

APPENDIX A -**ADDITIONAL
RESOURCES & REFERENCES****Addresses of Major Associations of the Welding Fabricating Industry**

American Welding Society (AWS)¹
550 N.W. LeJeune Rd.
P.O. Box 351040
Miami, FL 33135
(305)-443-9353

Aluminum Association (AA)¹
900 19th St., N.W.
Suite 300
Washington, DC 20006
(202) 862-5100

American Petroleum Institute (API)
1220 L Street, N.W.
Washington, D.C. 20005
(202) 682-8000

American Association of State Highway Officials
(AASHTO)
444 N. Capital St., N.W.
Washington, D.C. 20001
(202) 624-5800

Association of American Railroads (AAR)
50 F Street, N.W.
Washington, D.C. 20001
(202) 635-2100

Abrasive Engineering Society (AES)
1700 Painters Run Road
Pittsburgh, PA 15243
(412) 221-0909

American Gas Association (AGA)
1515 Wilson Blvd.
Arlington, VA 22209
(703) 841-8400

American Institute of Mining, Metallurgical and Petroleum
Engineering (AIME)
345 East 47th St.
New York, NY 10017
(212) 705-7695

American Institute of Plant Engineers (AIPE)
3975 Erie Ave.
Cincinnati, OH 45208
(513) 561-6000

American Institute of Steel Construction (AISC)
400 N. Michigan Ave.
Chicago, Illinois 60611
(312) 670-2400

Association of Iron and Steel Engineers (AISE)
Three Gateway Center
Suite 2350
Pittsburg, PA 15222
(412) 281-6323

American Iron and Steel Institute (AISI)¹
1000 16th St., N.W.
Washington, D. C. 20036
(202) 452-7236

American Nuclear Society (ANS)
555 North Kensington Ave.
La Grange Park, IL 60525
(312) 352-6611

American National Standards Institute (ANSI)
1430 Broadway
New York, New York 10018
(212) 642-4900

American Railway Engineering Association (AREA)
50 F Street, N.W.
Washington, D.C. 20001
(202) 639-2190

American Society of Civil Engineers (ASCE)
345 East 47th Street
New York, NY 10017
(212) 705-7496

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Major Association Addresses continued:

ASM International (ASM)
Route 87
Metals Park, OH 44073
(216) 338-5151

American Society of Mechanical Engineers (ASME)
345 East 47th Street
New York, New York 10017
(212) 705-7722

American Society for Nondestructive Testing (ASNT)
4153 Arlingate Plaza
Columbus, Ohio 43228
(614) 274-6003

American Society for Quality Control (ASQC)
310 W. Wisconsin Ave.
Milwaukee, WI 53203
(414) 272-8575

American Society of Safety Engineers (ASSE)
1800 East Oakton
Des Plaines, IL 60018-2187
(312) 692-4121

American Society for Testing Materials (ASTM)¹
1916 Race Street
Philadelphia, Pennsylvania 19103
(215) 299-5400

American Welding Institute (AWI)
Knoxville Lab
Route 4, Box 90
Louisville, TN 37777
(615) 970-2150

American Water Works Association (AWWA)
6666 W. Quincy Avenue
Denver, Colorado 80235
(303) 794-7711

American Bureau of Shipping (ABS)
45 Eisenhower Drive
Paramus, New Jersey 07652
(201) 368-9100

Canadian Standards Association (CSA)
178 Rexdale Boulevard
Rexdale, Ontario
Canada M9W 1R3
(416) 744-4000

Canadian Welding Bureau (CWB)
254 Merton Street
Toronto, Ontario M4S 1A9
Canada
(416) 487-5415

Canadian Welding Development Institute (CWDI)
391 Burnhamthorpe Rd.
East Oakville, Ontario L6J 4Z2
Canada
(416) 845-9881

Copper Development Association
2 Greenwich Office Park
Box 1840
Greenwich, CT 06836-1840
(203) 625-8210

Compressed Gas Association (CGA)
1235 Jeff Davis Highway
Arlington, Virginia 22202
(703) 979-0900

Cryogenic Society of America (CSA)
1033 South Blvd.
Oak Park, IL 60302
(312) 383-7053

Edison Welding Institute (EWI)
1100 Kinnear Rd.
Columbus, OH 43212
(614) 486-9400

Fabricators & Manufacturers' Association International (FMA)
7811 N. Alpine Rd.
Rockford, IL 61111
(815) 654-1902

Grinding Wheel Institute (GWI)
712 Lakewood Center North
14600 Detroit Ave
Cleveland, OH 44107
216-226-7700

Industrial Accident Prevention Association (IAPA)
100 Front Street West
Royal York Hotel Arcade
Toronto, Ontario M5J1R3
Canada
(416) 366-3711

Major Association Addresses continued:

Industrial Safety Equipment Association (ISE)
1901 N. Moore St.
Arlington, VA 22209
(703) 525-1695

International Institute Of Welding (IIW)
550 N. W. LeJeune Road
P.O. Box 351040
Miami, FL 33135
(305) 443-9353

International Organization for Standardization (ISO)
(See American National Standards Institute)

International Oxygen Manufacturers' Association (IOMA)
P.O. Box 16248
Cleveland, OH 44116
(216) 228-2166

Material Handling Institute (MHI)
8720 Red Oak Blvd.
Suite 201
Charlotte, NC 28210
(704) 522-8644

National Association of Corrosion Engineers (NACE)
Box 218340
Houston, TX 77218
(713) 492-0535

National Board of Boiler and Pressure Vessel Inspectors (NBBPVI)
1055 Crupper Avenue
Columbus, Ohio 43229
(614) 888-8320

