POSITION PAPER

20 February 2008

Building 08-001

Materials for Hot&Cold water applications

TEPPFA has concerns about the new proposed EN16421 Enhancement of Microbiological Growth (EMG) Method 1: the Biomass Production Potential (BPP) test method for Plastic Pipe and materials in contact with Drinking Water, and the proposed Pass-Fail-Criteria (PFC) <1000 pg ATP1/cm2, according to the same method.

Introduction

The use of plastics pipe products in the Hot&Cold application are frequently questioned regarding their performance related to health aspects and durability.

In order to provide the true picture, Teppfa Application Group Building has prepared this Position Paper as a response to unfair PR actions from some other industry sectors.

For the time being, this Position Paper is intended to be used by Teppfa members in case where they consider it appropriate and needed in their markets and communications with their users, without further pro-active publications.

In case you have any question or remark, please contact the Teppfa Project Manager, tmeijering@teppfa.org

Teppfa aisbl
Avenue de Cortenbergh 71 t: +32 2 736 24 06 71
B-1000 Brussels, Belgium e: info@teppfa.eu

Materials for Hot&Cold water applications

The Teppfa mission regarding the supply of sustainable products commits our members to no compromise concerning human health aspects in drinking water applications. Teppfa members are supplying several piping systems and materials for the use in Hot&Cold applications. Materials are primarily: PEX, PP-R, PB, PE-RT and CPVC used in solid wall and multi-layer pipe constructions. These products are certified by recognized European Certification Bodies after rigorous testing programs which demonstrate that the stringent performance requirements are met as applicable in the different countries. These requirements are established under the responsibility of the national governments.

Nevertheless, the use of plastics pipe products in this application are frequently questioned regarding their performance related to health aspects and durability. This is typically based on lack of knowledge or misinterpretation of scientific work.

In order to provide the true picture, the following summarizes the main aspects of the performance of plastics pipes and fittings.

1. **Applicability of plastic pipes in contact with drinking water**
   In many scientific studies and in extensive approval testing over many decades, it is well proven that plastic pipes do not affect the quality of drinking water and are fulfilling the various stringent legal requirements with a high safety margin in relation to human health. This holds for all types of drinking water, regardless of the pH value of the water and other quality aspects. The existence of different plastics systems and materials has the advantage of providing tailor made solutions for all situations. Correctly designed and installed plastic pipes systems will allow the appropriate thermal expansion or contraction characteristics.

2. **Durability**
   In general, the expected lifetime of plastic piping systems is at least 100 years. For hot water applications, the piping systems are arbitrarily designed for 50 years use with a safety factor of 2. The stabilization of the plastic material is optimized so that systems can easily withstand up to temperatures of 70°C for long exposure times. Proven performance in comprehensive test programs demonstrates the reliability of the material providing the strong basis on which national and European authorities

give qualification for safe use, without compromising on human health and durability.

3. **Reaction to bacteria**
   It is generally recognized and proven that the main factor for growth of (legionella) bacteria is the design of the piping system. The growth of bacteria preferably occurs in places where the stagnation of water is too long and temperatures around 37°C are sustained. Dead ends, long stagnation times of the drinking water, over-dimensioning of piping systems and temperatures between 25 – 50°C must be avoided. According to a recent KIWA report, there is no significant difference in the formation of biofilm and legionella when comparing different pipe materials. This is confirmed by an Ofi (Austria) study analyzing the occurrence of legionella in public buildings. There were no differences between plastic pipes and pipes from other materials.

4. **Surveillance of correct design and thermal dis-infection procedures**
   Recommendations for correct design can be found in EN806-2 and in several national regulations. The two most important procedures to avoid bacterial growth are correct network design and thermal dis-infection. Several certification bodies have developed certification schemes for drinking water installations regarding safety in respect of the occurrence of legionella. Schemes include an initial approval procedure and yearly audits which ensure the correct installation and subsequent management system including regular sampling and internal audits. Our industry recommends our clients to make use of these safety measures.

5. **Protection against diffusion from outside or inside**
   In cases where the piping system must fulfill a zero diffusion of gases (e.g. oxygen in floor heating), there is a wide choice of multi-layer plastic pipes with an intermediate barrier layer made from special plastic or from aluminum which avoids diffusion through the pipe wall completely.

6. **Resistance to high temperatures**
   Plastic pipes are perfectly capable for installation in hot water applications. Depending on the required temperature profile, the plastics industry has a variety of solutions which fulfill the tight specifications required in the relevant ISO and EN standards. The stabilization of the

plastic is carefully chosen in order to withstand the prescribed thermal disinfection procedures.

7. **Strength**
   For installation in hot water systems, the strength of plastic materials far exceeds what is needed to withstand handling during installation and internal pressures during operation. Extensive testing and approval programs clearly support the performance of plastics.

   For each plastic pipe system, the certification bodies assess the provided regression curves showing the admissible pressure during lifetime depending on the service temperature. The values are established via extensive testing programs by accredited laboratories. When used within the limits of this regression curve and with the inclusion of a significant safety factor, the plastic pipes will perfectly withstand hot temperatures over a long period of time (commonly 50 years and more).

8. **Hydraulic resistance**
   Corrosion cannot occur in plastic pipes. The internal surface of plastic pipes is smooth and remains smooth over time. The water flow rate in plastic pipes is not inhibited as it is for some other materials where a reduced rate results from a rough bore and build up of corrosion. These characteristics allow for plastic pipes offering optimal design regarding diameter choice, as widely recognized in the market.

9. **Recycling**
   Teppfa together with PlasticsEurope have developed initiatives to recycle post consumer products in order to achieve the intended sustainability. Plastic products are environmentally friendly and need very low energy consumption during production and use.

10. **Biofilm and legionella, results from KIWA and Ofi**
    The Teppfa members submit their products to strict and severe test methods and requirements, from which responsible authorities declare the suitability for use with full confidence concerning health and safety in the intended area of application. Products certified by the certification bodies are fit for purpose and can be used with full confidence

The latest KIWA report regarding the formation of biofilm and the behavior of legionella bacteria in the different pipe materials is subject of misinterpretation and misunderstanding by some industry sectors.

According to KIWA and the research of Ofi, in practice there are no significant differences between materials which are in use in hot water application, whether plastics or copper.
KIWA: “The material from which water pipelines are made has no influence on the growth of Legionella as long as the correct thermal measures are taken: cold water temperature below 25°C, hot water temperature above 60°C and no stagnation or ‘dead-end’ pipe sections in the system. If these conditions are met, plumbers do not have to differentiate between different types of materials for water pipelines”

See also at public website, Downloads AG Building

- Full KIWA report KWR 06.110, July 2007
- Full Ofi report
- KIWA website with a short summary of the correct interpretation of the report. http://www.kiwawaterresearch.eu/index-W.asp?id=3371
- Spanish Court decision notified on the 29th January 2008.