NIBCO®
HydraPure™

Lead-Free Presentation

Plumbing Foundation City of New York, Inc.

January 21, 2014

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NIBCO HydraPure

NIBCO Corporate Overview

- **Elkhart, Indiana Headquarters**
- **Established in 1904**
- **Privately-Held, Family-Owned for 4 Generations**
- **3,000 Associates**
- **9 Manufacturing Plants**
- **6 Distribution Centers**
- **30,000 SKU's**

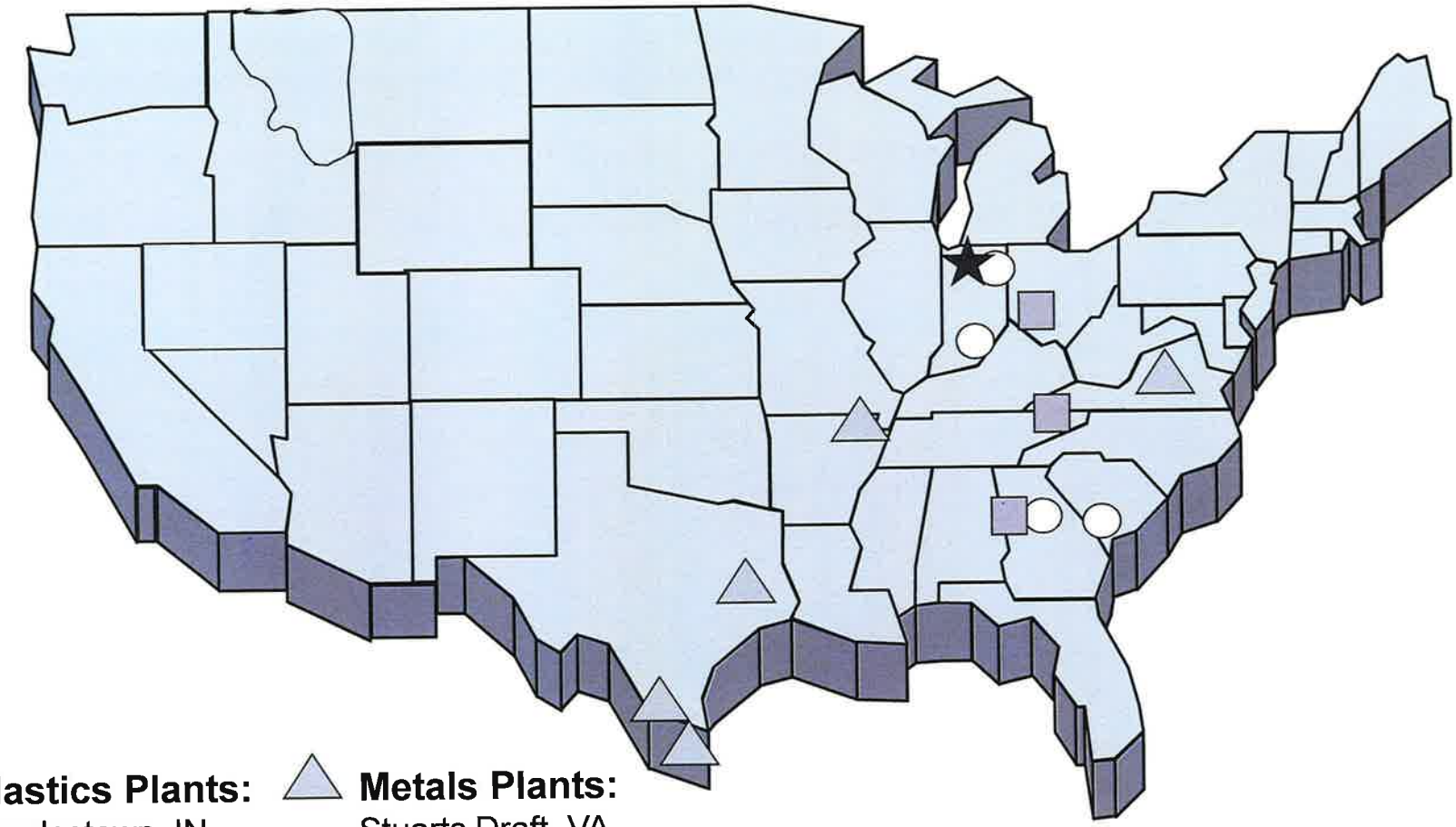
Vision *Leading the World in Flow Control Solutions*

Mission *Grow by being the leading innovative, customer-driven provider of flow control solutions to our global markets while delivering superior long-term prosperity to our stakeholders*

Values *Safety, Integrity, Teamwork, Continuous Improvement*

NIBCO AHEAD OF THE FLOW®

NIBCO Manufacturing and Distribution



Plastics Plants:
Charlestown, IN
Denmark, SC
Goshen, IN
Greensboro, GA
Lebanon, OH
Lodz, Poland

Metals Plants:
Stuarts Draft, VA
Blytheville, AR (2)
Nacogdoches, TX
McAllen, TX
Reynosa, MX

Distribution Centers:
Atlanta, GA
Lebanon, OH
Blytheville, AR
Stuarts Draft, VA

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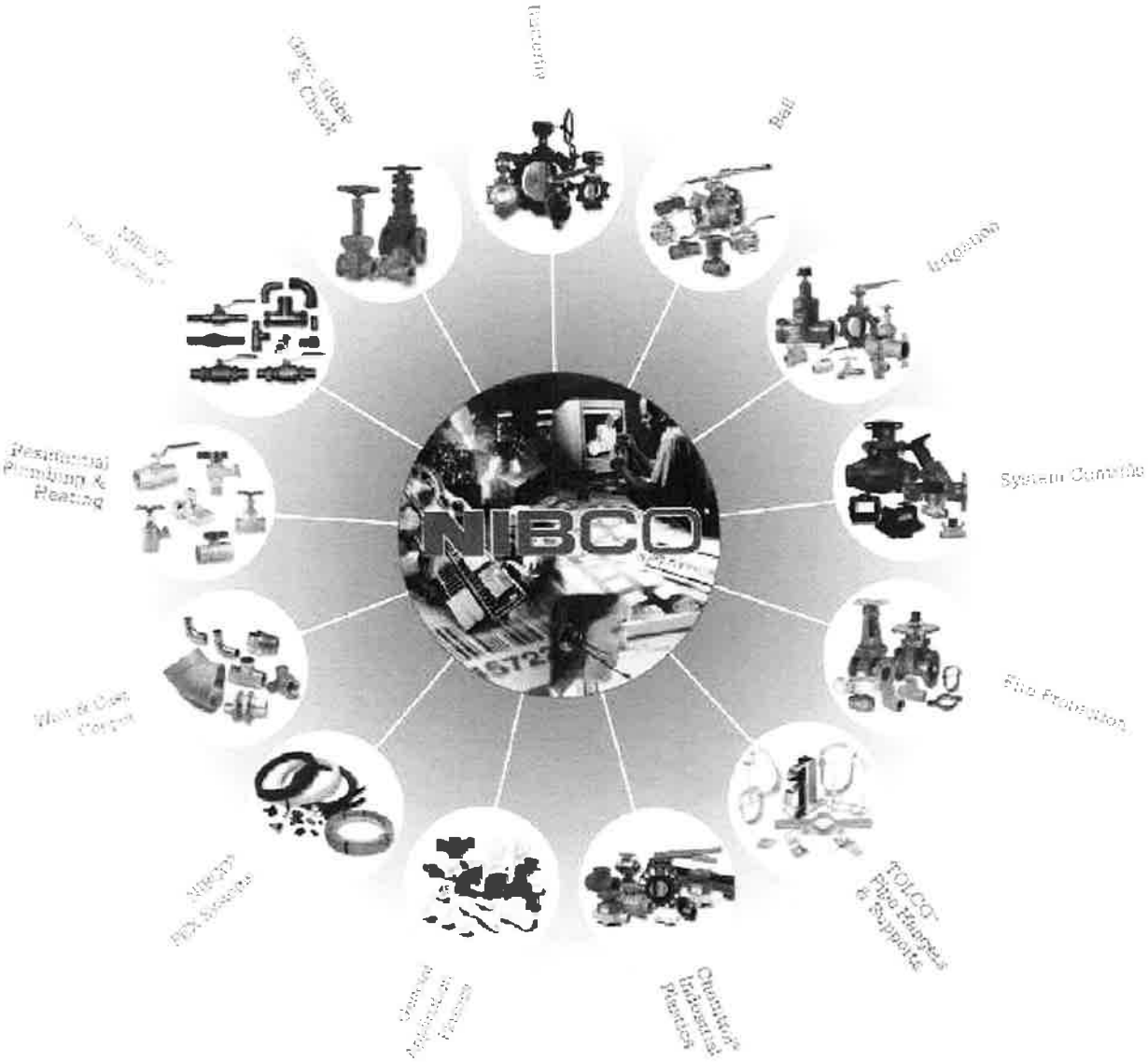
NIBCO Product Offerings



NIBCO LF Product:

THE LEAD FREE AUTHORITY

WROT COPPER & CAST PERFORMANCE BRONZE™
- Sweat and thread
- Size range: 1/8" to 8"

NIBCO® PRESS SYSTEM®
- Wrot copper and cast Performance Bronze
- Size range: ½" to 4"

NIBCO® PUSH
- Brass fittings and valves
- Size range: ½" to 1"

FLANGES
- 1-piece cast Performance Bronze
  - Size range: 1" to 6"
- 2-piece copper
  - Size range: ¾" to 6"

NIBCO® PEX PIPING SYSTEMS
- Performance Bronze fittings and valves
- Size range: ½" to 1"

CPVC-CTS FITTINGS
- Suitable for hot and cold water distribution
- Size range: ½" to 1"

THE LARGEST VALVE PACKAGE IN THE INDUSTRY
- Performance Bronze ball, gate and check
- Iron butterfly, gate and check
- Plumbing

Visit us at www.nibcoleadfree.com for our full lead-free offering.*

*Lead free refers to the wetted surface of pipe, fittings and fixtures in potable water systems that have a weighted average lead content ≤ 0.25% per the Safe Drinking Water Act Sec. 1417(a) amended 1-4-2011 and other state-defined state regulations.

