Article 1

Electrofusion Confusion - Lies, damn lies and statistics

(A phrase describing the persuasive power of numbers, particularly the use of statistics to bolster weak arguments, it is also sometimes colloquially used to doubt statistics used to prove an opponent's point!)

The Plastic Pipes Group of the British Plastics Federation discusses the mixed messages surrounding the integrity of PE pipe joints and highlights the need for installation best practice to a system which is globally accepted as a superb solution to pipe jointing.

For any pipe installation, regardless of the pipe material used, the joints are regarded as the most vulnerable points in the system and rely not only on the quality of the pipe system's design and manufacture, but also, to a significant degree, on the expertise and attention to detail involved in the installation jointing process.

Use of PE pipe has been proven to result in fewer system failures than any other material, with the electrofusion principle offering a more reliable and long term jointing solution than alternative mechanical jointing methods. And yet, a report published by UKWIR (UK Water Industry Research Limited) in 2011, claimed that up to 20% of PE electrofusion joints may fail before they reach their design life time.

This worrying claim about the failure rate for electrofused PE pipe joints has not only created uncertainty about the most appropriate specification choices within the water industry, it has potentially clouded the real issues effecting jointing quality. As a result, the five manufacturers that usually compete for a share of the PE pipe market have joined forces to set the record straight on the integrity of electrofusion joints, the longevity of PE installations and the steps that must be taken to eradicate system failure altogether.
Statistical Disparity

While the UKWIR report was based on credible research from an independent body, it appears to be an example of just how misleading statistics can be when delivered out of context. When the PE100+ association contacted the authors of the report for clarification on the supposed 20% failure rate stated as a headline claim in the report, they received the following statement in response:

“Recently UKWIR published an abstract on their website based on the work carried out on their behalf by Exova that implied 20% of all electrofusion joints contained defects which would cause the premature failure of polyethylene pipe systems. We wish to make it clear that this is not the case in respect of our findings from the work carried out, which has been misrepresented in this abstract.”

The statement goes on to say that ‘PE pipes have the lowest failure rate amongst all the different materials used in the construction of water mains’ and points to ‘poorly constructed electrofusion joints’ as the real problem.

It’s a conclusion that is echoed by the PE electrofusion fittings and pipe manufacturers’ own research, which saw all five companies pool their experience of failures returned to them in order to establish a more accurate failure rate and determine the causes of those failures. The results turn the UKWIR conclusions on their head: products returned to the manufacturers as a result of failure in the field constitute just 1 in 10,000 units – which is 0.0001%, a 2000% improvement on the UKWIR figure and does not reflect anything like the “headline grabbing” figure being bandied about within the industry.
Up-skilling for Integrity

Of course, even such a small rate of joint failures is unacceptable; a fact on which all five PE electrofusion fittings and pipe manufacturers agree. The question is…can anything be done to reduce this failure rate even further and reinvigorate the water industry’s trust in a process which was developed in conjunction with the same industry several years ago.

Ironically, many of the answers to that question are actually contained within the original UKWIR report. The report identifies the three main causes of joint failure revealed in audits as:

- Misalignment of the pipe within the fitting
- Contamination of the joint caused during the jointing process
- Poor joint preparation

All of these factors point to poor jointing practices rather than any inherent issues with PE pipe systems or the practice of electrofusion per se. Indeed, the UKWIR report points out the longevity benefits of a well-installed PE pipe system, stating that work currently being conducted on degradation over time suggests a life span of 200 years is achievable; quadrupling the minimum service life expectancy of 50 years.

The UK PE pipe system manufacturers are clear, however, that the issue of installation best practice and electrofusion skills must be addressed to quash any uncertainty about the integrity of PE joints in order to ensure the ground-breaking work developed by the industry continues to develop the high levels of quality originally experienced when the product was first developed.
Currentl initiatives include revisions to the standard for jointing PE pipe systems (WIS 4-32-08) and the development of a water standard for training and skills specifically targeted towards improving best practice for jointing of PE pipe materials.

Closer inspection of the evidence makes it clear that PE is the most reliable, robust and durable water main material. The change that needs to take place is not in the design of PE pipe systems or the jointing methodology used but in the up-skilling of on-site personnel to ensure that installation consistently follows best practice standards, without compromise.

*The following manufacturers have contributed to this article:*  
DuraFuse, Fusion Group, George Fischer, GPS PE Pipe Systems and Radius Systems.

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