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**ANSWERED BY
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Q: We are evaluating the specification for an upcoming project; we plan to bid it and so, of course, are trying to determine our costs. The spec states that in certain situations the contractor may propose for approval by the client a temper bead welding technique. I have heard about temper bead welding, but I don't really know anything about it. Can you tell me what it is and what is its purpose?

A: "Temper bead welding" is a term that can describe a fairly broad range of applications and specific techniques. For instance, in certain cases it has been accepted for use in the repair of pressure vessel welds in lieu of performing post-weld heat treatment after the repair welding, and it has been used in highly fatigue-sensitive structural steel applications for the purpose of decreasing

fatigue sensitivity at the toe of the weld.

The basic technique involves precise heat input control and bead placement. If performed properly, it has the effect of refining coarse grain structure in the heat-affected zone (HAZ), and thereby of reducing the hardness and improving the fracture toughness in the HAZ. So, in a sense, it has the effect of "tempering" the HAZ.

This is a simplified description, and in practice, temper bead welding requires techniques designed for the specific application and superbly skilled welders. We strongly recommend that you employ the services of a well-qualified welding engineer who has experience with the development and implementation of temper bead techniques.

Q: I work for an American company, and I have been asked to review some welding procedures submitted

to us by a European company that we are considering as a subcontractor. The problem is, some of the terminology is not familiar to me. For instance, in one of the WPSs, the welding process is listed as "136" and the position is listed as "PF." Can you tell me where to find the definitions of these terms?

A: Most likely the governing standard used when qualifying the procedure (probably one of the ISO 15614 documents, depending upon material) is listed on the WPS itself. In this standard you'll find referenced ISO 4063 and ISO 6947, which provide the nomenclature and definitions for welding processes and positions.

For instance, following are some of the common welding processes:
SMAW — 112
SAW (single wire) — 121

GMAW — 13
FCAW — 136

Note that there are additional subdivisions in many cases. Some of the main welding positions are

Flat — PA

Horizontal — PB, PC, or PD

Vertical — PF (up) or PG (down)

Overhead — PE.

Q: What is your opinion on fabricators welding the identification marking on a spool or support section and also when welders weld their symbol next to a weld?

A: Any CWI who is in this industry long enough will run across this scenario. When researching this condition, there is very little information that is directly related within the AWS library of codes, standards, handbooks, and general welding literature. In regard to spool and/or support identification, this practice somewhat leans toward material inspection and not so much to welding inspection. This differs from when a welder is actually identifying his completed welds by welding his weld symbol next to each weld.

Spool sections, support assemblies, etc., can range from a single tubular member to a complex geometrical shape consisting of numerous components, members, connections, etc. Final identification and marking can range from using marking pens to name plates or tags attached by welding. The important consideration is that whatever marking system is used, specific information within the contract documents should detail out exact considerations for location, size, and content of information required. Identification by means of welding should fall under the provisions of a qualified welding procedure, and inspected and documented under the terms and conditions of the governing contract and applicable welding standard. There are many options to choose from when identifying parts and assemblies, keeping in mind that complete traceability may be required from material receipt to final assembly and shipping.

We are bothered and confused by companies and welders who utilize the practice of welding their symbol next to completed welds. There are numerous other means that can be used to accomplish this same task without incorporat-

ing possible negative ramifications and additional inspection time. Low-stress stamping, indelible marking pens, vibro-etching, etc., are just a few of the better options welders can select to identify their welds. As with materials, the terms associated with weld identification when required shall be stated within the contract documents. The CWI may also be required to document each welder's symbol applicable for every welded connection completed, including repair welds.

In accordance with AWS D1.1, *Structural Welding Code — Steel*, any unspecified welding performed and added without the approval of the project engineer needs to be documented and reported. Both of these practices can be considered unspecified welding.

Q: What is meant by the term “TGW”?

A: Our guess is that the author meant GTAW for gas tungsten arc welding, although TGW is either a misprint or an in-house term used specifically by a particular company. Check with the company or drawing engineer to clarify this abbreviation.❖

Inspection Trends encourages question and answer submissions. Please mail to the editor (mjohnsen@aws.org).

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