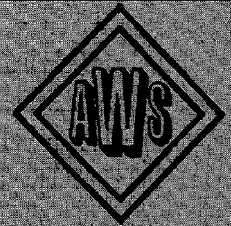


CHAPTER 2:**WELDING INSPECTOR
RESPONSIBILITIES****Introduction**

The welding inspector holds a position of responsibility. This responsibility demands a professional person with good character, ability, and common sense. A welding inspector may work at various fabrication plants and at various job sites. In all cases the welding inspector should observe the working hours of the fabricating organization. Strict observance of all rules and regulations especially those pertaining to personal conduct, safety, and security are mandatory. Never should the welding inspector consider himself entitled to special privileges. In dealing with the fabricating organization, the welding inspector should be impartial, render decisions promptly, and be tolerant of the opinion of others during communications. Remember, however, to stick to the facts when making decisions. Do not be easily swayed by differing opinions.

To perform visual inspection effectively, it is necessary to observe as many of the individual stages of fabrication as possible. Consequently, the various responsibilities of the welding inspector are categorized when they occur, specifically: before, during and after welding. Typical inspection requirements might be:

Inspection Responsibilities Before Welding

- Review all applicable drawings and standards.
- Check purchase orders to ensure that base and filler materials are properly specified.

- Check and identify materials as they are received against the purchase specifications.
- Check the chemical compositions and mechanical properties shown on mill test reports against specified requirements.
- Check the condition and storage of filler metals
- Check the condition and adequacy of equipment to be used.
- Check weld joint edge geometries.
- Check joint fit.
- Check joint cleanliness.
- Check the welding procedures and welder qualifications.
- Check preheat temperature.

Inspection Responsibilities During Welding

- Check welding parameters and technique for compliance with welding procedure.
- Check quality of individual weld passes.
- Check interpass cleaning.
- Check interpass temperature.
- Verify that in-process NDE is performed, if required.

Inspection Responsibilities After Welding

- Check finished weld appearance.
- Check finished weld sizes and lengths.
- Check dimensional accuracy of completed weldment.
- Select production test samples.
- Evaluate test results.
- Verify that additional NDE has been performed, if required.
- Verify that postweld heat treatment has been done satisfactorily, if required.
- Prepare and maintain inspection reports.

Inspection Responsibilities Before Welding

Knowledge of Drawings and Standards

Drawings, designs, standards, contracts, etc., should be studied in advance so that the welding inspector is aware of the construction details, the proposed use of subassemblies, and the specifics of the welding operation. Note which materials are to be used in the welded structure and whether any of them requires special treatment for satisfactory welding. This information should be clearly stated in the standards or welding procedures. If it is not there, the project engineer should be contacted for clarification.

During fabrication of a welded structure or component, the welding inspector may be called upon to interpret drawings or standards on the spot. Prior study of the drawings and design requirements will enhance his ability to make clear and concise decisions. Clear and concise decisions will speed completion of the work under

contract, increase the inspector's professional image, and greatly aid in exercising authority.

Situations that require a deviation from the drawing or detailed standard may arise during the fabrication of any structure. It is the welding inspector's responsibility to alert the project engineer or quality assurance (QA) personnel. They will decide whether the deviation in question should be permitted or rejected.

Sometimes acceptance or rejection of a large welded structure will be involved. It may be the inspector's duty, after careful study, to recommend whether the error can be corrected and whether the method of correction to be used will still insure a satisfactorily completed product in accordance with the drawings and standards. In all cases, he should exercise extreme caution in accepting deviations. Deviations from drawings should be referred to the design agency for approval. Their approval should be received "in writing."

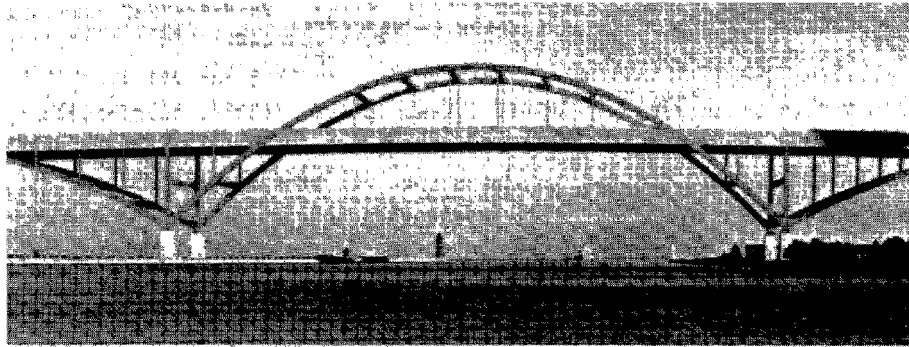
It is not always possible to write an all-inclusive standard containing all the detailed information needed to provide an answer for any question that might arise. If parts of the standard have requirements that are not fully defined, the inspector is often responsible for determining the meaning and intent of that document. Communication with engineering and design personnel may be necessary before responding to a fabricator.

