

TECHNICAL NOTE

Number: VX-TN-5C.2
First Issue: **TN-U6.1 July, 1995**
Revision 2: July 2002



Vinidex Pty. Limited
ABN 42 000 664 942
19-21 Loyalty Road (PO Box 4990)
North Rocks, NSW 2151, Australia

DESIGN CONSIDERATIONS FOR ULTRA-RIB FITTINGS

This technical note addresses only technical matters related to the application of our products. It does not address issues of health and safety practices, nor any regulatory limitations that may apply, and does not constitute a recommendation of suitability for any purpose

The purpose of this note is to discuss the functional requirements and design considerations of Ultra-Rib sewer fittings.

For structural wall flexible pipes in general, the primary strength parameter set is the pipe stiffness, which is a measure of the force required to produce a unit deflection (under parallel plate loading geometry).

$$PS = \frac{F}{\Delta Y}$$

Analytically

$$PS = \frac{EI}{0.149R^3}$$

where the symbols have their usual meaning.

The structural form derives its strength from the improvement to the moment of inertia of the wall cross-section, I . As in steel I-beams, there is an infinite range of geometries possible to obtain the desired moment of inertia. Very efficient (high strength-to-weight ratio) sections can be made by using high rib (web) sections, but there are of course limits imposed by other failure criteria, such as buckling, or as in the case of Ultra-Rib, the strain levels induced in the outer fibres of the ribs. Other practical considerations may prevail such as abrasion, temperature, and chemical resistance of the reduced base wall section thickness.

In the case of fittings, there are a number of additional points that need to be considered:

1. The general stiffness of the particular fitting geometry and the additional stiffness

contributed by flanges and sockets. As a whole, the fitting should offer a similar deflection response under load as the pipe, to avoid developing differential deflections across the joints.

Ultra-Rib fittings are designed with the same basic moment of inertia as the pipe for the wall cross-section of the body of the fitting, but with no ribs on the sockets. The socket stiffness is quite low, so that they contribute little to the overall stiffness of the fitting, and the socket deflection can readily "follow" the pipe deflection.

2. The higher strains likely in fittings due to asymmetric deformation. Asymmetric fittings undergo asymmetric deformation under load, and conservative design requires that the maximum rib height be reduced to limit outer fibre strain levels. In compensation the base wall thickness is increased to maintain the same moment of inertia. Section efficiency is sacrificed.

3. Wear due to abrasion and resistance to the action of cleaning equipment is of greater significance for fittings, in particular bends and junctions. Ultra-Rib fittings are designed with a thicker base wall than for pipes.

For further information about our products and applications, see our web site at

www.vinidex.com.au

Correspondence regarding this Technical Note should quote the reference number and version and be directed to:

The Technical Manager
Vinidex Pty Limited
Technical Services Group
254 Woodpark Rd.
Smithfield, NSW, 2164
Australia

Tel +61(0)2 9604 2422
Fax +61(0)2 9725 3363
Email techman@vinidex.com.au

Technical notes supplied by Vinidex represent the most advanced technology drawn from worldwide research and field experience available to us at the time of printing. They are published in the interest of better understanding of the technicalities of our products and more satisfactory performance for users.

The application of such technology may involve engineering judgements that cannot be correctly made without intimate knowledge of all conditions pertaining to a specific installation. Technology may be superseded in the light of new laboratory and fieldwork, and changes to product specifications, and this Technical note may be withdrawn or amended without notice.

Responsibility lies solely with the User to ensure the currency and validity of information or advice contained herein in the context of his circumstances. It is recommended that advice be obtained from a Consultant registered with the Institution of Engineers Australia.

No warranty (other than Statutory Warranty) is expressed or implied as to the content of the information or results obtained by use thereof, and Vinidex Pty. Limited will not be held liable for any costs, direct or indirect, that may arise therefrom.