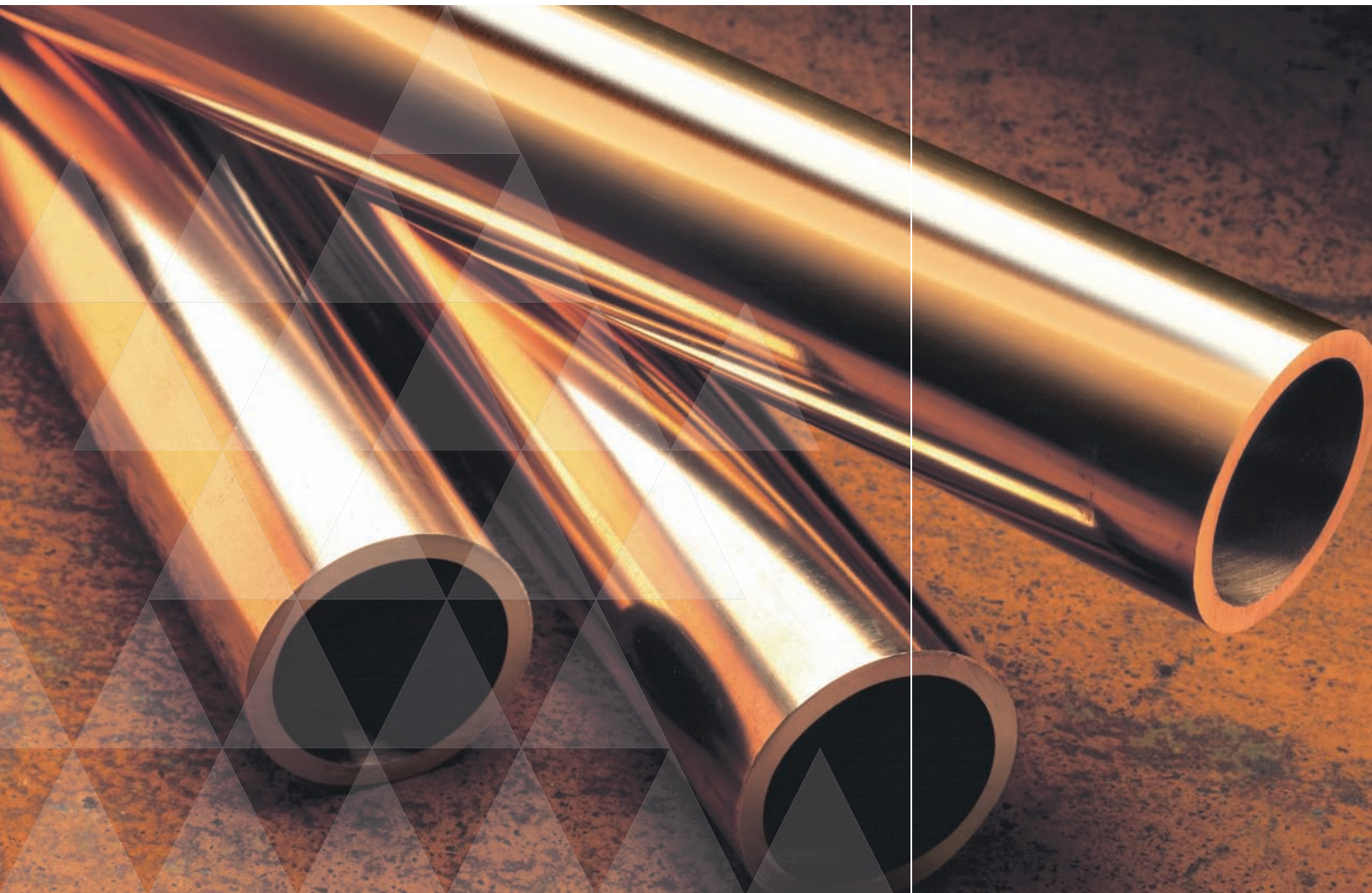




MATERION



BRUSH PERFORMANCE ALLOYS

**HIGH STRENGTH,
NON-MAGNETIC, NON-GALLING
PRECISION TUBE**

FOR INSTRUMENTATION
PRESSURE HOUSINGS
& BATTERY HOUSINGS USED IN:

DOWNHOLE MWD,
DOWNHOLE LWD,
WIRE LINE OILFIELD TOOLS

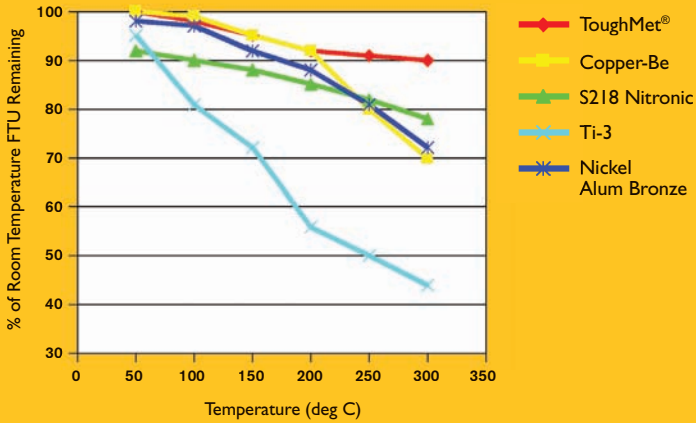
PRECISION TUBE

HIGH STRENGTH AT ROOM TEMPERATURE

Material	Description	Yield Strength (Rp0,2) Min.	Elongation (A5) Min.
Alloy 25	Pressure Housing Tube	1034 MPa	5%
Alloy 25	Pressure Housing Tube	965 MPa	6%
ToughMet® 3 TSI50	Pressure Housing Tube	1034 MPa	5%

AND elevated temperature...provides more resistance to collapse or distortion in high pressure and temperature environments downhole.

EFFECT OF ELEVATED TEMPERATURE ON STRENGTH OF SELECTED ALLOYS



BRUSH PRESSURE HOUSING TUBES ARE READILY AVAILABLE

ALLOY 25 HT Tube Standard Tolerance	
Made to Stock Standard Tolerance	OD x ID x Length Dimensions in [inches]
TUBE CD Alloy 25 HT	2.875 X 2.375 X 76.6
TUBE CD Alloy 25 HT	2.750 X 2.375 X RL*
TUBE CD Alloy 25 HT	2.010 X 1.625 X 192
TUBE CD Alloy 25 HT	1.908 X 1.620 X RL*
TUBE CD Alloy 25 HT	1.880 X 1.495 X RL
TUBE CD Alloy 25 HT	1.875 X 1.125 X 150
TUBE CD Alloy 25 HT	1.875 X 1.125 X 144
TUBE CD Alloy 25 HT	1.750 X 1.420 X 112.5
TUBE CD Alloy 25 HT	1.156 X 0.950 X 102

* RL = Random Length = 8-13ft

Alloy 25 HT Tube with Improved ID Tolerance	
Made to Stock Improved ID Tolerance	OD x ID x Length Dimensions in [inches]
TUBE CD Alloy 25 HT	2.010 X 1.625 X RL
TUBE CD Alloy 25 HT	1.908 X 1.625 X RL
TUBE CD Alloy 25 HT	1.880 X 1.500 X RL
TUBE CD Alloy 25 HT	1.750 X 1.500 X RL
TUBE CD Alloy 25 HT	1.750 X 1.441 X 112.5
TUBE CD Alloy 25 HT	1.750 X 1.441 X 103

