTM B88												
	External Diameter		Diameter Tolerance				Thickness					
			Annealed		Drawn		K		L		M	
	Inches		Inches	mm	Inches	mm	Inches	mm	Inches	mm	Inches	mm
1/2"	0.625	15.875	0.0025	0.0635	0.001	0.0254	0.049	1.2446	0.040	1.016	0.028	0.711
3/4"	0.875	22.225	0.003	0.0762	0.001	0.0254	0.065	1.651	0.045	1.143	0.032	0.813
1"	1.125	28.575	0.0035	0.0889	0.001	0.0381	0.065	1.651	0.050	1.270	0.035	0.889
-1/4"	1.375	34.925	0.004	0.1016	0.0015	0.0381	0.065	1.651	0.055	1.397	0.042	1.066
1-1/2"	1.625	41.275	0.0045	0.1143	0.0015	0.0508	0.072	1.829	0.060	1.524	0.049	1.245
2"	2.125	53.975	0.005	0.127	0.002	0.0508	0.083	2.108	0.070	1.778	0.058	1.474
2-1/2"	2.625	66.675	0.005	0.127	0.002	0.0508	0.095	2.413	0.080	2.032	0.065	1.651
3"	3.125	79.375	0.005	0.127	0.002	0.0508	0.109	2.769	0.090	2.286	0.072	1.829
4"	4.125	104.775	0.005	0.127	0.002	0.0508	0.134	3.404	0.110	2.279	0.095	2.413

2.2 Pressing Tools Selection

PurePro Press Fittings must be joined with an electro-hydraulic or electro-mechanical machine with electric or battery power supply. Fittings up to 2" require a press jaw and 2.5"+ fittings require a press ring with corresponding actuator, always match to corresponding tube diameter. The choice of tool is the responsibility of the installer; always refer to the manufacturer's instructions for the correct use of the tools, the regular maintenance to be carried out and the authorized service centers. The list of approved tools, declared as suitable or combination with PurePro Press Fittings, have been prepared as a result of internal compatibility tests of the tools according to the best performance and quality, following the instructions for use of the jaws, actuators and pressing tools.

This list of compatible tools is available, for the most current listing please contact F.W. Webb

- Milwaukee M12 "Compact Jaws": fittings up to 1 1/4"
- Milwaukee M18 "Standard Jaws": fittings up to 4"
- Ridgid "Compact Jaws": fittings up to 1 1/4"
- Ridgid "Standard Jaws": fittings up to 4"
- DeWalt "Standard Jaws": fittings up to 2"

Best practices apply as a requirement of all approvals.

- Jaws require cleaning to remove copper buildup or chips. Typically, cleaning is performed dry with an abrasive pad; however, specific jaw cleaning instructions are included in the jaw manufacturers operating instructions. Jaw cleaning intervals will vary by size, material, and engineering design. Moreover, jaws may require periodic inspections and or re-calibration; check the jaw manufacturers operating instructions for details.
- Pressing tools (sometimes called press tools or guns) require periodic inspection and re-calibration. Specific recommendations vary by manufacturer and model number; consult the operating instructions provided with the pressing tool.
- Jaw cleanliness, jaw inspection/re-calibration (if required), and periodic pressing tool re-calibration/ inspection are the responsibility of the installer. Failure to maintain the pressing tool, jaw, or actuator may void the manufacturer's warranty.

2.3 Other Required Tools

To complete a press connection the following tools are required:

- Pipe cutter or a fine-toothed hacksaw
- Deburring tool (internal and external side)
- Marker to mark insertion depth on tube based on insertion depth chart

2.4 Handling and Storage Handling

Handling

- Always thoroughly inspect fittings before to use
- Carefully handle fittings and tubing during shipping/ transportation
- Keep fittings in packaging until ready to install

Storage

- Keep fittings contained in a clean, dry spot, ideally their original packaging and not exposed to direct sunlight
- Store fittings above the ground in temperatures above zero degrees Fahrenheit
- To prevent corrosion, keep different materials stored separately

Disposal

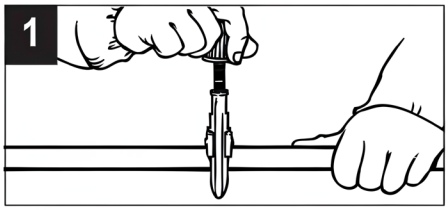
- Discard packaging materials once installation is complete in accordance with national, state and regional requirements

2.5 Installation Procedure

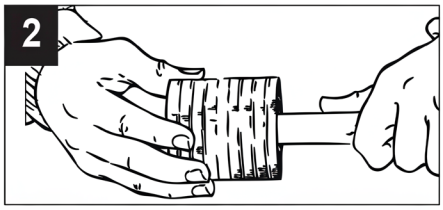
Preliminary Checks: Always visually check components (fittings, pipes and tools) before installation to ensure they are free from damage. Do not repair / install damaged items.

