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API Publication 939-B, *Repair and Remediation Strategies for Equipment Operating in Wet H_2S Service*

This report summarizes the experimental methods and findings of a research program entitled Repair and Remediation Strategies for Equipment Operating in Wet H_2S Service, conducted by the Materials Properties Council, Inc. (MPC). The program was jointly funded by MPC and the API Committee on Refinery Equipment.

The overall goal of this project was to provide guidelines for effective repair procedures for use in remediation of equipment damaged in wet H_2S service and to minimize the reoccurrence of cracking after inspection and/or repair. These included specific aspects related to:

- The use of temper bead as opposed to conventional weld repairs.
- The postweld heat treatment (PWHT) versus as-welded.
- Local thin areas in the base metal and grooves in the heat-affected zone (HAZ) which result from removal of cracks found by inspection.
- Influence of blend grinding on internal fillet-welded attachments.
- Evaluation of surface treatments.
- Serviceability of pre-existing wet H2S damage.

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June 2002
Downstream Segment
Pages: 236
Price: $125.00
Product No. C939B0

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API PUBLICATION 939-B
JUNE 2002

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Repair and Remediation Strategies for Equipment Operating in Wet H_2S Service

1 Executive Summary

This report summarizes the experimental methods and findings of a research project titled *Repair and Remediation Strategies for Equipment Operating in Wet H_2S Service* conducted by the Materials Properties Council, Inc. (MPC). The project was jointly funded by MPC and the API Committee on Refinery Equipment.

The overall goal was to provide guidelines for effective repair procedures for use in remediation of equipment damaged in wet H_2S service and to minimize the reoccurrence of cracking after inspection and/or repair. These included specific aspects related to:

a. The use of temper bead as opposed to conventional weld repairs.
b. The postweld heat treatment (PWHT) versus as-welded.
c. Local thin areas in the base metal and grooves in the heat-affected zone (HAZ) which result from removal of cracks found by inspection.
d. Influence of blend grinding on internal fillet-welded attachments.
e. Evaluation of surface treatments.
f. Serviceability of pre-existing wet H_2S damage.

To accomplish these goals, a series of large-scale exposure tests were conducted with steel test panels, containing various repair and remediation variables, welded into the body of a large-scale fabricated steel vessel filled with a pressurized H_2S containing solution prepared in accordance with NACE Standard TM0177, Solution A. Experiments were performed using test panels comprised of conventional, low sulfur conventional, hydrogen-induced cracking (HIC) resistant and advanced thermo-mechanically controlled processed steels per the ASTM A 516-70, A 285-C and A 841 specifications.

One of the most significant findings of the project was the impact of PWHT on reducing the number of toe cracks on both full penetration and attachment welds. It was demonstrated that the impact of PWHT was the result of:

1. The reduction in hardness observed in the weld area.
2. The reduction in the tensile residual stresses in the weldment.

These findings were supported by two series of experiments. One of the experiments compared the performance of as-welded versus PWHT attachments. A large number of toe cracks were produced on the as-welded attachments to conventional and low-sulfur conventional A 516-70 and no toe cracks were observed on the PWHT attachments. The difference in performance related most heavily to the range in hardness between the two techniques. In another experiment, as-welded and PWHT full penetration welds were fabricated in one of the test panels. Both the as-welded and PWHT full penetration welds possessed low hardnesses with respect to sulfide stress cracking (SSC) susceptibility; however, the as-welded, full penetration weldments still produced toe cracks despite the low hardness levels. Hence, the benefit of PWHT in this case most likely related to the reduction in tensile residual stress across the weldments combined with the reduced hardness as a result of PWHT.

Another important finding was the similarity in performance between conventional weld repairs with PWHT and temper bead weld repairs without PWHT. If repair welds are to be PWHT, then the weld repair would be made using a conventional procedure; however, if the repair welds are not to be subjected to a PWHT then the use of a temper bead technique might be chosen. In this project, the number of cracks observed in the weld area between the two procedures was nearly equivalent. Comparison of the total crack thickness in the weld area for both techniques also revealed consistency in behavior between the two techniques.

No benefit was derived from the use of blend grinding. In general, blend ground fillet attachment welds produced a greater number of toe cracks than non-treated fillet attachments. Deep toe dressings were also evaluated at fillet attachments and along full penetration welds. These results also indicated no benefit. In several instances on the low sulfur conventional A 516-70 steel, stress-oriented hydrogen-induced cracking (SOHIC) was found to initiate at the bottom of the deep toe dressings and propagate into the base plate to varying depths.

The serviceability of local thin areas and grooves was good, provided the guidelines detailed in API Recommended Practice 579 *Fitness-for-Service* were followed. In cases where both the remaining strength factor and groove radii were acceptable per the API RP 579 procedure, no through-wall oriented cracking resulted; however, in one of the cases where the groove radius was below the acceptable, SOHIC was observed to initiate and propagate to a substantial degree into the base plate.

Arc strikes and non-PWHT strip lining attachment welds were found to be detrimental to the serviceability of equipment operating in a severe wet H_2S environment. In nearly all cases, toe cracks initiated from the arc strikes and strip lining attachment welds, irrespective of the material of fabrication. However, these cracks in most cases were restricted to the HAZ.

SOHIC was produced to varying depths beneath intentional notches placed on the I.D. surface of the low sulfur conventional and HIC resistant A 516-70 test panels. The extension from the tip of the notch reached a maximum of 0.15 in. in the case of the low sulfur conventional and 0.06 in. in the HIC resistant steel; however, SOHIC was also observed

to initiate from the surface of the low sulfur conventional steel in the absence of artificial crack initiators (e.g., arc strikes, notches) in several of the metallographic sections evaluated. The maximum depth of propagation was approximately 30% of the wall thickness (0.16 in.).

Based on the results of this study, the following guidelines are given for effective repairs:

a. PWHT weld repairs, whenever feasible. Welding subjected to a PWHT will provide better reliability than non-PWHT repairs.

b. When PWHT of weld repairs on full penetration welds is not feasible, consider the use of temper bead weld techniques. Examples of temper bead weld sequences are shown in the figures in this report. Procedure qualifications should be made with hardness tests to verify the procedure.

c. The guidelines of API RP 579 can be used to evaluate grooves and local thin areas (LTAs) left from grinding out cracks and damage. Grooves and LTAs made in accordance with API RP 579 guidelines should be an acceptable alternative to weld repairs.

d. Grinding or dressing of attachment fillet welds does not appear to improve their performance. Neither does temper bead welding of attachment fillet welds appear to be beneficial. Only PWHT was shown to effectively improve the performance of attachment fillet welds in a severe wet H_2S environment.

2 References

2.1 STANDARDS, CODES, PUBLICATIONS, AND SPECIFICATIONS

The following standards, codes, publications, and specifications are cited in this publication. The latest edition or revision shall be used unless otherwise noted.

API

RP 579	*Fitness-for-Service*
Publ 939-A	*Research Report on Characterization of Cracking in Wet H_2S Service*

ASTM[1]

A 285	*Standard Specification for Pressure Vessel Plates, Carbon Steel, Low- and Intermediate-Tensile Strength*
A 516	*Standard Specification for Pressure Vessel Plates, Carbon Steel, for Moderate- and Lower-Temperature Service*
A 841	*Standard Specification for Steel Plates for Pressure Vessels, Produced by Thermo-Mechanical Control Process (TMCP)*

NACE[2]

Std TM0177	*Laboratory Testing of Metals for Resistance to Sulfide Stress Cracking and Stress Corrosion Cracking in H_2S*
Std TM0284	*Evaluation of Pipeline and Pressure Vessel Steels for Resistance to Hydrogen-Induced Cracking*

2.2 OTHER REFERENCES

1. W.A. Bonner and H.D. Burnham, "Air Injection for Prevention of Hydrogen Penetration of Steel," 11th Annual Conference of NACE, Chicago, Illinois, March, 1955.

2. R.D. Merrick, "Refinery Experiences with Cracking in Wet H_2S Environments," Paper No. 190, CORROSION/87, NACE, Houston, Texas, March 1987.

3. R.D. Kane, et.al., "Review of Hydrogen Induced Cracking of Steels in Wet H_2S Refinery Service," Proceedings of the International Conference on Interaction of Steels with Hydrogen in Petroleum Industry Pressure Vessel Service, Materials Properties Council, Inc., New York, March 1989.

4. NACE International, Committee T-8-16, *Survey of Wet H_2S Refinery Experience*: see Section 3, NACE RP 0296, "Guidelines for Detection, Repair, and Mitigation of Cracking of Existing Petroleum Refinery Pressure Vessels in Wet H_2S Environments."

5. R.D. Merrick and M.L. Bullen, "Prevention of Cracking in Wet H_2S Environments," Paper No. 269, CORROSION/89, NACE, Houston, Texas, March 1989.

6. F. Perdieus, "Re-Inspection of Previously Cracked Vessels," Proceedings of the 2nd International H_2S Materials Conference, Cortest Laboratories, Inc., Houston, Texas, January 1992.

7. M.S. Cayard, R.D. Kane, L. Kaley and M. Prager, "Research Report on Characterization and Monitoring of Cracking in Wet H_2S Service," API Publication 939, American Petroleum Institute, Washington, D.C., October 1994.

8. M.S. Cayard, R.D. Kane, L. Kaley and M. Prager, "Research Report on Characterization and Monitoring of Cracking in Wet H_2S Service," Welding Research Council Bulletin 396, Welding Research Council, New York, November 1994.

9. M.S. Cayard and R.D. Kane, "Characterization and Monitoring of Cracking of Steel Equipment in Wet H_2S Service," NACE CORROSION/95, Paper No. 329, (1995).

10. M. Iino, "Influence of Sulfur Content on the Hydrogen Induced Fracture in Linepipe Steels," Metallurgical Transactions, Vol. 10A, November 1979, pp 1691 – 1697.

11. R.D. Kane and M.S. Cayard, "Test Procedures for the Evaluation of Resistance of Steels to Cracking in Wet H_2S Environments," NACE CORROSION/94, Paper 519, Baltimore, Maryland, February 1994.

[1]American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, Pennsylvania 19428-2959, www.astm.org.

[2]NACE International, 1440 South Creek Drive, P.O. Box 218340, Houston, Texas 77218-8340, www.nace.org.

3 Acronyms

CLR	crack length ratio
CS	conventional steel
CSR	crack sensitivity ratio
CTR	crack thickness ratio
EDM	electrical discharge machining
HAZ	heat affected zone
HIC	hydrogen-induced cracking
HRS	HIC resistant steel
LT	longitudinal-transverse
LTA	local thin area
LSCS	low sulfur conventional steel
PTAW	plasma transfer arc welding
PWHT	post-weld heat treatment
RSF	remaining strength factor
SOHIC	stress-oriented hydrogen-induced cracking
SSC	sulfide stress cracking
SYMS	specified minimum yield strength
TL	longitudinal-transverse
TMCP	thermo-mechanically controlled processing

4 Introduction

This is the final report for a research program conducted by the Materials Properties Council. The program was jointly funded by MPC and the API Committee on Refinery Equipment. This project titled, *Repair and Remediation Strategies for Equipment Operating in Wet H_2S Service,* was conducted from 1993 through 1997 under the technical direction of the API Subcommittee on Corrosion and Materials. This report contains a comprehensive summary of the test facilities and experimental methods, pertinent findings and analysis of the results.

4.1 BACKGROUND

Refinery equipment in wet H_2S service is characterized by exposure to aqueous process environments containing hydrogen sulfide. Systematic inspection programs conducted by petroleum companies have shown that wet H_2S refinery processes can provide conditions for hydrogen charging of steel and widespread cracking of carbon steel equipment (1, 2). The results of operating experience surveys and technical investigations have described situations where carbon steel equipment exposed to wet H_2S environments may be susceptible to cracking via HIC, SOHIC and/or SSC (3 – 6). In some cases, cracking has been found to be minimal resulting in no significant effect on equipment integrity or serviceability. In other cases, widespread cracking initiates and/or cracks propagate to a substantial degree thus limiting the residual load and pressure capabilities of the affected equipment.

Prior to the initiation of this project, MPC organized a research project on wet H_2S cracking of steels sponsored by more than twenty major petroleum companies, steel manufacturers and equipment fabricators. This project was aimed at:

1. The development of screening procedures for evaluation of steels.
2. The determination of the influence of metallurgical processing and welding variables.
3. The better understanding of the roles of stress, environment composition and temperature.

It provided valuable fundamental information that has improved both the awareness of the causes of wet H_2S cracking and potential solutions in terms of both new construction and repair and remediation of existing equipment; however, there was a desire to validate the findings and conclusions, and to explore the complex interrelations of variables that can affect the actual behavior of large-scale equipment used in wet H_2S service.

This led to a research project to evaluate the large-scale performance of steel in wet H_2S environments (see API Publ 939-A). Conducted between 1991 and 1993, the two main objectives of the project were to demonstrate the performance of steels with varying quality and conditions, and demonstrate the effectiveness of nondestructive evaluation (NDE) techniques to characterize and monitor cracking in wet H_2S service. To accomplish these objectives, a series of large scale exposure tests were conducted with steel test panels containing welds and attachments welded into a fabricated steel vessel filled with a pressurized H_2S containing acidified solution. The results were significant (7 – 9) in terms of identifying the role of metallurgical, mechanical and welding variables on the susceptibility to wet H_2S cracking and providing information on the usefulness of various techniques for monitoring and characterizing wet H_2S damage.

Subsequent to the large-scale research effort described above, MPC organized a Phase II wet H_2S research project. Part of this new project explored the effectiveness of cracking repair and remediation strategies for equipment containing wet H_2S damage. The methodologies employed utilized small-scale or benchtop techniques to evaluate the large range of variables under study. The most feasible repair and remediation strategies were incorporated into the test panels utilized in the large-scale experiments reported in this document.

4.2 GOAL

The goals of this project were to provide guidelines for effective repair procedures for use in remediation of equipment damaged in wet H_2S service and to minimize the reoccurrence of cracking after inspection and/or repair. Specific aspects were closely examined, namely:

a. PWHT versus as-welded.
b. Temper bead as opposed to conventional weld repairs.
c. Influence of blend grinding on internal fillet welded attachments.
d. Local thin areas (LTAs) in the base metal and deep grooves in the heat affected zone (HAZ) which result from removal of cracks found by inspection.
e. Evaluation of surface treatments.

f. Behavior of low heat input welding and unintentional arc strikes.
g. Serviceability of pre-existing SOHIC.

4.3 TECHNICAL APPROACH

Three large scale exposure tests were conducted with a fabricated steel vessel (36 in. [90 cm] nominal outer diameter; 6 ft [1.8 m] long) made to ASME design requirements. Similar to the previous investigations (7 – 9), the tests utilized steel test panels fabricated with welds and attachments using practices consistent with the construction and maintenance of refinery equipment. These windows were welded into the test vessel which contained a pressurized wet H_2S test media. The specific procedures are further detailed in Section 4.

4.4 TERMINOLOGY

4.4.1 Wet H_2S Cracking

Wet H_2S cracking is a complex and often misunderstood phenomenon involving several fundamental cracking mechanisms. The complexities involved in developing a global understanding of wet H_2S cracking revolve around the fact that each cracking mechanism has different controlling metallurgical and environmental parameters as well as specific modes of attack. To properly present and discuss the results of this project, it is first necessary to clearly set forth the basic terminology related to the various mechanisms of wet H_2S cracking.

Wet H_2S cracking involves four types of mechanisms:

a. Hydrogen blistering.
b. HIC.
c. SOHIC.
d. SSC.

A brief discussion of each of these cracking mechanisms is presented below.

4.4.1.1 Hydrogen Blistering

Hydrogen blistering is the development of internal blisters in a steel caused by the accumulation of molecular hydrogen. The blisters usually occur at sites of large non-metallic inclusions, laminations or other large metallurgical discontinuities in the steel. The blisters are oriented parallel to the surfaces of the steel. The molecular hydrogen which acts to initiate and propagate these blisters arises from the absorption and diffusion of atomic hydrogen produced on the steel surface by the sulfide corrosion process. No externally applied stress is required to produce hydrogen blistering.

4.4.1.2 Hydrogen-induced Cracking (HIC)

HIC is a form of internal hydrogen damage caused by the development of small cracks oriented parallel to the surfaces of the steel. These cracks tend to link-up with other cracks due to a build-up of internal pressure in the hydrogen damage zones in the steel and the resultant stress fields around the zones. This link-up of the cracks tends to produce the characteristic stepwise crack appearance. Similar to hydrogen blistering, no externally applied stress is required for the formation of HIC.

The link-up of the small blister cracks on different planes in the steel is often referred to as "stepwise cracking" to describe the characteristics of the crack appearance. The stepwise linkage of these cracks can have a major or minor effect on reducing the load (pressure) capabilities of the equipment depending on the nature of the linkage. HIC is commonly found in steels with moderate to high impurity levels which have a high density of elongated sulfide inclusions often found in fully (Al-Si) killed steels.

4.4.1.3 Stress-oriented Hydrogen-induced Cracking (SOHIC)

SOHIC is the development of arrays of short cracks which are linked in the through-thickness direction. These arrays of cracks are typically aligned perpendicular to the tensile stress which can be produced by both applied mechanical and residual tensile stresses. SOHIC is commonly observed to occur in the HAZ microstructures in the base metal associated with fabrication and attachment welds. They may also be produced at high stress concentration points such as crack-like flaws, the tip of cracks produced by SSC in hard HAZs or where HIC intersects the weld HAZ area.

4.4.1.4 Sulfide Stress Cracking (SSC)

SSC is brittle cracking produced by a form of hydrogen embrittlement under the combined action of tensile stress and aqueous corrosion in the presence of hydrogen sulfide. SSC usually occurs in high strength steels or in high hardness regions of welds and HAZs. SSC involves the interaction of the absorbed atomic hydrogen produced by the sulfide corrosion process with internal sites in the metal lattice. Such sites can be grain boundaries and inclusions; however, SSC is usually differentiated from HIC because it does not require the recombination of the atomic hydrogen to form molecular hydrogen and the build-up of pressure at sites inside of the steel.

4.4.2 Steels

The present investigation involves the evaluation and testing of several types of steels which can be differentiated by the type of metallurgical processing received during manufacturing. In this report, the following steels were tested:

a. Conventional steel.
b. Low sulfur conventional steel.
c. HIC resistant steel.
d. Ultra-low sulfur advanced steel.

The basic attributes of each of these steels are described below.

4.4.2.1 Conventional Steel (CS)

A conventional steel is a commercially produced steel which is either hot rolled or normalized (e.g., ASTM A 516-70). It has generally moderate to high levels of impurities, particularly sulfur (i.e., 0.010 wt percent sulfur). This type of material generally has a high susceptibility to HIC in most hydrogen charging environments even under moderate exposure conditions.

4.4.2.2 Low Sulfur Conventional Steel (LSCS)

A low sulfur conventional steel is a commercially produced material which contains lower than normal levels of sulfur (i.e., 0.003 to 0.010 wt percent). This material can exhibit improved mechanical properties over conventional steels, but typically has not been processed to specifically exhibit high resistance to HIC. These steels can still show significantly high susceptibility to HIC even in moderate service environments.

4.4.2.3 HIC Resistant Steel (HRS)

The term "HIC resistant" steel is used by manufacturers and users to denote conventional grades of steel (i.e., ASTM A 516-70) which have been metallurgically processed to enhance their resistance to HIC. Such processing typically includes ultra-low sulfur levels (i.e., 0.002 wt percent sulfur), normalizing heat treatments to modify the hot rolled microstructure and possibly Ca additions to produce sulfide shape control. Shape control is important in that it produces sulfides of spherical morphology which reduce localized stresses in the vicinity of the inclusion, compared to the elongated stringers found in conventional steels. These steels are often tested to evaluate HIC resistance using conventional or modified NACE TM0284 methods for the purposes of lot acceptance or for supplemental information. These steels typically have improved resistance to HIC as compared to conventional steels; however, they may still show some degree of susceptibility to HIC and SOHIC in severe wet H_2S service conditions.

4.4.2.4 Ultra-low Sulfur Advanced Steels (TMCP)

Ultra-low sulfur advanced steels are those made by modern steelmaking and processing techniques. These steels typically have ultra-low levels of sulfur (e.g., 0.002 wt percent sulfur) and low carbon equivalents compared to conventional steels of comparable tensile strengths (i.e., ASTM A 516-70). Steels in this category are currently made to ASTM A 841 by thermo-mechanically controlled processing (TMCP) and/or accelerated cooling techniques. Also, they have reduced carbon levels as compared to conventional steels to produce ferritic or ferritic/banitic microstructures with little or no microstructural banding.

4.4.3 General Terminology

The following terms are used throughout the context of this report and are defined here for clarity.

4.4.3.1 Crack Length Ratio (CLR)

The crack length ratio or CLR provides a measure of the materials resistance to HIC as defined in NACE Standard TM0284. CLR is determined by summing the lengths of each crack array and dividing by the section width and multiplying by 100 to express it as a percentage. This is shown schematically in Figure 1.

4.4.3.2 Crack Thickness Ratio (CTR)

The crack thickness ratio or CTR also provides a measure of the materials resistance to HIC as defined in NACE Standard TM0284. CTR is determined by summing the thicknesses of each crack array and dividing by the section thickness and multiplying by 100 to express it as a percentage. This is shown schematically in Figure 1.

4.4.3.3 Crack Sensitivity Ratio (CSR)

The crack sensitivity ratio or CSR also provides a measure of the materials resistance to HIC as defined in NACE Standard TM0284. CSR is determined by summing the products of the length and thicknesses of each crack array and dividing this sum by the product of the section length and thickness and multiplying this value by 100 to express it as a percentage. This is shown schematically in Figure 1.

4.4.3.4 Longitudinal-transverse (LT) Section

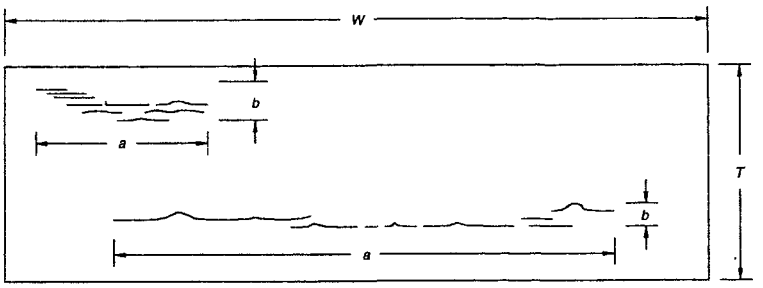
A longitudinal-transverse or LT section is a metallographic section in which the perpendicular to the polished face is parallel to the longitudinal or rolling direction.

4.4.3.5 Transverse-longitudinal (TL) Section

A transverse-longitudinal or TL section is a metallographic section in which the perpendicular to the polished face is perpendicular to the longitudinal or rolling direction.

5 Experimental Procedures

The materials evaluated, along with specimen configurations, general conditions of exposure, and post exposure evaluations conducted, are summarized below.



$$\text{Crack Sensitivity Ratio, CSR} = \frac{\sum (a \times b)}{W \times T} \times 100$$

$$\text{Crack Length Ratio, CLR} = \frac{\sum a}{W} \times 100$$

$$\text{Crack Thickness Ratio, CTR} = \frac{\sum b}{T} \times 100$$

Method Of Measuring Cracking Severity

Figure 1—HIC Damage Evaluation Formulas Given in NACE TM0284

5.1 MATERIALS EVALUATED

The present investigation involved the testing and evaluation of the following steels:

a. Conventional steel (CS) (two heats).
b. Low sulfur conventional steel (LSCS).
c. HIC resistant steel (HRS).
d. Ultra-low sulfur advanced steel (TMCP).

The basic attributes of the steels were described in 3.4.2. The material compositions and mechanical property data for each of the base plate materials are presented in Table 1.

5.2 TEST PANEL CONFIGURATIONS

As previously mentioned, the goals and objectives of this program were accomplished using a series of large-scale tests on a 36 in. (90 cm) nominal diameter pressure vessel approximately 6 ft (1.8 m) long. The test vessel is shown in Figure 2.

Each large-scale test incorporated the use of a test panel measuring approximately 2 ft by 2 ft (0.6 m by 0.6 m). This approach is detailed schematically in Figure 3. With the exception of the test panel, the entire ID surface of the vessel was coated with T31, ECTFE material, to protect the remaining vessel from damage. The T31 process is comprised of a primer and multiple topcoats of a partially fluorinated copolymer. The T31 coating is a true thermoplastic and was applied in this application in the thickness range of 0.015 to 0.025 in. (0.38 to 0.64 mm).

During insertion of the test panel into the vessel, the coated area in the vicinity of the weld underwent localized damage. The weld around the test panel and any additional damaged areas caused by excessive heat, arc strikes, etc. were repaired with a modified thermoplastic hand-applied coating. Both coatings utilized in this project were successful in protecting the vessel from damage for the total duration of testing.

5.2.1 Large-scale Exposure 1 Test Panel Configuration

The test panel utilized for the first exposure in this study is shown in Figure 4.It consisted of four quarter panels cold-rolled to the appropriate radius for welding together and subsequent welding of the completed panel into the body of the test vessel. Each quarter panel measured approximately 1 ft by 1 ft (0.3 m by 0.3 m). The typical structure of the three materials (InterCorr 2289 [CS], 3201 [HRS] and 4745 [CS]) are shown in Figures 5, 6 and 7, respectively.

Prior to panel fabrication, the four cold-rolled quarter panels were each pre-exposed, one sided to either NACE Standard TM0177, Solution A or NACE Standard TM0284, Solution B as indicated in Figure 4. The pre-exposures were conducted by coating the entire O.D. surface of the panel and 1 in. on the I.D. wrapped around the panel edges.

Each entire quarter panel was subsequently exposed, in separate exposure tanks, to the respective solutions saturated with 100% H_2S at ambient temperature and pressure for 30 days. At the conclusion of the exposures, strips were sectioned off the edges and duplicate specimens (LT orientation) were polished for metallographic examination and crack measurement using the measurement details and crack coding detailed in Figure 8.

Table 1—Materials Evaluated

InterCorr # Grade	2099 A 516-70	2280 A 516-70	2289 A 516-70	3201 A 516-70	3247 A 516-70	3250 A 841	4745 A 285-C[1]
Classification	LSCS	CS	CS	HRS	HRS	TMCP	CS
C	0.21	0.22	0.24	0.21	0.15	0.09	0.18
S	0.007	0.020	0.025	0.001	0.001	0.001	0.021
P	0.013	0.027	0.007	0.005	0.005	0.003	0.009
Mn	1.08	1.11	1.07	1.09	1.15	1.18	1.06
Cu	0.010	0.008	0.040	0.060	0.200	0.010	0.120
Ni	0.010	0.040	0.030	0.050	0.190	0.230	0.030
Cr	0.020	0.020	0.020	0.120	0.010	0.020	0.050
Mo	0.010	0.004	0.004	0.020	0.000	0.070	0.010
Ti				0.003			0.003
V		0.012	0.004	0.001	0.000	0.040	0.001
Nb		0.001	0.004	0.002	0.018	0.020	0.003
Si	0.21	0.27	0.23	0.26	0.26	0.25	0.30
Al	0.039	0.031	0.058	0.020	0.035	0.029	0.028
C.E.[2]	0.48	0.50	0.51	0.48	0.44	0.39	0.45
YS (ksi)	49.0	52.0	49.0	49.6	49.5	67.0	45.0
UTS (ksi)	76.0	76.9	78.5	76.2	72.2	79.0	70.2
Elong. (%)	45.0	42.0	26.0	27.0	26.0	25.0	33.5

[1] Mn content exceeds specification.
[2] Carbon Equivalent = C + Mn/4

The quarter panels were subsequently sectioned to their correct dimensions and welded together using a heat input of 20 – 25 kJ/in. with no preheat and no subsequent PWHT. At one location in the HAZ of the longitudinal and one location in the HAZ of the circumferential weld on each quarter panel, a 3 in. long groove was ground out approximately $^3/_{16}$ – $^1/_4$ in. deep to simulate a groove which was created after grinding out a crack. The groove was repaired or filled using a conventional welding procedure. This involved depositing an E7018 filler using a 20 – 25 kJ/in. heat input with no preheat. No effort was made to sequence the beads, three of which were required to fill the groove. Aside from these eight grind-out, conventional weld repairs, eight additional grind-outs were conducted at adjacent locations on the longitudinal and circumferential welds. These subsequent weld repairs were conducted using a temper bead technique. This technique consisted of depositing E7018 filler in multiple passes (six total) in specific sequencing steps to temper back the hardness and HAZ of the previous bead(s). Schematics of actual sections for the conventional and temper bead weld repairs are shown in Figures 9 and 10, respectively.

As shown, the conventional weld repair produced bead hardnesses of approximately HRB 88 to 95 converted from 500 gram Vickers microhardness data. The corresponding HAZ hardnesses ranged from approximately HRB 95 subsurface to HRC 35 at the surface. The temper bead repair produced bead hardnesses ranging from HRB 90 – 97. The corresponding HAZ hardnesses ranged from HRC 28 subsurface to HRB 93 at the surface. Hence, the temper bead technique was successful in reducing the hardness of the surface HAZ.

Attachments were also welded to each quarter panel on the I.D. surface. Two attachments were oriented longitudinally and two circumferentially on each quarter panel. One side of each attachment was welded using a one pass E7018 filler at 20 – 25 kJ/in. heat input with no preheat. The bead hardness measured approximately HRB 91 (converted from 500 gram Vickers microhardness) and the HAZ ranged from HRC 32 – 37. The opposite side was welded using a multiple pass temper bead technique with an E7018 filler at 20 – 25 kJ/in with no preheat. The bead hardnesses ranged from HRB 93 – 97 and HAZ hardnesses ranged from HRC 24 – 31. The HAZ hardnesses were reduced approximately seven HRC points; however, the hardness was still considered high from the standpoint of SSC susceptibility. Schematics of the resulting profiles for the conventional fillet and temper bead fillet attachment welds are shown in Figure 11.

Both sides of one longitudinal and one circumferential attachment on each quarter panel were blend ground to profile the weld root to a smooth transition to the I.D. surface of the test panel. This blend grinding was solely aimed at reduc-

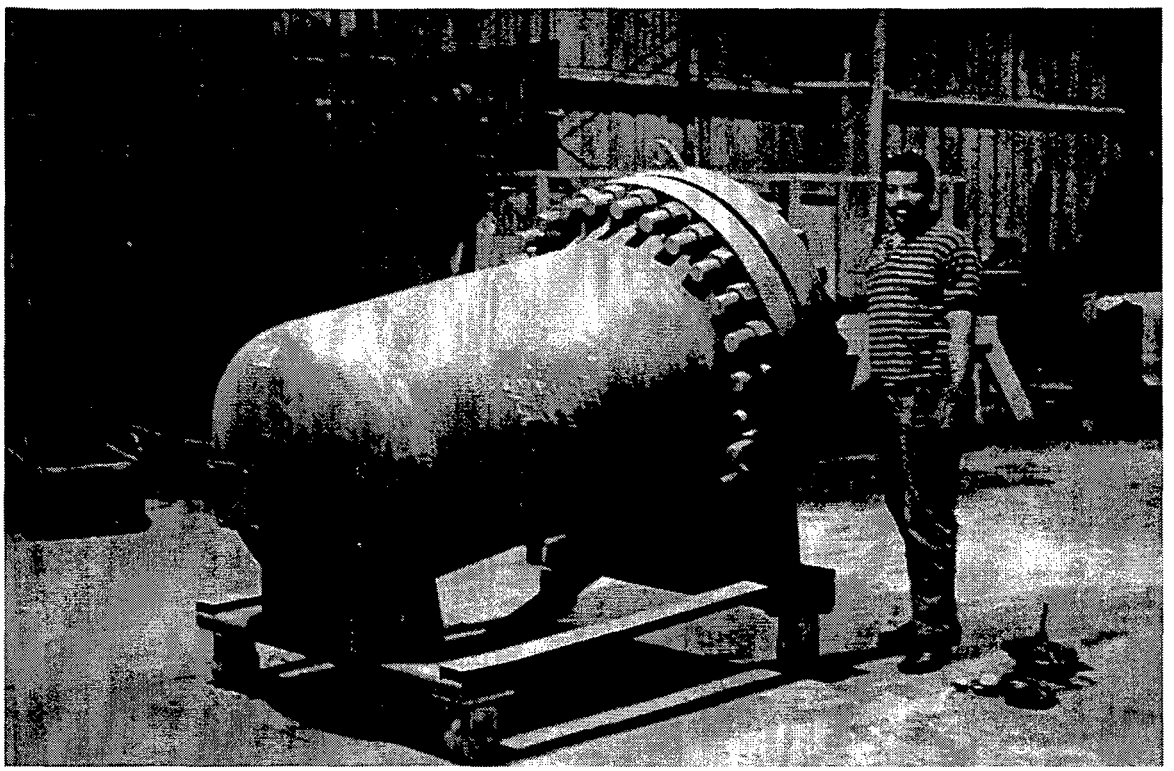


Figure 2—Large-scale Pressure Vessel Used for this Study (PN-3040-1)

ing the stress concentration at the toe of the fillet weld. No intent was made to remove the last pass, high hardness, HAZ region of the base metal adjacent to the root of the fillet weld. Detailed sectioning schematics and cracking results for the Exposure 1 test panel can be found in Appendix A.

5.2.2 Large-scale Exposure 2 Test Panel Configuration

The test panel utilized for the second exposure in this study is shown in Figure 12. It consisted of four quarter panels cold-rolled to the appropriate radius for welding together and subsequent welding of the completed panel into the body of the test vessel. Each quarter panel measured approximately 1 ft by 1 ft (0.3 m by 0.3 m). The typical structure of InterCorr 3201 (HRS) and 4745 (CS) are shown in Figures 6 and 7, respectively. The typical structure for InterCorr 2280 (CS) is shown in Figure 13.

Prior to panel fabrication, the four cold-rolled quarter panels were each pre-exposed, one sided to either NACE Standard TM0177, Solution A or NACE Standard TM0284, Solution B as indicated in Figure 12. The pre-exposures were conducted using the same procedures described in 4.2.1. At the conclusion of the exposures, strips were sectioned off the edges and duplicate specimens (LT orientation) were polished for metallographic examination and crack measurement.

The quarter panels were subsequently sectioned to the correct dimension and the full longitudinal weld joining the four quarter panels was welded using a heat input of 20 – 25 kJ/in. with no preheat. One-half of the circumferential weld of each quarter panel (in the center of the completed panel) was also welded using a heat input of 20 – 25 kJ/in. with no preheat. Hence at this stage the outermost 6 in. of the circumferential weld locations were non-welded. The purpose was to evaluate PWHT versus as-welded full penetration welds.

Similar to the Exposure 1 test panel, a 3-in. long groove was ground out approximately $^{3}/_{16}$ – $^{1}/_{4}$ in. deep to simulate a groove which was created after grinding out a crack at two locations in the HAZ of the longitudinal weld on each quarter panel. At this stage the two innermost grooves were repaired using a conventional welding procedure. This involved depositing an E7018 filler using a 20 – 25 kJ/in. heat input with no preheat. No effort was made to sequence the beads, three of which were required to fill the groove. At this stage, the outermost four grooves remained unrepaired.

Next, two attachments were welded onto each quarter panel using a single pass E7018 filler at 20 – 25 kJ/in. with no preheat. One attachment was welded in the longitudinal orientation and the second on each quarter panel was welded in the circumferential orientation. Subsequent to welding these eight attachments, the entire panel was subjected to a PWHT at 1150°F for one hour at temperature followed by air cooling.

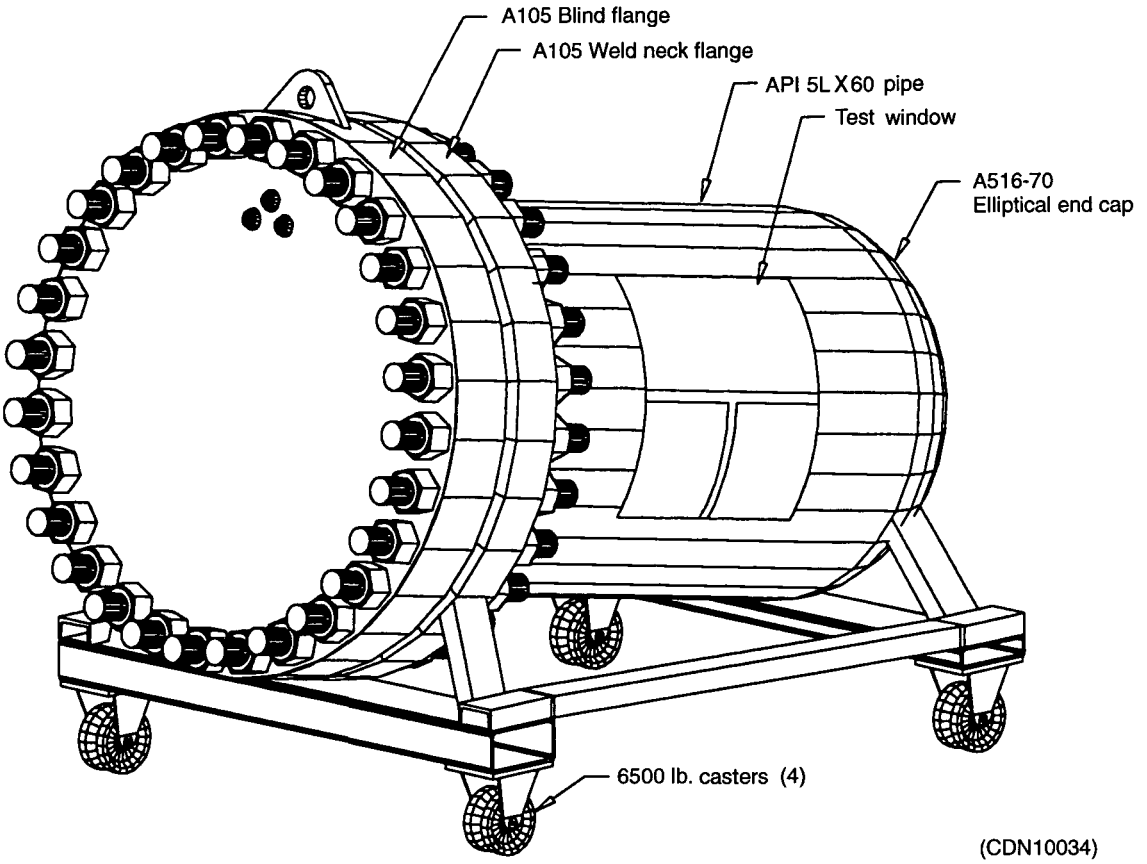


Figure 3—Schematic of the Large-scale Pressure Vessel Detailing the Materials Used

Following PWHT, the remaining eight attachments were welded onto the test panel using the same conventional welding technique described previously. The four unrepaired grooves were repaired using a temper bead welding technique, as was done for the Exposure 1 test panel. The technique consisted of depositing an E7018 filler in multiple passes (6 total) in specific sequencing steps to temper back the bead hardness and HAZ produced by the previous bead(s).

A schematic of the full penetration circumferential weld in the as-welded condition is shown in Figure 14. The bead hardness was approximately HRB 87 (converted from 500 gram Vickers). The HAZ hardness was approximately HRB 97 and HRB 98 at the I.D. surface. A schematic of the full penetration longitudinal weld, which was subjected to a PWHT, is shown in Figure 15. The bead hardness was approximately HRB 83. The HAZ hardness was approximately HRB 85 throughout the thickness. Hence PWHT reduced the bead hardness approximately 5 HRB points and the HAZ regions approximately 15 HRB points.

Schematics of actual sections for the conventional (with PWHT) and temper bead weld (as-welded) repairs are shown in Figures 16 and 17, respectively. As shown, the conventional weld repair with PWHT produced bead hardnesses of approximately HRB 86 converted from 500 gram Vickers microhardness data. The corresponding HAZ hardnesses were approximately HRB 85 throughout the extent of the repair. The temper bead repair produced bead hardnesses of approximately HRB 92. The corresponding HAZ hardnesses ranged from HRB 86 subsurface to HRB 93 at the surface. Hence, the temper bead technique produced higher hardness than the conventional weld repair with subsequent PWHT; however, hardnesses for both repairs were considered soft from the standpoint of SSC susceptibility.

