

# Materials

ITEM/PROPERTY	BARSTOCK	CASTING	FORGING
<b>CARBON STEEL</b>			
ASTM Specifications	A108-1215	A216-WCB	A105
Unified Numbering System	G12150	J03002	K03504
<b>MAJOR ELEMENTS</b>			
Carbon	0.09% max.	0.30% max.	0.35% max.
Manganese	0.75 - 1.05%	1.00% max.	0.60 - 1.05%
Phosphorus	0.04 - 0.09%	0.04% max.	0.04% max.
Sulfur	0.26 - 0.35%	0.045% max.	0.05% max.
Silicon	-	0.60% max.	0.35% max.
<b>MECHANICAL PROPERTIES</b>			
Tensile Strength	70,000psi min.	70,000psi min.	70,000psi min.
Yield Strength	36,000psi min.	36,000psi min.	36,000psi min.
<b>316 STAINLESS STEEL</b>			
ASTM Specifications	A276-316	A351-CF8M	A182-F316
Unified Numbering System	S31600	J92900	S31600
<b>MAJOR ELEMENTS</b>			
Carbon	0.08% max.	0.08% max.	0.08% max.
Chromium	16.00 - 18.00%	18.00 - 21.00%	16.00 - 18.00%
Molybdenum	2.00 - 3.00%	2.00 - 3.00%	2.00 - 3.00%
Nickel	10.00 - 14.00%	9.00 - 13.00%	10.00 - 14.00%
<b>MECHANICAL PROPERTIES</b>			
Tensile Strength	75,000psi min.	70,000psi min.	75,000psi min.
Yield Strength	30,000psi min.	30,000psi min.	30,000psi min.
<b>316L STAINLESS STEEL</b>			
ASTM Specifications	A276-316L	A351-CF3M	A182-F316L
Unified Numbering System	S31603	J92800	S31603
<b>MAJOR ELEMENTS</b>			
Carbon	0.03% max.	0.03% max.	0.03% max.
Chromium	16.00 - 18.00%	17.00 - 21.00%	16.00 - 18.00%
Molybdenum	2.00 - 3.00%	2.00 - 3.00%	2.00 - 3.00%
Nickel	10.00 - 14.00%	9.00 - 13.00%	10.00 - 15.00%
<b>MECHANICAL PROPERTIES</b>			
Tensile Strength	70,000psi min.	70,000psi min.	75,000psi min.
Yield Strength	25,000psi min.	30,000psi min.	30,000psi min.
<b>ALLOY 20</b>			
ASTM Specifications	B473-N08020	A351-CN7M	B462-N08020
Unified Numbering System	N08020	N08007	N08020
<b>MAJOR ELEMENTS</b>			
Chromium	19.00 - 21.00%	19.00 - 22.00%	19.00 - 21.00%
Copper	3.00 - 4.00%	3.00 - 4.00%	3.00 - 4.00%
Manganese	2.00% max.	1.5% max.	2.00% max.
Molybdenum	2.00 - 3.00%	2.33 - 3.00%	2.00% - 3.00%
Nickel	32.00 - 38.00%	27.50 - 30.50%	32.00 - 38.00%
<b>MECHANICAL PROPERTIES</b>			
Tensile Strength	80,000psi min.	62,000psi min.	80,000psi min.
Yield Strength	35,000psi min.	25,000psi min.	35,000psi min.

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<b>NICKEL</b>			
ASTM Specifications	B160-N02200	A494-CZ100	B160-N02200
Unified Numbering System	N02200	N02100	N02200
<b>MAJOR ELEMENTS</b>			
Molybdenum	2.00 - 3.00%	2.33 - 3.00%	2.00 - 2.00%
Nickel	99.00% max.	95.00% min.	99.00% max.
<b>MECHANICAL PROPERTIES</b>			
Tensile Strength	55,000psi min.	50,000psi min.	55,000psi min.
Yield Strength	15,000psi min.	18,000psi min.	15,000psi min.
<b>NICKEL-COPPER ALLOY</b>			
ASTM Specifications	B164-N04400	A494-M35-1	B564-N04400
Unified Numbering System	N04400	N/A	N04400
<b>MAJOR ELEMENTS</b>			
Copper	28.00 - 34.00%	26.00 - 33.00%	28.00 - 34.00%
Iron	2.50% max.	3.50% max.	2.50% max.
Manganese	2.00% max.	1.50% max.	2.00% max.
Molybdenum	2.00 - 3.00%	2.33 - 3.00%	2.00 - 3.00%
Nickel	63.00% min.	60.00% min.	63.00% min.
<b>MECHANICAL PROPERTIES</b>			
Tensile Strength	70,000psi min.	65,000psi min.	70,000psi min.
Yield Strength	25,000psi min.	25,000psi min.	25,000psi min.
<b>LEADED BRASS &amp; BRONZE ALLOYS</b>			
ASTM Specifications	B16	B584-C84400	
Unified Numbering System	C36000	C84400	
<b>MAJOR ELEMENTS</b>			
Copper	60.0 - 63.0%	78.0 - 82.0%	
Tin		2.3 - 3.5%	
Lead	2.5 - 3.7%	6.0% - 8.0%	
Zinc	33.00 - 37.5%	7.0 - 10.0%	
<b>MECHANICAL PROPERTIES</b>			
Tensile Strength	25,000psi min.	29,000psi min.	
Yield Strength	10,000psi min.	13,000psi min.	
<b>85-5-5-5 BRONZE ALLOYS</b>			
ASTM Specifications	N/A	B62-C83600	
Unified Numbering System	C83600	C83600	
<b>MAJOR ELEMENTS</b>			
Copper	84.0 - 86.0%	84.0 - 86.0%	
Tin	4.0 - 6.0%	4.0 - 6.0%	
Lead	4.0 - 6.0%	4.0 - 6.0%	
Zinc	4.0 - 6.0%	4.0 - 6.0%	
<b>MECHANICAL PROPERTIES</b>			
Tensile Strength	30,000psi min.	30,000psi min.	
Yield Strength	14,000psi min.	14,000psi min.	