PRODUCT INSTRUCTIONS

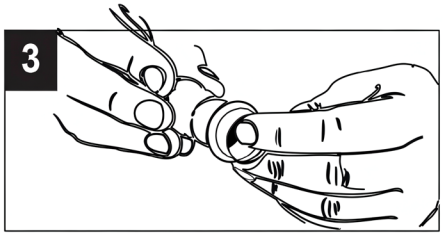
Dimensions 1/2"- 2"



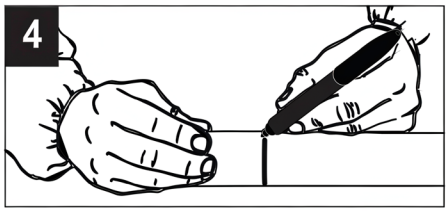
1. The copper pipes must be cut by using a pipe cutting tool, the effectiveness of which has previously been verified and declared by the producer. The pipe must be cut using a pipe cutter or a fine-toothed saw and must be perpendicular to the axis of the pipe.



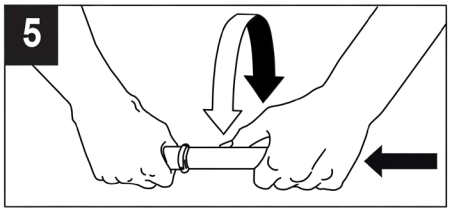
2. Once the pipe has been cut, it is always necessary to carefully deburr its internal and external extremities. This operation is absolutely essential whenever the adopted cutting system can create burrs; for example, with manual and electric saws. The removal of any residual chips prevents the possible damage of the O-ring gasket once the pipe is introduced into the fitting.



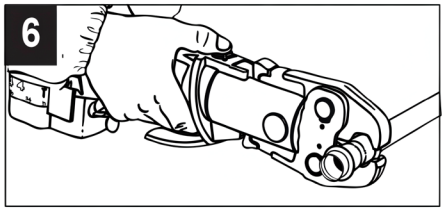
3. Check the correct O-ring position, its integrity and cleanliness, and if the internal surface of the fitting is clear of residues or burrs, that could hinder the proper functioning of the gasket. To improve the insertion of the copper pipe in the fitting and the sealing performance if the environment is dry and cold, apply a layer of lubricant (grease or oil certified by the manufacturer as compatible with EPDM and NSF 61 approved) on the O-Ring prior to inserting the pipe.



4. To be absolutely sure of the correct depth of the connection of the pipe inside the fitting, it is sufficient to mark the depth of the connection beforehand. As indicated by the tube insertion depth chart.



5. Insert the tube by applying a slight rotation.
To make easier the insertion of the pipe, water can be applied to the internal seat of the gasket (avoid using lubricants that can damage it).



6. To perform a proper press, the appropriate equipment must be used; put the fitting inside the jaw and keep the tool positioned at right angles to the pipe. Always refer to specific tool manufacturer instructions

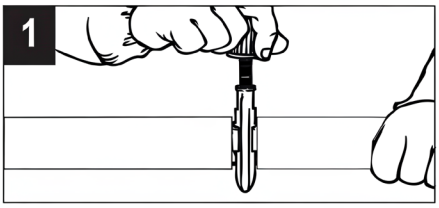
TUBE INSERTION DEPTH CHART - 1/2" - 2"							
		1/2"	3/4"	1"	1-1/4"	1-1/2"	2"
Insertion	Inches	0.71	0.91	0.91	1.02	1.42	1.57
	mm	18	23	24	26	36	40

2.5 Installation Procedure

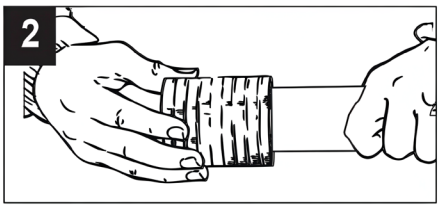
Preliminary Checks: Always visually check components (fittings, pipes and tools) before installation to ensure they are free from damage. Do not repair / install damaged items.

PRODUCT INSTRUCTIONS

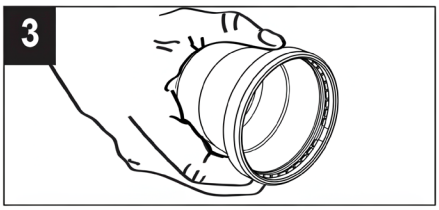
Dimensions 2-1/2"- 4"



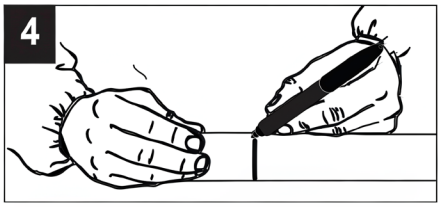
1. The copper pipes must be cut by using a pipe cutting tool, the effectiveness of which has previously been verified and declared by the producer. The pipe must be cut using a pipe cutter or a fine-toothed saw and must be perpendicular to the axis of the pipe.



