the answer is...

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ANSWERED BY
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Q: We need to perform ultrasonic testing (UT) of some single-sided welds to API-RP-2X. Can you explain how the notch in the sensitivity calibration block is used for calibration of the UT instrument?

A: A review of this recommended practice will show that the various notches in the different blocks (there are differing requirements for the notches for both "Level A" and "Level C" acceptance criteria) are used only for the evaluation of root reflectors. The remainder of the weld volume is evaluated using side-drilled holes. Though it depends somewhat upon which sizing methods you will be using (this needs to be included in your UT procedure based on RP-2X), for the most part the notch functions like the side-drilled hole, i.e., it is used for distance/amplitude correction.

One way to use the notches is possible only if the base material of the weld to be examined and the reference block are of the same thickness. In this case, you can simply set the response from the notch at any convenient screen height. During examination of the weld root then, any response from the root area that exceeds this screen height would effectively be greater than the reference level (i.e., the response from the notch).

Most of the time, however, the thicknesses of the base material and the calibration block are not equal and you've already constructed DAC curves for the volume of the weld (which essentially makes the above-described method less convenient than the following method). In this case, you need to make use of the DAC curve that you have constructed using the side-drilled holes for the examination of the body of the weld. Maximize the response from the notch and adjust the amplitude to the level of the appropriate DAC curve. This method, of course, can also be used when the block and base materials are of the same thickness.

Note that the Level C block has a number of different notches. Make sure to use the proper notch for each angle — you should use the notch that has a face that is perpendicular to the ultrasonic beam. Remember also that when working to API-RP-2X, your calibration is not complete until you have performed transfer correction.

Q: We would like to use ceramic backing during welder qualification to AWS D1.1 because we think it will save time; however, it is not perfectly clear in the code whether or not this is an acceptable practice. What are your thoughts on this?

A: As you say, the code is not crystal clear on this; although in the Annex B definition it states that backing "…may be either metal or nonmetal," other parts of the code seem to infer that steel backing is required. Look, for example, at paragraphs 2.2.5, 2.16.2, and 4.30.3 and Figs. 4.21, 4.22, 4.29, 4.30, etc. (though they do not all deal with welder qualification). Also enlightening is paragraph 2.17.1, which when talking about production welding prohibits groove welds made from one side with backing other than steel unless the WPS is qualified in accordance with Section 4 (i.e., there are no prequalified WPSs for use with ceramic backing that would allow single-side welding).

As stated in paragraph 4.23, "…qualification on joints with backing qualifies for welding production joints that are backgouged and welded from the second side." This would not change if ceramic backing is used, i.e., the use of ceramic backing would *not* qualify a welder for welding a single-sided weld without backing or backgouging.

Considering all of this, I think you should either use the steel backing as detailed on the appropriate figure from Section 4 or, if you decide to go ahead and use ceramic backing, the qualification weld joint should be backgouged and backwelded. This will keep you from getting into any arguments with your clients.

Q: We recently received from one of our vendors a load of tubular brace members that had been coped in its shop. When I say "cope," I mean that the workers had cut the CJP weld preparation for TYK tubular joints. They looked okay coming off of the truck, but when we began to fit them up to the chord members, we noted that many of the preparations were not in compliance with the AWS D1.1 requirements from Table 3.6. Is there any way to inspect these before they are actually fit up?

A: There are a couple of things you might do. I would urge you or your vendor to do a first piece inspection in all cases. It makes no sense to finish them all and then discover you have a problem — even if you haven't fit them up yet.

If these are simple connections (e.g., a simple tubular Y connection) with a fairly acute brace intersection angle you can make use of AWS D1.1 Annex G. Using this, it is reasonably straightforward to verify the point at which the weld needs to transition from Detail C to Detail D. This would give an immediate indication of whether or not something is seriously incorrect.

Another thing that is simple to do,

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and that allows you to more fully evaluate the weld prep, is to construct from stiff cardboard, thin plywood, or sheet metal a form that matches the outside dimension of the chord member. It should be light enough to be easily handled. This form can then be brought into proximity with the coped end of the brace. With this you can verify brace intersection angle, local dihedral angle, etc., without having to wait for fitup to the actual chord member.

Q: Numerous times, I have witnessed welding contractors heating and drying low-hydrogen electrodes with a gas torch prior to use. Is this an accepted practice that is not addressed by AWS?

A: If you are involved with any welding application that is referencing AWS standards such as D1.1 in regard to the welding activities, then this practice is not permitted nor should it be encouraged. AWS D1.1 references specific provisions within section five that provide detailed information regarding the storage, exposure, baking, and rebaking of low-hydrogen electrodes for shielded metal arc welding.

Complications can arise when a project specification does not contain specific reference(s) to nationally recognized standard(s) concerning welding activities. Welding contractors are then somewhat given carte blanche to complete their scope of services as they may perceive. Acts that are viewed as unacceptable workmanship practices and/or violations of governing national standards should be documented and reported to the responsible party or individual. When involved in such a finding, it is also helpful to provide a possible corrective action to resolve the nonconforming condition or action.

Q: Many standards such as ASME B31.3 reference a minimum root opening of 1/16 in. for socket weld joints. What is the maximum root opening, if any, and is no root opening acceptable after the welding operation? Can you please enlighten me on this?

A: Many recognized national standards will reference a 1/16-in. pullback root opening for socket welds. This is obtained by sliding the internal member (pipe) of the items being welded inside the outer member (fitting) until it comes in contact with the fitting inside shoulder. To do this, place a mark on the internal member and withdraw the pipe a minimum of 1/16 in. Measure from the established mark to assure that 1/16 in. has been obtained. Perform the welding operation. A 1/16-in. pullback is a sufficient distance to assure that the welding operation will not draw the two items into contact when complete. Pullbacks less than 1/16 in. may cause the items to come into contact and induce cracking from initiated stress. For this welding application, only a minimum pullback dimension needs to be addressed as there is not justification for a maximum pullback dimension and resultant increased internal root opening. A large internal root opening may also result in a collection source and/or disruption of flow over time for fluids or other contaminants that possibly could affect the base materials and thus reduce overall life expectancy of this joint. Whenever pullback root openings are in question, testing methods such as radiography and visual inspection (fiberscope) can be utilized to verify actual root opening dimensions after welding.

Q: I recently accepted a CWI position on a large steel church erection. In the specifications section under "welding inspection" there is a statement that reads "all nondestructive testing deemed necessary by the welding inspector shall be in accordance with the pertinent requirements of governmental agencies having jurisdiction." How I am to decipher what this means?

A: You have been exposed to a prime example of a specification that is both incorrect and incomplete. It is not your responsibility as a CWI to determine if any nondestructive testing shall be performed, what type of testing shall be used, and to what standard and/or acceptance criteria any testing shall be evaluated. Your first action is to document and discuss these issues with your employer for this project. I would anticipate that these issues will then be forwarded back to a responsible engineer or company performing engineering/architectural services for this project. The engineer may likely seek your opinion in performing any nondestructive testing, although it would be advantageous for this individual to consult with other engineers who are more experienced and knowledgeable with the AWS code and nondestructive examination applications. The testing requirements for the project need to be clear, concise, and stand alone regarding their intent so no confusion results during construction activities since you may be asked to oversee the NDE contractor.❖

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