Purchase Specifications Check

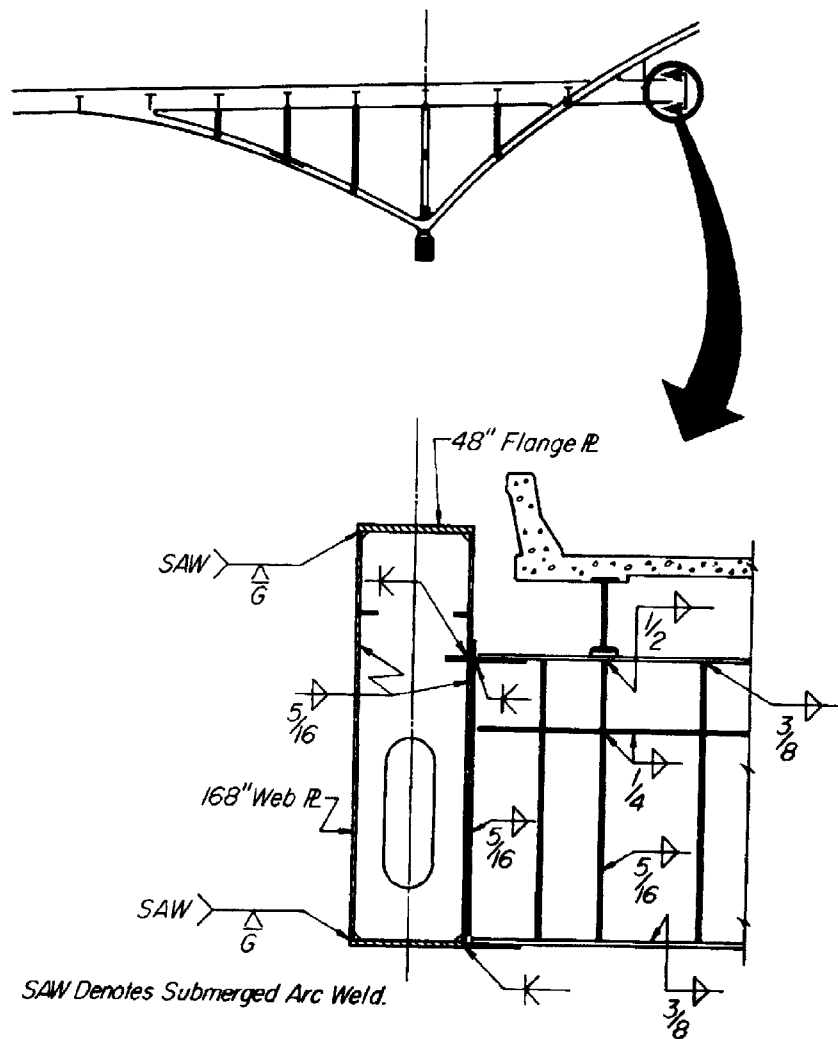
The specifications for the job should identify all the materials that will be used. This should include all consumable material such as welding electrodes, welding or brazing fluxes, shielding gases, consumable inserts, and backing bars or rings. The inspector should review the purchase order or contract to see that the materials ordered meet the specification requirements. For example, commercial specifications for steel, such as ASTM A572, frequently include more than one grade of the product, which must be individually identified on the purchase order to obtain the correct grade.

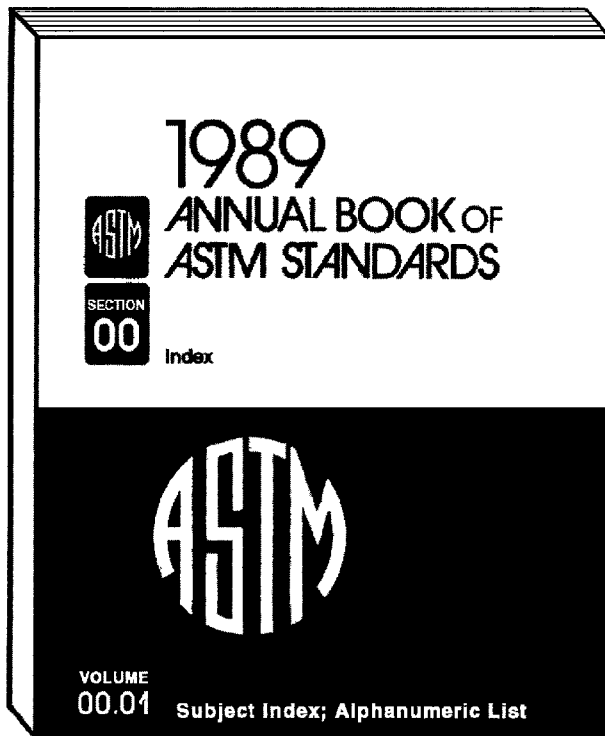
As another example, specifications for welding electrodes, such as AWS A5.1, will cover a dozen or more electrode classifications in the one document. In A5.1, the six E70XX electrodes are all equivalent in strength, but they are not

interchangeable when low hydrogen grades are required. If low hydrogen types are required, either E7015, E7016, E7018, or E7028 must be called out on the purchase order.



Lincoln Electric Company





Job Material Verification

Mistakes do happen. Many metals look alike, leading to the possibility of inadvertent mix-ups. To prevent this, the inspector must verify that the materials supplied match the applicable purchase order, when received. In some cases, there are additional requirements for marking the proper identification visibly on each piece, preferably at multiple locations. Identification is lost for the rest of the plate if the first slice cut off by the shop removes the labeled end with the grade stamp on it. Good practice calls for remarking remnants produced in cutting operations prior to the actual cutting while the identity is still verifiable.

Identification of low hydrogen welding electrodes is sometimes lost when stockroom clerks prematurely remove electrodes from their containers to store them in holding ovens. The individual electrodes will still bear classification numbers on their coverings (at the stub end), but the manufacturer's control number only appears on the now discarded container. In nuclear and other critical work, that manufacturer's control

number may be needed for each weld. The preferred container for a welding electrode is its original unopened package, or stored in its opened package in an oven or suitable location.

Chemical Analysis and Mechanical Properties Tests

Confirming tests of incoming materials are desired for many reasons. The number of tests required will depend on the inspector's judgment and past experience, unless everything is called out under quality assurance procedure requirements. If the material is in question, the inspector should request tests on representative samples of critical incoming materials to verify chemical composition and mechanical properties. Where material test reports from reliable suppliers (that is, suppliers accredited through an approved quality assurance program) give assurance of conformance, the welding inspector should ask for check tests when errors are strongly suspected.

Base Metal Defects Investigation

The quality of mill products supplied for a job must equal or exceed the quality specified for the final weldment or structure. Base metals almost always contain many small discontinuities. Their effect depends on the thickness of the metal, the type of loading and the criticality of the design. In some instances, they may be cause for rejection; while in other instances, they may not.

The welding inspector has the responsibility to see that discontinuities in the base metal are detected, identified, evaluated, and repaired properly, where necessary, so that they will not be incorporated into the welded product. That requires that the inspector be aware of the acceptable limits for these discontinuities. At times there may be a need to communicate with the responsible engineer in deciding what to do about a major defect.

Some specifications may require that a defective piece be rejected and replaced unless it can be repaired. In fact, some defects may require

rejecting the piece altogether. On the other hand, minor repairs such as flame straightening of members accidentally bent in shipping or handling may be permitted by the specification. As another example, the presence of laminations will rule out placing that plate where it must withstand tensile stresses in the through thickness direction, but other locations can be found where the same plate

may be used with complete safety. Engineering should make that decision. The welding inspector must then inspect any replacement materials.

