

## PIPE ROUGHNESS VALUES

Jacques Chaurette p. eng.

www.lightmypump.com

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Pipe absolute roughness values (RMS)		
Material	Absolute roughness (in x 10 <sup>-3</sup> )	Absolute roughness (micron or m x 10 <sup>-6</sup> )
Riveted steel <sup>1</sup>	36-360	915-9150
Concrete <sup>1</sup>	12-120	305-3050
Ductile iron <sup>2</sup>	102	2591
Wood stave <sup>1</sup>	3.6-7.2	91-183
Galvanized iron <sup>1</sup>	6	152
Cast iron – asphalt dipped <sup>1</sup>	4.8	122
Cast iron uncoated <sup>1</sup>	10	254
Carbon steel or wrought iron <sup>1</sup>	1.8	45
Stainless steel <sup>1</sup>	1.8	45
Fiberglass <sup>3</sup>	0.2	5
Drawn tubing – glass, brass, plastic <sup>1</sup>	0.06	1.5
Copper <sup>2</sup>	0.06	1.5
Aluminium <sup>2</sup>	0.06	1.5
PVC <sup>2</sup>	0.06	1.5
Red brass <sup>2</sup>	0.06	1.5

- Sources :
1. Cameron hydraulic data Book
  2. Engineered Software's PIPE-FLO software [www.engineered-software.com](http://www.engineered-software.com)
  3. Fiberglass Pipe Handbook, SPI Composites Institute