STANDARD

Sometimes You Can't Live With Them, But You Sure Can't Live Without Them!

By Allen W. Grobin, Jr.

Standards are a part of the everyday life of the metal finisher. They have been from the very beginning, when they took the form of the tank foreman's closely guarded notes, to today, where they are published, numbered documents.

The Early Years

The beginning—for metal finishing standards—appears to have been with individual companies who found that the plating delivered by the "foreman plater" just did not do the job. Experimentation showed that variations in coating thickness could be attributed to differences in bath chemistry, metal content, temperature and the "secret" additives of the foreman plater.

Consequently, they found it necessary to standardize the process used on their parts. This was especially true if more than one plating tank was involved ... or more than one foreman ... or more than one plating facility. They were, however, company standards and, for the most part, secret, closely guarded documents.

Metal finishing standards at the IBM Corporation, for example, began in 1930. They were numbered consecutively, A through N. Areas covered included both electroplating and painting. The standards specified the chemistry of the plating process that was to be used, as well as the thickness. In the case of paints, the color and thickness was specified to the paint manufacturer. In 1946, these standards were replaced by painting and plating specifications that outlined the end-point requirements and the methods of measuring those requirements.

The first metal finishing standards for an entity of the U.S. government were those written in 1942 for the Ordinance Corps and the rest of the U.S. Army, at the Frankford Arsenal, Philadelphia, PA, under the guidance of Joe Mazia. Joe had developed a zinc plating with chromate conversion coating for steel cartridge cases as a replacement for the usual brass cartridge case, brass being in extremely short supply. In order for the various war contractors to properly apply the zinc plating and conversion coating, Joe wrote and issued the FXS (Frankford Arsenal Tentative) document for this purpose in 1943.

These were followed by JAN (Joint Army-Navy) specifications. After the joining of the military services into the Department of Defense (DoD), it

Forms of ASTM Standards designation

ASTM B633-85 Specification for Electrodeposited Zinc on Iron and Steel

Year of issue or revision Number Subject area Document owner ASTM

Fig. 1a Designation form of ASTM Standards

ASTM B605-95a

Specification for Electrodeposited Coatings of Tin-Nickel

Revision in year of issue Year of issue Number Subject area (A-G) (nonferrous metals) Document owner ASTM

Fig. 1b Designation form of standard revised in year of issue

ASTM B633-85 (1994)

Specification for Electrodeposited Zinc on Iron and Steel

Year of reapproval Year of issue Number Subject area (A-G) (nonferrous metals) Document owner ASTM

Fig. 1c Designation form of reapproved ASTM Standards was decided to issue National Military Establishment (NME) specifications and standards for the DoD. These had a short life and were replaced by MIL standards beginning in 1945, when it was realized that the acronym NME was being pronounced "enemy."

The real effort to produce universal plating standards began in the early 1930s. In my initial "Standards Topics" column in the December 1994 issue of *P&SF*, I reported that your Society was actively promoting member involvement in the preparation and development of standards for metal finishing. This early involvement is documented in "History of

Forms of AWS Standards designation

AWS C2.16-78

Guide for Thermal Spray Operator and Equipment Qualifications

Year of issue Number Series Document owner AWS

Fig. 2a Designation form of AWS document

AWS D14.1-85R91

Cranes Welding of etc.

Year of revision Year of issue Number Series Document owner AWS

Fig. 2b Designation form of revised AWS document

AWS C3.7-93 NOT 1

Aluminum Brazing, Specification for ... Year of revision

Year of issue Number Series Document owner AWS

Fig. 2c Designation form of AWS document with Notice I attached

ASTM Committee B-8," by Dr. William Blum, *Plating and Surface Finishing*, March 1968. According to Dr. Blum, studies on electrodeposited coatings were started about 1927 by the ASTM A-5 Subcommittee on Hardware Specifications. The result of this first corrosion study was very unfavorable to electroplated zinc and cadmium coatings. In light of what we know today, these unfavorable findings were caused by poorly designed and controlled programs, rather than from any basic coating inferiorities.