National Electrical Manufacturers' Association (NEMA)
2101 L. St., N.W.
Washington, DC 20037
(202) 457-8400

National Fire Protection Association (NFPA)
Batterymarch Park
Quincy, Massachusetts 02269
(617) 770-3000

Naval Publication and Forms Center²
5801 Taber Avenue
Philadelphia, Pennsylvania 19120
(215) 697-2000

Steel Tank Institute (STI)
P.O. Box 4020
North Brook, IL 60065
(312) 498-1980

Superintendent of Documents³
U. S. Government Printing Office
Washington, DC 20402
(202) 783-3238

Titanium Development Association
P.O. Box 2307
Dayton, OH 45401
(513) 223-8432

Ultrasonic Industry Association (UIA)
P.O. Box 5126
Old Bridge, NJ 08857
(201) 521-4441

Underwriters Laboratories, Inc. (UL)
333 Pfingsten Road
Northbrook, Illinois 60062
(312) 272-8800

Uniform Boiler and Pressure Vessel Laws Society (UBPVLS)
2838 Long Beach Road
Oceanside, New York 11572
(516) 536-5485

Welding Research Council (WRC)
345 East 47th St.
Suite 1301
New York, NY 10017
(212) 705-7956

Welded Steel Tube Institute (WSTI)
522 Westgate Tower
Cleveland, OH 44116
(216) 333-4550

Note: For a detailed explanation of the agencies listed herein refer to AWS Welding Handbook, Vol 1, Chapter 13, "Codes and Standards"

1 Number Assigner for "UNS"
2 Military Specifications
3 Federal Specifications

NDI Selection Guide

Equipment Needs	Applications	Advantages	Limitations
Visual			
Magnifier, color enhancement, projectors, other measurement equipment, i.e., rulers, micrometers, optical comparators, light source.	Welds which have discontinuities on the surface.	Economical, expedient, requires relatively little training and relatively little equipment for many applications.	Limited to external or surface conditions only. Limited to the visual acuity of the observer or inspector.
Liquid Penetrant			
Fluorescent or dye penetrant, developers, cleaners (solvents, emulsifiers, etc.). Suitable cleaning gear. Ultraviolet light source if fluorescent dye is used.	Weld discontinuities open to surface, i.e., cracks, porosity.	Portable, relatively inexpensive equipment. Expedient inspection results. Results are easily interpreted. Requires no electrical energy except for light sources.	Surface films such as coatings, scale, smeared metal mask or hide rejectable defects. Seepage from weld porosity at the surface can also mask indications. Parts must be cleaned before and after inspection.
Magnetic Particle			
Prods, yokes, coils suitable for inducing magnetism into the weld. Power source (electrical). Magnetic powders. - some applications require special facilities and ultraviolet lights.	Most weld discontinuities open to the surface - some large voids slightly subsurface. Most suitable for cracks.	Relatively economical and expedient. Inspection equipment is considered portable. Unlike dye penetrants, magnetic particle can detect some discontinuities slightly below the surface.	Applicable only to ferromagnetic materials. Parts must be cleaned before and after inspection. Thick coatings may mask rejectable discontinuities. Some applications require parts to be demagnetized after inspection. Magnetic particle inspection requires use of electrical energy for most applications.
Radiography (Gamma)			
Gamma ray sources, gamma ray camera projectors, film holders, film, lead screens, film processing equipment, film viewers, exposure facilities, radiation monitoring equipment	Welds which have voluminous discontinuities such as porosity, incomplete joint penetration, corrosion, etc. Lamellar type discontinuities such as cracks and incomplete fusion can be detected with a lesser degree of reliability. May also be used in certain applications to evaluate dimensional requirements such as fit-up, root conditions, and wall thickness.	Generally not restricted by type of material or grain structure. Surface and subsurface inspection capability. Radiographic images aid in characterizing discontinuities. Provides a permanent record for future review.	Planar discontinuities must be favorably aligned with radiation beam to be reliably detected. Radiation poses a potential hazard to personnel. Cost of radiographic equipment, facilities, safety programs, and related licensing is relatively high. A relatively long time between exposure process and availability of results. Accessibility to both sides of the weld required.
Radiography (X-Rays)			
X-ray sources (machines, electrical power source, same general equipment as used with gamma sources (above))	Same application as above.	Adjustable energy levels. Generally produces higher quality radiographs than gamma sources. Also, same advantages as above.	High initial cost of X-ray equipment. Not generally considered portable. Also, same limitations as above.
Ultrasonic			
Pulse-echo instrument capable of exciting a piezoelectric material and generating ultrasonic energy within a weld, and a suitable cathode ray tube scope capable of displaying the magnitudes of received sound energy. Calibration standards, liquid couplant.	Most weld discontinuities including cracks, slag, and incomplete fusion. Can also be used to verify weld thickness.	Most sensitive to planar type discontinuities. Test results known immediately. Portable. Most ultrasonic flaw detectors do not require an electrical power outlet. High penetration capability.	Surface condition must be suitable for coupling of transducer. Couplant (liquid) required. Small, thin welds may be difficult to inspect. Reference standards are required. Requires a relatively skilled operator or inspector.
Eddy Current			
An instrument capable of inducing electromagnetic fields within a weld and sensing the resulting electrical currents (eddy) so induced with a suitable probe or detector. Calibration standards.	Weld discontinuities open to the surface, (i.e., cracks, porosity, incomplete fusion) as well as some subsurface discontinuities. Alloy content, heat treatment variations.	Equipment used with surface probes is generally lightweight and portable. Painted or coated welds can be inspected. Can be partially or completely automated for a high speed, relatively inexpensive test.	Relatively shallow depth of inspection. Many material and test variables can affect the test signal.