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COPPER • BRASS • BRONZE PUBLICATIONS

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AUTOMOTIVE

Automotive Hydraulic Brake Tube: The Case for 90-10 Copper Nickel Tubing

8023 [P] [D] The results of extensive corrosion testing and 15 years of use by Volvo show that C70600 copper-nickel tube is superior to the coated steel tube used in today's U.S.-made vehicles. Reprint, *SAE Technical Paper*, March 1993.

Copper and Brass Radiators Surpass 10-Year Corrosion-Resistance Goal

8043 [P] [D] Test results reported in this publication show how E-coatings and epoxy powders can double, even triple, the service life of copper and brass radiators and prevent the onset of rapid fin corrosion in highly aggressive environments. (6 pp) **1 free (add'l \$1.00 ea)**

Copper-Nickel Automotive Vehicle Brake Tubing

A8001 [P] [D] Describes growing usage of Copper Alloy No. C70600 (90-10 Cu-Ni) for automotive brake lines. Compares the strength

properties and corrosion resistance of 90-10 copper-nickel tube with traditional copper-brazed, double-wrapped, coated steel tube. (4 pp) **1 free (add'l \$1.00 ea)**

New Technology for Copper and Brass Radiators

801/7 [P] [D] Describes three new technologies to improve automotive radiator performance and cost: automated core baking, zinc-base solders, and mechanically clinched tank-to-header joints. Reprint, *SAE Technical Paper 870187*. (6 pp) **1 free (add'l \$1.00 ea)**

Procedure for Manufacturing and Testing Tensile-Peel Test Specimens

801/2 [P] [D] Describes specimen preparation and test procedures for evaluating the strength of soldering joints in copper and brass automotive radiator materials (4 pp) **1 free (add'l \$1.00 ea)**

Process Improvements in Soldering Automotive Radiators

805/8 [P] [D] Summarizes CDA's experimental programs on the interrelationships between copper alloy, solder composition, flux formulation and process parameters.

BUILDING CONSTRUCTION

Home Builders' Marketing Materials

50-Year Manufacturer's Limited Warranty Document

A9011 [P] [D] Terms of the 50-Year Limited Warranty on residential plumbing tube and fittings are fully stated on handsome certificates that you can display in your model homes and pass to customers along with the keys to their new homes. (1 p) (*English only*) **1 free (add'l \$0.25 ea)**

50-Year Warranty Document Display Stand

A9025 [P] [D] A countertop display stand provides a convenient and attractive way to exhibit copies of the 50-Year Manufacturer's Limited Warranty Certificate on copper tubing. Put the display stand and certificates in prominent, high-traffic areas of your showrooms and model homes, providing your customers with easy access to takeaway items. **1 free (add'l \$0.25 ea)**

Quality is the reason brochures

For home builders to distribute to potential customers, these brochures tell home buyers why the home builders chose the highest quality materials for their home. They ensure that copper quality and value don't go unnoticed. (6 panels ea.)

- Why your builder chose all-copper wiring **A9002** [P] [D], **1 free (add'l \$2.00 ea)**
- Why your builder chose copper communications wiring **A9013** [P] [D], **1 free (add'l \$2.00 ea)**

- Why your builder chose copper plumbing. **A9001** [P] [D], **1 free (add'l \$2.00 ea)**
- Why your builder chose copper flashing. **A9004** [P] [D], **1 free (add'l \$2.00 ea)**
- Why your builder chose flexible copper tube for gas distribution. **A9017** [P] [D], **1 free (add'l \$2.00 ea)**
- Why your builder chose solid brass hardware. **A9010** [P] [D], **1 free (add'l \$2.00 ea)**
- Why you should choose copper plumbing. **A9005** [P] [D], **1 free (add'l \$2.00 ea)**
- Why your builder chose solid brass plumbing fixtures. **A9003** [P] [D], **1 free (add'l \$2.00 ea)**

Countertop Brochure Display Stand for Quality is the reason brochures

A9027 [P] [D] This countertop display stand accommodates up to three different brochures to educate prospective buyers about the value of copper and brass building products in your homes. **1 free (add'l \$2.00 ea)**

Architecture

Adventures in Green Building

A4085 [P] [D] This article describes how copper was used to achieve a LEED rating on the new Transit Maintenance Facility in Santa Clarita, CA. by Christina Koch, Reprint: *MetalMag* (published by R.R. Donnelley), Nov/Dec 2007, pp 60-68. **1 free (add'l \$1.00 ea)**

Architectural Applications

A4039 [P] [D] A guide to selecting, fabricating, finishing, designing, installing, protecting and maintaining 10 principal alloys. (32 pp) **\$5.00**

Copper Design Series (3)

Originally published in *Progressive Architecture*. This series of four-page reprints portrays and discusses significant architectural projects with innovative copper applications. Includes detail drawings and architects' comments on the use of copper.

- Roofing—Momentum Place **A4021** [P] [D] Presents details and specifications for the spectacular intersecting barrel vault roof atop Momentum Place in Dallas, Texas.
- Roofing/Facades—Yale Psychiatric Institute **A4009** [P] [D] Allan Dehar discusses his and Frank Gehry's design which accents unusual copper textures and colors for the latest addition to Yale University in New Haven, Connecticut.
- Restoration—Ellis Island; The Police Building **A4022** [P] [D] James Rhodes and Denis Kuhn discuss their respective approaches to restoration and the use of copper on two New York area landmarks.

KEY TO SYMBOLS

- [P] Available at www.copper.org
- [D] Available as Printed Publication
- [C] Available on PC disk or CD-ROM
- [V] Available on Videotape (VHS - NTSC only)

To order, use enclosed Order Form or go to [/www.copper.org/publications](http://www.copper.org/publications)



Copper Flashings in Contemporary Construction

A4064 ■ Covers the role of copper flashing systems in long-lived applications. Includes discussion of thermal movement, corrosion concerns, solder and sealants, finishes and cost effectiveness. Reprint, *The Construction Specifier*, October 2000 (6 pp) **1 free (add'l \$1.00 ea)**

Copper in Architecture CD-ROM

A4053 © A comprehensive resource containing technical discussions, sample projects, details and specifications on the applications of architectural copper products. Details are AutoCad® compatible for easy importing, or printable as PDF documents. Specifications are CSI and AIA Masterspec® formatted. Includes copper alloy colors and finishes charts, along with supplier, contractor and manufacturer databases. (PC and Mac) **\$20.00**

Copper in Architecture – Handbook

A4050 ■ ■ A comprehensive compilation of designs, details and specifications. Includes far more information than ever before assembled in one reference on the many, varied and cost-effective ways copper and its alloys are being applied in architecture and building construction. (150 pp) **\$85.00**

Copper in Architecture – Video

A4038 ■ ■ This six-part videotape on copper roofing offers a close-up look at the basics – the fundamental forms, shapes and details that are the architect's tools. It should become a basic resource for all firms that specify or install copper roofing products.

Includes:

- Copper in Architecture: An Overview
- Standing Seam Roofs
- Batten Seam Roofs
- Flat Seam and Shingle Roofs
- Horizontal Seam Roofs
- Gutters, Flashing and Roof Details

55 minutes total **\$25.00**

Copper in Architecture – Self Study Program

A4032 ■ ■ ■ Covers design, specification and installation of architectural copper products. Includes *Copper in Architecture* six-part roof applications video, *the Copper in Architecture Handbook CD-ROM* with complete specifications and selected CAD details, the *Sheet Copper Applications* design manual, five-part quiz and credit registration form. Awards 5 AIA Learning Units and HSW hours for completion. **\$40.00**

Copper in Architecture – Roofing Applications

A4012 ■ Sweet's Catalog insert on CDA services and publications available to the roofing, building design and construction trades. (4 pp) **1 free (add'l \$1.00 ea)**

Copper in Architecture – Wall Cladding Applications

A4011 ■ Sweet's Catalog insert picturing contemporary wall cladding examples. Includes a color table depicting the weathering stages of copper over a 30-year period. (4 pp) **1 free (add'l \$1.00 ea)**

Copper Roofs Are Cool

A4094 ■ Can a copper roofing system save energy? Can it be considered "cool"?

