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# REHAU F1960 product instructions

Product instructions for REHAU F1960 fittings and rings for use in PEXa radiant heating and plumbing applications. [na.rehau.com/resource-center](http://na.rehau.com/resource-center)



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For updates to this publication and the most current technical instructions, safety information and manufacturer's recommendations, visit [www.na.rehau.com/resourcecenter](http://www.na.rehau.com/resourcecenter)

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# 1. Scope

Thank you for your purchase. These instructions contain information about the assembly and use of the REHAU F1960 cold expansion fitting system with RAUPEX® UV shield (PEXa) pipe, intended for use in hot- and cold-water potable systems and RAUPEX O<sub>2</sub> barrier pipe for hydronic heating and cooling systems.

For professional use only. Persons using this guide must be experienced and appropriately licensed professional contractors who understand the principles and practices associated with the proper installation of hot- and cold-water potable and hydronic systems.

The information presented in this product instruction manual is intended to demonstrate the proper assembly method and installation recommendations for the REHAU F1960 fitting system. Allow only persons who fully understand this manual to participate in the assembly and use of the REHAU F1960 fitting system with REHAU PEXa pipe.




It is the responsibility of the licensed contractor to check the prevailing local codes and to verify that the technical information presented in this guide is appropriate for a particular installation.

Nothing in this manual supersedes national or local code requirements or the recommendations of other manufacturers regarding their components. Observe all applicable national, state and local laws, regulations, standards, codes and ordinances. If you believe REHAU product information conflicts with applicable code requirements, industry standards, or the recommendations of other manufacturers regarding their components, contact the REHAU distributor in your area and consult with the building authority having jurisdiction before installing the F1960 fitting system.

Before starting the installation process, read the REHAU *PEXa Limited Warranty*, available at [www.na.rehau.com/warranties](http://www.na.rehau.com/warranties). It can also be obtained from your authorized REHAU distributor or by writing to REHAU Construction LLC, 1501 Edwards Ferry Road NE, Leesburg VA 20176 US.

Proper installation is the responsibility of the installing contractor. Review the REHAU *Technical Guidelines* prior to installation of the REHAU crosslinked polyethylene (PEXa) piping system. REHAU *Technical Guidelines* are defined in the REHAU *PEXa Limited Warranty* as: The most current and applicable versions of all the technical literature available on the REHAU North America website at [www.na.rehau.com/resourcecenter](http://www.na.rehau.com/resourcecenter), including, but not limited to, technical manuals, instruction guides, technical bulletins, submittals and REHAU Academy training presentations. Check the REHAU Resource Center at [www.na.rehau.com/resourcecenter](http://www.na.rehau.com/resourcecenter)) for the latest updates. Contact the REHAU distributor in your area if you do not understand the information in this manual or if you have questions about the REHAU *Technical Guidelines*.

This manual contains safety-related information that requires your special attention. It is indicated with the safety alert symbol and the signal words described below: :

 <b>DANGER</b>	Indicates a hazardous situation which, if not avoided, will result in death or serious injury.
 <b>WARNING</b>	Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
 <b>CAUTION</b>	Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
<b>NOTICE</b>	Indicates a risk of property damage, including damage to the individual components.

Only trained personnel should be engaged in the installation process. Follow the instructions in this manual and other REHAU *Technical Guidelines* and use common sense to reduce the risk of injury or property damage.

## 2. System overview and components

### 2.1 Applications

The REHAU F1960 cold expansion fitting system (REHAU F1960 fitting system) consists of ASTM F1960 cold expansion fittings (REHAU F1960 fittings) in polymer and lead-free brass, and PEX reinforcing rings (PEX rings), for use with REHAU PEXa UV shield pipe for potable plumbing system applications and RAUPEX O<sub>2</sub> barrier pipe for hydronic radiant heating and cooling system applications (REHAU PEXa pipe).

The REHAU F1960 fitting system is intended for use in hot- and cold-water potable systems and hydronic heating and cooling systems as defined by the following national codes:

- ICC International Plumbing Code (IPC)
- ICC International Residential Code (IRC)
- IAPMO Uniform Plumbing Code (UPC)
- National Plumbing Code of Canada (NPCC)
- International Mechanical Code (IMC)
- International Building Code (IBC)
- Uniform Mechanical Code (UMC)
- National Building Code of Canada (NBCC)
- CSA B214 Installation Code for Hydronic Heating Systems

### 2.2 System components

For a detailed description of the system components, refer to the *REHAU Building Solutions Product Catalog (855.312)*.

