Piping

Introduction: The term fabrication applies to the cutting, bending, forming, and welding of Individual pipe components to each other and their subsequent heat treatment and nondestructive examination (N DE) to form a unit (piping subassembly) for installation. The term installation refers to the physical placement of piping subassembly, valves, and other specialty items in their required final location relative to pumps, heat exchangers, turbines, boilers, and other equipment; assembly thereto by welding or mechanical methods; final NEED; heat treatment; leak testing; ND cleaning and flushing of the completed Installation.

Depending on the economics of the particular situation, fabrication may be accomplished in a commercial pipe fabrication shop, or a site fabrication shop, where portions of the piping system are fabricated into subassembly or modules for transfer to the location of the final installation. As a general rule piping NAPS 21/2 (DNA 65) and larger for nuclear and fossil power plants, chemical plants, refineries, industrial plants, resource recovery, and generation units are most often shop fabricated.

Piping NAPS 2 (DNA 50) and smaller Is often shop fabricated where special heat treatment or cleaning practices may be required: otherwise it is field fabricated. Pipelines and other systems involving long runs of essentially straight pipe sections welded together is usually field assembled. In recent years, the infusion of new bending technologies, new welding processes, new alloys, fracture toughness limitations, and mandatory quality assurance (QUA) programs have made piping fabrication and Installation much more complex than In the past.

Greater emphasis Is being placed on written procedures for QUA and quality intro (ICQ) programs, special processes, and qualification and certification of procedures and personnel. Improper selection of fabrication or installation practices can result in a system, which will not function properly or will fail before its expected life p. Accordingly, fabrication and installation contractors must work closely with the designer and be aware of the mandatory requirements of the applicable codes, the unique requirements and limitations of the materials, and those of the fabrication and installation techniques being applied.

Codes and Standards Considerations: A great many codes and standards apply to piping. It is incumbent on the fabricator and/or Installer to be familiar with the details of these codes and standards since some codes have the force of law, As an example, the SAME 331. 1 Power Piping Coded is referenced by SAME Section I Power Boilers: for piping classed as Boiler External Piping. The latter that is law in most states, contains rules for code stamping, data reports, and third-party inspection. Piping under SAME Section 1113 also has legal standing. Most other piping codes are used for contractual agreements.

Most codes preference SAME Section for nondestructive examination methodology and SAME Section XIX for welding requirements. Each of the codes covers a deferent piping practices, some have mandatory requirements, while others only have recommendations. Heat treatment requirements may vary from one to another. The manner in which the code-writing bodies have perceived the hazardous nature of different applications has led to differing NEED requirements. Generally, the codes are reasonably

similar, but the owner, designer, fabricator, and installer must meet the specifics of the applicable code to ensure a satisfactory installation.

It is essential that the designer be very familiar with the code being used and that purchasing specifications for material, fabrication, and installation be very specific. Reference to the code alone is not sufficient. In the design, a particular allowablestressfor a specific material, grade, type, product form, and/or heat-treated condition was selected. The specifications issued for material purchase and fabrication must reflect these specify to assure that the proper materials and fabrication practices are used. It is also incumbent upon the fabricator and/or installer to be very familiar with the applicable code.

Each project should be reviewed in detail. " Standard shop practices" may not always produce the desired result. Communicationbetween the designer, fabricator, and installer is essential. All should be familiar with the various standards used in piping design. Most piping systems are composed of items, which conform to some dimensional standards such as SAME 836. MM and SAME 836. MM for Pipe, 816. 57 for flanges, etc. The Manufacturers Standardization Society (MS) and the American Petroleum Institute (API) issue other dimensional standards.

The Pipe Fabrication Institute (IF) publishes a series of Engineering Standards, which outline suggested practices for various fabrication processes. These standards give excellent guidance for many aspects of piping fabrication not covered by the codes. The American Welding Society (SAWS) publishes a number of recommended practices for welding of pipe in

various materials. Materials Considerations: Piping systems are fabricated from a great variety of metals and nonmetals, material selection being a function of theenvironmentand service conditions. Materials must inform to the standards and specifications outlined in the governing code.

Some codes such as SAME Section Ill impose additional requirements on materials beyond those in the material specifications. All fabrication and installation practices applied to these materials must be conducted so as to assure that the final installation exhibits all of the properties implicit in the design. For example, hot bending of certain austenite stainless steels in the assassination range will reduce their corrosion resistance if they are not subsequently heat-treated. Accordingly, a heat treatment to restore these properties should be specified.