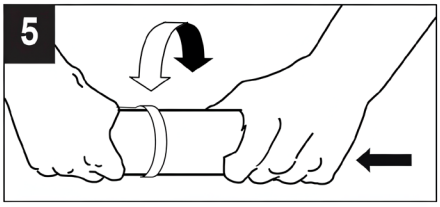
2. Once the pipe has been cut, it is always necessary to carefully deburr its internal and external extremities. This operation is absolutely essential whenever the adopted cutting system can create burrs; for example, with manual and electric saws. The removal of any residual chips prevents the possible damage of the O-ring gasket once the pipe is introduced into t fitting.



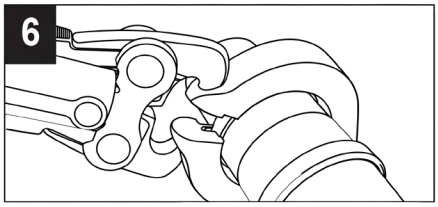
3. Before proceeding, it is necessary to check the correct O-ring position, the grip ring and nylon spacer, ensuring their integrity and cleanliness, and at the same time check if the internal seat of the fitting is free of residues that could hinder the right functioning of the gasket.



4. To be absolutely sure of the correct depth of the connection of the pipe inside the fitting, it is sufficient to mark the depth of the connection beforehand. As indicated by the tube insertion depth chart.



5. Insert the tube by applying a slight rotation
To make easier the insertion of the pipe, water can be applied to the internal seat of the gasket (avoid using lubricants that can damage it).



6. To perform a proper pressing, the appropriate equipment must be used; put the fitting inside the appropriate ring and press with the appropriate jaw, keeping the tool positioned at right angles to the pipe. Always refer to specific tool manufacturer instructions

TUBE INSERTION DEPTH CHART - 2-1/2" - 4"				
		1/2"	3/4"	1"
Insertion	Inches	1.75	1.97	2.40
	mm	44	50	61

Pressure Testing:

Once the installation has been completed, it is necessary to pressurize the system in accordance with the local regulations and in compliance with the maximum performances indicated for the Purepro Press system. If no local regulations currently exist for system pressure testing, please follow the procedures described below; it is always recommended to not cover or insulate any fitting before testing:

Water Leak Testing:

The water pressure test should be done immediately before the start-up phase, at least 7 days before using potable water.

Fill the system and, at the same time, vent it from appropriate points

Pressurize slowly up to 50 psi and stabilize for at least 2 hours

During the pressure test, check for visible pressure leaks

Once the system has been confirmed to be leak free, water pressure can be increased to the working pressure to verify the system is working properly (always remember not to exceed the maximum working pressure of the product) See Paragraph 1.6.2

Air Leak Testing:

- The test must be conducted using dry, oil free compressed air or nitrogen.
- Pressurize slowly up to 45 psi and stabilize for at least 2 hours
- Check that the pressure does not change during testing (e.g. due to temperature variation)
- During the pressure test, check for visible pressure leaks
- Once the system has been confirmed to be leak free, pressure can be increased to the working pressure to verify is working properly (always remember not to exceed the maximum working pressure of the product see paragraph 1.6.2)

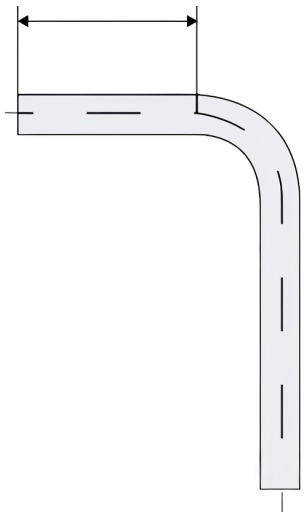
Please have in mind that all PurePro Press fittings are equipped with device which allows the user to immediately identify any unpressurized joints; the device works both when testing with water (in the range between 15 and 85 psi) and when using air (between 1/2 and 45 psi).

2.6 General Installation Requirements

For a successful installation, it is also necessary and advisable to evaluate some collateral aspects that may affect the quality of the work.

2.6.1 Pipe Bending

The range of PurePro Press fittings includes 45° and 90° bends and elbows that allow changes to be made in the route without the need to bend the pipe directly. However, sometimes, the cold shaping of the pipes is necessary. To carry out this type of operation, please give priority to the information placed in the user instruction given by the pipe supplier. In any case it is always necessary to respect a minimum distance from the bend made on the pipe to the installation of fittings (see picture below).



2.6.2 Pipe Hangers and Support

PurePro Press fittings hangers and supports do not require special consideration.

Press fittings should never be used in place of tubing supports.

Always refer to industry standard practices and guidelines for tube layout and support.

Hangers and supports must conform to the local code requirements. If none exist, hangers and supports should conform to ANSI/MSS SP 58 (pipe hangers and supports-materials, design, manufacture, selection, application and Installation).

As a general rule, for PurePro Press system use copper collars or, steel with rubber seals; this type of support allows the acoustic isolation and dampening of any rustling and vibration, and also prevent undesirable corrosive elements due to contact between different metals.