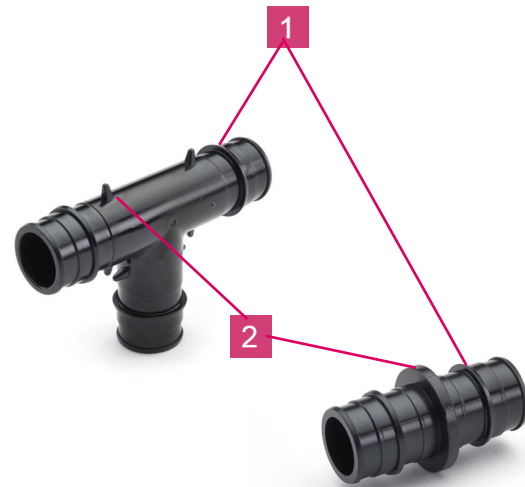
### 2.3 Product range

The REHAU F1960 fitting system is available in 3/8, 1/2, 5/8, 3/4, 1, 1 1/4, 1 1/2 and 2 in. sizes and is intended for use with REHAU PEXa SDR9 copper tube size (CTS) pipe manufactured in accordance with ASTM F876.

### 2.4 Fitting features

REHAU F1960 polymer and lead-free brass fittings have the following features:

1. Sealing rib
2. Fitting shoulder



### 2.5 REHAU F1960 polymer fittings

REHAU F1960 cold expansion polymer fittings are available in couplings, tees, elbows, multi-port tees and plugs. All polymer fittings are produced from a polyphenylsulfone (PPSU) material that meets the requirements of NSF61 for health effects of drinking water system components and complies with the lead-free requirements of the U.S. Safe Drinking Water Act.



## 2.6 REHAU F1960 lead-free (LF) brass fittings

REHAU F1960 cold expansion LF brass fittings are available as transition fittings to NPT thread and copper solder connections. All metal fittings are produced from ECO BRASS® (UNS C69300 or CW724R) that meets the requirements of NSF61 for health effects of drinking water system components and complies with the lead-free requirements of the U.S. Safe Drinking Water Act.



## 2.7 REHAU F1960 PEX reinforcing rings

REHAU F1960 PEX reinforcing rings are intended for use with REHAU F1960 fittings and REHAU PEXa pipe.



## 2.8 REHAU PEXa pipe

RAUPEX PEXa pipe is produced using the high-pressure peroxide method for crosslinked polyethylene (PEXa) in accordance with ASTM F876, F877, CSA B137.5 and PPI TR-3, and is certified to NSF 61 standards. RAUPEX UV shield pipe also meets the requirements NSF14 and of ASTM F2023 for chlorine resistance. REHAU PEXa pipe is manufactured using a quality management system which has been certified to the latest version of ISO 9001.



RAUPEX UV shield pipe



RAUPEX O<sub>2</sub> barrier pipe

## 2.9 F1960 assembly tools

Installation of the REHAU F1960 cold expansion fitting system may be performed with commercially available F1960 cold expansion tools.

Readily available tools currently in the market are:

- DeWALT® 20V MAX PEX Expander (DCE400B)
- Milwaukee Tool® M12™ ProPEX® Expansion Tool (2432)
- Milwaukee Tool® M18™ ProPEX® Expansion Tool (2632)
- Milwaukee Tool® M18™ FORCE LOGIC™ 2"-3" ProPEX® Expansion Tool (2633)

F1960 cold expansion tools are not sold or endorsed by REHAU. It is the responsibility of the contractor to verify the tools are being used in accordance with the tool manufacturer recommendations.

## 2.10 Certifications

The REHAU F1960 fitting system is certified to the following standards:

- ASTM F1960 *Standard Specification for Cold Expansion Fittings with PEX Reinforcing Rings for Use with Cross-linked Polyethylene (PEX) Tubing*
- NSF/ANSI 14 *Plastic Piping System Components and Related Materials*
- NSF/ANSI 61 *Drinking Water System Components – Health Effects*
- NSF/ANSI 372 *Drinking Water System Components – Lead Content*
- CSA B137.5 *Crosslinked polyethylene (PEX) Tubing Systems for Pressure Applications*

# 3. Assembly

The basic process of assembling an F1960 joint is as follows:

- Inspect fitting and ring.
- Make a clean, square cut of the pipe using a REHAU pipe cutter.
- Slide the ring onto pipe until ring stops on end of pipe.
- Insert F1960 expansion tool expander head into pipe.
- Expand pipe with ring the necessary number of times while rotating the expander head between expansions.
- Insert fitting into expanded end of pipe so pipe with ring are touching fitting shoulder.
- Hold joint in place until pipe and ring shrink securely around fitting.
- Inspect completed joint.

Required assembly tools include:

- REHAU pipe cutter
- F1960 expansion tool with expander heads provided by same manufacturer (toolkit supplied by others)

## ⚠ WARNING



Read the tool manufacturers' instruction manual for F1960 expansion tools before use and follow all safety precautions - improper use can cause serious personal injury or property damage.

## NOTICE

For use only with REHAU PEXa pipe, other materials may crack or otherwise fail which could result in leaking and property damage.

Assembly of a REHAU F1960 joint should be performed at a temperature above 5°F(-15°C).

Use only expander heads that match the dimension of the pipe being installed (e.g., 1/2 in. expander head for 1/2 in. pipe and ring). Use of expander heads that are the wrong size may result in faulty joints, which can lead to leaking and property damage.

