

clay today

for sustainability tomorrow

Clay “the sustainable choice”

An International conference on “Sustainability – Take your Responsibility” was held last year in Sorrento.

Hosted by the **European clay pipe manufacturers association**, feugres, in excess of 300 delegates from across Europe, Middle East and Australia attended to hear the latest thinking in Europe on the subject of sustainability within the sewer infrastructure.

Papers were presented by experts in the fields of finance, law, manufacturing, and development and management of sewer networks.

Fundamentally, it was seen that sustainability in construction of our sewer network should and would increasingly become a key element in the choice of sewer material.

Delegates were challenged by Mr Friesl of the Federation of Austrian Industry at the start of the conference to build sustainability

through Corporate Social Responsibility into the core of their business decisions and way of working. It was agreed that in any value analysis of sewer infrastructure, whole life costs should be the criteria for product choice and not installed cost. Key to this is the life expectancy of the sewer structure which in turn will depend on the choice of pipe material.

In Europe through the presentation of Mr Neuhold, who manages the sewer networks of Zurich, and Professor Max Preusner of Hamburg, it was clearly stated that sewer systems must last well in excess of 100 years. This is based not only on the limited finance available for replacement, but more practically, urban areas cannot withstand the disruption

Welcome to clay today

Welcome to this first edition of clay today, a new publication highlighting modern clay drainage developments and news.

Modern drainage materials must exist in an environment of sustainable manufacture and use, and clay’s sustainability credentials are exemplary. Manufactured in energy efficient kilns using local clay acquired from fully restored quarries, clay pipes are entirely re-cycleable and can be laid with re-cycled bedding materials. Durability and longevity have long been recognised as clay’s prime advantages, making clay the sustainable choice of drainage material.

Strength and hydraulic performance remain the principal requisites of any drainage system. Clay pipe strength are certified at the time of manufacture and remain unchanged throughout the operating life of the pipe. The increased strength of modern pipes means that the use of expensive bedding materials can often be reduced; providing additional environmental benefits.

Clay’s excellent resistance to high pressure jetting means that systems can be effectively maintained to ensure continued hydraulic performance.

The aim of this publication is to present vitrified clay drainage systems as today’s solution to the sustainable drainage needs of tomorrow.

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Delegates at the feugres conference



Clay Fact:

Clay pipes retain their strength: a 100 year-old clay pipe will have the same strength as on day one

that sewer replacement in excess of this would involve. It was further claimed by these experts that only vitrified clay pipes could demonstrate the necessary life expectancy in excess of 100 years.

Professor in Law Thomas Axe informed delegates that it was legally acceptable and appropriate to incorporate ecological and sustainable criteria such as life expectancy into product procurement criteria.

It became clear by the end of the conference that we all, manufacturers, specifiers and asset managers have a responsibility to build the concept of sustainability into the core of our business decision making by, in the most general of terms "meeting the needs of today without compromising the ability of future generations to meet their needs"



Ray Doughty of Hepworth Drainage

Interestingly, if we ask how sustainable we are in the UK, one only has to look at the facts. In the UK the sewer network is being replaced at well under 0.5% per annum. This implies that the assets installed by previous generations (largely in clay or brick) are providing us with the benefits of low replacement cost, and low levels of disruption. Yet today many Water companies and Developers have no such long-term life expectancy criteria built into their procurement policy and are willing to allow the installation of product whose life expectancy is believed to be less than 50 years.

This policy is certainly building a liability, not for today perhaps, but for future generations. Clearly, as yet, we, in the UK, are not taking seriously our responsibility to develop truly sustainable sewer systems.

Clay Fact:
UK clay drainage was installed on every continent in 2004, including Africa & Australasia



Clay pipes hit the beach

Clay pipes recently provided the infrastructure for a most prestigious site in Cornwall. "The Beach" is a development of super-luxury flats at Carlyon Bay; civils works were carried out by contractor Jackson Civil Engineering.

Hathernware – Clay Pipes for Extreme Environments

Naylor has continued to develop its Hathernware range of high performance ceramic drainage systems.

Whilst the product is well-established within the chemical and process industries, recent applications have included projects in the food and drink industry (breweries, dairies and food processing plants operating under super-hygienic conditions) and the healthcare sector (hospital laundries with high temperature disinfection procedures; medical and research centres whose labs/departments may discharge corrosive chemicals). These are frequently too aggressive for ordinary sewer systems, allowing the Hathernware range of chemical and thermal shock resistant pipes to come into its own.

Naylor's latest product development has combined this with the company's experience in the field of microtunnelling. Denchem is a pipe designed for trenchless installation incorporating specially formulated clay and joint/seal configurations. Designed to meet extreme operating conditions – including

operating temperatures of 130 degrees – Denchem's development responded to the requirements of a UK brewery whose under-floor plastic drainage system had been melted by sterilisation procedures; the product was also used on a site at Sasolburg, the South African petrochemical complex near Johannesburg. The product recently won two innovation awards: Microtunnelling Innovation of the Year from World Tunnelling & Trenchless Construction magazine and the UKSTT's Award for Technical Innovation.



Naylor Hathernware Pipes

Clay "takes the load"

Clay "takes the load" off contractors concerned about the risks they take when installing Structured Wall Plastics.



