



Recommended Practices Regarding Application of Pesticides and Termiticides near PEX Pipes

TN – 39

August 2007

Foreword

This report was developed and published with the technical help and financial support of the members of the PPI (Plastics Pipe Institute). The members have shown their interest in quality products by assisting independent standards making and user organizations in the development of standards, and also by developing reports on an industry-wide basis to help engineers, code officials, specifying groups, and users.

The purpose of this technical note is to provide general information on crosslinked polyethylene (PEX).

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1. Background

Liquid pesticides/termiticides are often applied to treat the soil below the concrete slabs of slab-on-grade structures. The treatment of the soil is intended to create a barrier to prevent the infiltration of pests and termites through the floor of the structure. Crosslinked polyethylene (PEX) pipes for plumbing applications are often installed within slabs or below slabs, in trenches in the soil, below the soil that is treated.

Liquid pesticides/termiticides use a liquid solvent to carry the active ingredients. These solvents can be categorized as one of two types:

- **Organic solvent-based (also known as petroleum solvent-based)**
- **Water-based (water solvent-based)**

The type of solvent used in a pesticide/termiticide will affect its ability to permeate through various materials. Organic-based pesticides/termiticides have largely disappeared from the NA marketplace for this application, and the majority of products available today are water-based. Water-based products are generally safer to the environment and pose less risk of infiltration into water pipes.

To address the concern of plumbers, builders, engineers, approval authorities and general users about the possibility for these chemicals to permeate through PEX plumbing pipes, the Plastics Pipe Institute (PPI) has begun research into this topic and is publishing the following information and recommendations for the safe installation of PEX water pipes.

2. Information

The following excerpts are from the report *Investigating the Possible Permeation of Organic Chemicals Commonly Used in Termiticide Barrier Treatments through Polyethylene Water Pipes*.¹ This study was conducted in 2001 in Australia to answer some of the same concerns that exist in USA about permeation of pesticides and termiticides through polyethylene and PEX² water pipes.

- “The migration of active ingredients and solvents from pesticide barrier treatments, through typical residential polyethylene pipe is investigated in this report.”
- “The two pesticides investigated were **Dursban**[®] (Dow Agrisciences; active ingredient chlopyrifos, solvents includes Aromatic 100, trimethyl benzene, cumene, ethyltoluene, xylene) and **Biflex**[®] (FMC; active ingredient bifenthrin, includes solvents N-methyl-2-pyrrolidone and aromatic hydrocarbon mixture).”
- “Organic matter in soil generally absorbs organic chemicals, and therefore, chemicals may be retained, delaying permeation into PE pipes.”
- “The results from this study indicate that migration of pesticide constituents and their associated solvents, through the polyethylene pipe, did not occur, indicating that the concentration of solvents (even in the saturated soil) was not high enough to cause permeation of the solvents through the PE pipe wall (within the 16 week period of study).”

- “This indicates that the concentrations of these constituents in the soil in contact with the pipes was not high enough to develop a positive diffusion pressure and cause the constituents to be detected in the water.”

¹ Commonwealth Scientific and Industrial Research Organization, (CSIRO) November 2001

² Cross-linked polyethylene (PEX) pipes are assumed to behave similarly to polyethylene water pipes.

Available data indicate that the solvents used in liquid pesticides/termiticides will soak into the ground and/or evaporate before they can pass through the wall of polyethylene water pipes. The data also indicate that these solvents are prevented from passing through the wall of polyethylene pipes because of the large size of the water or organic solvent molecules, relative to the size of the molecules in the pipe itself. Once liquid solvents have dissipated or evaporated, the solids that remain behind can not permeate through the walls of PE or PEX pipes because of the molecular size.

The above study was conducted using worst-case **organic-based** solvent pesticides and pipes installed in typical buried applications. While this study showed no permeation of organic-based solvent pesticides through PE water pipes in a real-world application, other experiments have shown that it is possible for organic-based solvent pesticides to permeate through PE water pipes in certain conditions. This can be assumed to apply also to PEX pipes, though not necessarily at the same level, due to molecular differences. Therefore, caution is necessary when applying these products near or on PEX water pipes.