Additional relevant guidelines about hangers:

- Never place fixed hanger near a fitting (Fig. 1).
- The sliding hangers are not positioned to ensure that they behave as if they were fixed points (Fig. 2).
- When there are sections of straight pipe without expansion compensators, only one fixed point can be installed in order to prevent possible deformations. All the remaining points must be sliding points. It is a good practice to position this point in the intermediate position with respect to the length of the straight section (Fig. 3) as much as possible; by doing this, the elongation due to expansion in the two directions is shared, thus halving the length of the necessary expansion arm.

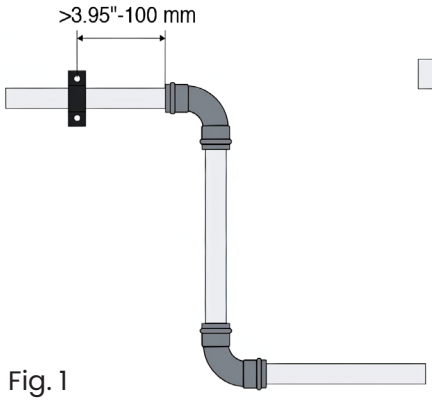


Fig. 1

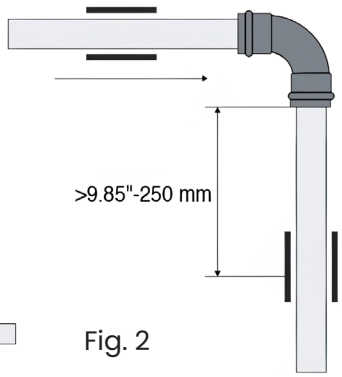


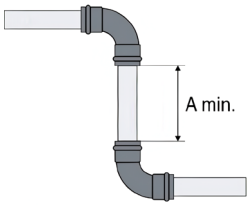
Fig. 2

Fig. 3

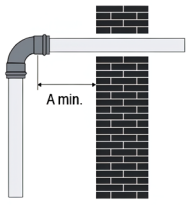
2.6.3 Distance and Maneuvering Space

Before preparing the installation it is advisable to consult the technical information provided by the manufacturers of press tools in order to check the minimum distances that can be achieved between two different press ends and the distances that can be applied between press ends and surrounding obstacles (walls, floors, other pipes).

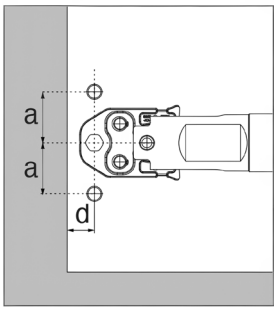
The following are the maneuvering distances and the minimum distances that can be considered as a general indication, obtained from experimental laboratory tests using tools available among those approved. It is necessary to always refer to the minimum distances of your selected tool supplier.



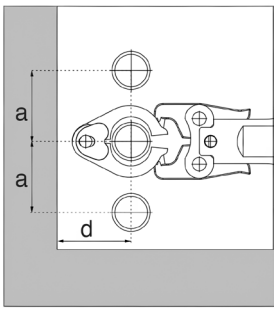
TAB. 1 MINIMUM DISTANCE BETWEEN TWO PRESSED FITTINGS										
Size		1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"	4"
A	Inches	0.6	0.8	0.8	1	1/2	1/4	0.6	0.6	0.6
	mm	15	20	20	25	30	35	15	15	15



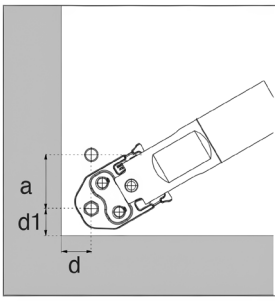
TAB. 2 MINIMUM DISTANCE FROM THE FITTING TO THE WALL FOR PASS-THROUGH INSTALLATIONS		
Size		1/2" - 4"
A	Inches	1.97
	mm	50



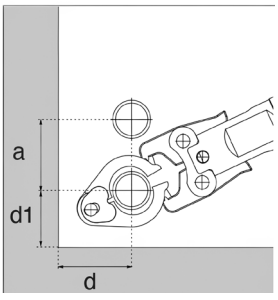
TAB. 3 MINIMUM DEPTHS OF THE PIPELINES INSTALLED IN-WALL							
Size		1/2"	3/4"	1"	1-1/4"	1-1/2"	2"
d	Inches	0.9	1	1	1.2	3	3.4
	mm	22	25	25	30	75	85
a	Inches	2.4	2.6	3	3.3	4.5	4.7
	mm	60	65	75	83	115	120



TAB. 3 MINIMUM DEPTHS OF THE PIPELINES INSTALLED IN-WALL				
Size		2-1/2"	3"	4"
d	Inches	4.35	4.7	5.5
	mm	110	120	140
a	Inches	5.5	5.9	6.7
	mm	140	150	170