In addition to the above variables, the serviceability of unrepaired grooves/local thin areas (LTAs) was also evaluated. The profiles were derived using a remaining strength factor (RSF) of 0.8. A schematic representation of the three profiles is provided in Figure 18. Profile 1 was positioned on one side of each fillet attachment. Profile 2 was centered at two places on the longitudinal weld and Profile 3 was positioned at two places on the circumferential weld. The position of Profile 3 was such that one-half the metal removed was in the as-welded circumferential weld and the other half in the PWHT circumferential weld. Based on the width and length of the profiles, Profile 1 would be classified as a groove and Profiles 2 and 3 would each be classified as an LTA.

Note: All three profiles would be acceptable per API RP 579 *Fitness-For-Service* procedure.

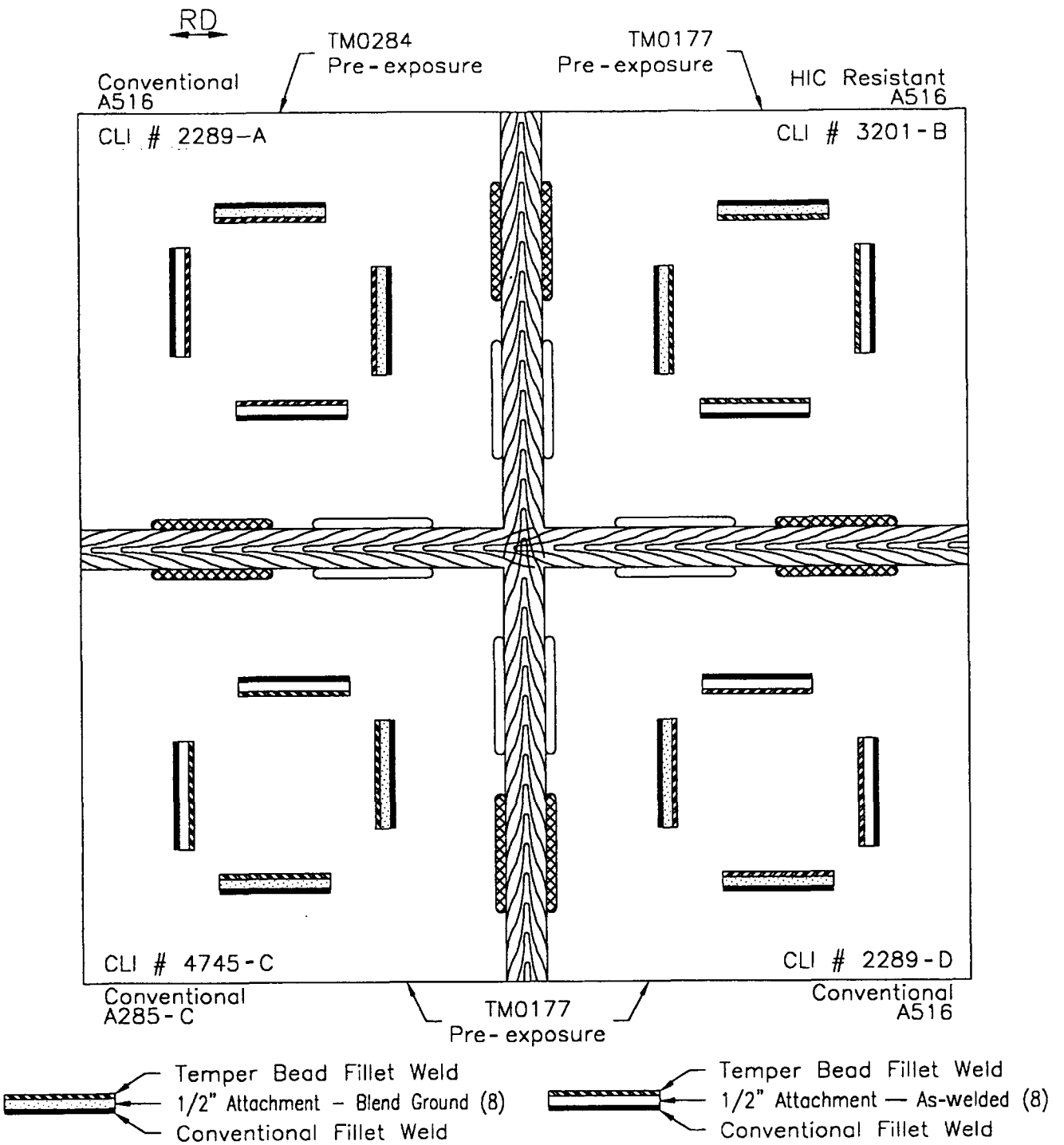


Figure 4—Schematic of the Exposure 1 Test Panel Detailing the Variables Evaluated

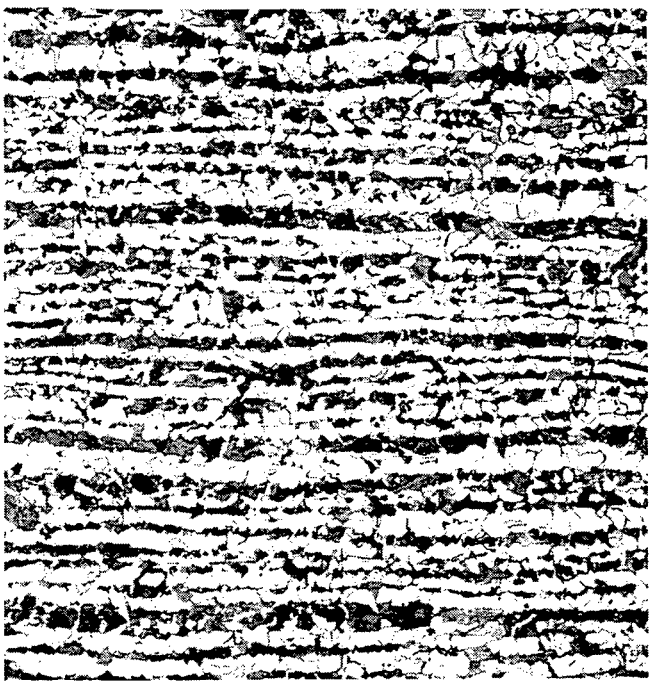


Figure 5—Structure of InterCorr 2289 CS. Magnification 200 × (PN 4464-6)

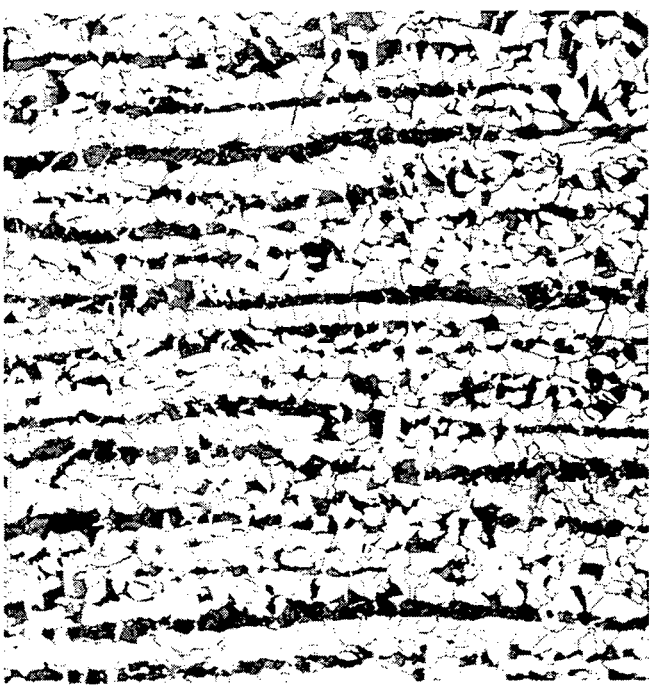


Figure 6—Structure of InterCorr 3201 HRS. Magnification 200 × (PN 4464-7)

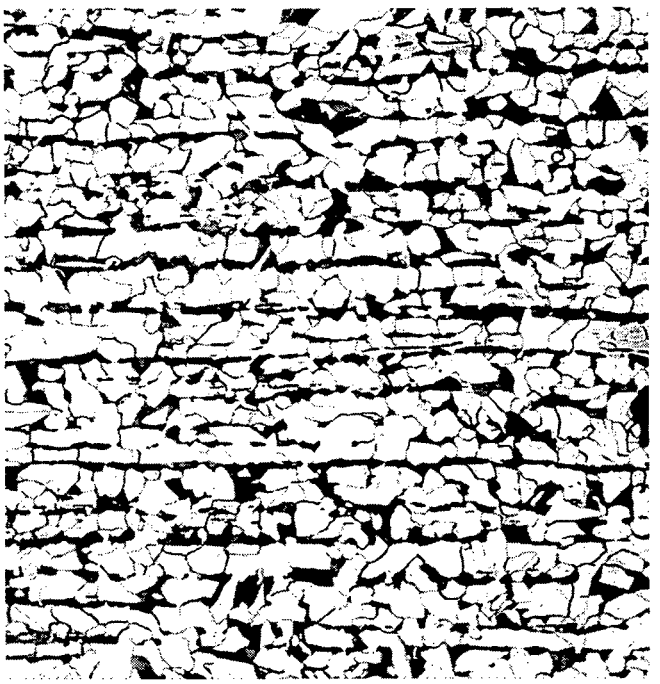


Figure 7—Structure of InterCorr 4475. Magnification 200 × (PN 4464-5)

The use of strip lining the I.D. surface was also investigated in this test panel. AISI 304L sheet, 0.109-in. thick was welded on the I.D. in two places across the circumferential weld using an AISI 309L filler. The objective of this test panel was not to evaluate the ability of the liner to reduce hydrogen permeation. Experience has proven that this method provides adequate protection to the underlying base metal thereby preventing or minimizing further damage. The variable under evaluation with this surface treatment was the interaction/behavior of the lining attachment welds. Detailed sectioning schematics and cracking results for the Exposure 2 test panel can be found in Appendix B.

5.2.3 Large-scale Exposure 3 Test Panel Configuration

The test panel utilized for the third exposure in this study is shown in Figure 19. It consisted of four quarter panels cold-rolled to the appropriate radius for welding together and subsequent welding of the completed panel into the body of the test vessel. Each quarter panel measured approximately 1 ft by 1 ft (0.3 m by 0.3 m). The typical structure of InterCorr 2289 (CS) is shown in Figure 5. The typical structure for InterCorr 2099 (LSCS), 3247 (HRS) and 3250 (TMCP) are shown in Figures 20, 21, and 22, respectively.

Prior to panel fabrication, the LSCS and HRS panels were notched in the locations indicated in Figure 19 using a plunging electrical discharge machining (EDM) procedure. The purpose of the notching was to assist in the initiation of

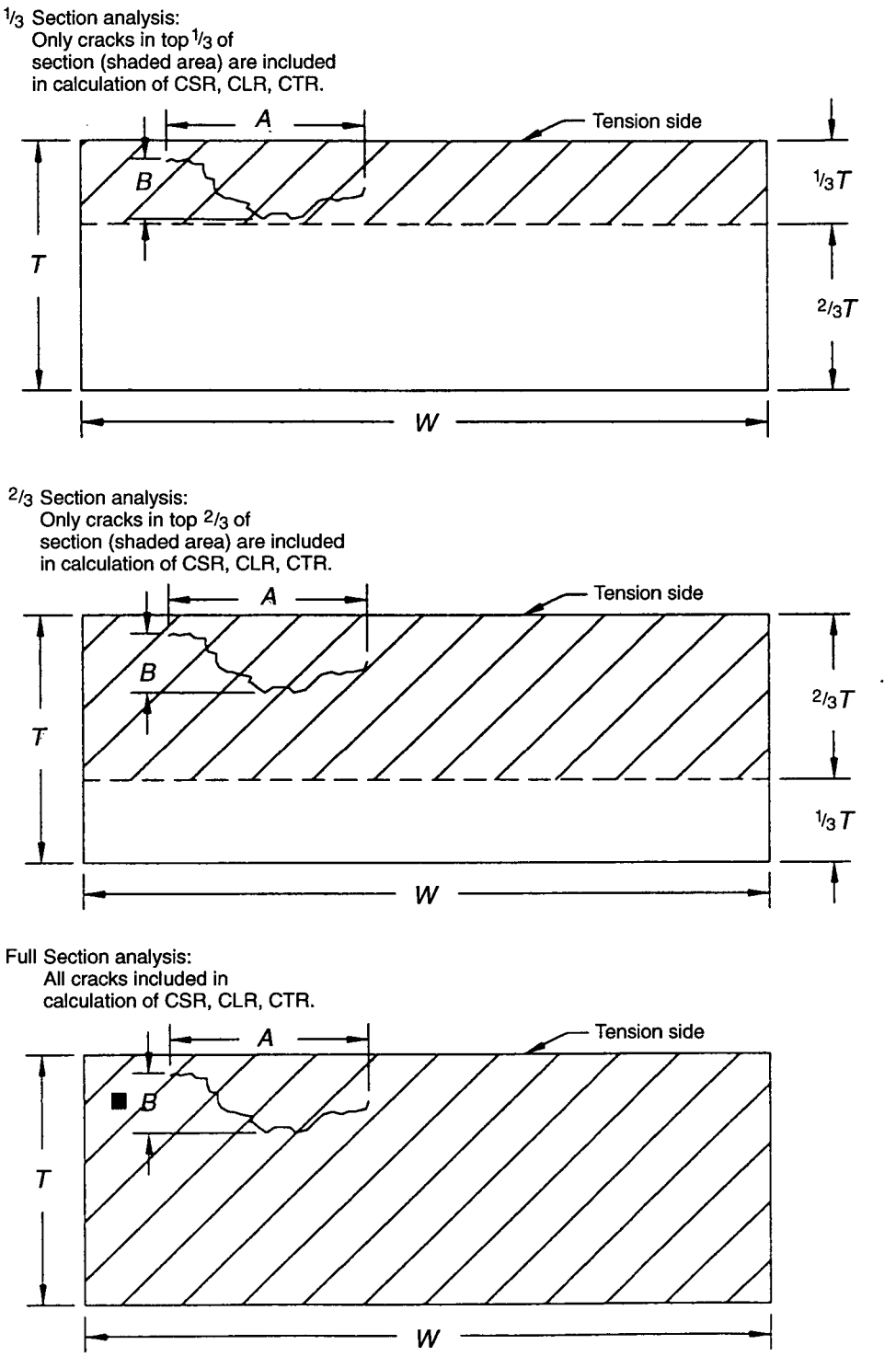


Figure 8—Location Coding Used to Measure and Present the Detailed Cracking Data

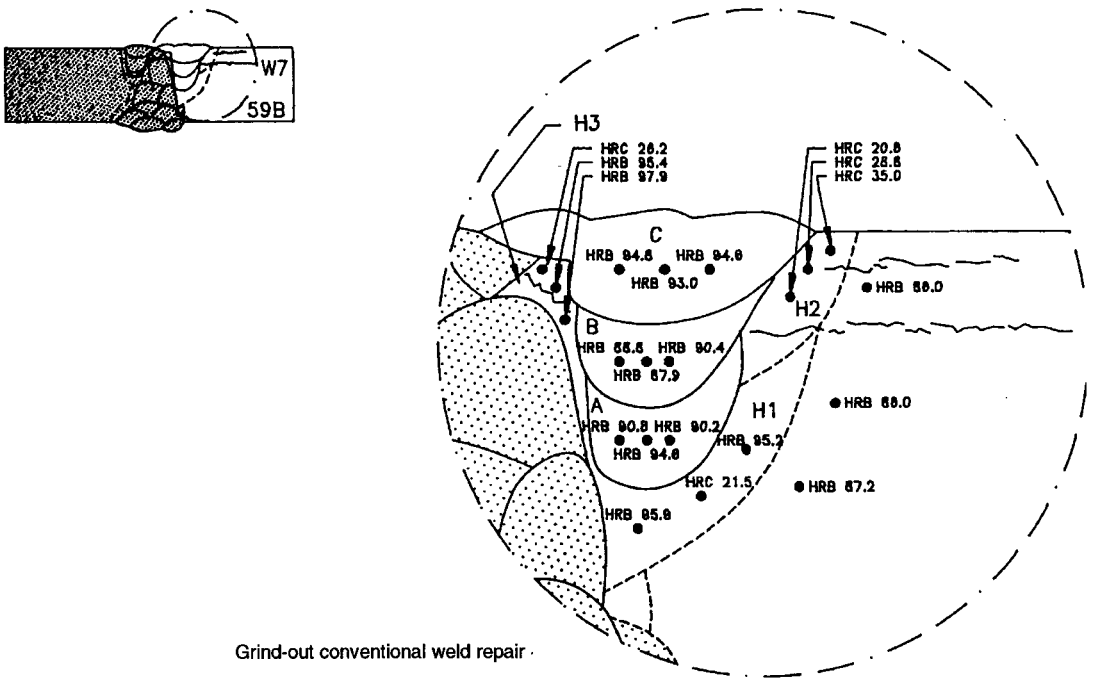


Figure 9—Microhardness Survey Results from the Grind-out, Conventional Weld Repair Evaluated in Exposure 1 Test Panel

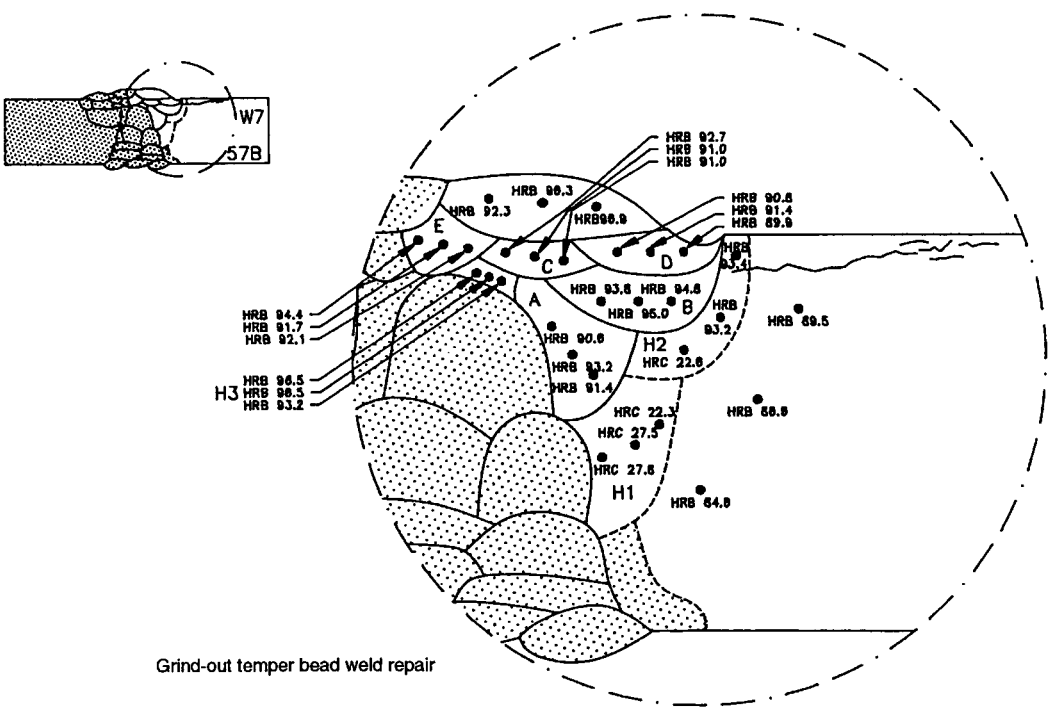


Figure 10—Microhardness Survey Results from the Grind-out, Temper Bead Weld Repair Evaluated in the Exposure 1 Test Panel

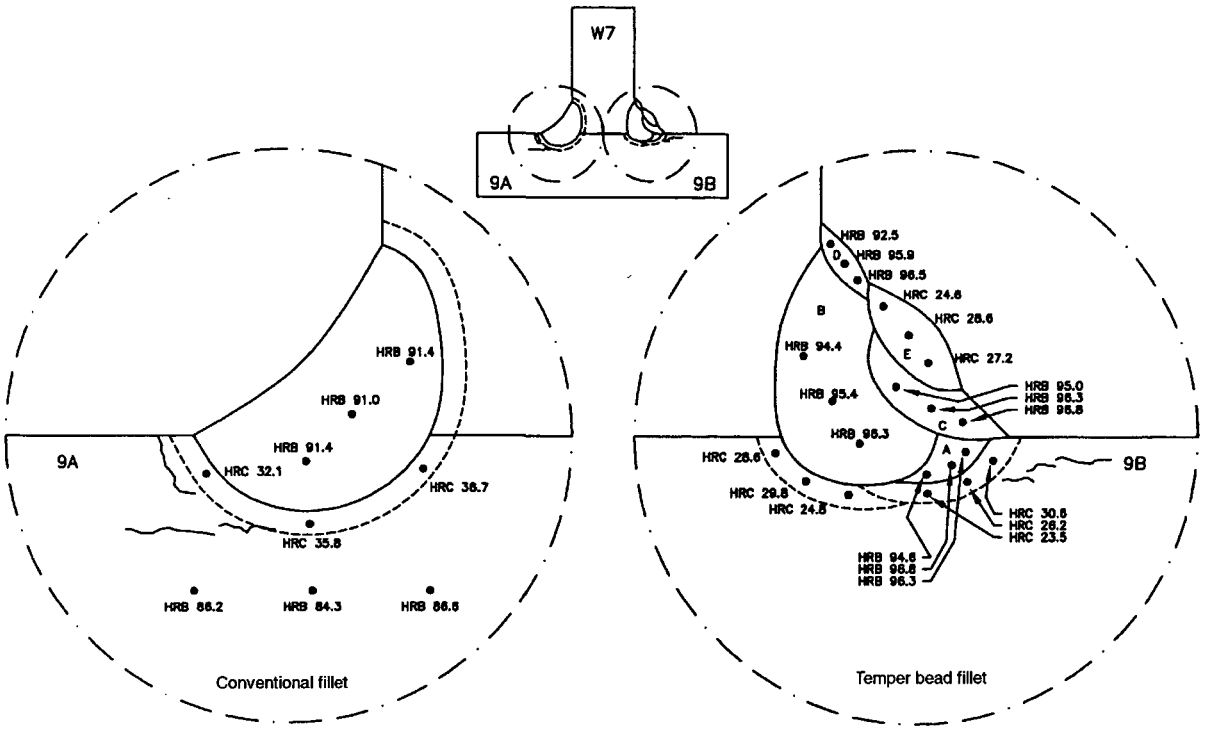


Figure 11—Microhardness Survey Results from Both Conventional and Temper Bead Attachment Welding Evaluated in the Exposure 1 Test Panel

SOHIC damage beneath the notch prior to insertion of the test panel into the test vessel and subsequent large-scale exposure. Each of the two quarter panels were strain gaged and loaded in three point bending in I.D. tension across the notch. The applied hoop stress was 34,200 psi which corresponded to 90% of the specified minimum yield strength (SMYS).

Barnacle cells were affixed over the notch and subsequently exposed to NACE Standard TM0177, Solution A for seven days. The exposed region was a 2 in. by 5 in. rectangle centered over the notch.

The remaining exposed surface area was coated with a modified thermoplastic hand applied coating. A photograph of the exposure facility is shown in Figure 23.

Following the exposures, the quarter panels were submitted to two inspection companies for sizing. The first company was unable to locate any SOHIC in either panel. The second company did locate SOHIC in the LSCS panel but was hesitant to size the depth with any degree of confidence. This same company indicated that only slight SOHIC extension, if any, was present beneath the notch in the HRS panel; however, based on other testing of these same heats of steel, Inter-Corr was confident SOHIC extension was present; however, metallographic sectioning at this stage was not possible. Cracking was found beneath the notch in both materials following the large-scale vessel exposure as determined by metallographic sectioning.

An Inconel 625 patch was welded onto the O.D. of the CS and TMCP quarter panels in the areas indicated in Figure 19. The areas measured 3.5 in. by 3.5 in. The Inconel 625 material was applied using a plasma transfer arc weld process (PTAW). The purpose of this O.D. patch was to determine if a higher hydrogen concentration could be attained due to the increased diffusion barrier for hydrogen at the O.D. surface.

Next, one attachment was welded onto the CS, LSCS and HRS quarter panels in the longitudinal orientation using a single pass E7018 filler at 20 – 25 kJ/in. with no preheat. One additional attachment was welded onto the TMCP quarter panel using an E7018 filler on one side and an E7016-G filler on the other side of the attachment. This electrode was recommended for welding the TMCP steel. The carbon equivalent of the E7016-G more closely matched that of the A841 TMCP steel. Hence, using an E7018 filler on one side and E7016-G filler on the opposite side of this attachment allowed direct comparison of the behavior on the TMCP panel. The four quarter panels, each containing one attachment, were subjected to a PWHT at 1150°F for 1 hour at temperature followed by air cooling. This was conducted for the sole purpose of postweld heat treating the fillet attachments (one per quarter panel).

The quarter panels were subsequently sectioned to their correct dimensions and welded together using a heat input of 20 – 25 kJ/in. with no preheat and no subsequent PWHT. Next, two additional attachments were welded onto the LSCS and HRS quarter panels in the longitudinal orientation using a single pass E7018 filler at 20 – 25 kJ/in. with no preheat and no subsequent PWHT. One additional attachment was welded

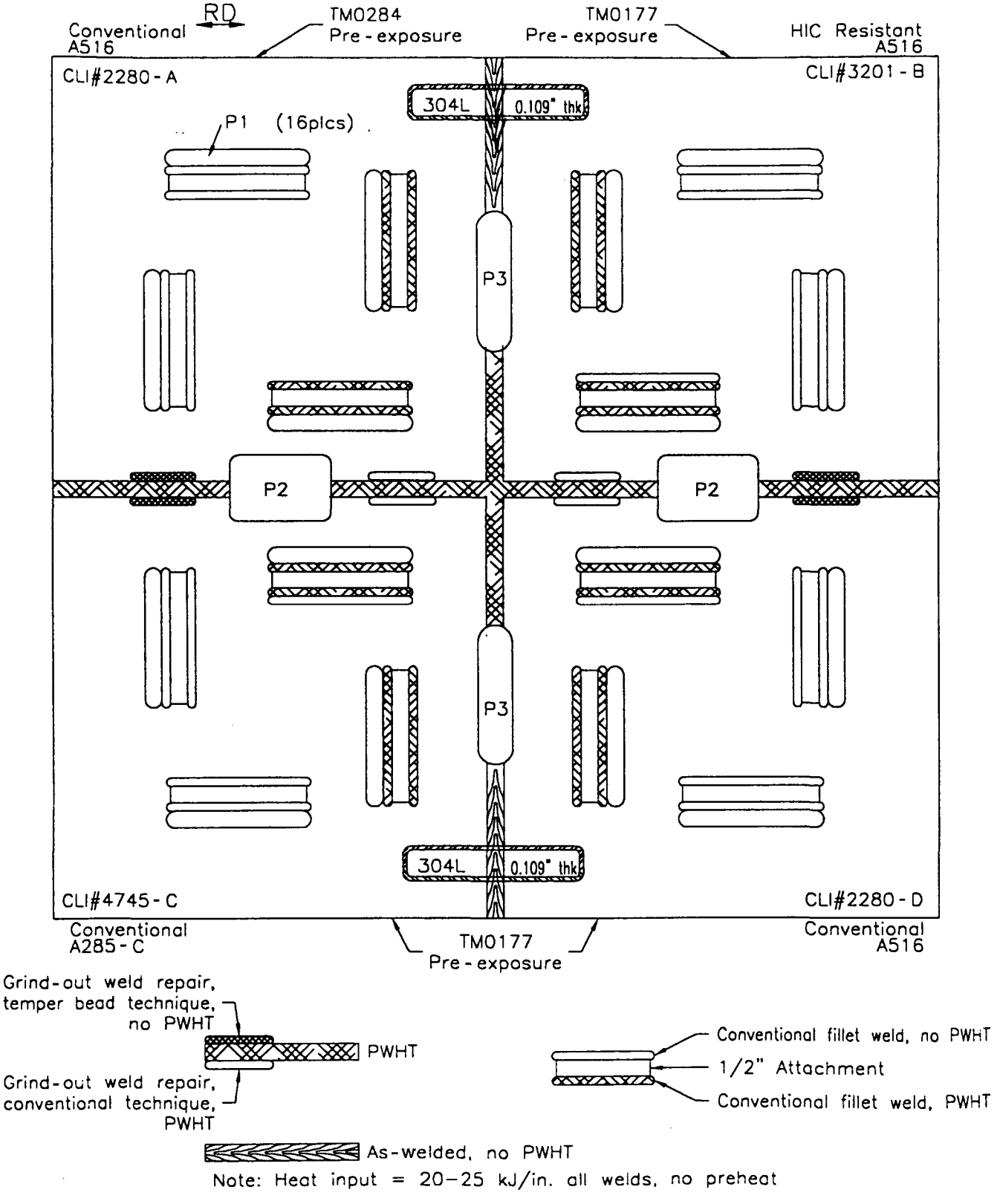


Figure 12—Schematic of the Exposure 2 Test Panel Detailing the Variables Evaluated

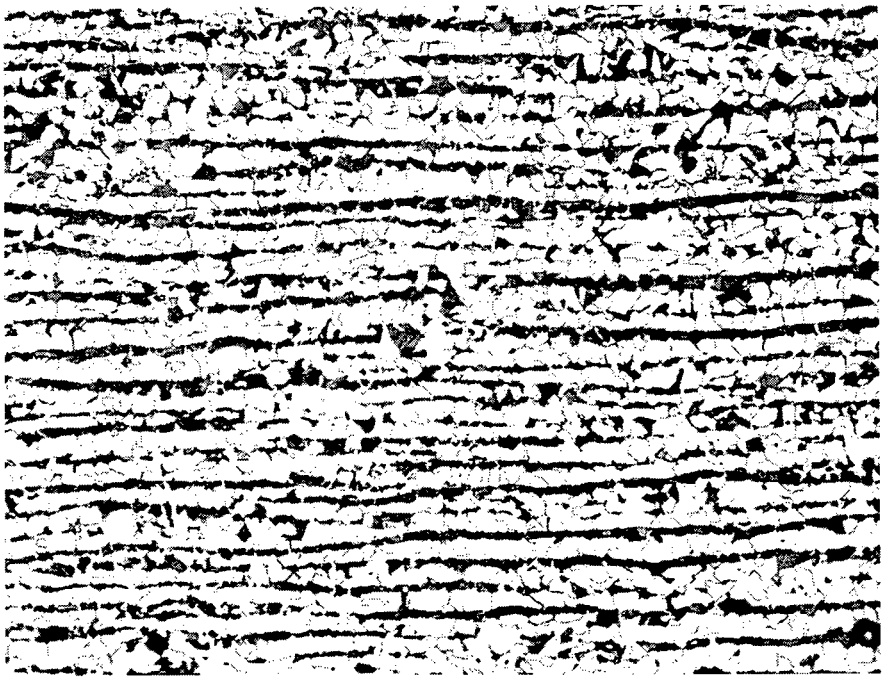


Figure 13—Structure of InterCorr 2280 CS.
Magnification 200 × (PN 4464-4)

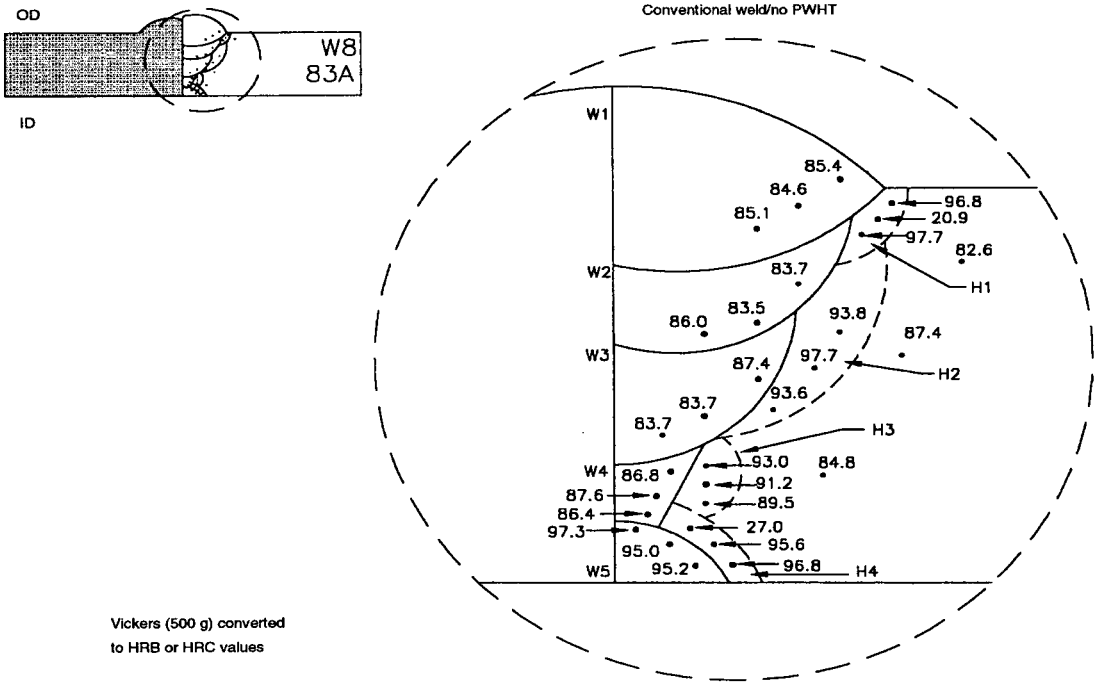


Figure 14—Microhardness Survey Results from the
Conventional Full Penetration Weld without PWHT

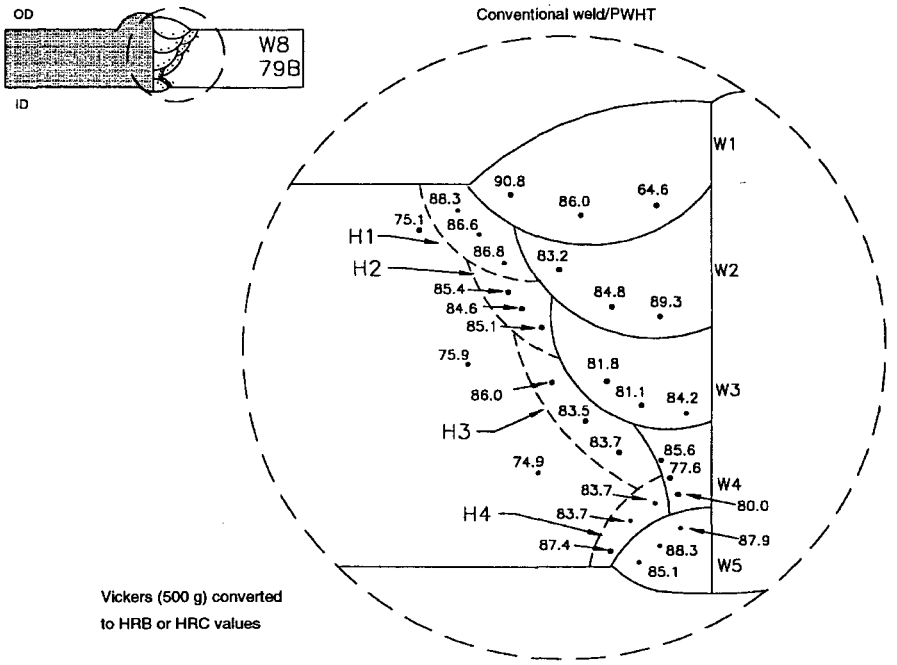


Figure 15—Microhardness Survey Results from the Conventional Full Penetration Weld with PWHT

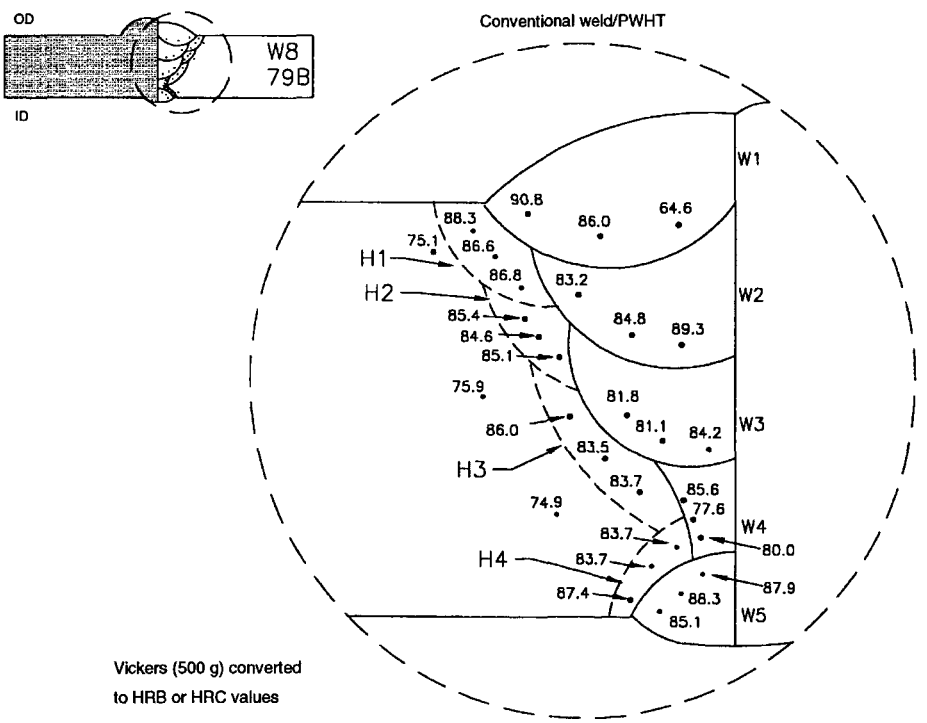


Figure 16—Microhardness Survey Results from the Grind-out, Conventional Weld Repair with PWHT

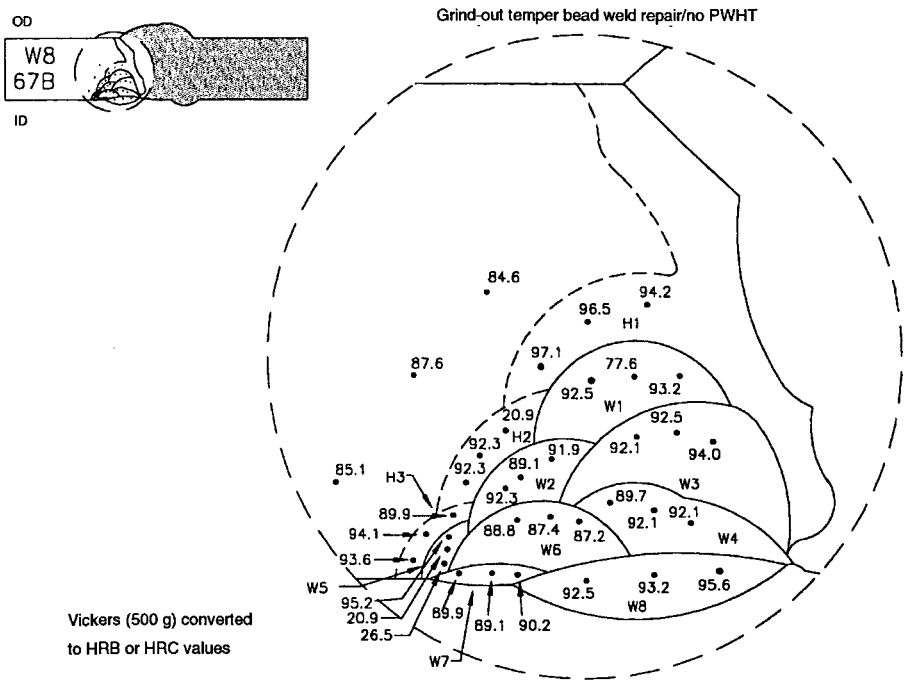


Figure 17—Microhardness Survey Results from the Grind-out, Temper Bead Weld Repair without PWHT

onto the CS quarter panel in the longitudinal orientation using the same single pass welding procedure just described and one additional attachment was welded onto the TMCP quarter panel in the longitudinal orientation using an E7018 filler on one side and an E7016-G filler on the other side of the attachment. All four of these attachments were left in the as-welded condition for comparison to those attachments subjected to a PWHT.

