Type of Fitting	K Value
D2/D1 = 0.2	0.08
Expansion - Sudden	
D2/D1 = 0.8	0.16
D2/D1 = 0.5	0.57
D2/D1 = 0.2	0.92
Expansion - Conical	
D2/D1 = 0.8	0.03
D2/D1 = 0.5	0.08
D2/D1 = 0.2	0.13
Valves	
Gate valve fully open	0.25
Gate valve ¾ open	1
Gate valve ½ open	5.6
Gate valve ¼ open	24
Check valve fully open	4.3

Note that for valves it is advisable to obtain manufacturers data on head losses. System head calculations would normally be carried out using valve open figures

Table 7-4 – K Values for Type of Fittings

7.4. Structural Design

7.4.1. Internal Forces

In accordance to BS EN 805 standard, pipelines shall be designed to withstand a transient pressure of 80 kPa below atmospheric pressure (approximately 20 kPa absolute pressure).

7.4.2. Temperature Range

Pressure mains shall be designed for continuous operation over the anticipated temperature range of 10 – 50°C. Note that de-rating factors will need to be applied to flexible pipes for the high temperature.

7.4.3. Unbalanced Thrust

Unbalanced forces (forces at valves, changes in direction, etc.) shall be compensated by an adequate number of restrained joints, thrust blocks or other anchorages. Where thrust blocks are to bear against the soil the safe bearing pressure shall be determined.

Blocks shall take the form of a cradle wedged against the undisturbed trench side and design based on the safe bearing pressure of the ground. Minimum safety factors are shown in Table 7-5.

minimum friction safety factor	1.5
minimum sliding safety factor	2.0
minimum overturning safety factor	2.0

Table 7-5 – Minimum Thrust Safety Factors