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(Page 1 of 9)

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UK Water Industry

INFORMATION AND GUIDANCE FOR THE EVALUATION OF NEW PRODUCTS AND THE DEVELOPMENT AND AMENDMENT OF SPECIFICATIONS FOR THE WATER INDUSTRY

CONTENTS

1. GENERAL SCOPE AND OBJECTIVES
2. EVALUATION OF A NEW PRODUCT
3. PRODUCT SPECIFICATIONS
4. TYPICAL PROPERTIES AND PERFORMANCE CONSIDERATIONS

1. GENERAL SCOPE AND OBJECTIVES

This document is intended to provide guidance for the evaluation of new products for use by the UK Water Industry and to help in the development and amendment of appropriate standards.

When introducing a new product to the Industry and/or considering the development or amendment of a new specification, it is important to recognise the requirements of both the European Utilities Directive¹ and the Construction Products Directive². Reference is made to CESWI 6³ Pages 11 and 12 for further guidance on the requirements of these Directives.

Where no European Standard exists, it might be appropriate to develop a Water Industry Specification. This Guidance Note can be used by those involved in the preparation and amendment of such specifications to ensure that all the important design characteristics of a

product are considered. It does not, however, contain details of tests and test limits but identifies the general properties which should be addressed.

2. EVALUATION OF A NEW PRODUCT

2.1 General

It is expected that many of the performance criteria appropriate to a product will have been evaluated by the manufacturer prior to marketing the product within the Water Industry.

However, for certain critical products Water UK may require a more detailed performance investigation dependent on the nature of the material, product or process involved before recommending it to the Water Industry. It is hoped that in this way the product will be adequately evaluated for water industry purposes, but avoid the need for the manufacturer to address the requirements of individual water companies separately.

Research has shown that there is a need to proceed with caution until any limitations of a new product have been identified and understood. Initial recommendations for the use of new products have been based on technical judgement and previous experience of similar materials, but this is not entirely reliable.

It is only after practical investigation that claimed performance is verified. This evaluation may

This document has been prepared by the Water UK Standards Board. Requests for further copies and technical queries should be addressed to the Standards Board via WRc plc, Frankland Road, Blagrove, Swindon, Wiltshire SN5 8YF Telephone +44 (0) 1793 865000 Facimile. +44 (0) 1793 865001.

also include the monitoring of site trials and the agreement of an implementation programme within the Water Industry.

2.2 Making contact with the Water Industry

The manufacturer should make contact with the Water Industry through Water UK's Standards Board via the Water Research Centre (WRC).

Details of the stages of an evaluation can be discussed between the manufacturer and the Water UK Topic Advisor relevant to the product. A list of Topic Advisors is maintained by WRC

Evaluation in conjunction with the Water Industry does not absolve the supplier from any legal obligations for the product.

2.3 Ongoing monitoring

The evaluation of a product in conjunction with the Water Industry will be reported through the Water UK Topic Advisor who is appropriate to the product.

The Water Industry will be advised of progress by the Standards Board and provision for a dissemination seminar should be made in the costing of the project.

2.4 Quality Assurance

It is Water Industry policy for individual purchasers to decide where third party certification is required.

3. PRODUCT SPECIFICATIONS

3.1 Using European and National Standards

Under the Utilities Directive, which came into force on 31 January 2006, where a European Standard (EN) covering the proposed product exists this must be used in the purchasing and therefore, to meet market demand, in the manufacture of the product. If an EN does not exist, national standards from EU member states should be sought. European and national Standards will not normally be available in the case of newly developed products, but this is not to be seen as inhibiting the use of such products. To fill this gap, a series of tailor-made Specifications is produced by the Water Industry. It is recognised that **Water Industry Specifications (WISs)** have a valuable role

where national or European standards are not yet available. They should not be seen to be in competition with British or other national standards but as a precursor to the development of a national Standard through BSi or a European Standard through CEN.

In addition to the need for technical specifications covering performance, testing and quality control procedures, there are occasions when the Industry as a whole wishes to provide guidance to the individual Water and sewerage suppliers and their suppliers. **Information and Guidance Notes (IGNs)** have been developed for this purpose.

These guidelines have been prepared on the preparation and amendment route, formal authorisation procedure and editorial requirements. It is intended that, by provision of these guidelines, documents of a consistent quality and standard will be produced.

