

KDS023 Pipe Material Design Specific Roughness (ϵ)

Pipe Material	Design Value for ϵ (metres x 10^{-6})
Carbon Steel, Welded or Seamless	45
Stainless Steel, Welded or Seamless	45
Ductile Iron	259
Concrete	300 to 3000
Cast Iron, Plain	254
Cast Iron, Asphalt Dipped	122
Cast Iron, Cement Lined	2.4
Galvanised Iron, Plain	150
Copper	1.5
Brass	1.5
Lead	1.5
Glass	1.5
Plastic (e.g. PVC, ABS, Polyethylene)	1.5
Fibreglass	5

Notes:

- Adapted from various sources.
- 1 micron (μm) = 1×10^{-6} metres = 0.000001 m = 0.001 mm
- These values are for use with the Moody Friction Factor Chart, Colebrook Equation or Swamee-Jain Equation