Recall the evaluation of blend grinding conducted on the Exposure 1 test panel, where the fillet welds were blend ground to make a smooth transition to the I.D. surface of the panel. No surface HAZ metal was removed in that evaluation. In the current exposure panel, one attachment from the LSCS and HRS quarter panels was blend ground in a manner which removed the surface HAZ region of the base metal. These blend ground areas or toe dressings were approximately 0.125 in. deep; hence, producing a groove. These deep toe dressings were also applied at one location on each quarter panel along the circumferential weld.

To evaluate potential accidental initiators for SSC, arc strikes and low heat input (LHI) weld beads were intentionally added to the test panel. One 3 in. line of arc strikes was added to the LSCS and HRS quarter panels and two lines of arc strikes were added to the CS and TMCP quarter panels, one of which was positioned opposite the O.D. Inconel 625 patch. Evaluation of the LHI welds beads was restricted to the CS and TMCP quarter panels. Two beads were placed on both quarter panels, one of which was positioned opposite the O.D. Inconel 625 patch.

In addition to the above variables, the serviceability of unrepaired grooves was also evaluated in this exposure panel. The groove profiles in the Exposure 3 test panel represent the latest evaluation criteria in API RP 579.

The intent was to evaluate grooves which did not require derating of the vessel (i.e., RSF > 0.9). However, the root radius of each of the three grooves was reduced, incrementally, to produce a higher stress concentration. A schematic of the three grooves and their respective locations on the test panel are shown in Figure 19. The length of all three grooves was 2 in. Groove 1 was acceptable per API RP 579. Grooves 2 and 3 would have been re-classified as a crack and re-analyzed as such due to the sharpness of the root radii. Detailed sectioning schematics and cracking results for the Exposure 3 test panel can be found in Appendix C.

5.3 EXPERIMENTAL OVERVIEW

Several aspects of the experimental procedures are common to all of the experiments such as solution, temperature, pressure and exposure duration. The test solution for all of the evaluations corresponded to NACE Standard TM0177, Solution A (5.0 weight percent sodium chloride plus 0.5 weight percent glacial acetic acid in distilled water).

The solution was saturated with 100 mole percent H_2S at ambient temperature and pressure. H_2S concentration and solution pH were monitored throughout the test period. All of the evaluations were conducted at room temperature. The test duration ranged from 11 – 14 days. The test pressure was applied hydrostatically.

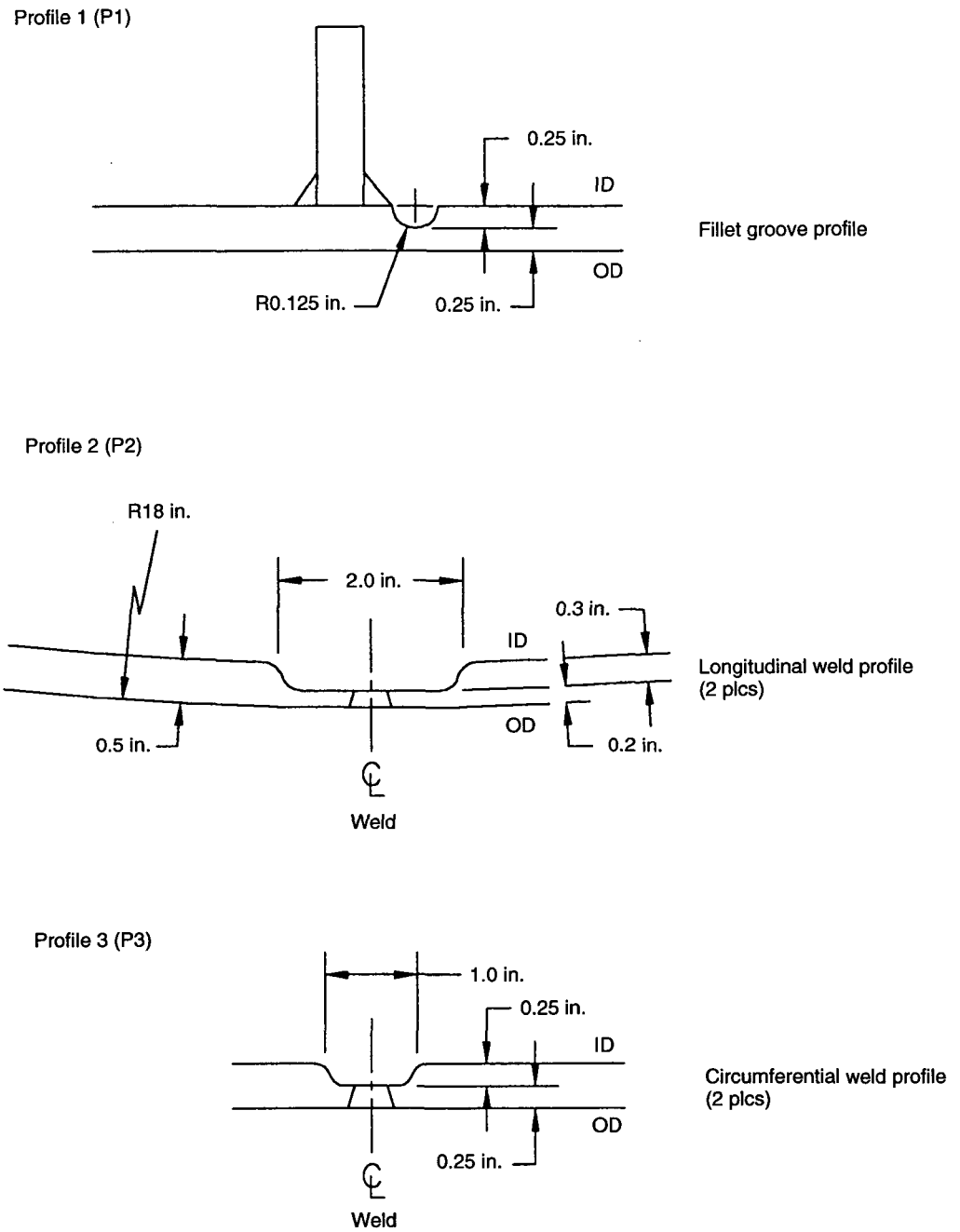


Figure 18—LTA/Groove Profiles Evaluated in the Exposure 2 Test Panel

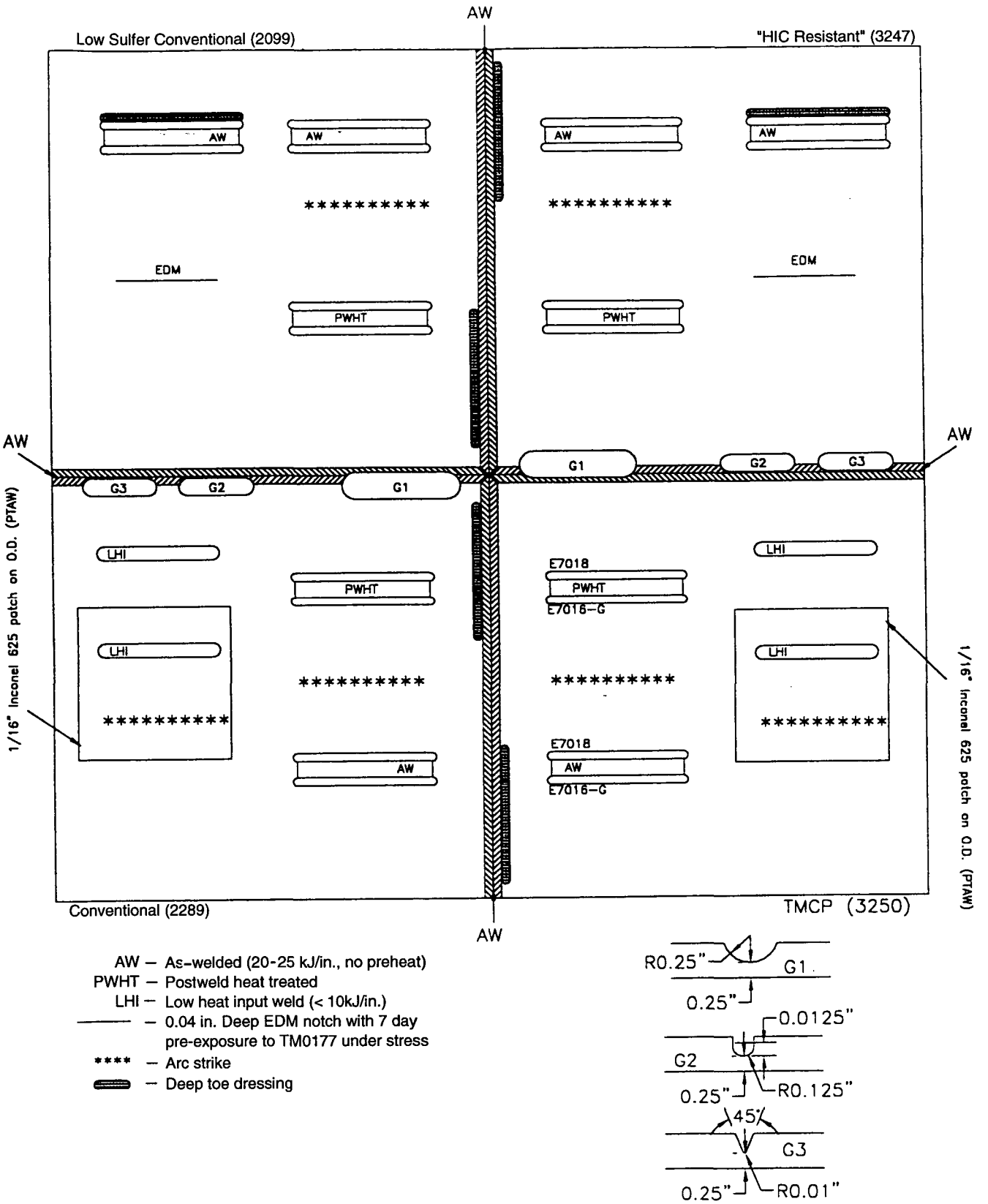


Figure 19—Schematic of the Exposure 3 Test Panel Detailing the Variables Evaluated

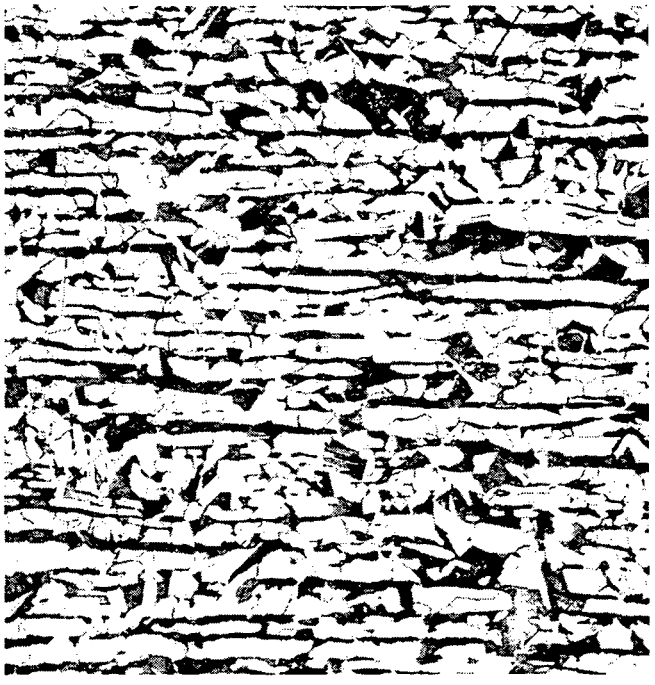


Figure 20—Structure of InterCorr 2099 LSCS. Magnification 200 × (PN 4464-3)

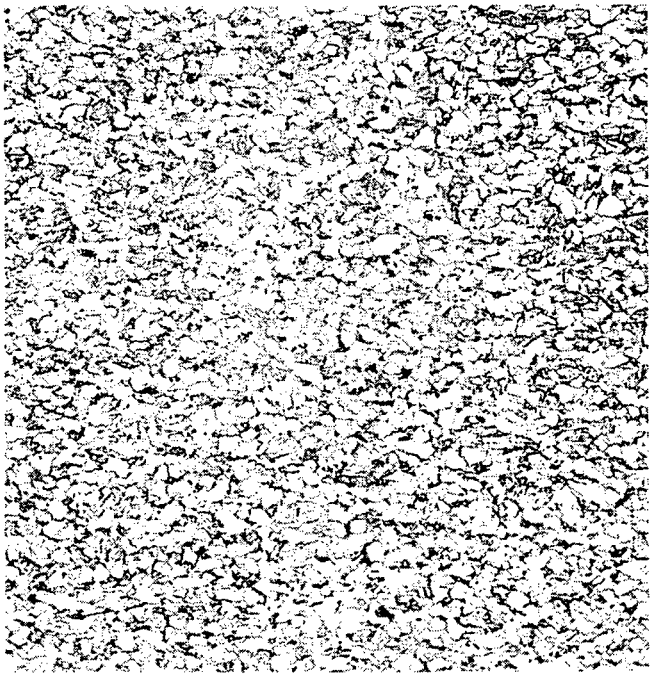


Figure 22—Structure of InterCorr 3250 TMCP Steel. Magnification 200 × (PN4464-1)

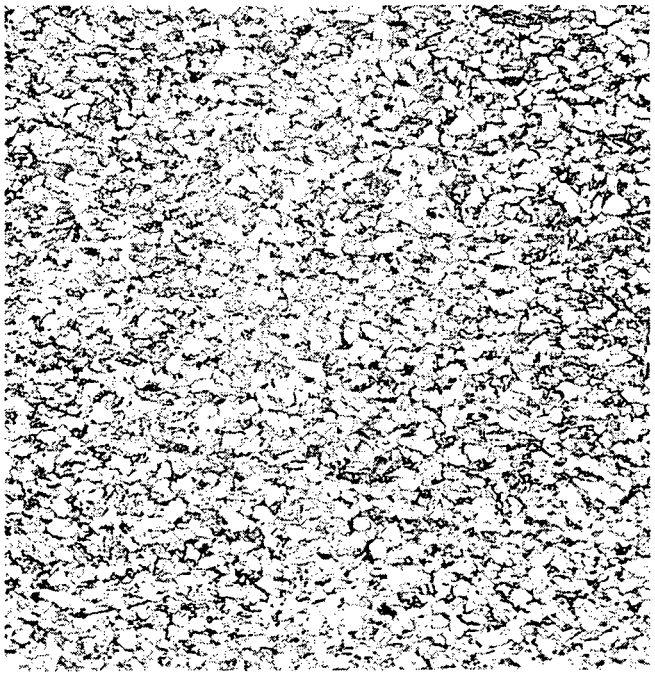


Figure 21—Structure of InterCorr 3247 HRS. Magnification 200 × (PN 4464-2)

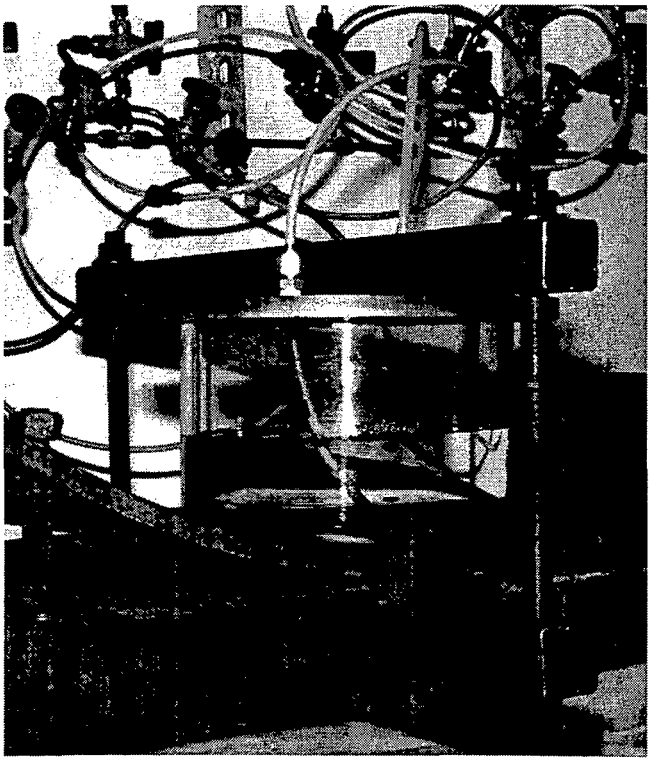


Figure 23—Facility Utilized to Produce the Pre-existing SOHIC in Two of the Exposure 3 Quarter Panels

The applied test pressure was 600 psig which corresponded to the ASME vessel allowable. This pressure produced a hoop stress of 17,500 psi on the test panel. No depletion in H_2S concentration was observed during the tests due to the high ratio of solution volume to exposed steel surface area used in these experiments. The H_2S concentration in solution was approximately 1800 to 2200 ppm throughout the test duration. The solution pH on all three of the exposures ranged from 2.8 at the initiation of the test to 3.6 to 3.8 at test completion.

Following each exposure in the test vessel, extensive sectioning was conducted to quantify the extent of cracking as a function of the variables being evaluated. The number of sections evaluated ranged from 72 on Exposure 1 to 90 on Exposure 2.

6 Results and Discussion

The findings of this investigation have been evaluated based on their relevance to the serviceability and/or repair and remediation strategies for refinery wet H_2S equipment. For clarity, the test results and the findings they support have been separated into the following sections.

a. Materials selection
b. Postweld heat treatment.
c. Temper bead welding.
d. Blend grinding/toe dressings.
e. Local thin areas/grooves.
f. Strip lining.
g. Arc strikes/low heat input welds.
h. Pre-existing SOHIC.

6.1 MATERIALS SELECTION

Conventional A 516-70 steel pre-exposed, one-sided, to NACE Standard TM0284, Solution B (pH 5.0) for 30 days exhibited an increase in cracking following a subsequent 10 day exposure to NACE Standard TM0177, Solution A (pH 3) in the test vessel.

One of the CS quarter panels in Exposure 1 was subjected to a 30-day, one-sided pre-exposure to NACE Standard TM0284, Solution B (pH 5) prior to panel fabrication. Duplicate sections were removed and polished to quantify the extent of cracking. Both sections revealed no indication of cracking. After fabrication of the full test panel and subsequent vessel exposure using NACE Standard TM0177, Solution A (pH 3), extensive cracking was noted in this same steel yielding a CLR and CTR of 36% and 57%, respectively (see Figure 24).This result was caused by the increased hydrogen charging severity of the TM0177, Solution A as compared to the TM0284, Solution B (pH 3 versus pH 5). It should also be noted that the steels pre-exposed, one-sided to the TM0177, Solution A (pH 3) environment for 30 days resulted in no significant differences in cracking following the subsequent re-exposure to the same solution in the test vessel. This was true for the in-plane cracking (CLR) as well as for the through-thickness cracking (CTR), even though the pre-exposures were conducted with no applied stress and the test vessel exposure was conducted under a stress equivalent to the ASME allowables.

These data, CLR and CTR, are shown schematically in Figures 25 and 26, respectively. Under these conditions, the CTR values would have been expected to increase as a result of the applied stress. However, these results may be explained by the presence of tensile residual stresses on the I.D. ligament of the quarter panels during the pre-exposure. The quarter panels were cold-rolled to the appropriate radius without subsequent stress relief. Hence, the residual stresses may have assisted in producing CTR values equivalent to or greater than those which may have been experienced on a similar material in the test vessel in the absence of residual tensile stress.

6.1.1 The susceptibility of the base metal to HIC decreased with a corresponding decrease in sulfur content.

Figure 27 shows the cracking severity of the CS, LSCS, HRS and TMCP experienced in Exposure 3. These steels have sulfur contents of 0.025, 0.007, 0.001 and 0.001 weight percent, respectively. No pre-exposures were conducted on the quarter panels for this exposure, hence the cracking shown in Figure 27 occurred during the 13-day exposure in the large-scale test vessel. As shown, the severity of cracking decreased with a decrease in sulfur content. This behavior was expected and was also observed in the previous Phase I effort (7-9).

Another interesting finding from the data shown in Figure 27 is the ratio of CLR to CTR for the steels evaluated, the CS and LSCS in particular. In the case of the CS, the CLR and CTR were nearly equivalent. However in the LSCS, the CTR was nearly twice the corresponding CLR. Hence, the LSCS exhibited a higher ratio of through-wall link-up. The practical implication of this result revolves around the serviceability of the steels with pre-existing damage from the standpoint of producing a through-wall failure. Steels which produce a higher CLR to CTR ratio have a higher probability of arresting a through-wall crack by virtue of the intersection of the crack tip with a subsequent in-plane crack. This concept is shown schematically in Figure 28. Given the cracking depicted in the figure, a through-wall crack initiating from the surface, as shown in Figure 28 (a), will arrest, provided intersection with an in-plane crack occurs as shown in Figure 28 (b).

6.1.2 Based on the limited results obtained in this study, no differences in wet H_2S performance were noted between the use of an E7018 electrode versus an E7016-G electrode for attachment welding on the ASTM A 841 TMCP steel.

Exposure 3 utilized an E7018 filler on one side of two attachments and an E7016-G filler on the opposite side. In addition, one attachment was subjected to a PWHT prior to the vessel exposure. The E7016-G electrode was recommended for use on the TMCP material since the carbon

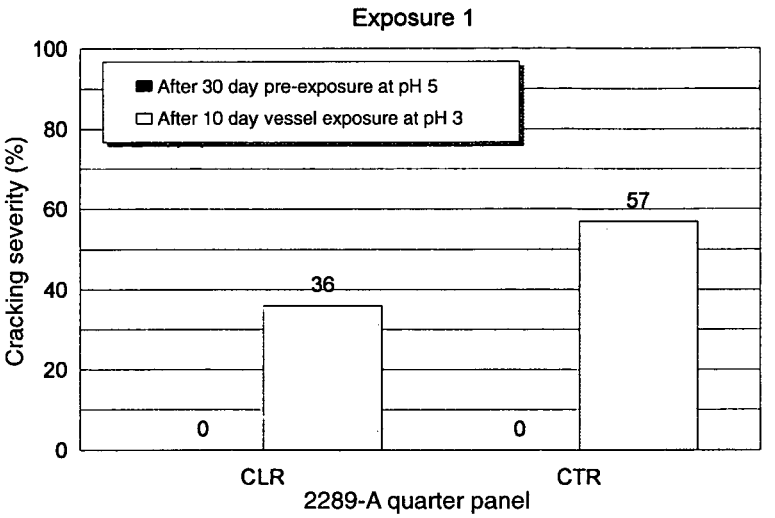


Figure 24—Comparison of the Base Metal Cracking Severity Obtained in the 2289-A CS Pre-exposed to the NACE Standard TM0284, Solution B Versus the Subsequent Exposure in the Test Vessel to NACE TM0177, Solution A

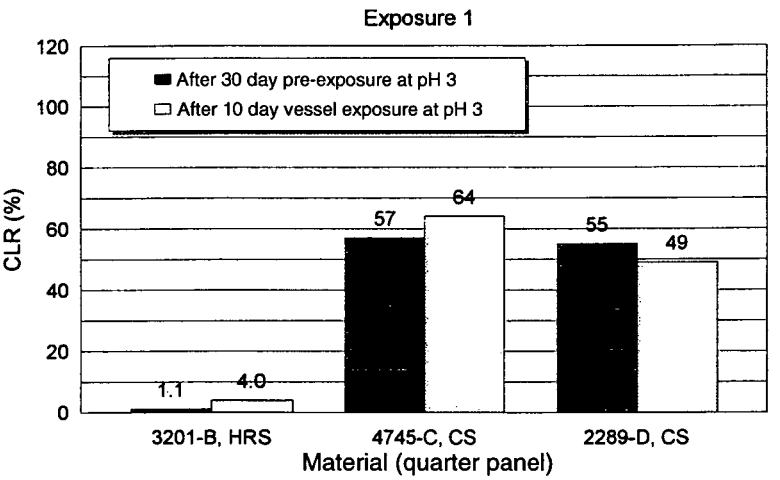


Figure 25—Comparison of Base Metal CLR Obtained in the 3201-B HRS, 4745-C CS and 2289-D CS Pre-exposed to the NACE Standard TM0177, Solution A Versus Subsequent Exposure in the Test Vessel to the Same Solution

equivalent of the electrode more closely matched the carbon equivalent of the TMCP steel. No toe cracks were observed on either side of the attachments for the as-welded or PWHT attachment welds. Hence, they both exhibited similar resistance to wet H_2S cracking.

Furthermore, microhardness surveys made subsequent to the vessel exposure indicated no differences in the bead or HAZ hardnesses produced by the two different electrodes. Since there are numerous electrodes which could be used with the A 841 TMCP steels, the steel producer should be consulted on the most appropriate choice of welding consumables.

6.2 POSTWELD HEAT TREATMENT

6.2.1 Postweld heat treatment was successful in reducing the occurrence of SSC toe cracking at the full penetration welds.

The Exposure 2 test panel included eight postweld heat treated full penetration weld sections and four full penetration weld sections left in the as-welded condition. Toe cracks were

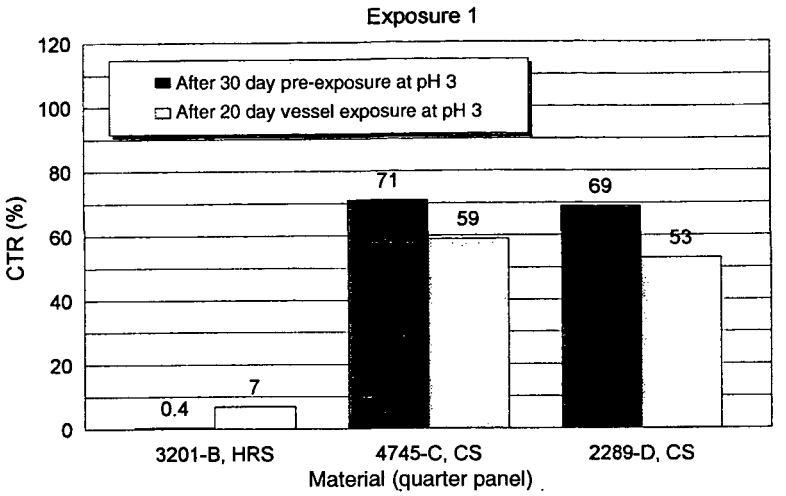


Figure 26—Comparison of Base Metal CTR Obtained in the 3201-B HRS, 4745-C CS and 2289-D CS Pre-exposed to the NACE Standard TM0177, Solution A Versus Subsequent Exposure in the Test Vessel to the Same Solution

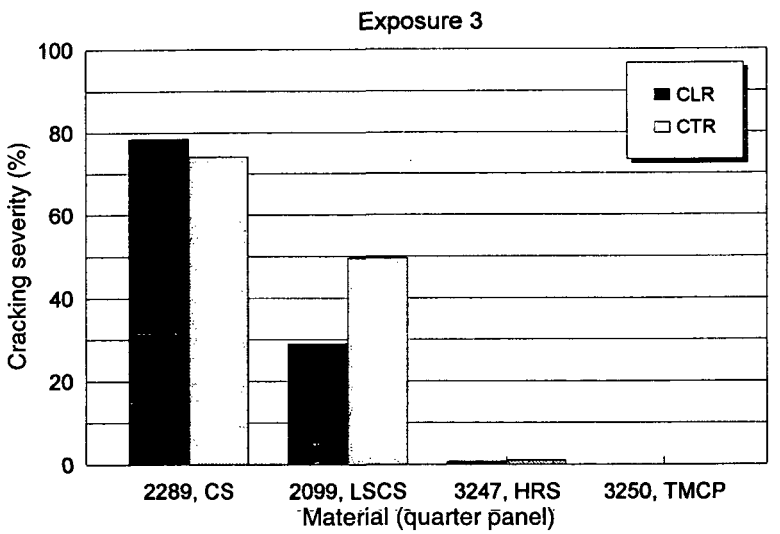


Figure 27—Cracking Severity of the CS, LSCS, HRS and TMCP Steel Experienced in Exposure 3. Note the Decrease in Cracking Susceptibility with Increased Steel Cleanliness

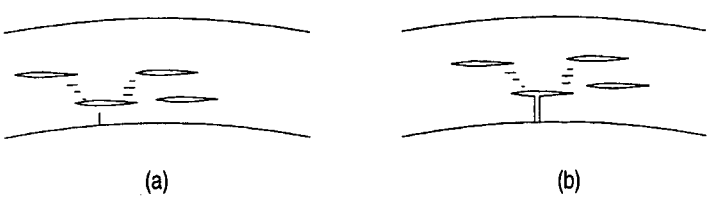


Figure 28—Schematic Explaining the Potential Benefit of Steels which Possess Higher CLR to CTR Ratios

observed emanating from the I.D. surface on all four as-welded sections. Contrary to this, no toe cracks were observed on the eight postweld heat treated sections.

The microhardness evaluations conducted on the as-welded and postweld heat treated sections indicated hardnesses of the beads and HAZ in the range of HRB 87 to HRB 98 for the full penetration weld in the as-welded condition (see Figure 14) and HRB 83 to HRB 85 for the PWHT full penetration welds (see Figure 15). The PWHT was successful in reducing the hardness as compared to the as-welded hardnesses. However, the as-welded hardnesses were not high from the standpoint of SSC susceptibility. The benefit of PWHT in this case likely related to the combined reduction in hardness and tensile residual stress across the weldments.

Postweld heat treatment was successful in reducing the occurrence of SSC toe cracks at the attachment welds.

Recall on Exposure 3, two attachments were welded onto each quarter panel. One attachment was subjected to a PWHT and the second was left in the as-welded condition. With duplicate metallographic sections on each attachment and two fillet welds per metallographic section, this resulted in a total of eight fillet welds for examination (four as-welded, four PWHT) for each of the four materials. Benefit of PWHT was noted on both the CS and LSCS. Fifty percent of the as-welded attachments cracked on the CS and 100% of them cracked on the LSCS. No cracking was observed in the PWHT attachments for either of these same two materials (see Figure 29).

No toe cracks were observed on the attachments on the HRS or TMCP steel in either the as-welded or PWHT condition. While not conclusive, the absence of cracking in these two steels may relate to the reduced carbon equivalent inherent with these two steels, 0.44 and 0.39, respectively. In comparison, the carbon equivalents for the CS and LSCS which exhibited cracking in the as-welded condition were 0.51 and 0.48.

6.3 TEMPER BEAD WELDING

6.3.1 Based on the results of this project, temper bead welding proved to be of no benefit in reducing the presence of cracking in the attachment welds.

In Exposure 1, each quarter panel contained twelve sets of metallographic sections which compared temper bead to conventional welding. These twelve sets consisted of four conventional welded attachments, four temper bead welded attachments, two grind-out, conventional repairs, and two grind-out temper bead repairs. The total number of crack arrays in the weld areas (i.e., HAZ and weld) of both the conventional and temper bead welds were counted on each quarter panel. With the exception of the CS pre-exposed to NACE Standard TM0284, Solution B, the temper bead welded regions exhibited more cracking compared to the conventional welded regions. This increase, based on number of crack arrays, ranged from 15% to 25% (see Figure 30).

The average sum of the crack thickness in the weld areas (i.e., HAZ and weld) of both the conventional and temper bead areas was also tabulated. In all but the CS pre-exposed to TM0177, Solution A, the average temper bead weld area crack thickness exceeded the corresponding average in the conventional welds. This increase ranged from 13% to 134% (see Figure 31).

6.3.2 Based on the results of this project, repair welds of grind-outs made using a temper bead welding technique without PWHT exhibited similar cracking behavior to repair welds of grind outs made using a conventional welding technique with PWHT.

If repair welds are to be PWHT, then the weld repair would be made using a conventional procedure. However, if the repair welds are not to be subjected to a PWHT, then the use of a temper bead technique might be chosen. For this reason, an additional study was included in Exposure 2 on the longitudinal weld of the test panel. Four grind-out conventional repairs were conducted with PWHT and four grind-out temper bead repairs were conducted without PWHT. The number of cracks in the weld area for both techniques was compared for each quarter panel. The number of cracks in the weld area between the two procedures were nearly equivalent in almost all four cases as shown in Figure 32.

Comparison of the total crack thickness in the weld area for both techniques on each quarter panel also revealed consistency in behavior between the two techniques (see Figure 33). Data on grind out, conventional repairs with and without PWHT were not available to illustrate the potential difference. However, the results described above do suggest a potential benefit of temper bead weld repairs in cases where PWHT is not feasible.

6.4 BLEND GRINDING/TOE DRESSINGS

6.4.1 Blend grinding the weld toe of attachment welds, which produced a smooth transition to the plate surface, resulted in more toe cracking in the weld area via SSC than fillet attachment welds left in the as-welded condition.

In conjunction with Exposure 1, two out of four attachments on each quarter panel were blend ground. The blend grinding was intended to produce a smooth transition from the toe of the fillet to the base plate surface (i.e., reduce the stress concentration at the toe). No attempt was made to remove the hard HAZ region of the base metal adjacent to the attachment weld.

The number of toe cracks observed at fillet attachments left as-welded versus those which were blend ground were tabulated per quarter panel. An example of toe cracks in a blend ground attachment weld on the HRS quarter panel is shown in Figure 34. Based on this analysis, both the CS and HRS quarter panels exhibited more toe cracks for blend ground areas than those left as-welded as shown in Figure 35. The

remaining two quarter panels showed essentially no effect of blend grinding.

These results were surprising. No correlation could be made with respect to welding, orientation, bead hardness or depth of grinding. The only variable found to correlate well with these results was the degree of cracking present in the panels at the time of welding the attachments. The panels which exhibited a greater number of toe cracks exhibited little to no cracking at the time of attachment welding due to either the nature of the steel grade (HRS quarter panel) or pre-exposure solution (CS quarter panel exposed to TM0284, Solution B). The other two panels had extensive cracking at the time of fillet welding as a result of the 30-day one-sided, pre-exposure to TM0177, Solution A. This correlation remained unexplained.

6.4.2 Deep toe dressings, which removed the hard HAZ region of the base metal adjacent to the weld, reduced the susceptibility to the formation of SSC toe cracks, but in some cases led to the initiation and propagation of SOHIC at the base of the produced groove.

Recall from the discussion in 5.4.1, the blend grinding or toe dressing evaluated in Exposure 1 was intended to reduce the stress concentration at the toe of the fillet weld. No intent was made to remove the hard HAZ region of the base metal adjacent to the weld. In Exposure 3, deep toe dressings were included to intentionally remove the hard HAZ region of the base metal. The approach was successful in removing the hard HAZ region; however, this produced a groove in the process. These grooves were approximately 0.125 in. deep (25% of the wall thickness) and had a root radius of 0.0625 in. The deep toe dressings were evaluated on the LSCS and HRS attachments in the as-welded condition and the circumferential weld of all four materials, also in the as-welded condition.

No SSC was observed on any of the deep toe dressings evaluated. However, both metallographic sections removed from the attachment on the LSCS exhibited extensive SOHIC beneath the groove. The SOHIC initiated at the base of the groove and propagated to 50% and 70% of the wall thickness for the two sections, respectively. This percentage corresponded to SOHIC extension in the range of 0.125 in. to 0.225 in. beyond the base of the groove. A photograph of one of the sections removed from the LSCS attachment is shown in Figure 36. In addition to these attachments, both deep toe dressings along the circumferential weld of this same material (LSCS) exhibited SOHIC initiation at the base of the groove. However, the extension was mild ranging from 0.01 to 0.03 in. No SOHIC initiation was observed at these same locations on any of the remaining three materials.

6.5 LOCAL THIN AREAS/GROOVES

6.5.1 No through-wall cracking was observed at the local thin areas along the longitudinal weld or circumferential weld which had an inherent remaining strength factor of 0.8.

The Exposure 2 test panel contained two pairs of two LTA profiles as was depicted previously in Figure 18. One pair (Profile P2) was located on the longitudinal weld and represented the deepest of the LTAs evaluated (60% of the wall; 0.30 in.). The second pair (Profile P1) was located on the circumferential weld with depths to 50% of the wall thickness (0.25 in.). No through-wall oriented cracking occurred at any of these four LTAs.

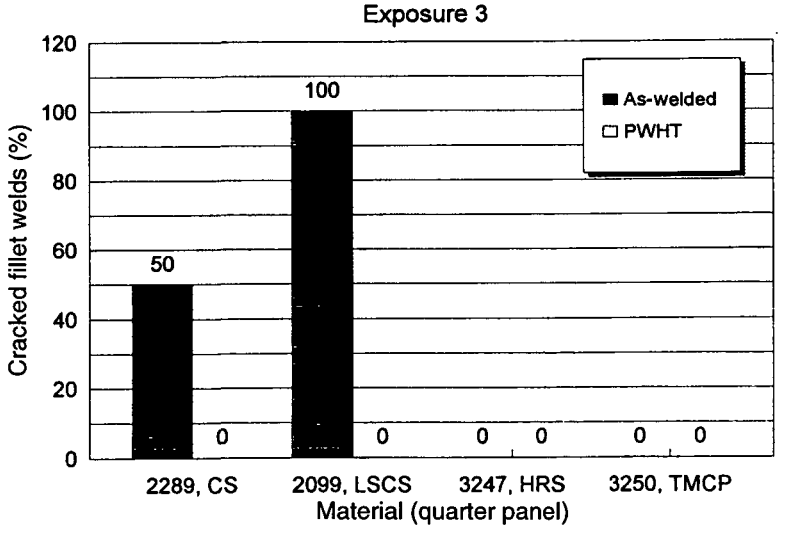


Figure 29—Reduction in the Occurrence of SSC Toe Cracks with PWHT in the Attach Welds Evaluated in Exposure 3

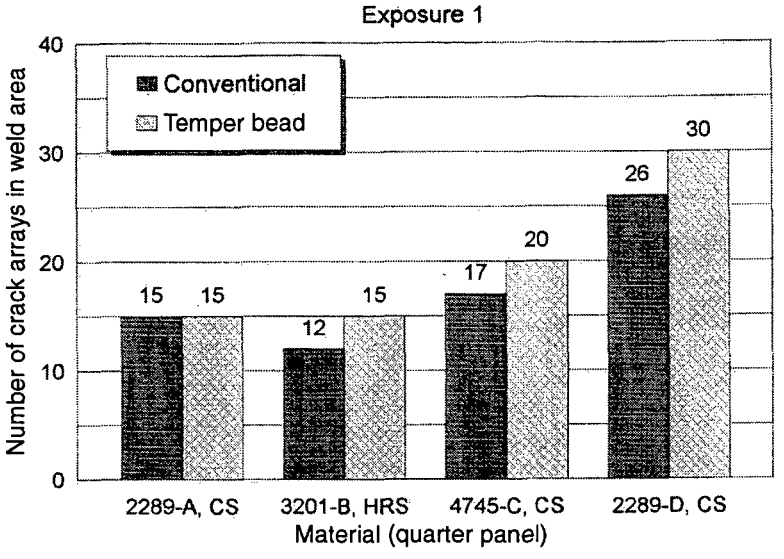


Figure 30—Number of Cracks Observed in the Conventional and Temper Bead Attachment Welds Illustrating the Slight Increase in the Occurrence of Cracking with the Temper Bead Technique

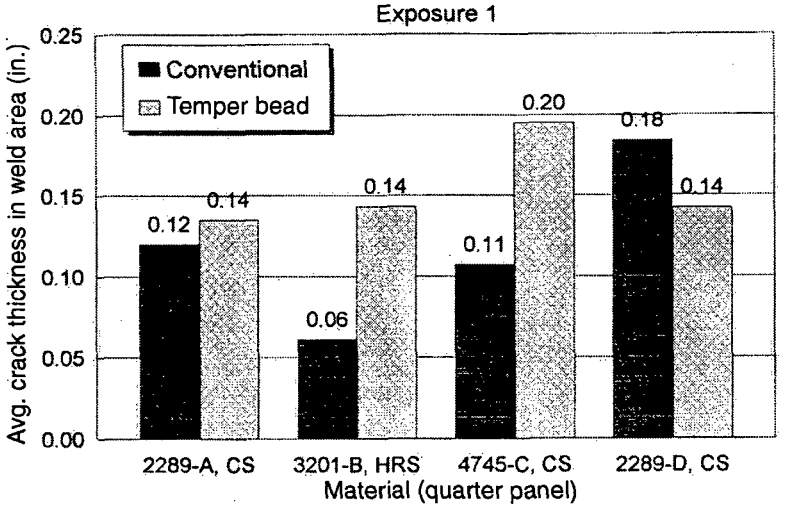


Figure 31—Average Crack Thickness in the Weld Area of the Conventional and Temper Bead Attachment Welds

HIC damage was observed just beneath many of the LTAs, but was limited to the immediate vicinity. HIC damage did not approach the O.D. surface. The minimal depth of HIC damage which occurred in the remaining ligament could be explained by the resulting hydrogen concentration gradients which developed in the full wall thickness versus the LTA remaining thickness. Figure 37 shows a schematic of the two potential hydrogen concentration gradients. If HIC damage is observed in the full thickness section extending from the surface to midwall, then the critical hydrogen concentration required to produce cracking, C_{cr}, can be estimated at one-half the subsurface hydrogen concentration C_0. Using this same C_0 and C_{cr} for the remaining ligament of the LTA, the depth of cracking would also extend to the midwall of the remaining ligament. However, due to the differences in ligament thicknesses, the damaged ligament would be substantially thinner for the case of the LTA, hence explaining the limited depth of cracking observed.