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www.nibco.com

NIBCO INC. Confidential

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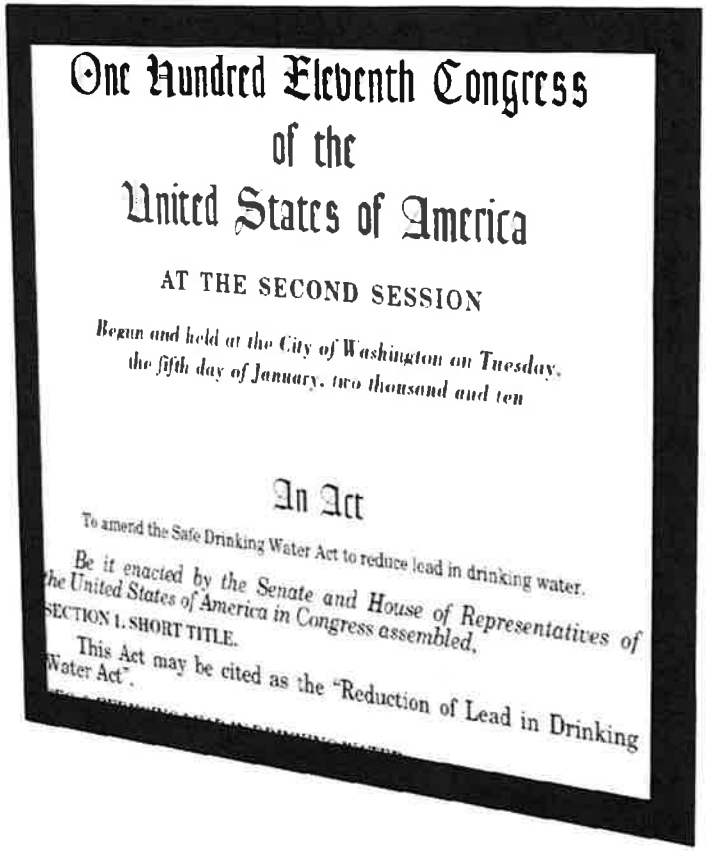
Federal "Lead-Free" Law

- Reduction of Lead in Drinking Water Act
- Timeline
  - January 4th 2011 bill signed
  - Implementation **January 4th 2014**
- Amends the Safe Drinking Water Act
  - The amended definition of "lead-free" is provided
    - 0.2% max lead for solder and flux
    - 0.25% max lead for products by weighted average
    - Multiple component products are calculated to address total wetted exposure



One Hundred Eleventh Congress
of the
United States of America

AT THE SECOND SESSION

Begun and held at the City of Washington on Tuesday, the fifth day of January, two thousand and ten

An Act

To amend the Safe Drinking Water Act to reduce lead in drinking water.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE.

This Act may be cited as the "Reduction of Lead in Drinking Water Act".

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Safe Drinking Water Act Reference

Further language identifies the requirements to be added to section 1417 of the SDWA

- SDWA is main federal law ensuring the quality of Americans' drinking water
- Under SDWA, EPA sets standards for drinking water quality and oversees the states, localities, and water suppliers who implement those standards
- Section 1417 (a)(1) of the SDWA states "no person may use any pipe, any pipe or plumbing fitting or fixture, any solder, or any flux, in the installation or repair of any public water system or any plumbing in a residential or nonresidential facility providing water for human consumption that is not lead-free"

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Exemptions To Federal "Lead-Free" Law

- Exemptions are identified
  - Pipes, pipe fittings, plumbing fittings, or fixtures, including backflow preventers, that are used exclusively for non-potable services such as manufacturing, industrial processing, irrigation, outdoor watering, or any other uses where the water is not anticipated to be used for human consumption.
  - Toilets, bidets, urinals, fill valves, flush-o-meter valves, tub fillers, shower valves, and service saddles are exempt from LF. **Please see your local Plumbing Inspector regarding water distribution main gate valves that are 2 inches in diameter or larger**.

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Lead-Free Plumbing Systems - Situation

"Lead is a developmental toxicant" and the "harmful effects of lead on children's development can occur without signs or symptoms."

~ Centers for Disease Control and Prevention

- Regulations prohibit lead in common products like most gasoline and paint
- Thousands of people in the U.S. each year are lead poisoned
- When lead gets inside the body
  - The body confuses it with calcium and other essential nutrients
  - This confusion can cause permanent damage to the health of both children and adults

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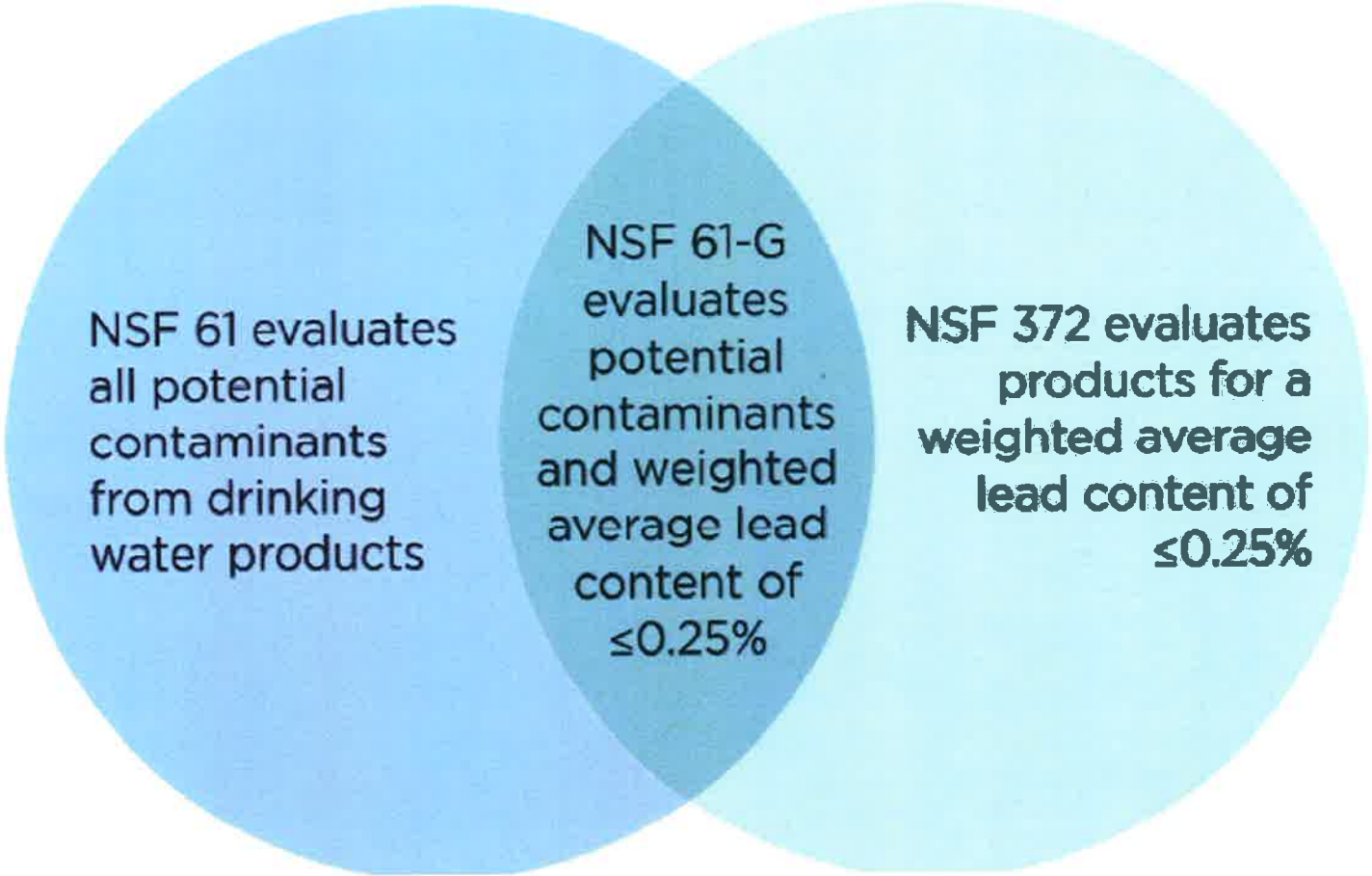
Third Party Certifications: NSF 372 vs. 61-G



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Agencies & References

- NSF www.nsf.org
- Truesdail Labs www.truesdail.com
- UL www.ul.com
- IAPMO www.iapmo.org
- WQA www.wqa.org
- CSA www.csa-international.org
- EPA www.epa.gov
- SDWA
  http://water.epa.gov/lawsregs/rulesregs/sdwa/
- Lead and Copper Rule
  http://water.epa.gov/lawsregs/rulesregs/sdwa/lcr/index.cfm
- Federal "LF" Law
  http://www.gpo.gov/fdsys/pkg/PLAW-111publ380/pdf/PLAW-111publ380.pdf

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Lead Free Valve Markings & Packaging

Identification

Blue on White handles

Double oval and "Si" body markings

Blue carton labels and hang tags

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Alloys

Basis for Lead-Free Copper Alloy Selection

- Type of alloy
  - Is the alloy truly lead-free?
- Mechanical properties
  - Is the alloy capable from a performance perspective?
- Corrosion resistance
  - Does the alloy have adequate corrosion resistance for the intended service?
- **Installation considerations**
  - **What do alloy differences mean to the installer?**

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Comparing Mechanical Properties of the LF Alloys

- Silicon Copper Alloys
  - Maintains mechanical strength at elevated temperatures
  - No low-melt point constituent such a bismuth or lead

- Bismuth Copper Alloys
  - Can have a reduction of mechanical strength with high temperature soldering, brazing or service exposure
  - Melting Point: 520.7° F versus 621.5° F for lead
  - Bismuth is extremely brittle as compared to lead which is very ductile

Note: Soldering typically requires minimum temperatures between 420° F and 590° F in order to melt the solder and can exceed 600° F. More aggressive heating is required for hard soldering, silver soldering, and brazing which are done at temperatures exceeding 700° F.