The assembly methods for the REHAU F1960 joint with the F1960 expansion tool is as follows:

### 1. Inspect fitting and ring.

- Verify the marking on the fitting and ring are the proper size to be connected with the pipe.
- Carefully inspect all fittings and rings for damage prior to assembly. Do not use fittings or rings if there is any doubt about their integrity.

### 2. Squarely cut the REHAU PEXa pipe.

- Using a REHAU pipe cutter, cut pipe to the desired length. Prior to cutting pipe, ensure pipe cutter is in good condition with a sharp blade.
- The cut must be clean and square (i.e., forming a 90° angle with side of pipe) and must be free of burrs, nicks and jagged ends.



## NOTICE

Not having a clean, square cut of the pipe could cause leakage of the finished joint.

### 3. Slide the PEX ring onto REHAU PEXa pipe.

- Slide the correctly-sized ring onto pipe until ring stops on the end of pipe.
- The ring is directional and will only slide onto the pipe in one direction.
- For 3/8 in. PEX ring, expand each side of the ring once before sliding onto pipe.



#### 4. Screw expander head on the F1960 expansion tool until hand tight.

- Select the properly sized expander head for pipe diameter (e.g., 1/2 in. expander head for 1/2 in. pipe and ring).
- Ensure the expander head is from the same manufacturer as the F1960 expansion tool.
- Ensure expander head is securely tightened on tool.



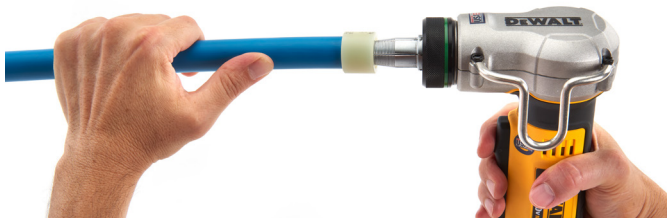
### NOTICE

The use of incorrectly sized, damaged or loose expander heads or a damaged tool may produce faulty joints that could leak.

- Inspect each expander head to ensure no segments are broken, bent or chipped. Do not use if the expander head is damaged.
- Check tool for damage to the expander cone. Never use a tool or attachment that is worn, damaged or modified.

#### 5. Insert expander head into end of REHAU PEXa pipe.

- Insert the expander head into the end of the pipe.
- The pipe with ring are expanded by the tool.



### ⚠ WARNING

Moving parts can pinch. To reduce the risk of personal injury during operation:

- Never touch the expander head during operation.
- Keep hands and other parts of your body away from expander head during operation.

### NOTICE

Prevent grease from entering pipe being installed

- Avoid over-lubricating the expansion cone.
- Do not apply grease to the expander head segments
- Wipe away excess grease from inside tubing after expansion.
- Remove excess grease from the outer surface of the expander head segments.

#### 6. Expand pipe with ring the necessary number of times so pipe with ring are snug to the expander head shoulder.



#### Cold expanding with auto rotating expander heads:

- The expander head should expand, retract and rotate slightly between expansions.
- Hold the pipe so it does not rotate with the expander head.
- Continue to repeat pipe expansions until the pipe with ring are snug to the expander head shoulder.
- Do not keep tool in the expanded position with pipe and ring in place. This will over-expand the pipe and ring and will require additional time to shrink over the fitting.
- Ensure the expander head is rotating during expansion.
- Remove the expander head from the pipe.

#### Cold expanding without auto rotating expander heads:

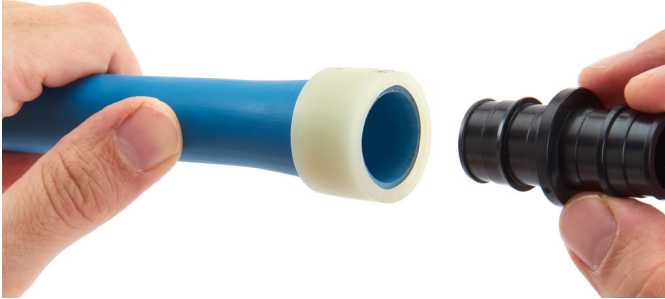
- After each expansion, remove the expander head from the pipe, rotate expander tool 1/8-turn, insert expander head back into pipe and expand again.
- Continue to repeat pipe expansions until the pipe with ring are snug to the expander head shoulder, ensuring expander head is rotated 1/8-turn between expansions.
- Do not keep tool in the expanded position with pipe and ring in place. This will over-expand the pipe and ring and will require additional time to shrink over the fitting.
- Evenly expand the pipe. Ensure the expander head is rotated 1/8-turn between expansions.
- Remove the expander head from the pipe.

### NOTICE

Improper expansion of the pipe with ring can create deep grooves in the inside of the pipe which may result in faulty joints that could leak.

**7. Insert F1960 fitting into expanded REHAU PEXa pipe with PEX ring.**

- Push fitting into pipe so that the end of pipe with ring are touching the fitting shoulder when assembled.
- If the fitting does not insert far enough, immediately remove fitting and expand again. Then reinsert fitting into expanded pipe with ring.