6.5.2 No through-wall cracking was observed at the grooves (RSF = 0.8) along the longitudinal or circumferential attachments.

The Exposure 2 test panel contained 16 grooves positioned along each attachment on the test panel. These grooves con-

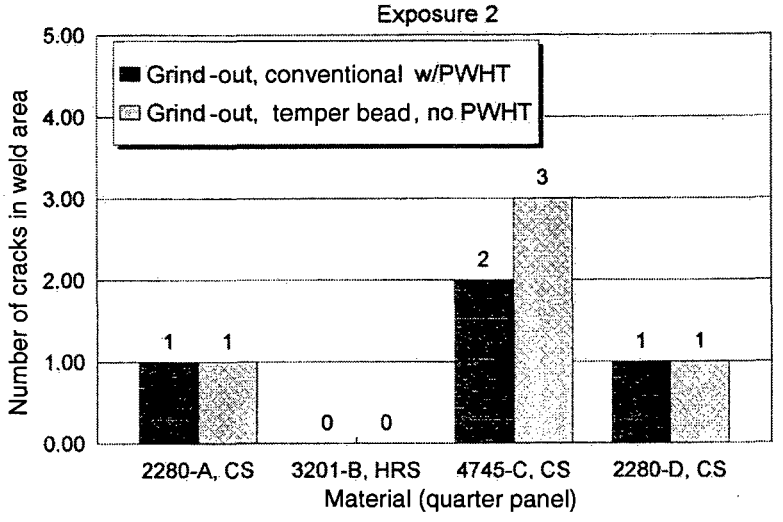


Figure 32—Number of Cracks in the Weld Area between the Grind-out, Conventional Repair with PWHT and the Grind-out, Temper Bead Repair without PWHT

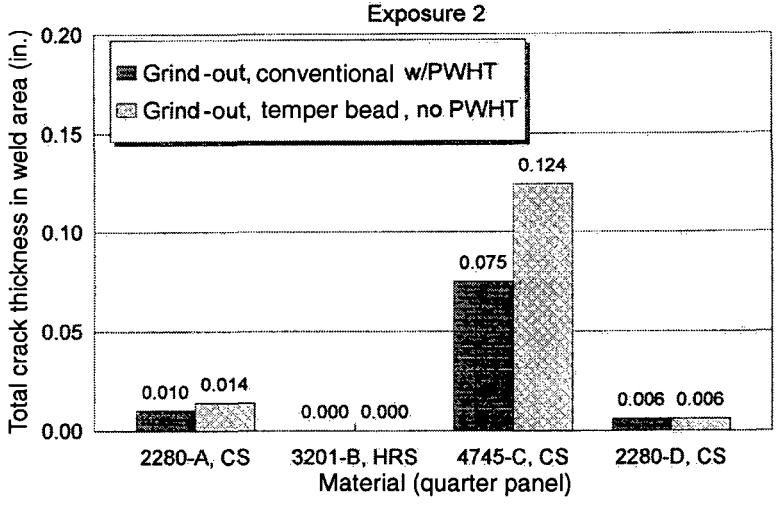


Figure 33—Total Crack Thickness in the Weld Area between the Grind-out, Conventional Repair with PWHT and the Grind-out, Temper Bead Repair without PWHT

tained a 0.25 in. root radius and were 0.25 in. deep by the full length of the attachments (4 in.). This groove profile was acceptable per API RP 579 procedures. No through-wall oriented cracking occurred at any of the grooves, thus supporting the guidelines in API RP 579.

6.5.3 No through-wall cracking was observed at the grooves (RSF > 0.9) along the longitudinal weld despite the sharpness of the root radii evaluated.

Recall three groove profiles (RSF > 0.9) were evaluated along the longitudinal weld in Exposure 3. The first groove profile was acceptable per API RP 579 methodology but represented the limit with respect to the sharpness of the root. However, the remaining two profiles contained root radii which were smaller than the critical root radius allowed by the proposed procedures. Per API RP 579, these two grooves would have been reclassified as a crack and re-analyzed. Despite the sharpness of the root radii, no through-wall cracking was observed.

HIC damage was observed at the base of several of the grooves, however this cracking was in-plane and restricted to the immediate vicinity of the bottom of the grooves as found previously (recall the discussion in 5.5.1 concerning the hydrogen concentration gradients).

6.5.4 SOHIC initiation and propagation was observed beneath the deep toe dressings/grooves in the LSCS.

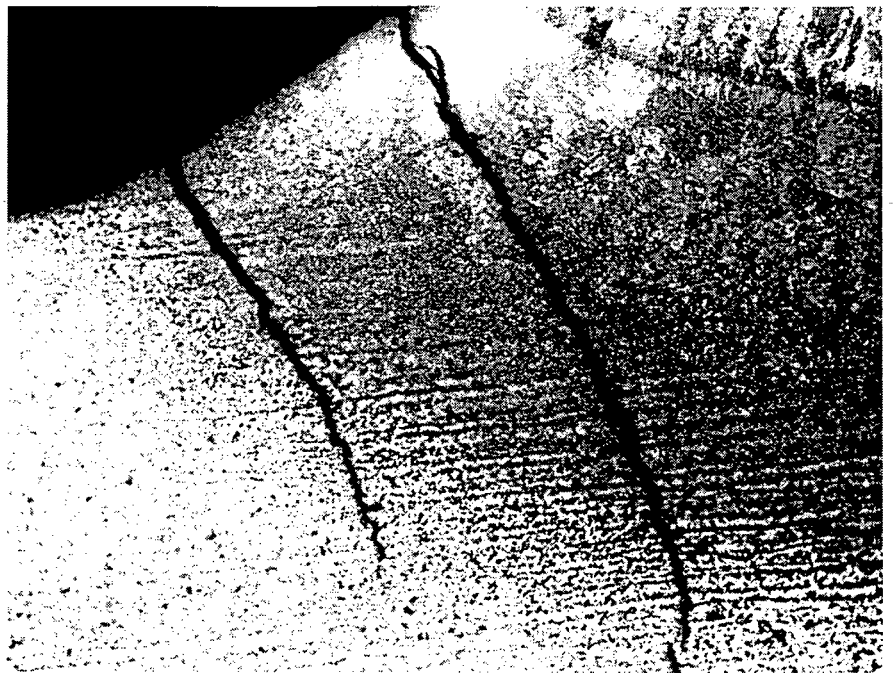


Figure 34—Toe Cracks Observed in the Blend Group Attachments on the 3201-B HRS. InterCorr 3201-22B, Magnification 50 × (PN 4465-3)

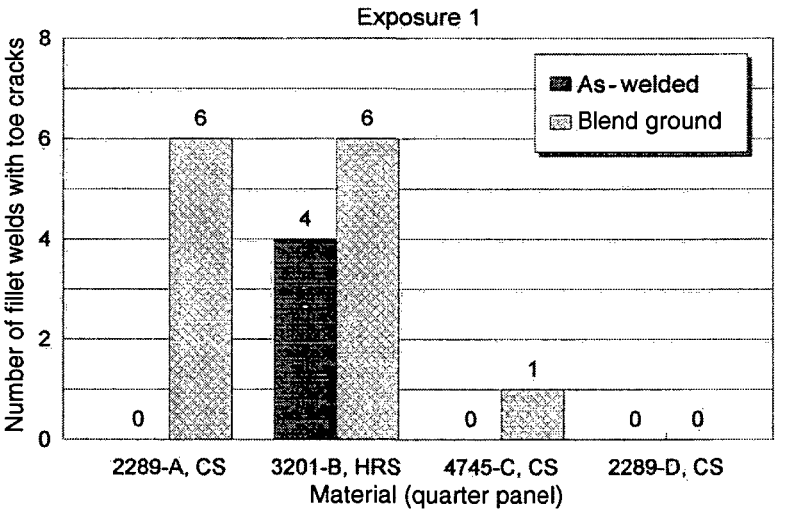


Figure 35—Number of Fillet Welds with Toe Cracks Observed between the As-welded and Blend Ground Weld Toes

Recall the discussion in 5.4.2 which presented the results observed for the deep toe dressings adjacent to the attachment welds. These deep toe dressings produced a groove approximately 0.125 in. deep with a $^1/_{16}$ in. root radius.

Note: These grooves would require reclassification as a crack per API RP 579 methodology. SOHIC initiated at the base of the groove and propagated to a depth of up to 70% of the wall thickness (see Figure 36). In this case, the sharp root radius did result in cracking and supported the stipulated acceptance criteria in API RP 579.

6.6 STRIP LINING

6.6.1 Strip lining of the I.D. surface of the vessel without PWHT protected the material from further damage; however, toe cracks initiated at the attachment welds on three out of four of the materials evaluated.

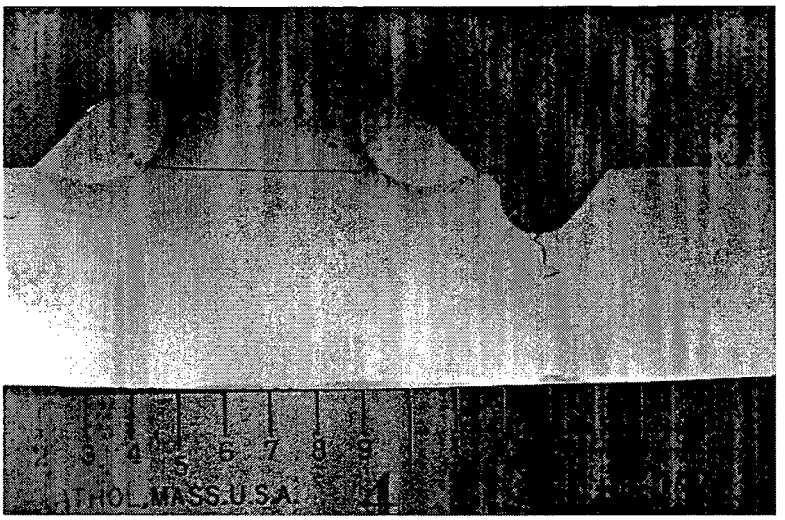


Figure 36—SOHIC Extension from the Bottom of the Deep Toe Dressing on the LCSC Attachment Weld Evaluated in Exposure 3 (PN 4478-1)

The objective of this surface treatment was to evaluate the interactions/behavior of the attachment welds joining the 304L sheet to the base plate. The protection of the underlying base material was not of concern. Experience has proven that this method provides adequate protection to the base plate thereby minimizing further damage.

Toe cracks were observed on the non-PWHT welds which utilized a 309L filler to attach the 304L sheet to the base plate on both of the CS quarter panels (2280-A and 2280-D) and HRS panel (3201-B). In the case of the CS, the cracks initiated and propagated to the extent of the HAZ (see Figure 38). However, in the case of the HRS, these cracks were observed to propagate slightly past the extent of the HAZ into the base plate (see Figure 39). This behavior was also observed in the previous phase of large-scale testing(7,8).

In the case of the remaining CS quarter panel (4745-C), no toe cracks were observed. Cracking in this steel was restricted to in-plane HIC only. Based on the cracking and minor extent of interaction with the attachment HAZ, the damage was believed to be present prior to the strip lining operation as a result of the 30-day, one-sided pre-exposures.

6.6.2 Strip lining across existing weldments did not lead to cracking at the attachment weld to girth weld intersections.

Sections were removed parallel to the girth weld on both strip lined areas included in Exposure 2. The purpose was to examine the susceptibility of the weld-to-weld interface to cracking. No cracking was observed in either section.

6.7 ARC STRIKES/LOW HEAT INPUT WELDS

6.7.1 SSC initiated from nearly all arc strikes evaluated on the CS, LSCS, HRS and TMCP. These cracks were found to arrest in the underlying base metal. All cracking was restricted to the HAZ.

Arc strikes were studied in Exposure 3 to evaluate the potential for localized cracking in the hard HAZ regions. They were produced by removing the flux from the electrode tip and striking the metal. Metallographic sections were removed across the center of the arc strikes and examined.

Hardnesses ranged from HRC 29 (converted from 500 gram Vickers) on the TMCP steel to HRC 50 on the LSCS. SSC initiated from most sections evaluated and in all cases the cracking was restricted to the HAZ. The cracking observed at the arc strikes in the LSCS and the TMCP steel is shown in Figures 40 and 41, respectively.

6.7.2 Low heat input welds (< 10 kJ/in.) did not result in the initiation of SSC. However, hardnesses were substantially lower than those produced by arc strikes.

Low heat input welds (< 10 kJ/in.) have been historically used in previous laboratory studies to act as initiators of SSC for the purpose of examining the propagation behavior into the underlying base plate. Several low heat input weld beads were evaluated in Exposure 3. Bead hardnesses ranged from HRB 95 to HRC 26 (converted from 500 gram Vickers). HAZ hardnesses ranged from HRC 22 to HRC 31. No SSC was observed on any of the metallographic sections evaluated.

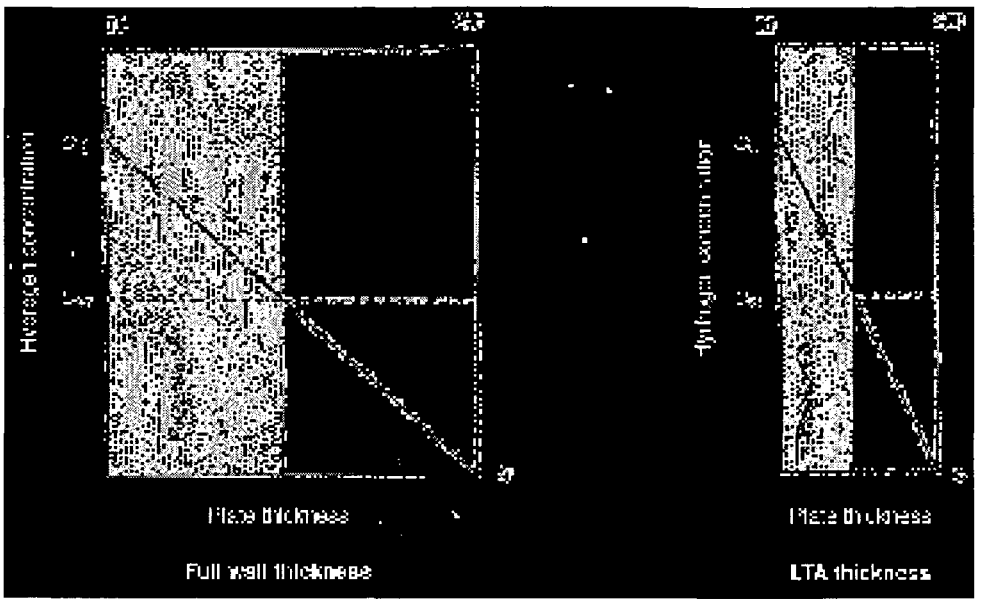


Figure 37—Schematic of the Hydrogen Concentration Gradients Produced on a Full Wall Section of the Vessel Wall and the Remaining Ligament of an LTA

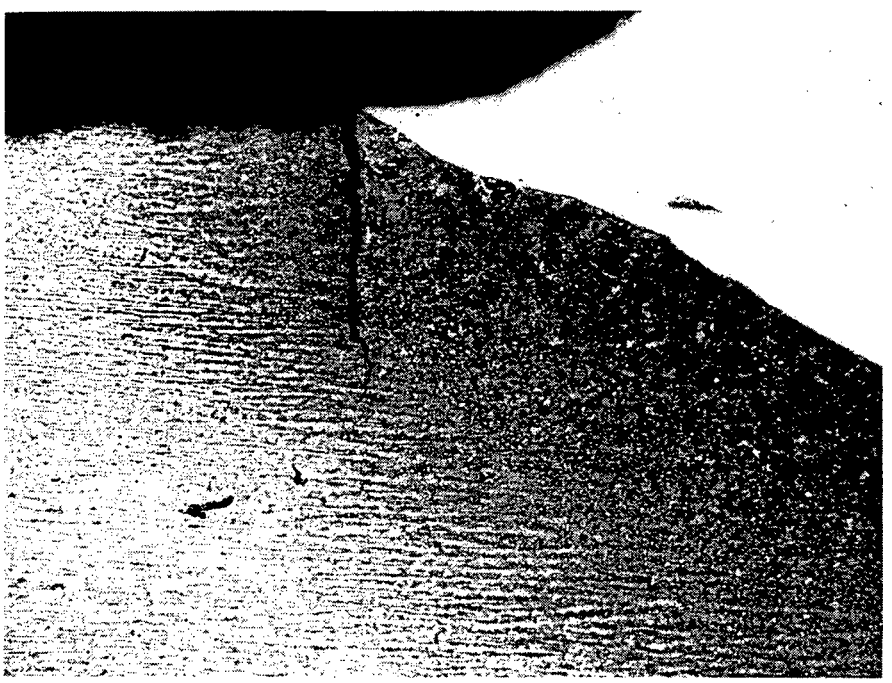


Figure 38—Toe Crack Observed in the Strip Lining Attachment Weld on the 2280-A CS Quarter Panel. InterCorr 2280-19, Magnification 50 × (PN 4466-1)

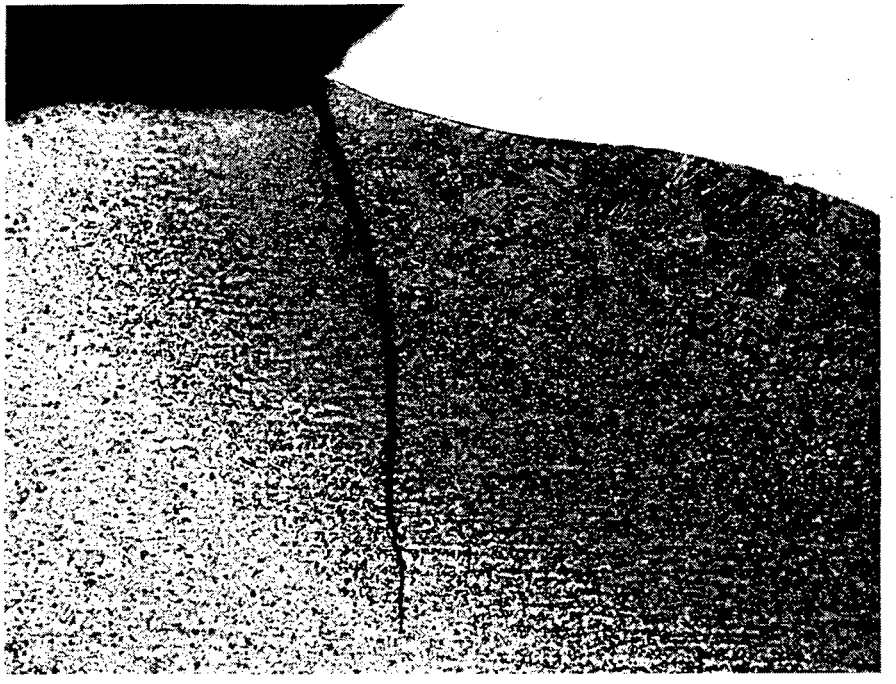


Figure 39—Toe Crack Observed in the Strip Lining Attachment Weld on the 3201-B HRS Quarter Panel. InterCorr 3201-32, Magnification 50 × (PN 4466-2)

However, hardnesses were lower than those typically obtained with this technique. Furthermore, the hardnesses were substantially lower than those produced by the arc strikes discussed earlier.

6.8 PRE-EXISTING SOHIC

6.8.1 Difficulty was observed sizing SOHIC flaws following the 7-day, one-sided pre-exposures under an applied stress of 90% of the SMYS. This was true for both the LSCS and HRS.

Following the exposures to produce SOHIC as described in 4.2.3, the quarter panels were submitted to two inspection companies for sizing. The first company was unable to locate any SOHIC in either panel using a manual ultrasonic technique. The second company did locate SOHIC in the LSCS panel using an automated ultrasonic technique, but was hesitant to size the depth with any degree of confidence. This same company indicated that only slight SOHIC extension, if any, was present beneath the notch in the HRS panel. Based on other testing of these same heats of steel, InterCorr was confident SOHIC extension was present. However, metallographic sectioning at this stage was not possible.

6.8.2 SOHIC extension from the EDM notches was observed following the large-scale exposure in both the LSCS and HRS to varying depths as revealed by metallographic sectioning.

Following the large-scale Exposure 3, duplicate sections were removed across the EDM notches in the LSCS and HRS quarter panels and examined for cracking. Both materials exhibited crack extension from the base of the EDM notches via SOHIC. The maximum SOHIC extension measured in the LSCS was 0.15 in. The full crack array is shown in Figure 42.

The maximum SOHIC extension measured in the HRS was 0.06 in., approximately 50% of that observed in the LSCS. The full crack array is shown in Figure 43.

SOHIC initiation from the I.D. surface of the LSCS, away from any artificial initiators, was observed and propagated to a maximum depth corresponding to 30% of the wall thickness (0.16 in.).

In addition to the SOHIC observed under the EDM notches in the LSCS and HRS, SOHIC was also observed on several additional sections evaluated on the LSCS. The SOHIC initiated from the I.D. surface of the plate in the absence of artificial initiators (e.g., arc strikes, attachment welds, low heat input welds, notches). The maximum depth measured on the sections corresponded to slightly over 30% of the wall thickness (0.16 in.). This depth closely matches that observed under the EDM notch on the same material described in 5.8.2. The SOHIC array which was observed to produce the maximum depth of cracking is shown in Figure 44.

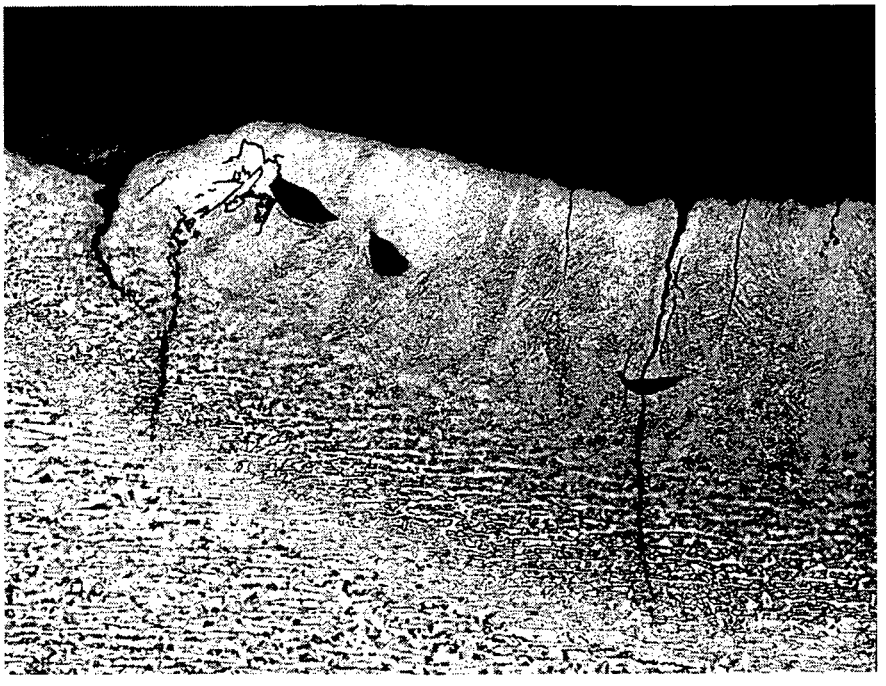


Figure 40—Cracking at the Arc Strike on the LSCS.
InterCorr 2099-9, Magnification 50 × (PN 4465-5)

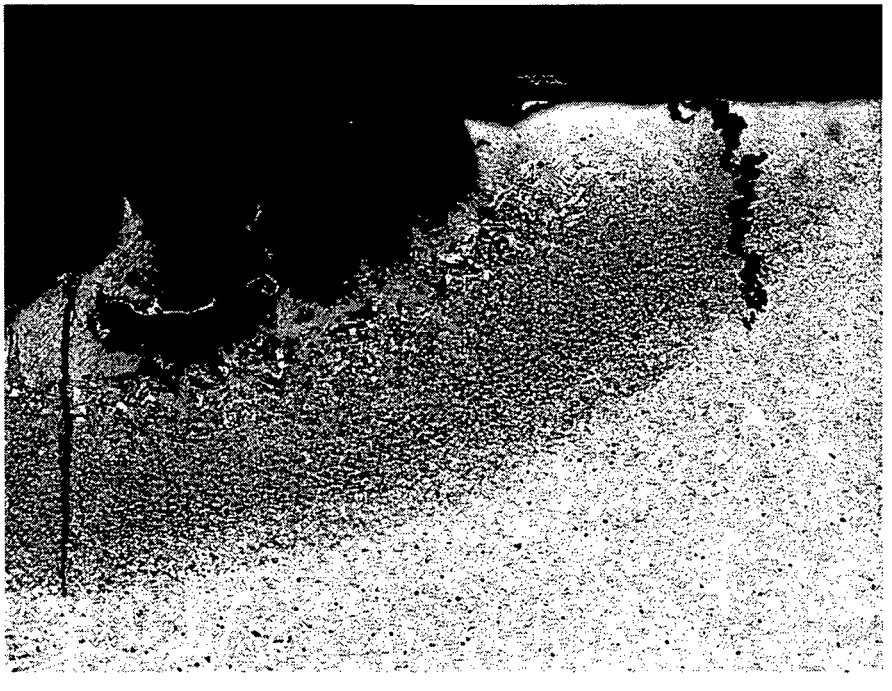


Figure 41—Cracking at the Arc Strike on the TMCP Steel.
InterCorr 3250-37, Magnification 50 × (PN 4465-4)

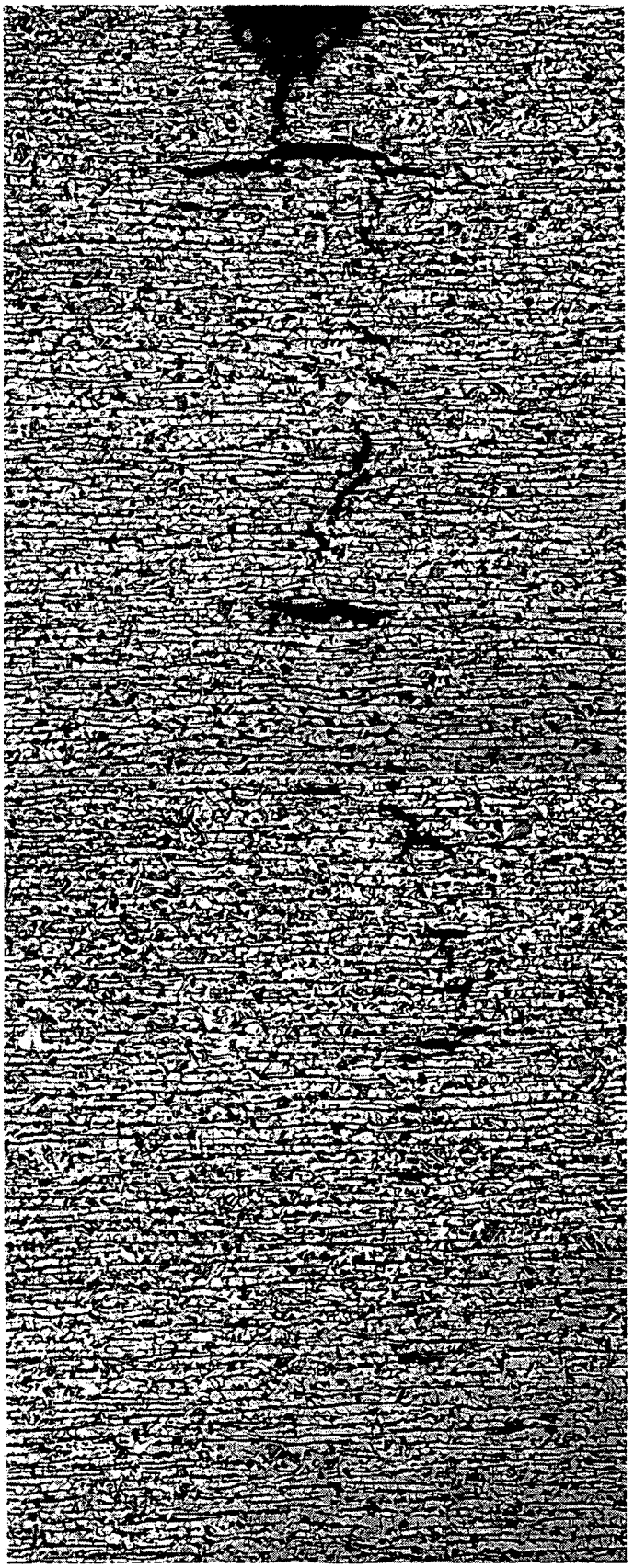


Figure 42—SOHIC Extension from the Base of the EDM Notch Observed on the LSCS in Exposure 3. InterCorr 2099-13, Magnification 50 × (PN 4465-7)

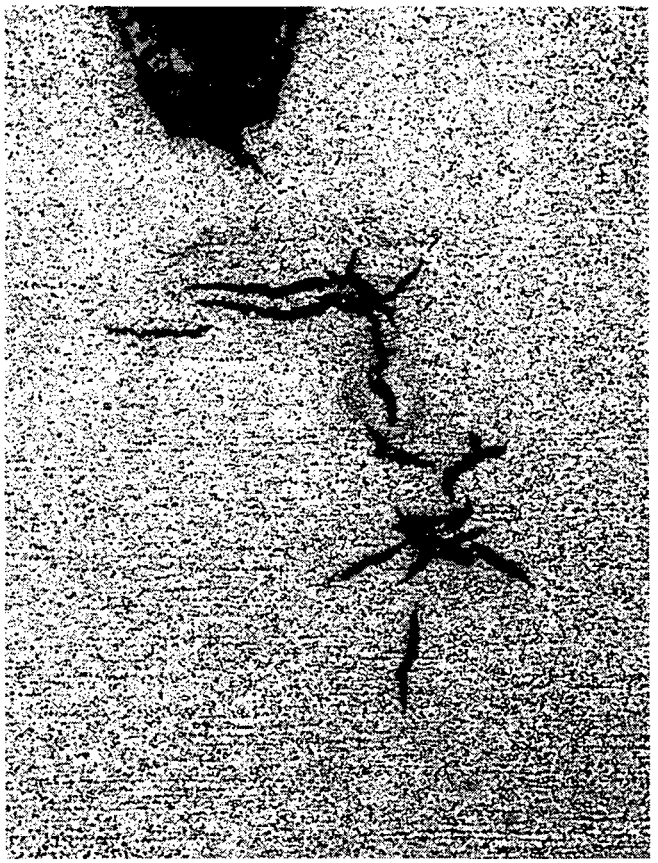


Figure 43—SOHIC Extension from the Base of the EDM Notch Observed on the HRS in Exposure 3. InterCorr 3247-20, Magnification 50 × (PN 4465-2)

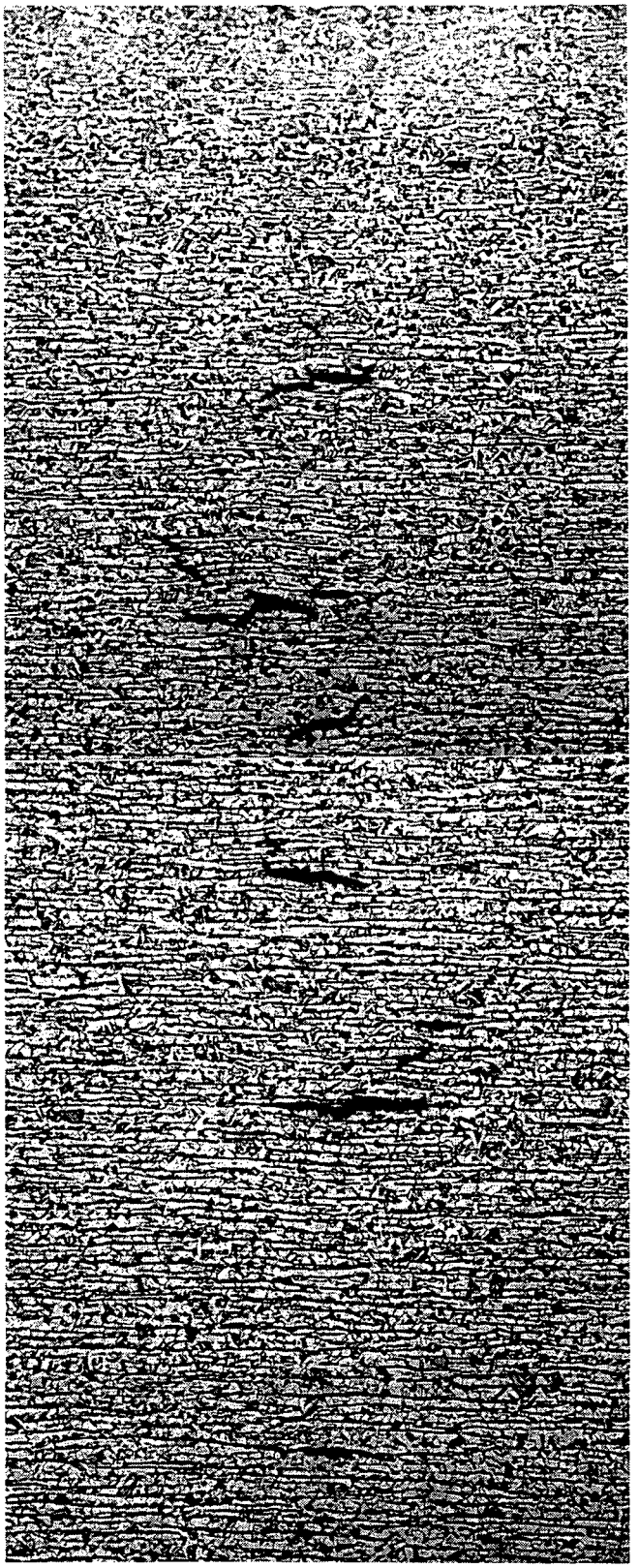
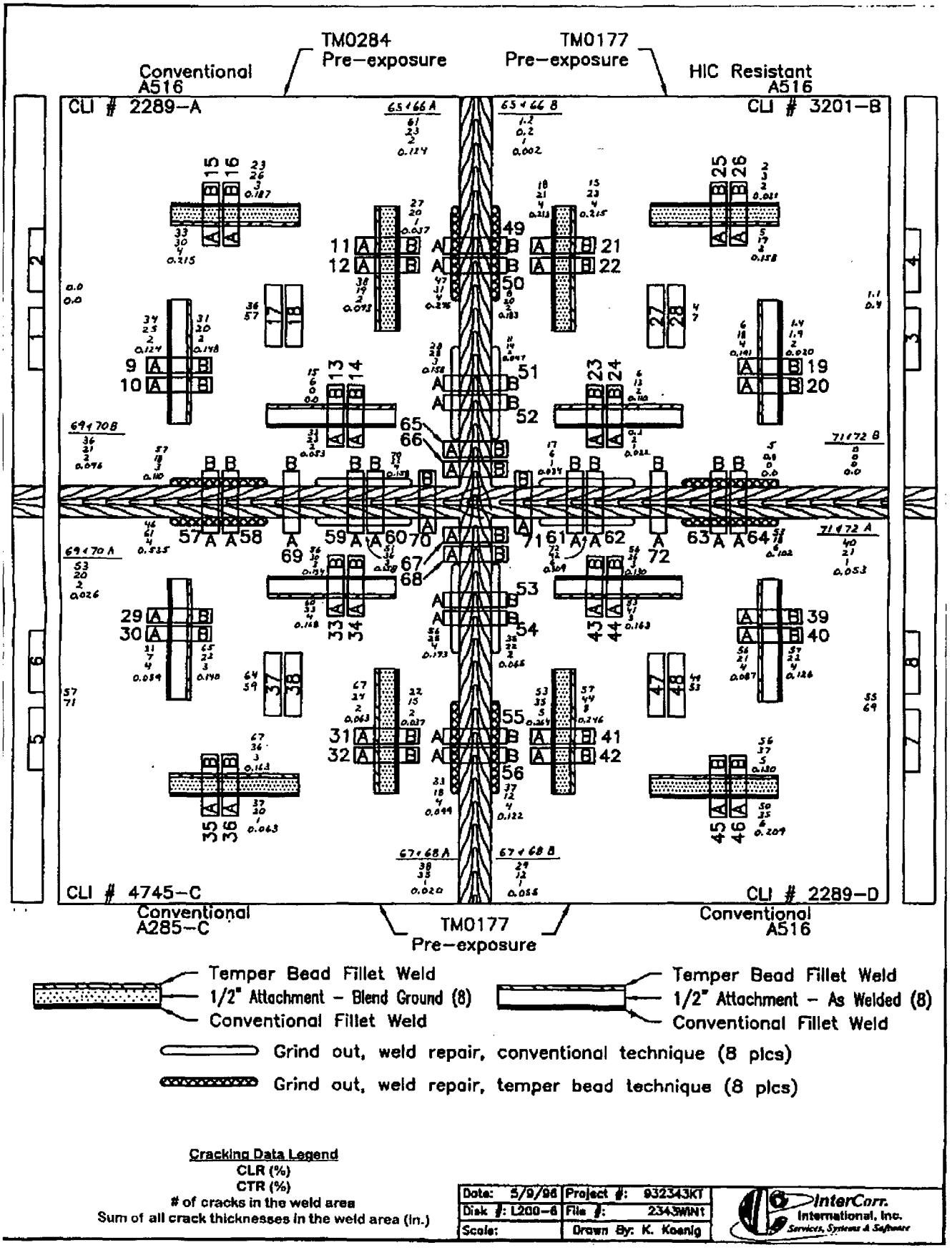


Figure 44—SOHIC in the Base Metal of the LSCS, which Developed in the Absence of an Artificial Crack Initiator. InterCorr 2099-13, Magnification 50 × (PN 4465-6)

APPENDIX A

EXPOSURE 1

DETAILED CRACKING RESULTS



Material : A516-70 CS
Sulfur : 0.025
Condition : As-rolled
Solution : TM0284

Project # : L932343KT
Exposure : One-sided, 30 days
pH (INIT) : 8.2
pH (FINL) : 5.2

CLI # : 2289A
Section # : W7-1, 2
File # : W7-12.WK4
Date : 5/2/96

Section	Top 1/3, Mid. 1/3, or Bottom 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W7-1	Top 1/3	0.0000	0.0000	1.984	0.522		0.00	0.00	0.00
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						
W7-2	Top 1/3	0.0000	0.0000	1.971	0.522		0.00	0.00	0.00
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						

Full Thickness Averages of All Three Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

Crack Location Codes

B - B-Base Metal	S - Surface
W - Weld Metal	T - I.D.
H1 - Heat Affected Zone 1	M - Middle
H2 - Heat Affected Zone 2	C - O.D.