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Leaded Copper Alloy Highlights

- The C92200 & C83600 are higher-end leaded alloys
- General cast plumbing items are made of C84400 alloy
- High zinc alloys, C36000 & C37700, are commonly used in service where corrosion is not an issue

Cast Leaded Copper Alloys							
Alloy	Nominal Chemistry (%)				Mechanical Properties		
Number	Copper	Tin	Lead	Zinc	UTS (psi)	YS (psi)	% Elongation
C92200	88	6	1.5	4.5	40,000	20,000	30
C83600	85	5	5	5	37,000	17,000	30
C84400	81	3	7	9	34,000	15,000	26

Wrought Leaded Copper Alloys						
Alloy	Nominal Chemistry (%)			Mechanical Properties		
Number	Copper	Lead	Zinc	UTS (psi)	YS (psi)	% Elongation
C36000	61.5	2.7	35.4	45,000	15,000	20
C37700	59.5	2.0	38	52,000	20,000	45

Class 125 & 150 - gate, globe and check valves = C83600
Class 200 & 300 - gate, globe and check valves = C92200
T/S-585-70 ball valves = C84400

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LF Silicon Copper (Si Cu) Alloy Details

- Strength of Si Cu alloys far exceeds leaded plumbing alloys
- C87600 alloy contains 5.5% Zn
- C87850 & C69300 alloys contain > 15 % Zn; corrosion resistant through alloying with silicon and phosphorus; "**Performance Bronze**"

Lead-Free Silicon Copper Alloys							
Alloy	Nominal Chemistry (%)				Mechanical Properties		
Number	Copper	Silicon	Phosphorus	Zinc	UTS (psi)	YS (psi)	% Elongation
C87600	89	4.5	-	5.5	66,000	32,000	32
C87850	76	3.0	0.15	20.9	63,000	26,000	25

Lead-Free Silicon Copper Alloys							
Alloy	Nominal Chemistry (%)				Mechanical Properties		
Number	Copper	Silicon	Phosphorus	Zinc	UTS (psi)	YS (psi)	% Elongation
C69300	75	3.0	0.10	21.7	80,000	49,000	10

Ball, gate & check valves = C87850
Ball valves = C87600 & C69300

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LF Bismuth Copper Alloy Details

- NIBCO in 1992 was the first domestic producer of a lead-free plumbing alloy, C89844 bismuth brass
- NIBCO restricted the use of bismuth brass as a replacement for the general C84400 leaded alloy due to limitations

Cast Bismuth Copper Alloys							
Alloy	Nominal Chemistry (%)				Mechanical Properties		
Number	Copper	Tin	Bismuth	Zinc	UTS (psi)	YS (psi)	% Elongation
C89844	84.5	4	3	8	34,000	15,000	30
C89833	89	5	2.2	3	37,000	17,000	28
C89836	89	5.5	2.5	3	37,000	19,000	30

Wrought Bismuth Copper Alloys							
Alloy	Nominal Chemistry (%)				Mechanical Properties		
Number	Copper	Tin	Bismuth	Zinc	UTS (psi)	YS (psi)	% Elongation
C49300	60	1.5	1.2	36	67,000	59,000	9

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Types of Corrosion

- Dezincification Corrosion is the selective loss of zinc from high zinc copper alloys under exposure to aggressive media (waters)

- Stress Corrosion Cracking is the loss of mechanical strength of a copper alloy due to the combined influence of stress and corrosion

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Example: Uniform Dezincification Corrosion

General Attack – White, Loose (Zinc-Rich) Corrosion Product

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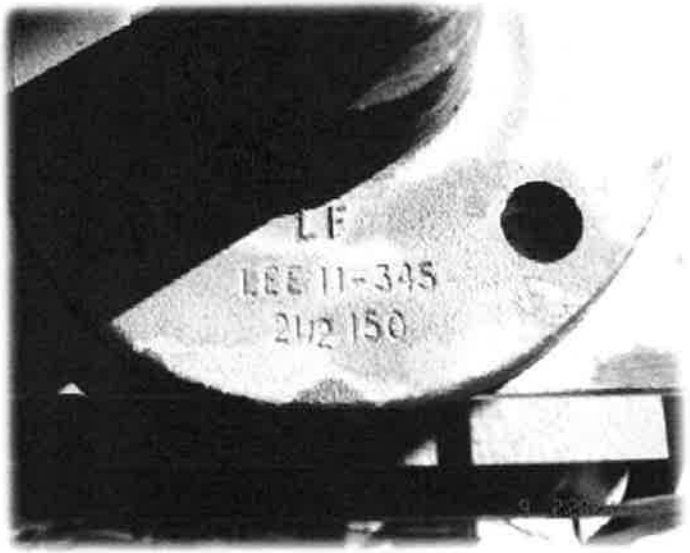
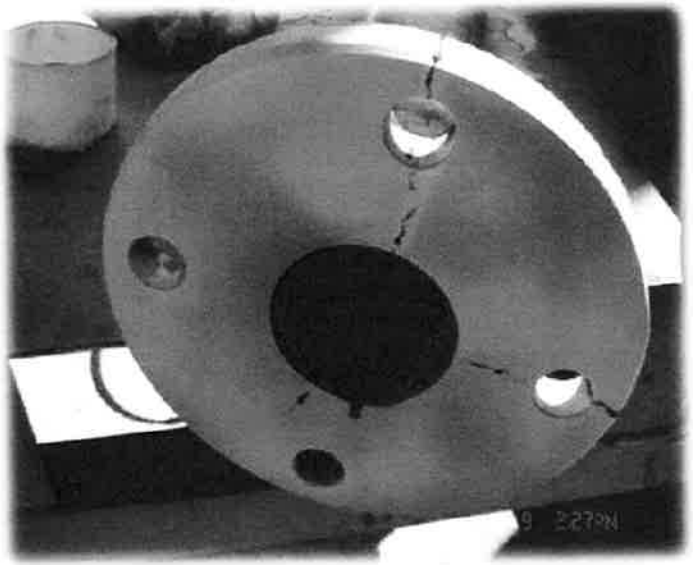
Example: Bismuth Brass – High Temp Sensitivity



C89833 bismuth brass sensitivity to high temperature results in cracking in this brazing application



Stress + High Temp = Fracture

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Lead-Free Soldering

LF Alloy Solder Ability

- There are two major material factors that impact the ability to solder LF alloys effectively:
  1. Thermal Conductivity
     - Thermal conductivity describes the potential for a material to internally transfer heat from one point to another
       - Design considerations?
  2. Corrosion Resistance
     - Alloys with greater sensitivity to corrosion are better suited for weak fluxes. All truly inhibited alloys (silicon, arsenic, etc.) will not only resist corrosive attack from aggressive water-borne agents, but also will resist intended flux surface corrosion to some degree.

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Soldering Lead Free Alloys

- Changes to soldering characteristics are inherent with the change to lead free alloys.
  - This is true for Silicon and Bismuth alloys.
- The lead free alloys transfer heat differently than leaded alloys!
- The installer must continually move the torch around the solder cup of valves and fittings in order to ensure adequate distribution of heat for proper solder flow.
  - UNIFORM HEATING IS KEY.
  - Torch Tip angles are important.
  - Torch types are important (soft tip vs turbo tip)
  - **DO NOT PARK TIPS**
  - NIBCO rep's are available for field demonstrations

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Flux Considerations

- Types of flux
  - Water-Soluble: easily removed, dissolves in water
  - Water Flushable: system flushing **ASTM B 813**
- Reasons for flux
  - Removes surface oxides from joining surfaces
  - Maintains oxide-free surfaces throughout soldering
- Important points
  - **Poor solder practice trumps good flux selection**
  - Flux manufacturers do reformulate; improving or degrading flux effectiveness
  - Flux is hygroscopic (attracts and holds water) and should be stored and used properly for good results

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Review of Solder Melting Temperatures

- Typical Solder Melting Ranges:
  - Low Melt Selenium Based Solders: 400 F to 475F
  - 50/50 solder: 421°F to 475°F (low melt solders)
  - 95/5 solder: 450°F to 500°F (medium melt solders
  - 500°F to 800°F (high-melt solders)

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Solder Melting Points by Brand Name

- Nickel-Bearing High Tensile Strength Solder
  - Harris-Brigit Nickel-Bearing Solder: 460°F to 630°F
- 95-5 solder melting range is 430 to 550° F
  - Canfields – 452-464° F
  - Oatey – 450-464°F
  - Wolverine Silverbrite - 430-550°F
  - Wolverine Silverbrite 100 w/copper – 440-500°F
- Lower Temp solders range 415 - 490°F
  - Lenox Sterling: 410°F (advertised as having the "lowest melting point solder" by the mfgr)
  - Canfields Watersafe – 418-440°F
  - Canfields Silverflo – 420-470°F
  - Canfields Superflo – 415-490°F
  - Oatey Safeflo -420-460°F
  - Oatey Silver Lead Free – 420-460°F

- **Is your preferred flux activation range compatible with your preferred solder melting range?**

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Soldering Silicon Performance Bronze

- Silicon Performance Bronze Soldering Recommendations
  - Silicon bronze alloys have a much higher heat tolerance than Bismuth alloys, therefore overheating of the valve will NOT degrade the mechanical properties.
  - Don't worry about "cooking the seats" in ball valves
    - We will show in demo
  - As a result of Silicon bronze alloys' superior corrosion resistance, they do require an aggressive flux, high in chlorides.
    - The use of **Oatey H-20^{95} tinning flux** and 95/5 or low-melt solder results in 100% solder cup coverage with good solder practices.

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Lead Free Silicon Performance Bronze

- Lead Free Performance Silicon Bronze™
  - Superior alloy to Bismuth bronze in mechanical strength and corrosion resistance.
  - Not susceptible to stress cracking when heated.
  - **Oatey brand H-20[95] Water Soluble Tinning Flux** proves to be the most forgiving flux across multiple types of heat sources, torch tips, available plumbing solders and varying installer soldering techniques.
    - **Activation range is 400-700°F, covering all solder melting points.**
  - Melting point of Silicon substitute for lead is 2,577°F.