Plastic Drainage with full surround



Clay drainage with trenchbottom bedding



Key National Trust sustainable development selects clay drainage

Clay Drainage systems from Hepworth are incorporated in the first large scale sustainable housing development to be constructed in line with National Trust specifications.

INVESTMENT CONTINUES

The UK clay pipe industry continues to invest in sophisticated modern equipment:

- The last 10 years have seen capital investment of over £30m
- 7 new kilns have been built; these have enabled manufacturers to improve the thermal efficiency and reduce the environmental impact of their operations
- 2004 alone saw multi-million pound kiln investments at Hepworth's Donnington and Naylor's Cawthorne plants

Increasingly, Water Companies such as United Utilities and Wessex are demanding post-installation deformation checks such as "Lightline", for plastics sewer installations. The Lightline technique detects, measures and records the extent of deformation in the pipeline. If deformation exceeds the prescribed limit of 6% (5% for United Utilities) remedial works, and in some cases, complete replacement of the pipeline, will be required before the sewer is adopted by the Water Company. This represents a serious risk for contractors.

Deformation is a problem for plastics pipes because of their inherent flexible behaviour and creep properties which result in a loss of strength under load of 50% after two years and 80% after fifty years buried in the ground. The

structural integrity of a plastic sewer is derived almost exclusively from properly installed bedding, surround and backfill materials. Hence, the structural integrity is dependant on the quality of the installation and for this the burden falls firmly upon the contractor.

Vitrified Clay pipes behave in an entirely different manner. Clay pipes are rigid and provide the majority of the required structural strength, which can be enhanced by, but is only ever partially reliant on, any bedding construction. Clay Pipe strengths are third party certified at the point of manufacture and they will not lose strength with time under load. Although the pipes are designated as rigid, clay pipelines benefit from advanced flexible jointing technology which provides the required pipeline flexibility to take up any ground movements. They do not suffer deformation under load and Lightline testing is consequently not required by the Water Companies. Contractors and developers can therefore avoid the risk of deformation, resulting in expensive remedial works and delays in the adoption process.

In addition to risk reduction the use of clay pipes can result in installation cost savings arising from the use of recycled bedding materials and/or reduced quantities of imported bedding material.

Deformation at 10.1%



Laying Vitrified Clay Pipes on Recycled Material

Reduced Aggregate reinforces clay's green credentials

Recent research on clay pipes laid on a variety of all-in and graded sizes of recycled materials has shown that these materials may be safely used for laying clay pipes.

Correlation of the research findings into meaningful advice for clay pipe users was greatly aided by the publication in 1998 of BRE Digest 433 on Recycled Aggregates by the Building Research Establishment. This set out requirements for the use of these materials and specified 3 simply determined classes for recycled material based on their content. This enabled the advice to be given that classes RCA II and III could be used for clay pipe bedding, but not class RCA I (brick).

The use of recycled aggregate is likely to become even more financially rewarding as next year's aggregate tax further penalises those using virgin aggregate. The results are good news for clay's competitiveness as these materials may not be used with flexible (plastic) pipe systems.

Research into the structural performance of clay pipes laid on a variety of recycled materials showed that these may be safely used for bedding clay pipes.

The research was carried out at the Ceram Research laboratories at Stoke-On-Trent, supported by the Department of the Environment, Transport and the Regions under the Partners in Technology programme. The results of the work are described in Ceram Research Paper 815¹.

Examining the results obtained alongside those from the original programme of bedding research carried out at the same laboratories showed that normal bedding factors were achieved using a wide range of materials.

The materials tested included both graded and "all-in" materials, with compositions ranging from concrete to "as-received" general construction and demolition waste. The research came to a number of conclusions:

- Recycled Construction and Demolition Waste may be used for pipe bedding, specified using the classes in BRE Digest 433² "Recycled Aggregates".
- Recycled material is applicable to all bedding classes, N,F,B & S.
- 20mm size aggregate may be used for all sizes of clay pipes – it is no longer necessary to use 10mm for 100mm diameter and 14mm for 150mm diameter.

Of the three classes of recycled aggregate material described in the BRE digest, the two which may be used for clay pipe bedding are Class RCA (II), concrete and Class RCA (III), concrete and brick. This means that the material for recycling can come from general construction and demolition waste and does not need to be only concrete. Specifying the recycled aggregate to Digest 433 will exclude unwanted materials, such as asphalt, which would otherwise lead to a lack of adequate pipe support.

It should be noted that Class RCA (I), brick, cannot be used because it does not give sufficient support to the pipes, largely due to its mortar and plaster content.

In common with all granular pipe bedding material, recycled materials need a compaction fraction no greater than 0.3 in order to achieve the normal bedding factors of 1.1 for Class N, 1.5 for Class F, 1.9 for Class B and 2.2 for Class S. For the enhanced bedding factors which may be applied to vitrified clay pipes according to Water Industry Specification 4-11-02³ the recycled aggregate used must have a compaction fraction not greater than 0.2.



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References

1. Use of Recycled Aggregates as Clay Pipe Bedding, Research Paper 815, Ceram Research, 1999
2. Recycled Aggregates, BRE Digest 433, Construction Research Communications Ltd, 1998
3. Revised bedding factors for vitrified clay pipes, Water Industry Specification 4-11-02, WRC, 1988