2/3 Thickness Averages of All Three Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

Comments

1/3 Thickness Averages of All Three Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

Material : A516-70 HRS
Sulfur : 0.001
Condition : Normalized
Solution : TM0177-90

Project # : L932343KT
Exposure : One-sided, 30 days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 3201B
Section # : W7-3, 4
File # : W7-34.WK4
Date : 5/2/96

Section	Top 1/3, Mid. 1/3, or Bottom 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	Section CSR (%)	Section CLR (%)	Section CTR (%)
W7-3	Top 1/3	0.0000	0.0000	2.300	0.536		0.00	1.03	0.37
	Middle 1/3	0.0051	0.0008			BM			
		0.0185	0.0012			BM			
	Bottom 1/3	0.0000	0.0000						
W7-4	Top 1/3	0.0039	0.0008	2.140	0.536	BT	0.00	1.14	0.44
	Middle 1/3	0.0205	0.0016			BM			
	Bottom 1/3	0.0000	0.0000						

Full Thickness Averages of All Three Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	1.08	Std. Dev. =	0.31
Avg. CTR =	0.40	Std. Dev. =	0.10

Crack Location Codes

B - B-Base Metal	S - Surface
W - Weld Metal	T - I.D.
H1 - Heat Affected Zone 1	M - Middle
H2 - Heat Affected Zone 2	C - O.D.

2/3 Thickness Averages of All Three Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	1.08	Std. Dev. =	0.32
Avg. CTR =	0.40	Std. Dev. =	0.10

Comments

1/3 Thickness Averages of All Three Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.09	Std. Dev. =	0.06
Avg. CTR =	0.07	Std. Dev. =	0.05

Material : A285-C
Sulfur : 0.021
Condition : As-rolled
Solution : TM0177

Project # : L932343KT
Exposure : One-sided, 30 days
pH (INIT) : 2.8
pH (FINL) : 3.6

CLI # : 4745C
Section # : W7-5, 6
File # : W7-56.WK4
Date : 5/2/96

Section	Top 1/3, Mid. 1/3, or Bottom 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W7-5	Top 1/3	0.0118	0.0020	2.087	0.518	BT	0.00	39.99	71.06
		0.2421	0.0650			BT			
		0.0059	0.0020			BT			
		0.0039	0.0020			BT			
		0.0276	0.0472			BT			
		0.1634	0.0492			BT			
		0.1732	0.0669			BT			
		0.0098	0.0020			BT			
		0.0079	0.0020			BT			
		0.0098	0.0020			BT			
		0.0079	0.0020			BT			
		0.0669	0.0886			BT			
		0.1043	0.0374			BT			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						
W7-6	Top 1/3	0.2106	0.0768	1.933	0.518	BT	1.61	73.83	70.68
		0.2717	0.0531			BT			
		0.3465	0.0669			BT			
		0.0059	0.0020			BT			
		0.1673	0.0866			BT			
		0.1063	0.0394			BT			
		0.3189	0.0413			BT			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						

Full Thickness Averages of All Three Sections

Avg. CSR =	0.81	Std. Dev. =	0.29
Avg. CLR =	56.91	Std. Dev. =	5.39
Avg. CTR =	70.87	Std. Dev. =	5.92

Crack Location Codes

B - B-Base Metal	S - Surface
W - Weld Metal	T - I.D.
H1 - Heat Affected Zone 1	M - Middle
H2 - Heat Affected Zone 2	C - O.D.

2/3 Thickness Averages of All Three Sections

Avg. CSR =	0.81	Std. Dev. =	0.29
Avg. CLR =	56.91	Std. Dev. =	5.48
Avg. CTR =	70.87	Std. Dev. =	6.00

Comments

1/3 Thickness Averages of All Three Sections

Avg. CSR =	0.81	Std. Dev. =	0.30
Avg. CLR =	56.91	Std. Dev. =	5.57
Avg. CTR =	70.87	Std. Dev. =	6.06

Material : A516-70 CS
Sulfur : 0.025
Condition : As-rolled
Solution : TM0177

Project # : L932343KT
Exposure : One-sided, 30 days
pH (INIT) : 2.8
pH (FINL) : 3.7

CLI # : 2289D
Section # : W7-7, 8
File # : W7-78.WK4
Date : 5/2/96

Section	Top 1/3, Mid. 1/3, or Bottom 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	Section CSR (%)	Section CLR (%)	Section CTR (%)
W7-7	Top 1/3	0.0591	0.0276	1.968	0.524	BT	0.16	51.61	58.60
		0.3012	0.0571			BT			
		0.0827	0.0276			BT			
		0.0827	0.0236			BT			
		0.0354	0.0118			BT			
		0.0787	0.0413			BT			
		0.1122	0.0433			BT			
		0.1398	0.0413			BT			
		0.1240	0.0335			BT			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						
W7-8	Top 1/3	0.0453	0.0374	2.017	0.524	BT	0.16	58.56	78.89
		0.1280	0.0354			BT			
		0.2008	0.0630			BT			
		0.1280	0.0492			BT			
		0.0256	0.0138			BT			
		0.2677	0.0945			BT			
		0.2657	0.0689			BT			
		0.1201	0.0512			BT			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						

Full Thickness Averages of All Three Sections

Avg. CSR =	0.16	Std. Dev. =	0.04
Avg. CLR =	55.09	Std. Dev. =	4.47
Avg. CTR =	68.75	Std. Dev. =	4.96

Crack Location Codes

B - B-Base Metal	S - Surface
W - Weld Metal	T - I.D.
H1 - Heat Affected Zone 1	M - Middle
H2 - Heat Affected Zone 2	C - O.D.

2/3 Thickness Averages of All Three Sections

Avg. CSR =	0.16	Std. Dev. =	0.04
Avg. CLR =	55.09	Std. Dev. =	4.49
Avg. CTR =	68.75	Std. Dev. =	4.94

1/3 Thickness Averages of All Three Sections

Avg. CSR =	0.16	Std. Dev. =	0.04
Avg. CLR =	55.09	Std. Dev. =	4.50
Avg. CTR =	68.75	Std. Dev. =	4.89

Comments

Material : A516-70 CS
Sulfur : 0.025
Condition : As-rolled
Solution : TM0177

Project # : L932343KT
Exposure : One-sided, 10 days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 2289A
Section # : W7-9A, 10A
File # : W7-9A.WK4
Date : 5/7/96

Section	Top 1/3, Mid. 1/3, or Bottom 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W7-9A	Top 1/3	0.0453	0.0118	1.013	0.521	BT	0.96	32.47	16.62
		0.0728	0.0177			BT			
		0.0551	0.0059			BT			
		0.0394	0.0394			BS, BT, H2T			
		0.1161	0.0118			BT			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						
W7-10A	Top 1/3	0.1516	0.0610	1.011	0.521	BT	3.65	35.44	32.49
		0.0217	0.0020			BT			
		0.0945	0.0846			BS, BT, H2T			
		0.0906	0.0217			BT			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						

Full Thickness Averages of All Three Sections

Avg. CSR =	2.31	Std. Dev. =	0.48
Avg. CLR =	33.95	Std. Dev. =	4.55
Avg. CTR =	24.56	Std. Dev. =	4.35

2/3 Thickness Averages of All Three Sections

Avg. CSR =	2.31	Std. Dev. =	0.50
Avg. CLR =	33.95	Std. Dev. =	4.65
Avg. CTR =	24.56	Std. Dev. =	4.50

1/3 Thickness Averages of All Three Sections

Avg. CSR =	2.31	Std. Dev. =	0.53
Avg. CLR =	33.95	Std. Dev. =	4.72
Avg. CTR =	24.56	Std. Dev. =	4.66

Crack Location Codes

B - B-Base Metal	S - Surface
W - Weld Metal	T - I.D.
H1 - Heat Affected Zone 1	M - Middle
H2 - Heat Affected Zone 2	C - O.D.

Comments

One sided, 30 day pre-exposure, TM0284.

Number of cracks in weld area - 2

Total crack thickness in weld area - 0.1240

Girth weld, conventional fillet weld, no blend grinding.

Material : A516-70 CS
Sulfur : 0.025
Condition : As-rolled
Solution : TM0177

Project # : L932343KT
Exposure : One-sided, 10 days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 2289A
Section # : W7-9B, 10B
File # : W7-9B.WK4
Date : 5/7/96

Section	Top 1/3, Mid. 1/3, or Bottom 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W7-9B	Top 1/3	0.1929	0.0748	1.013	0.521	BT, H2T	2.76	22.55	16.25
		0.0118	0.0039			BT			
		0.0138	0.0039			BT			
		0.0098	0.0020			BT			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						
W7-10B	Top 1/3	0.1102	0.0059	1.011	0.521	BT	2.69	39.92	24.56
		0.1063	0.0728			BS, BT, H2T			
		0.0531	0.0098			BT			
		0.1339	0.0394			BS, BT			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						

Full Thickness Averages of All Three Sections

Avg. CSR =	2.73	Std. Dev. =	0.69
Avg. CLR =	31.23	Std. Dev. =	5.59
Avg. CTR =	20.40	Std. Dev. =	4.46

2/3 Thickness Averages of All Three Sections

Avg. CSR =	2.73	Std. Dev. =	0.72
Avg. CLR =	31.23	Std. Dev. =	5.79
Avg. CTR =	20.40	Std. Dev. =	4.65

1/3 Thickness Averages of All Three Sections

Avg. CSR =	2.73	Std. Dev. =	0.76
Avg. CLR =	31.23	Std. Dev. =	6.00
Avg. CTR =	20.40	Std. Dev. =	4.86

Crack Location Codes

B - B-Base Metal	S - Surface
W - Weld Metal	T - I.D.
H1 - Heat Affected Zone 1	M - Middle
H2 - Heat Affected Zone 2	C - O.D.

Comments

One sided, 30 day pre-exposure, TM0284.

Number of cracks in weld area - 2

Total crack thickness in weld area - 0.1476

Girth weld, temper bead fillet weld, no blend grinding.

Material : A516-70 CS
Sulfur : 0.025
Condition : As-rolled
Solution : TM0177

Project # : L932343KT
Exposure : One-sided, 10 days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 2289A
Section # : W7-11A, 12A
File # : W7-11A.WK4
Date : 5/7/96

Section	Top 1/3, Mid. 1/3, or Bottom 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W7-11A	Top 1/3	0.0591	0.0138	0.995	0.517	BT	1.84	51.07	14.85
		0.0236	0.0020			BT			
		0.3760	0.0197			BT			
		0.0059	0.0020			BT			
		0.0118	0.0020			BT			
		0.0315	0.0374			H1S, H1T, H2T			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						
W7-12A	Top 1/3	0.0827	0.0394	0.995	0.518	BT	1.41	25.14	22.42
		0.1358	0.0197			BT			
		0.0079	0.0020			BT			
		0.0236	0.0551			H1T, H2T, BT			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						

Full Thickness Averages of All Three Sections

Avg. CSR =	1.62	Std. Dev. =	0.34
Avg. CLR =	38.10	Std. Dev. =	8.36
Avg. CTR =	18.64	Std. Dev. =	3.04

2/3 Thickness Averages of All Three Sections

Avg. CSR =	1.62	Std. Dev. =	0.35
Avg. CLR =	38.10	Std. Dev. =	8.70
Avg. CTR =	18.64	Std. Dev. =	3.14

1/3 Thickness Averages of All Three Sections

Avg. CSR =	1.62	Std. Dev. =	0.36
Avg. CLR =	38.10	Std. Dev. =	9.08
Avg. CTR =	18.64	Std. Dev. =	3.24

Crack Location Codes

B - B-Base Metal	S - Surface
W - Weld Metal	T - I.D.
H1 - Heat Affected Zone 1	M - Middle
H2 - Heat Affected Zone 2	C - O.D.

Comments

One sided, 30 day pre-exposure, TM0284.

Number of cracks in weld area - 2

Total crack thickness in weld area - 0.0925

Girth weld, temper bead fillet weld, blend ground.

Material : A516-70 CS
Sulfur : 0.025
Condition : As-rolled
Solution : TM0177

Project # : L932343KT
Exposure : One-sided, 10 days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 2289A
Section # : W7-11B, 12B
File # : W7-11B.WK4
Date : 5/7/96

Section	Top 1/3, Mid. 1/3, or Bottom 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W7-11B	Top 1/3	0.2480	0.0413	0.995	0.517	BT	2.22	29.29	19.42
		0.0236	0.0059			BT			
		0.0197	0.0531			BT			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						
W7-12B	Top 1/3	0.0551	0.0276	0.995	0.518	BT	1.38	24.94	21.28
		0.1142	0.0374			BT			
		0.0551	0.0079			BT			
		0.0236	0.0374			H1T, H2T			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						

Full Thickness Averages of All Three Sections

Avg. CSR =	1.80	Std. Dev. =	0.48
Avg. CLR =	27.12	Std. Dev. =	6.09
Avg. CTR =	20.35	Std. Dev. =	3.45

2/3 Thickness Averages of All Three Sections

Avg. CSR =	1.80	Std. Dev. =	0.50
Avg. CLR =	27.12	Std. Dev. =	6.36
Avg. CTR =	20.35	Std. Dev. =	3.56

1/3 Thickness Averages of All Three Sections

Avg. CSR =	1.80	Std. Dev. =	0.53
Avg. CLR =	27.12	Std. Dev. =	6.66
Avg. CTR =	20.35	Std. Dev. =	3.66

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - I.D.
H1 - Heat Affected Zone 1	M - Middle
H2 - Heat Affected Zone 2	C - O.D.

Comments

One sided, 30 day pre-exposure, TM0284.

Number of cracks in weld area - 1

Total crack thickness in weld area - 0.0374

Girth weld, conventional fillet weld, blend ground.

Material : A516-70 CS
Sulfur : 0.025
Condition : As-rolled
Solution : TM0177

Project # : L932343KT
Exposure : One-sided, 10 days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 2289D
Section # : W7-13A, 14A
File # : W7-13A.WK4
Date : 5/7/96

Section	Top 1/3, Mid. 1/3, or Bottom 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W7-13A	Top 1/3	0.0945	0.0591	1.039	0.521	BS, BT	3.15	35.64	27.20
		0.1496	0.0433			BT			
		0.1260	0.0394			BS, BT, H2T			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						
W7-14A	Top 1/3	0.0591	0.0531	1.042	0.521	BT	1.80	29.66	19.27
		0.1890	0.0315			BT			
		0.0492	0.0138			BT, H2T			
		0.0118	0.0020			BT			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						

Full Thickness Averages of All Three Sections

Avg. CSR =	2.47	Std. Dev. =	0.44
Avg. CLR =	32.65	Std. Dev. =	5.70
Avg. CTR =	23.24	Std. Dev. =	3.96

2/3 Thickness Averages of All Three Sections

Avg. CSR =	2.47	Std. Dev. =	0.46
Avg. CLR =	32.65	Std. Dev. =	5.89
Avg. CTR =	23.24	Std. Dev. =	4.09

1/3 Thickness Averages of All Three Sections

Avg. CSR =	2.47	Std. Dev. =	0.47
Avg. CLR =	32.65	Std. Dev. =	6.08
Avg. CTR =	23.24	Std. Dev. =	4.21

Crack Location Codes

B - B-Base Metal	S - Surface
W - Weld Metal	T - I.D.
H1 - Heat Affected Zone 1	M - Middle
H2 - Heat Affected Zone 2	C - O.D.

Comments

One sided, 30 day pre-exposure, TM0284.

Number of cracks in weld area - 2

Total crack thickness in weld area - 0.0532

Longitudinal weld, conventional fillet weld, no blend grinding.

Material : A516-70 CS
Sulfur : 0.025
Condition : As-rolled
Solution : TM0177

Project # : L932343KT
Exposure : One-sided, 10 days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 2289D
Section # : W7-13B, 14B
File # : W7-13B.WK4
Date : 5/7/96

Section	Top 1/3, Mid. 1/3, or Bottom 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	Section CSR (%)	Section CLR (%)	Section CTR (%)
W7-13B	Top 1/3	0.1004	0.0217	1.039	0.521	BT	0.41	10.61	4.53
		0.0098	0.0020			BT			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						
W7-14B	Top 1/3	0.0177	0.0020	1.042	0.521	BT	0.93	18.70	7.93
		0.0098	0.0020			BT			
		0.0276	0.0020			BT			
		0.1398	0.0354			BS, BT			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						

Full Thickness Averages of All Three Sections

Avg. CSR =	0.67	Std. Dev. =	0.23
Avg. CLR =	14.66	Std. Dev. =	3.71
Avg. CTR =	6.23	Std. Dev. =	1.80

2/3 Thickness Averages of All Three Sections

Avg. CSR =	0.67	Std. Dev. =	0.24
Avg. CLR =	14.66	Std. Dev. =	3.90
Avg. CTR =	6.23	Std. Dev. =	1.89

1/3 Thickness Averages of All Three Sections

Avg. CSR =	0.67	Std. Dev. =	0.26
Avg. CLR =	14.66	Std. Dev. =	4.10
Avg. CTR =	6.23	Std. Dev. =	2.00

Crack Location Codes

B - B-Base Metal	S - Surface
W - Weld Metal	T - I.D.
H1 - Heat Affected Zone 1	M - Middle
H2 - Heat Affected Zone 2	C - O.D.

Comments

One sided, 30 day pre-exposure, TM0284.

Number of cracks in weld area - 0

Total crack thickness in weld area - 0.0000

Girth weld, temper bead fillet weld, no blend grinding.

Material : A516-70 CS
Sulfur : 0.025
Condition : As-rolled
Solution : TM0177

Project # : L932343KT
Exposure : One-sided, 10 days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 2289A
Section # : W7-15A, 16A
File # : W7-15A.WK4
Date : 5/7/96

Section	Top 1/3, Mid. 1/3, or Bottom 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W7-15A	Top 1/3	0.0433	0.0059	1.023	0.517	BT	2.83	33.29	33.51
		0.1949	0.0453			BT			
		0.0197	0.0098			BT			
		0.0512	0.1102			H1S, H1T, H2T, BT			
		0.0315	0.0020			H1T			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						
W7-16A	Top 1/3	0.1654	0.0039	1.028	0.511	BT	1.27	32.17	26.97
		0.0394	0.0217			BS, BT			
		0.0295	0.0098			BS, BT			
		0.0512	0.0413			H1S, H1T, H2T			
		0.0453	0.0610			H1T			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						

Full Thickness Averages of All Three Sections

Avg. CSR =	2.05	Std. Dev. =	0.41
Avg. CLR =	32.73	Std. Dev. =	5.07
Avg. CTR =	30.24	Std. Dev. =	5.31

Crack Location Codes

B - B-Base Metal	S - Surface
W - Weld Metal	T - I.D.
H1 - Heat Affected Zone 1	M - Middle
H2 - Heat Affected Zone 2	C - O.D.

2/3 Thickness Averages of All Three Sections

Avg. CSR =	2.05	Std. Dev. =	0.43
Avg. CLR =	32.73	Std. Dev. =	5.23
Avg. CTR =	30.24	Std. Dev. =	5.50

1/3 Thickness Averages of All Three Sections

Avg. CSR =	2.05	Std. Dev. =	0.45
Avg. CLR =	32.73	Std. Dev. =	5.38
Avg. CTR =	30.24	Std. Dev. =	5.70

Comments

One sided, 30 day pre-exposure, TM0284.

Number of cracks in weld area - 4

Total crack thickness in weld area - 0.2145

Longitudinal weld, temper bead fillet weld, blend ground.

Material : A516-70 CS
Sulfur : 0.025
Condition : As-rolled
Solution : TM0177

Project # : L932343KT
Exposure : One-sided, 10 days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 2289A
Section # : W7-15B, 16B
File # : W7-15B.WK4
Date : 5/7/96

Section	Top 1/3, Mid. 1/3, or Bottom 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W7-15B	Top 1/3	0.0039	0.0020	1.023	0.517	BT	0.63	19.63	14.47
		0.0079	0.0020			BT			
		0.0079	0.0020			BT			
		0.0157	0.0059			BT			
		0.0118	0.0039			BT			
		0.0039	0.0020			BT			
		0.0728	0.0236			H1T, H1S			
		0.0492	0.0236			H2T, BT, BS			
	Middle 1/3	0.0276	0.0098			BM			
	Bottom 1/3	0.0000	0.0000						
W7-16B	Top 1/3	0.0827	0.1398	1.028	0.511	BS, BT, H2T, H1T	3.65	26.81	36.98
		0.1594	0.0472			BS, BT			
	Middle 1/3	0.0335	0.0020			BM			
	Bottom 1/3	0.0000	0.0000						

Full Thickness Averages of All Three Sections

Avg. CSR =	2.14	Std. Dev. =	0.54
Avg. CLR =	23.22	Std. Dev. =	3.78
Avg. CTR =	25.73	Std. Dev. =	6.00

2/3 Thickness Averages of All Three Sections

Avg. CSR =	2.14	Std. Dev. =	0.57
Avg. CLR =	23.22	Std. Dev. =	3.90
Avg. CTR =	25.73	Std. Dev. =	6.25

1/3 Thickness Averages of All Three Sections

Avg. CSR =	2.11	Std. Dev. =	0.59
Avg. CLR =	20.24	Std. Dev. =	4.11
Avg. CTR =	24.58	Std. Dev. =	6.58

Crack Location Codes

B - B-Base Metal	S - Surface
W - Weld Metal	T - I.D.
H1 - Heat Affected Zone 1	M - Middle
H2 - Heat Affected Zone 2	C - O.D.

Comments

One sided, 30 day pre-exposure, TM0284.

Number of cracks in weld area - 3

Total crack thickness in weld area - 0.187

Longitudinal weld, conventional fillet weld, blend ground.

Material : A516-70 CS
Sulfur : 0.025
Condition : As-rolled
Solution : TM0177

Project # : L932343KT
Exposure : One-sided, 10 days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 2289A
Section # : W7-17, 18
File # : W7-17.WK4
Date : 5/7/96

Section	Top 1/3, Mid. 1/3, or Bottom 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W7-17	Top 1/3	0.0079	0.0039	2.005	0.520	BT	3.85	35.25	50.73
		0.3012	0.1043			BS, BT			
		0.0433	0.0157			BS, BT			
		0.0236	0.0138			BS, BT			
		0.0610	0.0295			BS, BT			
		0.0236	0.0039			BT			
		0.0177	0.0059			BS, BT			
		0.0846	0.0335			BT			
		0.0059	0.0020			BT			
		0.0315	0.0118			BS, BT			
		0.0236	0.0138			BT			
		0.0827	0.0256			BT			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						
W7-18	Top 1/3	0.0472	0.0472	2.009	0.517	BS, BT	2.54	37.72	62.44
		0.1339	0.0472			BS, BT			
		0.0906	0.0276			BS, BT			
		0.0669	0.0433			BS, BT			
		0.0945	0.0453			BS, BT			
		0.0965	0.0433			BS, BT			
		0.0295	0.0039			BT			
		0.0236	0.0138			BS, BT			
		0.0315	0.0138			BS, BT			
		0.0098	0.0020			BT			
		0.0433	0.0020			BT			
		0.0906	0.0335			BS, BT			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						

Full Thickness Averages of All Three Sections

Avg. CSR =	3.20	Std. Dev. =	0.51
Avg. CLR =	36.49	Std. Dev. =	2.87
Avg. CTR =	56.59	Std. Dev. =	4.26

2/3 Thickness Averages of All Three Sections

Avg. CSR =	3.20	Std. Dev. =	0.52
Avg. CLR =	36.49	Std. Dev. =	2.90
Avg. CTR =	56.59	Std. Dev. =	4.31

1/3 Thickness Averages of All Three Sections

Avg. CSR =	3.20	Std. Dev. =	0.54
Avg. CLR =	36.49	Std. Dev. =	2.94
Avg. CTR =	56.59	Std. Dev. =	4.35

Crack Location Codes

B - B-Base Metal	S - Surface
W - Weld Metal	T - I.D.
H1 - Heat Affected Zone 1	M - Middle
H2 - Heat Affected Zone 2	C - O.D.

Comments

One sided, 30 day pre-exposure, TM0284.

Material : A516-70 HRS
Sulfur : 0.001
Condition : Normalized
Solution : TM0177

Project # : L932343KT
Exposure : One-sided, 10 days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 3201B
Section # : W7-19A, 20A
File # : W7-19A.WK4
Date : 5/8/96

Section	Top 1/3, Mid. 1/3, or Bottom 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W7-19A	Top 1/3	0.0256 0.0413	0.0866 0.0079	0.963	0.528	H1S, H1T, H2T, BT H1T, W	0.50	6.95	17.90
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						
W7-20A	Top 1/3	0.0177 0.0217	0.0945 0.0020	0.960	0.526	H1S, H1T, H2T, BT H2T	0.34	4.10	18.34
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						

Full Thickness Averages of All Three Sections

Avg. CSR =	0.42	Std. Dev. =	0.13
Avg. CLR =	5.53	Std. Dev. =	1.31
Avg. CTR =	18.12	Std. Dev. =	5.81

Crack Location Codes

B - B-Base Metal	S - Surface
W - Weld Metal	T - I.D.
H1 - Heat Affected Zone 1	M - Middle
H2 - Heat Affected Zone 2	C - O.D.

2/3 Thickness Averages of All Three Sections

Avg. CSR =	0.42	Std. Dev. =	0.14
Avg. CLR =	5.53	Std. Dev. =	1.38
Avg. CTR =	18.12	Std. Dev. =	6.16

1/3 Thickness Averages of All Three Sections

Avg. CSR =	0.42	Std. Dev. =	0.15
Avg. CLR =	5.53	Std. Dev. =	1.44
Avg. CTR =	18.12	Std. Dev. =	6.57

Comments

One sided, 30 day pre-exposure, TM0177.

Number of cracks in weld area - 4

Total crack thickness in weld area - 0.1910

Girth weld, temper bead fillet weld, no blend grinding.

Material : A516-70 HRS
Sulfur : 0.001
Condition : Normalized
Solution : TM0177

Project # : L932343KT
Exposure : One-sided, 10 days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 3201B
Section # : W7-19B, 20B
File # : W7-19B.WK4
Date : 5/8/96

Section	Top 1/3, Mid. 1/3, or Bottom 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W7-19B	Top 1/3	0.0138	0.0118	0.963	0.525	W	0.03	1.43	2.25
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						
W7-20B	Top 1/3	0.0138	0.0079	0.960	0.526	W	0.02	1.44	1.50
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						

Full Thickness Averages of All Three Sections

Avg. CSR =	0.03	Std. Dev. =	0.01
Avg. CLR =	1.43	Std. Dev. =	0.52
Avg. CTR =	1.87	Std. Dev. =	0.69

2/3 Thickness Averages of All Three Sections

Avg. CSR =	0.03	Std. Dev. =	0.01
Avg. CLR =	1.43	Std. Dev. =	0.55
Avg. CTR =	1.87	Std. Dev. =	0.74

1/3 Thickness Averages of All Three Sections

Avg. CSR =	0.03	Std. Dev. =	0.01
Avg. CLR =	1.43	Std. Dev. =	0.60
Avg. CTR =	1.87	Std. Dev. =	0.80

Crack Location Codes

B - B-Base Metal	S - Surface
W - Weld Metal	T - I.D.
H1 - Heat Affected Zone 1	M - Middle
H2 - Heat Affected Zone 2	C - O.D.

Comments

One sided, 30 day pre-exposure, TM0177.

Number of cracks in weld area - 2

Total crack thickness in weld area - 0.0197

Girth weld, conventional fillet weld, no blend grinding.

Material : A516-70 HRS
Sulfur : 0.001
Condition : Normalized
Solution : TM0177

Project # : L932343KT
Exposure : One-sided, 10 days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 3201B
Section # : W7-21A, 22A
File # : W7-21A.WK4
Date : 5/8/96

Section	Top 1/3, Mid. 1/3, or Bottom 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W7-21A	Top 1/3	0.0177	0.0394	1.023	0.512	H1S, H1T, H2T	2.33	34.65	30.37
		0.0984	0.1122			W			
	Middle 1/3	0.0295	0.0020			BM			
		0.2087	0.0020			BM			
	Bottom 1/3	0.0000	0.0000						
W7-22A	Top 1/3	0.0118	0.0354	1.017	0.524	H1S, H1T, H2T	0.10	1.55	11.65
		0.0039	0.0256			WS, W			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						

Full Thickness Averages of All Three Sections

Avg. CSR =	1.21	Std. Dev. =	0.51
Avg. CLR =	18.10	Std. Dev. =	5.24
Avg. CTR =	21.01	Std. Dev. =	5.58

Crack Location Codes

B - B-Base Metal	S - Surface
W - Weld Metal	T - I.D.
H1 - Heat Affected Zone 1	M - Middle
H2 - Heat Affected Zone 2	C - O.D.

2/3 Thickness Averages of All Three Sections

Avg. CSR =	1.21	Std. Dev. =	0.54
Avg. CLR =	18.10	Std. Dev. =	5.53
Avg. CTR =	21.01	Std. Dev. =	5.87

1/3 Thickness Averages of All Three Sections

Avg. CSR =	1.17	Std. Dev. =	0.60
Avg. CLR =	6.45	Std. Dev. =	2.73
Avg. CTR =	20.63	Std. Dev. =	6.43

Comments

One sided, 30 day pre-exposure, TM0177.

Number of cracks in weld area - 4

Total crack thickness in weld area - 0.2126

Girth weld, conventional fillet weld, blend ground.

Material : A516-70 HRS
Sulfur : 0.001
Condition : Normalized
Solution : TM0177

Project # : L932343KT
Exposure : One-sided, 10 days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 3201B
Section # : W7-21B, 22B
File # : W7-21B.WK4
Date : 5/8/96

Section	Top 1/3, Mid. 1/3, or Bottom 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W7-21B	Top 1/3	0.0374	0.0866	1.023	0.512	H1S, H1T, H2T, BT	0.66	14.25	17.69
		0.0925	0.0020			BT			
		0.0157	0.0020			BT			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						
W7-22B	Top 1/3	0.0236	0.0276	1.017	0.517	W	1.25	16.65	28.18
		0.0512	0.0807			H1S, H1T, H2T, BT			
		0.0453	0.0197			H2S, H2T, BT			
		0.0492	0.0177			BT, BS			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						

Full Thickness Averages of All Three Sections

Avg. CSR =	0.95	Std. Dev. =	0.22
Avg. CLR =	15.45	Std. Dev. =	2.57
Avg. CTR =	22.93	Std. Dev. =	5.10

2/3 Thickness Averages of All Three Sections

Avg. CSR =	0.95	Std. Dev. =	0.23
Avg. CLR =	15.45	Std. Dev. =	2.65
Avg. CTR =	22.93	Std. Dev. =	5.32

1/3 Thickness Averages of All Three Sections

Avg. CSR =	0.95	Std. Dev. =	0.24
Avg. CLR =	15.45	Std. Dev. =	2.72
Avg. CTR =	22.93	Std. Dev. =	5.57

Crack Location Codes

B -	B-Base Metal	S -	Surface
W -	Weld Metal	T -	I.D.
H1 -	Heat Affected Zone 1	M -	Middle
H2 -	Heat Affected Zone 2	C -	O.D.

Comments

One sided, 30 day pre-exposure, TM0177.

Number of cracks in weld area - 4

Total crack thickness in weld area - 0.2146

Girth weld, temper bead fillet weld, blend ground.

Material : A516-70 HRS
Sulfur : 0.001
Condition : Normalized
Solution : TM0177

Project # : L932343KT
Exposure : One-sided, 10 days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 3201B
Section # : W7-23A, 24A
File # : W7-23A.WK4
Date : 5/8/96

Section	Top 1/3, Mid. 1/3, or Bottom 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	Section CSR (%)	Section CLR (%)	Section CTR (%)
W7-23A	Top 1/3	0.0059	0.0217	1.047	0.522	WS, W	0.02	0.56	4.15
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						
W7-24A	Top 1/3	0.0000	0.0000	1.049	0.528		0.00	0.00	0.00
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						

Full Thickness Averages of All Three Sections

Avg. CSR =	0.01	Std. Dev. =	0.01
Avg. CLR =	0.28	Std. Dev. =	0.15
Avg. CTR =	2.07	Std. Dev. =	1.11

Crack Location Codes

B - B-Base Metal	S - Surface
W - Weld Metal	T - I.D.
H1 - Heat Affected Zone 1	M - Middle
H2 - Heat Affected Zone 2	C - O.D.

2/3 Thickness Averages of All Three Sections

Avg. CSR =	0.01	Std. Dev. =	0.01
Avg. CLR =	0.28	Std. Dev. =	0.16
Avg. CTR =	2.07	Std. Dev. =	1.19

1/3 Thickness Averages of All Three Sections

Avg. CSR =	0.01	Std. Dev. =	0.01
Avg. CLR =	0.28	Std. Dev. =	0.18
Avg. CTR =	2.07	Std. Dev. =	1.30

Comments

One sided, 30 day pre-exposure, TM0177.

Number of cracks in weld area - 1

Total crack thickness in weld area - 0.0217

Longitudinal weld, conventional fillet weld, no blend grinding.

Material : A516-70 HRS
Sulfur : 0.001
Condition : Normalized
Solution : TM0177

Project # : L932343KT
Exposure : One-sided, 10 days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 3201B
Section # : W7-23B, 24B
File # : W7-23B.WK4
Date : 5/8/96

Section	Top 1/3, Mid. 1/3, or Bottom 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W7-23B	Top 1/3	0.0197	0.0512	1.047	0.521	H1S, H1T, H2T, BT	0.18	1.88	9.82
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						
W7-24B	Top 1/3	0.0453	0.0591	1.049	0.526	H1S, H1T, H2T	0.61	10.32	15.72
		0.0138	0.0020			BT			
		0.0354	0.0177			BT, BS			
	Middle 1/3	0.0138	0.0039			BM			
	Bottom 1/3	0.0000	0.0000						

Full Thickness Averages of All Three Sections

Avg. CSR =	0.40	Std. Dev. =	0.13
Avg. CLR =	6.10	Std. Dev. =	1.34
Avg. CTR =	12.77	Std. Dev. =	3.57

2/3 Thickness Averages of All Three Sections

Avg. CSR =	0.40	Std. Dev. =	0.13
Avg. CLR =	6.10	Std. Dev. =	1.40
Avg. CTR =	12.77	Std. Dev. =	3.77

1/3 Thickness Averages of All Three Sections

Avg. CSR =	0.39	Std. Dev. =	0.14
Avg. CLR =	5.44	Std. Dev. =	1.49
Avg. CTR =	12.40	Std. Dev. =	4.02

Crack Location Codes

B - B-Base Metal	S - Surface
W - Weld Metal	T - I.D.
H1 - Heat Affected Zone 1	M - Middle
H2 - Heat Affected Zone 2	C - O.D.

Comments

One sided, 30 day pre-exposure, TM0177.

Number of cracks in weld area - 2

Total crack thickness in weld area - 0.1103

Longitudinal weld, temper bead fillet weld, no blend grinding.

Material : A516-70 HRS
Sulfur : 0.001
Condition : Normalized
Solution : TM0177

Project # : L932343KT
Exposure : One-sided, 10 days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 3201B
Section # : W7-25A, 26A
File # : W7-25A.WK4
Date : 5/8/96

Section	Top 1/3, Mid. 1/3, or Bottom 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	Section CSR (%)	Section CLR (%)	Section CTR (%)
W7-25A	Top 1/3	0.0354	0.0157	2.136	0.528	BT	0.21	3.41	16.78
		0.0256	0.0709			H1S, H1T, H2T, BT			
	Middle 1/3	0.0118	0.0020			BM			
	Bottom 1/3	0.0000	0.0000						
W7-26A	Top 1/3	0.0315	0.0787	1.065	0.528	H1S, H1T, H2T, BT	0.48	6.29	16.78
		0.0256	0.0079			W			
	Middle 1/3	0.0098	0.0020			BM			
	Bottom 1/3	0.0000	0.0000						

Full Thickness Averages of All Three Sections

Avg. CSR =	0.35	Std. Dev. =	0.11
Avg. CLR =	4.85	Std. Dev. =	0.95
Avg. CTR =	16.78	Std. Dev. =	4.75

2/3 Thickness Averages of All Three Sections

Avg. CSR =	0.35	Std. Dev. =	0.12
Avg. CLR =	4.85	Std. Dev. =	0.99
Avg. CTR =	16.78	Std. Dev. =	5.02

1/3 Thickness Averages of All Three Sections

Avg. CSR =	0.34	Std. Dev. =	0.13
Avg. CLR =	4.11	Std. Dev. =	1.07
Avg. CTR =	16.40	Std. Dev. =	5.36

Crack Location Codes

B - B-Base Metal	S - Surface
W - Weld Metal	T - I.D.
H1 - Heat Affected Zone 1	M - Middle
H2 - Heat Affected Zone 2	C - O.D.

Comments

One sided, 30 day pre-exposure, TM0177.

Number of cracks in weld area - 3

Total crack thickness in weld area - 0.1575

Longitudinal weld, temper bead fillet weld, blend ground.

Material : A516-70 HRS
Sulfur : 0.001
Condition : Normalized
Solution : TM0177

Project # : L932343KT
Exposure : One-sided, 10 days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 3201B
Section # : W7-25B, 26B
File # : W7-25B.WK4
Date : 5/8/96

Section	Top 1/3, Mid. 1/3, or Bottom 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W7-25B	Top 1/3	0.0295 0.0059	0.0157 0.0020	1.068	0.516	W BT	0.09	3.32	3.43
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						
W7-26B	Top 1/3	0.0157	0.0157	1.065	0.518	W	0.04	1.48	3.04
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						

Full Thickness Averages of All Three Sections

Avg. CSR =	0.07	Std. Dev. =	0.02
Avg. CLR =	2.40	Std. Dev. =	0.78
Avg. CTR =	3.24	Std. Dev. =	1.06

Crack Location Codes

B -	B-Base Metal	S -	Surface
W -	Weld Metal	T -	I.D.
H1 -	Heat Affected Zone 1	M -	Middle
H2 -	Heat Affected Zone 2	C -	O.D.

2/3 Thickness Averages of All Three Sections

Avg. CSR =	0.07	Std. Dev. =	0.03
Avg. CLR =	2.40	Std. Dev. =	0.83
Avg. CTR =	3.24	Std. Dev. =	1.13

1/3 Thickness Averages of All Three Sections

Avg. CSR =	0.07	Std. Dev. =	0.03
Avg. CLR =	2.40	Std. Dev. =	0.89
Avg. CTR =	3.24	Std. Dev. =	1.20

Comments

One sided, 30 day pre-exposure, TM0177.

Number of cracks in weld area - 2

Total crack thickness in weld area - 0.0314

Longitudinal weld, conventional fillet weld, blend ground.

Material : A516-70 HRS
Sulfur : 0.001
Condition : Normalized
Solution : TM0177

Project # : L932343KT
Exposure : One-sided, 10 days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 3201B
Section # : W7-27, 28
File # : W7-27.WK4
Date : 5/8/96

Section	Top 1/3, Mid. 1/3, or Bottom 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W7-27	Top 1/3	0.0098	0.0020	2.002	0.522	BT	0.24	4.92	9.80
		0.0217	0.0118			BT, BS			
		0.0630	0.0354			BT, BS			
	Middle 1/3	0.0039	0.0020			BM			
	Bottom 1/3	0.0000	0.0000						
W7-28	Top 1/3	0.0315	0.0098	2.002	0.529	BT	0.08	3.24	4.84
		0.0335	0.0157			BT, BS			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						

Full Thickness Averages of All Three Sections

Avg. CSR =	0.16	Std. Dev. =	0.05
Avg. CLR =	4.08	Std. Dev. =	0.88
Avg. CTR =	7.32	Std. Dev. =	1.77

Crack Location Codes

B - B-Base Metal		S - Surface	
W - Weld Metal		T - I.D.	
H1 - Heat Affected Zone 1		M - Middle	
H2 - Heat Affected Zone 2		C - O.D.	

2/3 Thickness Averages of All Three Sections

Avg. CSR =	0.16	Std. Dev. =	0.05
Avg. CLR =	4.08	Std. Dev. =	0.92
Avg. CTR =	7.32	Std. Dev. =	1.86

1/3 Thickness Averages of All Three Sections

Avg. CSR =	0.16	Std. Dev. =	0.06
Avg. CLR =	3.98	Std. Dev. =	0.97
Avg. CTR =	7.13	Std. Dev. =	1.97

Comments

One sided, 30 day pre-exposure, TM0177.