**8. Hold joint in place until REHAU PEXa pipe and PEX ring shrink securely around fitting.**

**NOTICE**

Do not move on to next fitting assembly until fitting is secured with pipe and ring. If not secure, pipe could pull away from joint, which may result in faulty joints that could leak.

**9. Inspect completed F1960 joint.**

- The pipe with ring should fit closely against the fitting shoulder. A maximum gap of up to 1/16th in. (1.6 mm), or about the thickness of two credit cards, is acceptable. This applies to all sizes of fittings.
- If the gap is more than 1/16th in. (1.6 mm) the joint must be replaced.

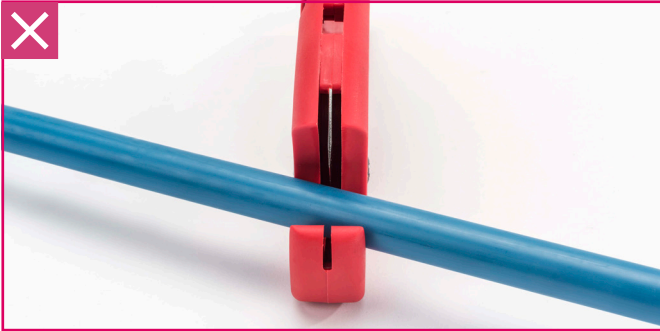




# 4. Assembly considerations

## 4.1 Pipe cutting

When cutting the pipe to length, the cut must be clean and at a right angle (90°) to the pipe wall. Ensure there are no burrs or debris inside the pipe.



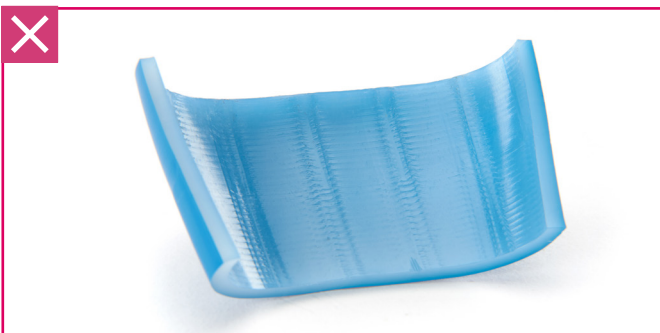
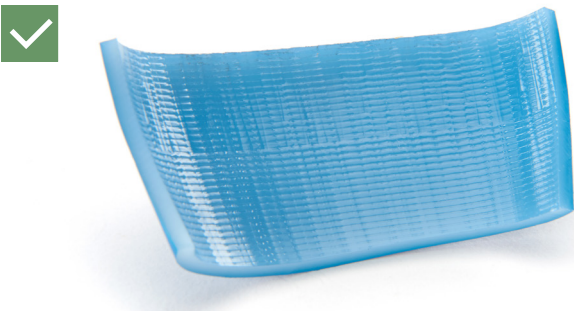
## 4.2 Expansion of pipe

Expand the pipe with ring the necessary number of times while ensuring expander head is rotating between expansions.

### NOTICE

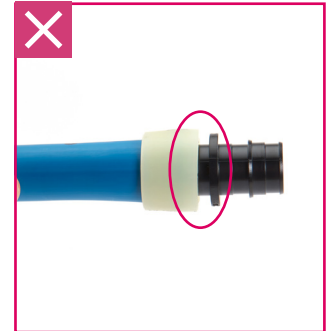
Improper expansion of the pipe with ring can create deep grooves inside the pipe which may result in a faulty joint that could leak.

- Ensure expander head is rotating between expansions.
- Do not rotate pipe during the expansion process.
- Expanding rings at temperatures below 55°F (13°C) can result in inconsistent expansion of ring. Ensure rings are kept warm (above 55°F) prior to expansion.



## 4.3 Fitting insertion

Insert the fitting into the expanded end of the pipe so the pipe with ring are touching the fitting shoulder.



If the fitting does not insert far enough, immediately remove the fitting and expand the pipe with ring again. Then reinsert the fitting.

## 4.4 Finished joint

A finished joint can be visually inspected. There are no calibration tools or go/no-go gauges required to inspect a finished joint.

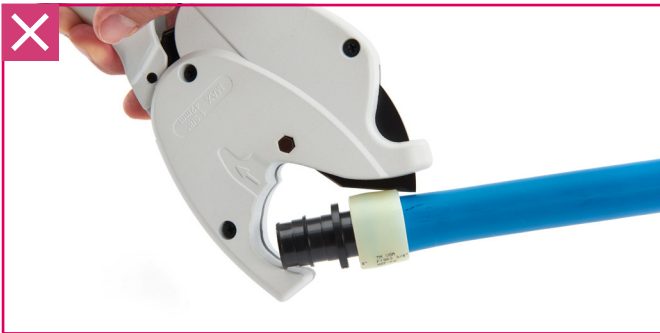
- A properly completed F1960 joint requires the pipe with ring to be flush with the fitting shoulder. A small gap of 1/16th in (1.6 mm) is acceptable.
- To avoid putting unnecessary stress on the pipe, fitting or ring, ensure that the transition of the pipe into the fitting is not at an angle.