The Glory of Copper

A4067 ■ Five articles discuss the appeal and use of architectural copper in the USA; basic facts for designers and installers; answers to commonly asked question about copper roofing; identification of copper roofing information resources; and a description of CDA's installer training program. Reprint, *Metal Roofing Magazine*, January 2003. (8 pp) **1 free (add'l \$1.00 ea)**

The Role of Copper, Bronze and Brass in Architecture & Design

A4082 ■ This article covers the basics of copper design and installation for both exterior and interior applications. It also contains a description of how copper facilitates sustainable construction and green building. Reprinted from *Metal Architecture*, May 2007.

Installing Copper Roofing – Videotape

A4058 ■ ■ A contractor-oriented instructional videotape on architectural sheet metal applications. Six program modules show step-by-step installation procedures of the most common copper roofing systems.

Includes:

- Introduction (4:00)
- Basic Concepts (20:00)
- Standing Seam Systems (15:00)
- Batten Seam Systems (15:00)
- Flat Locked and Soldered System (8:00)
- Flashing (10:00)

(72 minutes total) **\$35.00**

A Primer on Copper Roofing

A4037 ■ Covers basics important to every architect and contractor, including: valley flashing and line corrosion, long-pan panel design, designing for severe wind conditions, artificial patination, sealants, soldering and stain prevention. Reprint, *The Construction Specifier*, September 1998. (6 pp) **1 free (add'l \$1.00 ea)**

How to Apply Statuary and Patina Finishes

A1081 ■ Cleaning procedures and chemicals for coloring architectural metal work brown (statuary) or green (accelerated patina).

Sheet Copper Applications

401/0R ■ Leading architects' use of copper in outstanding contemporary buildings. Sheet copper fundamentals, design, details and specifications for professionals includes color weathering chart. (56 pp) **\$5.00**

The Copper Advantage

A4095 ■ This article addresses the use of copper and copper alloys in residential and commercial building environments, particularly focusing on architectural applications of antimicrobial copper, brass and bronze. Content includes ways in which architects and designers can effectively use these materials for frequently touched surfaces in healthcare, mass transit, educational and other public and private facilities. Reprint: *Metal Architecture*, June 2009

Fire Sprinklers

Contractor Finds Copper System Saves More than Just Pennies

4043 ■ Phoenix's high-rise Municipal Building brought new awareness to installer and owner of how a copper sprinkler system can save money. Not only is the material easy to

install, reducing labor costs; but can be cut and assembled right on the site, eliminating guesswork and time-consuming off-site fabrication and transportation. Reprint, *U.S. Fire Sprinkler Reporter*, July 1993. (2 pp) **1 free (add'l \$0.25 ea)**

Copper vs. CPVC for Automatic Fire Sprinkler Systems

A4026 ■ Evaluates copper tube and CPVC pipe for use in fire sprinkler systems in terms of installation requirements, properties, performance and cost. (8 pp) **1 free (add'l \$0.25 ea)**

Fire Sprinkler Case Histories (4)

Describes system design, technical details of the installation, and materials requirements for four copper fire sprinkler system installations:

- **Peabody Court Hotel**
405/4 ■ Retrofit of a 14-story, 105-room hotel originally built in 1930.
- **Pelican Bay Apartments**
410/5 ■ A three-story, 472-unit luxury apartment complex.
- **Stone Creek Apartments**
404/4 ■ A three-story, 248-unit apartment complex.
- **Wanamaker House Apartments**
406/4 ■ A 33-story, 333-unit apartment building.

Fire Sprinkler Systems

A4003 ■ ■ A guide to designing and specifying soldered and brazed copper fire sprinkler systems. Covers standards and code acceptance, materials specifications, friction loss, flow capacity and installation. (12 pp) **1 free (add'l \$1.00 ea)**

Phoenix Municipal Building: Copper Installation

4014 ■ Shows simple techniques used to save time and money installing copper tube for an automatic fire sprinkler system in a 21-story Arizona building. Reprint, *FPC Magazine*, October 1993.

Residential Fire Sprinkler Systems

A4010 ■ A design and installation guide for plumbing, mechanical and sprinkler contractors. Offers a simple but thorough explanation of NFPA Standards and expert tips on the use of copper tube for residential automatic fire sprinkler systems.

Natural Gas

Copper Tube Sizing Calculator for Fuel Gas Distribution Systems

A4030 ■ Simplifies the selection of the proper copper tube size based upon the required Btu/h, Developed Length of Tube or Flow Rate (cfh). Using accepted engineering practice, the smallest allowable tube can be selected. (5-page handbook, calculator) **1 free (add'l \$5.00 ea)**

Copper Tubing for Mechanical Systems

409/2 ■ Explains why maintenance-free copper is preferred for liquid or gas, high or low pressure, solar or conventional systems.

Fuel Gas Distribution Systems – Copper Tube

A4006 ■ ■ Design guide for layout, specification and installation of copper tube in fuel gas systems. Illustrations and tables provide quick, useful references to the latest applicable National Fuel Gas Code and ASTM information. (12 pp) **1 free (add'l \$1.00 ea)**

Using Flexible Copper Gas Tubing

A4033 Details the advantages to builders and contractors of flexible copper tube versus traditional black iron pipe for fuel gas distribution. Examines copper's low-cost and high-convenience features along with its unique suitability for both low- and high-pressure systems. (2 pp) **1 free (add'l \$0.25 ea)**

Plumbing

Copper Tube Handbook

A4015 The most up-to-date guide to specifying and installing copper tube for plumbing, heating, air conditioning and refrigeration. Shows soldering and brazing techniques. (50 pp) **1 free (add'l \$1.00 ea)**

Copper-Tube Corrosion in Domestic-Water Systems

A4073 Show how to identify and mitigate corrosion of copper tube and fittings in domestic waters. The seven sources of corrosion are discussed: solder-flux-induced pitting attack, hydrogen-sulfide-induced pitting attack, erosion corrosion, cuprosolvency, concentration-cell corrosion, chemistry-related hot- and cold-water pitting. Reprint, BSE Boiler Systems Engineering, June 2005. (8 pgs.) **1 free (add'l \$0.25 ea)**

Copper Tube Sizing Calculator and Handbook

A4005 For design of plumbing systems, fire sprinkler systems, etc. Slide rule calculates tube diameter, pressure loss, developed length, flow rate, friction loss and flow velocity. (5 pp, calculator) **1 free (add'l \$5.00)**

Conditions Contributing to Underground Copper Corrosion

1094 Identifies the possible situations in which copper tube or pipe may be subject to external corrosion underground. Identifies measures to prevent such attack. Reprint, *AWWA Journal*, August 1984. (4 pp) **1 free (add'l \$0.25 ea)**

Corrosion by Potable Waters in Building Systems and Water Treatment to Mitigate Corrosion of Copper Plumbing Systems

A1070 Two articles reprinted from *Materials Performance*, August 1993. The first tells how to avoid pitting attack (cold and hot water), concentration cell, dezincification, erosion and galvanic corrosion. Materials selection, system design and chemical treatment techniques are examined. The second article provides an analysis of water treatment techniques used successfully by water utilities or dwelling owners, including the addition of hydrated lime, caustic soda, ash or a silicate to the distributed water.