For instance, in an installation in which the organic-based solvent pesticide is in constant contact with the water pipe, pooled around the pipe in a constant liquid state, for instance, permeation is probable. This must be avoided. Important criteria for safe application of the chemical product includes correct application of the product in terms of depth of application and correct concentration (apply as directed).

Additional research shows that **water-based** pesticides/termiticides are of sufficiently-large molecular size to prevent permeation through PE and PEX water pipes. Instances of water-based pesticides/termiticides permeating through PE or PEX pipes are not known. Still, caution is required to ensure safe installation of plastic PEX water pipes and to prevent mis-application of the liquid pesticides or termiticides, especially to prevent pooling or puddling of these chemicals around PEX pipes.

This Technical Note describes recommendations for correct installation of PEX water pipes for service line applications as well as hot- and cold-water distribution use. These recommendations are intended for the installing plumber, and will help to prevent misapplication of liquid pesticides/termiticides around PEX pipes.

Instructions from the pesticide/termiticide manufacturer must also be adhered to. Local codes and standards must also be adhered to.

3. Application

Cross-linked polyethylene (PEX) pipes for hot- and cold-water distribution (plumbing) are approved for installation directly within or below concrete slabs. This is especially useful in slab-on-grade construction.

It is not required that PEX pipes which are installed within or below concrete slabs be sleeved, though it is usually recommended to use either flexible polyethylene(PE) protection sleeve (shown), polyethylene bags or rigid PVC bend guides at all slab penetrations to protect PEX pipes from abrasion where they pass through the concrete slab (see Figure 1 for details). These products are described as “slab penetration protection devices”. When using PE bags, these should be wrapped tightly around the PEX pipes to prevent any gaps. This may be accomplished with zip-ties or with adhesive tape³ wrapped around the PE bag.

³ Check with the PEX pipe manufacturer for compatibility of adhesive tapes onto PEX pipes; many PEX pipes are not compatible with adhesive tapes. In this case, apply the adhesive tape to the PE bag itself, but not directly to the pipe.

When using polyethylene protection sleeve or PVC bend guides, an annular gap between these protection devices and the PEX pipe will exist. In such installations, the annular gap between the protection device and the PEX pipe at the exposed ends must be filled to help prevent pathways for pests and the mistaken application of harmful chemicals into the space between the PEX pipe and the protection device. Use only sealants that are compatible with PEX pipes (see Appendix 1). Check with the pipe manufacturer for recommendations.

Note 1: The misapplication of these products between a PEX pipe and slab penetration protection devices could result in pooling or puddling of the products around the PEX water pipe, a practice that is prohibited. The application of pesticides or termiticides between PEX pipe and slab penetration protection devices is strictly prohibited.

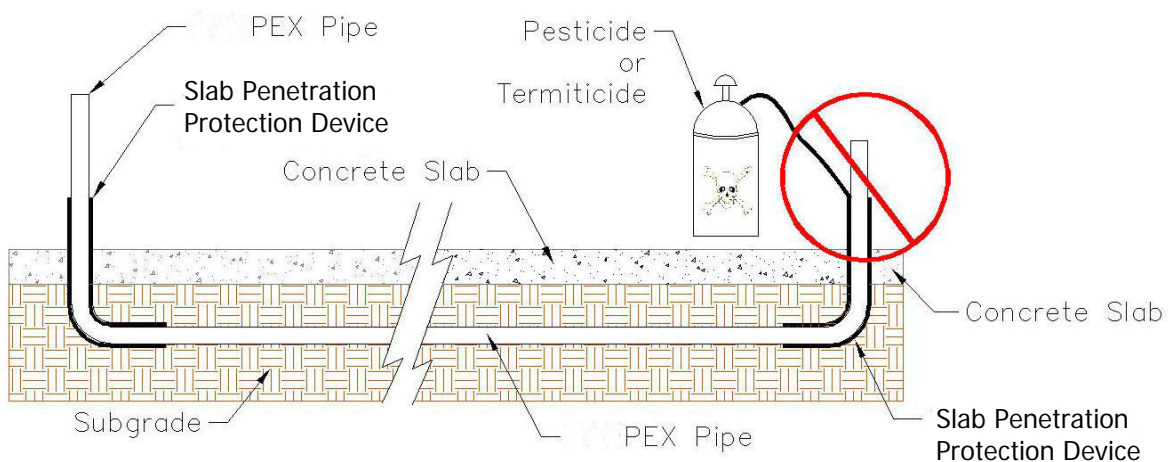


Figure 1: Recommended installation of PEX pipe under a slab.