3.2 Proposing a new or amended Specification

The development or amendment of both WISs and IGNs (4-series) is co-ordinated by Water UK's Standards Board and managed on their behalf by WRC.

[Note: 9-series specifications are also produced by the Water Regulations Advisory Scheme.]

As a first step, the proposer of a new or amended specification (this might be a member of the Water Industry, a manufacturer or Trade Association for example) should define as closely as possible the proposed scope of the new or amended specification and the justification for its development or amendment.

The need for a new or amended Water Industry Specification should:

- be justifiable in terms of the potential use of the product in the Industry;
- not be in competition with European or British standards;
- be seen as a precursor to the development of a National Standard through BSi or a European Standard through CEN.

This should be done through completion of the **Application for Development or Amendment** form (Appendix A).

[Note: Contact WRc for the most recent version of this form and help with its completion].

The completed form then constitutes a formal application to Water UK's Standards Board and will be submitted to them via WRc.

It is the stated policy of the Board that "WISs are inappropriate for unique products, although they continue to be quite appropriate for generic products. Independent assessments should be sought to provide the water industry with the latest knowledge on new products".

The Board will consider the application with regard to such things as the technical need for, and merit of, the proposed or amended specification; the importance of the product to the Water Industry; the number of manufacturing companies producing that product, and the funding available from manufacturers of the product or other sources.

To save wasting effort, drafting should not commence until approval to proceed has been received.

3.3 Drafting

The progress of the document will be entirely dependent upon its complexity, the progress of any associated research work and the number of parties involved in the drafting.

To help in achieving the estimated target for public comment, it is strongly recommended that:

- at this stage, the document **remains confidential** to the members of the panel and any co-operating parties who may be providing information for the document e.g. manufacturers, research laboratories etc. and not circulated more widely to the organisations that they represent;
- the **scope** of the document is agreed at the first meeting and all future work strictly adheres to this scope;

- a **record** is kept of all meetings and changes to the document and drafts of the document are numbered for future reference;
- all hand-written amendments are clearly marked with the date of addition and the source of the comment.

The format and style of these documents follows BS '0' as closely as possible.

3.4 Circulation for public comment

Once the drafting panel is happy with the content of the draft document, it is necessary to issue it for public comment.

This is a key stage in the development or amendment of an Industry-wide specification.

This should be done through completion of the **Approval to Publish** form (Appendix B).

[Note: Contact WRc for the most recent version of this form].

The Chairmen of both the drafting panel and Water UK's Standards Board should sign the form before proceeding further.

The primary author is charged with the task of ensuring that the current draft meets the format and style requirements given in BS '0' and any additional requirements used for WISs.

In addition, the primary author should check that the draft is complete (e.g. all diagrams are included); the draft has been proof read; and is clearly marked "Draft for Comment".

A copy of the draft Standard should be sent to the appropriate Water UK Topic Advisor who will issue it for public comment.

Generally a 3 month deadline is given for submission of comments after which date no further comments are taken.

3.5 Dealing with comments

All comments will be sent through the appropriate Water UK Topic Advisor.

All comments are referred to the appointed drafting panel. It is usual to collate all comments into a single document marked against the

relevant clause numbers. In the case of a large number of comments, it might be useful to separate these into General/Technical/Editorial. Comments in the collated document are not attributed.

All comments should be noted and reasons given for exclusion, where this occurs. These decisions are the responsibility of the nominated Working Group/drafting panel and not that of the author(s).

3.6 Editing and final approval

The final editing of the document is carried out by the appropriate Water UK Topic Advisor prior to signing off by Water UK's Standards Board.

Once edited and formatted, the final document will be sent to the Chairmen of the drafting panel and Water UK's Standards Board for approval. This should be done through the final part of the **Approval to Publish** form (Appendix B).

4. TYPICAL PROPERTIES AND PERFORMANCE CONSIDERATIONS

4.1 Introduction

Consideration of product properties and performance criteria depends upon the particular materials and/or process involved. The following section is included to provide an example of the range of requirements that might be required. It is included as a guide only and should not be considered as a complete specification of requirements.

4.2 General

4.2.1 Quality management systems and certification

It is Water Industry policy for individual purchasers to decide where third party certification is required. Reference should not be made to either the need for quality management systems or certification to the product specification in the document

4.2.2 Water Quality

All materials in contact with, or likely to come into contact with, water for public supply shall be introduced in accordance with the requirements

of the Water Supply (Water Quality) Regulations 2000 or the Water Supply (Water Quality) (Scotland) Regulations 2001 or the Water Supply (Water Quality) Regulations (NI) 2002 or the Water Supply (Water Quality) Regulations (Wales) 2001, as appropriate.