Guide Specifications on Plumbing

A4018 Contains standards, references and specifications on copper and copper alloy piping system products and materials. Provides information on installation methods and procedures and minimum recommendations on pipe/tube fittings and joints for specific applications. (16 pp with MS Word® file in a PC disk) **1 free (add'l \$1.00 ea)**

Occurrence and Control of Corrosion in Copper Water Tube Systems

A1162 Describes North American and European standards covering tubes, fittings, solders, fluxes and guidelines for assembly of copper tube water systems and the low inci-

dence of corrosion-related failures. Discusses responsibility of water purveyors to provide noncorrosive waters to their customers. Reprint, *Proceedings of the 1994 Water Quality Technology Conference*, November 1994.

Overcoming Corrosion Concerns in Copper Tube Systems

A1095 Describes proper materials selection, system design and operations, correct workmanship practices and effective water treatment alternatives for mitigating corrosion concerns while satisfying the 1991 Lead-Copper Rule Amendment to the 1974 Safe Drinking Water Act. Reprint, *Materials Performance*, September 1996. **1 free (add'l \$0.25 ea)**

Pitting Corrosion of Copper in Cold Potable Water Systems

A1061 Examines the influence of water chemistry on cold-water pitting of copper tube. Explains how this low-incidence problem can be mitigated by simply raising the water's pH and lowering free carbon dioxide to acceptable levels. Reprint, *Materials Performance*, October 1995.

Water- and Soil-Side Corrosion of Copper Water Service Lines

A1062 Study results of 10- to 70-year underground copper water service lines throughout Billings, Montana, show copper has excellent resistance to indigenous soils and water. Reprint, *Materials Performance*, March 1995.

ELECTRICAL

General

Ambient Temperature Ampacity Corrections for Cable Bundling and Direct Solar Exposure

A6091 Heat is one of the enemies of electrical systems. This study discusses the effects of ambient temperature and electrical loading on bundled cable and of direct sunlight on conductors in conduits. The results carry great import in determining ampacity corrections required to meet the National Electrical Code®. When de-rating tables are not applied in practice, serious consequences can result. Reprint, *IAEI News*, September 2003 (12 pp) **1 free (add'l \$0.25 ea)**

Building Wire: Copper vs. Aluminum

A6015 Survey results from 713 electrical contractors on their preferences for copper or aluminum in building wire applications. Contains tabular data and quotes from respondents. (6 pp) **1 free (add'l \$0.25 ea)**

Bigger Really is Better

A6119 "Inspectors and Contractors Prefer Larger Gages and More Circuits" A recent survey of electrical inspectors, contractors and instructors indicated an overwhelming preference for more circuits, larger gages than Code minimums, and copper conductors in their own homes.

Corrosion and Current Burst Testing Of Copper And Aluminum Power Connectors for Use with Copper And Aluminum Conductor

A 6107 A report by Powertech Labs on testing of aluminum and copper power connectors used on both aluminum and copper cables. Using accelerated aging tests, the aluminum conductor resulted in an unac-

ceptable failure rate of the connections. (This research was also the subject of an IEEE Transaction Paper, a copy of which can be ordered from the Publication List) (23 pp.) **1 free (add'l \$0.25 ea)**

Connecting with Copper

A6123 Colorful, six page summary of the results of the aluminum and copper connector study detailed below, with photographs and a description of the research and results.

Comparative Corrosion and Current Burst Testing of Copper and Aluminum Electrical Power Connectors

A 6108 Crimped and mechanically bolted aluminum and copper connectors are commonly used for terminating electric power cables. In this IEEE Transaction Paper, copper-to-copper, aluminum-to-copper, and aluminum-to-aluminum connections were subjected to accelerated aging. (6 pgs.) **1 free (add'l \$0.25 ea)**

Rooftop Ampacity Adjustments

A6115 A pocket-sized slide tool designed to allow easy calculation of adjusted ampacities for conduits on rooftops exposed to direct sunlight, as required in the 2008 NEC. Contains temperature data for several dozen cities. A complement to booklet A6116. **1 free (add'l \$0.25 ea)**

Derating: Outdoor Temperatures for Various U.S. Cities and Temperatures Inside Conduits on Rooftops Exposed to Direct Sunlight

A6116 A pocket-sized list of over 700 U.S. locations, their calculated average 2% design temperatures from ASHRAE data, the temperatures inside rooftop conduits at various heights above the roof, and the maximum temperature recorded for that locale. (16 pp) **1 free (add'l \$0.25 ea)**

Do You Need An Electrician?

A6059 A questionnaire encouraging consumers to self-inspect their homes for telltale signs of electrical problems. Contains ten questions with explanations. Also contains a list of questions to ask an electrician or electrical contractor in order to assess their qualifications. *Available free to installers in bulk quantities by calling 212-251-7200.* **1 free (add'l \$0.25 ea)**

Energy Efficiency

Ampacities and Mechanical Properties of Rectangular Copper Busbar

(See PROPERTIES/STANDARDS, p 7)

Copper Busbar Design Guide

(See PROPERTIES/STANDARDS, p 8)


Driving America to Energy Independence 30 MPG Wind = 100 MPG

A6120 Austin Energy had an unusual idea: convert and store nighttime wind energy to daytime gasoline. This article explores the concept behind Plug-in Partners, and how Austin Energy is approaching the idea of utilizing Texas' abundant wind energy.


High-Efficiency Copper-Wound Transformers Save Energy and Dollars

A6007 Examines the economics of dry-type transformers. Stresses importance of life-cycle costs. Charts rapid payback and annual energy savings that can be achieved using high-efficiency transformers. (2 pp) **1 free (add'l \$0.25 ea)**


MotorMaster+

 Downloadable software analyzes and compares initial and life-cycle costs and features of actual motors (1 to 600 hp) sold in the USA and catalogued by the U.S. Department of Energy. Enables energy-efficient motor purchase choices, modeling of motor inventories and helps with rewind vs. purchase decisions. Includes nameplate data for thousands of non-residential motors. Can be downloaded from http://www1.eere.energy.gov/industry/bestpractices/software_motor-master.html


MotorSlide Calculator

A6066  Slide rule that quickly calculates the annual operating cost of a given motor or calculates the operating savings of a high-efficiency motor versus one of lower efficiency. Input parameters are expected hours of use and cost of electricity. **1 free (add'l \$2.00 ea)**


One Wire Size Up Means Big Savings

A6008  Illustrates how installing wire one size larger than required by the National Electrical Code can lower electrical energy costs and yield quick paybacks while increasing the flexibility of the installation. (2 pp) **1 free (add'l \$0.25 ea)**


Bowling Pin Manufacturer Fights Rising Energy Costs With Premium-Efficiency Motors

A6129  QubicaAMF strikes just the right score with NEMA Premium® motors. Located in a high energy cost region, this famous bowling pin manufacturer found high efficiency motors were part of their energy solution.