TAB. 4 MINIMUM DEPTHS OF THE PIPELINES INSTALLED NEAR CORNERS							
Size		1/2"	3/4"	1"	1-1/4"	1-1/2"	2"
d	Inches	1/2	1/2	1/2	1/2	3	3/4
	mm	31	31	31	31	75	85
a	Inches	3.2	3.2	3.2	3.4	3	3.4
	mm	80	80	80	84	75	85
d1	Inches	1.1	1.4	1.4	1.7	4.5	4.7
	mm	28	35	35	44	115	120



TAB. 4 MINIMUM DEPTHS OF THE PIPELINES INSTALLED NEAR CORNERS				
Size		2-1/2"	3"	4"
d	Inches	4.3	4.7	5.5
	mm	110	120	140
a	Inches	4.3	4.7	5.5
	mm	110	120	140
d1	Inches	5.5	5.9	6.7
	mm	140	150	170

2.6.4 Distance Between Soldering/Brazing from Press End

Pressing Near an existing Soldered / Brazed Connection require minimum distances:

- Brazed connection and pressing a new connection is 2 pipe diameters and outlined in chart below
- Soldered connection and pressing a new connection outlined in chart below

Size	Soldered Minimum Distance (inches)	Soldered Minimum Distance (mm)	Brazed Minimum Distance (inches)	Brazed Minimum Distance (mm)
1/2"	0.25	7	1	26
3/4"	0.25	7	1.5	38
1"	0.44	11	2	51
1-1/4"	0.44	11	2.5	64
1-1/2"	0.63	16	3	76
2"	0.75	19	4	102
2-1/2"	0.25	7	5	127
3"	0.25	7	6	153
4"	0.25	7	8	204

Soldering/Brazing near an existing Pressed Connection require minimum distances:

- Existing PurePro Press Fitting Connection and Soldering a new connection is 3 pipe diameters, outlined in chart below
- Existing PurePro Press Fitting Connection and Brazing a new connection 9 pipe diameters, outlined in chart below
- Maintain the minimum space to ensure the proper seal of both the soldered and pressed connections
- Take precautions to keep the press connections cool. Suggested ways:
  - Wrapping the press connection with a cold, wet cloth
  - Pre-fabricating solder/brazed connections and waiting for tube to cool prior to when fitting is installed
  - Applying spray cooling gel

MINIMUM DEPTHS OF PIPELINES				
Size	Soldered Minimum Distance (inches)	Soldered Minimum Distance (mm)	Brazed Minimum Distance (inches)	Brazed Minimum Distance (mm)
1/2"	1.5	38	4.5	114
3/4"	2.25	57	6.75	172
1"	3	76	9	229
1-1/4"	3.75	95	11.25	286
1-1/2"	4.5	114	13.5	343
2"	6	153	18	457
2-1/2"	7.5	191	22.5	572
3"	9	229	27	686
4"	12	305	36	915

2.7 Maintenance

To avoid personal injury to yourself, fellow workers, or damage to property from release of process fluids, before performing any maintenance:

1. Shut off all operating lines.
2. Isolate the fitting completely from the process
3. Release process pressure
4. Drain the process fluid

Press fittings are not designed for rebuilding, nor is it economical to do so. If over time the fitting leaks, complete replacement is recommended.

Press fittings, if properly used, do not require regular maintenance. However, a visual inspection should be part of a regular maintenance program. A higher frequency of inspection is recommended for fittings operating under extreme conditions.

3. Technical Information

3.1 Freeze and Anti-Freezing

It is known that freezing water increases in volume. This can cause breakage of tanks and deformations in the sections of the system where the increase in the volume of the water is hindered.

When using PurePro Press Fittings in systems that can be found at temperatures close to 32°F with the consequent formation of ice, the drainage of the system is recommended, and in case of a pressure test during the cold period, the use of compressed air or inert gas.

The strong stresses that any frost could give to the pipeline could also negatively affect the seal of the fitting, reducing performance and causing undesired leaks. In many cases, the use of antifreeze systems that are designed to ensure circulation within the system even at low temperatures is recommended.

In case of the use of anti-corrosion or antifreeze additives, it is recommended to consult the F.W. Webb team to verify their suitability. The chemical composition of the additive could damage the sealing gasket over time, compromising durability and reliability.

3.2 Corrosion Protection

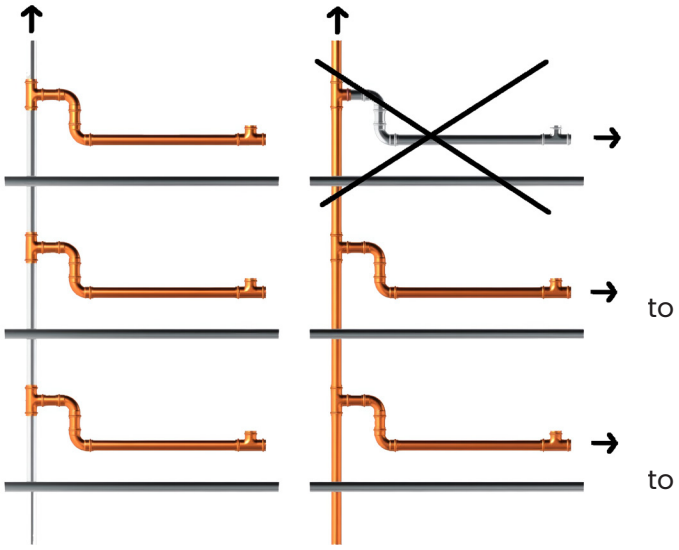
PurePro Press Fittings can also be installed under the floor, however, some caution should be taken when installing in the following environments:

- Contact with materials containing ammonium or nitrite, such as construction materials.
- Environments with aggressive substances suspended in air

It is always necessary to contact the appropriate authorities prior to installation verify that the installation criteria defined by state and local codes have been met.

In the case of underground installations (i.e. in contact with soil or a particularly humid environment) PurePro Press fittings may be subject corrosion, and therefore reference according to NACE RP0169-2002 or any local codes.

Finally, do not underestimate the effects of excessive fluid velocity within the piping, which typically represents the primary cause of erosion corrosion.



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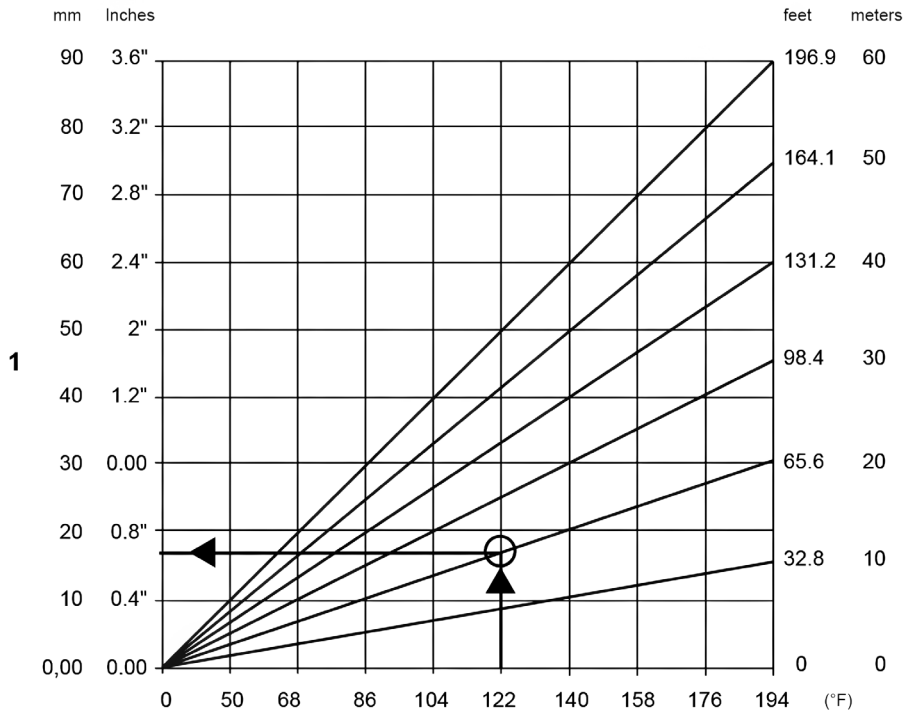
3.3 Thermal Expansion

As for all the types of pipes constituting a distribution network, even with PurePro Press fittings the elongations or contractions due to thermal expansions as a result of the increase or decrease of temperature of the conveyed fluid must be evaluated.

To compensate for these effects, the necessary space for the expansions, the proper placement of fixed or sliding support points, and the realization of any line compensators must therefore be provided for.

The table below gives an overview about the thermal expansion of a copper system, considering several thermal changes (ΔT) and different lengths:



1: Length expansion ΔI (inches/mm)
2: Pipe length (feet/meters)
3: Temperature difference (°F)

It is advisable to refer to a specialist to select the best option technically for the specific installation, which will take into account the available space, the installation context, the thermal expansion to be compensated for and the available resources.

3.4 Pressure Drops

When sizing the system, it is important to take into account the pressure losses generated by the fluid passing through the pipe (continuous or distributed losses) and the connections (localized or accidental losses).

The correct sizing of the distribution network, which ensures that the system operates in accordance with the customer's requirements, depends primarily on the correct quantification of the pressure losses.

For this purpose, it is essential to have information on friction losses, which can be obtained from the manufacturer of the pipe used, and losses resulting from the crossing of fittings along the distribution system.

Equivalent Method:

This is a calculation method that solves the calculation problem as a function of a particular local resistance and gives the equivalent length of a straight piece of tube with the same diameter that would have the same pressure drop. In order to use this method of calculation all length-equivalent values for each fitting type in the table are to be added to the actual length of the supply network. This method is not as accurate as the direct analytical method but has the advantage that the calculation can be carried out faster.