Condition and Storage of Filler Materials Check

The welding inspector should check the condition of filler metals to be used. This is

CERTIFICATION OF TESTS				
CUSTOMER		TECNIWELD, INC.		
PURCHASE ORDER		4563	DATE SHIPPED 5-14-90	
DESCRIPTION		1 3/4" THK., 10 PCS. 39-1/2 O. D. X 9-5/8 I. D. TEMP		
		2		
		3		
		4		
SPECIFICATION:		ASTM-A-516 GR. 70 PVQ - FINE GRAIN		
PROPERTIES	1	2	3	4
HEAT NO.	91E060			
C	.22			
MN	1.05			
P	.009			
S	.022			
SI	.23			
NI	.02			
CR	.02			
MO	.005			
CU	.02			
V	.004			
YIELD PSI	48.2 KSI			
TENSILE PSI	76.3 KSI			
%ELONGATION	8" = 25.0			
% RED OF AREA				
BEND TEST				
WE HEREBY CERTIFY THAT THE ABOVE MATERIALS HAVE BEEN INSPECTED AND TESTED IN ACCORDANCE WITH THE APPLICABLE SPECIFICATION AND THAT THE ABOVE FIGURES ARE CORRECT AS CONTAINED IN THE RECORDS OF THIS COMPANY. SWORN TO AND SUBSCRIBED BEFORE ME THIS _____ DAY OF _____ 19____ NOTARY PUBLIC JANE DOE Notary Public, State of Ohio Recorded in Cuyahoga County My Commission Expires 2/22/2001 GENERAL STEEL SHEET & PLATE, INC. ANYTOWN, U.S.A. By _____ I. B. Manager				

Typical Example of a Mill Test Report

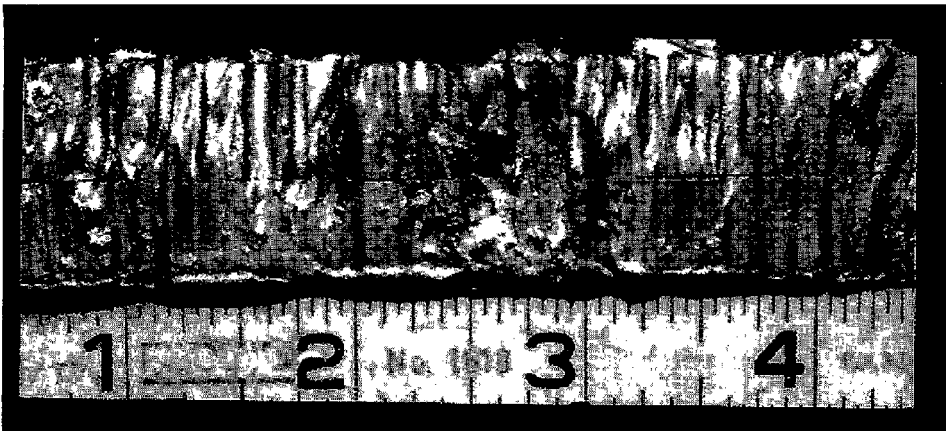
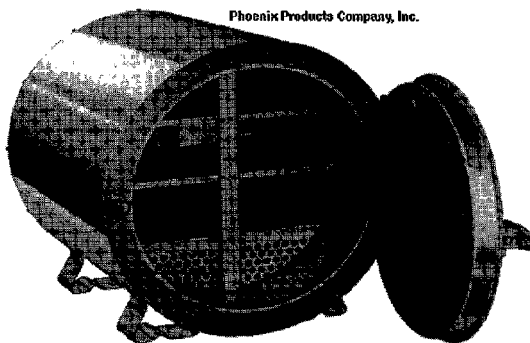


PLATE LAMINATION

especially true in the case of shielded metal arc welding electrodes that have a flux coating that can be easily damaged. Other types of filler metals that may be stored out in the open could also deteriorate with time. For example, solid wire and flux cored electrodes can develop rust, which could result in the production of porosity in the weld.

When low hydrogen type shielded metal arc welding electrodes are being used, they must be stored in electrically heated, vented and thermostatically-controlled storage ovens to maintain their low moisture content once they have been removed from their shipping containers.

Besides these filler metals, some fluxes and flux cored electrodes also require special protection from moisture, whether it be rain or high humidity. Some submerged arc fluxes even require heated storage containers.



ELECTRODE OVEN

Welding Equipment Check

All welding equipment, including that to be used for testing, should be checked periodically for operational capability, calibration, and safety. For example, always check the ammeters and voltmeters if present. These meters

on welding machines may not always be accurate because of mistreatment, shop contamination, and overloads. Periodic calibration is recommended.

The equipment should also be checked to make certain it has the necessary output capacity to satisfy the welding procedure requirements. Welding leads, gas hoses and wire feed apparatus must also be examined to ensure their good condition and operability.

Weld Joint Edge Geometry Check

Specific tolerances are listed for weld joint edge geometries in various codes and specifications. The prequalified joints found in Section 2 of AWS D1.1 are typical examples. Inspection responsibilities include examination of the unwelded joint for edge geometry, including root face dimensions and groove angles. The suitability of the joint for the welding process to be used will be discussed in greater detail in Chapter 5.

Weld Joint Fit Check

Again, looking at the unwelded joint, the welding inspector should observe the fit of the parts. For butt joints, alignment and root opening are important. Keep in mind that prestressing or cambering may be needed for welds that will be subject to distortion as a result of weld shrinkage stresses. The fabricator should not attempt such welds without the necessary knowledge.



Inspector Checking Equipment

Procedure modifications may give an acceptable weld, but the welding inspector may offer suggestions to the project engineer, not to the foreman. If the foreman later says, "You told me to do it this way," the inspector has more difficulty in turning down an unacceptable result.

The fit of backing preparations needs particular attention. Backing bars and rings should fit tightly against the pieces to be joined. Transverse joints between segments of a backing material are undesirable, because they induce cracking in the root pass. For this reason, when welding in accordance with AWS D1.1, steel backing on groove welds is required to be made continuous for the entire length of that backing member.

Weld Joint Cleanliness Check

In welding, the cleanliness of the base metal surfaces in and adjacent to the joint is a critical factor. Welding over contamination such as oil, grease, paint, moisture, rust, etc. will likely result in porosity in the completed weld. In many cases, this contamination could also lead to the occurrence of incomplete fusion, or even cracking. Consequently, it is imperative that the welding inspector check the cleanliness of the weld zone prior to welding.