High Efficiency Motors & Transformers


A6121  Explains how premium motors and transformers are made, how they differ from standard-efficiency products, and details their advantages, particularly in heavy-duty-cycle use. Includes information on the latest DOE rules and Energy legislation. Also contains numerous video clips and text material on both technical and life-cycle-cost issues. (CD-ROM) (PC only) **1 free (add'l \$2.00 ea)**

A Systems Approach to Calculating Energy Savings


A6003  Provides sample calculations to determine energy savings in each component of one complete motor circuit comprised of a transformer, wiring and a motor. Shows the contributions of each and demonstrates how changing one element of the system synergistically decreases the energy losses in the other elements. (6 pp) **1 free (add'l \$0.25 ea)**

Case Studies on Energy Efficiency:

Copper-Rotor Motors + Variable Frequency Drives Maximize Savings at a Brass Mill


A1356  This summary describes the results of a copper-rotor motor evaluation program undertaken by the New York State Energy Research and Development Authority (NYSERDA) at the Rome, New York, brass mill of Revere Copper Products, Inc.

Copper-Rotor Motors + Variable Frequency Drives Maximize Savings at Water Treatment Plant


A1357  This summary describes the results of a copper-rotor motor evaluation program undertaken by the New York State Energy Research and Development Authority (NYSERDA) at the Albany County Sewage

District's (ASCD) North Plant in Menands, New York.


Mineral Producer Installing 150 Copper-Rotor Motors Rising Energy Costs Drive Upgrades, Rapid Payback Expected

A6118  This New York State mining concern decided to fight increasing utility charges by going beyond premium motor efficiency, long before the law required the change. 150 new cast copper rotor motors are being installed in place of both NEMA Premium and EPAct-efficiency motors. Read the whole story here. (4 pp.) **1 free (add'l \$0.25 ea)**


Shaw Industries Demands NEMA Premium® Efficiency Motors for Savings, Reliability

A6106  A subsidiary of Berkshire Hathaway Inc., the world's largest manufacturer of tufted broadloom carpet reduces their company's energy costs by having a corporate policy that mandates NEMA Premium® Efficiency Motors. (6 pp.) **1 free (add'l \$0.25 ea)**


Bryant University Saves Energy, Cuts Costs With All-Copper Systems

A6105  This Rhode Island institution saves energy and dollars with NEMA Premium® motors and efficient all-copper transformers. NEMA Premium or better efficiency has become standard on campus. Reliability is enhanced as a fringe benefit. (6 pp.) **1 free (add'l \$0.25 ea)**


Transformer Manufacturer Uses Only Copper

A6100  Copper is a very small part of the initial cost of a transformer. Pennsylvania Transformer Technologies points to the smaller size per kVA, allowing less lamination steel (meaning less no-load losses), less insulation, less oil, smaller heat exchangers, etc. Combined with high reliability demanded by their customers, copper is a better choice for winding material that provides OEM's with easier assembly and better manufacturability, and their customers with lower life cycle cost. (4 pp.) **1 free (add'l \$0.25 ea)**

Copper and Wind Energy: Partners For a Clean Environment

A6101  Wind energy is growing at a very fast pace due to increased interest in renewable resources as the cost of fossil fuels rises, and copper plays a vital role in making that happen. Austin Energy is one utility that is taking dramatic steps to ensure that wind, and other renewables, are a big part of their energy mix. (4 pp.) **1 free (add'l \$0.25 ea)**

Kodak Focuses on NEMA Premium™ Motors


A6092  Kodak is a name associated with quality photographic products. But they are also environmentally conscious and energy-aware. The key element of Kodak's energy-saving efforts is a company-wide *Total Motor Program*. Its guidelines are straightforward: reduce energy use through the installation, wherever possible, of NEMA Premium efficiency motors. That policy has already saved Kodak over \$250,000 per year in energy costs.

Cool Idea! Motor Upgrades Help Cut HVAC Energy Costs at Emory University


A6097  A combination of a sound motor replace/repair policy along with a sophisti-

cated monitoring system have contributed to large operating savings at this prestigious university. Working closely with their motor service shop, Emory installs NEMA Premium motors whenever possible, while adhering to EASA guidelines for repairs. (6 pp.) **1 free (add'l \$0.25 ea)**


Skating Arena Cuts Energy Costs With Premium-Efficiency Motors

A6090  Even with only a 28% duty cycle, Martha's Vineyard Arena saved thousands of dollars per year by replacing older, standard-efficiency motors with NEMA Premium electric motors. Even though they were still operable, two older but relatively trouble-free compressor motors were replaced with new, higher efficiency NEMA Premium units, and the savings paid for the replacement in a few months. (4 pp.) **1 free (add'l \$0.25 ea)**


Brass Mill Cuts Costs with NEMA Premium® Motors

A6089  At one of the nation's largest brass mill, if a 50-hp (or smaller) motor fails, it's replaced with NEMA Premium. If it's larger and the cost of a repair or rewind is 50% or more of a replacement, a new motor is purchased. That policy is ensuring 18-month, or less, payback for Outokumpu Copper Products. See how this motor plan, along with copper-wound transformers, can help your company.


Cummins Engine Company Saves \$200,000/Year with Premium Efficiency Motors

A6046  Explains how Cummins was able to win the U.S. Department of Energy's Captain's Command Award in 1999 for energy efficiency while saving \$200,000 — savings that wouldn't have been possible without the proper use of copper.

Energy-Efficient Transformer Yields 156% ROI


A6030  By applying life-cycle cost analysis, Herman Miller, Inc. achieved a seven-month payback period on the incremental cost of purchasing the most efficient transformer for their facility. Their Green Building/Facility Design Group uses lowest-total-owning cost analysis to reduce energy costs throughout the company. The practice can help your company also. (4 pp) **1 free (add'l \$0.25 ea)**

Weyerhaeuser Policy Calls for Premium-Efficiency Motors and Transformers

A6080  If you're going "green," do it right. In 1995, Weyerhaeuser established a company-wide policy to reduce energy consumption and costs and to minimize the impact of its huge power requirement on the environment. Replacement of 2,800 motors per year and another 525 upgrades per year to the best motors available actually reduces their total cost of ownership and increases the reliability and service life of their equipment. (6 pp) **1 free (add'l \$0.25 ea)**

Power Quality

Are You Ready for the Electrical Needs of Today and Tomorrow?

A6006  Offers a quick primer on the symptoms of power quality problems (most originate within the building). Lists recommended solutions for commercial, industrial and institutional facilities. (4 pp) **1 free (add'l \$0.25 ea)**

Fundamentals of Power Harmonics Video

A6004 [] [] Discusses the sources of harmonics, interpretation of harmonic signatures, how to perform a site survey, and steps to mitigate power quality problems. Produced in cooperation with the Fluke Corporation. (26:00) (NTSC) \$10.00

The Importance of Power Quality to the Future Use of Copper Building Wire

A6021 [] This paper, presented at *Wire & Cable Focus '97*, discusses the usage intensity of copper building wire. Importantly, it identifies solutions to specific problems associated with poor power quality that dictate greater copper consumption in the years ahead. 1 free (add'l \$0.25 ea)

Power Quality – CD-ROM

A6027 [] Videos, articles and diagrams leading to an understanding of important power quality issues, including adequate wiring, exterior and interior grounding, harmonics, lightning protection and power conditioning. Suggests techniques to alleviate power quality problems with computers and other sensitive electronic equipment. (version 2.0) 1 free (add'l \$2.00 ea)

Power Quality Issues and Recommendations and An Abbreviated Bibliography of Power Quality Information Sources

A6016 [] [] Lists 13 recommended practices and procedures to help ensure power quality in all kinds of buildings. Also includes a list of nine of the most useful and widely available publications on power quality issues. (2 pp) 1 free (add'l \$0.25 ea)

A Primer on Power Quality

A6018 [] [] Provides electricians, engineers, designers and facility managers with a thorough "grounding" in what power quality is. Identifies the problems associated with poor power quality in today's commercial/industrial environments and recommends wiring and grounding techniques and practices that should be part of the design of new or renovated structures. (8 pp) 1 free (add'l \$0.25 ea)

Case Studies on Power Quality:

Reliable Grounding Saves Years of Seed Development, Protects Equipment, Stops High-Cost Losses

A6127 [] The world's largest independently owned agricultural seed producer had a serious problem. For lack of a simple thing like adequate grounding, the Harris Moran Seed Company faced the loss of several years of research and development and a threat to its competitive position.