#### 4.5 Fitting removal

If it is required to remove the fitting or disassemble the joint, some precautions and additional considerations should be taken:

- F1960 polymer fittings **CANNOT** be reused and should be discarded immediately.
- F1960 PEX rings **CANNOT** be reused and should be discarded immediately.



F1960 LF brass fittings **CAN** be reused, as long as the fitting was not damaged during removal.

If it is required to remove a LF brass fitting or disassemble the joint, ensure system is depressurized and use the following procedure:

1. Cut off ring. Avoid damaging the fitting. Discard ring.
2. Heat joint with heat gun, rotating the joint several times while heating.
3. Remove heat and use pliers to remove the pipe from the fitting.
4. Inspect fitting for damage. If any part of the fitting has been cut or damaged during removal, discard fitting.

#### NOTICE

Support the pipe while keeping hands and other body parts away from the heat. Be careful not to damage the fitting with the tool.

#### ⚠ WARNING

- Do not use open flames to disassemble the joint. Open flames can cause injury or property damage.
- Never use a torch, open flame or heat gun on a pressurized system.
- Never rework a joint that is under pressure. Depressurize the system, cut-out joint and replace.

For re-assembly of a new F1960 joint, the following should be considered:

- The end of the pipe where the previous fitting had been installed must be completely cut off prior to making a new joint. Cutting off a minimum of 3 in (approximately 75 mm) is recommended.

#### 4.6 Rework leaking fitting

If a fitting continues to leak beyond 24-hours after assembly, cut out joint and replace.

#### NOTICE

Never use a heat gun on an F1960 joint to speed up the contraction time as this could result in damage to the fitting and/or softening of the pipe, resulting in the pipe pulling away from the fitting and causing a leak.

# 5. Installation considerations

## 5.1 Packaging, transport, handling and storage

REHAU F1960 fittings and PEX rings are shipped in cardboard boxes to protect them from sunlight, rain, dirt and other hazards. Keep the products in the original packaging until they are required for installation. Return unused products to the packaging for storage.

Fittings and rings must be handled with care. At a minimum, avoid the following:

- Storing loose fittings in tool boxes.
- Contact with oil or oily products such as gasoline, paint thinner, glues or solvents.
- Exposure of polymer fittings and rings to soldering or any open flame.
- Excessive or permanent exposure to sunlight of polymer fittings and rings.

## 5.2 Ultraviolet resistance

F1960 fittings and PEX rings must never be stored in direct sunlight or outside of the original cardboard packaging. In addition, the system is not intended for permanent outdoor applications or in areas with continuous exposure to UV.

## 5.3 Chemical compatibility

There are certain chemicals that can damage the F1960 fitting system. This applies to external exposure of chemicals and to the transport of such chemicals by the piping system.

Chemicals that may damage the system include (but are not limited to):

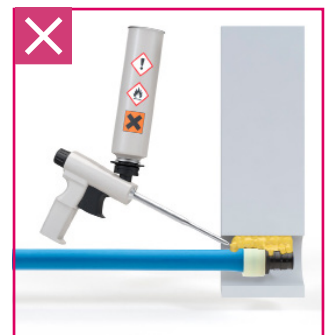
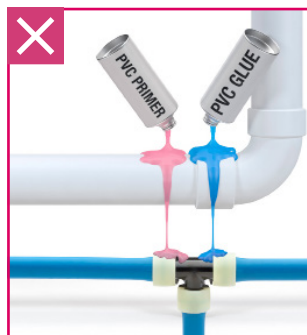
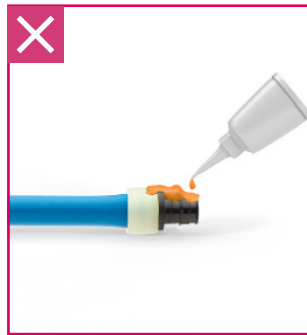
- Adhesives and tapes other than those recommended by REHAU
- Oil/petroleum-based products
- Paints, solvents
- Firestop caulk
- Oxidizing agents (e.g., bleach)
- Disinfectants (e.g., separate dosing unit integrated into building distribution system)
- PVC glues, solvents, cements
- Expandable polyurethane foams
- Leak detection liquids

Many factors, such as exposure time, temperature, pressure and other operating parameters, can influence the performance of a system that is exposed to a chemical. To determine the impact of a particular chemical, short- and long-term pressure testing may be required. In some cases, a system may be resistant to short-term exposure to the chemical, but not resistant to continuous exposure.

Each chemical must be evaluated individually. It is the responsibility of the installing contractor to verify chemical compatibility of any chemicals when coming into contact with the polymer material.

## ⚠ WARNING

The REHAU F1960 fitting system shall not be installed in contaminated soils or immersed in liquid chemicals. Do not directly spray on or allow organic (petroleum-based) chemicals such as, petroleum distillates, termiticides or pesticides to come into contact with the F1960 fitting system. Permeation of these harmful chemicals may occur through the pipe wall resulting in serious injury or death.



## 5.4 Insulating joints

Insulation can be installed to improve resistance to condensation or better maintain internal water temperature. Always comply with prevailing local codes.