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Solder Lead Free Alloys with Tinning Flux

- Through an extensive test of all fluxes offered, Oatey's unsolicited recommendation is their H20-95 Water Soluble Tinning Flux for ALL industry Lead-Free alloys, not just NIBCO

OATEYSCS
Supply Chain Services

db Dearborn Brass

Oatey

Technical Bulletin
Soldering and Fluxing "Low Lead" Brass Material Products
(3/2012)

All Oatey fluxes can be used to solder "low lead" brass material products. Based on our internal testing, we have determined that H2O-95 Water Soluble Tinning Flux performs the best of all the Oatey fluxes.

Oatey recommends that the installers use 120-grit (or coarser) sandpaper in the application to clean the material surfaces, and ensure that heat is applied consistently during the soldering to the impacted surfaces.

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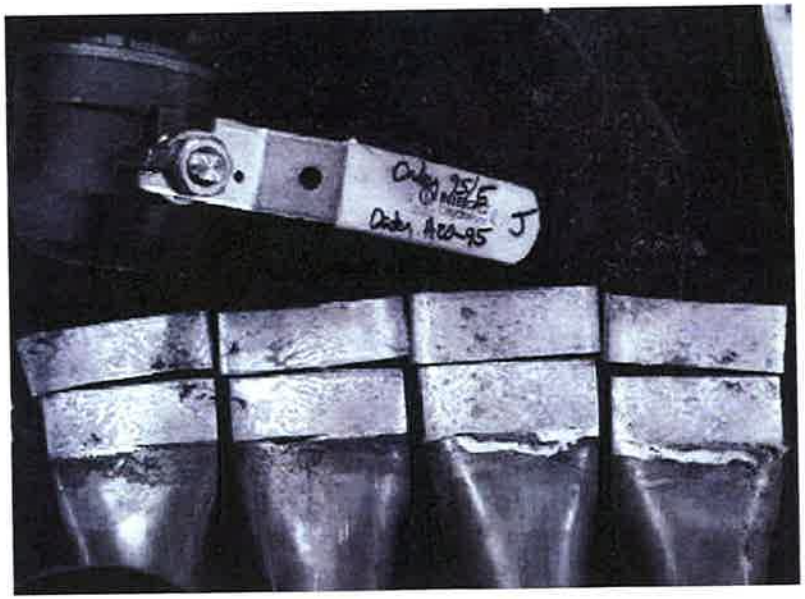
Solder Peel Test Pictorial Evidence

- Using Oatey H20-95 Water Soluble Tinning Flux, please review the 100% coverage results on NIBCO S-585-80-LF solder cups:



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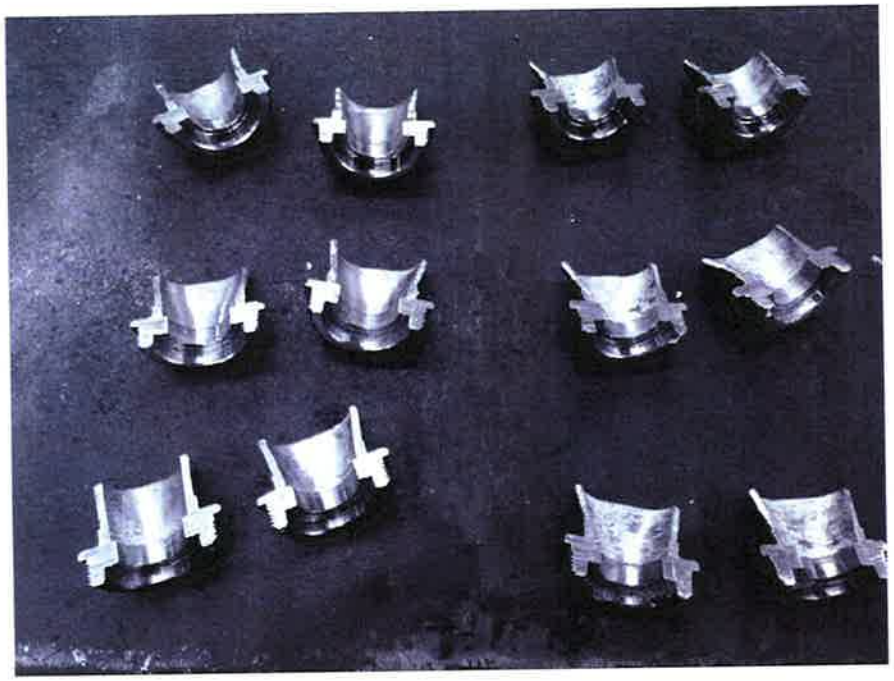
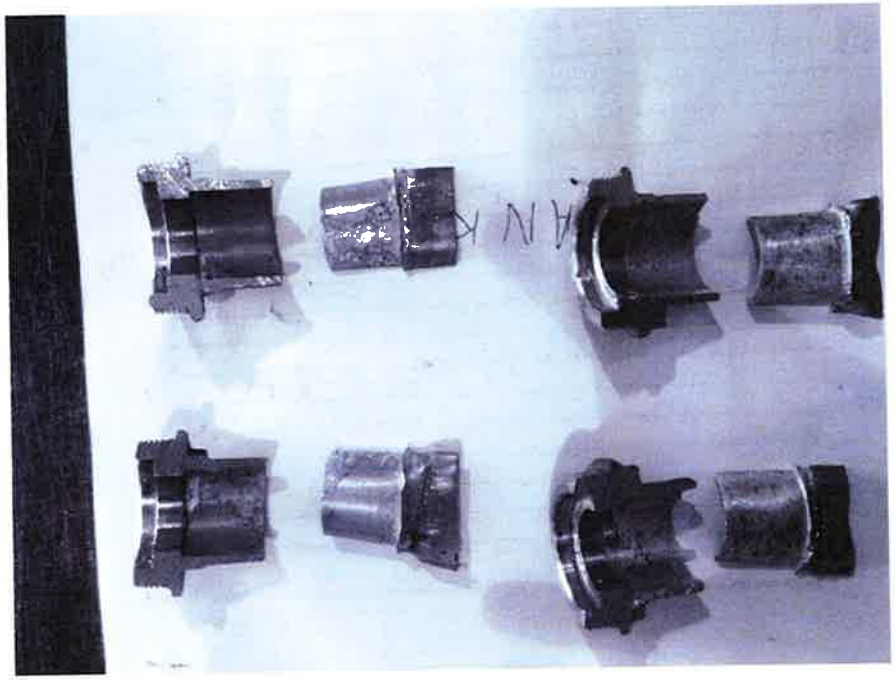
Proper Flux Is The Solution!

- Left side of each picture: Contractor's attempt with Brand X flux
- Right side of each picture: NIBCO's results with Oatey H20-95 Water Soluble Tinning Flux





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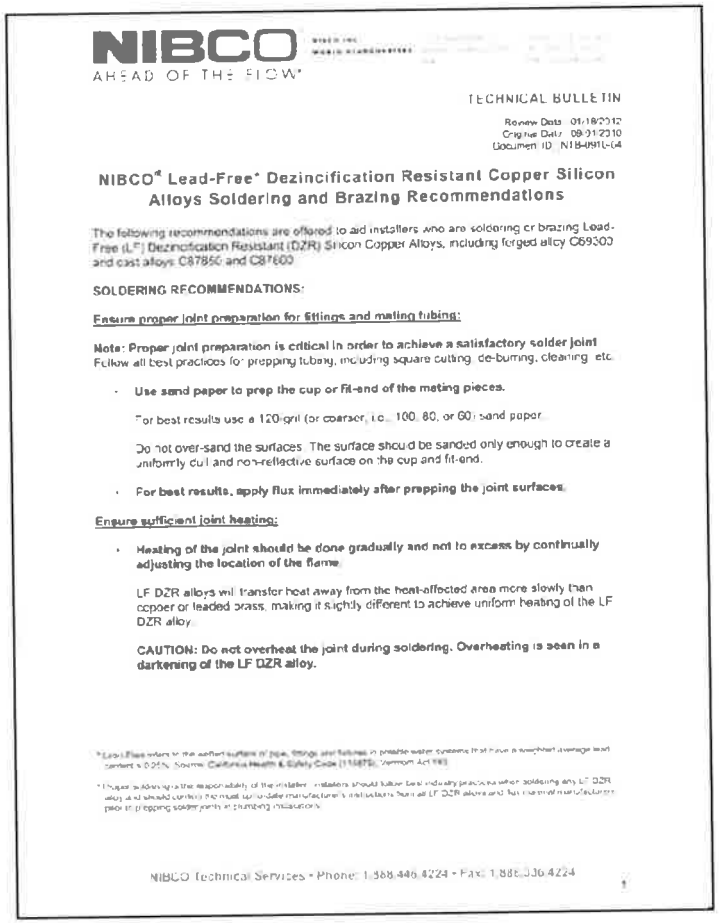
Tech Bulletin

- Basic "Good Soldering Practice"
- **Lead-free alloys utilized by NIBCO are considered "EXCELLENT" in solder suitability by the Copper Development Association**
- Solder Installation Video: www.nibco.com/Resources/Videos/
- Techincal Bulletins: www.nibco.com/Resources/Technical-Bulletins/



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TECHNICAL BULLETIN

Review Date: 01/18/2012
Original Date: 08/01/2010
Document ID: NIB-0911-04

NIBCO® Lead-Free* Dezincification Resistant Copper Silicon Alloys Soldering and Brazing Recommendations

The following recommendations are offered to aid installers who are soldering or brazing Lead-Free (LF) Dezincification Resistant (DZR) Silicon Copper Alloys, including forged alloy C69300 and cast alloys C87850 and C87600

SOLDERING RECOMMENDATIONS:

Ensure proper joint preparation for fittings and mating tubing:

Note: Proper joint preparation is critical in order to achieve a satisfactory solder joint Follow all best practices for prepping tubing, including square cutting, de-burring, cleaning, etc.

- **Use sand paper to prep the cup or fit-end of the mating pieces.**

  For best results use a 120-grit (or coarser, i.e., 100, 80, or 60) sand paper.

  Do not over-sand the surfaces. The surface should be sanded only enough to create a uniformly dull and non-reflective surface on the cup and fit-end.

