

Manning's Roughness Coefficient, n

Type of Channel and Description	Manning's Roughness Coefficient, n <sup>a</sup> (dimensionless)
<b>A. Closed Conduits Flowing Partly Full</b>	
<b>A-1. Metal</b>	
Brass, smooth	0.010
Steel, welded	0.012
Corrugated metal storm drain	0.024
<b>A-2. Nonmetal</b>	
Lucite (acrylic)	0.009
Glass	0.010
Cement, mortar	0.013
Concrete, finished	0.012
Concrete, steel form	0.013
Concrete, smooth wood form	0.014
Concrete, rough wood form	0.017
Sanitary sewers coated with sewage slimes, with bends and connections	0.013
Polyethylene PE - Corrugated with smooth inner walls	0.009 - 0.015 <sup>b</sup>
Polyethylene PE - Corrugated with corrugated inner walls	0.018 - 0.025 <sup>b</sup>
Polyethylene PE - Smooth Pipe	0.010 <sup>c</sup>
PVC Pipe	0.011 <sup>d</sup>
<b>B. Lined or Built-Up Channels</b>	
<b>B-1. Metal</b>	
Smooth steel surface, unpainted	0.012
Smooth steel surface, painted	0.013
Corrugated	0.025
<b>B-2. Nonmetal</b>	
Wood, planed, untreated	0.012
Concrete, trowel finish	0.013
Concrete, float finish	0.015
Concrete, finished, with gravel on bottom	0.017
Concrete, unfinished	0.017
Gunite, good section	0.019
Gunite, wavy section	0.022
Gravel bottom with sides of formed concrete	0.020
Gravel bottom with sides of random stone in mortar	0.023
<b>C. Excavated or Dredged</b>	
Earth, straight and uniform, clean, recently completed	0.018
Earth, straight and uniform, clean, after weathering	0.022
Earth, winding and sluggish, no vegetation	0.025
Earth, winding and sluggish, grass, some weeds	0.030
Earth, winding and sluggish, dense weeds or aquatic plants in deep channels	0.035
Earth, winding and sluggish, earth bottom and rubble sides	0.030
Earth, winding and sluggish, stony bottom and weedy banks	0.035
Earth, winding and sluggish, cobble bottom and clean sides	0.040
Rock cuts, smooth and uniform	0.035
Rock cuts, jagged and irregular	0.040

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D. Natural Streams

D-1. Minor Streams (top width at flood stage <100 ft)

Streams on plain, clean, straight, full stage, no rifts or deep pools	0.020
Streams on plain, clean, straight, full stage, no rifts or deep pools, more stones and weeds than above	0.035
Streams on plain, clean, winding, some pools and shoals	0.040
Streams on plain, clean, winding, some pools and shoals, more stones and weeds	0.045
Streams on plain, sluggish reaches, weedy, deep pools	0.070
Streams on plain, very weedy reaches, deep pools, or floodways with heavy stand of timber and underbrush	0.100
Mountain streams, no vegetation in channel, banks usually steep, trees and brush along banks submerged at high stages, bottom: gravels, cobbles, and few boulders	0.040
Mountain streams, no vegetation in channel, banks usually steep, trees and brush along banks submerged at high stages, bottom: cobbles with large boulders	0.050

D-2. Flood Plains

Pasture, no brush, short grass	0.030
Pasture, no brush, high grass	0.035

D-3. Major Streams (top width at flood stage >100 ft)

The n-value is less than that for minor streams of similar description because banks offer less effective resistance.	
Regular section with no boulders or brush	0.025 - 0.060
Irregular and rough section	0.035 - 0.100

<sup>a</sup>Chow, 1959 (except where noted).

<sup>b</sup>[www.engineeringtoolbox.com](http://www.engineeringtoolbox.com)

<sup>c</sup>Plastics Pipe Institute, page 4: "Practical experience has shown that this value [ $n = 0.010$ ] represents a reliable, conservative approximation of the flow properties associated with polyethylene pipe".

<sup>d</sup>PVC Pipe Association, Handbook of PVC Pipe Design and Construction, 5th Edition, Page 9.81: "Studies in the laboratory, and more importantly, in actual use, have found the value of "n" for PVC to range from 0.007 to 0.011." Table uses the more conservative value of 0.011.

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