Check the chemical compatibility of insulating materials with F1960 fittings and ensure polymer fittings are protected from foaming agents.

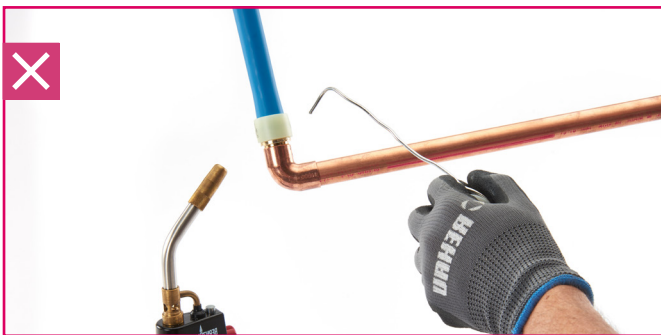
## 5.5 Copper soldering

Proper soldering techniques must be followed when soldering F1960 fittings according to the Copper Development Association (CDA) Handbook:

- The surface of the fitting soldering area must be properly cleaned for a good solder connection. Applying flux is not considered sufficient cleaning for the soldering area. Using a proper sanding or brush technique is necessary to remove the surface oxides. In order to prevent further formation of oxides, the flux should be applied immediately after the cleaning process. A proper flux that is compatible with the brass alloy must be used.
- Care must be taken to not overheat the soldering surface as this can lead to the formation of oxides preventing good adhesion of the solder material. It is imperative that the fitting is heated evenly around the entire surface so as to not overheat one particular area.
- All completed solder joints must be tested for joint integrity following the procedures prescribed by local applicable codes.

When soldering an F1960 fitting:

- When using an F1960 copper adapter fitting, the fitting must be soldered onto the copper first.
- Allow the solder connection to cool to ambient room temperature prior to making an F1960 joint.
- Never solder after an F1960 joint has been made.



## ⚠ CAUTION

- Use gloves and a holding tool. Heated pipe or fittings can cause burns.

## 5.6 Water heater connections

In accordance to *Uniform Plumbing Code (UPC), Section 604.13*: "PEX tubing shall not be installed within the first eighteen (18) inches (457 mm) of piping connected to a water heater." A minimum of 18 in (45 cm) of metallic transition piping must be used for both of the direct connections to water heater connections. Corrugated metal water heater connector pipes of copper or stainless steel are the typical materials for this application.

Within the UPC, this applies to all PEX fitting systems and all types of water heaters (electric, fossil fuel, and indirect-fired) including storage tank type and tankless type (also known as demand or instantaneous) water heaters.

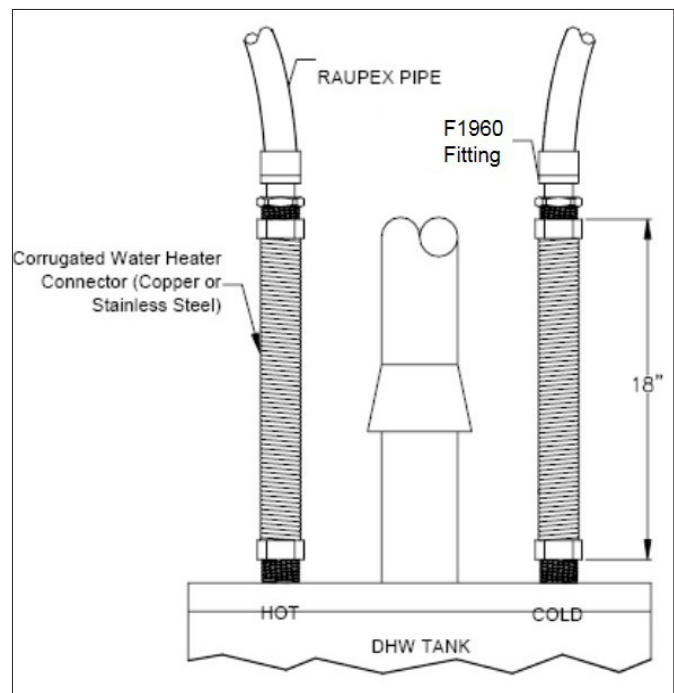


Fig. 5.1 DHW water tank with 18" of metallic transition piping per UPC

In some local jurisdictions, direct connection of PEX pipe to a water heater is allowed. In these cases, RAUPEX pipe may be directly connected as per the following:

### 5.6.1 Electric, storage-type water heaters

- Direct connection allowed to electric water heaters, which are intended for domestic applications, unless prohibited by the specific water heater manufacturer.

### 5.6.2 Gas, tankless water heaters

- Direct connection allowed to tankless water heaters, which are intended for domestic applications, unless prohibited by the specific water heater manufacturer.
- Connection must be a minimum 6" distance from flue, specific distance based on specific water heater manufacturer's recommendation.
- If the minimum distance from flue cannot be accomplished, metallic transition piping is required.