- **For best results, apply flux immediately after prepping the joint surfaces.**

Ensure sufficient joint heating:

- **Heating of the joint should be done gradually and not to excess by continually adjusting the location of the flame.**

  LF DZR alloys will transfer heat away from the heat-affected area more slowly than copper or leaded brass, making it slightly different to achieve uniform heating of the LF DZR alloy.

  CAUTION: Do not overheat the joint during soldering. Overheating is seen in a darkening of the LF DZR alloy.

*Lead-Free refers to the wetted surfaces of pipe, fittings and fixtures in potable water systems that have a weighted average lead content ≤ 0.25%. Source: California Health & Safety Code (116875), Vermont Act 193

† Proper soldering is the responsibility of the installer. Installers should follow best industry practices when soldering any LF DZR alloy and should contact the solder manufacturer's instructions from all LF DZR alloys and fluxes of manufacturers prior to prepping solder joints in plumbing installations.

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APPENDIX

- LEAD FREE BISMUTH VS LEAD FREE SILICON ALLOYS
  - COMPARISON
  - MELT TEMPS
  - EFFECT OF HEAT AND TEMPERATURES
  - SOLDER AND FLUX ANALYSIS

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Too Close For Comfort

- ← 550°F High end melting point of higher tensile strength Nickel-bearing solders
- ← 520°F Melting point of Bismuth
- ← 475°F Low end melting point of higher tensile strength Nickel-bearing solders
- ← 450°F Melting point of common 95/5 Antimony/Tin solders
- ← 400°F Low-melt solders with Selenium
  - **Common solders start to flow within 70°F of Bismuth's melting point.**

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How Much Control Do You Have?

- When gasses are burning this hot, how much control over the valve or fitting body temperature do you really have?

Fuel Gas	Combustion with Oxygen (°F)	Combustion with Air (°F)
Acetylene	5,612	4,352
Butane		3,578
Carbon Monoxide		3,850
Ethane		3,560
Hydrogen	4,820	3,713
MAPP[1)]	5,396	
Methane	5,090	3,555
Natural Gas	5,018	
Propane	5,108	3,596
Propane Butane Mix		3,578
Propylene	5,198	

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NIBCO's Battle with Bismuth

- Bismuth Bronze has a history at NIBCO
  - NIBCO used Bismuth based lead free alloys in the early 1990s
    - Original line of HydraPure bismuth based Lead free fittings and valves sold from 1993 to 2000.
    - Melting point of Lead is 622°F, while the melting point of Bismuth for a Lead substitute is 520°F.
    - We learned that Bismuth alloy lead free valves and fittings **cannot be brazed**.
    - Overheating of Bismuth alloys can occur during manufacturing, machining, installation (soldering) or even during in-service use causing stress cracking and failures.
    - New Lead free legislation in 2010 forced a superior alternative alloy to be sought out.

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Bismuth And Heat Do Not Get Along

- NIBCO's ultimate decision to abandon Bismuth based Lead free alloys was due to Bismuth's poor heat resistance in manufacturing, machining, and solder/brazing installations.

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NIBCO Lead-Free Competitors

Bismuth Alloy Recall Notice

- Major Bismuth failures and resultant recall already witnessed
  - Fusan Machinery initiated a 163,000 piece recall of LF Bismuth alloy valves due to "cracking."

October 11, 2012

SAFETY RECALL NOTICE
Immediate Action Required

Dear Customer:

Fu San Machinery Co., Ltd., in cooperation with the U.S. Consumer Product Safety Commission (CPSC), is recalling its models NL1362FP ¾" and 1" sweat and NL1361FP ¾" and 1" threaded low lead brass ball valves with date codes 1103 through 1112, which correspond to manufacturing dates of March 2011 through December 2011. The valve body and/or threads of the recalled low lead valves have cracked in water applications. While no low lead valve failures have been reported in flammable gas applications, if cracking occurs, a possible gas leak could pose a fire hazard. Accordingly, we are recalling all such low lead valves that have not yet been installed and any low lead valves that have been installed in flammable gas lines.

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Bismuth's Continued Usage

- NIBCO Competitors Still Using Bismuth
  - Check websites for alloy C89833
    - Technical bulletin warning of overheating new lead free alloy and resultant product failures.
    - First generation of 100% Bismuth line had failures and resorted to a Bismuth/Silicon mix of materials for their ball valves.
  - Check websites for alloy C89836
    - Technical bulletin claims there is no special considerations, yet special insert in packaging warns against heating over 500°, which is only 50° away from the melting point of 95/5 solder.
  - Check websites for alloy with 36% Zinc
    - High dezincification potential

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Other Lead Free Soldering Differences Witnessed

- Competitors' lead free soldering consideration bulletin excerpt:

> The low lead alloys generally have lower thermal conductivity and heat transfer coefficients, so that local temperature increases in the joint, as are seen in soldering operations, don't smooth out as rapidly. This means higher temperature spikes can be seen if extra care isn't taken. These consequences can in turn create problems for the valve. In extreme cases, overheating the valve could lead to a stress rupture somewhere in the metal itself. Less severe overheating could easily damage or destroy the valve seats.

- Competitor's valve box insert:

> This valve is designed to be soft soldered using only low melting point solders. Melting points should not exceed 500°F. Heat should be applied with the flame directed away from the center of the valve body. Propane gas is recommended. MAPP® and Acetylene gases should be used with caution as excess heat may damage PTFE seats and seals. Solder valves in the open position only.
>
> Form I281500

NIBCO HydraPure

Soldering Differences Continued

- Competitor's Installation, Operation and Maintenance manual excerpt:

Solder End (Sweat In) Valves

Caution: Use only solders with melt points below 500°F.

Caution: Valves should only be soldered in the fully open position.

During soldering, the mid-portion of the valve body should not exceed 300°F. This can be monitored using Tempilstik® or an infra-red temperature sensor. Depending on the fuel selected and the orientation of the installation it may be necessary to wrap the valve body with wet rags or employ other heat absorbing techniques. The flame must be directed away from the valve body, concentrated on the solder cup. The cup should be heated evenly. Once one of the joints is complete, the valve should be allowed to cool until "cool to the touch" before beginning the second joint.

Fuel	Flame temp w/Oxygen
Propane	5122°F (2828°C)
Propylene	5245°F (2896°C)
MAPP Gas	5389°F (2976°C)
Acetylene	5720°F (3160°C)

Warning: Excessive heat input will damage the body seal resulting in leaks at the valve body joint. In extreme cases, seats and stem packing may also be damaged.

NIBCO HydraPure

NIBCO®
HydraPure™

NIBCO Lead-Free Product Offering

Lead-Free Valves:

Featuring Silicon Performance Bronze Valves (NSF 61-G)

- **T/S 585-80-LF & T/S 685-80-LF** 1/4" To 2"
  - 2 Piece Ball
  - Includes SS Trim
- **T/S 595-Y-LF** ¼" To 2-1/2"
  - 3 Piece Ball
  - Includes SS Trim
- **T/S 111-LF & 113-LF** ½" To 2"
  - RS & NRS Gate
- **T/S 413-Y-LF** ½" To 2"
  - Swing Check
- **T/S 480-Y-LF** ½" To 2"
  - Ring Check
- **726-LF /76-LF** ½" & ¾"
  - Stop And Waste
- **Supply Stops** (8 Versions)

NIBCO HydraPure

Lead-Free Valves

- LD/WD2000 2" To 12"
- LD1000 14" To 24"
  - Certified to NSF-372
- GD-4765-N 2" To 12"
  - NSF-61-G
- Silent Checks
  - 920W 2" To 20"
  - 910B 2" To 20"
  - 960B 2-1/2" To 12"
  - Certified To NSF-372
- Resilient Wedge Gate Valves
  - F607RW 2-1/2" To 12"
  - F619RW 2-1/2" To 12"
  - Certified to NSF-372
- Ductile Iron Gate & Check Valves
  - Gates 2" – 24" & Checks 2" – 12"
  - SS Trim

NIBCO HydraPure

The NIBCO® Press System®: A complete LF System…

NIBCO HydraPure

NIBCO® Press System®

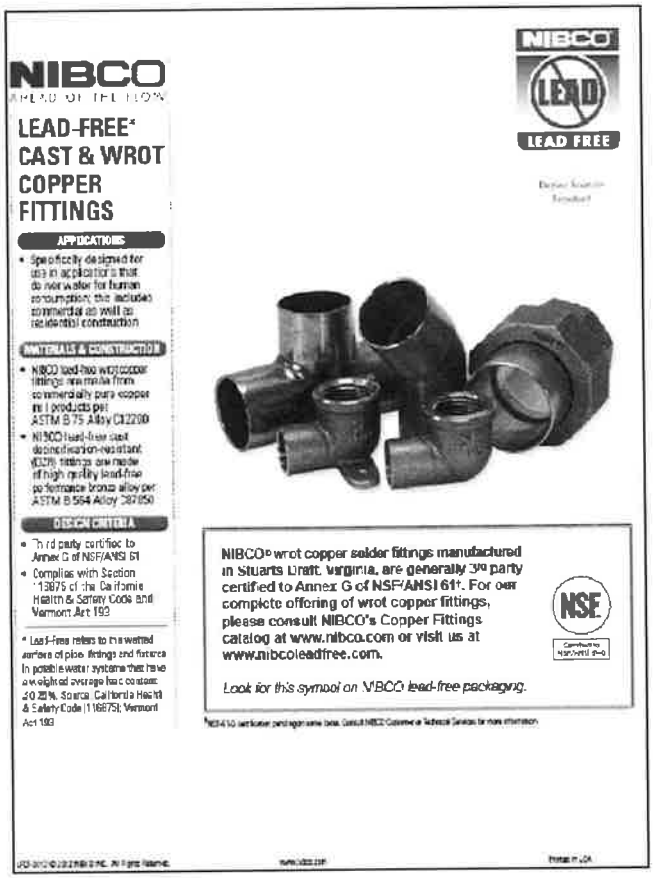
- Fittings, Valves, Strainers ½"- 4"
- NIBCO Press Tools

