

Defence Standard 02-833 or NES 833 is a 10/5/5 Nickel Aluminium Bronze manufactured in accordance with MoD (Navy) requirements. One particular difference from standard 10/5/5 Aluminium Bronzes is the need for the nickel content to be higher than the iron content. This improves the overall corrosion resistance of the alloy by helping to eliminate any deleterious phases within the microstructure. Other tests are also required, including a minimum impact strength (on all sizes above 15mm) together with a full ultrasonic test to meet the requirements of DEF STAN 02-729 Part 5 for Grade 1 material.

Defence Standard 02-833 is primarily used in the marine and offshore industries for fasteners, pump and valve components, pipe fittings, deck fittings and heat exchangers due to its high strength and toughness (even at cryogenic temperatures), combined with an excellent corrosion resistance in seawater. The inherent wear and abrasion resistance of this Aluminium Bronze combined with its non-sparking properties also lends itself to applications such as bearings (especially under heavy loads), wear plates, thrust washers, bushes, safety tools, worm wheels and gears.

#### Related Specifications

Defence Standard 02-833 Pt 2 Iss 3 – 2011	Def Stan 02-833 Pt 2 Iss 2 – 2007
Def Stan 02-833 Part 2 Issue 1 – 2000	DGS 1043
NES 833 Pt2 Iss2 – 1991	DGS 8543

#### Chemical Composition

Copper	Rem
Aluminium	8.5 - 10.0%
Nickel	4.5 - 5.5%
Iron	4.0 - 5.0%
Manganese	0.50% max
Total Impurities	0.50% max

\*Nickel content to be higher than the iron content for the latest Def Stan specification.

#### Key Features

- High Mechanical Strengths
- Excellent corrosion resistance in marine environments
- Very good wear and abrasion resistance
- Retention of properties at cryogenic temperatures
- Very high galling resistance
- Non- Sparking
- Grade 1 material is ultrasonically tested

#### Mechanical Properties

Diameter	6-15mm	15-25mm	25-100mm	>100mm
UTS	680 N/mm	680 N/mm	635 N/mm	620 N/mm

Proof Strength	325 N/mm	325 N/mm	295 N/mm	245 N/mm
Elongation	17%	17%	17%	17%
Impact Strength	-	24J	27J	23J

### Physical Properties

Density	7.5 g/m <sup>3</sup>
Melting Range	1060-1075°C
Coeff. Thermal Expansion (20-300°C)	18 x 10 <sup>-6</sup>
Thermal Conductivity	33-46 W/m °K
Electrical Conductivity	7-10% IACS
Magnetic Permeability	~1.5

### Fabrication Properties

Annealing Temp	650-850°C
Stress Relieving Temp	300-400°C
Hot Working Temp	850-975°C
Hot Formability	Good
Cold Formability	Limited
Max Cold Reduction before Anneal	10%
Machinability Rating	20% (Free machining brass = 100)

### Joining Methods

Soldering	Not Recommended
Brazing	Fair
MIG Welding	Good
TIG Welding	Good
Resistance Welding	Good

### Typical Applications:

Being a naval engineering grade of aluminium bronze the DSTAN 02-833 / NES 833 has traditionally been utilised for marine valve and pump components, pipe fittings, heat exchanger parts and high strength fasteners as well as general marine fittings and hardware. However its physical and mechanical properties enable it to be utilised in springs, thrust washers, bearing bushes, gears, bearing races, valve stems, wear plates, worm gears, cams, pump rods and safety tools.

This technical information is given by Holme Dodsworth Metals without charge and the user shall employ such information at their own discretion and risk. For more detailed technical advice on temper selection, fabrication, joining, machining, physical and mechanical data please contact us as space does not permit the listing of every feature of the material.