Old Walmart + Electrical Upgrade = New 9-1-1 Center

A6128 [] The key component of any sheriff's department is its communication center, including the all-important 9-1-1 hub and dispatch room. Sumter County's problem was that its new 9-1-1 center is located smack in the heart of the most lightning-prone region in the entire country, Florida's notorious "lightning alley", yet the building's electrical and grounding systems were built for a 1970s-vintage department store!

Copper Checks In @ Internet Hotel

A6093 [] [] Downtown Phoenix Technology Exchange provides an example of a technology-filled building that has proper wiring and

grounding essential for reliable operation of sensitive equipment. By exceeding the requirements of electrical codes and following recommended practices, this 380,000 square foot building provides their tenants with a facility that meets or exceeds demanding reliability expectations. (6 pp.) 1 free (add'l \$0.25 ea)

Copper Corrects Power Quality Problems in Columbus, Ohio, High-Rise Office Tower

A6095 [] [] False economies in original construction, including aluminum feeders, led to numerous, hard to solve power quality problems for this otherwise-modern high-rise office building. Among the changes were a switch to copper feeders, which solved power quality problems and provided for additional capacity. (4 pp.) 1 free (add'l \$0.25 ea)

Power Quality Gets Top Grades at Business-Oriented University

A6112 [] [] Copper conductors, attention to harmonics, limiting outlets per circuit and separation of sensitive loads are among the steps Bryant University takes to ensure reliability of service and equipment. This case history describes in detail the "beyond code" design considerations for quality power at this computer-intensive university. (4 pp) 1 free (add'l \$0.25 ea)

All-Copper Electrical and Grounding Systems Ensure Reliability at First Data Teleservices

A6031 [] [] How growing business volume led to a decision to upgrade the center's electrical systems with high-quality copper grounding for added reliability, lightning protection and improved power quality. Points out the value of thinking "beyond the Code." (6 pp) 1 free (add'l \$0.25 ea)

All-Copper Grounding Network Ensures Reliability at Satellite Communications Station

A6069 [] [] Only a robust, low-resistance copper grounding system is sufficient to protect the largest array of satellite communications antennas in the Western Hemisphere. (6 pp) 1 free (add'l \$0.25 ea)

All-Copper Grounding Systems End Million Dollar Losses at Emergency Response System

A6088 [] [] Florida's "Lightning Alley" wreaked havoc on Orange County's critical 911 operations for more than 10 years. See the details of a new, system-wide replacement and upgrade of the system's grounding and lightning protection. It's enabling trouble-free, reliable service that saves lives and saves substantial tax dollars, too. (6 pp) 1 free (add'l \$0.25 ea)

Copper-Based Grounding System Ends Lightning Damage at Florida Resort

A6054 [] [] Following major damage from lightning at a Florida resort, the investment of \$3,500 in a copper grounding system upgrade is now successfully protecting \$1.5 million in electronic equipment. (6 pp) 1 free (add'l \$0.25 ea)

Copper Grounding System Protects Mt. Washington Towers

A6024 [] Mitigating lightning strikes and other static discharges was necessary to protect millions of dollars in electronic equipment for this broadcasting opera-

tion. A new, robust grounding system was installed at a cost far less than for the repair of annual equipment damages. The system has performed flawlessly for more than five years. (4 pp)

Florida Credit Union Data Center Shrugs Off Direct Lightning Hit

A6071 [] [] Shows the degree of protection afforded a major Florida bank by a solid-copper grounding system and multiple levels of surge protection, even when subjected to a direct lightning strike. (6 pp) 1 free (add'l \$0.25 ea)

Florida 911 Center Upgrades Lightning Protection System for Maximum Safety

A6053 [] [] Located in "lightning alley" in Central Florida, this emergency communications center and its adjoining tower were extensively retrofitted to provide sufficient protection for lightning and other power surges. (6 pp) 1 free (add'l \$0.25 ea)

New Grounding System Ends Lightning-Caused Outages at 100-kW FM Station

A6082 [] [] Lightning strikes in "Tornado Alley" regularly took this Nebraska radio station off the air and severely damaged transmitter and HVAC equipment, until they installed a total grounding system upgrade. The simple low-cost system is described in detail. The results have been 24/7 reliability and no equipment damage, despite even a powerful strike that burned through a ground strap at the top of the antenna tower. (6 pp) 1 free (add'l \$0.25 ea)

Networked Machine Shop/Manufacturing Plant Learns the Value of Grounding

A6044 [] [] Shows how proper grounding helped one company overcome years of bad advice to realize the full value of its networked CNC-CAD/CAM systems. Points out how grounding can tame network signal noise and its associated problems. (6 pp) 1 free (add'l \$0.25 ea)

New Rules and Copper Conductors Help Upgrade a 20-Year-Old Electrical System

A6023 [] [] Power quality problems are widespread and growing worse as new businesses occupy older commercial buildings. This case study shows how one data-processing firm overcame a host of typical, disruptive problems and revamped their power distribution system to ensure reliability and productivity. (4 pp) 1 free (add'l \$0.25 ea)

Proper Copper Grounding System Stops Lightning Damage at Nebraska FM Station

A6032 [] [] Reveals how safety, power quality and communications improve with low-resistance copper grounding. Identifies often-overlooked target areas of concern and corrects some misunderstood concepts. (6 pp) 1 free (add'l \$0.25 ea)

Two Miles of Copper Grounding Saves Big Money, Improves Safety on New Mexico Ski Lift

A6081 [] [] Power quality issues aren't confined to computers and sensitive electronics. Big, sprawling motor-driven operations like this ski lift are heavily impacted, too. Read how installing transient voltage protection and one of North America's most extensive copper-based grounding systems restored dependable operation and profits at this rugged business environment. (6 pp) 1 free (add'l \$0.25 ea)

Allegheny Power Insists on Copper for Substation Transformers

A6110 [I] Utility transformers are big and expensive, and reliable service to customers is a paramount consideration. That's why copper windings are so important, and a relatively insignificant cost factor in the overall buying decision. This story discusses Allegheny's reasoning, and why they always specify copper. (4 pp) **1 free (add'l \$0.25 ea)**

Copper Protects MIT Computer Center

A6111 [I] This world-famous university takes quality power seriously, and makes robust electrical design one of their priorities when constructing new facilities. This case history describes one such building on campus, the eye-catching Stata Center, and the "above minimum" design elements used to ensure power reliability and long term capacity. (4 pp) **1 free (add'l \$0.25 ea)**

Telecommunications

Communications Wiring for Today's Homes

A6019 [I] (Contractor Edition)

A6020 [I] (Homebuilder Edition)

A6057 [I] (Remodeler Edition)

A guide for electrical contractors, homebuilders and remodelers to help get a handle on low-cost, high-tech unshielded cabling comprised of four twisted pairs of copper wires. Briefly describes desirable home wiring schemes using Category 5 (or better) and RG-6 coaxial cable for phone, data and video communications.

(4 pp) **1 free (add'l \$0.25 ea)**

Is Your Home Wired for the 21st Century?