The results of this study caused an immediate concern within the electroplating industry, particularly

Forms of ISO standards designation

ISO 2080:1981(T)

Electroplating and related processes—Vocabulary

Three or more language versions included Year of issue or revision Number Document owner ISO

Fig. 3a Designation form of multi-language ISO Standards

ISO 2081:1986 Electroplated coatings of zinc on iron or steel

Year of issue or revision Number Document owner ISO

Fig. 3b Designation form of ISO Standards

ISO 4524-5:1986 Test methods for electrodeposited gold and gold alloy coatings—Part 5: Adhesion tests

Year of issue or revision Part 5 of multipart document Number Document owner ISO

Fig. 3c Designation form of multi-part ISO Standards

ISO 2106:1982 Amd 1:1983 Test methods for xxxxxx

Year of issue of amendment Amendment 1 Document owner ISO

Fig. 3d Designation form of amendment to ISO Standards within the AES. As explained by Dr. Blum, the members of the electroplating industry felt that insufficient information and participation was received from the industry to adequately represent the full potential of the electroplating procedures. As a result, an effort was made within the Society to get more knowledgeable members to join and participate in ASTM to correct the deficiency.

A joint ASTM-AES committee was formed to conduct exposure tests of electrodeposited coatings on steel and non-ferrous metals. The committee consisted of representatives of ASTM

Form of SAE Ground Vehicle Standards designation

SAE J207 FEB85 Electroplating of Nickel and Chromium on Metal Parts—Automotive Ornamentation and Hardware

Year of issue, letter following is a revision Number Document owner SAE

Fig. 4 Form of SAE Ground Vehicle Standards

Forms of SAE/AMS Aerospace Standards designation

SAE/AMS 2399

Plating, Nickel-Boron, Electroless (Apr 80)

Year of issue Number AMS Series Document owner SAE

Fig. 5a Designation form of SAE/AMS Standards

SAE/AMS 2402F Plating, Zinc (Jul 78)

Year of issue 7th revision Number AMS Series Document owner SAE

Fig. 5b Designation form of revised SAE/AMS Standards

SAE/AMS 2431/6

Peening Media, Glass Shot (Apr 88) Year of issue Part 6 of multi-part document Number AMS Series Document owner SAE

Fig. 5c Designation form of multi-part SAE/ AMS Standards Committees A-5, B-3, and B-6 and the Research Board of AES. The National Bureau of Standards (known today as the National Institute of Standards and Technology [NIST]) furnished the plating facilities and technical supervision. Manufacturers donated the materials, and ASTM supplied exposure sites.

This was the first corrosion study organized in the mode that is still in use today throughout the world. Although modifications and improvements have been made over the years, these original concepts and procedures for corrosion tests have been retained. The culmination of this study was the publication by ASTM Committee A-5 in 1935 of three new tentative standards—A 164T, A 165T,

Forms of GSA Commercial Item Descriptions designations

A-A-52474 Electrocoating primer

> Document number in serial order Indicates GSA Commercial Item Description

Fig. 6a Designation form of Commercial Item Description

A-A-52474B(1)

Electrocoating primer

Amendment 1 attached 2nd revision Document number in serial order Indicates GSA Commercial Item Description

Fig. 6b Designation form of Revised CID with amendment attached

A-A-52474 NOT 1

Electrocoating primer

Amendment 1 Document number in serial order Indicates GSA Commercial Item Description

Fig. 6c Designation form of CID with Notice 1 attached

A-A-52474 SUP 1

Electrocoating primer

Supplement 1 Document number in serial order Indicates GSA Commercial Item Description

Fig. 6d Designation form of CID with Supplement 1 attached and A 166T. ASTM Standard A 164T-35, Specification for Electrodeposited Coatings of Zinc on Steel; A 165T-35, Specification for Electrodeposited Coatings of Cadmium on Steel; and A 166T-35, Specification for Electrodeposited Nickel and Chromium on Steel. These were the very first industry standards ever published for electroplated coatings, and resulted in immediate improvement and savings for the producer (platers), user (manufacturers) and general interest (academia and the public-at-large) groups.

ASTM A 164T-35, A 165T-35, and A 166T-35 were revised in 1939 and dropped the "T" tentative designation by Committee A-5. The first test method specification for plated coatings, published in 1939 by Committee A-5, was A 219, Method of Test for Local Thickness of Electrodeposited Coatings.