Material : A285-C
Sulfur : 0.021
Condition : As-rolled
Solution : TM0177

Project # : L932343KT
Exposure : One-sided, 10 days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 4745C
Section # : W7-29A, 30A
File # : W7-29A.WK4
Date : 5/8/96

Section	Top 1/3, Mid. 1/3, or Bottom 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W7-29A	Top 1/3	0.1142	0.0079	1.000	0.514	BT, H2T, H1T	0.34	15.75	5.36
		0.0433	0.0197			H1T, H2T			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						
W7-30A	Top 1/3	0.1535	0.0079	1.004	0.513	BT	1.21	45.88	7.67
		0.1398	0.0098			BT, H2T, H1T			
		0.1673	0.0217			BT, H2T, H1T			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						

Full Thickness Averages of All Three Sections

Avg. CSR =	0.77	Std. Dev. =	0.18
Avg. CLR =	30.81	Std. Dev. =	6.21
Avg. CTR =	6.52	Std. Dev. =	1.37

Crack Location Codes

B - B-Base Metal	S - Surface
W - Weld Metal	T - I.D.
H1 - Heat Affected Zone 1	M - Middle
H2 - Heat Affected Zone 2	C - O.D.

2/3 Thickness Averages of All Three Sections

Avg. CSR =	0.77	Std. Dev. =	0.19
Avg. CLR =	30.81	Std. Dev. =	6.45
Avg. CTR =	6.52	Std. Dev. =	1.43

1/3 Thickness Averages of All Three Sections

Avg. CSR =	0.77	Std. Dev. =	0.20
Avg. CLR =	30.81	Std. Dev. =	6.70
Avg. CTR =	6.52	Std. Dev. =	1.49

Comments

One sided, 30 day pre-exposure, TM0177.

Number of cracks in weld area - 4

Total crack thickness in weld area - 0.0591

Girth weld, conventional fillet weld, no blend grinding.

Material : A285-C
Sulfur : 0.021
Condition : As-rolled
Solution : TM0177

Project # : L932343KT
Exposure : One-sided, 10 days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 4745C
Section # : W7-29B, 30B
File # : W7-29B.WK4
Date : 5/8/96

Section	Top 1/3, Mid. 1/3, or Bottom 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W7-29B	Top 1/3	0.3484	0.0512	1.000	0.518	BT, H2T, BT	5.42	61.22	18.62
		0.2461	0.0413			BT			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0177	0.0039			BC, BS			
W7-30B	Top 1/3	0.3051	0.0138	1.004	0.517	BT, H2T, H1T	6.00	68.82	28.18
		0.2776	0.0748			BT, H2T, H1T, H1S			
		0.1083	0.0571			BT, BS			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						

Full Thickness Averages of All Three Sections

Avg. CSR =	5.71	Std. Dev. =	1.27
Avg. CLR =	65.02	Std. Dev. =	12.67
Avg. CTR =	23.40	Std. Dev. =	4.77

Crack Location Codes

B - B-Base Metal	S - Surface
W - Weld Metal	T - I.D.
H1 - Heat Affected Zone 1	M - Middle
H2 - Heat Affected Zone 2	C - O.D.

2/3 Thickness Averages of All Three Sections

Avg. CSR =	5.70	Std. Dev. =	1.32
Avg. CLR =	64.13	Std. Dev. =	13.22
Avg. CTR =	23.02	Std. Dev. =	4.99

1/3 Thickness Averages of All Three Sections

Avg. CSR =	5.70	Std. Dev. =	1.38
Avg. CLR =	64.13	Std. Dev. =	13.70
Avg. CTR =	23.02	Std. Dev. =	5.19

Comments

One sided, 30 day pre-exposure, TM0177.

Number of cracks in weld area - 3

Total crack thickness in weld area - 0.1398

Girth weld, temper bead fillet weld, no blend grinding.

Material : A285-C
Sulfur : 0.021
Condition : As-rolled
Solution : TM0177

Project # : L932343KT
Exposure : One-sided, 10 days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 4745C
Section # : W7-31A, 32A
File # : W7-31A.WK4
Date : 5/8/96

Section	Top 1/3, Mid. 1/3, or Bottom 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W7-31A	Top 1/3	0.1732	0.0315	1.028	0.514	BT	3.36	59.55	16.47
		0.2480	0.0374			BS, BT, H2T, H1T			
		0.1909	0.0157			BT			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						
W7-32A	Top 1/3	0.1496	0.0217	1.028	0.514	BT	5.96	74.87	31.79
		0.1654	0.0472			BT			
		0.2520	0.0256			BT, H2T			
		0.2028	0.0689			BT, BS			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						

Full Thickness Averages of All Three Sections

Avg. CSR =	4.66	Std. Dev. =	0.77
Avg. CLR =	67.21	Std. Dev. =	9.62
Avg. CTR =	24.13	Std. Dev. =	3.92

Crack Location Codes

B - B-Base Metal	S - Surface
W - Weld Metal	T - I.D.
H1 - Heat Affected Zone 1	M - Middle
H2 - Heat Affected Zone 2	C - O.D.

2/3 Thickness Averages of All Three Sections

Avg. CSR =	4.66	Std. Dev. =	0.79
Avg. CLR =	67.21	Std. Dev. =	9.82
Avg. CTR =	24.13	Std. Dev. =	4.04

1/3 Thickness Averages of All Three Sections

Avg. CSR =	4.66	Std. Dev. =	0.82
Avg. CLR =	67.21	Std. Dev. =	9.93
Avg. CTR =	24.13	Std. Dev. =	4.14

Comments

One sided, 30 day pre-exposure, TM0177.

Number of cracks in weld area - 2

Total crack thickness in weld area - 0.0630

Girth weld, temper bead fillet weld, blend ground.

Material : A285-C
Sulfur : 0.021
Condition : As-rolled
Solution : TM0177

Project # : L932343KT
Exposure : One-sided, 10 days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 4745C
Section # : W7-31B, 32B
File # : W7-31B.WK4
Date : 5/8/96

Section	Top 1/3, Mid. 1/3, or Bottom 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W7-31B	Top 1/3	0.0118	0.0039	1.028	0.513	H1T	2.17	31.02	28.78
		0.1358	0.0335			BS, BT, H2T, H1T			
		0.0197	0.0020			BT			
		0.0906	0.0079			BT			
		0.0610	0.1004			BT, BS			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						
W7-32B	Top 1/3	0.1299	0.0039	1.028	0.513	BT	0.10	12.64	0.77
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						

Full Thickness Averages of All Three Sections

Avg. CSR =	1.14	Std. Dev. =	0.33
Avg. CLR =	21.83	Std. Dev. =	4.47
Avg. CTR =	14.77	Std. Dev. =	4.71

Crack Location Codes

B - B-Base Metal	S - Surface
W - Weld Metal	T - I.D.
H1 - Heat Affected Zone 1	M - Middle
H2 - Heat Affected Zone 2	C - O.D.

2/3 Thickness Averages of All Three Sections

Avg. CSR =	1.14	Std. Dev. =	0.34
Avg. CLR =	21.83	Std. Dev. =	4.66
Avg. CTR =	14.77	Std. Dev. =	4.97

1/3 Thickness Averages of All Three Sections

Avg. CSR =	1.14	Std. Dev. =	0.36
Avg. CLR =	21.83	Std. Dev. =	4.85
Avg. CTR =	14.77	Std. Dev. =	5.28

Comments

One sided, 30 day pre-exposure, TM0177.

Number of cracks in weld area - 2

Total crack thickness in weld area - 0.0374

Girth weld, conventional fillet weld, no blend grinding.

Material : A285-C
Sulfur : 0.021
Condition : As-rolled
Solution : TM0177

Project # : L932343KT
Exposure : One-sided, 10 days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 4745C
Section # : W7-33A, 34A
File # : W7-33A.WK4
Date : 5/8/96

Section	Top 1/3, Mid. 1/3, or Bottom 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W7-33A	Top 1/3	0.0709	0.0217	1.077	0.517	BT	5.96	75.89	38.84
		0.1102	0.0335			BT			
		0.0236	0.0177			BT			
		0.1201	0.0394			BT, BS			
		0.1732	0.0374			H1T, H2T, H1T, H2T			
		0.3189	0.0512			BT, H2T, BT			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						
W7-34A	Top 1/3	0.0709	0.0571	1.074	0.519	BT, BS	4.40	43.62	26.17
		0.0768	0.0197			BT, H2T, H1T			
		0.3209	0.0591			BT, H2T, H1T			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						

Full Thickness Averages of All Three Sections

Avg. CSR =	5.18	Std. Dev. =	0.95
Avg. CLR =	59.75	Std. Dev. =	9.18
Avg. CTR =	32.50	Std. Dev. =	4.08

2/3 Thickness Averages of All Three Sections

Avg. CSR =	5.18	Std. Dev. =	0.98
Avg. CLR =	59.75	Std. Dev. =	9.45
Avg. CTR =	32.50	Std. Dev. =	4.15

1/3 Thickness Averages of All Three Sections

Avg. CSR =	5.18	Std. Dev. =	1.02
Avg. CLR =	59.75	Std. Dev. =	9.71
Avg. CTR =	32.50	Std. Dev. =	4.19

Crack Location Codes

B - B-Base Metal	S - Surface
W - Weld Metal	T - I.D.
H1 - Heat Affected Zone 1	M - Middle
H2 - Heat Affected Zone 2	C - O.D.

Comments

One sided, 30 day pre-exposure, TM0177.

Number of cracks in weld area - 4

Total crack thickness in weld area - 0.1675

Longitudinal weld, temper bead fillet weld, no blend grinding.

Material : A285-C
Sulfur : 0.021
Condition : As-rolled
Solution : TM0177

Project # : L932343KT
Exposure : One-sided, 10 days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 4745C
Section # : W7-33B, 34B
File # : W7-33B.WK4
Date : 5/8/96

Section	Top 1/3, Mid. 1/3, or Bottom 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W7-33B	Top 1/3	0.3760	0.0531	1.077	0.518	BT, H2T, H1T	5.91	57.24	26.22
		0.1850	0.0650			H1T, H2T, BT, BS			
		0.0551	0.0177			BT, BS			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						
W7-34B	Top 1/3	0.1614	0.0709	1.074	0.521	BT, BS	6.40	54.62	34.76
		0.0098	0.0020			BT			
		0.1575	0.0354			BT, H2T, H1T			
		0.2579	0.0728			BT, BS			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						

Full Thickness Averages of All Three Sections

Avg. CSR =	6.16	Std. Dev. =	1.19
Avg. CLR =	55.93	Std. Dev. =	10.18
Avg. CTR =	30.49	Std. Dev. =	5.24

2/3 Thickness Averages of All Three Sections

Avg. CSR =	6.16	Std. Dev. =	1.24
Avg. CLR =	55.93	Std. Dev. =	10.54
Avg. CTR =	30.49	Std. Dev. =	5.41

1/3 Thickness Averages of All Three Sections

Avg. CSR =	6.16	Std. Dev. =	1.29
Avg. CLR =	55.93	Std. Dev. =	10.91
Avg. CTR =	30.49	Std. Dev. =	5.58

Crack Location Codes

B - B-Base Metal	S - Surface
W - Weld Metal	T - I.D.
H1 - Heat Affected Zone 1	M - Middle
H2 - Heat Affected Zone 2	C - O.D.

Comments

One sided, 30 day pre-exposure, TM0177.

Number of cracks in weld area - 3

Total crack thickness in weld area - 0.1535

Longitudinal weld, conventional fillet weld, no blend grinding.

Material : A285-C
Sulfur : 0.021
Condition : As-rolled
Solution : TM0177

Project # : L932343KT
Exposure : One-sided, 10 days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 4745C
Section # : W7-35A, 36A
File # : W7-35A.WK4
Date : 5/8/96

Section	Top 1/3, Mid. 1/3, or Bottom 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W7-35A	Top 1/3	0.1142	0.0728	1.046	0.518	BT, BS	2.02	29.18	16.72
		0.1909	0.0138			BT			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						
W7-36A	Top 1/3	0.0236	0.0059	1.049	0.512	BT	5.25	45.79	24.22
		0.3661	0.0630			BS, BT, H2T, H1T			
		0.0906	0.0551			BT, BS			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						

Full Thickness Averages of All Three Sections

Avg. CSR =	3.64	Std. Dev. =	1.08
Avg. CLR =	37.49	Std. Dev. =	9.35
Avg. CTR =	20.47	Std. Dev. =	4.80

Crack Location Codes

B - B-Base Metal	S - Surface
W - Weld Metal	T - I.D.
H1 - Heat Affected Zone 1	M - Middle
H2 - Heat Affected Zone 2	C - O.D.

2/3 Thickness Averages of All Three Sections

Avg. CSR =	3.64	Std. Dev. =	1.14
Avg. CLR =	37.49	Std. Dev. =	9.82
Avg. CTR =	20.47	Std. Dev. =	5.03

1/3 Thickness Averages of All Three Sections

Avg. CSR =	3.64	Std. Dev. =	1.21
Avg. CLR =	37.49	Std. Dev. =	10.34
Avg. CTR =	20.47	Std. Dev. =	5.27

Comments

One sided, 30 day pre-exposure, TM0177.

Number of cracks in weld area - 1

Total crack thickness in weld area - 0.0630

Longitudinal weld, conventional fillet weld, blend ground.

Material : A285-C
Sulfur : 0.021
Condition : As-rolled
Solution : TM0177

Project # : L932343KT
Exposure : One-sided, 10 days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 4745C
Section # : W7-35B, 36B
File # : W7-35B.WK4
Date : 5/8/96

Section	Top 1/3, Mid. 1/3, or Bottom 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W7-35B	Top 1/3	0.1437	0.0551	1.046	0.515	BT	8.04	63.83	38.22
		0.2933	0.0433			H1T			
		0.2303	0.0984			BT, BS			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						
W7-36B	Top 1/3	0.0886	0.0551	1.049	0.514	BT, BS	7.33	71.12	34.08
		0.1398	0.0728			H2S, H2T, H1T			
		0.5177	0.0472			H1T, H2T, BT			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						

Full Thickness Averages of All Three Sections

Avg. CSR =	7.69	Std. Dev. =	1.47
Avg. CLR =	67.47	Std. Dev. =	13.45
Avg. CTR =	36.15	Std. Dev. =	6.15

2/3 Thickness Averages of All Three Sections

Avg. CSR =	7.69	Std. Dev. =	1.52
Avg. CLR =	67.47	Std. Dev. =	13.98
Avg. CTR =	36.15	Std. Dev. =	6.34

1/3 Thickness Averages of All Three Sections

Avg. CSR =	7.69	Std. Dev. =	1.57
Avg. CLR =	67.47	Std. Dev. =	14.53
Avg. CTR =	36.15	Std. Dev. =	6.50

Crack Location Codes

B - B-Base Metal	S - Surface
W - Weld Metal	T - I.D.
H1 - Heat Affected Zone 1	M - Middle
H2 - Heat Affected Zone 2	C - O.D.

Comments

One sided, 30 day pre-exposure, TM0177.

Number of cracks in weld area - 3

Total crack thickness in weld area - 0.1633

Longitudinal weld, temper bead fillet weld, blend ground.

Material : A285-C
Sulfur : 0.021
Condition : As-rolled
Solution : TM0177

Project # : L932343KT
Exposure : One-sided, 10 days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 4745C
Section # : W7-37, 38
File # : W7-37.WK4
Date : 5/8/96

Section	Top 1/3, Mid. 1/3, or Bottom 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W7-37	Top 1/3	0.0295	0.0079	1.979	0.514	BT, BS	6.63	63.36	55.53
		0.4409	0.0689			BT			
		0.0846	0.0413			BT, BS			
		0.1142	0.0256			BT			
		0.3346	0.0610			BT, BS			
		0.1496	0.0531			BT, BS			
		0.0886	0.0217			BT			
		0.0118	0.0059			BT			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						
W7-38	Top 1/3	0.0453	0.0079	1.992	0.513	BT	6.19	65.12	62.16
		0.3189	0.0846			BT, BS			
		0.0945	0.0256			BT			
		0.2067	0.0295			BT			
		0.1437	0.0394			BT			
		0.1299	0.0394			BT			
		0.2894	0.0531			BT			
		0.0512	0.0157			BT			
		0.0177	0.0236			BT			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						

Full Thickness Averages of All Three Sections

Avg. CSR =	6.41	Std. Dev. =	0.81
Avg. CLR =	64.24	Std. Dev. =	6.06
Avg. CTR =	58.85	Std. Dev. =	4.75

2/3 Thickness Averages of All Three Sections

Avg. CSR =	6.41	Std. Dev. =	0.83
Avg. CLR =	64.24	Std. Dev. =	6.15
Avg. CTR =	58.85	Std. Dev. =	4.78

1/3 Thickness Averages of All Three Sections

Avg. CSR =	6.41	Std. Dev. =	0.85
Avg. CLR =	64.24	Std. Dev. =	6.23
Avg. CTR =	58.85	Std. Dev. =	4.79

Crack Location Codes

B - B-Base Metal	S - Surface
W - Weld Metal	T - I.D.
H1 - Heat Affected Zone 1	M - Middle
H2 - Heat Affected Zone 2	C - O.D.

Comments

One sided, 30 day pre-exposure, TM0177.

Material : A516-70 CS
Sulfur : 0.025
Condition : As-rolled
Solution : TM0177

Project # : L932343KT
Exposure : One-sided, 10 days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 2289D
Section # : W7-39A, 40A
File # : W7-39A.WK4
Date : 5/7/96

Section	Top 1/3, Mid. 1/3, or Bottom 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W7-39A	Top 1/3	0.0059	0.0020	0.996	0.516	BT	1.73	56.13	13.73
		0.0354	0.0020			BT			
		0.0512	0.0118			BS, BT			
		0.1732	0.0295			BS, BT			
		0.2165	0.0118			BT			
		0.0315	0.0059			BT			
		0.0453	0.0079			H1S, H1T, H2T, BT			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						
W7-40A	Top 1/3	0.1161	0.0295	0.989	0.518	BT	2.56	55.33	27.36
		0.0551	0.0236			BT, H2T, H1T			
		0.1299	0.0374			H1T, H2T			
		0.1004	0.0177			H1T, H2T			
		0.0512	0.0217			BT			
		0.0630	0.0079			BT			
		0.0315	0.0039			BT			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						

Full Thickness Averages of All Three Sections

Avg. CSR =	2.14	Std. Dev. =	0.29
Avg. CLR =	55.73	Std. Dev. =	5.90
Avg. CTR =	20.55	Std. Dev. =	2.16

2/3 Thickness Averages of All Three Sections

Avg. CSR =	2.14	Std. Dev. =	0.30
Avg. CLR =	55.73	Std. Dev. =	6.00
Avg. CTR =	20.55	Std. Dev. =	2.20

1/3 Thickness Averages of All Three Sections

Avg. CSR =	2.14	Std. Dev. =	0.31
Avg. CLR =	55.73	Std. Dev. =	6.08
Avg. CTR =	20.55	Std. Dev. =	2.23

Crack Location Codes

B - B-Base Metal	S - Surface
W - Weld Metal	T - I.D.
H1 - Heat Affected Zone 1	M - Middle
H2 - Heat Affected Zone 2	C - O.D.

Comments

One sided, 30 day pre-exposure, TM0177.

Number of cracks in weld area - 4

Total crack thickness in weld area - 0.0866

Girth weld, temper bead fillet weld, no blend grinding.

Material : A516-70 CS
Sulfur : 0.025
Condition : As-rolled
Solution : TM0177

Project # : L932343KT
Exposure : One-sided, 10 days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 2289D
Section # : W7-39B, 40B
File # : W7-39B.WK4
Date : 5/7/96

Section	Top 1/3, Mid. 1/3, or Bottom 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W7-39B	Top 1/3	0.0315	0.0059	0.996	0.516	BT	6.56	76.88	24.03
		0.2362	0.0551			H1T, H2T, BT			
		0.0039	0.0020			H1T			
		0.4094	0.0472			H2T, BT			
		0.0846	0.0138			BT			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						
W7-40B	Top 1/3	0.1024	0.0217	0.989	0.518	BT	2.00	37.02	19.76
		0.0689	0.0217			H2T, H1T			
		0.0630	0.0039			BT			
		0.0138	0.0020			BT			
		0.1181	0.0531			BT, BS			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						

Full Thickness Averages of All Three Sections

Avg. CSR =	4.28	Std. Dev. =	0.95
Avg. CLR =	56.95	Std. Dev. =	9.90
Avg. CTR =	21.90	Std. Dev. =	3.49

2/3 Thickness Averages of All Three Sections

Avg. CSR =	4.28	Std. Dev. =	0.99
Avg. CLR =	56.95	Std. Dev. =	10.24
Avg. CTR =	21.90	Std. Dev. =	3.60

1/3 Thickness Averages of All Three Sections

Avg. CSR =	4.28	Std. Dev. =	1.03
Avg. CLR =	56.95	Std. Dev. =	10.61
Avg. CTR =	21.90	Std. Dev. =	3.72

Crack Location Codes

B - B-Base Metal	S - Surface
W - Weld Metal	T - I.D.
H1 - Heat Affected Zone 1	M - Middle
H2 - Heat Affected Zone 2	C - O.D.

Comments

One sided, 30 day pre-exposure, TM0177.

Number of cracks in weld area - 4

Total crack thickness in weld area - 0.1260

Girth weld, conventional fillet weld, no blend grinding.

Material : A516-70 CS
Sulfur : 0.025
Condition : As-rolled
Solution : TM0177

Project # : L932343KT
Exposure : One-sided, 10 days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 2289D
Section # : W7-41A, 42A
File # : W7-41A.WK4
Date : 5/7/96

Section	Top 1/3, Mid. 1/3, or Bottom 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W7-41A	Top 1/3	0.0453	0.0059	1.035	0.514	BT	3.02	49.26	36.38
		0.0256	0.0039			BS, BT			
		0.0965	0.0157			BS, BT			
		0.0709	0.0079			H1T			
		0.0846	0.0689			W			
		0.0866	0.0512			H1T, H2T			
		0.1004	0.0335			BT			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						
W7-42A	Top 1/3	0.1102	0.0236	1.029	0.517	BT	2.41	57.42	34.27
		0.0925	0.0236			BT			
		0.0098	0.0177			BS, BT			
		0.0866	0.0236			BT			
		0.0531	0.0020			BT			
		0.1358	0.0177			H1T, H2T			
		0.0413	0.0472			W			
		0.0610	0.0217			BS, BT			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						

Full Thickness Averages of All Three Sections

Avg. CSR =	2.71	Std. Dev. =	0.29
Avg. CLR =	53.34	Std. Dev. =	4.26
Avg. CTR =	35.33	Std. Dev. =	3.56

2/3 Thickness Averages of All Three Sections

Avg. CSR =	2.71	Std. Dev. =	0.30
Avg. CLR =	53.34	Std. Dev. =	4.26
Avg. CTR =	35.33	Std. Dev. =	3.62

1/3 Thickness Averages of All Three Sections

Avg. CSR =	2.71	Std. Dev. =	0.30
Avg. CLR =	53.34	Std. Dev. =	4.23
Avg. CTR =	35.33	Std. Dev. =	3.66

Crack Location Codes

B - B-Base Metal	S - Surface
W - Weld Metal	T - I.D.
H1 - Heat Affected Zone 1	M - Middle
H2 - Heat Affected Zone 2	C - O.D.

Comments

One sided, 30 day pre-exposure, TM0177.

Number of cracks in weld area - 5

Total crack thickness in weld area - 0.2640

Girth weld, conventional fillet weld, blend ground.

Material : A516-70 CS
Sulfur : 0.025
Condition : As-rolled
Solution : TM0177

Project # : L932343KT
Exposure : One-sided, 10 days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 2289D
Section # : W7-41B, 42B
File # : W7-41B.WK4
Date : 5/7/96

Section	Top 1/3, Mid. 1/3, or Bottom 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W7-41B	Top 1/3	0.0827	0.0295	1.035	0.514	BT	3.07	52.30	46.34
		0.0906	0.0315			BT, H2T, H1T			
		0.0827	0.0709			W			
		0.0177	0.0098			W, H1T			
		0.0059	0.0335			WS, W			
		0.0315	0.0217			W, H1T			
		0.1240	0.0177			BT			
		0.0945	0.0197			BT			
		0.0118	0.0039			BT			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						
W7-42B	Top 1/3	0.1240	0.0571	1.029	0.517	BS, BT	5.96	60.86	41.50
		0.0453	0.0433			W			
		0.1004	0.0118			H1T, H2T			
		0.0965	0.0236			H1S, H1T, H2T, BT			
		0.2500	0.0768			BT			
		0.0098	0.0020			BT			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						

Full Thickness Averages of All Three Sections

Avg. CSR =	4.52	Std. Dev. =	0.74
Avg. CLR =	56.58	Std. Dev. =	5.86
Avg. CTR =	43.92	Std. Dev. =	4.36

2/3 Thickness Averages of All Three Sections

Avg. CSR =	4.52	Std. Dev. =	0.76
Avg. CLR =	56.58	Std. Dev. =	5.95
Avg. CTR =	43.92	Std. Dev. =	4.42

1/3 Thickness Averages of All Three Sections

Avg. CSR =	4.52	Std. Dev. =	0.78
Avg. CLR =	56.58	Std. Dev. =	6.04
Avg. CTR =	43.92	Std. Dev. =	4.47

Crack Location Codes

B - B-Base Metal	S - Surface
W - Weld Metal	T - I.D.
H1 - Heat Affected Zone 1	M - Middle
H2 - Heat Affected Zone 2	C - O.D.

Comments

One sided, 30 day pre-exposure, TM0177.

Number of cracks in weld area - 8

Total crack thickness in weld area - 0.2461

Girth weld, temper bead fillet weld, blend ground.

Material : A516-70 CS
Sulfur : 0.025
Condition : As-rolled
Solution : TM0177

Project # : L932343KT
Exposure : One-sided, 10 days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 2289D
Section # : W7-43A, 44A
File # : W7-43A.WK4
Date : 5/7/96

Section	Top 1/3, Mid. 1/3, or Bottom 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W7-43A	Top 1/3	0.0374	0.0020	0.960	0.519	BT	6.03	53.75	40.58
		0.1654	0.0925			BS, BT			
		0.2087	0.0551			BS, BT			
		0.0531	0.0079			BT			
		0.0512	0.0531			W			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						
W7-44A	Top 1/3	0.2264	0.0689	0.964	0.521	BS, BT	5.02	52.68	41.18
		0.1102	0.0413			BT, H2T, H1T			
		0.0335	0.0020			BT			
		0.0236	0.0079			BT			
		0.0433	0.0689			W			
		0.0709	0.0256			BS, BT			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						

Full Thickness Averages of All Three Sections

Avg. CSR =	5.52	Std. Dev. =	0.96
Avg. CLR =	53.22	Std. Dev. =	7.08
Avg. CTR =	40.88	Std. Dev. =	5.53

2/3 Thickness Averages of All Three Sections

Avg. CSR =	5.52	Std. Dev. =	1.00
Avg. CLR =	53.22	Std. Dev. =	7.25
Avg. CTR =	40.88	Std. Dev. =	5.67

1/3 Thickness Averages of All Three Sections

Avg. CSR =	5.52	Std. Dev. =	1.03
Avg. CLR =	53.22	Std. Dev. =	7.41
Avg. CTR =	40.88	Std. Dev. =	5.80

Crack Location Codes

B -	B-Base Metal	S -	Surface
W -	Weld Metal	T -	I.D.
H1 -	Heat Affected Zone 1	M -	Middle
H2 -	Heat Affected Zone 2	C -	O.D.

Comments

One sided, 30 day pre-exposure, TM0177.

Number of cracks in weld area - 3

Total crack thickness in weld area - 0.1633

Longitudinal weld, temper bead fillet weld, no blend grinding.

Material : A516-70 CS
Sulfur : 0.025
Condition : As-rolled
Solution : TM0177

Project # : L932343KT
Exposure : One-sided, 10 days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 2289D
Section # : W7-43B, 44B
File # : W7-43B.WK4
Date : 5/7/96

Section	Top 1/3, Mid. 1/3, or Bottom 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W7-43B	Top 1/3	0.0906	0.0295	0.960	0.519	BS, BT	3.77	58.06	31.48
		0.0748	0.0591			W			
		0.0374	0.0079			BT			
		0.1575	0.0453			BT			
		0.1969	0.0217			H1T, H2T, BT			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						
W7-44B	Top 1/3	0.1122	0.0354	0.964	0.521	BS, BT	1.59	54.52	21.16
		0.0453	0.0492			W			
		0.0335	0.0039			BT			
		0.0295	0.0020			BT			
		0.1772	0.0059			BT			
		0.0138	0.0020			BT			
		0.0984	0.0039			BT			
		0.0157	0.0079			BT			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						

Full Thickness Averages of All Three Sections

Avg. CSR =	2.68	Std. Dev. =	0.38
Avg. CLR =	56.29	Std. Dev. =	6.30
Avg. CTR =	26.32	Std. Dev. =	3.43

2/3 Thickness Averages of All Three Sections

Avg. CSR =	2.68	Std. Dev. =	0.39
Avg. CLR =	56.29	Std. Dev. =	6.41
Avg. CTR =	26.32	Std. Dev. =	3.52

1/3 Thickness Averages of All Three Sections

Avg. CSR =	2.68	Std. Dev. =	0.41
Avg. CLR =	56.29	Std. Dev. =	6.51
Avg. CTR =	26.32	Std. Dev. =	3.60

Crack Location Codes

B - B-Base Metal	S - Surface
W - Weld Metal	T - I.D.
H1 - Heat Affected Zone 1	M - Middle
H2 - Heat Affected Zone 2	C - O.D.

Comments

One sided, 30 day pre-exposure, TM0177.

Number of cracks in weld area - 3

Total crack thickness in weld area - 0.1300

Longitudinal weld, conventional fillet weld, no blend grinding.

Material : A516-70 CS
Sulfur : 0.025
Condition : As-rolled
Solution : TM0177

Project # : L932343KT
Exposure : One-sided, 10 days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 2289D
Section # : W7-45A, 46A
File # : W7-45A.WK4
Date : 5/7/96

Section	Top 1/3, Mid. 1/3, or Bottom 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W7-45A	Top 1/3	0.0492	0.0138	0.978	0.507	BT	4.62	59.81	40.38
		0.0709	0.0138			BT, BS			
		0.0157	0.0020			BT			
		0.1929	0.0610			H1T, H2T			
		0.0374	0.0472			W			
		0.1575	0.0374			H1T, H2T, BT			
		0.0610	0.0295			BT			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						
W7-46A	Top 1/3	0.0492	0.0138	0.983	0.508	BS, BT	1.80	39.25	29.45
		0.0886	0.0197			H2T, H1T			
		0.0098	0.0020			H2T			
		0.0236	0.0413			W			
		0.1161	0.0256			BT			
		0.0433	0.0020			BT			
		0.0551	0.0453			BT			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						

Full Thickness Averages of All Three Sections

Avg. CSR =	3.21	Std. Dev. =	0.51
Avg. CLR =	49.53	Std. Dev. =	5.27
Avg. CTR =	34.91	Std. Dev. =	3.65

Crack Location Codes

B - B-Base Metal	S - Surface
W - Weld Metal	T - I.D.
H1 - Heat Affected Zone 1	M - Middle
H2 - Heat Affected Zone 2	C - O.D.

2/3 Thickness Averages of All Three Sections

Avg. CSR =	3.21	Std. Dev. =	0.53
Avg. CLR =	49.53	Std. Dev. =	5.36
Avg. CTR =	34.91	Std. Dev. =	3.71

1/3 Thickness Averages of All Three Sections

Avg. CSR =	3.21	Std. Dev. =	0.54
Avg. CLR =	49.53	Std. Dev. =	5.43
Avg. CTR =	34.91	Std. Dev. =	3.76

Comments

One sided, 30 day pre-exposure, TM0177.

Number of cracks in weld area - 6

Total crack thickness in weld area - 0.2086

Longitudinal weld, conventional fillet weld, blend ground.

Material : A516-70 CS
Sulfur : 0.025
Condition : As-rolled
Solution : TM0177

Project # : L932343KT
Exposure : One-sided, 10 days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 2289D
Section # : W7-45B, 46B
File # : W7-45B.WK4
Date : 5/7/96

Section	Top 1/3, Mid. 1/3, or Bottom 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W7-45B	Top 1/3	0.1280	0.0433	0.978	0.507	BT	4.44	55.98	22.91
		0.1220	0.0138			H1T			
		0.0315	0.0039			H1T, H2T, H2S			
		0.2657	0.0551			BT, BS			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						
W7-46B	Top 1/3	0.1063	0.0669	0.983	0.508	BT	4.40	55.27	51.15
		0.0433	0.0472			W			
		0.1752	0.0394			H1T			
		0.0650	0.0256			H1T, H2T, BT			
		0.0492	0.0197			BT			
		0.0374	0.0276			BT, BS			
		0.0669	0.0335			BT			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						

Full Thickness Averages of All Three Sections

Avg. CSR =	4.42	Std. Dev. =	0.71
Avg. CLR =	55.63	Std. Dev. =	7.06
Avg. CTR =	37.03	Std. Dev. =	4.17

2/3 Thickness Averages of All Three Sections

Avg. CSR =	4.42	Std. Dev. =	0.73
Avg. CLR =	55.63	Std. Dev. =	7.22
Avg. CTR =	37.03	Std. Dev. =	4.23

1/3 Thickness Averages of All Three Sections

Avg. CSR =	4.42	Std. Dev. =	0.76
Avg. CLR =	55.63	Std. Dev. =	7.35
Avg. CTR =	37.03	Std. Dev. =	4.27

Crack Location Codes

B - B-Base Metal	S - Surface
W - Weld Metal	T - I.D.
H1 - Heat Affected Zone 1	M - Middle
H2 - Heat Affected Zone 2	C - O.D.

Comments

One sided, 30 day pre-exposure, TM0177.

Number of cracks in weld area - 5

Total crack thickness in weld area - 0.1299

Longitudinal weld, temper bead fillet weld, blend ground.

Material : A516-70 CS
Sulfur : 0.025
Condition : As-rolled
Solution : TM0177

Project # : L932343KT
Exposure : One-sided, 10 days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 2289A
Section # : W7-47, 48
File # : W7-47.WK4
Date : 5/7/96

Section	Top 1/3, Mid. 1/3, or Bottom 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W7-17	Top 1/3	0.0374	0.0079	2.000	0.517	BS, BT	2.88	45.47	46.07
		0.2579	0.0413			BS, BT			
		0.2008	0.0433			BS, BT			
		0.0650	0.0020			BT			
		0.0177	0.0177			BS, BT			
		0.1004	0.0394			BS, BT			
		0.0945	0.0335			BS, BT			
		0.0335	0.0177			BT			
		0.0689	0.0236			BS, BT			
		0.0335	0.0118			BT			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						
W7-18	Top 1/3	0.0354	0.0039	2.000	0.519	BT	4.04	53.25	59.93
		0.1299	0.0374			BS, BT			
		0.0453	0.0197			BS, BT			
		0.1791	0.0453			BS, BT			
		0.1398	0.0591			BS, BT			
		0.0197	0.0039			BS, BT			
		0.1201	0.0374			BS, BT			
		0.0492	0.0197			BS, BT			
		0.0059	0.0020			BT			
		0.2008	0.0610			BS, BT			
		0.0886	0.0197			BT			
	Middle 1/3	0.0512	0.0020			BM			
	Bottom 1/3	0.0000	0.0000						

Full Thickness Averages of All Three Sections

Avg. CSR =	3.46	Std. Dev. =	0.34
Avg. CLR =	49.36	Std. Dev. =	3.50
Avg. CTR =	53.00	Std. Dev. =	3.65

2/3 Thickness Averages of All Three Sections

Avg. CSR =	3.46	Std. Dev. =	0.34
Avg. CLR =	49.36	Std. Dev. =	3.52
Avg. CTR =	53.00	Std. Dev. =	3.67

1/3 Thickness Averages of All Three Sections

Avg. CSR =	3.46	Std. Dev. =	0.35
Avg. CLR =	48.08	Std. Dev. =	3.58
Avg. CTR =	52.81	Std. Dev. =	3.68

Crack Location Codes

B - B-Base Metal	S - Surface
W - Weld Metal	T - I.D.
H1 - Heat Affected Zone 1	M - Middle
H2 - Heat Affected Zone 2	C - O.D.

Comments

One sided, 30 day pre-exposure, TM0177.

Material : A516-70 CS
Sulfur : 0.025
Condition : As-rolled
Solution : TM0177

Project # : L932343KT
Exposure : One-sided, 10 days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 2289A
Section # : W7-49A, 50A
File # : W7-49A.WK4
Date : 5/8/96

Section	Top 1/3, Mid. 1/3, or Bottom 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W7-49A	Top 1/3	0.1142	0.0413	1.049	0.520	BT, BS	10.53	63.43	43.16
		0.0433	0.0866			BT, H2T, H1T, W, WS			
	Middle 1/3	0.5079	0.0965			BM, H2M, H1M			
	Bottom 1/3	0.0000	0.0000						
W7-50A	Top 1/3	0.0846	0.0335	1.041	0.519	BT, BS	1.47	30.44	18.59
		0.0531	0.0492			H2T, BT, H2T, H1T			
	Middle 1/3	0.1791	0.0138			BM, H2M			
	Bottom 1/3	0.0000	0.0000						

Full Thickness Averages of All Three Sections

Avg. CSR =	6.00	Std. Dev. =	2.21
Avg. CLR =	46.94	Std. Dev. =	12.33
Avg. CTR =	30.87	Std. Dev. =	6.16

2/3 Thickness Averages of All Three Sections

Avg. CSR =	6.00	Std. Dev. =	2.35
Avg. CLR =	46.94	Std. Dev. =	12.98
Avg. CTR =	30.87	Std. Dev. =	6.39

1/3 Thickness Averages of All Three Sections

Avg. CSR =	1.28	Std. Dev. =	0.32
Avg. CLR =	14.12	Std. Dev. =	3.76
Avg. CTR =	20.27	Std. Dev. =	5.42

Crack Location Codes

B - B-Base Metal	S - Surface
W - Weld Metal	T - I.D.
H1 - Heat Affected Zone 1	M - Middle
H2 - Heat Affected Zone 2	C - O.D.

Comments

One sided, 30 day pre-exposure, TM0177.

Number of cracks in weld area - 4

Total crack thickness in weld area - 0.2461

Girth weld, grind out temper bead weld repair.

Material : A516-70 HRS
Sulfur : 0.001
Condition : As-rolled
Solution : TM0177

Project # : L932343KT
Exposure : One-sided, 10 days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 3201B
Section # : W7-49B, 50B
File # : W7-49B.WK4
Date : 5/8/96

Section	Top 1/3, Mid. 1/3, or Bottom 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W7-49B	Top 1/3	0.0453 0.0866	0.1024 0.0256	1.049	0.528	H1S, H1T, H2T, BT BT, BS	1.24	12.57	24.23
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						
W7-50B	Top 1/3	0.0394	0.0807	1.041	0.528	H1S, H1T, H2T	0.58	3.78	15.29
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						

Full Thickness Averages of All Three Sections

Avg. CSR =	0.91	Std. Dev. =	0.26
Avg. CLR =	8.18	Std. Dev. =	2.42
Avg. CTR =	19.76	Std. Dev. =	6.10

Crack Location Codes

B - B-Base Metal	S - Surface
W - Weld Metal	T - I.D.
H1 - Heat Affected Zone 1	M - Middle
H2 - Heat Affected Zone 2	C - O.D.

2/3 Thickness Averages of All Three Sections

Avg. CSR =	0.91	Std. Dev. =	0.28
Avg. CLR =	8.18	Std. Dev. =	2.56
Avg. CTR =	19.76	Std. Dev. =	6.47

1/3 Thickness Averages of All Three Sections

Avg. CSR =	0.91	Std. Dev. =	0.29
Avg. CLR =	8.18	Std. Dev. =	2.73
Avg. CTR =	19.76	Std. Dev. =	6.91

Comments

One sided, 30 day pre-exposure, TM0177.

Number of cracks in weld area - 2

Total crack thickness in weld area - 0.1831

Girth weld, grind out temper bead weld repair.