Applications	Potable Water Systems Chilled and Hot Water Systems HVAC/Process Water Systems
Approvals	IAPMO PS-117, UPC, NSF/ANSI 61 ICC, CSA
Operating Pressure	200psi CWP
Temperature range	-20°F - 250°F
Compatibility	Suitable for K, L & M hard-drawn copper tube (up to 1" soft-annealed copper tube)

NIBCO HydraPure

Lead-Free Products:

Featuring Silicon Performance Bronze Fittings



- **Wrot copper plumbing fittings**
  - Existing product line manufactured in Stuarts draft, Virginia
  - Wrot copper is a lead-free alloy
  - Generally certified to NSF-61-G (some items pending)
- **Cast DZR bronze plumbing fittings**
  - High quality lead free performance bronze alloy
  - Dezincification-resistant
  - New items certified to NSF-61-G
  - Previous cast fitting line still available

NIBCO HydraPure

NIBCO LF Product:

THE LEAD FREE AUTHORITY

WROT COPPER & CAST PERFORMANCE BRONZE™
- Sweat and thread
- Size range: 1/8" to 8"

NIBCO® PRESS SYSTEM®
- Wrot copper and cast Performance Bronze
- Size range: ½" to 4"

NIBCO® PUSH
- Brass fittings and valves
- Size range: ½" to 1"

FLANGES
- 1-piece cast Performance Bronze
  - Size range: 1" to 6"
- 2-piece copper
  - Size range: ¾" to 6"

NIBCO® PEX PIPING SYSTEMS
- Performance Bronze fittings and valves
- Size range: ½" to 1"

CPVC-CTS FITTINGS
- Suitable for hot and cold water distribution
- Size range: ½" to 1"

THE LARGEST VALVE PACKAGE IN THE INDUSTRY
- Performance Bronze ball, gate and check
- Iron butterfly, gate and check
- Plumbing

Visit us at www.nibcoleadfree.com for our full lead-free offering.*

*Lead free refers to the wetted surface of pipe, fittings and faucets in potable water systems that have a weighted average lead content ≤ 0.25% per the Safe Drinking Water Act (Sec. 1417) amended 1-4-2011 and other equivalent state regulations.

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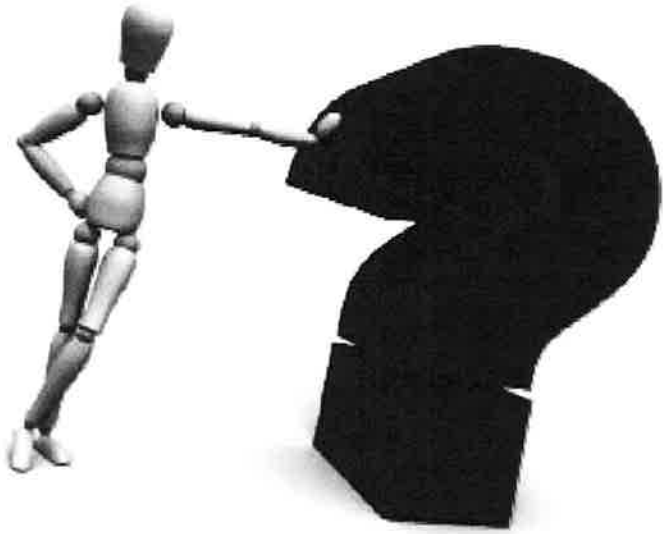
NIBCO HydraPure

Questions



NIBCO HydraPure

SECTION 22 0523 - GENERAL-DUTY VALVES FOR PLUMBING PIPING – "LEAD FREE"

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
1. Bronze ball valve.
2. Ductile-iron, single-flange butterfly valve.
3. Ductile-iron, grooved-end butterfly valve.
4. Bronze lift check valve.
5. Bronze swing check valve.
6. Bronze gate valve.
7. Iron swing check valve.
8. Iron, center-guided check valve.
9. Iron gate valve
10. Chainwheels.

B. Related Sections:
1. Division 22 plumbing piping Sections for specialty valves applicable to those Sections only.
2. Division 22 Section "Identification for Plumbing Piping and Equipment" for valve tags and schedules.

1.3 DEFINITIONS

A. CWP: Cold working pressure.

B. EPDM: Ethylene propylene copolymer rubber.

C. NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.

D. NRS: Nonrising stem.

E. OS&Y: Outside screw and yoke.

F. RS: Rising stem.

G. PTFE: Polytetrafluoroethylene plastic.

H. SWP: Steam working pressure.

I. Lead Free: Refers to the wetted surface of pipe, fittings and fixtures in potable water systems that have a weighted average lead content $\leq 0.25\%$ per Safe Drinking Water Act as amended January 4th 2011 Section1417. *Add specific state requirements as needed.*

1.4 SUBMITTALS

A. Product Data: For each type of valve indicated.

1.5 QUALITY ASSURANCE

A. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.

B. ASME Compliance:
1. ASME B16.10 for ferrous valve dimensions.
2. ASME B31.9 for building services piping valves.

C. NSF Compliance: NSF/ANSI 61-G and/or NSF/ANSI 372 for valve materials for potable-water service. Valves for domestic water must be 3rd Party Certified.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Prepare valves for shipping as follows:
1. Protect internal parts against rust and corrosion.
2. Protect threads, flange faces, grooves, and weld ends.
3. Set angle, and globe valves closed to prevent rattling.
4. Set ball and plug valves open to minimize exposure of functional surfaces.
5. Set butterfly valves closed or slightly open.
6. Block check valves in either closed or open position.

B. Use the following precautions during storage:
1. Maintain valve end protection.
2. Store valves indoors and maintain at higher than ambient dew point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.

C. Use sling to handle large valves; rig sling to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR VALVES

A. Refer to valve schedule articles for applications of valves.

B. Lead Free silicon bronze (ASTM listed) valves shall be made with corrosion-resistant materials. Manufacturer shall provide third party certification tested in accordance with EN ISO 6509 regarding dezincification corrosion resistance and stress corrosion cracking.

C. Bronze Valves: NPS 2 (DN 50) and smaller with threaded or solder ends, unless otherwise indicated.

D. Ferrous Valves: NPS 2-1/2 (DN 65) and larger with flanged ends, unless otherwise indicated.

E. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

F. Valve Sizes: Same as upstream piping unless otherwise indicated.

G. Valve Actuator Types:
1. Gear Actuator: For quarter-turn valves NPS 8 (DN 200) and larger.
2. Handwheel: For valves other than quarter-turn types.
3. Hand lever: For quarter-turn valves NPS 6 (DN 150) and smaller.
4. Chainwheels: Device for attachment to valve handwheel, stem, or other actuator; of size and with chain for mounting height, as indicated in the "Valve Installation" Article.

H. Valves in Insulated Piping: With 2-inch (50-mm) stem extensions and the following features:

1. Ball Valves: With extended operating handle of non-thermal-conductive material that meets UL 2043 approved for inside air plenum, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation and memory stops that are fully adjustable after insulation is applied

a. Basis-of-Design Product: Subject to compliance with requirements, provide NIBCO NIB-SEAL (-NS suffix in figure no.), handle extension or approved equal.

2. Butterfly Valves: Shall have 2" extended neck for insulation clearance.

3. Gate Valves: With rising stem.

I. Valve-End Connections:
1. Flanged: With flanges according to ASME B16.1 for iron valves.
2. Grooved: With grooves according to AWWA C606.
3. Solder Joint: With sockets according to ASME B16.18.
a. NIBCO highly recommends the use of Oatey H20 95 Tinning Flux (or any tinning flux) with the use of our Silicon Bronze Alloys.
b. Follow soldering recommendations per NIBCO Technical Bulletin: **NIBCO® Lead-Free* Silicon Bronze Alloys Soldering & Brazing Recommendations, Review Date: 05/07/13, Original Date: 09/01/2010, Document ID: NTB-0910-08.**
c. **Technical Bulletins**
d. **Refer to "3. Execution" at end of document.**
4. Threaded: With threads according to ASME B1.20.1.
5. Copper Press: With sockets according to ASME B16.22/ASTM B75

J. Valve Bypass and Drain Connections: MSS SP-45.

K. Manufacturers:
1. Subject to compliance with requirements, provide products by one of the following:
a. NIBCO Inc.

2.2 BRONZE BALL VALVES

A. Three-Piece, full port, silicon bronze ball valves with the capability of accepting extended operating handles:

1. Basis-of-Design Product: Subject to compliance with requirements, provide NIBCO Model T-595-Y-66-LF (-NS) with NIBCO Copper x Male adapters; figure no. 604, or NIBCO Model S-595-Y-66-LF (-NS).

2. Description:
   a. Standard: MSS SP-110 and ASME A1124.14.
   b. CWP Rating: 600 psig (4140 kPa).
   c. Body Design: Three piece bronze with threaded body packnut design (no threaded stem designs allowed) with adjustable stem packing.
   d. Body Material: Silicon bronze (ASTM Listed), corrosion resistant.
   e. Ends: Threaded or solder
   f. Seats: PTFE or TFE.
   g. Stem: Stainless steel (silicon bronze available).
   h. Ball: Stainless steel (silicon bronze available).
   i. Port: Full.

B. Two piece, full port, silicon bronze ball valves with the capability of accepting extended operating handles.

1. Basis-of-Design Product: Subject to compliance with requirements, provide NIBCO Model T/PC-585-66-LF (-NS) with NIBCO Copper x Male adapters; figure no. 604 or PC604 Press x Male adapters. Or, NIBCO Model S-585-66-LF (-NS).

2. Description:
   a. Standard: MSS SP-110 and ASME A1124.14
   b. CWP Rating: 600 psig (4140 kPa).
   c. Body Design: Two piece bronze with threaded body packnut design (no threaded stem designs allowed) with adjustable stem packing.
   d. Body Material: Silicon bronze (ASTM Listed), corrosion resistant.
   e. Ends: Threaded, solder or pressed.
   f. Seats: Reinforced PTFE or TFE.
   g. Stem: Stainless steel (silicon bronze available).
   h. Ball: Stainless steel (silicon bronze available).
   i. Port: Full.