TAB. 5 EQUIVALENT LENGTHS FOR WROUGHT COPPER FITTINGS

Size	90° Elbow		45° Elbow		Tee Branch		Tee Run		Coupling	
	Ft.	m	Ft.	m	Ft.	m	Ft.	m	Ft.	m
1/2″	1'	0.30	0.5'	0.15	2'	0.60	-	-	-	-
3/4″	2'	0.60	0.5'	0.15	3'	0.90	-	-	-	-
1″	2.5'	0.75	1'	0.30	4.5'	1.35	-	-	-	-
1 1/4″	3'	0.90	1'	0.30	5.5'	1.65	0.5'	0.15	0.5'	0.15
1 1/2″	4'	1.20	1.5'	0.45	7'	2.15	0.5'	0.15	0.5'	0.15
2″	5.5'	1.65	2'	0.60	9'	2.75	0.5'	0.15	0.5'	0.15
2 1/2″	7'	2.15	2.5'	0.75	12'	3.65	0.5'	0.15	0.5'	0.15
3″	9'	2.75	3.5'	1.00	15'	4.50	1'	0.30	1'	0.30
4″	12.5'	3.75	5'	1.50	21'	6.40	1'	0.30	1'	0.30

Values are purely indicative and may be subject to change due to production requirements.

TAB. 6 EQUIVALENT LENGTHS FOR WROUGHT COPPER FITTINGS

Size	90° Elbow		Tee Run		Tee Branch	
	Ft.	m	Ft.	m	Ft.	m
1/2″	1'	0.30	0.5'	0.15	2'	0.60
3/4″	2'	0.60	0.5'	0.15	3'	0.90
1″	4'	1.20	0.5'	0.15	5'	1.50
1 1/4″	5'	1.50	1'	0.30	7'	2.15
1 1/2″	8'	2.50	1'	0.30	9'	2.75
2″	11'	3.35	2'	0.60	12'	3.65

Values are purely indicative and may be subject to change due to production requirements.

3.5 Electrical Bonding

PurePro Press fittings, when properly installed, comply with Section 1211.15 (Electrical Connection and Grounding of the Uniform Plumbing Code). It is necessary to keep in mind that the pressing tool creates a metallic continuity between the fitting and the pipe.

3.6 Pressure Surges

It is advisable to check in advance for pressure surges caused, for example, by the operation of quick-opening/closing valves or other sources that can cause water hammer damaging to the system. Designers and installers should take measures to absorb such surges without causing damage to network components.

4. Warranty - Terms and Conditions of Sale

Limited Warranty for Copper And Brass Press Fittings

Limited Warranty for Residential and Commercial Applications

PurePro® warrants to the initial purchaser in the United States and Canada which includes licensed installers (each an "initial purchaser") when properly installed in accordance with the published PurePro recommendations and standard industry practice in non-industrial applications and under normal conditions of use, will be free of defects in material and workmanship for a period of fifty (50) years from the date of initial purchase. Should any failure to conform to this warranty appear before the fifty (50) year anniversary of the date of initial purchase, PurePro will, upon written notification and conformance with the procedures set forth below, reimburse the initial purchaser for the repair and/or replacement of the press fitting.

17In the event any defect occurs which is believed to be covered by this limited warranty, it is the responsibility of the claimant to (1) obtain and pay for reasonable and related repairs and/ or replacement, and (2) keep the press fitting claimed to be defective. Promptly after the date of such defect (and no later than thirty (30) days after the date of such defect), the claimant shall contact the initial purchaser of the press fitting in writing to obtain a Return of Material Authorization ("RMA"). The claimant should be prepared to ship to the address indicated in the RMA, at claimant's expense, the press fitting claimed to be defective and the initial purchaser should document the initial date of purchase. Within a reasonable time after receiving the claimed item, PurePro will investigate the reason for the alleged defect. PurePro will notify the initial purchaser in writing of the results of its review. In the event that PurePro determines that a defect in the press fitting occurred and that this warranty applies, the SOLE AND EXCLUSIVE REMEDY under this warranty shall be reimbursement for reasonable and related repairs and/or replacement of the defective item.

This limited warranty DOES NOT apply if the defect or any resulting damage is caused by:

- Any products, parts or components which are not manufactured or sold by PurePro;
- Any products, parts or components which are used for purposes other than a purpose authorized by PurePro;
- The improper design, installation, inspection, or testing of the press fitting and/or the failure to install the press fitting in accordance with the published PurePro recommendations in effect at the time of the installation and/or the failure to install the press fitting in accordance with applicable code requirements and standard industry practice;
- Improper handling and protection of the press fitting prior to and during installation, inadequate freeze protection, exposure to water pressures or temperatures or in applications outside acceptable operating conditions indicated in the installation manual;
- Acts of nature such as, but not limited to, earthquakes, fire, flood, or lightning;
- External environmental causes, such as water quality variations, aggressive water, or other external chemical or physical conditions;
- Normal wear and tear; or any other cause beyond the reasonable control of PurePro.