Material : A516-70 CS
Sulfur : 0.025
Condition : As-rolled
Solution : TM0177

Project # : L932343KT
Exposure : One-sided, 10 days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 2289A
Section # : W7-51A, 52A
File # : W7-51A.WK4
Date : 5/8/96

Section	Top 1/3, Mid. 1/3, or Bottom 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	Section CSR (%)	Section CLR (%)	Section CTR (%)
W7-51A	Top 1/3	0.0354	0.0335	1.003	0.519	BT, BS	1.58	28.08	31.86
		0.1654	0.0276			BT			
		0.0157	0.0157			BT, BS			
		0.0236	0.0098			BT			
		0.0256	0.0768			H1T			
	Middle 1/3	0.0157	0.0020			H2M			
	Bottom 1/3	0.0000	0.0000						
W7-52A	Top 1/3	0.0866	0.0079	0.998	0.521	BT	1.67	27.02	24.56
		0.0413	0.0079			BT			
		0.0768	0.0335			BT, BS			
		0.0650	0.0787			H1T			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						

Full Thickness Averages of All Three Sections

Avg. CSR =	1.63	Std. Dev. =	0.29
Avg. CLR =	27.55	Std. Dev. =	4.15
Avg. CTR =	28.21	Std. Dev. =	4.56

2/3 Thickness Averages of All Three Sections

Avg. CSR =	1.63	Std. Dev. =	0.30
Avg. CLR =	27.55	Std. Dev. =	4.26
Avg. CTR =	28.21	Std. Dev. =	4.71

1/3 Thickness Averages of All Three Sections

Avg. CSR =	1.62	Std. Dev. =	0.31
Avg. CLR =	26.77	Std. Dev. =	4.43
Avg. CTR =	28.02	Std. Dev. =	4.87

Crack Location Codes

B -	B-Base Metal	S -	Surface
W -	Weld Metal	T -	I.D.
H1 -	Heat Affected Zone 1	M -	Middle
H2 -	Heat Affected Zone 2	C -	O.D.

Comments

One sided, 30 day pre-exposure, TM0177.

Number of cracks in weld area - 3

Total crack thickness in weld area - 0.1575

Girth weld, grind out conventional weld repair.

Material : A516-70 HRS
Sulfur : 0.001
Condition : Normalized
Solution : TM0177

Project # : L932343KT
Exposure : One-sided, 10 days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 3201B
Section # : W7-51B, 52B
File # : W7-51B.WK4
Date : 5/8/96

Section	Top 1/3, Mid. 1/3, or Bottom 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W7-51B	Top 1/3	0.0472	0.0965	1.003	0.526	BT, BS	0.87	6.68	18.71
		0.0197	0.0020			BT, BS			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						
W7-52B	Top 1/3	0.0413	0.0433	0.998	0.527	H1T	0.42	14.79	8.96
	Middle 1/3	0.1063	0.0039			H1M, H2M, BM			
	Bottom 1/3	0.0000	0.0000						

Full Thickness Averages of All Three Sections

Avg. CSR =	0.65	Std. Dev. =	0.23
Avg. CLR =	10.73	Std. Dev. =	2.97
Avg. CTR =	13.84	Std. Dev. =	5.00

2/3 Thickness Averages of All Three Sections

Avg. CSR =	0.65	Std. Dev. =	0.25
Avg. CLR =	10.73	Std. Dev. =	3.14
Avg. CTR =	13.84	Std. Dev. =	5.33

1/3 Thickness Averages of All Three Sections

Avg. CSR =	0.61	Std. Dev. =	0.27
Avg. CLR =	5.41	Std. Dev. =	1.78
Avg. CTR =	13.46	Std. Dev. =	5.76

Crack Location Codes

B - B-Base Metal	S - Surface
W - Weld Metal	T - I.D.
H1 - Heat Affected Zone 1	M - Middle
H2 - Heat Affected Zone 2	C - O.D.

Comments

One sided, 30 day pre-exposure, TM0177.

Number of cracks in weld area - 2

Total crack thickness in weld area - 0.0472

Girth weld, grind out conventional weld repair.

Material : A285-C
Sulfur : 0.021
Condition : As-rolled
Solution : TM0177

Project # : L932343KT
Exposure : One-sided, 10 days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 4745C
Section # : W7-53A, 54A
File # : W7-53A.WK4
Date : 5/8/96

Section	Top 1/3, Mid. 1/3, or Bottom 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W7-53A	Top 1/3	0.2579	0.0413	1.008	0.516	BT	4.48	59.17	15.26
		0.3386	0.0374			BT, H2T, H1T			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						
W7-54A	Top 1/3	0.3563	0.0433	1.004	0.518	BT	4.46	53.13	34.58
		0.0709	0.0295			BT, H2T, H1T			
		0.0531	0.1024			H1T			
		0.0531	0.0039			H1T			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						

Full Thickness Averages of All Three Sections

Avg. CSR =	4.47	Std. Dev. =	0.95
Avg. CLR =	56.15	Std. Dev. =	11.90
Avg. CTR =	24.92	Std. Dev. =	5.22

2/3 Thickness Averages of All Three Sections

Avg. CSR =	4.47	Std. Dev. =	1.00
Avg. CLR =	56.15	Std. Dev. =	12.40
Avg. CTR =	24.92	Std. Dev. =	5.44

1/3 Thickness Averages of All Three Sections

Avg. CSR =	4.47	Std. Dev. =	1.04
Avg. CLR =	56.15	Std. Dev. =	12.94
Avg. CTR =	24.92	Std. Dev. =	5.68

Crack Location Codes

B - B-Base Metal	S - Surface
W - Weld Metal	T - I.D.
H1 - Heat Affected Zone 1	M - Middle
H2 - Heat Affected Zone 2	C - O.D.

Comments

One sided, 30 day pre-exposure, TM0177.

Number of cracks in weld area - 4

Total crack thickness in weld area - 0.1732

Girth weld, grind out conventional weld repair.

Material : A516-70 CS
Sulfur : 0.025
Condition : As-rolled
Solution : TM0177

Project # : L932343KT
Exposure : One-sided, 10 days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 2289D
Section # : W7-53B, 54B
File # : W7-53B.WK4
Date : 5/8/96

Section	Top 1/3, Mid. 1/3, or Bottom 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W7-53B	Top 1/3	0.1693	0.0276	1.008	0.517	H1T, H2T, BT	2.05	42.96	17.90
		0.0709	0.0118			BT			
		0.0846	0.0236			BT			
		0.1083	0.0295			BT, BS			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						
W7-54B	Top 1/3	0.0610	0.0374	1.004	0.517	H2S, H2T, H1T	2.45	27.65	25.89
		0.1102	0.0453			BS, BT			
		0.1063	0.0512			BS, BT			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						

Full Thickness Averages of All Three Sections

Avg. CSR =	2.25	Std. Dev. =	0.37
Avg. CLR =	35.30	Std. Dev. =	5.32
Avg. CTR =	21.89	Std. Dev. =	3.40

2/3 Thickness Averages of All Three Sections

Avg. CSR =	2.25	Std. Dev. =	0.38
Avg. CLR =	35.30	Std. Dev. =	5.45
Avg. CTR =	21.89	Std. Dev. =	3.49

1/3 Thickness Averages of All Three Sections

Avg. CSR =	2.25	Std. Dev. =	0.39
Avg. CLR =	35.30	Std. Dev. =	5.55
Avg. CTR =	21.89	Std. Dev. =	3.56

Crack Location Codes

B -	B-Base Metal	S -	Surface
W -	Weld Metal	T -	I.D.
H1 -	Heat Affected Zone 1	M -	Middle
H2 -	Heat Affected Zone 2	C -	O.D.

Comments

One sided, 30 day pre-exposure, TM0177.

Number of cracks in weld area - 2

Total crack thickness in weld area - 0.0650

Girth weld, grind out conventional weld repair.

Material : A285-C
Sulfur : 0.021
Condition : As-rolled
Solution : TM0177

Project # : L932343KT
Exposure : One-sided, 10 days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : ;4745C
Section # : W7-55A, 56A
File # : W7-55A.WK4
Date : 5/8/96

Section	Top 1/3, Mid. 1/3, or Bottom 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W7-55A	Top 1/3	0.2776	0.0650	0.992	0.517	BT, BS	4.54	41.49	22.08
		0.1102	0.0472			BT, H2T, H1T, H1S			
		0.0236	0.0020			H1T			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						
W7-56A	Top 1/3	0.1024	0.0177	0.990	0.518	BT	0.98	24.67	12.92
		0.1201	0.0217			BT, H2T, H1T			
		0.0217	0.0276			H1T			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						

Full Thickness Averages of All Three Sections

Avg. CSR =	2.76	Std. Dev. =	0.84
Avg. CLR =	33.08	Std. Dev. =	7.33
Avg. CTR =	17.50	Std. Dev. =	3.65

2/3 Thickness Averages of All Three Sections

Avg. CSR =	2.76	Std. Dev. =	0.89
Avg. CLR =	33.08	Std. Dev. =	7.66
Avg. CTR =	17.50	Std. Dev. =	3.81

1/3 Thickness Averages of All Three Sections

Avg. CSR =	2.76	Std. Dev. =	0.94
Avg. CLR =	33.08	Std. Dev. =	8.02
Avg. CTR =	17.50	Std. Dev. =	3.97

Crack Location Codes

B - B-Base Metal	S - Surface
W - Weld Metal	T - I.D.
H1 - Heat Affected Zone 1	M - Middle
H2 - Heat Affected Zone 2	C - O.D.

Comments

One sided, 30 day pre-exposure, TM0177.

Number of cracks in weld area - 4

Total crack thickness in weld area - 0.0985

Girth weld, grind out conventional weld repair.

Material : A516-70 CS
Sulfur : 0.025
Condition : As-rolled
Solution : TM0177

Project # : L932343KT
Exposure : One-sided, 10 days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 2289D
Section # : W7-55B, 56B
File # : W7-55B.WK4
Date : 5/8/96

Section	Top 1/3, Mid. 1/3, or Bottom 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W7-55B	Top 1/3	0.2835 0.0217	0.0374 0.0295	0.992	0.517	BT, H2T, H1T H1S, H1T, H2T	2.37	46.06	14.09
	Middle 1/3	0.1516	0.0059			BM, H2M			
	Bottom 1/3	0.0000	0.0000						
W7-56B	Top 1/3	0.2638 0.0197	0.0492 0.0020	0.990	0.515	BT, H2T, H1T, W BT	2.55	28.65	9.94
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						

Full Thickness Averages of All Three Sections

Avg. CSR =	2.46	Std. Dev. =	0.78
Avg. CLR =	37.35	Std. Dev. =	9.66
Avg. CTR =	12.01	Std. Dev. =	3.05

Crack Location Codes

B - B-Base Metal	S - Surface
W - Weld Metal	T - I.D.
H1 - Heat Affected Zone 1	M - Middle
H2 - Heat Affected Zone 2	C - O.D.

2/3 Thickness Averages of All Three Sections

Avg. CSR =	2.46	Std. Dev. =	0.83
Avg. CLR =	37.35	Std. Dev. =	10.16
Avg. CTR =	12.01	Std. Dev. =	3.20

1/3 Thickness Averages of All Three Sections

Avg. CSR =	2.37	Std. Dev. =	0.89
Avg. CLR =	29.71	Std. Dev. =	10.51
Avg. CTR =	11.44	Std. Dev. =	3.42

Comments

One sided, 30 day pre-exposure, TM0177.

Number of cracks in weld area - 4

Total crack thickness in weld area - 0.1220

Girth weld, grind out temper bead weld repair.

Material : A285-C
Sulfur : 0.021
Condition : As-rolled
Solution : TM0177

Project # : L932343KT
Exposure : One-sided, 10 days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 4745C
Section # : W7-57A, 58A
File # : W7-57A.WK4
Date : 5/7/96

Section	Top 1/3, Mid. 1/3, or Bottom 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W7-57A	Top 1/3	0.1004	0.0354	1.000	0.521	BT	6.86	51.77	36.65
		0.3327	0.0768			BS, BT, H2T, H1T			
		0.0846	0.0787			W			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						
W7-58A	Top 1/3	0.2047	0.0689	1.003	0.521	BT	15.67	41.04	86.15
		0.1850	0.3642			W, H1T			
		0.0217	0.0157			H1T			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						

Full Thickness Averages of All Three Sections

Avg. CSR =	11.27	Std. Dev. =	3.16
Avg. CLR =	46.41	Std. Dev. =	9.50
Avg. CTR =	61.40	Std. Dev. =	16.58

Crack Location Codes

B - B-Base Metal	S - Surface
W - Weld Metal	T - I.D.
H1 - Heat Affected Zone 1	M - Middle
H2 - Heat Affected Zone 2	C - O.D.

2/3 Thickness Averages of All Three Sections

Avg. CSR =	11.27	Std. Dev. =	3.33
Avg. CLR =	46.41	Std. Dev. =	9.89
Avg. CTR =	61.40	Std. Dev. =	17.43

1/3 Thickness Averages of All Three Sections

Avg. CSR =	11.27	Std. Dev. =	3.52
Avg. CLR =	46.41	Std. Dev. =	10.30
Avg. CTR =	61.40	Std. Dev. =	18.40

Comments

One sided, 30 day pre-exposure, TM0177.

Number of cracks in weld area - 4

Total crack thickness in weld area - 0.5354

Longitudinal weld, grind out temper bead weld repair.

Material : A516-70 CS
Sulfur : 0.025
Condition : As-rolled
Solution : TM0177

Project # : L932343KT
Exposure : One-sided, 10 days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 2289A
Section # : W7-57B, 58B
File # : W7-57B.WK4
Date : 5/7/96

Section	Top 1/3, Mid. 1/3, or Bottom 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W7-57B	Top 1/3	0.0827	0.0354	1.000	0.521	BS, BT	4.43	45.08	21.54
		0.0138	0.0059			BS, BT			
		0.2894	0.0689			H1T, H2T, BT, BS			
	Middle 1/3	0.0650	0.0020			BM			
	Bottom 1/3	0.0000	0.0000						
W7-58B	Top 1/3	0.3228	0.0256	1.003	0.521	H2T, BT	2.64	69.31	13.98
		0.0886	0.0157			H2T, BT			
		0.1220	0.0236			BT			
	Middle 1/3	0.1614	0.0079			BM			
	Bottom 1/3	0.0000	0.0000						

Full Thickness Averages of All Three Sections

Avg. CSR =	3.54	Std. Dev. =	0.94
Avg. CLR =	57.20	Std. Dev. =	10.01
Avg. CTR =	17.76	Std. Dev. =	3.47

Crack Location Codes

B - B-Base Metal	S - Surface
W - Weld Metal	T - I.D.
H1 - Heat Affected Zone 1	M - Middle
H2 - Heat Affected Zone 2	C - O.D.

2/3 Thickness Averages of All Three Sections

Avg. CSR =	3.54	Std. Dev. =	0.99
Avg. CLR =	57.20	Std. Dev. =	10.33
Avg. CTR =	17.76	Std. Dev. =	3.60

1/3 Thickness Averages of All Three Sections

Avg. CSR =	3.40	Std. Dev. =	1.05
Avg. CLR =	45.90	Std. Dev. =	10.82
Avg. CTR =	16.81	Std. Dev. =	3.82

Comments

One sided, 30 day pre-exposure, TM0177.

Number of cracks in weld area - 3

Total crack thickness in weld area - 0.1102

Longitudinal weld, grind out temper bead weld repair.

Material : A285-C
Sulfur : 0.021
Condition : As-rolled
Solution : TM0177

Project # : L932343KT
Exposure : One-sided, 10 days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 4745C
Section # : W7-59A, 60A
File # : W7-59A.WK4
Date : 5/7/96

Section	Top 1/3, Mid. 1/3, or Bottom 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W7-59A	Top 1/3	0.0866	0.0157	1.012	0.518	BT	3.52	47.49	31.92
		0.0197	0.0020			BT			
		0.0157	0.0059			BT			
		0.0177	0.0020			BT			
		0.1339	0.0531			BS, BT			
		0.1555	0.0512			BT, H2T, H1T, W			
		0.0512	0.0354			H1T			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						
W7-60A	Top 1/3	0.1299	0.0571	1.015	0.518	BS, BT	7.65	54.52	40.66
		0.2382	0.0827			BT			
		0.1850	0.0709			BS, BT, H2T, H1T			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						

Full Thickness Averages of All Three Sections

Avg. CSR =	5.58	Std. Dev. =	0.99
Avg. CLR =	51.00	Std. Dev. =	7.15
Avg. CTR =	36.29	Std. Dev. =	5.22

Crack Location Codes

B - B-Base Metal	S - Surface
W - Weld Metal	T - I.D.
H1 - Heat Affected Zone 1	M - Middle
H2 - Heat Affected Zone 2	C - O.D.

2/3 Thickness Averages of All Three Sections

Avg. CSR =	5.58	Std. Dev. =	1.03
Avg. CLR =	51.00	Std. Dev. =	7.33
Avg. CTR =	36.29	Std. Dev. =	5.36

1/3 Thickness Averages of All Three Sections

Avg. CSR =	5.58	Std. Dev. =	1.06
Avg. CLR =	51.00	Std. Dev. =	7.50
Avg. CTR =	36.29	Std. Dev. =	5.50

Comments

One sided, 30 day pre-exposure, TM0177.

Number of cracks in weld area - 3

Total crack thickness in weld area - 0.1575

Longitudinal weld, grind out conventional weld repair.

Material : A516-70 CS
Sulfur : 0.025
Condition : As-rolled
Solution : TM0177

Project # : L932343KT
Exposure : One-sided, 10 days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 2289A
Section # : W7-59B, 60B
File # : W7-59B.WK4
Date : 5/7/96

Section	Top 1/3, Mid. 1/3, or Bottom 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W7-59B	Top 1/3	0.0669	0.0236	1.012	0.526	H1T	4.72	75.51	26.20
		0.1969	0.0571			H1T, H2T, BT, BS			
		0.3425	0.0177			BT			
		0.1575	0.0394			BS, BT			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						
W7-60B	Top 1/3	0.0374	0.0374	1.015	0.526	H1T	4.16	64.03	40.42
		0.1063	0.0394			H1T, H2T, BT			
		0.1240	0.0610			BT			
		0.1004	0.0295			BS, BT			
		0.0886	0.0256			BT			
	Middle 1/3	0.1929	0.0197			BM			
	Bottom 1/3	0.0000	0.0000						

Full Thickness Averages of All Three Sections

Avg. CSR =	4.44	Std. Dev. =	0.59
Avg. CLR =	69.77	Std. Dev. =	9.07
Avg. CTR =	33.31	Std. Dev. =	3.83

2/3 Thickness Averages of All Three Sections

Avg. CSR =	4.44	Std. Dev. =	0.60
Avg. CLR =	69.77	Std. Dev. =	9.24
Avg. CTR =	33.31	Std. Dev. =	3.87

1/3 Thickness Averages of All Three Sections

Avg. CSR =	4.08	Std. Dev. =	0.62
Avg. CLR =	60.26	Std. Dev. =	9.19
Avg. CTR =	31.44	Std. Dev. =	3.99

Crack Location Codes

B - B-Base Metal	S - Surface
W - Weld Metal	T - I.D.
H1 - Heat Affected Zone 1	M - Middle
H2 - Heat Affected Zone 2	C - O.D.

Comments

One sided, 30 day pre-exposure, TM0177.

Number of cracks in weld area - 4

Total crack thickness in weld area - 0.1575

Longitudinal weld, grind out conventional weld repair.

Material : A516-70 CS
Sulfur : 0.025
Condition : As-rolled
Solution : TM0177

Project # : L932343KT
Exposure : One-sided, 10 days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 2289D
Section # : W7-61A, 62A
File # : W7-61A.WK4
Date : 5/7/96

Section	Top 1/3, Mid. 1/3, or Bottom 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W7-61A	Top 1/3	0.2500	0.0610	1.023	0.518	BS, BT	9.93	63.69	37.24
		0.3346	0.1102			BT, H2T, H1T			
		0.0335	0.0059			BS, BT			
		0.0236	0.0098			H1T			
		0.0098	0.0059			H1T			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						
W7-61A	Top 1/3	0.0335	0.0138	1.023	0.518	BT	6.54	81.01	47.12
		0.0630	0.0098			BT			
		0.0591	0.0039			BT			
		0.1161	0.0276			BT			
		0.3031	0.0709			BT, H2T, H1T			
		0.0965	0.0039			BT			
		0.0748	0.0984			H1T			
		0.0650	0.0138			H1T			
	Middle 1/3	0.0177	0.0020			BM			
	Bottom 1/3	0.0000	0.0000						

Full Thickness Averages of All Three Sections

Avg. CSR =	8.24	Std. Dev. =	1.64
Avg. CLR =	72.35	Std. Dev. =	9.32
Avg. CTR =	42.18	Std. Dev. =	6.11

Crack Location Codes

B - B-Base Metal	S - Surface
W - Weld Metal	T - I.D.
H1 - Heat Affected Zone 1	M - Middle
H2 - Heat Affected Zone 2	C - O.D.

2/3 Thickness Averages of All Three Sections

Avg. CSR =	8.24	Std. Dev. =	1.69
Avg. CLR =	72.35	Std. Dev. =	9.55
Avg. CTR =	42.18	Std. Dev. =	6.29

1/3 Thickness Averages of All Three Sections

Avg. CSR =	8.23	Std. Dev. =	1.76
Avg. CLR =	71.49	Std. Dev. =	9.83
Avg. CTR =	41.99	Std. Dev. =	6.48

Comments

One sided, 30 day pre-exposure, TM0177.

Number of cracks in weld area - 6

Total crack thickness in weld area - 0.3090

Longitudinal weld, grind out conventional weld repair.

Material : A516-70 HRS
Sulfur : 0.001
Condition : Normalized
Solution : TM0177

Project # : L932343KT
Exposure : One-sided, 10 days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 3201B
Section # : W7-61B, 62B
File # : W7-61B.WK4
Date : 5/7/96

Section	Top 1/3, Mid. 1/3, or Bottom 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	Section CSR (%)	Section CLR (%)	Section CTR (%)
W7-61B	Top 1/3	0.0748	0.0256	1.023	0.526	BT	0.36	8.85	5.61
		0.0059	0.0020			BT			
	Middle 1/3	0.0098	0.0020			BM			
	Bottom 1/3	0.0000	0.0000						
W7-62B	Top 1/3	0.0256	0.0020	1.023	0.526	BT	1.23	25.02	7.11
	Middle 1/3	0.1949	0.0335			H1M			
	Bottom 1/3	0.0354	0.0020			BC			

Full Thickness Averages of All Three Sections

Avg. CSR =	0.80	Std. Dev. =	0.32
Avg. CLR =	16.93	Std. Dev. =	5.03
Avg. CTR =	6.36	Std. Dev. =	1.95

Crack Location Codes

B - B-Base Metal	S - Surface
W - Weld Metal	T - I.D.
H1 - Heat Affected Zone 1	M - Middle
H2 - Heat Affected Zone 2	C - O.D.

2/3 Thickness Averages of All Three Sections

Avg. CSR =	0.79	Std. Dev. =	0.34
Avg. CLR =	15.20	Std. Dev. =	5.38
Avg. CTR =	6.17	Std. Dev. =	2.08

1/3 Thickness Averages of All Three Sections

Avg. CSR =	0.18	Std. Dev. =	0.11
Avg. CLR =	5.20	Std. Dev. =	2.22
Avg. CTR =	2.81	Std. Dev. =	1.44

Comments

One sided, 30 day pre-exposure, TM0177.

Number of cracks in weld area - 1

Total crack thickness in weld area - 0.0335

Longitudinal weld, grind out conventional weld repair.

Material : A516-70 CS
Sulfur : 0.025
Condition : As-rolled
Solution : TM0177

Project # : L932343KT
Exposure : One-sided, 10 days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 2289D
Section # : W7-63A, 64A
File # : W7-63A.WK4
Date : 5/7/96

Section	Top 1/3, Mid. 1/3, or Bottom 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W7-63A	Top 1/3	0.2402	0.0394	1.032	0.518	BT	2.07	29.77	12.16
		0.0669	0.0236			BS, BT, H2T, H1T			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						
W7-64A	Top 1/3	0.1181	0.0236	1.027	0.518	BT	2.83	75.52	23.56
		0.0472	0.0177			BS, BT			
		0.1083	0.0354			BS, BT, H2T, H1T			
		0.3602	0.0157			BT, H2T, H1T			
		0.0748	0.0236			H1T			
		0.0079	0.0020			H1T			
		0.0098	0.0020			H1T			
	Middle 1/3	0.0492	0.0020			BM			
	Bottom 1/3	0.0000	0.0000						

Full Thickness Averages of All Three Sections

Avg. CSR =	2.45	Std. Dev. =	0.45
Avg. CLR =	52.65	Std. Dev. =	8.95
Avg. CTR =	17.86	Std. Dev. =	2.50

2/3 Thickness Averages of All Three Sections

Avg. CSR =	2.45	Std. Dev. =	0.47
Avg. CLR =	52.65	Std. Dev. =	9.25
Avg. CTR =	17.86	Std. Dev. =	2.55

1/3 Thickness Averages of All Three Sections

Avg. CSR =	2.44	Std. Dev. =	0.49
Avg. CLR =	50.25	Std. Dev. =	9.69
Avg. CTR =	17.67	Std. Dev. =	2.62

Crack Location Codes

B - B-Base Metal	S - Surface
W - Weld Metal	T - I.D.
H1 - Heat Affected Zone 1	M - Middle
H2 - Heat Affected Zone 2	C - O.D.

Comments

One sided, 30 day pre-exposure, TM0177.

Number of cracks in weld area - 6

Total crack thickness in weld area - 0.1023

Longitudinal weld, grind out temper bead weld repair.

Material : A516-70 HRS
Sulfur : 0.001
Condition : As-rolled
Solution : TM0177

Project # : L932343KT
Exposure : One-sided, 10 days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 3201B
Section # : W7-63B, 64B
File # : W7-63B.WK4
Date : 5/7/96

Section	Top 1/3, Mid. 1/3, or Bottom 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	Section CSR (%)	Section CLR (%)	Section CTR (%)
W7-63B	Top 1/3	0.0374	0.0020	1.032	0.526	BT	0.04	9.73	1.12
		0.0138	0.0020			BT			
	Middle 1/3	0.0492	0.0020			BM			
	Bottom 1/3	0.0000	0.0000						
W7-64B	Top 1/3	0.0098	0.0020	1.027	0.531	BT	0.00	0.96	0.37
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						

Full Thickness Averages of All Three Sections

Avg. CSR =	0.02	Std. Dev. =	0.01
Avg. CLR =	5.35	Std. Dev. =	1.47
Avg. CTR =	0.75	Std. Dev. =	0.17

Crack Location Codes

B - B-Base Metal	S - Surface
W - Weld Metal	T - I.D.
H1 - Heat Affected Zone 1	M - Middle
H2 - Heat Affected Zone 2	C - O.D.

2/3 Thickness Averages of All Three Sections

Avg. CSR =	0.02	Std. Dev. =	0.01
Avg. CLR =	5.35	Std. Dev. =	1.56
Avg. CTR =	0.75	Std. Dev. =	0.18

1/3 Thickness Averages of All Three Sections

Avg. CSR =	0.01	Std. Dev. =	0.00
Avg. CLR =	2.96	Std. Dev. =	1.11
Avg. CTR =	0.56	Std. Dev. =	0.17

Comments

One sided, 30 day pre-exposure, TM0177.

Number of cracks in weld area - 0

Total crack thickness in weld area - 0.0000

Longitudinal weld, grind out temper bead weld repair.

Material : A516-70 CS
Sulfur : 0.025
Condition : As-rolled
Solution : TM0177

Project # : L932343KT
Exposure : One-sided, 10 days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 2289A
Section # : W7-65A, 66A
File # : W7-65A.WK4
Date : 5/9/96

Section	Top 1/3, Mid. 1/3, or Bottom 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W7-65A	Top 1/3	0.0138	0.0039	0.960	0.521	BT	4.66	37.52	18.51
		0.0551	0.0157			BT, BS			
		0.2913	0.0768			BS, BT, H2T, H1T			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						
W7-66A	Top 1/3	0.2657	0.0413	0.878	0.521	BT	6.16	84.30	28.34
		0.1378	0.0236			BT			
		0.1654	0.0354			BT			
		0.1713	0.0472			BS, BT, H2T, H1T			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						

Full Thickness Averages of All Three Sections

Avg. CSR =	5.41	Std. Dev. =	1.17
Avg. CLR =	60.91	Std. Dev. =	10.62
Avg. CTR =	23.43	Std. Dev. =	4.20

2/3 Thickness Averages of All Three Sections

Avg. CSR =	5.41	Std. Dev. =	1.22
Avg. CLR =	60.91	Std. Dev. =	10.97
Avg. CTR =	23.43	Std. Dev. =	4.34

1/3 Thickness Averages of All Three Sections

Avg. CSR =	5.41	Std. Dev. =	1.27
Avg. CLR =	60.91	Std. Dev. =	11.32
Avg. CTR =	23.43	Std. Dev. =	4.49

Crack Location Codes

B -	B-Base Metal	S -	Surface
W -	Weld Metal	T -	I.D.
H1 -	Heat Affected Zone 1	M -	Middle
H2 -	Heat Affected Zone 2	C -	O.D.

Comments

One sided, 30 day pre-exposure, TM0177.

Number of cracks in weld area - 2

Total crack thickness in weld area - 0.1240

Girth weld.

Material : A516-70 HRS
Sulfur : 0.001
Condition : Normalized
Solution : TM0177

Project # : L932343KT
Exposure : One-sided, 10 days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 3201B
Section # : W7-65B, 66B
File # : W7-65B.WK4
Date : 5/9/96

Section	Top 1/3, Mid. 1/3, or Bottom 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W7-65B	Top 1/3	0.0236	0.0020	0.960	0.528	H1T	0.01	2.46	0.37
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						
W7-66B	Top 1/3	0.0000	0.0000	0.878	0.527		0.00	0.00	0.00
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						

Full Thickness Averages of All Three Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	1.23	Std. Dev. =	0.66
Avg. CTR =	0.19	Std. Dev. =	0.10

2/3 Thickness Averages of All Three Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	1.23	Std. Dev. =	0.71
Avg. CTR =	0.19	Std. Dev. =	0.11

1/3 Thickness Averages of All Three Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	1.23	Std. Dev. =	0.77
Avg. CTR =	0.19	Std. Dev. =	0.12

Crack Location Codes

B - B-Base Metal	S - Surface
W - Weld Metal	T - I.D.
H1 - Heat Affected Zone 1	M - Middle
H2 - Heat Affected Zone 2	C - O.D.

Comments

One sided, 30 day pre-exposure, TM0177.

Number of cracks in weld area - 1

Total crack thickness in weld area - 0.0020

Girth weld.

Material : A285C
Sulfur : 0.021
Condition : As-rolled
Solution : TM0177

Project # : L932343KT
Exposure : One-sided, 10 days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 4745C
Section # : W7-67A, 68A
File # : W7-67A.WK4
Date : 5/9/96

Section	Top 1/3, Mid. 1/3, or Bottom 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W7-67A	Top 1/3	0.0650	0.0197	1.083	0.516	H1T, H2T	9.40	54.53	56.46
		0.2126	0.0433			BT, BS			
		0.1929	0.2008			BT, BS			
		0.1201	0.0276			BT			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						
W7-68A	Top 1/3	0.0217	0.0020	1.128	0.518	BT	2.44	20.77	13.30
		0.2126	0.0669			BT			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						

Full Thickness Averages of All Three Sections

Avg. CSR =	5.92	Std. Dev. =	1.70
Avg. CLR =	37.65	Std. Dev. =	7.22
Avg. CTR =	34.88	Std. Dev. =	9.42

2/3 Thickness Averages of All Three Sections

Avg. CSR =	5.92	Std. Dev. =	1.78
Avg. CLR =	37.65	Std. Dev. =	7.49
Avg. CTR =	34.88	Std. Dev. =	9.90

1/3 Thickness Averages of All Three Sections

Avg. CSR =	5.92	Std. Dev. =	1.89
Avg. CLR =	37.65	Std. Dev. =	7.77
Avg. CTR =	34.88	Std. Dev. =	10.45

Crack Location Codes

B - B-Base Metal	S - Surface
W - Weld Metal	T - I.D.
H1 - Heat Affected Zone 1	M - Middle
H2 - Heat Affected Zone 2	C - O.D.

Comments

One sided, 30 day pre-exposure, TM0177.

Number of cracks in weld area - 1

Total crack thickness in weld area - 0.0197

Girth weld.

Material : A516-70 CS
Sulfur : 0.025
Condition : As-rolled
Solution : TM0177

Project # : L932343KT
Exposure : One-sided, 10 days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 2289D
Section # : W7-67B, 68B
File # : W7-67B.WK4
Date : 5/9/96

Section	Top 1/3, Mid. 1/3, or Bottom 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W7-67B	Top 1/3	0.1240 0.2205	0.0413 0.0551	0.655	0.517	BT BS, BT, H2T, H1T	5.10	52.59	18.66
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						
W7-68B	Top 1/3	0.0217 0.0295	0.0256 0.0039	0.915	0.517	BT, BS BT	0.14	5.59	5.71
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						

Full Thickness Averages of All Three Sections

Avg. CSR =	2.62	Std. Dev. =	0.94
Avg. CLR =	29.09	Std. Dev. =	9.24
Avg. CTR =	12.18	Std. Dev. =	3.30

2/3 Thickness Averages of All Three Sections

Avg. CSR =	2.62	Std. Dev. =	1.00
Avg. CLR =	29.09	Std. Dev. =	9.79
Avg. CTR =	12.18	Std. Dev. =	3.48

1/3 Thickness Averages of All Three Sections

Avg. CSR =	2.62	Std. Dev. =	1.07
Avg. CLR =	29.09	Std. Dev. =	10.44
Avg. CTR =	12.18	Std. Dev. =	3.68

Crack Location Codes

B - B-Base Metal	S - Surface
W - Weld Metal	T - I.D.
H1 - Heat Affected Zone 1	M - Middle
H2 - Heat Affected Zone 2	C - O.D.

Comments

One sided, 30 day pre-exposure, TM0177.

Number of cracks in weld area - 1

Total crack thickness in weld area - 0.0551

Girth weld.

Material : A285C
Sulfur : 0.021
Condition : As-rolled
Solution : TM0177

Project # : L932343KT
Exposure : One-sided, 10 days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 4745C
Section # : W7-69A, 70A
File # : W7-69A.WK4
Date : 5/9/96

Section	Top 1/3, Mid. 1/3, or Bottom 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W7-69A	Top 1/3	0.0118 0.1161 0.4921	0.0020 0.0394 0.0827	1.007	0.521	H1T BT, BS BT, BS BT	8.64	61.61	23.80
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						
W7-70A	Top 1/3	0.3898 0.0650	0.0650 0.0236	1.019	0.518	BT, BS H2S, H2T, H1T	5.09	44.62	17.10
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						

Full Thickness Averages of All Three Sections

Avg. CSR =	6.86	Std. Dev. =	2.07
Avg. CLR =	53.12	Std. Dev. =	14.07
Avg. CTR =	20.45	Std. Dev. =	4.78

2/3 Thickness Averages of All Three Sections

Avg. CSR =	6.86	Std. Dev. =	2.18
Avg. CLR =	53.12	Std. Dev. =	14.78
Avg. CTR =	20.45	Std. Dev. =	5.00

1/3 Thickness Averages of All Three Sections

Avg. CSR =	6.86	Std. Dev. =	2.31
Avg. CLR =	53.12	Std. Dev. =	15.59
Avg. CTR =	20.45	Std. Dev. =	5.25

Crack Location Codes

B - B-Base Metal	S - Surface
W - Weld Metal	T - I.D.
H1 - Heat Affected Zone 1	M - Middle
H2 - Heat Affected Zone 2	C - O.D.

Comments

One sided, 30 day pre-exposure, TM0177.

Number of cracks in weld area - 2

Total crack thickness in weld area - 0.0256

Longitudinal weld.

Material : A516-70 CS
Sulfur : 0.025
Condition : As-rolled
Solution : TM0177

Project # : L932343KT
Exposure : One-sided, 10 days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 2289A
Section # : W7-69B, 70B
File # : W7-69B.WK4
Date : 5/9/96

Section	Top 1/3, Mid. 1/3, or Bottom 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W7-69B	Top 1/3	0.0374	0.0197	1.007	0.517	BT, BS	7.34	47.13	22.85
		0.4213	0.0886			BT, BS			
		0.0157	0.0098			BS, BT, H2T, H2S			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						
W7-70B	Top 1/3	0.2087	0.0866	1.019	0.521	BS, BT, H2T, H1T	3.46	24.34	18.89
		0.0118	0.0020			BT			
		0.0276	0.0098			BT, BS			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						

Full Thickness Averages of All Three Sections

Avg. CSR =	5.40	Std. Dev. =	1.82
Avg. CLR =	35.74	Std. Dev. =	10.56
Avg. CTR =	20.87	Std. Dev. =	5.37

2/3 Thickness Averages of All Three Sections

Avg. CSR =	5.40	Std. Dev. =	1.92
Avg. CLR =	35.74	Std. Dev. =	11.12
Avg. CTR =	20.87	Std. Dev. =	5.63

1/3 Thickness Averages of All Three Sections

Avg. CSR =	5.40	Std. Dev. =	2.04
Avg. CLR =	35.74	Std. Dev. =	11.78
Avg. CTR =	20.87	Std. Dev. =	5.93

Crack Location Codes

B - B-Base Metal	S - Surface
W - Weld Metal	T - I.D.
H1 - Heat Affected Zone 1	M - Middle
H2 - Heat Affected Zone 2	C - O.D.

Comments

One sided, 30 day pre-exposure, TM0177.

Number of cracks in weld area - 2

Total crack thickness in weld area - 0.0964

Longitudinal weld.

Material : A516-70 CS
Sulfur : 0.025
Condition : As-rolled
Solution : TM0177

Project # : L932343KT
Exposure : One-sided, 10 days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 2289D
Section # : W7-71A, 72A
File # : W7-71A.WK4
Date : 5/9/96

Section	Top 1/3, Mid. 1/3, or Bottom 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W7-71A	Top 1/3	0.0295	0.0020	1.026	0.516	BT	0.56	23.42	8.77
		0.0925	0.0098			BT			
		0.0591	0.0138			BT, BS			
		0.0591	0.0197			BT, BS			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						
W7-72A	Top 1/3	0.1004	0.0531	1.029	0.518	H2S, H2T, H1T	9.45	56.24	33.82
		0.4311	0.1024			BT, BS			
		0.0472	0.0197			BT, BS			
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						

Full Thickness Averages of All Three Sections

Avg. CSR =	5.01	Std. Dev. =	1.89
Avg. CLR =	39.83	Std. Dev. =	9.65
Avg. CTR =	21.30	Std. Dev. =	4.92

2/3 Thickness Averages of All Three Sections

Avg. CSR =	5.01	Std. Dev. =	1.99
Avg. CLR =	39.83	Std. Dev. =	10.10
Avg. CTR =	21.30	Std. Dev. =	5.14

1/3 Thickness Averages of All Three Sections

Avg. CSR =	5.01	Std. Dev. =	2.11
Avg. CLR =	39.83	Std. Dev. =	10.60
Avg. CTR =	21.30	Std. Dev. =	5.39

Crack Location Codes

B - B-Base Metal	S - Surface
W - Weld Metal	T - I.D.
H1 - Heat Affected Zone 1	M - Middle
H2 - Heat Affected Zone 2	C - O.D.

Comments

One sided, 30 day pre-exposure, TM0177.

Number of cracks in weld area - 1

Total crack thickness in weld area - 0.0531

Longitudinal weld.