### 5.6.3 Gas, storage-type water heaters

- Direct connection allowed to gas water heaters, which are intended for domestic applications, unless prohibited by the specific water heater manufacturer.
- Connection must be minimum from 6" from flue and 6" from blower box.
- If the minimum distance from flue and blower box cannot be accomplished, metallic transition piping is required.

### 5.7 Protecting joints

REHAU permits F1960 joints (polymer and LF brass) to be buried or concealed. REHAU recommends that threaded connections never be buried or concealed as they must be accessible for periodic inspection, per building codes.

The requirement to wrap an F1960 joint can depend on many factors including location and the presence of other materials that contact or can come in contact with the joint. In general, REHAU recommends the following:

#### **Concealed in inaccessible locations (e.g. behind drywall):**

When F1960 joints are concealed but are still in open air space, it is not necessary to wrap the joint. However, the installer should ensure that the fitting does not come in contact with chemicals (e.g. PVC glues, solvents, cements) that could damage the fitting material. Use only Linerless Rubber Tape, Black (Art. 241002) also available at most distributors and retailers (Scotch™ 2242).

#### **Buried directly in a concrete slab:**

When burying an F1960 joint directly in a concrete slab, it is not necessary to wrap the joint. However, there are some additives in concrete that could potentially damage the fitting material, and in this case, wrapping is recommended. Use only Linerless Rubber Tape, Black (Art. 241002) also available at most distributors and retailers (Scotch™ 2242).

#### **Buried in a sub-base or underground in soil:**

In these instances, the joint must be wrapped. Use only Linerless Rubber Tape, Black (Art. 241002) also available at most distributors and retailers (Scotch™ 2242).

#### **With foaming agents:**

Foaming agents and solvents in closed-cell foam insulation kits can damage the PPSU fitting material. Therefore, it is necessary to wrap polymer fittings in a protective tape to protect from polyurethane foams. Use only REHAU Protective Tape, Red (Art. 246869-001) or Linerless Rubber Tape, Black (Art. 241002).



When wrapping an F1960 joint, the following is required:

- Wrap the joint, ensure minimum of 50% overlap of the tape.
- Avoid wrinkles or kinks in the tape and ensure the joint is completely covered, extending on to the pipe as necessary.
- Indicate the location of each joint as required on the "as-built" drawings.

### NOTICE

Use only REHAU recommended protective tapes for wrapping F1960 joints. Do not use other types of tapes (e.g. duct tape, standard electrical tape) to wrap the joint, as chemicals in the adhesive may not be compatible with the PPSU fitting material or the PEX pipe.

### NOTICE

Never use heat shrink tubing (e.g. RAUCROSS) to wrap the joint, as the high temperatures produced from a heat gun will soften the pipe and may cause it to pull away from the fitting.

### 5.8 Distance between fittings

A minimum distance between F1960 fittings is required to ensure the fittings are not damaged during the expansion process by the installation tools. A minimum pipe length is required, see Table 5.1.

**Table 5.1: Required minimum distance between fittings**

Nominal size (fitting)	Length of pipe
1/2 in.	2 in.
3/4 in.	3 in.
1 in.	3 1/2 in.
1 1/4 in.	4 1/2 in.
1 1/2 in.	4 1/2 in.
2 in.	6 in.

### 5.9 Supporting F1960 fittings

Supports and clamps shall not be placed directly on the F1960 fitting, multi-port tee or PEX ring. Always comply with prevailing local codes.

### 5.10 Excessive pressure and temperature

The maximum temperature and pressure ratings of the REHAU F1960 fitting system is in accordance with ASTM F877 and CSA B137.5 for SDR9 PEX, see REHAU pipe product submittals for ratings.

Avoid installing pipe or fittings in areas where they may be exposed to temperatures above the maximum temperature ratings of the system. In addition, pipe and fittings must avoid contact with surfaces or substances that may exceed the maximum temperature ratings of the system (e.g., recessed can lights, boiler vents, chimneys or chemicals that may have an exothermic reaction such as spray foam insulations).

Temperature and pressure (T&P) relief valves are safety mechanisms in case the system overheats (mandatory in hot water distribution systems). These valves act quickly to relieve excess temperature or pressure if either one of these conditions is reached. ASTM F877 and CSA B137.5 require the system to be able to accommodate short-term exposure conditions of 210°F (99°C) at 150 psi (10 bar) for 48 hours, in the event of a water heating system failure or T&P relief valve failure.

### 5.11 Water quality

REHAU PEXa pipe and F1960 fittings are third-party tested and certified for use where drinking water qualities meet the requirements of the EPA *National Primary Drinking Water Regulations* and the *Guidelines for Canadian Drinking Water Quality* by Health Canada.

Refer to REHAU *Technical Bulletin TB240 Impact of Water Quality on System Components* for more information.

### 5.12 Disinfection

Disinfection of the system should always follow prevailing local codes and requirements. If required by code and no conditions are specified, disinfect using chlorination according to AWWA or ICC procedures outlined below:

**Table 5.2: AWWA/ICC Disinfection Schedule**

Chlorine Concentration	Disinfection Period	Authority
50 to 100 ppm	3 hours	AWWA
50 ppm	6 hours	ICC

Pre-mix solution before injecting into system. Do not allow disinfection solution to sit in system beyond the disinfection period. Thoroughly flush entire system with potable water after disinfection.