These early standards have been revised many times and are now replaced by newer standards; A 164 has been replaced by B 633, Electrodeposited Coatings of Zinc on Iron and Steel; A 165 has been replaced by B 766, Electrodeposited Coatings of Cadmium; A 166 has been replaced by B 456, Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium; A 219 has been replaced by five new standards—B 487, Test Method for Measurement of Metal and Oxide Coating Thickness by Microscopical Examination of a Cross Section; B 499, Test Method for Measurement of

Forms of GSA Federal Specifications designation

QQ-N-290A

Nickel Plating (Electrodeposited)

1st revision Document number in serial order First letter of first key word Indicates GSA Specification

Fig. 7a Designation form of GSA Federal Specification

QQ-C-320B(4)

Chromium Plating (Electrodeposited)

Amendment 4 attached 2nd revision Document number in serial order First letter of first key word Indicates GSA Specification

Fig. 7b Designation form of GSA Specification with amendment attached Coating Thickness by the Magnetic Method: Nonmagnetic Coatings on Magnetic Basis Metals: B 530, Test Method for Measurement of Coating Thickness by the Magnetic Method: Electrodeposited Nickel Coatings on Magnetic and Nonmagnetic Substrates; B 555, Standard Guide for Measurement of Electrodeposited Metallic Coating Thickness by the Dropping Test; and B 556, Standard Guide for Measurement of Thin Chromium Coatings by the Spot Test.

As a result of these joint efforts, as well as a decided increased interest in standardization of electrodeposited metallic coatings, Committee B-8 on Electrodeposited Metallic Coatings was formed on March 6, 1941, and Committee A-5 transferred A 164, A 165, A 166, and A 219 to the new committee. There were 31 members, most of whom were also members of AES. The records show that the most active of these were Ed Anderson,

Forms of GSA Federal Standards designation

FED-STD-141C

Paint, Varnish, Lacquer and Related Materials Methods of Inspection, Sampling and Testing

3rd revision Document number in serial order Indicates a GSA Federal standard

Fig. 8a Designation form of a revised GSA Federal Standard

FED-STD-141C NOT 2

Paint, Varnish, Lacquer and Related Materials Methods of Inspection, Sampling and Testing

Notice 2 attached 3rd revision Document number in serial order Indicates a GSA Federal standard

Fig. 8b Designation form of a revised GSA Federal Standard

FED-STD-141C()

Paint, Varnish, Lacquer and Related Materials Methods of Inspection, Sampling and Testing

Any amendments would be shown here 3rd revision Document number in serial order Indicates a GSA Federal standard

Fig. 8c Designation form of a revised GSA Federal Standard with an amendment attached

Earl Baker, Don Bigge, William Blum, Frank Carlin, Marc Darrin, Myron Diggin, Kenneth Graham, Carl Heussner, C.L. Hippensteel, George Hogaboom, Burt Knapp, Frank LaQue, Fred Lowenheim, Joe Mazia, Bob McKay, Ed Parker, Walter Pinner, Dick Saltonstall, Clarence Sample, Tom Slattery, Gus Soderberg, "LG" Tubbs, Frank Waite and Dick Wick. The then-president of AES, Thomas F. Slattery, fostered the cooperation of the Society with ASTM. To this day, AESF is the principal source of membership in ASTM Committee B-8.

Finding Your Way

Through the Current "Maze"

Today, in North America, there are seven completely independent and sometimes uncoordinated sources of metal finishing standards. They are.

1. ASTM (American Society for Testing and Materials) with approximately 121 standards covering anodizing, chemically

Forms of DoD Military Specifications designation

MIL-R-81841 Rotary Flap Peening of Metal Parts

Document number in serial order First letter of first key word Indicates DoD Specification

Fig. 9a Designation form of DoD Military Specification

MIL-G-45204C(3)

Gold Plating (Electrodeposited)

Amendment 3 attached 3rd revision Document number in serial order First letter of first key word Indicates DoD Specification

Fig. 9b Designation form of Revised DoD Military Specification with amendment attached

MIL-C-20218F NOT 1

Chromium Plating, Electrodeposited, Porous

Notice 1 attached 6th revision Document number in serial order First letter of first key word Indicates DoD Specification

Fig. 9c Designation form of Revised DoD Military Specification with a Notice attached deposited, electrodeposited, mechanically deposited, thermally deposited, and vapor deposited coatings, preparation practices, terminology, test methods and assorted guides. ASTM is coordinating with AWS, ISO, and DoD.