The various Water Supply (Water Quality) Regulations apply only to products used by water companies in the treatment and distribution of public water supplies: they do not apply to use of fixtures and fittings on consumer's own premises. However, approval under the Water Regulations Advisory Scheme is desirable.

4.3 Product Performance Descriptors

4.3.1 Introduction

A range of basic information is required by purchasers in order to specify a product for use in a scheme. These might include:

- Pressure rating;
- Size range, dimensions and tolerances;
- Head loss across the component;
- Installation and assembly method;
- Interaction with other materials;
- Product identification;
- Compatibility with established systems.

Each of these is considered in turn.

4.3.2 Pressure rating

Most pipes are designed for operation at a particular pressure. In general, these range from about 6 bar to 15 bar. Pressures above 16 bar may be required but these would be specified as exceptions. Preferred pressure ratings are 6, 8, 10, 12, and 16 bar.

Fatigue conditions sometimes apply within water supply networks although failures are not common. All products should be capable of withstanding the effects of diurnal pressure variations.

Further guidance on calculating surge and fatigue allowances can be found in the Manuals for Polyethylene Pipe Systems⁴ and PVC Pipe Systems⁵ and in IGN 4-37-02⁶.

4.3.3 Size range, dimensions and tolerances

Dimensions and tolerances essential to define the flow capacity and connectivity of a product should be included.

Pipes are specified either on outside diameter (OD) or inside diameter (ID).

4.3.4 Head loss

There may be a significant pressure loss across some components in a pipeline, particularly small diameter systems. This is aggravated by the use of complex fittings such as meter boxes, ferrules, check valves etc. This loss of pressure could affect the capability of a system to meet standards of service and therefore have significant cost implications to the industry. It is recommended that a maximum allowable head loss at a specified flow is given for service connections < 63 mm.

4.3.5 Installation and assembly methods

A specification or separately identified part must be solely achievable by a single party (e.g. manufacturer or installer). Therefore, installation practice cannot be specified in a product standard but a requirement for the manufacturer to provide clear and adequate instructions for carrying out assembly and installation can be specified.

Some specifications (e.g. WIS 4-32-08) specify the methods of installation.

4.3.6 Interaction with other materials

Interaction between different component materials in a product may cause degradation. This is particularly true for some metals and may lead to corrosion.

Interaction between the product and the environment may also lead to loss in performance. In some instances, coatings, lining or wrappings may need to be specified. Alternatively limitations on use may be specified (e.g. below ground).

The resistance of the pipe material to contaminated land and permeability to gases should also be considered.

4.3.7 Product identification

A specification for a product should include a marking clause. Marking or labelling should

include, at least, the number and year of the Water Industry Standard and means of identifying the manufacturer.

Additional requirements such as grade, size, class or other characteristics should also be specified as appropriate and practical.

The method of marking should allow products to be positively identified on removal from storage and/or wrappings. Colour may be specified for the identification of the use of certain products for health and safety reasons (e.g. yellow for gas pipes, blue for potable water).

4.4 Long-term durability

4.4.1 Introduction

The probable performance of some products over its desired lifetime can be characterised by tests which can be accomplished over a relatively short timescale.

These might include:

- Pressure performance;
- Degradation of materials (Corrosion and erosion);
- Creep in polymers;
- Weathering

Each of these is considered in turn.

4.4.2 Pressure performance

The specification should allow the product to be assessed to ensure that its reliability over the range of conditions and lifetime over which it is expected to operate. The test criteria should also take into account changes in materials performance with time (e.g. a short term pressure test might be adequate to assess a metallic product whose change over time is only related to degradation, whereas a longer term pressure regime might be appropriate for plastics pipes where the effect of creep needs to be considered).

Stress rupture - the long term performance of plastics is characterised by a reduction in time to failure with increased pressure or increased temperature. For example a pipe designed to operate at 10 bar over many years may be capable of withstanding 30 bar for a relatively short time - this property can be used to accelerate testing.

4.4.3 Degradation of materials

Resistance to corrosion, erosion and abrasion of materials must be considered. The product lifetime can be significantly reduced by these actions and any protection systems need to be adequately assessed.