2.3 DUCTILE IRON, SINGLE-FLANGE BUTTERFLY VALVES

A. 200 CWP, Iron, Single-Flange Butterfly Valves with EPDM Seat and Aluminum-Bronze Disc:

1. Basis-of-Design Product: Subject to compliance with requirements (NSF/ ANSI 61 and/or NSF/ANSI 372) *Add specific state requirements as needed California has accepted the LD2000 which has been tested for lead content by IAPMO.*, provide NIBCO Model LD-2000N-3/5 Description:

   a. Standard: MSS SP-67, Type I.
   b. NPS 12 (DN 300) and Smaller CWP Rating: 200 psig (1380 kPa).
   c. Body Design: Lug type; suitable for bidirectional dead-end service at rated pressure without use of downstream flange.
   d. Body Material: ASTM A 536, ductile iron.
   e. Seat: EPDM.
   f. Stem: One-piece stainless steel.

g. Disc: Lead Free Aluminum bronze.

2.4 DUCTILE IRON, GROOVED-END BUTTERFLY VALVES

A. 300 CWP, Iron, Grooved-End Butterfly Valves with EPDM Disc:

1. Basis-of-Design Product: Subject to compliance with requirements (NSF/ANSI 61 and/or NSF/ANSI 372), provide NIBCO Model GD-4765N-3/5.

2. Description:

a. Standard: MSS SP-67, Type I.
b. NPS 10 (DN 200) and Smaller CWP Rating: 300 psig (2070 kPa).
c. NPS 12 (DN 250) CWP Rating: 200 psig (1380 kPa).
d. Body Material: Polyamide Coated, ductile iron ASTM A 395.
e. Stem: Two-piece stainless steel.
f. Disc: EPDM-Encapsulated, ductile iron.
g. Seal: EPDM.

2.5 SILICON BRONZE LIFT CHECK VALVES

A. 250 CWP, Lift Check Valves with Nonmetallic TFE Disc:

1. Basis-of-Design Product: Subject to compliance with requirements, provide NIBCO Model T-480-Y-LF with NIBCO Copper x Male adapters; figure no. 604. Or, NIBCO Model S-480-Y-LF.

2. Description:
a. Standard: MSS SP-139
b. CWP Rating: 200 psig (1380 kPa).
c. Body Design: Vertical or horizontal flow
d. Body Material: Silicon bronze (ASTM Listed), corrosion resistant.
e. Ends: Threaded or solder
f. Disc: TFE.

2.6 SILICON BRONZE SWING CHECK VALVES

A. 200 CWP, Bronze Swing Check Valves with TFE Disc:

1. Basis-of-Design Product: Subject to compliance with requirements, provide NIBCO Model T-413-Y-LF with NIBCO Copper x Male adapters; figure no. 604. Or, NIBCO Model S-413-Y-LF.

2. Description:
a. Standard: MSS SP-139
b. CWP Rating: 300 psig (1380 kPa).
c. Body Design: Horizontal or vertical (flow in upward direction) flow.
d. Body Material: Silicon bronze (ASTM Listed), corrosion resistant.

e. Ends: Threaded or Soldered.
f. Disc: PTFE or TFE.

2.7 SILICON BRONZE GATE VALVES

A. 200 CWP, NRS Bronze Gate Valves:
1. Basis-of-Design Product: Subject to compliance with requirements, provide NIBCO Model T-113-LF with NIBCO Copper x Male adapters; figure no. 604. Or, NIBCO Model S-113-LF.

2. Description:

a. Standard: MSS SP-139.
b. CWP Rating: 300 psig (1380 kPa).
c. Body Material: Silicon bronze (ASTM Listed), corrosion resistant.
d. Ends: Threaded or Solder.
e. Stem: Silicon bronze, ASTM B99 Alloy C65100.
f. Disc: Solid wedge; silicon bronze.
g. Packing: Asbestos free.
h. Handwheel: Malleable iron.

2.8 IRON SWING CHECK VALVES

A. Class 150, Ductile Iron Swing Check Valves with Metal Seats:

1. Basis-of-Design Product: Subject to compliance with requirements, provide NIBCO Model F938-33

2. Description:
a. Standard: MSS SP-136
b. CWP Rating: 285 psig (1380 kPa).
c. Body Design: Clear or full waterway.
d. Body Material: ASTM A 395 Ductile Iron
e. Ends: Flanged.
f. Trim: Stainless steel
g. Gasket: Asbestos free.

2.9 IRON, CENTER-GUIDED CHECK VALVES (PUMP DISCHARGE)

A. Class 125, Iron, Globe, Center-Guided Check Valves with Resilient Seat:

1. Basis-of-Design Product: Subject to compliance with requirements, provide NIBCO Model F/W-910-B-LF.

2. Description

a. Standard: MSS SP-125, FCI 74-1 and MIL-V-18436F.
b. CWP Rating: 200 psig (1380 kPa).
c. Body Material: ASTM A 126 Class B
d. Trim: Silicon bronze (ASTM listed), corrosion resistant.

e. Style: Globe or wafer, spring loaded.
f. Ends: Flanged or wafer.
g. Seat: Silicon bronze.

2.10 IRON, TWIN DISC, CHECK VALVE

A. Class 125, Iron, Double Door Check Valves with Resilient Seat:

1. Basis-of-Design Product: Subject to compliance with requirements, provide NIBCO Model W-920-W-LF.

2. Description

a. Standard: NSF/ANSI 372.
b. CWP Rating: 200 psig (1380 kPa).
c. Body Material: ASTM A 126 Class B
d. Trim: Silicon bronze (ASTM listed), corrosion resistant.
e. Style: Wafer, spring loaded-plate.
f. Ends: Wafer.
g. Seat: Silicon bronze.

2.11 IRON, GROOVED, CHECK VALVE

A. Class 125, Iron, Grooved Check Valves with Resilient Seat:

1. Basis-of-Design Product: Subject to compliance with requirements, provide NIBCO Model G-920-W-LF.

2. Description

a. Standard: NSF/ANSI 372.
b. CWP Rating: 250 psig (1380 kPa).
c. Body Material: Ductile iron, ASTM 536
d. Trim: Silicon bronze (ASTM listed), corrosion resistant.
e. Style: Twin disc, spring loaded.
f. Ends: Grooved.
g. Seat: Buna N.

2.12 DUCTILE IRON GATE VALVES

Class 150, OS&Y and Non-Rising Stem Ductile Iron Gate Valves:

1. Basis-of-Design Product: Subject to compliance with requirements, provide NIBCO Model F637-33 OS&Y & F639-33 Non-Rising Stem

2. Description:
a. Standard: Lead Free, MSS SP-70, Type I
b. CWP Rating: 285 psig (1380 kPa).

c. Body Material: ASTM A 395 Ductile Iron
d. Ends: Flanged.
e. Trim: Stainless steel
f. Disc: Solid wedge
g. Packing and Gasket: Asbestos free.

2.13 DUCTILE IRON GATE VALVES WITH RESILIENT WEDGE

Class 125, OS&Y, Ductile Iron Gate Valves:

1. Basis-of-Design Product: Subject to compliance with requirements, provide NIBCO Model F-607-RW-LF.

2. Description:
   a. Standard: MSS SP-70, Type I.
   b. CWP Rating: 200 psig (1380 kPa).
   c. Body Material: ASTM A536 ductile iron.
   d. Ends: Flanged.
   e. Disc: Resilient wedge.
   f. Packing and Gasket: Asbestos free.

2.14 IRON GATE VALVES

Class 125, NRS, Ductile Iron Gate Valves:

1. Basis-of-Design Product: Subject to compliance with requirements, provide NIBCO Model F-619-RW-LF.

2. Description:
   a. Standard: MSS SP-70, Type I.
   b. CWP Rating: 200 psig (1380 kPa).
   c. Body Material: ASTM A536 ductile iron.
   d. Ends: Flanged.
   e. Disc: Resilient wedge.
   f. Packing and Gasket: Asbestos free.

2.15 CHAINWHEELS

Manufacturers: Subject to compliance with requirements,

1. Basis-of-Design Product: Subject to compliance with requirements, provide NIBCO Babbitt Sprocket Rims or a comparable product.

2. Description: Valve actuation assembly with sprocket rim, brackets, and chain.

   a. Brackets: Type, number, size, and fasteners required to mount actuator on valve.

   b. Attachment: For connection to ball and gate valve stems.

c. Sprocket Rim with Chain Guides: Cast iron Aluminum Bronze, of type and size required for valve.

d. Chain: Hot-dip, galvanized steel, of size required to fit sprocket rim.

3.EXECUTION

EXAMINATION

Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.

Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.

Examine threads on valve and mating pipe for form and cleanliness.

Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.

Do not attempt to repair defective valves; replace with new valves.

VALVE INSTALLATION

Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

Locate valves for easy access and provide separate support where necessary.

Install valves in horizontal piping with stem at or above center of pipe.

Install valves in position to allow full stem movement.

Install chainwheels on operators for ball and gate valves NPS 4 (DN 100) and larger and more than 96 inches (2400 mm) above floor or more than three feet above ceiling. Extend chains to 60 inches (1520 mm) above finished floor or just above ceiling.

Install check valves for proper direction of flow and as follows:
Swing Check Valves: In horizontal position with hinge pin level.
Lift Check Valves: With stem upright and plumb.

When soldering use paste fluxes that are approved by the manufacture for use with Lead Free Alloys.

ADJUSTING

Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

If valve applications are not indicated, use the following:
Shutoff Service: Ball, butterfly or gate valves.
Butterfly Valve Dead-End Service: Single-flange (lug) type.
Throttling Service: Ball valves.
Pump-Discharge Check Valves:
NPS 2 (DN 50) and Smaller: spring-loaded lift valves with nonmetallic disc.
NPS 2-1/2 (DN 65) and Larger for Domestic Water: center-guided metal-seat check valves.

If valves with specified CWP ratings are not available, the same types of valves with CWP ratings may be substituted.