A6068 [I] A questionnaire encouraging consumers to self-inspect their homes to determine their need for adequate communications wiring for the Internet age. Contains ten questions with explanations. Also contains a list of questions to ask an installer in order to assess their qualifications. *Available free to installers in bulk quantities by calling 212-251-7200.* **1 free (add'l \$0.25 ea)**

Infrastructure Wiring Video Series

(2 tapes) **\$15.00**

A6051 and **A6055** [I]

Infrastructure Wiring for New Homes

A6051 [I] A resource for people involved in the specification, design, selection and installation of new residential low-voltage wiring systems. (97 min.) **\$10.00 ea.**

Infrastructure Wiring for Existing Homes

A6055 [I] A resource for people involved in the specification, design, selection and retrofit installation of residential low-voltage wiring systems. (121 min.) **\$10.00 ea.**

Networking Your Home

A6083 [I] Retrofitting an existing home can boost your enjoyment and productivity while enhancing your home's value. This article describes all the basics and identifies the tools and the components needed for a proper wiring installation. Offers a checklist for DIYers or for working with a contractor, as well as sources for additional information. Reprint. *Handy Magazine*, Sept./Oct. 2002. (6 pp) **1 free (add'l \$0.25 ea)**

Structured Wiring For Today's Homes (Homebuilder Edition)

A6073 [I] Answers questions builders have about why they should incorporate structured wiring systems in today's new homes, and what is involved. Video clips feature builders, homeowners, realtors, installers and others, followed by answers to frequently asked questions and other sources of information. (CD-ROM) (PC only) **1 free (add'l \$2.00 ea)**

Structured Wiring For Today's Homes (Installer Edition)

A6074 [I] Answers questions installers and potential installers have about why residential structured wiring is a good business to be in. Video clips feature installers, homeowners, builders and others, followed by answers to frequently asked questions and other sources of information. (CD-ROM) (PC only) **1 free (add'l \$2.00 ea)**

Structured Wiring For Today's Homes (Remodeler Edition)

A6075 [I] Answers questions remodelers have about why they should add structured wiring to their portfolios and what is involved. Video clips feature remodelers, homeowners, realtors, installers and others, followed by answers to frequently asked questions and other sources of information. (CD-ROM) (PC only) **1 free (add'l \$2.00 ea)**

Structured Wiring for Today's Homes (Homeowner Edition)

A6076 [I] Answers questions homeowners and homebuyers have about why they need structured wiring systems in their homes and what is involved. Video clips feature John Ratzenberger, homeowners, realtors, installers and others, followed by answers to frequently asked questions and other sources of information. (CD-ROM) (PC only) **1 free (add'l \$2.00 ea)**

Telecommunications Issues for Copper Wire and Cable

A6026 [I] This paper, presented at *Wire & Cable Focus '98*, examines trends in copper usage and its increasing role for inside wiring applications. Discusses the prospect for xDSL technologies, what's happening in commercial premises wiring, and the existing activity in residential communications wiring. (7 pp) **1 free (add'l \$0.25 ea)**

Wiring the Residence—A Significant New Market for the Information Age

A6061 [I] Presented at *Wire & Cable Focus '00*, this paper examines the fastest growing future market for copper communications wire and cable: residential structured wiring. In particular, the retrofit market is featured. Also covers benefits to upgrading from AWG 14 to AWG 12 in residential building wire.

INDUSTRIAL

General

Benzotriazole: An effective corrosion inhibitor for copper alloys

A1349 [I] Benzotriazole has proven to be very effective at preventing surface corrosion and tarnishing of copper and copper alloys. This publication describes its effectiveness and uses.

Clear Organic Finishes for Copper and Copper Alloys

A1350 [I] On some occasions, builders, archi-

ects and building owners want to preserve the color and appearance of a copper alloy rather than letting it naturally patinate. This publication describes clear coatings available for this purpose, their uses and any limitations.

Electronic Connectors Alloy Design Guide

A7030 [I] Presented at *Wire & Cable Focus '00*, this paper examines the fastest growing future market for copper communications wire and cable: residential structured wiring. In particular, the retrofit market is featured. Also covers benefits to upgrading from AWG 14 to AWG 12 in residential building wire.

Metallurgy of Copper-Base Alloys (See PROPERTIES/STANDARDS, p. 8)

Multibarrier Copper-Base Containers for High-Level Waste Disposal

7024 [I] Several design and closure techniques are suggested for a robust, composite waste container composed of a copper overpack surrounding an inner shell of high-strength aluminum bronze. The thermodynamic and kinetic stability of the metals is discussed including their corrosion- and creep-related properties in anticipated repository environments. Reprint, *ANS Nuclear Technology*, Vol. 104, November 1993. (16 pp) **1 free (add'l \$1.00 ea)**

Process Industries Corrosion: Copper and Copper-Base Alloys

1095 [I] Describes properties of copper metals used in corrosive industrial processes, common forms of corrosion to be resisted, and performance in fifteen specific corrosive environments. Reprint, *NACE Handbook on Process Industries Corrosion—The Theory and Practice*. (23 pp) **\$5.00**

Selecting Coppers and Copper Alloys

A7022 [I] A quick aid to designers and engineers for selecting the proper wrought and cast copper alloys for product applications. Discusses pertinent material characteristics of all alloy families and provides physical and mechanical properties for representative alloys. Reprint, *Advanced Materials & Processes*, February 1994. (16 pp) **1 free (add'l \$1.00 ea)**

Bronze Bearings

Cast Bronze Bearing Design Manual

7083 [I] Design and lubrication of 360-degree bearings. Originally published by the Cast Bronze Bearing Institute, Inc. (72 pp) **\$5.00**

Cast Copper Alloy Sleeve Bearings Selection Guide

A1063 [I] Describes the principles of lubricated bronze journal bearing design. Discusses the many alloys successfully being used and their applications. The text enable users to choose the optimum bearing material and dimensions for a designated service condition. (72 pp)

Wear Properties of Heavily Loaded Copper-Base Bearing Alloys

7014 [I] Discusses the microstructure, bearing properties and wear mechanisms of four copper-base bearing alloys. Includes phase diagrams and photomicrographs. Reprint, *Journal of Metals*, October 1983. (6 pgs.)

Selecting Bronze Bearing Materials

702/6A [I] Abbreviated presentation of basic design principles for sleeve bearings comparing properties of five families of the 17 most used standard bearing bronzes. (6 pp) **1 free (add'l \$1.00 ea)**

Cast Products

International Workshop on Permanent Mold Casting of Copper-Base Alloys

A7016 [] [] Focusing on such issues as gravity permanent-mold casting, high pressure die casting, low-lead and lead-free alloys for plumbing applications, the 1998 workshop was intended for foundrymen, ingot makers, equipment manufacturers, suppliers, design engineers and researchers. (184 pgs.) \$5.00

Copper Alloys for Permanent Mold Casting

A7014 [] [] Describes the permanent mold casting process and the copper alloys to which it is most advantageously applied. Mechanical and physical properties, compositions and comparative tables accompany an in-depth discussion on the selection, design principles and use of 26 alloys. (20 pp) \$5.00

Copper Castings Alloys

7014 [] [] Comprehensive guide to selecting copper casting alloys. Includes complete physical and mechanical properties along with detailed information for those who select, specify and buy materials. Describes and illustrates the many casting processes. (112 pp) \$5.00

