

# Brass Rod Solutions for “Lead-Free” Compliance

Understanding compliance requirements for regulations that restrict lead (Pb) in materials and products can be a daunting task. The simple matrix below is intended to help manufacturers readily identify commercially available brass rod solutions that meet U.S. and European “lead-free” compliance requirements in regulated markets. The notes provide key details on specific compliance conditions and include links to additional guidance materials. Alloy compositions, typical mechanical properties and machinability ratings are also provided on the following page for reference.

Alloy	US Reduction of Lead in Drinking Water Act (100% wetted surface area contact) <sup>1</sup>	California Proposition 65 <sup>2</sup>	EU Restriction of Hazardous Substances Directive (RoHS II) <sup>3</sup>	EU End-of-Life Vehicle Directive (ELV) <sup>4</sup>	EU Registration Evaluation Authorization and Restriction of Chemicals Directive (REACH) <sup>5</sup>
C27450	✓	✓	✓	✓	✓
C27451	✓	✓	✓	✓	✓
C34500		✓	✓	✓	✓
C35000		✓	✓	✓	✓
C35300		✓	✓	✓	✓
C36000		✓	✓	✓	✓
C36300		✓	✓	✓	✓
C37000		✓	✓	✓	✓
C37700		✓	✓	✓	✓
C38500		✓	✓	✓	✓
C69300	✓	✓	✓	✓	✓
C69850	✓	✓	✓	✓	✓
Aviva 3	✓	✓	✓	✓	✓

1. Assumes alloy is the only material in the product in contact with water. Products must have a weighted average of ≤0.25% Pb with respect to total wetted surface area. Pb leachate testing for endpoint devices (e.g. faucets) is also required by states per NSF/ANSI 61 Section 9. More info: <https://bit.ly/2lzoftm> and <https://bit.ly/2xFkbdT>
2. Warning labels must be included on packaging if potential exposures from use of the product may exceed the Safe Harbor Limit for Pb. Manufacturers may apply Prop 65 warning labels even in the absence of an exposure evaluation if the product is known to contain Prop 65 constituents. More info: <https://bit.ly/31chmyH>
3. Brass alloys containing up to 4% Pb by weight are compliant under Exemption 6(c). Exemptions are reviewed every few years for renewal. More info: <https://bit.ly/2iBiHP1>
4. Brass alloys containing up to 4% Pb by weight are compliant under Exemption 3. Exemptions are reviewed every few years for renewal. More info: <https://bit.ly/2kuxrz2>
5. Customer communication obligations apply if brass articles exported to EU contain >0.1% Pb w/w. If Pb in the brass articles exported to EU totals more than one tonne per importer per year, and if Pb is present in the article above 0.1% w/w, the importer must notify the EU Chemicals Agency. More info: <https://bit.ly/2iEfrZs>

## Typical Alloy Compositions According to Nominal Standards

Alloy	Cu	Pb	Sn	Zn	Fe	P	Ni	Mn	Si	Te
C27450 <sup>1</sup>	62.5	0.25 (max)	-	Rem	0.35 (max)	-	-	-	-	-
C27451 <sup>1</sup>	63.0	0.25 (max)	-	Rem	0.35 (max)	0.13	-	-	-	-
C34500 <sup>2</sup>	63.5	2.0	-	Rem	0.15 (max)	-	-	-	-	-
C35000 <sup>2</sup>	62.5	1.4	-	Rem	0.15 (max)	-	-	-	-	-
C35300 <sup>2</sup>	62.0	2.0	-	Rem	0.15 (max)	-	-	-	-	-
C36000 <sup>3</sup>	61.5	2.75	-	Rem	0.35 (max)	-	-	-	-	-
C36300 <sup>4</sup>	62.0	0.48	-	Rem	0.15 (max)	0.10	-	-	-	-
C37000 <sup>4</sup>	60.5	1.15	-	Rem	0.15 (max)	-	-	-	-	-
C37700 <sup>4</sup>	59.5	2.0	-	Rem	0.30 (max)	-	-	-	-	-
C38500 <sup>5</sup>	57.0	3.0	-	Rem	0.35 (max)	-	-	-	-	-
C69300 <sup>6</sup>	75.0	0.09 (max)	0.20 (max)	Rem	0.10 (max)	0.10	0.10 (max)	0.10 (max)	3.05	-
C69850 <sup>6</sup>	68.2	0.09 (max)	0.20 (max)	Rem	0.10 (max)	0.10	0.10 (max)	0.10 (max)	1.75	-
Aviva 3	86.5	0.09 (max)	0.30 (max)	Rem	0.30 (max)	-	0.30 (max)	-	-	0.60

ASTM Reference Standards: (1) B927/B927M-17; (2) B453/B453M-19; (3) B16/B16M-10(2015); (4) B981/B981M-19; (5) B455 - 10(2017); (6) B371/B371M-19

## Typical Mechanical Properties and Machinability Ratings (Rod, H02 Temper)

Alloy	Tensile Strength (ksi / MPa)	Yield Strength (ksi / MPa)	Elongation (%)	Rockwell B Hardness	Machinability (100 scale)
C27450	58 / 400	40 / 276	30	65	70
C27451	55 / 379	35 / 241	30	65	70
C34500	54 / 372	34 / 234	35	66	90
C35000	60 / 414	20 / 138	30	70	70
C35300	54 / 372	45 / 310	25	65	90
C36000	56 / 386	45 / 310	25	72	100
C36300	65 / 448	45 / 310	20	75	80
C37000	65 / 448	45 / 310	30	75	70
C37700	52 / 359	20 / 138	45	78	80
C38500	60 / 414	20 / 138	30	65	90
C69300	88 / 607	50 / 345	10	90	80
C69850	77 / 531	49 / 338	10	80	70
Aviva 3	50 / 345	31 / 215	16	65	90

Disclaimer: The values listed above represent reasonable approximations suitable for general engineering use. Due to commercial variations in compositions and to manufacturing limitations, they should not be used for specification purposes. See applicable ASTM International specification references. Additional property data is also available on CDA's website: <https://bit.ly/2LSnyGc>.