Improved OD tolerance for Alloy 25 tube is available on a Made-to-Order Basis

ToughMet® 3 TSI50 Tube Standard Tolerance	
Made to Stock Standard Tolerance	OD x ID x Length Dimensions in [inches]
TUBE TOUGHMET 3 TSI50	1.375 X 1.030 X RL
TUBE TOUGHMET 3 TSI50	1.675 X 1.275 X RL
TUBE TOUGHMET 3 TSI50	2.010 X 1.625 X RL
TUBE TOUGHMET 3 TSI50	1.718 X 1.404 X RL
TUBE TOUGHMET 3 TSI50	1.750 X 1.400 X RL
TUBE TOUGHMET 3 TSI50	1.750 X 1.375 X RL

Improved OD and/or ID Tolerance for ToughMet tube is available on a Made-to-Order Basis

PRECISE DIMENSIONAL CONTROL DIAMETERS, CONCENTRICITY, AND STRAIGHTNESS

Standard Diameter Tolerances		
Average Diameter Tolerances for Pressure Housing Tube (ASTM-B-643)	Tolerance +/- [inch]	Tolerance +/- [mm]
Specified O.D. or I.D. inches (mm)		
Over 1/2 to 3/4, incl (12.7mm - 19.05mm)	0.003	0.076
Over 3/4 to 1, incl (19.05mm - 25.4mm)	0.006	0.152
Over 1 to 2, incl (25.4mm - 50.8mm)	0.008	0.203
Over 2 to 3, incl (50.8mm - 76.2mm)	0.010	0.254
Over 3 to 4, incl (76.2mm - 101.6mm)	0.012	0.305



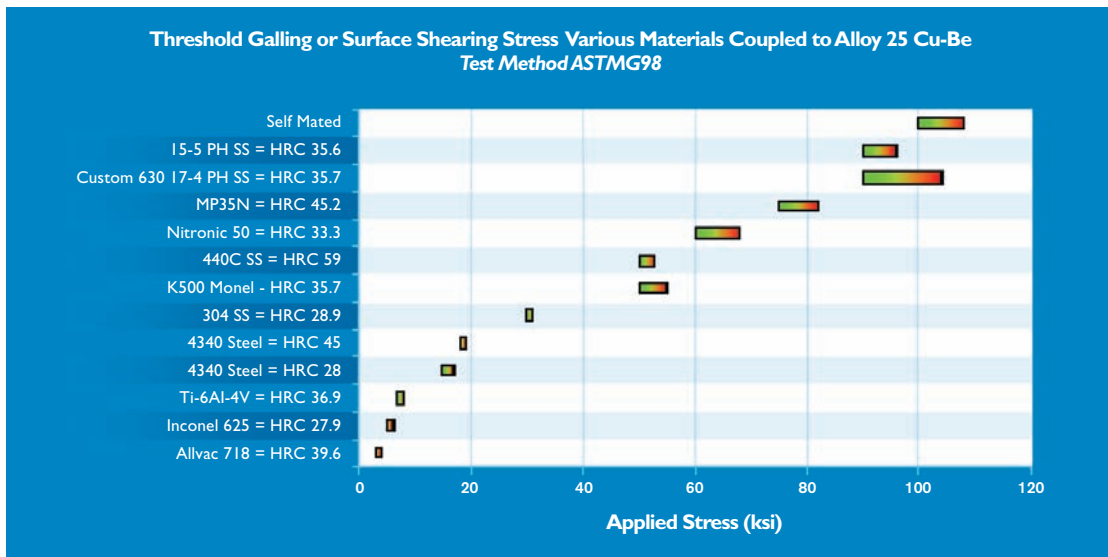
PRECISE DIMENSIONAL CONTROL DIAMETERS, CONCENTRICITY, AND STRAIGHTNESS

Standard Straightness Tolerances	
0.009" PER FOOT.	0.027" IN ANY 3 FT
(0.229mm PER 300mm.)	0.685mm IN ANY 915mm)