4. Cautionary Statements

1. If pesticides or termiticides are applied while the installed PEX plumbing pipes still have exposed open ends and are not yet connected to plumbing fixtures, the ends of the pipes must be capped, plugged or closed to prevent these chemicals from entering the pipes themselves.
2. Do not spray on or allow organic (petroleum-based) chemicals, petroleum distillates, termiticides or pesticides to come into contact with PEX pipes, otherwise permeation of harmful chemicals may occur through the pipe wall and contaminate drinking water.
3. The annular gap between PEX pipes and slab penetration protection devices (sleeving, bags or PVC bend guides) at the ends of the pipes must be filled to help prevent pathways for pests and the mistaken application of harmful chemicals into the space between the PEX pipe and the protection device. Use only sealants that are compatible with PEX pipes (see Appendix 1).
4. PEX pipes for potable water applications must never be immersed in liquid chemicals or installed in contaminated soils that would permeate through the pipe wall⁴.
5. When PEX plumbing pipes are continuously sleeved below or above a slab, the space between the PEX pipe and the sleeving must never be filled with any liquid chemical, including pesticides or termiticides (see Figure 2). Pooling or puddling of these liquids around PEX pipes must be prevented.
6. Do not apply adhesive tape directly to PEX pipes, as adhesives may damage the pipes. To plug open ends of PEX pipes, it is recommended to use approved plug fittings or PE bags or film to cover the ends of the pipes.

⁴consult pipe manufacturer

Application of pesticides or termiticides between PEX pipe and sleeving is strictly prohibited.

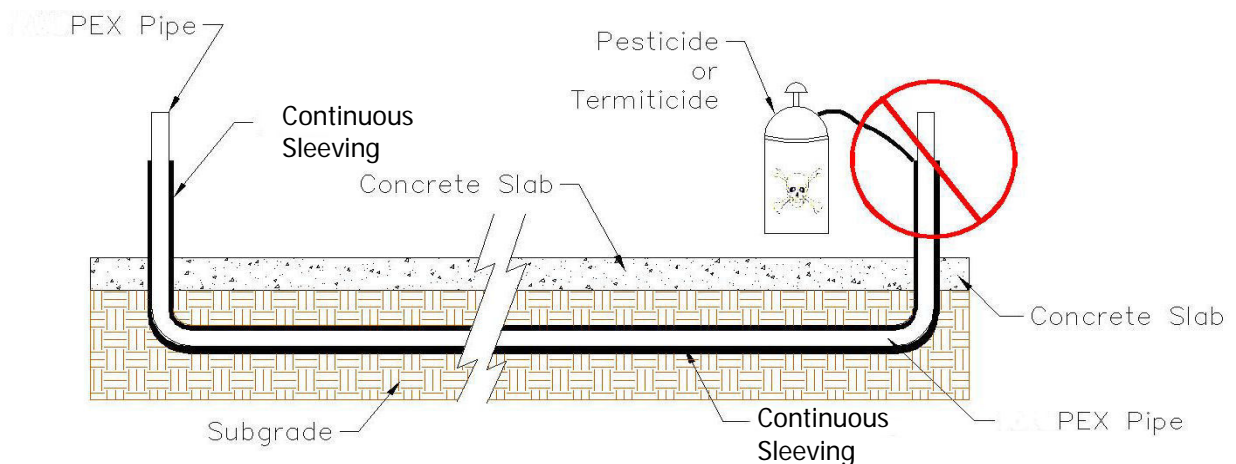


Figure 2: PEX Pipe sleeved under a slab.

5. Retreatment of Soil

In situations where it is necessary to retreat soil around PEX plumbing pipes, be sure that puddling or pooling of the pesticide/termiteicide product on or near the PEX pipes is prevented.

Appendix 1: Compatible Sealants

The following types of products are compatible for external contact on PEX drinking water pipes for use when sealing between PEX pipes and slab penetration protection devices.

- Latex caulk
- Latex foam
- Silicone sealant
- Polyurethane expanding foam

Note A1: **Do Not Use** petroleum-based sealants on PEX pipes.