Moody diagram: Friction factor, f, versus Reynolds number, Re, with relative roughness ϵ/D curves.

Pipe material	ϵ [in]	ϵ [mm]
Commercial Steel	0.0018	0.046
PVC, Cooper, Brass	0.00006	0.0015
Cast Iron	0.01	0.26
Galvanized Iron	0.006	0.15
Concrete (smooth)	0.012	0.3
Concrete (course)	0.12	3.0

Transition Region

→ Zone of complete turbulence

Laminar
$f = 64/N_R$

ϵ/D

0.05
0.02
0.01
0.005
0.002
0.001
0.0005
0.0002
0.0001
0.00005
0.00002
0.00001
smooth pipe