Welding Procedure Qualification Check

The fabricator must pre-scribe the details of the welding procedure that will be followed in producing weldments. They should produce welded joints with acceptable mechanical properties as required by the particular specification or code. Chapter 10 of this manual describes the basic elements of a welding procedure specification, the reasons for its use, its qualification, and your responsibilities as welding inspector in verifying proper application of the welding procedure on the job.

Welder Qualification Check

Codes and specifications that apply to the fabrication of weldments usually require qualification of all welders and welding operators. It is the welding inspector's duty to verify that every welder and welding operator who works under the code or specification has been properly qualified in accordance with those requirements. Verification can be made either by personally witnessing each test or a review of verified test results. It is important for the welding inspector to monitor the welders and welding operators to ensure that they are working within the scope of their qualifications with respect to such variables as: base metal type and thickness, position of welding, welding process, electrode type and size, etc.



Inspector observing welder qualification testing.

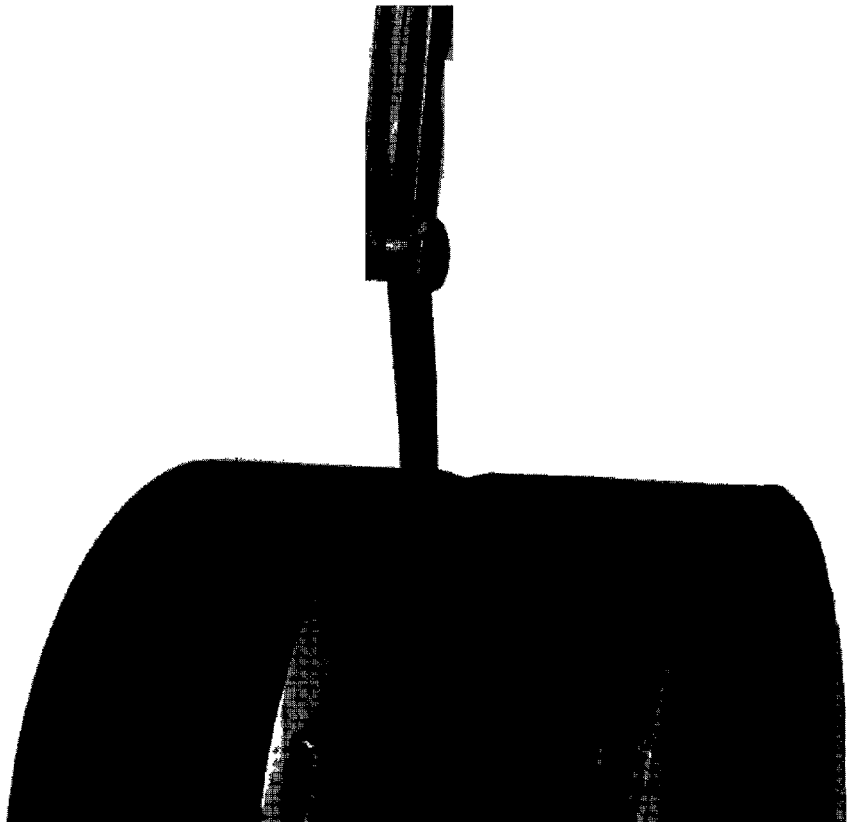
Welding codes and specifications do not normally require requalification of procedures, welders or welding operators for each new contract or design. The welding inspector should review the requirements of the contract specification or code to make this determination. Remember that the main objective of qualification tests is to insure that procedures and welders or welding operators are adequate for the intended purpose. To be fair to the fabricator and purchaser, the inspector should make every effort to avoid unnecessary qualification tests.

Preheat Temperature Check

Most codes and specifications require that certain materials are preheated prior to welding. In Chapter 6, there is a discussion of some of the reasons why preheat is necessary. For carbon steels, preheat will be required as the base metal alloy content or thickness increases. Most often, preheat temperature is verified using temperature indicating crayons that are

formulated to melt at the temperature noted on their coatings. However, digital contact pyrometers are an effective alternate. Since preheat is necessary to prevent degradation of the base metal properties during the welding operation, the preheat temperature should be measured approximately 1 inch from the edge of the weld preparation, unless the part is greater than 3 inches in thickness. In that case, the temperature measurement should be made at a distance from the weld approximately equal to the part thickness. Normally, the temperature should be maintained during all welding of the joint.

For most carbon steels, the preheat is specified as a minimum. However, for some types, such as the quenched and tempered steels, the preheat temperature is expressed as a range of temperatures having a minimum and maximum value.



Taper Gauge



Temperature Sensitive Crayon for Measuring Metal Temperature

Welding Inspector Responsibilities During Welding

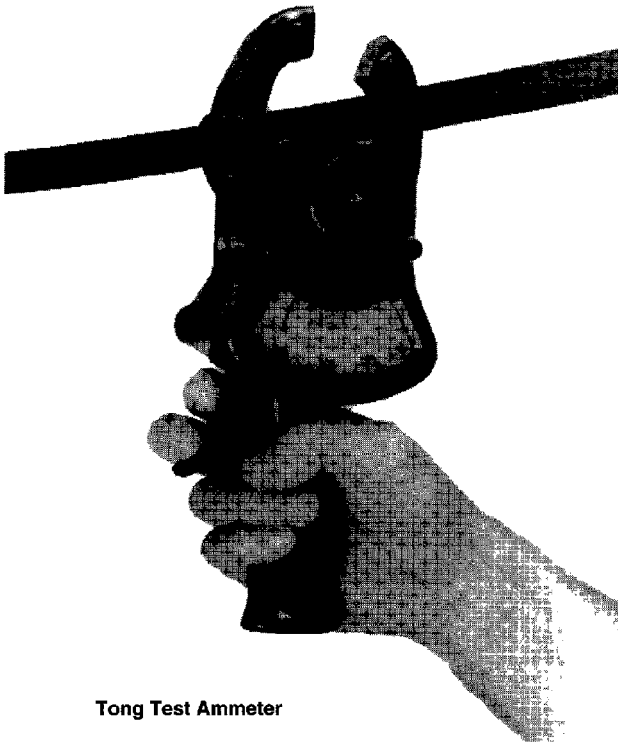
In order to continue the ongoing welding quality control, the welding inspector has numerous items to check as the welding is actually being performed. As was the case for inspections performed prior to welding, these checks can hopefully detect problems when they occur so they can be more easily corrected. During this phase of the fabrication process, the inspector's knowledge of welding will be extremely beneficial, since part of the inspection will involve the evaluation of the actual welding technique as well as the resulting weld quality. It is realized that it is unrealistic to think that the welding inspector can observe the deposition of each and every weld pass. Therefore, the experienced welding inspector should be able to select those aspects of the

welding sequence which are considered to be critical enough to warrant his presence.