- 2. AWS (American Welding Society) with approximately four standards, covering thermally deposited coatings and safety practices. AWS is coordinating with ASTM, ISO, and other interested groups.
- 3. IPC (Institute for Interconnection and Packaging Electronic Circuits) with just one chemical plating standard.
- 4. ISO with approximately 141 standards covering the same areas as ASTM, AWS, SAE, and the U.S. Government standards.
- 5. SAE (Society of Automotive Engineers) with five "J" Ground Vehicle Standards and approximately 94 AMS (Aerospace Material Standards) standards. Efforts are ongoing under the aegis of AESF to get coordination

Forms of DoD Military Standards designation

MIL-STD-2197

Brush Electroplating on Marine Machinery

Document number in serial order Indicates a standard Indicates DoD Standard

Fig. 10a Designation form of DoD Military Standard

MIL-STD-889B(3) Dissimilar Metals

Amendment 3 attached 2nd revision Document number in serial order Indicates a standard Indicates DoD Standard

Fig. 10b Designation form of Revised DoD Military Standard with amendment attached

MIL-STD-868A NOT 1 Nickel Plating, Low Embrittlement, Electrodeposition

Notice 1 attached 1st revision Document number in serial order Indicates a standard Indicates DoD Standard

Fig. 10c Designation form of Revised DoD Military Standard with a Notice attached between SAE-AMS and ASTM.

- NAS (National Aerospace Standards of the Aerospace Industries Association) with two standards.
- 7. U.S. Government standards, which include those administered by the General Services Administration (GSA) and the Department of Defense (DoD). There are perhaps 500–700 documents, but the numbers are changing rapidly as the government gets out of the standards business and adopts consensus commercial standards.

GSA documents are: CID (Commercial Item Descriptions), FED (Federal Specifications and Federal Standards), and QPL (Qualified Products List - Federal).

DoD documents are: MIL-PRF (Military Performance Specifications), MIL (Military Detail Specifications), MS (Detail MS Drawings), MIL-STD (Military Standards), QPL (Qualified Products List - Military), and MIL-HDBK (Military Handbook).

Forms of GSA and DoD Qualified Product Lists

QPL-TT-P-28-13 Paint, Aluminum, Heat Testing (1200 DEG. F)

Revision 13 Refers to Federal Specification TT-P-28 Indicates a GSA Qualified Products List

Fig. 11a. Designation form of GSA Qualified Products List

QPL-81706-15(1)

Chemical Conversion Materials for Coating Aluminum and Aluminum Alloys

Amendment 1 attached Revision number Refers to Military Specification MIL-C-81706 Indicates a DoD Qualified Products List

Fig. 11b Designation form of DoD Qualified Products List

Form of DoD Military Handbook designation

MIL-HDBK-132A Protective Finishes for Metal and Wood Surfaces

1st revision Document number in serial order Indicates a DoD Military Handbook

Fig. 12 Form of DoD Military Handbook designation

An IBM corporate director of standards under whom I served once observed that, of the many items that had been standardized, standards designation, standards nomenclature, and standards presentation were not among them. Therein lies the problem that faces most users of these documents. How do you tell the revision level if there are any amendments or supplements? What is the current level of the document? Figures 1–12 have been color-coded for the simplest way to show the meaning of the "gobbledy-gook" in the various standards documents designations. Each figure set serves to give you an idea of just how much information is covered in an alpha-numeric coding system.

In order to maintain ISO 9000 approval, companies need to have the latest level standards document that they certify to. When you pick up a copy of the standard, do you have all the parts?

The Catalyst

The advent of ISO 9000 certification—where you, the plater, document your process and the specifications to which you plate—has made the job of keeping your standards file up-to-date a critical operation.

The ISO 9000 series of standards covers quality management and quality assurance. ISO 9000 is in four parts: Part 1-Guidelines for selection and use; Part 2—Generic guidelines for application of ISO 9001, ISO 9002, and ISO 9003; Part 3-Guidelines for the application of ISO 9001 to the development, supply and maintenance of software; Part 4-Guide to dependability programme management. The quality systems standards are: ISO 9001-Model for quality assurance in design, development, production, installation and servicing: ISO 9002—Model for quality assurance in production, installation and servicing: and ISO 9003—Model for quality assurance in final inspection and test.

Most jobshops would normally become certified under ISO 9002, and most captive shops under ISO 9001. Today, most purchasers insist on ISO 9000 certification. What brought all of this about was a general recognition that most processes were out of control and, at the very least, undocumented. The self-certification that had prevailed within the metal finishing industry for many years was totally lacking in regimen, and there was no incentive to expend any effort to establish a regimen. Today, independent third parties inspect operations for adherences to process documentation, and that is how ISO 9000 registration is obtained. While the time to document all of your processes is a big investment, it can pay big dividends. A number of platers I have worked with have found, to their surprise and embarrassment, what their employees were really doing. Every one of these shops has had an improvement in overall quality with a consequent reduction in rejection and rework, resulting in lower costs and increased profits.