Non-Leaded Red Brass and Yellow Brass Casting Alloys

A1032 [] [] Discusses two new red brasses (C89510 and C89520) and one new yellow brass (89550). The machinability ratings and casting characteristics of these bismuth and selenium modified brasses are presented. Specifying these non-leaded EnviroBrass (SeBiLOY) alloys facilitates meeting NSF Standard 61 which relates to the 1996 amendment to the EPA's Safe Drinking Water Act (SDWA). (4 pp) 1 free (add'l \$1.00 ea)

Understanding Copper-Base Alloys

A7021 [] [] Discusses the range of choices for designers to achieve corrosion-resistance, high conductivity and mechanical properties as well as ease of secondary processing through the use of different copper alloys. Reprint, *Engineered Casting Solutions*, Summer 2000 (4 pp.) 1 free (add'l \$1.00 ea)

Machined Rod Products

Comparative Machinability of Brasses, Steels and Aluminum Alloys

A7009 [] [] Describes the development of CDA's Universal Machinability Index and how it can be applied, using a nomograph, in the value analysis of screw machine products and parts. Includes case histories from commercial practice. Reprint, *SAE Technical Paper 900365*, 1990. (10 pp) 1 free (add'l \$1.00 ea)

Copper and Copper Alloys—Innovative Rod and Bar Applications

108/0 [] [] Describes major applications and specifications for copper rod and bar, with emphasis on machining properties and how they compare with competitive steel and aluminum. Reprint, *ASTM Standardization News*, March 1990. (6 pp) 1 free (add'l \$1.00 ea)

Copper Rod Alloys for Machined Products—Handbook

A7017 [] [] (CD-ROM, PC format only) \$5.00
A7005 [] [] An alloy selection guide for copper and copper alloy rod, bar and shapes used for machined parts. The handbook is organized to help the designer, engineer or purchas-

ing manager specify the proper alloy for the intended application. Presents data on all copper rod metals, but emphasis is on free-cutting brass, including part cost comparisons of brass vs. steel, which demonstrate how material cost, machining cost, design and scrap value influence the total cost of machined parts. (128 pp) \$10.00

Corrosion Tests Prove Free-Cutting Brass Outlasts Plated Steel

A1007 [] [] Detailed results of rigorous salt-spray (fog) testing under ASTM B 117 and ASTM G 44 show C36000 brass parts significantly outperform E-coated and zinc-chromate-coated 12L14 steel parts. (6 pp) 1 free (add'l \$1.00 ea)

Custom Brass Extrusions Improve Quality, Reduce Costs

A7003 [] [] Shows how to save money and reduce components, operations and inspections related to the manufacture of single parts by using a one-step custom brass extrusion. (1 pp) 1 free (add'l \$1.00 ea)

Forging Alloys for High Quality, Cost-Competitive Products

A7004 [] [] Details why copper alloy forgings are ideal for safety-related products, pressure-retaining valves and fittings, and precision components based upon their inherent strength, toughness, dimensional control, smooth surfaces, high thermal and electrical conductivity and corrosion resistance. (8 pp) 1 free (add'l \$1.00 ea)

Free-Cutting Brass (Alloy 360) for Automatic Screw Machine Products

A7002 [] [] Details physical attributes and economic benefits of C36000. Discusses strength, machinability, recyclability of brass turnings and design flexibility. (4 pp) 1 free (add'l \$1.00 ea)

Free-Cutting Brass (Alloy 360) Promotes Design Flexibility, Reduces Costs

A7001 [] [] Shows how hose fittings take advantage of C36000's machinability, strength, corrosion resistance and lower cost. 1 free (add'l \$1.00 ea)

Free-Cutting Brass for Lower Screw Machine Product Cost (6)

Case histories of screw machine products which have been converted from leaded free-machining steel to free-cutting brass, Copper Alloy No. C36000. Design details, cycle times, productivity gains and cost savings (bare and plated) are presented:

- HVAC Heating Element Housing
A7027 [] [] (1 p) 1 free (add'l \$1.00 ea)
- Hydraulic Fitting
A7026 [] [] (1 p) 1 free (add'l \$1.00 ea)
- Molded Plastic
A7025 [] [] (1 p) 1 free (add'l \$1.00 ea)
- Temperature Sensor
A7024 [] [] (1 p) 1 free (add'l \$1.00 ea)
- Actuating Sleeve
A7019 [] [] (1 p) 1 free (add'l \$1.00 ea)
- Air-Brake Hose Fitting
A7011 [] [] (1 p) 1 free (add'l \$1.00 ea)
- Cellular Antenna
A7012 [] [] (1 p) 1 free (add'l \$1.00 ea)
- Fitting Body
702/9A [] [] (1 p) 1 free (add'l \$1.00 ea)
- Knob Insert
703/9 [] [] (1 p) 1 free (add'l \$1.00 ea)
- Pneumatic Hose Fitting
A7013 [] [] (1 p) 1 free (add'l \$1.00 ea)

A Note on the Dezincification of Brass and the Inhibiting Effect of Elemental Additions

7013 [] [] Lists and reviews the technical literature on the effects of alloying additives on the dezincification of brasses. (9 pp) 1 free (add'l \$1.00 ea)

Low Lead Copper Rod Alloys

A7031 [] [] This publication describes copper rod alloys with lead content less than 0.25%. Although this selection guide is primarily used for plumbing applications these alloys are extremely useful in any applications that require very low lead content. (8 pp) 1 free (add'l \$1.00 ea)

Mold Alloys

Copper Alloy Molds—The Plastic Industry's Best Kept Secret

A7006 [] [] Explains how copper alloys outperform other metals used for molds by providing the best combination of high thermal conductivity and hardness used in the plastic industry today—resulting in reduced cycle times and higher quality parts. (4 pp) 1 free (add'l \$1.00 ea)

Mold Design Guidelines

A7023 [] [] In a nine-part series, Dr. Paul Engelmann and Bob Dealey discuss the latest technology and various techniques and strategies for maximizing performance in injection mold design using copper alloys. Reprint, *Modern Mold & Tooling*. (40 pp) 1 free (add'l \$1.00 ea)

Whirlpool Uses Copper Alloy Mold for Dishwasher Console Part

A7008 [] [] Shows how the excellent thermal conductivity of copper alloys used for injection mold tools reduces cycle times and improves part quality. Details how Whirlpool controlled warpage of deep ridges and improved the straightness and flatness on the exterior of a front control bezel. (2 pp) 1 free (add'l \$1.00 ea)

SEAWATER

The Application of Copper-Nickel Alloys in Marine Systems

7044 [] [] A book of five papers on copper-nickel alloys for marine service covering: properties, corrosion and fouling resistance; seawater piping systems; condenser and heat exchanger applications; usage in desalting plants and equipment; and sheathing of offshore structures and ship hulls. From a series of seminars presented jointly by CDA and the Nickel Development Institute. (82 pp) \$5.00

Brazed Copper-Nickel Piping Systems

701/5 [] [] Describes, with 10 photographs, 5 drawings and 5 tables, how to braze copper-nickel piping systems, especially for seawater distribution systems where copper-nickel's resistance to biofouling and seawater corrosion is needed. (6 pp) 1 free (add'l \$1.00 ea)

Copper-Nickel Fabrication

A7020 [] [] Thoroughly reviews the material properties, welding, brazing, fabrication and handling of 90-10 and 70-30 copper-nickels and their applications for pipe systems, condenser service, heat exchangers, boat hulls, sheathing and other structures engineered for marine use. (28 pp) \$5.00

Copper-Nickel Piping for Offshore Platforms

708/5 [] [] C70600 (90-10 Cu-Ni) piping is ideal for offshore platforms on the basis of cost effectiveness, corrosion and biofouling resistance. Includes engineering considerations for installation and fabrication. (6 pp) **1 free (add'l \$1.00 ea)**