Following are some of the aspects of this phase of visual welding inspection which you may need to perform.

Check Production Welding for Compliance with Welding Procedure

When conducting welding inspection during the production welding, the inspector must rely on the welding procedure to guide that inspection. This document will specify all of those important aspects of the welding operation, including: welding process, materials, specific technique, preheat and interpass temperature, plus any additional information which describes how the production welding should be performed.



Tong Test Ammeter

The welding inspector's job will essentially consist of monitoring the production welding to assure that it is being performed in accordance with the appropriate procedure.

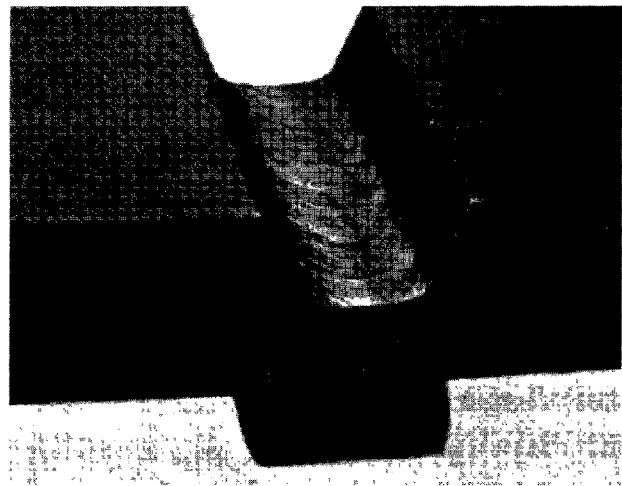
Check the Quality of Individual Passes

One of the aspects of the welding inspection during production welding is the visual examination of the individual weld passes as they are deposited. At that time, any surface discontinuities can be detected and corrected, if necessary. It is also important to note any weld profile irregularities which may hinder subsequent welding. An example of such a situation may occur during the welding of a multipass groove weld. If one of the intermediate passes is deposited such that it exhibits a very convex profile which creates a deep notch at its toe, that configuration may prevent a subsequent pass from properly fusing at that location. If noted, the welding inspector could ask that some grinding be done to assure that thorough fusion can be attained on the next pass.

Checking the in-process quality is especially critical in the case of the root bead. In most situations, this portion of the weld cross section represents the most difficult welding condition, especially in the case of an open root joint. In conditions of high restraint, the shrinkage stresses from welding may be sufficient to fracture the root pass if it is not thick enough to resist those stresses. The welding inspector should be aware of these problems and thoroughly check the root pass prior to any additional welding so that any irregularities can be found and corrected when they occur.

Check Interpass Cleaning

Another feature which should be evaluated during the welding operation relates to cleanliness of intermediate weld passes. If the welder fails to thoroughly clean the weld deposit between individual passes, there is a possibility that slag inclusions and/or incomplete fusion could result. This is especially critical when using a welding process which uses a flux for protective shielding. However, careful interpass cleaning is still recommended for those processes using gas shielding. Proper cleaning may be hindered when the deposited weld exhibits a convex profile which prevents sufficient access to the slag coating. As indicated above, it may then be necessary to



Partially Filled Groove Welded Joint With Backing Strip

perform additional grinding to remove the objectionable profile and facilitate proper cleaning.

Check Interpass Temperature

For welding procedures requiring interpass temperature control, the welding inspector may need to monitor this aspect of the process. As with preheat, the interpass temperature could be specified as a minimum, maximum or both. The interpass temperature is also measured on the base metal surface near the weld zone. Devices such as temperature indicating crayons and surface contact pyrometers are used for these measurements.

In-Process Nondestructive Examination

For some welds, there may be a requirement for other types of nondestructive examination other than visual examination. This testing may occur at various stages during the production of welds. For example, it is common for the root pass to be evaluated using magnetic particle or penetrant testing to assure that it is free of surface discontinuities or cracking. Discovery of problems at this time will result in a relatively easy and inexpensive repair compared to that required if the problem were not detected until the weld was completed.

Nondestructive examination operations shall be performed by an individual qualified in

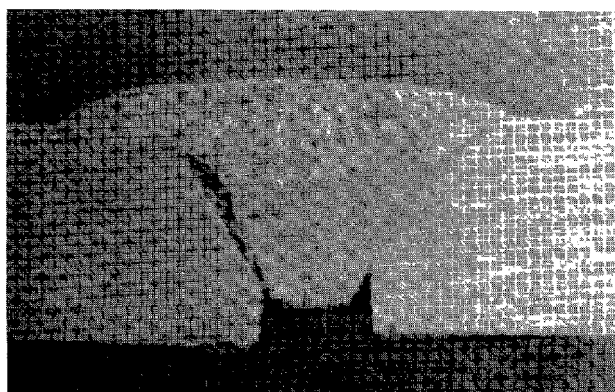
accordance with the recommendations of ASNT's "SNT-TC-1A," or equivalent. If the welding inspector has this qualification, he can perform this inspection as well as the visual examination. However, often a separate NDE technician will perform the nondestructive test. The welding inspector is required to verify that the proper test has been administered and the results have been properly recorded.

Welding Inspector Responsibilities After Welding

Once a weld has been completed, the welding inspector must examine the finished product to assure that all preceding steps have been performed to produce a quality weld. If all of the preliminary steps have been performed as required, the postweld inspection should simply confirm that the weld is of sufficient quality and size. However, the codes specify the required attributes of the finished weld, so the welding inspector must examine the weld visually to determine if those requirements have been met. Some of the important features of this post-weld inspection are discussed below.

Check Final Weld Appearance

In general, visual inspection after welding consists of looking at the appearance of the finished weld. This visual examination will detect surface discontinuities in the weld and adjacent base metal. Of special importance during this aspect of the welding inspection is the evaluation of the weld's profile. Sharp surface irregularities could result in premature failures of a component during service or create difficulty in film interpretation if the weld is to be radiographed. These visible features are evaluated in accordance with the applicable code which will describe the permissible amount of a certain type of discontinuity.



