

— WIRSBO-PEX  16X2.2 PB 1 0 95 °C DVGW

Tips on Tubing Selection

SOME OF THE RULES FOR EVALUATING the qualities of the various brands of plastic tubing have been gathered in this chapter.

Every serious dealer has to be in a position to provide documented data concerning each of these criteria.

1. Which type of plastic is used to manufacture the tubing?

The manufacturer should make it clear both in announcements and in other information supplied by the company as well as on the tubing label itself just what raw material was used in the tubing.

The flexible plastic tubing that appears on the market for heating, drinking water and hot water are, for the most part, produced from the raw materials shown in Table 9:1.

2. What commercial brand of the raw material is actually used to manufacture the tubing?

The tubing manufacturer should be asked to provide information as to which commercial variety of the raw material has been used in his tubing.

Examples of commercial brands are:

- BASF Lupolen 5261 Z Q 100 for PEX tubing manufactured according to the Engel method (Wirsbo-PEX tubing)
- Hoechst Hostalen PPH 2222 for polypropylene tubing
- Shell PB 4121 for polybutylene tubing

3. Is the tubing adequately labeled?

It must be possible to identify a high-quality tubing by means of a label that will not easily rub off. Various items must be included on that label.

1. The name of the manufacturer or the brand name of the tubing
2. The tubing's measurements (wall thickness, outside diameter)
3. Permissible operating temperature
4. Permissible pressure at the permissible operating temperature
5. Stamp of approval from the relevant monitoring agency
6. Kind of raw material (name or code)
7. Number of the production machine (in case the manufacturer uses several machines)
8. Year of manufacture

4. Is there a contractual agreement between the manufacturer and an official quality-assurance and monitoring board?

Every serious manufacturer should be able to provide proof that the product he manufactures is monitored by a recognized and respected testing institute for the maintenance of certain quality standards. For a list of some of these official quality-assurance and monitoring boards see Chapter 11. (Page 99).

5. Is there official authorization for the proposed usage?

The manufacturer has the burden of providing the proof of such authorization in cases where it is necessary. That is true especially when the tubing is to be used for hot-water and drinking-water systems.

6. Does the tubing have a negative impact on health when it is used for hot-water or drinking-water systems?

Manufacturers who offer tubing for use in such situations must have a certificate from an official board attesting to the fact that the products are unobjectionable from a health standpoint (hygienic and toxicological certification).

7. The tubing must meet the relevant standards and guidelines - but is that enough?

The tubing has to fulfill the requirements of the standards and quality guidelines that are

Uses and Suitability of Some Selected Piping Materials

Materiale	Abbreviation	Heating	Drinking Water	Hot water
Low-density polyethylene	LDPE	(x)	x	-
High-density polyethylene	HDPE	-	x	-
Cross-linked polyethylene*	PEX, (XPE, XLPE)	x	x	x
Polypropylene**	PP	x	x	-
Polypropylene** (Copolymerized)	PP-C	x	x	-
Polybutylene-1	PB-1	x	x	(x)

* Cross-linked polyethylene is not a specific piping material but rather a whole group of materials that cover a broad spectrum of differences in quality.

Table 9:1

** Numerous kinds of polypropylene and polybutylene are offered, each with varying degrees of quality.

Interpretation of the table:

- x = common usage
- (x) = usage not as common
- = not used

laid down for the specific purposes for which it will be used. The qualification should also be made here that these regulations only represent the minimum requirements. Just the mere fact that they are met still does not represent any guarantee of quality. Normally the requirements of the testing boards go significantly beyond the standards.

8. Is the time-to-failure strength documented?

The manufacturer should be able to provide evidence of the official testing of the hydrostatic time-to-failure behavior of the tubing.

The long-term testing should not be done on sample tubing provided by the raw-material supplier or on specially produced samples from the processor. Rather, it should be conducted on tubing from the manufacturer's regular production line.

The time-to-failure results should be provided for:

- a) The highest operating temperature
- b) Temperatures beyond those permissible for normal operation
- c) Bent tubing
- d) Tubing with predetermined breaking points (scratches)
- e) Tubing that comes into contact with stress-crack inducing agents
- f) PEX tubing made of PE that has been cross-linked in varying degrees. In each case, they should be tested as described in a) through e).

9. How resistant is the tubing to aging?

- a) The resistance of a tubing to aging, that is, its resistance to degradation from thermo-oxidation, should be documented. This should be done both for tubing that is not under stress and for tubing that is put under stress by boiling. The boiling water used in the tests should be exchanged periodically (as proof that the stabilizer system does not wash out of the tubing material).
- b) It should be possible to demonstrate that investigations of the aging and time-to-failure behavior of the tubing have been combined.

10. Has any official testing been done at installation sites?

One should also ask for results of tests conducted on tubing actually installed in the field. Some examples are:

- a) Temperature-interval (fatigue) tests on:
 1. Pipe connectors (of different construction and brands)
 2. Pipes enclosed in concrete slabs
 3. Bent tubing
- b) Other tests on pipe connectors:
 1. Tensile strength
 2. Rupture strength
 3. Impulse pressure
- c) References

11. Are there any installation instructions and if so, what do they say?

In case the manufacturer provides any guidelines and instructions for installation, they should give information concerning the following items:

- a) The permissible temperatures and the nominal pressure limit
- b) Flexibility (limits)
- c) Cold-breaking behavior (if apropos)
- d) Resistance to ultraviolet rays
- e) Fusibility
- f) Flexibility when warm
- g) Pipe-connector system
- h) Elongation factor

12. What kind of data has been gathered concerning the tubing material.

- a) Mechanical data
 1. Density
 2. Tensile strength
 3. E-modulus
 4. Elongation at breaking
 5. Impact strength
 6. Water absorption
 7. Coefficient of friction
 8. Surface tension
 9. Oxygen permeability
- b) Thermal data
 1. Temperature limits
 2. Linear thermal-expansion coefficient
 3. Fusing temperature
 4. Specific heat
 5. Heat conductivity