

# Nondestructive Testing (NDT) of Welds in Polyvinylidene Fluoride (PVDF) Piping

## STATUS AND PROBLEMS

PVDF is a weldable plastic pipe typically specified for deionized water systems in semiconductor manufacturing plants. Weld defects (voids) can significantly reduce the pipe wall thickness. Under hydrotesting or cyclical peak loads, a defective weld can fracture leading to brittle failure of an entire section of pipe.

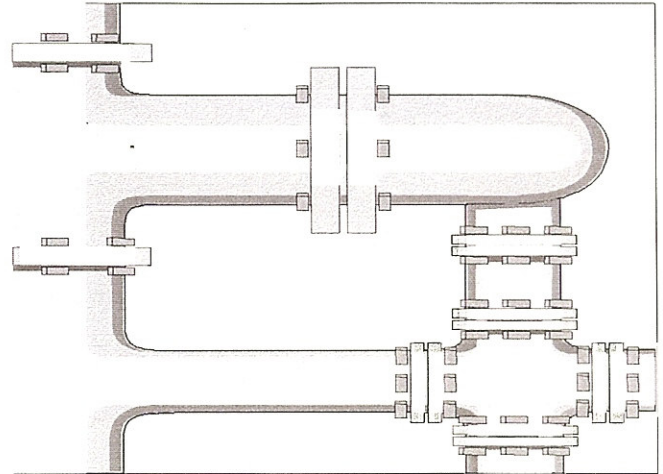
Unit downtime and replacement costs are potentially very high.

## TECHNICAL SERVICES

Two NDT methods, radiographic testing (RT) and ultrasonic testing (UT), have applications in the assessment of PVDF weld quality. REINHART & ASSOCIATES, INC. (R&A) has developed RT and UT techniques to locate PVDF weld discontinuities.

RT produces negative images of a circumferential weld. Increases in photographic density or darkness in the weld indicate a loss of material associated with voids or lack of fusion.

RT poses a significant radiation hazard to personnel in the area and is usually performed after working



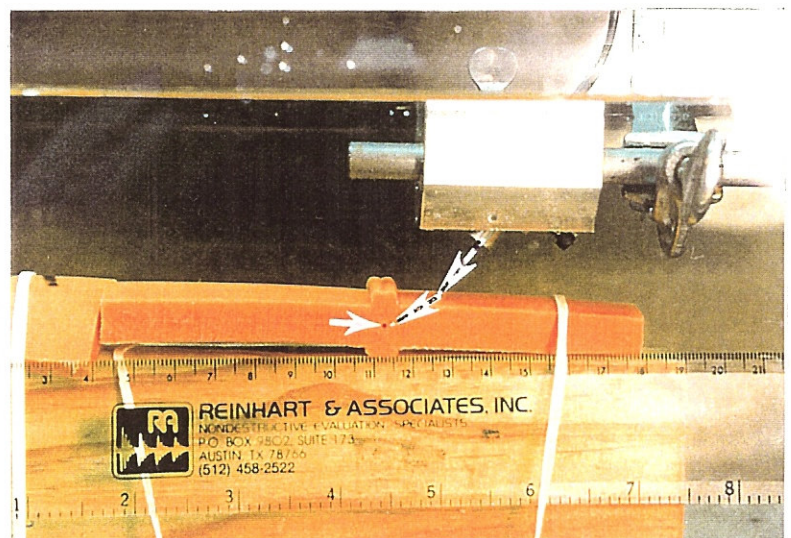
hours. Radiation damage to PVDF has been reported at high dose levels ( $\geq 20\text{MR}$  [megarads]), but RT should not result in doses greater than a tiny ( $\sim 2.5 \times 10^{-6}$ ) fraction of that amount.

UT can be performed in the midst of an occupied construction or lab site with no danger to personnel. The subjectivity associated with UT can be reduced by supplying printouts of indications for evaluation off-site or at a later date. This technology is presently accessible in current UT instrument systems.



**NONDESTRUCTIVE EVALUATION  
SPECIALISTS**

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## PARTIAL LIST OF CLIENTS

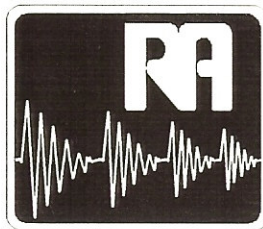
Alamo Steel & Machine Co., Austin, TX  
Baltimore Gas & Electric Co., Baltimore, MD  
Battelle Pacific NW Labs., Richland, WA  
Champlin Petroleum Co., Corpus Christi, TX  
City of Austin, Austin, TX  
Consumers Power Co., Jackson, MI  
Continental Field Machining, Schaumburg, IL  
Electric Power Research Inst., Palo Alto, CA  
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Georgia Kraft Co., Macon, GA  
Houston Lighting & Power, Houston, TX

International Paper Co., Natchez, MS  
Lower Colorado River Authority, Austin, TX  
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Missouri Public Service, Kansas City, MO  
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Ontario Hydro, Ontario, Canada  
Pacific Gas & Electric, San Ramon, CA  
Southern California Edison, Los Angeles, CA  
Tampa Electric Co., Tampa, FL  
Westinghouse Heavy Mtr. Div., Round Rock, TX  
Wyle Laboratories, Norco, CA

## PROFESSIONAL AFFILIATIONS

American Society for Nondestructive Testing, American Council of Independent Laboratories, American Society of Mechanical Engineers, National Society of Professional Engineers, and Texas Society of Professional Engineers.

**FOR MORE INFORMATION, CONTACT:**



## REINHART & ASSOCIATES, INC.

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