Cross-section of a partial penetration groove weld with heavy slag inclusion



Magnetic Particle Testing of a partially filled groove weld

Check Final Weld Sizes and Lengths

Included in visual examination of a weld is the measurement of the weld to determine if it is as large as required by the drawing. For a groove weld, a primary concern is whether or not the weld groove is filled flush with the base metal surfaces or has the required reinforcement. Any underfill which is present must be corrected by depositing additional weld metal. Excessive weld reinforcement must be removed in such a manner that its height is within specified limits and it blends smoothly with the adjacent base metal.

For fillet welds, the size determination is normally accomplished with the aid of a fillet weld gage. While this measurement could be performed using standard measuring devices, fillet weld gages have been manufactured to facilitate much easier and accurate gaging of the fillet weld size. There are numerous different types of fillet weld gages which can be used, including gages or templates which are specially made for a particular fillet weld configuration.

Since fillet weld sizes are designated as nominal dimensions, there should realistically be some tolerance applied to their measurement. Since commercially-available gages are typically graduated in 1/16 inch increments, it would seem reasonable to gage fillet weld sizes to the closest 1/32 inch. Conditions warranting such an approach include: the difficulty in positioning your eyes properly to view the gage, the fact that

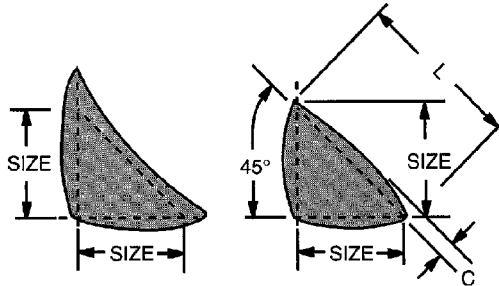
weld sizes cannot be thought of in terms of machining precision, gage imprecision, base and weld metal surface irregularities, and the difficulty in determining the exact location of the toe of a convex fillet weld.

Once a weld has been measured to determine if it is of sufficient size, the welding inspector must then evaluate its length to assure that enough weld metal was deposited to satisfy the requirements. This is of special importance where intermittent fillet welds have been specified. Here each segment should be measured as well as their center-to-center, or pitch, distances.

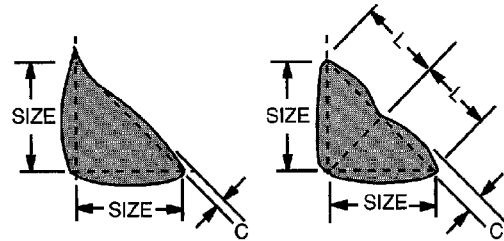
For continuous groove or fillet welds, they are only considered to be of sufficient length if they are filled to their full cross section for the entire length of the shorter of the two members being joined. Normally, minimum lengths are specified, so the presence of extra fillet weld length is not considered rejectable. However, in some cases, excessive weld lengths may be unacceptable.

Check Dimensional Accuracy of Completed Weldment

Other measurements are required to evaluate the overall dimensional accuracy of the completed weldment. This is important since the shrinkage stresses from welding may have caused the size of the part to change. For example, a weld deposited around the outside of a machined bore may cause the diameter of that bore to be reduced, necessitating further machining to provide the appropriate bore size. Some of this dimensional evaluation will be to determine if any distortion resulted from welding. The localized heat of welding could cause members to be distorted or misaligned with respect to other parts of the weldment. These measurements will determine if the amount of distortion which is present is enough to cause the part to be rejectable or unusable.



(A) DESIRABLE FILLET WELD PROFILES



(B) ACCEPTABLE FILLET WELD PROFILES

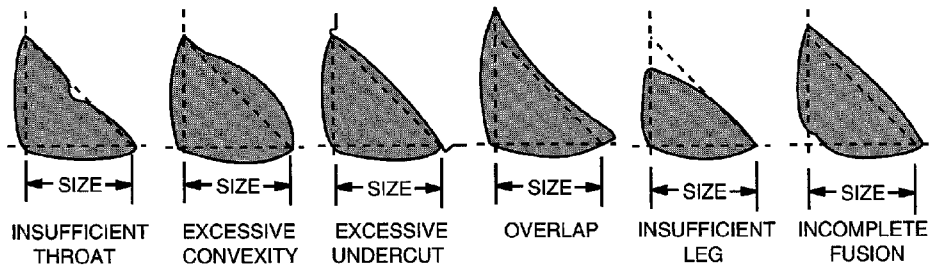
Note: Convexity, C, of a weld or individual surface bead shall not exceed the value of the following table:

Measured Leg Size or
Width of Individual Surface Bead, L

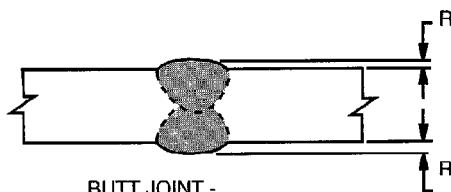
$L \leq 5/16$ in. (8 mm)
$5/16$ in. $< L \leq 1$ in. (25.4 mm)
$L \geq 1$ in.

Max. Convexity

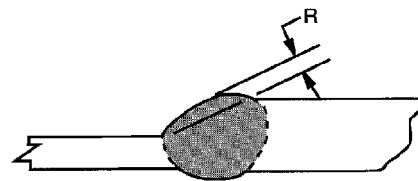
$1/16$ in. (1.6 mm)
$1/8$ in. (3mm)
$3/16$ in. (5mm)