4.4.4 Creep

In the long term, plastics under a constant stress exhibit movement of material away from the point of stress - this might lead to a reduction in compression at a joint or the lessening of a stress concentration at a point load.

4.4.5 Weathering

Some products (e.g. plastics pipes/ wrapping / coatings, elastomeric sealing rings) may suffer weathering or surface oxidation when subjected to sunlight. In some cases, this can effect long-term performance and is particularly critical when the product is designed for above-ground use. Storage time in the stockyard or on site should also be considered.

4.5 Short term control factors

4.5.1 Introduction

The aim of most short term tests is to provide routine quality control monitoring of products during the production cycle.

Tests may be carried out on the products, parts of the product, or components from with the product. These might include:

- Tensile properties;
- Hardness;
- Strength of joints;
- Pressure performance
- Resistance to handling and installation damage

Each of these is considered in turn.

4.5.2 Tensile properties

This test is typically performed to determine the tensile strength and the strain behaviour (elongation properties) of the product. Both properties can be used as a measure of quality of the material before and after production. They may also be required in pipeline design calculations.

4.5.3 Hardness

For some products (e.g. elastomeric seals, external coatings) the hardness is important. This might determine its ability to resist loads (i.e. a seal where the hardness is too low will creep away from the point of loading and form an inadequate seal; similarly with a polymeric coating material may creep away from the load and leave the product surface unprotected).

4.5.4 Strength of joints

The leak tightness of pipeline systems is dependent upon the quality of the jointing systems. Joints might be fused or mechanical (incorporating an elastomeric seal) in nature.

It may be appropriate to consider the effect of tensile (pull - out), shear and deflection loads on the joint. The long-term performance under these loads or under cyclic fatigue might be important.

4.5.5 Pressure performance

The short term (burst) performance of component under pressure can, in some cases, be used to predict longer term performance. In addition, short term testing can be a check of quality of a product or component (e.g. porosity of metal castings, faults at weld lines, product assembly). Short term testing at high pressures can provide confidence that a product will withstand pressures in excess of the site test pressure for a complete system.

4.5.6 Resistance to handling and installation damage

Pipes and components can be subject to damage during handling and installation which might impair their long-term performance or the effectiveness of their corrosion protection systems.

Minor cracks or notches in a pipe wall might be tolerated, but above a certain level these may lead to premature failure.

External impact tests, pressure tests on notched systems and adhesion tests (coatings) might be appropriate.

Since this damage can occur, the importance of crack growth (propagation of a crack from a defect or point load, either slow or rapid) might be important. Examples of this are the fracture

toughness test for PVC-U pipes and the RCP (rapid crack propagation) test for polyethylene pipes.

5. REFERENCES

1. Council Directive on the procurement procedures of entities in the water, energy, transport and postal services sectors (2004/17/EC).
2. Council Directive on the approximation of laws, regulations and administrative provisions of the Member States relating to construction products (89/106/EEC)
3. Civil engineering specification for the water industry. 6th Edition. UKWIR, June 2004.
4. Manual for Polyethylene Pipe Systems for water supply applications. WRc plc, July 1994.
5. Manual for PVC pressure pipe systems. WRc, July 1994
6. IGN 04-37-02 Design against surge and fatigue conditions for thermoplastic pipes.

APPENDIX A



WATER INDUSTRY SPECIFICATIONS

APPLICATION FOR DEVELOPMENT OR AMENDMENT OF 4-SERIES (MATERIALS)

Provisional title:

Scope (please describe as fully as possible)

Initiator:

Group responsible for drafting or amending:
(Standards Board to confirm)

Technical Secretary of Board:

Primary Author:

Funding route:

Estimated date for Public Comment:

Recommendation from Drafting Group to go to the Water UK Standards Board

Chairman Date.....

Water UK Standards Board Approval for drafting

Chairman Date

Please Note that drafting should not commence until this approval has been received.

Original copy of signed form is to be sent to the Water UK Standards Board via WRc.

APPENDIX B



WATER INDUSTRY SPECIFICATIONS

APPROVAL TO PUBLISH (4-SERIES MATERIALS)

Title

WIS No.

Issue No.

APPROVAL TO CIRCULATE FOR PUBLIC COMMENT

Steering Group:

Signature of Chairman:

Date:

Circulation date:

APPROVAL TO PUBLISH

Signature of Chairman (Drafting Group):

Date:

Signature of Chairman of Standards Board:

Date:

Original copy of signed form is to be sent to the Water UK Standards Board via WRc.