Select valves, except wafer types, with the following end connections:
For Copper Tubing, NPS 2 (DN 50) and Smaller: Threaded ends except where solder-joint valve-end option is indicated in valve schedules below.
For Copper Tubing, NPS 2-1/2 to NPS 4 (DN 65 to DN 100): Flanged ends except where threaded valve-end option is indicated in valve schedules below.
For Copper Tubing, NPS 5 (DN 125) and Larger: Flanged ends.
For Steel Piping, NPS 2 (DN 50) and Smaller: Threaded ends.
For Steel Piping, NPS 2-1/2 to NPS 4 (DN 65 to DN 100): Flanged ends except where threaded valve-end option is indicated in valve schedules below.
For Steel Piping, NPS 5 (DN 125) and Larger: Flanged ends.

DOMESTIC, HOT- AND COLD-WATER VALVE SCHEDULE

Pipe NPS 3 (DN 75) and Smaller:
Bronze Valves: May be provided with solder-joint, press to connect ends or threaded ends.
Ball Valves: Three-piece or Two-piece, full port, bronze with stainless-steel trim.
Bronze Swing Check Valves: 300 CWP, nonmetallic TFE disc.
Bronze Lift Check Valves: 200 CWP, nonmetallic TFE disc.

Pipe NPS 2-1/2 (DN 165) and Larger:

Iron Valves, NPS 2-1/2 (DN 65) and Larger: May be provided with flanged, wafer or grooved ends.
Ductile-Iron, Single-Flange Butterfly Valves: 200 CWP, EPDM seat, aluminum-bronze disc.
Iron Swing Check Valves: Class 125 metal seats.
Iron, Center-Guided Check Valves: Class 125, globe, resilient seat. (for pump discharge)

NIBCO
AHEAD OF THE FLOW

NIBCO INC.
WORLD HEADQUARTERS

TECHNICAL BULLETIN

Review Date: 05/07/13
Original Date: 09/01/2010
Document ID: NTB-0910-05

NIBCO® Lead-Free* Silicon Bronze Alloys Soldering & Brazing Recommendations

The following recommendations are offered to aid installers who are soldering lead-free (LF) silicon bronze alloys. NIBCO selected lead-free silicon bronze alloys primarily due to superior heat tolerance, strength and corrosion resistance, although attention-to-detail is required when soldering.

When soldering any lead-free products for the first time, always practice and review solder coverage via peel test joints. Practicing on small and large diameter joints is highly recommended, to ensure the installer is comfortable in achieving consistent quality coverage.

For soldering and peel test recommendations, review video at www.nibcoleadfree.com

SOLDERING RECOMMENDATIONS:

1. Ensure proper joint preparation for solder cup and mating tube:

Proper joint preparation is critical in order to achieve a satisfactory solder joint - follow all best practices for prepping tube by using a coarse emery cloth or a clean wire brush, including square cutting, de-burring (inside and outside), cleaning, etc.

2. Select appropriate solder, flux and heat:

The selection of a compatible solder / flux combination is a critical first step to achieving a quality joint.

All solder / flux combinations should be tested and confirmed for adequate coverage.

Solder: NIBCO recommends plumbing solders with a melting point above 400°F. Solders with a melting point above 400°F include traditional 95/5 tin / antimony and those containing silver or other filler elements.

Flux: The purpose of flux is to clean, prep, and protect the surfaces of the joint to accept solder. It is important that the flux utilized has an active temperature range compatible with the intended solder. Many plumbing flux and solder combinations have been confirmed for use with silicon bronze alloys. There are generally many flux types beyond plumbing – best practice calls for installers to utilize plumbing paste fluxes containing chlorides. Contact the flux manufacturer regarding the suitability of their flux for use with any intended solder. Confirming flux suitability per local plumbing code is the responsibility of the installer.

* Lead Free refers to the wetted surface of pipe, fittings and fixtures in potable water systems that have a weighted average lead content ≤ 0.25% per the Safe Drinking Water Act (Sec. 1417) amended 1-4-2011 and other equivalent state regulations.

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1

Heat: Silicon bronze alloys will transfer heat away from the heat affected area more slowly than copper or leaded bronze; therefore, more attention may be required to achieve uniform heating of the alloy. Select torch tip and gas mix to adequately distribute the heat. The hotter the flame, the more skill and technique are required.

3. **Ensure sufficient joint heating:**

Ball valves should be in the CLOSED position and gate valves OPEN when soldering.

Ensuring sufficient heat is critical to achieving a satisfactory solder joint.

Standard soldering techniques can be used with proper selection of a solder and flux combination**. Even, uniform heat should be accomplished by directing the inner-most flame tip (neutral flame) to the joint, remembering these critical points:

- Begin by mildly preheating the socket and tube.
- Do not direct the flame into the gap.
- Heat the entire joint, always keep the flame moving – **do not linger in any one position.**
- Watch for the flux to activate, per flux manufacturer's recommendation. Flux will generally bubble as it reaches activation temperature, taking care not to burn out the flux.
- Apply the flame to the base of the solder cup – the farthest point you want to draw the solder to.
- With uniform heating around the base of the cup, touch the solder to the joint. If the solder doesn't melt remove the solder and continue heating the entire joint.
- When the solder begins to melt, **return the flame to the base of the cup**, rotating the flame 360 degrees around the cup.

Due to expansion and contraction of materials after heating, the ball valve or gate valve pack nut may need to be tightened.

Lead–free solder training kits are available and highly encouraged – consult your local NIBCO representative.

BRAZING RECOMMENDATIONS:

1. Although soldering of large diameter joints is possible, NIBCO recognizes that LF bronze alloy joints larger than 2" in diameter become increasingly difficult to achieve adequate solder coverage.

2. LF silicon bronze alloy brazing, including filler material selection and installation, is identical to that used in good industry practice for traditional plumbing products.

Failure to follow installation instructions can result in improper installation and damage to property.
For answers to additional questions regarding soldering, brazing or any other technical issue involving NIBCO products, please call toll-free:

** ASTM B828 Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings.

Proper soldering is the responsibility of the installer. Installers should follow best industry practices when soldering any LF bronze alloy and should confirm the most up-to-date manufacturer's instructions from all solder and flux material manufacturers prior to prepping solder joints in plumbing installations.

NIBCO Technical Services • Phone: 1.888.446.4224 • Fax: 1.888.336.4224

OATEYSCS
Supply Chain Services

Technical Bulletin
Soldering and Fluxing "Low Lead" Brass Material Products
(3/2012)

All Oatey fluxes can be used to solder "low lead" brass material products. Based on our internal testing, we have determined that H2O-95 Water Soluble Tinning Flux performs the best of all the Oatey fluxes.

Oatey recommends that the installers use 120-grit (or coarser) sandpaper in the application to clean the material surfaces, and ensure that heat is applied consistently during the soldering to the impacted surfaces.

We recommend that only Oatey "Lead Free" Plumbing Solder products be used when soldering "low lead" brass material products.

Should you have further questions regarding soldering and fluxing "low lead" brass material products, please consult your Oatey Representative or contact Oatey Technical Support at 1-800-321-9532.

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TECHNICAL SPECIFICATION

H-20^{95}
WATER SOLUBLE TINNING FLUX

Quality ISO 9001 System

TECHNICAL SPECIFICATION: Oatey H-20^{95} Water Soluble Tinning Flux cleans, tins and fluxes most commonly soldered metals including copper, brass, zinc, galvanized iron, lead and tin or copper-coated metals. Fluxing is a critical step in the soldering process. H-20^{95} Tinning Flux is lead-free and ideal for copper systems including fire sprinkler, hydronic heating, potable water service and DWV piping. H-20^{95} Tinning Flux remains active up to 700° F. H-20^{95} Flux complies with CA & VT lead content regulations.

PHYSICAL/CHEMICAL PROPERTIES

Appearance	Greenish-Gray Paste
Shelf Life	1 year from manufacture date
pH	3-4
Solder Temp. Range	400-700 F

DIRECTIONS FOR USE

Paste Fluxes require only a small amount of flux applied to the joint. Clean all surfaces before soldering. Apply small amount of flux inside the fitting and outside of the pipe. Heat to temperature required for soldering. Do not overheat the piping. For small diameter piping, direct the heat near the joint. For large diameter piping, move the heat around the joint to ensure adequate solder flow around the circumference of the joint. NOT FOR USE WITH ALUMINUM, STAINLESS STEEL OR MAGNESIUM. DO NOT USE ON ELECTRICAL PARTS.

When soldering process is complete, allow joint to cool undisturbed. Remove any flux residual with a damp cloth. Do not store H-20^{95} Tinning Flux above 120° F.

PRECAUTIONS

Read all cautions and directions carefully before using this product. Apply flux with brush- do not apply with fingers. Wash thoroughly after handling and before eating. Eye/Skin contact may cause intense irritation and injury. In case of eye/skin contact, flush freely with water and seek medical attention immediately. If swallowed, DO NOT INDUCE VOMITING, drink water and call a physician or poison control center immediately. Ingestion of this product could cause gastrointestinal distress. DO NOT REUSE EMPTY CONTAINER. KEEP OUT OF REACH OF CHILDREN.

Refer to material safety data sheet for more information. For emergency first aid help, call 1-877-740-5015.

COMMON APPLICATIONS

Oatey H-20^{95} Water Soluble Tinning Flux can be used to solder most commonly soldered metals including copper, brass, zinc, galvanized iron and tin or copper-coated metals.

Consult Oatey Technical Department for applications not specifically referenced above.

INGREDIENTS (CAS Number)

Triethanolamine Hydrochloride (637-39-8)
Zinc Chloride (7646-85-7)
Ammonium Chloride (12125-02-9)
Surfactant Blend (N/A)
Inert Fillers (N/A)
Tin (7440-31-5)
Copper (7440-50-8)
Bismuth (7440-69-9)

COMPLIANCE AND LISTINGS

NSF

NSF Listed to Standard 61	Lead Free Flux Complies with CA & VT lead legislation

Flux Base meets ASTM Standard B 813

PRODUCT NUMBER	DESCRIPTION	PACK	CARTON WEIGHT
30140	1.7 oz. H-20^{95} Water Soluble Tinning Flux	12	4 lbs.
30142	8 oz. H-20^{95} Water Soluble Tinning Flux	24	16 lbs.
30143	16 oz. H-20^{95} Water Soluble Tinning Flux	24	15 lbs.
53068	1.7 oz. H-20^{95} Water Soluble Tinning Flux with Brush – Carded	12	2 lbs.

END OF SECTION