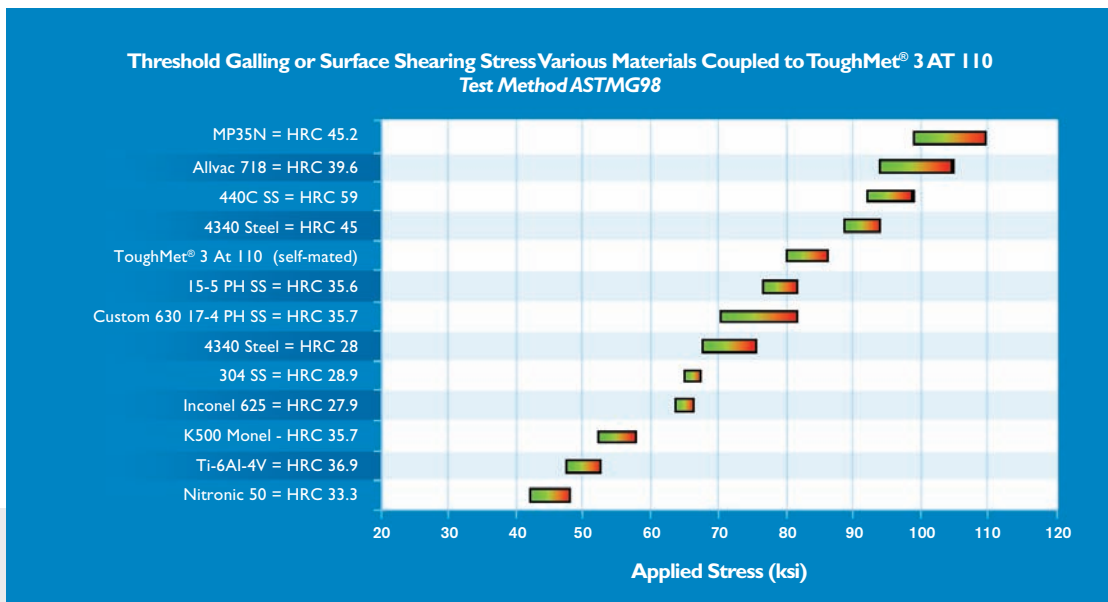
Improved O.D.Tolerances (FOR Alloy 25 HT and ToughMet® 3 TS I50 TUBE)	
1.875" O.D. = +/- 0.004"	47.6mm(+/- 0.102mm)
2.010" O.D. = + 0.010/- 0.000"	51mm(+0.254/- 0.000mm)

Improved I.D.Tolerances (FOR Alloy 25 HT and ToughMet® 3 TS I50 TUBE)	
1.441" I.D. = +0.003/- 0.002"	36.6mm(+0.076/-0.051mm)
1.500" I.D. = +0.000/-0.004"	38.1mm(+0.000/-0.102mm)
1.625" I.D. = +0.000/-0.005"	41.3mm(+0.000/-0.127mm)

SUPERIOR RESISTANCE TO GALLING DAMAGE OF THREADED CONNECTIONS



Alloy 25 will tolerate nearly 700 MPa compression stress without galling damage when mated to itself.



ToughMet® is a registered trademark of Materion Brush Inc.



MATERION

ABOUT MATERION

Materion is the new name for Brush Engineered Materials Inc., its Brush Wellman Inc. subsidiary, and all of the company's businesses worldwide. Materion is among the world's premier providers of advanced materials solutions and services. Now under the one Materion brand, we are better aligned to deliver a broader scope of products, services and expertise needed to drive our customers' growth and profitability and become their first choice in a partner. Materion Corporation common stock trades on the New York Stock Exchange under the symbol MTRN.

MATERION BUSINESSES

Advanced Chemicals	Electrofusion
Barr Precision Optics & Thin Film Coatings	Large Area Coatings
Brush Beryllium & Composites	Microelectronics & Services
Brush Performance Alloys	Natural Resources
Ceramics	Technical Materials

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