What Lies Ahead For You & for the AESF?

AESF, in response to suggestions from members and to better serve the needs of the membership, has taken steps to be more involved with the standards process and metal finishing standards. Under Past President Steve Schachameyer, the ASTM-ISO Specification Review Committee was established. Its charter was to review the metal finishing standards of these organizations for accuracy, practicality and any potential adverse impact on our membership, and to look for opportunities to take on a greater role in this area. In 1993, such an opportunity presented itself. The Secretariat of ISO/TC 107, on metallic and other inorganic coatings, became vacant. Under the leadership of then-President B.J. Mason, the AESF seized that opportunity and volunteered through ANSI (American National Standards Institute), the U.S. member of ISO, to undertake the ISO/TC 107 Secretariat. This offer was accepted by the ISO Central Secretariat, and ANSI designated AESF to hold the Secretariat, and I was appointed to manage it.

AValuable, Economical Service

Plans are now under way for AESF to become a distributor of all of the metal finishing standards published by our sister societies, the U.S. government and the ISO. A lot of effort and planning has gone into this enterprise. Past President Bill Bonivert has taken the lead in organizing how the standards documents will be distributed, and I have taken the lead in identifying the documents, obtaining licenses from the organizations owning the documents. When this service becomes operational in early 1997, you will be able to review the current level of various metal finishing standards and place orders immediately through the National Metal Finishing Resource Center. With the use of a credit card, your request will be processed by AESF and your standards will be downloaded to your computer for you to print them out at your location. Those who haven't mastered the computer and the Internet will be able to call AESF Headquarters and place orders to be sent via FAX directly to you. A very few documents, because they are primarily color photographs standards, will be mailed to you. We are currently working on a price structure that provides a discount for AESF members.

Included in this new service will be the current issue of metal finishing standards, guides, practices and test methods from the following organizations:

- AA (Aluminum Association) Standards
- AAMA (Architectural Aluminum Manufacturers Association) Standards
- ASTM (American Society for Testing and Materials) Committee A01, on Steel, Stainless Steel, & Related Alloys; A05, on Iron & Steel (Metallic Coated Products): B04, on Metallic Materials; B08, on Metallic and Inorganic Coatings (Including Porcelain and Vitreous Enamel); D01, on Paint and Related Coatings and Materials; D19, on Water; E04, on Metallography; E07, on Nondestructive Testing; E11, on Quality and Statistics; E28, on Mechanical Testing; F07, on Aerospace and Aircraft; F16, on Fasteners; G01, on Corrosion of Metals; and G02, on Erosion and Wear.
- AWS (American Welding Society) Standards for Thermal Spraying of Metals
- IPC (Institute For Interconnection and Packaging Electronic Circuits) Specifications
- ISO (International Organization for Standardization) Standards
- NAMF (National Association of Metal Finishers) Guides
- SAE (Society of Automotive Engineers) Ground Vehicle Standards

- SAE/AMS (Aerospace Material Specifications) Standards
- NAS (National Aerospace Standards)
- U.S. Government and Military documents in the FSC (Federal Supply Class) 8010 (Paint) and MFFP Area (Metal Finishing and Finishing Processes).
 - U.S. Government Commercial Item Descriptions Specifications
 - U.S. Government Specifications
 - U.S. Government Standards
 - U.S. Government QPL
 - (Qualified Product Lists)
 - U.S. Military Specifications
 - U.S. Military Standards
 - U.S. Military Handbooks
 - U.S. Military QPL (Qualified Product Lists)

Other standard documents will be added to the selection upon request.

Learning to Live with Standards

In order to maintain this service and cover the cost of operations, your support of this effort is vital. Each of you in the metal finishing industry will benefit by using the AESF service for your standards document needs. You will find the AESF service not only to be faster, but lower in cost as well. An added bonus will be the ability to query the AESF Specification Review Committee to discuss initiating changes or corrections to current documents or possibly to initiate a new standard. **Pasf**

About the Author



In June 1994, the AESF took over management of the International Standards Organization (ISO) Secretariat for Technical Committee 107, and Al Grobin, Jr. was

appointed by AESF to manage the secretariat in its behalf.

Since December of 1994, he has written a monthly column, "Standards Topics," in *P&SF*. Now retired from IBM Corporation, he is president of Grobin Associates, Inc., 187 Noxon Rd., Poughkeepsie, NY 12603.