Copper-Nickel Piping Reduces Costs, Biofouling, Corrosion

704/4 [] Results of a prototype test installation in the Gulf of Mexico show that, although initial costs may sometimes be higher, the life-cycle cost of copper-nickel piping is less and productivity is improved. Reprint, *World Oil*, November 1984. (3 pp) **1 free (add'l \$1.00 ea)**

Copper-Nickel Sheathing Improving Jacket Performance

706/5 [] Describes several prototype applications of 90-10 copper-nickel alloy sheathing of offshore structural members. Includes cost comparisons and design considerations. Reprint, *Offshore*, November 1985. (3 pp) **1 free (add'l \$1.00 ea)**

Design Guide: Copper Alloy Mesh in Marine Aquaculture

704/5 [] Describes prototype fish cages and other aquatic hardware made with copper alloy mesh which resists corrosion and biofouling. Summarizes design data for such installations. (87 pp) **\$5.00**

Guidelines for the Use of Copper Alloys in Seawater

A7032 [] [] A thorough presentation of the relative properties and advantages of 18 different copper alloys (including copper itself) in seawater applications. Presents service and laboratory data on resistance to corrosion and biofouling under various environmental conditions. Reprint, *Materials Performance*, September 1987. (11 pp) **1 free (add'l \$1.00 ea)**

Metallic Coatings for Corrosion Control of Marine Structures

A1213 [] Reviews properties of copper-nickel alloys including corrosion behavior and biofouling resistance as affected by composition, water velocity, exposure conditions and methods of attachment to steel. Describes the results of long-term trials of Cu-Ni alloys applied to pilings and ship hulls. Cost benefits are analyzed. (28 pp) **1 free (add'l \$1.00 ea)**

SOLDERING/BRAZING/WELDING

Brazing Procedure Specifications, Procedure Qualification Records and Brazing Performance Qualification Records

A4014 [] Specifications and record-keeping forms as required by NFPA 99, *Standard for Health Care Facilities*; Section IX, *ASME Boiler & Pressure Vessel Code, Welding & Brazing Qualifications*; and ANSI/AWS B2.2 *Standard for Brazing Procedure & Performance Qualifications*. (43 pp)

Tips for Soldering and Brazing Copper Tubing

A4065 [] While soldering and brazing of copper tube and fittings are relatively simple operations, to achieve good joints, care must be taken to follow appropriate installation

practices. This reprinted article from the American Welding Society's *Welding Journal*, August 2002 outlines key elements on deciding which joining process to use as well as detailed explanation of how to use these processes in making joints between copper and copper alloy tube and fittings.

Making Stress-Free Solder Joints for High-Stress Performance

A4068 [] [] Updates the profession on the materials and methods for making soldered joints. Reviews latest solder and flux products, as well as new pressure ratings and the soldering standards that affect performance. Discusses how to evaluate solder joints, recognize flaws that may jeopardize their integrity, and how to preclude potential problems. Reprint, *Reeves Journal*, September 2004. (4 pgs.) **1 free (add'l \$1.00 ea)**

Process Improvements in Soldering Automotive Radiators

(See AUTOMOTIVE, p. 1)

A Quality Joint

A4057 [] [] How do you define a properly soldered joint? This article explains how the CDA Soldering Procedure Specification (A1298) was developed, why it was developed and why it's such an important tool for the plumbing industry in its efforts to ensure the highest possible standards for quality soldered joints. Reprint, *Reeves Journal*, February 2002. (4 pp) **1 free (add'l \$0.25 ea)**

Soldering and Brazing Copper Tube

A4044 [] Illustrates the proper techniques for soldering and brazing copper plumbing systems. Produced in conjunction with The National Association of Plumbing-Heating-Cooling Contractors. (DVD)(18:00) **\$25.00**

Soldering and Brazing Copper Tube and Fittings

A1143 [] [] Illustrated step-by-step guide details how to join copper tube and fittings using proper soldering and brazing techniques. Includes pressure-temperature ratings, compositions and classifications of filler metals, solder requirements for solder joint pressure fittings and description of fluxes. (8 pp) **1 free (add'l \$0.25 ea)**

Soldadura & Soldadura Reforzada para Tubo de Cobre y Enlaces

A1143S [] [] Guía ilustrada y detallada paso a paso de como unir tubos de cobre con enlaces usando metodos técnicos de soldadura y soldadura reforzada. Incluye un índice de presiones y temperaturas, clasificaciones y composiciones de metales para relleno, requisitos de soldadura para enlaces de presión y descripciones de fundentes. (8 pag.) **1 gratis (adicionales \$0.25 cada una)**

Soldering Procedure Specifications, Procedure Qualification Records, and Solderer Performance Qualification Records

A1298 [] [] Provides a standardized procedure for the testing and qualification of solderers. CDA has utilized existing accepted trade practices and standards to create an effective qualification standards and information guide that can be used by local unions training centers or contractors to create their own certification programs. This will help ensure that the highest standards of soldering are met on a consistent basis nationwide. (28 pp) **1 free (add'l \$1.00 ea)**

Welding Copper and Copper Alloys

A1050 [] Shows how to weld, braze and solder copper and copper alloys. Recommends the appropriate process for particular applications. Describes the major classes of copper alloys and their metallurgy. Explains how alloying elements affect joining characteristics. American Welding Society (AWS) *Welding Handbook*, Volume 3, 8th Edition, *Materials and Applications*, Miami: American Welding Society.

PROPERTIES/STANDARDS

The Copper Advantage -- A Guide to Working With Copper and Copper Alloys

A1360 [] [] This booklet gives an in-depth overview of the well-known physical, mechanical and chemical properties of copper, as well as more recent scientific findings that show copper has an intrinsic antimicrobial property. (27 pgs.) **1 free (add'l \$1.00 ea)**

Diamond Anniversary for ASTM Copper Committee

A4070 [] Reprinted, with permission, from *ASTM Standardization News*, Vol. 32, No. 10, Copyright © ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428

60 Years: Copper Standards Development

123/9 [] Describes in an historical context how ASTM standard specifications and procedures relate to copper and copper alloy mill and foundry products and to their production and quality assurance. Reprint, *ASTM Standardization News*, September 1989. (12 pp) **1 free (add'l \$1.00 ea)**

Ampacities and Mechanical Properties of Rectangular Copper Busbar

A6022 [] Ampacity tables, mechanical properties of C11000 bus; quick busbar size selector; effect of emissivity and number of buses.

Comparative Machinability of Brasses, Steels and Aluminum Alloys

(See INDUSTRIAL *Machined Rod Products*, p. 6)

Copper and Copper Alloy Powder Metallurgy -- Properties and Applications

129/6 [] [] Covers production, consolidation, strengthening, copper in iron and steel P/M parts, and non-structural applications. (34 pp) **1 free (add'l \$1.00 ea)**

Copper and Copper Alloy Tube and Pipe

1237 [] Describes how copper tube and pipe are made, commercial specifications and standards and major end uses. Design and installation data are summarized as well as future application trends for tube and pipe. Reprint, *ASTM Standardization News*, September 1987. (6 pp) **1 free (add'l \$1.00 ea)**

Copper Rod Alloys for Machined Products -- Handbook

(See INDUSTRIAL *Machined Rod Products*, p. 6)

CopperSelect

CopperSelect is a family of software and databases designed to help users of copper and its alloys address various engineering, metallurgical and economic issues involving copper.

• **Cast Copper Alloy Sleeve Bearing Material Selection Guide**
(See INDUSTRIAL *Bronze Bearings*, p. 6)

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