MetalTek INTERNATIONAL
BECAUSE YOU DEMAND MORE THAN METAL

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Tek Bulletin

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Metals Trivia:

- Stainless steels are called "stainless" because the chromium content causes creation of chromium oxide and retards the "rust" appearance of normal steels.

- Lead in tin bronzes can act as a lubricant in applications where greases cannot be applied. Lead is insoluble in most other metals, so it stays as lead particles. These lead particles actually "grease" the surface of the metal as they smear during wear. MetalTek's high-leaded Bearium® withstands extremely high loads.

Zeron 100® is a registered trademark of Weir Materials. The cast equivalent is A890-6A or A995-6A.
Ferralium® is a registered trademark of Langley Alloys and is produced under license.
254SMo® is a registered trademark of Avesta Sheffield. Cast equivalent is A351-CK3MCuN.
AL6XN® is a registered trademark of Allegheny Ludlum. Cast equivalent is A351-CN3MN.
Trademarks are used for familiarity only.

Have a Metals problem?
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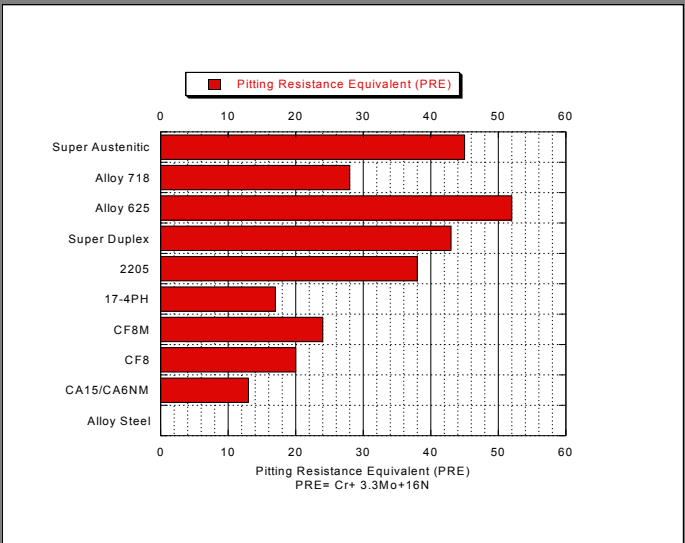
www.MetalTek.com

PITTING RESISTANCE EQUIVALENT (PRE) NUMBERS

Pitting Resistance Equivalent Numbers are a way of subjectively comparing the anticipated corrosion properties of stainless steel alloys in a chloride containing environments. The higher the number, the more resistant the alloy.
In the early 1900's, Swedish engineers, looking for lower cost stainless alloys, discovered duplex stainless steels. This family of alloys has higher chromium content and lower nickel content than 316-alloy, and also includes the use of nitrogen as an alloying element.
Alloys such as 2205 (4A), 2507 (5A), Ferralium®, Zeron 100® (6A) represent the modern range of duplex and super-duplex materials. The alloys are classed as duplex or super-duplex based on the PREn. PREn above 40 is considered "super-duplex" and anything under "duplex."



Pitting Resistance of Various Alloys. Note the high PREn associated

Successful production of these alloys require the balancing of the chemical content to achieve the PREn, while maintaining the correct ferrite-austenite balance. Secondary refining, such as Argon Oxygen Decarburization (AOD) is extremely advantageous and included in many specifications.
Austenitic and super-austenitic alloys may be similarly compared with PREn. The high molybdenum and nitrogen content in Super-austenitic (e.g. 254SMo®, AL6XN®) alloys greatly increases the PREn. Nickel based alloys (Alloy 625 and Alloy 718, for example) can also be viewed from a PREn perspective.

NICKEL HELPS CARBURIZATION PERFORMANCE

In heat resistant applications, nickel promotes stabilization of austenite and, in the case of gamma prime Super Alloys (e.g. MTEK718, Alloy 939, Rene 77, etc.), combines with other alloying elements to form inter-metallic phases(Ni3Al, Ni3Ti) that serve as alloy strengtheners.
Low nickel heat resistant alloys are characterized by good oxidation resistance, but relatively poor resistance to carbon corrosion.
Nickel in the 35%+ range has been shown to reduce carburization by more than 50% (C. Steel and W. Engel, 1981).
One mechanism at work is the reduced rate of carbon diffusion in higher nickel alloys (Lai).
Carbon in reducing atmospheres at temperatures below 850˚C (1550˚F) promotes metal dusting in many alloys. A future newsletter will further address this deleterious phenomenon.