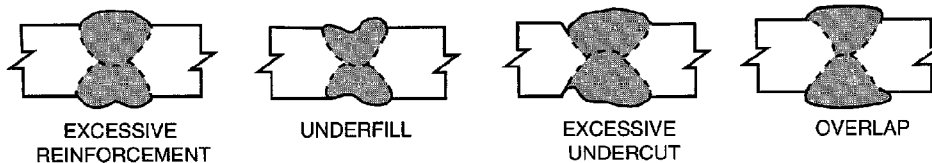
(C) UNACCEPTABLE FILLET WELD PROFILES

BUTT JOINT -
EQUAL THICKNESS PLATE

NOTE: Reinforcement = R

BUTT JOINT (TRANSITION) -
UNEQUAL THICKNESS PLATE

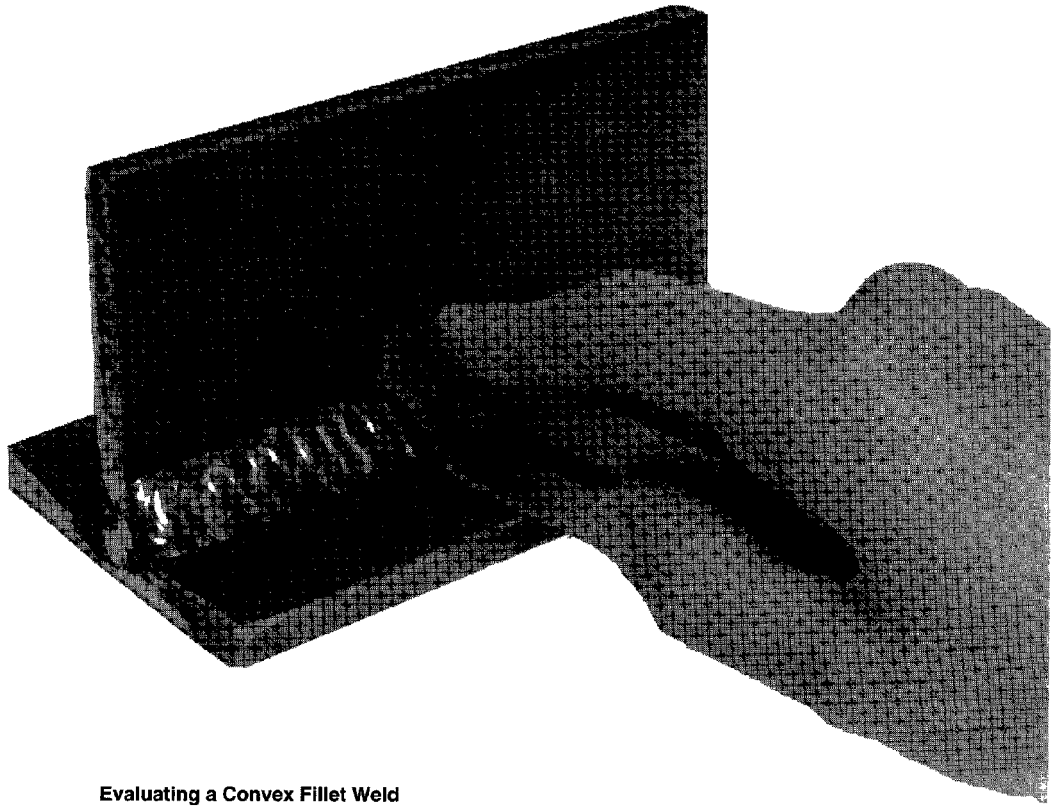
(D) ACCEPTABLE GROOVE WELD PROFILE IN BUTT JOINT



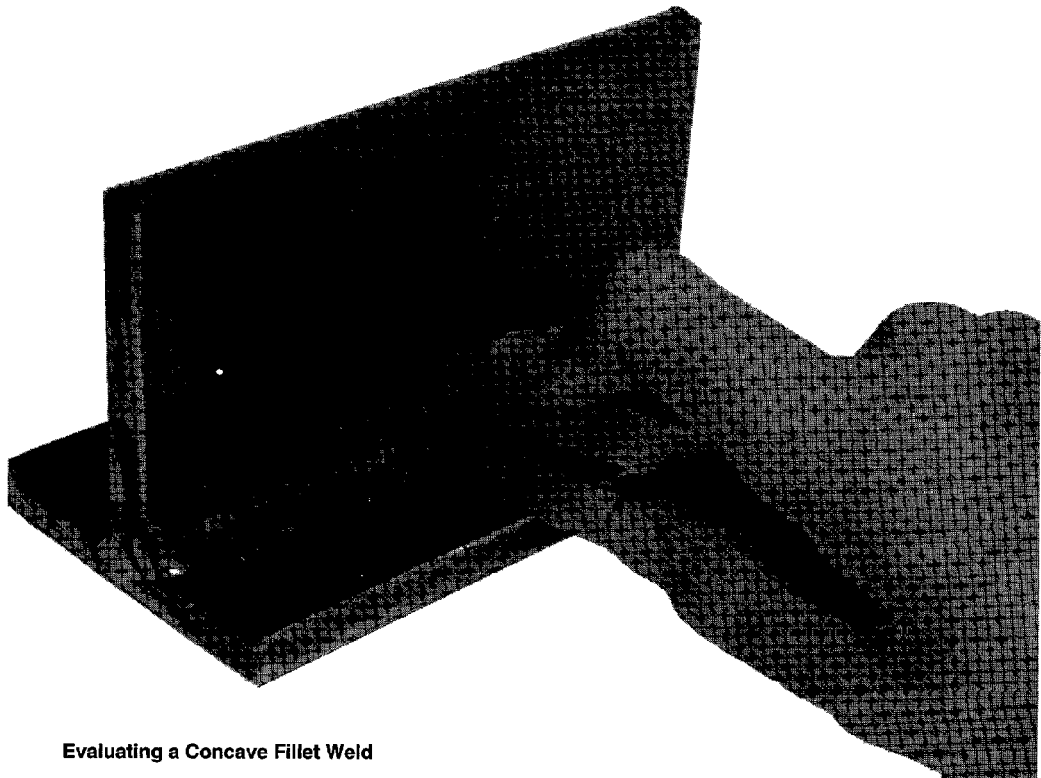
(E) UNACCEPTABLE GROOVE WELD PROFILES IN BUTT JOINTS

ACCEPTABLE and UNACCEPTABLE WELD PROFILES (Source AWS D1.1-92)

2-14



Evaluating a Convex Fillet Weld



Evaluating a Concave Fillet Weld

Selection of Production Test Samples

In welded assemblies, inspection of the product may be performed on samples taken from the production line. These samples may be selected by chance or according to an established order. In either case, witnessing their selection and testing is one of the welding inspector's important duties. Sometimes selection of samples is left to the inspector's judgment and discretion. It is not necessary to take more samples than are necessary to determine conformance. Typical tests include: radiography and other nondestructive tests, hydrostatic tests, chemical analysis, metallurgical examinations, and destructive mechanical testing. It is important to assure that such work is properly carried out. Various sampling plans, test processes and inspection methods are described in Chapters 6 and 9.