### 5.13 Chlorine resistance

F1960 joints have the same chlorine resistance ratings as the REHAU PEXa pipe. Refer to REHAU *Technical Bulletin TB135 Chlorine Resistance of RAUPEX Pipe* for permitted operating conditions.

### 5.14 Stress corrosion resistance

REHAU F1960 LF brass fittings have been tested in accordance with NSF/ANSI 14 and comply with the requirement for stress corrosion resistance. However, fittings should not be exposed to harmful chemicals or aggressive water conditions that could result in operational failures.

### 5.15 Freeze break resistance

The flexibility of the REHAU PEXa pipe allows it to expand as water freezes in the pipe as long as the pipe has room to expand. However, this does not ensure the integrity of the joint. Therefore, installers must take precautions to ensure that pipes and fittings do not freeze. This may result in leaks and operational failures.

# 6. System testing and maintenance

A pressure test must be performed on the system to ensure the REHAU PEXa pipe and F1960 joints are leak free. In addition, a visual inspection of all joints is recommended to ensure all connections have been properly assembled.

## 6.1 Pressure testing

The following detailed pressure test guideline applies to both compressed air and hydrostatic (water) testing:

### WARNING

- Failure to follow proper safety precautions for an air pressure test could result in dangerous separation of the material, leading to serious injury or death.
- Use personal protective equipment. To reduce the risk of eye injury, always wear close-fitting protective eye wear with side protection. Eye wear must be impact-rated and marked as complying with ANSI Z87.1.
- Never use a torch, open flame or heat gun on a pressurized system. Exceeding the temperature pressure ratings will result in dangerous separation of materials leading to serious injury or death.
- Never rework a connection that is under pressure. Depressurize the system, cut out connection and replace.
- To reduce the risk of personal injury, only qualified persons conducting and/or inspecting the pressure test should be present.

### 6.1.1 General recommendations

- A pressure test must always be performed prior to closing in the system (e.g., behind drywall).
- Perform test using water or air at ambient temperature. Do not exceed 150 psi (1030 kPa) for the piping system. Verify maximum pressure limits are not exceeded for all system components prior to performing the pressure test.
  - When air pressure testing with polymer fittings do not exceed 120 psi (825 kPa).
- A pressure test must always be performed on the system prior to and during the installation of the thermal mass to ensure that REHAU PEXa pipe and connections are leak free.
- Tests shall comply with local codes where applicable and, where required, shall be witnessed by the building official.

### 6.1.2 Pressure testing with air

Air can store a high amount of energy as compared to water during a pressure test. Due to this higher energy, different failure modes of system materials must be understood by persons conducting the pressure test.

- If a thermoset polymer (e.g., PEXa pipe) is over-pressurized and fails (bursts), it does so in a ductile mode, the pipe will swell and then split with no separation of fragments.

- If a rigid thermoplastic polymer material (e.g., PPSU) is over-pressurized and fails (bursts), it does so in a brittle mode and can result in separation of the material.

### 6.1.3 REHAU pressure test procedure

- Use an air test if conditions do not permit a water test (e.g., freezing conditions, insufficient water supply/pressure).
- Air temperature will affect the gauge pressure. Perform all pressure tests at a constant temperature. Verify maximum pressure requirements for other systems prior to performing the test.
- Conduct a visual inspection of the piping system, to ensure all connections have been properly made and all piping has been properly secured prior to pressurization.
- Perform a preliminary pressure test pressurizing the system to 1.5 times the maximum operating pressure not to exceed the maximum pressures defined above for 30 minutes.
- As the piping expands, restore pressure, first at 10 minutes into the test and again at 20 minutes.
- At the end of the 30-minute preliminary test, pressure must not fall by more than 5 psi from the maximum, and there shall be no leakage.
- After performing the preliminary test, perform the main pressure test immediately. The main pressure test shall last at least 2 hours. The test pressure should be restored and must not fall more than 3 psi after 2 hours. No leakage should be detected.
- It is recommended to maintain pressure on the system during further construction, where practical, to immediately identify damage. If a water (hydrostatic) test is used, protect the water from freezing or drain water from pipes.
- If any repairs or corrections are necessary, depressurize the system before proceeding.

### NOTICE

- When other thermoplastic piping materials (e.g., CPVC, PP-R) are present in the piping system, these sections of piping must be isolated from the REHAU PEXa piping system during the pressure test. The installer must consult the other component manufacturer's installation instructions for pressure testing those sections of the system.
- Always refer to the local codes for pressure testing requirements and use air testing only if approved by the local Authority Having Jurisdiction (AHJ).
- REHAU only provides the general guidelines for performing a pressure test, which by no means supersede or are intended to contradict safety requirements. It is the responsibility of the installing contractor to ensure a proper and safe pressure test is performed on site.
- All other trades must be notified that the pressure test will be conducted on the piping system.

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