PurePro SHALL NOT BE LIABLE UNDER ANY CIRCUMSTANCES FOR ANY OTHER DIRECT OR INDIRECT, INCIDENTAL, CONSEQUENTIAL OR OTHER DAMAGE (BY WAY OF EXAMPLE BUT NOT LIMITATION, WATER DAMAGE OR PROPERTY OR MOLD REMEDIATION) OF ANY KIND, INCLUDING, BUT NOT LIMITED TO, LOSS OF BUSINESS OR LOST PROFIT, UNDER ANY LEGAL THEORY AND WHETHER ASSERTED BY DIRECT ACTION, FOR CONTRIBUTION OR INDEMNITY OR OTHERWISE. THE LIABILITY OF PurePro UNDER THIS LIMITED WARRANTY IS SOLELY LIMITED TO THE REPAIR AND/ OR REPLACEMENT OF THE PRESS FITTING THAT HAS BEEN DETERMINED BY PurePro TO CONTAIN A DEFECT IN MATERIAL OR WORKMANSHIP. THIS LIMITED WARRANTY IS THE ONLY WARRANTY FOR THE PRESS FITTING PROVIDED BY PurePro AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Other than this limited warranty, PurePro does not authorize any person or firm to create for it any other obligation or liability in connection with the press fitting.

Warranty

This Limited Warranty gives you specific legal rights and you also may have other rights which may vary from state to state. This warranty shall be interpreted and applied under the law of the state in which the product is sold.

Limited Warranty for Industrial Applications

Industrial applications are defined as non-residential and non-commercial applications not normally accessible to the general public, including manufacturing, mining, process or fabrication environments. PurePro warrants to the initial purchaser in the United States and Canada which includes only licensed installers (each an "initial purchaser") that PurePro copper and brass press fittings (each a "press fitting") when properly installed in accordance with the published PurePro recommendations and standard industry practice in an industrial application, will be free of defects in material and workmanship for a period of two (2) years from the date of initial purchase. Should any failure to conform to this warranty appear before the two (2) year anniversary of the date of initial purchase, PurePro will, upon written notification and conformance with the procedures set forth below, reimburse the initial purchaser for the repair and/or replacement of the press fitting.

In the event any defect occurs which is believed to be covered by this limited warranty, it is the responsibility of the claimant to (1) obtain and pay for reasonable and related repairs and/ or replacement, and (2) keep the press fitting claimed to be defective. Promptly after the date of such defect (and no later than thirty (30) days after the date of such defect), the claimant shall contact the initial purchaser of the press fitting in writing to obtain a Return of Material Authorization ("RMA"). The claimant should be prepared to ship to the address indicated in the RMA, at claimant's expense, the press fitting claimed to be defective and the initial purchaser should document the initial date of purchase. Within a reasonable time after receiving the claimed item, PurePro will investigate the reason for the alleged defect. PurePro will notify the initial purchaser in writing of the results of its review. In the event that PurePro determines that a defect in the press fitting occurred and that this warranty applies, the SOLE AND EXCLUSIVE REMEDY under this warranty shall be reimbursement for reasonable and related repairs and/or replacement of the defective item.

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- Any products, parts or components which are used for purposes other than a purpose authorized by PurePro;
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- Improper handling and protection of the press fitting prior to and during installation, inadequate freeze protection, exposure to water pressures or temperatures or in applications outside acceptable operating conditions indicated in the installation manual;
- Acts of nature such as, but not limited to, earthquakes, fire, flood, or lightning;
- External environmental causes, such as water quality variations, aggressive water, or other external chemical or physical conditions;
- Normal wear and tear; or any other cause beyond the reasonable control of PurePro.

PurePro SHALL NOT BE LIABLE UNDER ANY CIRCUMSTANCES FOR ANY OTHER DIRECT OR INDIRECT, INCIDENTAL, CONSEQUENTIAL OR OTHER DAMAGE (BY WAY OF EXAMPLE BUT NOT LIMITATION, WATER DAMAGE OR PROPERTY OR MOLD REMEDIATION) OF ANY KIND, INCLUDING, BUT NOT LIMITED TO, LOSS OF BUSINESS OR LOST PROFIT, UNDER ANY LEGAL THEORY AND WHETHER ASSERTED BY DIRECT ACTION, FOR CONTRIBUTION OR INDEMNITY OR OTHERWISE. THE LIABILITY OF PurePro UNDER THIS LIMITED WARRANTY IS SOLELY LIMITED TO THE REPAIR AND/OR REPLACEMENT OF THE PRESS FITTING THAT HAS BEEN DETERMINED BY PurePro TO CONTAIN A DEFECT IN MATERIAL OR WORKMANSHIP.

WARRANTY THIS LIMITED WARRANTY IS THE ONLY WARRANTY FOR THE PRESS FITTING PROVIDED BY PurePro AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Other than this limited warranty, PurePro does not authorize any person or firm to create for it any other obligation or liability in connection with the press fitting.

This Limited Warranty gives you specific legal rights and you also may have other rights which may vary from state to state. This warranty shall be interpreted and applied under the law of the state in which the product is sold.

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