Evaluation of Test Results

Sometimes it will be impractical for a welding inspector to witness all tests. However, enough tests should be witnessed to satisfy the inspector that the tests are being performed in the proper manner and that the results are accurately reported. It is important to make certain that the testing equipment calibration is documented. When the tests have been performed, the inspector must evaluate the results and decide whether the product meets the specifications.

Final Nondestructive Examination

Some welds must also be examined upon completion using other nondestructive test methods in addition to the visual inspection. You may also perform this testing, or it could be done by some other nondestructive examination technician. In either case, the individual performing the test shall be properly qualified. A CWI certification does not qualify a person to perform nondestructive tests. If someone else performs the testing, the welding inspector is required to verify that these nondestructive

examinations have been performed by qualified personnel in the specified manner. In that case, the welding inspector's primary responsibility is to review the resulting information to assure that the results are complete. The welding inspector is then responsible for the maintenance of those test records.

Maintaining Records and Reports

Code work always requires record keeping. Whether other jobs call for it or not, complete records should be kept by every inspector. These can be in the form of either detailed notes or a formal inspection report.

The welding inspector should check official records for completeness and accuracy and make certain that they are available. Records that require the fabricator's signature should be prepared by the fabricator, not by the inspector. Records should be as detailed as necessary and should be entered in ink. Errors are to be crossed out with a single line and not erased; otherwise record tampering may be suspected. The final report should comment on the general character of the work, how well it stayed within prescribed tolerances, difficulties that occurred, and any defects that were noted. Repairs should be explained. If there are reports describing the presence of weld defects, there should be accompanying reports which describe the acceptance of those subsequent repairs. Copies should be distributed to all involved parties, and the welding inspector should maintain a copy for his own personal records should some question arise later. Chapter 12 should be reviewed for a more detailed description of this aspect of the welding inspector's responsibilities.

REVIEW - CHAPTER 2

WELDING INSPECTOR RESPONSIBILITY

- Q2-1** Of those listed below, which is an acceptable way to correct an error on an inspection report?
- Draw a line through the incorrect portion of the report.
 - Erase the incorrect word or words.
 - Throw away the report.
 - Line out the error, make the correction, and initial and date the correction.
 - none of the above
- Q2-2** What records should you keep as a CWI?
- copies of reports of all inspections you perform
 - copies of reports relevant to your areas of responsibility (material test reports, welder qualification paperwork, procedure qualification paperwork, etc.) even though you didn't prepare them
 - copies of sales literature describing welding equipment
 - both a and b
 - all of the above
- Q2-3** When a particular type of weld is consistently marginal, with rejects occurring, what action would be appropriate for you as the inspector?
- Tell the welder what you want.
 - Bring the problem to the attention of engineering personnel in order for corrective action to be taken, if possible.
 - Simply continue to accept or reject the welds according to specified criteria [no more action is appropriate for inspectors].
 - all of the above
 - none of the above

- Q2-4** A specification for a weld joint which must be immediately accepted or rejected lacks detailed information about that particular joint. Who should rule on the meaning and intent of the specification?
- the designer
 - the welding engineer
 - the project engineer or quality assurance personnel [if their approval is required by contract]
 - you, as the CWI
 - none of the above
- Q2-5** How can you identify an individual low hydrogen electrode which a welder is already consuming to make a weld?
- Read the classification numbers painted on the covering near the stub end of the electrode.
 - Ask the welder what it is.
 - Ask the welding foreman.
 - Look at the completed weld and identify the type of electrode by the visual appearance of the weld deposit.
 - Look on the drawing or specification to determine what type of electrode is required for that weld.
- Q2-6** How should low hydrogen electrodes be stored before use?
- in their original unopened containers
 - in ovens held at a temperature which assures the maintenance of their low moisture content
 - in tool room cribs, properly labeled, ready for quick distribution
 - either a or b
 - all of the above
- Q2-7** What joint fit should you insist on?
- within tolerances specified on drawings or specifications
 - Groove welds should have minimal root openings to reduce distortion.
 - root openings greater than 1/8" to assure complete penetration
 - Fillet welds should have root openings so that the resulting weld's effective throat will be greater.
 - none of the above

2-18

- Q2-8** Which welders are allowed to work on a “code” job?
- a. only those with certification papers from former jobs
 - b. only those tested by the fabricator for this particular job
 - c. only those qualified in accordance with job specifications
 - d. only those you have requalified for this job
 - e. all of the above
- Q2-9** How should low hydrogen electrodes out of their original containers be stored?
- a. in their original resealed containers
 - b. in heated storage ovens
 - c. in open tool crib shelves
 - d. in individual welders’ electrode pouches
 - e. none of the above
- Q2-10** How can a CWI verify that the specified material is used on the job?
- a. For code jobs, each piece of material must be correctly marked with its identity.
 - b. Perform a quick carbon analysis with a field test kit.
 - c. Material must be scrapped if no identification is evident.
 - d. Once the material leaves the storage area, the CWI no longer has to verify it.
 - e. none of the above
- Q2-11** If a mill product has imperfections such as splits, tears or surface irregularities, what action should you as the inspector take?
- a. Reject any imperfect materials.
 - b. Judge whether or not the imperfections meet acceptance criteria according to applicable job specifications.
 - c. Ignore the irregularities if not in the immediate vicinity of the weld joint.
 - d. Wait until the welder finishes the weld to see if any cracking occurs before making any judgment.
 - e. none of the above

- Q2-12** Which of the conditions below suggests a weldability problem?
- a. One of the welders seems to have inordinate trouble making a sound weld on the grade of steel being used.
 - b. Every Monday, five of the welders make poor welds, but the rest of the week all goes well.
 - c. One of the welders produces undercut with welding in the vertical position.
 - d. Cracking is repetitive when welding a certain steel alloy.
 - e. none of the above
- Q2-13** Which of the following is a welding inspector's responsibility prior to welding?
- a. Check joint fit.
 - b. Check preheat temperature.
 - c. Check interpass temperature.
 - d. a and b above
 - e. b and c above
- Q2-14** A 1/4" fillet weld is specified on the drawing. When the CWI inspects the weld, it is measured to be 3/8." What should be done?
- a. Reject the weld for being oversize.
 - b. Accept the weld if no weld size tolerances are specified.
 - c. Ask for an engineering review of the design.
 - d. b and c above
 - e. none of the above
- Q2-15** Fillet welds should be measured using what tolerance?
- a. + 1/16"
 - b. + 1/32"
 - c. -1/16"
 - d. -1/32"
 - e. no tolerance