STAINLESS FOUNDRY & ENGINEERING, INC.

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Pressure Equipment Directive

"The alloy that is inherently resistant"

Sand Casting • Investment Casting • Machining Services • Quality/Inspections • Metallurgy • Engineering

STAINLESS FOUNDRY & ENGINEERING, INC.

FIRST CLASS QUALITY. FIRST CAST SUCCESS.

ILLIUM® Alloy 8 for Non-Galling, Corosion-Resistant Alloy Solutions

STAINLESS FOUNDRY & ENGINEERING, INC.

Established in 1946, Stainless Foundry & Engineering, Inc. produces stainless steel and high alloy castings. The foundry has advanced capabilities in both precision investment and sand casting methods. Metallurgical expertise is our strength. Alloy modification, process changes to meet special needs, and improved production techniques are major thrusts. Sophisticated and comprehensive inspection and testing procedures are a hallmark of Stainless Foundry & Engineering. Quality Assurance is maintained in accordance with MIL-I-45208, and ISO 10012-1, ANSI-Z540-1 and ISO 9001:2015. Value-added services include machining, in-house heat treating, protective coating applications and packaging are performed daily.

Nickel Based Alloy-ILLIUM® Alloy 8

Representative Alloy

ILLIUM® Alloy 8 -Trademark of Stainless Foundry & Engineering, Inc.

Typical Cast Specification ASTM A494, grade CY5SnBiM

UNS Number N26055

Principal Features

Where product purity is important, ILLIUM® Alloy 8 is used to avoid galling in devices which have metal to metal contact and which require corrosion resistance to a wide variety of chemicals. This is a nickel based alloy that provides excellent galling resistance due to the formation of tin-bismuth rich phases. This alloy is very machinable; however, it is not weldable, The design of ILLIUM® Alloy 8 and ASTM A494, grade, CY5SnBiM, was to help provide an alloy with gall resistant properties, comparing to other non-galling alloys in its class.

Limitations

Difficult for an inexperienced foundry to produce.

Typical Uses

Rotor, casing and impellers where food contact is required. Applications such as food pumps, scrapers, bushings, mixing components, meat grinders, dairy products, pharmaceutical, as well as other applications.

Machinability

ILLIUM® Alloy 8 is soft; machining chips are small. It dissipates heat poorly and abrades tool materials rapidly. It behaves somewhat like gray cast iron: edge wear is primary mode of tool failure. It differs from cast iron in that it exhibits more rapid tool wear; surface speeds should be less than that of cast irons of similar hardness.

Weldability

This alloy cannot be welded, but it may be silver soldered.

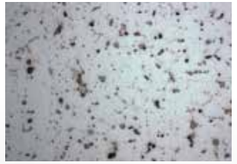
Corrosion Resistance

This alloy is extremely corrosion resistant to product exposure and most cleaning products. ILLIUM® Alloy 8 has very good corrosion resistance when exposed to acidic environments such as nitric, hydrochloric, sulfuric and acetic as well as other corrosive products and by-products.

Typical Heat Treatment

ILLIUM® Alloy 8 cannot be heat treated. It is to be used in the as-cast condition.

200x-Unetched Micrograph



Optical photomicrograph of a typical galling pin section showing the presence of globular tin and bismuth phases along the grain boundaries. ILLIUM® Alloy 8 is a corrosion resistant nickel based alloy designed to operate in contact with stainless steel without galling or seizing.

Physical Properties

Property, Units	Temperature, °F	Value
Density, lb/in^3	Room Temperature	0.31
Linear Coefficient of Thermal Expansion, in/in/°F x 10^{-6}	32-500 32-1000 32-1500	8.01 8.88 9.88
Modulus of Elasticity, psi x 10^6	Room Temperature	27.0
Thermal, Conductivity, btu/ft^2/hr/ft	105	16.7
Electrical Resistivity, microhm-cm	77	112.7
Magnetic Properties	Room Temperature	No attraction to a hand magnet/feebly magnetic

Chemical Composition Weight %

Cr	11.0-14.0
Ni	balance
Mo	2.0-3.5
Si	0.5 maximum
Mn	1.5 maximum
Sn	3.0-5.0
S	0.02 maximum
P	0.03 maximum
Bi	3.0-5.0
Fe	2.0 maximum
C	0.05 maximum

Typical Mechanical Properties

Ultimate Tensile Strength (ksi)	46
Yield Strength (ksi)	37
Elongation % in 4D	7
Impact Toughness - Charpy V - Notch (Ft.-lbs.) @ 70°F	7
Hardness (HBW)	142

Wear and Galling Properties

ILLIUM® Alloy 8 has anti-galling properties which are superior to many food grade stainless steels and nickel based alloys. ILLIUM® Alloy 8 is far superior in wear, galling and friction properties, to AISI 304 or 316 as well as being comparable to wrought Nitronic 60 (UN S21800) or cast alloy CF10SMnN (UNS J92972).

Each ILLIUM® Alloy 8 heat is evaluated on SF&E's galling and wear testing apparatus.