Material : A516-70 HRS
Sulfur : 0.001
Condition : Normalized
Solution : TM0177

Project # : L932343KT
Exposure : One-sided, 10 days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 3201B
Section # : W7-71B, 72B
File # : W7-71B.WK4
Date : 5/9/96

Section	Top 1/3, Mid. 1/3, or Bottom 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	Section CSR (%)	Section CLR (%)	Section CTR (%)
W7-71B	Top 1/3	0.0000	0.0000	1.026	0.526		0.00	0.00	0.00
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						
W7-72B	Top 1/3	0.0000	0.0000	1.029	0.528		0.00	0.00	0.00
	Middle 1/3	0.0000	0.0000						
	Bottom 1/3	0.0000	0.0000						

Full Thickness Averages of All Three Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

Crack Location Codes

B - B-Base Metal	S - Surface
W - Weld Metal	T - I.D.
H1 - Heat Affected Zone 1	M - Middle
H2 - Heat Affected Zone 2	C - O.D.

2/3 Thickness Averages of All Three Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

1/3 Thickness Averages of All Three Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

Comments

One sided, 30 day pre-exposure, TM0177.

Number of cracks in weld area - 0

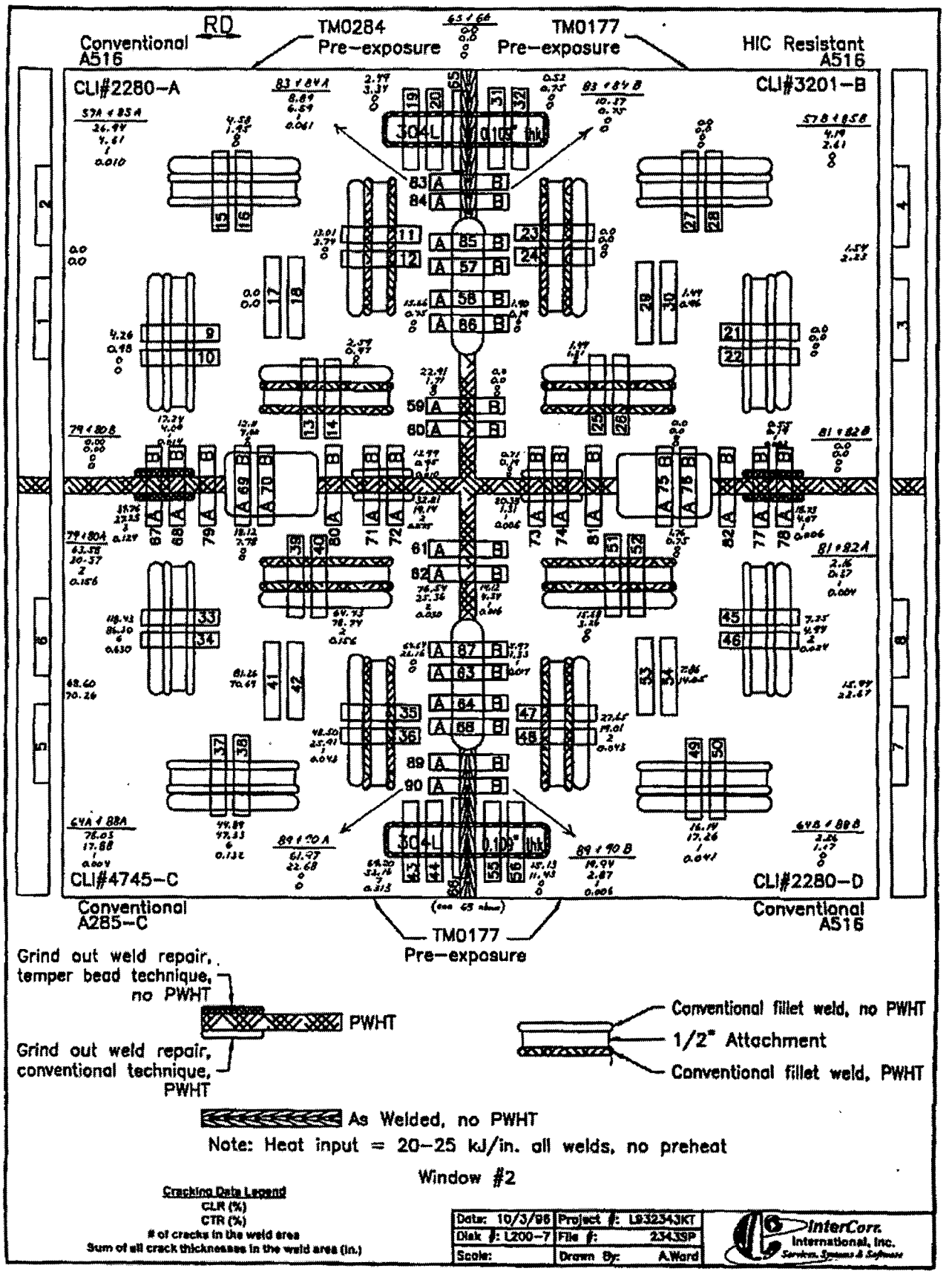
Total crack thickness in weld area - 0.0000

Longitudinal weld.

APPENDIX B

EXPOSURE 2

DETAILED CRACKING RESULTS



Material : A516-70 CS
Sulfur : 0.020
Condition : Normalized
Solution : TM0284

Project # : L932343TK
Exposure : One sided, 30 Days
pH (INIT) : 8.3
pH (FINL) : 5.0

CLI # : 2280-A
Section # : W8-1,2
File # : W8_1-2.wk4
Date : 10/02/96

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W8 -1	I.D. 1/3	0.0000	0.0000	2.114	0.505		0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						
W8 -2	I.D. 1/3	0.0000	0.0000	1.970	0.505		0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

2/3 Thickness Averages of All Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

1/3 Thickness Averages of All Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

Comments

One sided, 30 day pre-exposed, TM0177.

Baseline prior to vessel exposure.

Material : A516-70 HRS
Sulfur :0.001
Condition : Normalized
Solution : TM0177

Project # : L932343TK
Exposure : One sided,30 Days
pH (INIT) :2.8
pH (FINL) : 3.7

CLI # : 3201-B
Section # : W8-3,4
File # : W8_3-4.wk4
Date :10/02/96

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W8 -3	I.D. 1/3	0.0039	0.0157	2.118	0.529	BT	0.02	1.67	3.72
	Mid. 1/3	0.0315	0.0039			BM			
	O.D. 1/3	0.0000	0.0000						
W8 -4	I.D. 1/3	0.0118	0.0020	2.111	0.529	BT	0.01	1.40	0.74
	Mid. 1/3	0.0177	0.0020			BM			
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Sections

Avg. CSR =	0.011	Std. Dev. =	0.00
Avg. CLR =	1.536	Std. Dev. =	0.44
Avg. CTR =	2.233	Std. Dev. =	0.79

2/3 Thickness Averages of All Sections

Avg. CSR =	0.011	Std. Dev. =	0.00
Avg. CLR =	1.536	Std. Dev. =	0.47
Avg. CTR =	2.233	Std. Dev. =	0.85

1/3 Thickness Averages of All Sections

Avg. CSR =	0.004	Std. Dev. =	0.00
Avg. CLR =	0.373	Std. Dev. =	0.18
Avg. CTR =	1.675	Std. Dev. =	0.93

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

Comments

One sided, 30 day pre-exposed, TM0177.

Baseline prior to vessel exposure.

Material : A285-C CS
Sulfur : 0.020
Condition : Not Specified
Solution : TM0177

Project # : L932343TK
Exposure : One sided, 30 Days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 4745-C
Section # : W8-5,6
File # : W8_5-6.wk4
Date : 10/02/96

Section	ID 1/3, Mid. 1/3, or OD 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W8 -5	I.D. 1/3	0.0965	0.0236	2.152	0.522	BS,BT	11.68	70.80	69.01
	I.D. 1/3	0.2638	0.0827			BS,BT			
	I.D. 1/3	0.6378	0.1378			BS,BT			
	I.D. 1/3	0.1161	0.0413			BS,BT			
	I.D. 1/3	0.1594	0.0472			BT,BS			
	I.D. 1/3	0.2500	0.0276			BT,BS			
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						
W8 -6	I.D. 1/3	0.1437	0.0591	1.992	0.523	BS,BT	8.32	66.41	71.51
	I.D. 1/3	0.3268	0.0709			BT			
	I.D. 1/3	0.2283	0.0512			BS,BT			
	I.D. 1/3	0.1831	0.0630			BS,BT			
	I.D. 1/3	0.2933	0.0866			BT,BS			
	I.D. 1/3	0.1476	0.0433			BS,BT,BS			
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Sections

Avg. CSR =	9.999	Std. Dev. =	1.66
Avg. CLR =	68.604	Std. Dev. =	7.40
Avg. CTR =	70.262	Std. Dev. =	7.15

2/3 Thickness Averages of All Sections

Avg. CSR =	9.999	Std. Dev. =	1.71
Avg. CLR =	68.604	Std. Dev. =	7.50
Avg. CTR =	70.262	Std. Dev. =	7.22

1/3 Thickness Averages of All Sections

Avg. CSR =	9.999	Std. Dev. =	1.77
Avg. CLR =	68.604	Std. Dev. =	7.56
Avg. CTR =	70.262	Std. Dev. =	7.24

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

Comments

One sided, 30 day pre-exposed, TM0177.

Baseline prior to vessel exposure.

Material : A516-70 CS
Sulfur : 0.020
Condition : Normalized
Solution : TM0177

Project # : L932343TK
Exposure : One sided, 30 Days
pH (INIT) : 2.8
pH (FINL) : 3.6

CLI # : 2280-D
Section # : W8-7,8
File # : W8_7-8.wk4
Date : 10/02/96

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W8 -7	I.D. 1/3	0.3917	0.1594	2.121	0.508	BS,BT,BS	5.87	24.59	32.55
	Mid. 1/3	0.1299	0.0059			BM			
	O.D. 1/3	0.0000	0.0000						
W8 -8	I.D. 1/3	0.0768	0.0610	1.997	0.506	BS,BT,BS	0.51	7.29	14.78
	I.D. 1/3	0.0413	0.0098			BS,BT,BS			
	Mid. 1/3	0.0276	0.0039			BM			
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Sections

Avg. CSR =	3.19	Std. Dev. =	1.49
Avg. CLR =	15.94	Std. Dev. =	4.83
Avg. CTR =	23.67	Std. Dev. =	8.35

2/3 Thickness Averages of All Sections

Avg. CSR =	3.19	Std. Dev. =	1.59
Avg. CLR =	15.94	Std. Dev. =	5.12
Avg. CTR =	23.67	Std. Dev. =	8.90

1/3 Thickness Averages of All Sections

Avg. CSR =	3.15	Std. Dev. =	1.73
Avg. CLR =	12.19	Std. Dev. =	5.48
Avg. CTR =	22.70	Std. Dev. =	9.64

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

Comments

One sided, 30 day pre-exposed, TM0177.

Baseline prior to vessel exposure.

Material : A516-70 CS
Sulfur :0.020
Condition : Normalized
Solution : TM0177

Project # : L932343KT
Exposure : One sided, 10 Days
pH (INIT) :2.8
pH (FINL) : 3.9

CLI # : 2280-A
Section # : W8-9,10
File # : W8_9-10.wk4
Date :10/02/96

Section	I.D. 1/3, Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W8 -9	Tens. 1/3	0.0827	0.0039	2.561	0.501	BT	0.03	3.23	0.79
	Mid. 1/3	0.0000	0.0000						
	Comp. 1/3	0.0000	0.0000						
W8 -10	Tens. 1/3	0.0000	0.0000	2.563	0.503		0.03	5.30	1.17
	Mid. 1/3	0.0807	0.0039			BM			
	Mid. 1/3	0.0551	0.0020			BM			
	Comp. 1/3	0.0000	0.0000						

Full Thickness Averages of All Sections

Avg. CSR =	0.03	Std. Dev. =	0.01
Avg. CLR =	4.26	Std. Dev. =	1.15
Avg. CTR =	0.98	Std. Dev. =	0.28

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - Top
H1 - Heat Affected Zone 1	M - Middle
H2 - Heat Affected Zone 2	C - Bottom

2/3 Thickness Averages of All Sections

Avg. CSR =	0.03	Std. Dev. =	0.01
Avg. CLR =	4.26	Std. Dev. =	1.23
Avg. CTR =	0.98	Std. Dev. =	0.30

1/3 Thickness Averages of All Sections

Avg. CSR =	0.01	Std. Dev. =	0.01
Avg. CLR =	1.61	Std. Dev. =	1.01
Avg. CTR =	0.39	Std. Dev. =	0.25

Comments

One sided, 30 day pre-exposed, TM0284.

Number of cracks in weld area - 0

Total crack thickness in weld area - 0.000

Material : A516-70 CS
Sulfur : 0.020
Condition : Normalized
Solution : TM0177

Project # : L932343KT
Exposure : One sided, 10 Days
pH (INIT) : 2.8
pH (FINL) : 3.9

CLI # : 2280-A
Section # : W8-11,12
File # : W8_11-12.wk4
Date : 10/02/96

Section	I.D. 1/3, Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W8 -11	I.D. 1/3	0.0906	0.0039	2.458	0.503	BT	0.40	24.99	5.09
	Mid. 1/3	0.3524	0.0098			BM			
	Mid. 1/3	0.1004	0.0079			BM,BS			
	Mid. 1/3	0.0709	0.0039			BS,BM			
	O.D. 1/3	0.0000	0.0000						
W8 -12	I.D. 1/3	0.0000	0.0000	2.494	0.503		0.00	1.03	0.39
	Mid. 1/3	0.0256	0.0020			BM			
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Sections

Avg. CSR =	0.20	Std. Dev. =	0.07
Avg. CLR =	13.01	Std. Dev. =	3.65
Avg. CTR =	2.74	Std. Dev. =	0.61

2/3 Thickness Averages of All Sections

Avg. CSR =	0.20	Std. Dev. =	0.07
Avg. CLR =	13.01	Std. Dev. =	3.85
Avg. CTR =	2.74	Std. Dev. =	0.64

1/3 Thickness Averages of All Sections

Avg. CSR =	0.01	Std. Dev. =	0.01
Avg. CLR =	1.84	Std. Dev. =	1.16
Avg. CTR =	0.39	Std. Dev. =	0.25

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

Comments

One sided, 30 day pre-exposed, TM0284.

Number of cracks in weld area - 0

Total crack thickness in weld area - 0.000

Material : A516-70 CS
Sulfur : 0.020
Condition : Normalized
Solution : TM0177

Project # : L932343KT
Exposure : One sided, 10 Days
pH (INIT) : 2.8
pH (FINL) : 3.9

CLI # : 2280-A
Section # : W8-13,14
File # : W8_13-14.wk4
Date : 10/02/96

Section	I.D. 1/3, Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W8 -13	I.D. 1/3	0.0354	0.0039	2.583	0.506	BT,BS	0.03	5.18	1.95
	Mid. 1/3	0.0551	0.0039			BM			
	Mid. 1/3	0.0433	0.0020			BM			
	O.D. 1/3	0.0000	0.0000						
W8 -14	I.D. 1/3	0.0000	0.0000	2.578	0.504		0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Four Sections

Avg. CSR =	0.02	Std. Dev. =	0.01
Avg. CLR =	2.59	Std. Dev. =	0.72
Avg. CTR =	0.97	Std. Dev. =	0.28

2/3 Thickness Averages of All Four Sections

Avg. CSR =	0.02	Std. Dev. =	0.01
Avg. CLR =	2.59	Std. Dev. =	0.76
Avg. CTR =	0.97	Std. Dev. =	0.30

1/3 Thickness Averages of All Four Sections

Avg. CSR =	0.01	Std. Dev. =	0.00
Avg. CLR =	0.69	Std. Dev. =	0.43
Avg. CTR =	0.39	Std. Dev. =	0.24

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

Comments

One sided, 30 day pre-exposed, TM0284.

Number of cracks in weld area - 0

Total crack thickness in weld area - 0.000

Material : A516-70 CS
Sulfur : 0.020
Condition : Normalized
Solution : TM0177

Project # : L932343KT
Exposure : One sided, 10 Days
pH (INIT) : 2.8
pH (FINL) : 3.9

CLI # : 2280-A
Section # : W8-15,16
File # : W8_15-16.wk4
Date : 10/02/96

Section	I.D. 1/3, Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W8 -15	I.D. 1/3	0.0650	0.0079	2.593	0.504	BS,BT	0.10	6.60	3.12
	Mid. 1/3	0.1063	0.0079			BM			
	O.D. 1/3	0.0000	0.0000						
W8 -16	I.D. 1/3	0.0000	0.0000	2.614	0.502		0.02	2.56	0.78
	Mid. 1/3	0.0669	0.0039			BM			
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Four Sections

Avg. CSR =	0.06	Std. Dev. =	0.02
Avg. CLR =	4.58	Std. Dev. =	1.34
Avg. CTR =	1.95	Std. Dev. =	0.58

2/3 Thickness Averages of All Four Sections

Avg. CSR =	0.06	Std. Dev. =	0.02
Avg. CLR =	4.58	Std. Dev. =	1.41
Avg. CTR =	1.95	Std. Dev. =	0.61

1/3 Thickness Averages of All Four Sections

Avg. CSR =	0.02	Std. Dev. =	0.01
Avg. CLR =	1.25	Std. Dev. =	0.79
Avg. CTR =	0.78	Std. Dev. =	0.49

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

Comments

One sided, 30 day pre-exposed, TM0284.

Number of cracks in weld area = 0

Total crack thickness in weld area= 0.000

Material : A516-70 CS
Sulfur : 0.020
Condition : Normalized
Solution : TM0177

Project # : L932343KT
Exposure : One sided, 10 Days
pH (INIT) : 2.8
pH (FINL) : 3.9

CLI # : 2280-A
Section # : W8-17,18
File # : W8_17-18.wk4
Date : 10/02/96

Section	I.D. 1/3, Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W8 -17	I.D. 1/3	0.0000	0.0000	2.562	0.504		0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						
W8 -18	I.D. 1/3	0.0000	0.0000	2.542	0.498		0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

2/3 Thickness Averages of All Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

1/3 Thickness Averages of All Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

Comments

One sided, 30 day pre-exposed, TM0284.

Material : A516-70 CS	Project # : L932343KT	CLI # : 2280-A
Sulfur : 0.020	Exposure : One sided, 10 Days	Section # : W8-19,20
Condition : Normalized	pH (INIT) : 2.8	File # : W8_19-20.wk4
Solution : TM0177	pH (FINL) : 3.9	Date : 10/02/96

Section	I.D. 1/3, Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W8 -19	I.D. 1/3	0.0256	0.0039	2.698	0.502	BT	0.01	0.95	0.78
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						
W8 -20	I.D. 1/3	0.0551	0.0079	2.732	0.500	BT	0.12	4.04	5.91
	I.D. 1/3	0.0551	0.0217			BS,BT,BS			
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Sections

Avg. CSR =	0.06	Std. Dev. =	0.02
Avg. CLR =	2.49	Std. Dev. =	0.72
Avg. CTR =	3.34	Std. Dev. =	1.15

2/3 Thickness Averages of All Sections

Avg. CSR =	0.06	Std. Dev. =	0.02
Avg. CLR =	2.49	Std. Dev. =	0.76
Avg. CTR =	3.34	Std. Dev. =	1.23

1/3 Thickness Averages of All Sections

Avg. CSR =	0.06	Std. Dev. =	0.03
Avg. CLR =	2.49	Std. Dev. =	0.81
Avg. CTR =	3.34	Std. Dev. =	1.32

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

Comments

One sided, 30 day pre-exposed, TM0284.

Number of cracks in weld area - 0

Total crack thickness in weld area - 0.000

304L Overlay

Material : A516-70 HRS
Sulfur :0.001
Condition : Normalized
Solution : TM0177

Project # : L932343TK
Exposure : One sided,10 Days
pH (INIT) :2.8
pH (FINL) : 3.9

CLI # : 3201-B
Section # : W8-21,22
File # : W8_21-22.wk4
Date :10/02/96

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W8 -21	I.D. 1/3	0.0000	0.0000	2.489	0.429		0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						
W8 -22	I.D. 1/3	0.0000	0.0000	2.482	0.554		0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

2/3 Thickness Averages of AllSections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

1/3 Thickness Averages of All Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

Comments

One sided, 30 day pre-exposed, TM0177.

Number of cracks in weld area - 0

Total crack thickness in weld area - 0.000

Material : A516-70 HRS
Sulfur : 0.001
Condition : Normalized
Solution : TM0177

Project # : L932343TK
Exposure : One sided,10 Days
pH (INIT) : 2.8
pH (FINL) : 3.9

CLI # : 3201-B
Section # : W8-23,24
File # : W8_23-24.wk4
Date : 10/02/96

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W8 -23	I.D. 1/3	0.0000	0.0000	2.526	0.541		0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						
W8 -24	I.D. 1/3	0.0000	0.0000	2.537	0.521		0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

2/3 Thickness Averages of All Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

1/3 Thickness Averages of All Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

Comments

One sided, 30 day pre-exposed, TM0177.

Number of cracks in weld area - 0

Total crack thickness in weld area - 0.000

Material : A516-70 HRS
Sulfur : 0.001
Condition : Normalized
Solution : TM0177

Project # : L932343TK
Exposure : One sided,10 Days
pH (INIT) : 2.8
pH (FINL) : 3.9

CLI # : 3201-B
Section # : W8-25,26
File # : W8_25-26.wk4
Date : 10/02/96

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W8 -25	I.D. 1/3	0.0413	0.0118	2.524	0.524	BS,BT,BS	0.04	2.89	2.63
	Mid. 1/3	0.0315	0.0020			BM			
	O.D. 1/3	0.0000	0.0000						
W8 -26	I.D. 1/3	0.0000	0.0000	2.529	0.523		0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Sections

Avg. CSR =	0.02	Std. Dev. =	0.01
Avg. CLR =	1.44	Std. Dev. =	0.53
Avg. CTR =	1.31	Std. Dev. =	0.60

2/3 Thickness Averages of All Sections

Avg. CSR =	0.02	Std. Dev. =	0.01
Avg. CLR =	1.44	Std. Dev. =	0.56
Avg. CTR =	1.31	Std. Dev. =	0.65

1/3 Thickness Averages of All Sections

Avg. CSR =	0.02	Std. Dev. =	0.01
Avg. CLR =	0.82	Std. Dev. =	0.51
Avg. CTR =	1.13	Std. Dev. =	0.71

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

Comments

One sided, 30 day pre-exposed, TM0177.

Number of cracks in weld area - 0

Total crack thickness in weld area - 0.000

Material : A516-70 HRS
Sulfur :0.001
Condition : Normalized
Solution : TM0177

Project # : L932343TK
Exposure : One sided,10 Days
pH (INIT) :2.8
pH (FINL) : 3.9

CLI # : 3201-B
Section # : W8-27,28
File # : W8_27-28.wk4
Date :10/02/96

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W8 -27	I.D. 1/3	0.0000	0.0000	2.534	0.522		0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						
W8 -28	I.D. 1/3	0.0000	0.0000	2.531	0.533		0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

2/3 Thickness Averages of All Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

1/3 Thickness Averages of All Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

Comments

One sided, 30 day pre-exposed, TM0177.

Number of cracks in weld area - 0

Total crack thickness in weld area - 0.000

Material : A516-70 HRS
Sulfur : 0.001
Condition : Normalized
Solution : TM0177

Project # : L932343TK
Exposure : One sided,10 Days
pH (INIT) : 2.8
pH (FINL) : 3.9

CLI # : 3201-B
Section # : W8-29,30
File # : W8_29-30.wk4
Date : 10/02/96

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W8 -29	I.D. 1/3	0.0374	0.0039	2.483	0.533	BT	0.01	1.51	0.74
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						
W8 -30	I.D. 1/3	0.0374	0.0059	2.728	0.504	BT	0.02	1.37	1.17
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Sections

Avg. CSR =	0.01	Std. Dev. =	0.00
Avg. CLR =	1.44	Std. Dev. =	0.52
Avg. CTR =	0.96	Std. Dev. =	0.35

2/3 Thickness Averages of All Sections

Avg. CSR =	0.01	Std. Dev. =	0.01
Avg. CLR =	1.44	Std. Dev. =	0.56
Avg. CTR =	0.96	Std. Dev. =	0.38

1/3 Thickness Averages of All Sections

Avg. CSR =	0.01	Std. Dev. =	0.01
Avg. CLR =	1.44	Std. Dev. =	0.60
Avg. CTR =	0.96	Std. Dev. =	0.41

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

Comments

One sided, 30 day pre-exposed, TM0177.

Material : A516-70 HRS
Sulfur :0.001
Condition : Normalized
Solution : TM0177

Project # : L932343TK
Exposure : One sided,10 Days
pH (INIT) :2.8
pH (FINL) : 3.9

CLI # : 3201-B
Section # : W8-31,32
File # : W8_31-32.wk4
Date :10/02/96

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W8 -31	I.D. 1/3	0.0000	0.0000	2.664	0.524		0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						
W8 -32	I.D. 1/3	0.0276	0.0079	2.665	0.527	BT	0.02	1.03	1.49
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Sections

Avg. CSR =	0.01	Std. Dev. =	0.00
Avg. CLR =	0.52	Std. Dev. =	0.28
Avg. CTR =	0.75	Std. Dev. =	0.40

2/3 Thickness Averages of All Sections

Avg. CSR =	0.01	Std. Dev. =	0.00
Avg. CLR =	0.52	Std. Dev. =	0.30
Avg. CTR =	0.75	Std. Dev. =	0.43

1/3 Thickness Averages of All Sections

Avg. CSR =	0.01	Std. Dev. =	0.00
Avg. CLR =	0.52	Std. Dev. =	0.32
Avg. CTR =	0.75	Std. Dev. =	0.47

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

Comments

One sided, 30 day pre-exposed, TM0177.

Number of cracks in weld area - 0

Total crack thickness in weld area - 0.000

304L Overlay

Material : A285-C CS
Sulfur : 0.021
Condition : Not specified
Solution : TM0177

Project # : L932343TK
Exposure : One sided, 10 Days
pH (INIT) : 2.8
pH (FINL) : 3.9

CLI # : 4745-C
Section # : W8-33,34
File # : W8_33-34.wk4
Date : 10/02/96

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W8 -33	I.D. 1/3	0.1772	0.0551	2.559	0.518	BS,BT,BS	21.49	183.49	132.63
	I.D. 1/3	1.0630	0.0020			BT			
	I.D. 1/3	0.1360	0.0217			H2,BT,BS			
	I.D. 1/3	0.3981	0.0177			BT			
	I.D. 1/3	0.4823	0.4823			BT,H2			
	I.D. 1/3	0.8465	0.0039			BT,H2			
	I.D. 1/3	0.5709	0.0039			H2,BT			
	I.D. 1/3	0.2324	0.0807			BT,BS			
	I.D. 1/3	0.6398	0.0079			BT,BS			
	Mid. 1/3	0.0453	0.0039			BS,BM			
	Mid. 1/3	0.1043	0.0079			BM,BS			
	O.D. 1/3	0.0000	0.0000						
W8 -34	I.D. 1/3	0.1319	0.0079	2.575	0.522	BS,BT	4.08	53.36	39.97
	I.D. 1/3	0.3130	0.0453			BT,H2			
	I.D. 1/3	0.3091	0.0728			BT,H2,BT,BS			
	I.D. 1/3	0.2638	0.0512			BT,BS			
	I.D. 1/3	0.1358	0.0157			BS,BT			
	Mid. 1/3	0.0551	0.0039			BM,BS			
	Mid. 1/3	0.0236	0.0039			BM,BS			
	Mid. 1/3	0.1417	0.0079			BM,BS,BM			
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Sections

Avg. CSR =	12.78	Std. Dev. =	3.23
Avg. CLR =	118.43	Std. Dev. =	10.69
Avg. CTR =	86.30	Std. Dev. =	17.30

2/3 Thickness Averages of All Sections

Avg. CSR =	12.78	Std. Dev. =	3.34
Avg. CLR =	118.43	Std. Dev. =	10.83
Avg. CTR =	86.30	Std. Dev. =	17.86

1/3 Thickness Averages of All Sections

Avg. CSR =	12.69	Std. Dev. =	3.69
Avg. CLR =	111.22	Std. Dev. =	11.53
Avg. CTR =	83.65	Std. Dev. =	19.64

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

Comments

One sided, 30 day pre-exposed, TM0177.

Number of cracks in weld area - 6

Total crack thickness in weld area - 0.630

Material : A285-C CS
Sulfur : 0.021
Condition : Not specified
Solution : TM0177

Project # : L932343TK
Exposure : One sided, 10 Days
pH (INIT) : 2.8
pH (FINL) : 3.9

CLI # : 4745-C
Section # : W8-35,36
File # : W8_35-36.wk4
Date : 10/02/96

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W8 -35	I.D. 1/3	0.1594	0.0256	2.475	0.523	BT,BS	4.30	54.88	20.32
	I.D. 1/3	0.8287	0.0472			BT,H2,BT			
	I.D. 1/3	0.3701	0.0335			BT,BS			
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						
W8 -36	I.D. 1/3	0.2047	0.0531	2.477	0.525	BS,BT,BS	3.70	42.12	31.50
	I.D. 1/3	0.1673	0.0059			BT			
	I.D. 1/3	0.3209	0.0335			BT			
	I.D. 1/3	0.3504	0.0728			BT,BS			
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Sections

Avg. CSR =	3.999	Std. Dev. =	0.81
Avg. CLR =	48.500	Std. Dev. =	8.65
Avg. CTR =	25.910	Std. Dev. =	4.31

2/3 Thickness Averages of All Sections

Avg. CSR =	3.999	Std. Dev. =	0.84
Avg. CLR =	48.500	Std. Dev. =	8.94
Avg. CTR =	25.910	Std. Dev. =	4.44

1/3 Thickness Averages of All Sections

Avg. CSR =	3.999	Std. Dev. =	0.88
Avg. CLR =	48.500	Std. Dev. =	9.24
Avg. CTR =	25.910	Std. Dev. =	4.56

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

Comments

One sided, 30 day pre-exposed, TM0177.

Number of cracks in weld area - 1

Total crack thickness in weld area - 0.0427

Material : A285-C
Sulfur :0.001
Condition : Normalized
Solution : TM0177

Project # : L932343TK
Exposure : One sided,10 Days
pH (INIT) :2.8
pH (FINL) : 3.9

CLI # : 4745-C
Section # : W8-37,38
File # : W8_37-38.wk4
Date :10/02/96

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W8 -37	I.D. 1/3	0.3524	0.0728	2.546	0.518	BS,BT,BS	3.09	40.44	31.92
	I.D. 1/3	0.2992	0.0217			BT,H2			
	I.D. 1/3	0.0236	0.0039			H2,BT			
	I.D. 1/3	0.1398	0.0512			BT,BS			
	I.D. 1/3	0.0827	0.0059			BT,H2			
	I.D. 1/3	0.0315	0.0020			BT			
	I.D. 1/3	0.1004	0.0079			BS,BT			
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						
W8 -38	I.D. 1/3	0.0335	0.0138	2.593	0.524	BS,BT,BS	3.93	49.35	62.74
	I.D. 1/3	0.0709	0.0374			BT,BS			
	I.D. 1/3	0.0748	0.0413			BT			
	I.D. 1/3	0.0217	0.0039			BS,BT,H2			
	I.D. 1/3	0.3091	0.0453			H2,BT			
	I.D. 1/3	0.2776	0.0512			BT,H2			
	I.D. 1/3	0.1122	0.0453			BS,BT,BS			
	I.D. 1/3	0.0984	0.0276			BT,BS			
	I.D. 1/3	0.1811	0.0591			BT,BS			
	Mid. 1/3	0.1004	0.0039			BM,BS			
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Sections

Avg. CSR =	3.508	Std. Dev. =	0.45
Avg. CLR =	44.891	Std. Dev. =	4.13
Avg. CTR =	47.329	Std. Dev. =	4.33

2/3 Thickness Averages of All Sections

Avg. CSR =	3.508	Std. Dev. =	0.46
Avg. CLR =	44.891	Std. Dev. =	4.18
Avg. CTR =	47.329	Std. Dev. =	4.38

1/3 Thickness Averages of All Sections

Avg. CSR =	3.494	Std. Dev. =	0.48
Avg. CLR =	42.955	Std. Dev. =	4.29
Avg. CTR =	46.954	Std. Dev. =	4.44

Crack Locations Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

Comments

One sided, 30 day pre-exposed, TM0177.

Number of cracks in weld area - 6

Total crack thickness in weld area - 0.132

Material : A285-C CS
Sulfur :0.021
Condition : Not specified
Solution : TM0177

Project # : L932343TK
Exposure : One sided, 10 Days
pH (INIT) :2.8
pH (FINL) :3.9

CLI # : 4745-C
Section # : W8-39,40
File # : W8_39-40.wk4
Date :10/02/96

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W8 -39	I.D. 1/3	0.1850	0.0433	2.651	0.525	BS,BT	8.13	58.96	59.24
	I.D. 1/3	0.1417	0.0984			BS,BT,BS			
	I.D. 1/3	0.6811	0.0925			BS,BT,H2			
	I.D. 1/3	0.4350	0.0630			H2,BT,BS			
	I.D. 1/3	0.0433	0.0079			BT,BS			
	Mid. 1/3	0.0768	0.0059			BM,BS			
	O.D. 1/3	0.0000	0.0000						
W8 -40	I.D. 1/3	0.2283	0.0650	2.870	0.519	BT,BS	8.16	69.89	98.24
	I.D. 1/3	0.0630	0.0236			BS,BT,BS			
	I.D. 1/3	0.0669	0.0276			BS,BT,BS			
	I.D. 1/3	0.1299	0.0472			BT,BS			
	I.D. 1/3	0.3504	0.0866			BT,BS			
	I.D. 1/3	0.3366	0.0610			BS,BT,BS			
	I.D. 1/3	0.2677	0.0512			BS,BT,BS			
	I.D. 1/3	0.1890	0.0571			BS,BT			
	I.D. 1/3	0.0630	0.0256			BS,BT,BS			
	I.D. 1/3	0.3110	0.0650			BS,BT,BS			
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Sections

Avg. CSR =	8.14	Std. Dev. =	1.00
Avg. CLR =	64.43	Std. Dev. =	6.24
Avg. CTR =	78.74	Std. Dev. =	6.29

2/3 Thickness Averages of All Sections

Avg. CSR =	8.14	Std. Dev. =	1.02
Avg. CLR =	64.43	Std. Dev. =	6.32
Avg. CTR =	78.74	Std. Dev. =	6.29

1/3 Thickness Averages of All Sections

Avg. CSR =	8.13	Std. Dev. =	1.05
Avg. CLR =	62.98	Std. Dev. =	6.47
Avg. CTR =	78.18	Std. Dev. =	6.29

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

Comments

One sided, 30 day pre-exposed, TM0177.

Number of cracks in weld area - 2.000

Total crack thickness in weld area - 0.1555

Material : A285-C CS
Sulfur :0.021
Condition : Not specified
Solution : TM0177

Project # : L932343TK
Exposure : One sided, 10 Days
pH (INIT) :2.8
pH (FINL) :3.9

CLI # : 4745-C
Section # : W8-41,42
File # : W8_41-42.wk4
Date :10/02/96

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W8 -41	I.D. 1/3	0.2283	0.0650	2.870	0.519	BT,BS	8.05	69.89	93.30
	I.D. 1/3	0.0630	0.0236			BS,BT,BS			
	I.D. 1/3	0.0669	0.0276			BS,BT,BS			
	I.D. 1/3	0.1299	0.0472			BT,BS			
	I.D. 1/3	0.3504	0.0866			BT,BS			
	I.D. 1/3	0.3366	0.0610			BS,BT,BS			
	I.D. 1/3	0.2677	0.0512			BS,BT,BS			
	I.D. 1/3	0.1890	0.0571			BS,BT			
	I.D. 1/3	0.0630	0.0000			BS,BT,BS			
	I.D. 1/3	0.3110	0.0650			BS,BT,BS			
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						
W8 -42	I.D. 1/3	0.2972	0.0886	2.865	0.520	BT	12.63	92.62	48.08
	I.D. 1/3	0.0768	0.0276			BT,BS			
	I.D. 1/3	0.4665	0.0217			BT			
	I.D. 1/3	0.1220	0.0256			BS,BT,BS			
	I.D. 1/3	1.6909	0.0866			BT,BS			
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Sections

Avg. CSR =	10.34	Std. Dev. =	1.90
Avg. CLR =	81.26	Std. Dev. =	11.60
Avg. CTR =	70.69	Std. Dev. =	6.04

2/3 Thickness Averages of All Sections

Avg. CSR =	10.34	Std. Dev. =	1.97
Avg. CLR =	81.26	Std. Dev. =	11.93
Avg. CTR =	70.69	Std. Dev. =	6.07

1/3 Thickness Averages of All Sections

Avg. CSR =	10.34	Std. Dev. =	2.04
Avg. CLR =	81.26	Std. Dev. =	12.27
Avg. CTR =	70.69	Std. Dev. =	6.06

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

Comments

One sided, 30 day pre-exposed, TM0177.

Material : A285-C CS
Sulfur :0.021
Condition : Not specified
Solution : TM0177

Project # : L932343TK
Exposure : One sided, 10 Days
pH (INIT) :2.8
pH (FINL) :3.9

CLI # : 4745-C
Section # : W8-43,44
File # : W8_43-44.wk4
Date :10/02/96

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W8 -43	I.D. 1/3	0.1102	0.0217	2.489	0.533	BS,BT,H2	7.75	67.62	55.77
	I.D. 1/3	0.1220	0.0335			BS,H2,BT			
	I.D. 1/3	0.5079	0.0827			BT,H2,BT			
	I.D. 1/3	0.1988	0.0531			BT,H2			
	I.D. 1/3	0.1909	0.0413			H2,BT			
	I.D. 1/3	0.5531	0.0650			BS,BT,BS			
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						
W8 -44	I.D. 1/3	0.1909	0.0472	2.492	0.519	BS,BT,BS	6.33	70.78	48.55
	I.D. 1/3	0.0551	0.0276			BS,BT,H2			
	I.D. 1/3	0.2520	0.0610			BS,BT,BS			
	I.D. 1/3	0.1850	0.0256			BS,BT			
	I.D. 1/3	0.3976	0.0374			BT			
	I.D. 1/3	0.6831	0.0531			H2,BT			
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Sections

Avg. CSR =	7.04	Std. Dev. =	0.96
Avg. CLR =	69.20	Std. Dev. =	8.00
Avg. CTR =	52.16	Std. Dev. =	4.94

2/3 Thickness Averages of All Sections

Avg. CSR =	7.04	Std. Dev. =	0.98
Avg. CLR =	69.20	Std. Dev. =	8.14
Avg. CTR =	52.16	Std. Dev. =	4.96

1/3 Thickness Averages of All Sections

Avg. CSR =	7.04	Std. Dev. =	1.01
Avg. CLR =	69.20	Std. Dev. =	8.26
Avg. CTR =	52.16	Std. Dev. =	4.93

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

Comments

One sided, 30 day pre-exposed, TM0177.

Number of cracks in weld area - 7

Total crack thickness in weld area - 0.313

304L Overlay

Material : A516-70-CS
Sulfur : 0.020
Condition : Normalized
Solution : TM0177

Project # : L932343TK
Exposure : One sided, 10 Days
pH (INIT) : 2.8
pH (FINL) : 3.9

CLI # : 2280-D
Section # : W8-45,46
File # : W8_45-46.wk4
Date : 10/08/96

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W8 -45	I.D. 1/3	0.0945	0.0157	2.522	0.496	H2,BT	0.23	10.85	4.76
	I.D. 1/3	0.1791	0.0079	2.522	0.496	BT,H2			
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						
W8 -46	I.D. 1/3	0.0000	0.0000	2.529	0.501		0.10	3.66	5.11
	Mid. 1/3	0.0551	0.0157			BS,BM			
	Mid. 1/3	0.0374	0.0098			BM,BS			
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Sections

Avg. CSR =	0.16	Std. Dev. =	0.04
Avg. CLR =	7.25	Std. Dev. =	1.96
Avg. CTR =	4.94	Std. Dev. =	1.15

2/3 Thickness Averages of All Sections

Avg. CSR =	0.16	Std. Dev. =	0.04
Avg. CLR =	7.25	Std. Dev. =	2.06
Avg. CTR =	4.94	Std. Dev. =	1.20

1/3 Thickness Averages of All Sections

Avg. CSR =	0.12	Std. Dev. =	0.05
Avg. CLR =	5.42	Std. Dev. =	2.30
Avg. CTR =	2.38	Std. Dev. =	1.02

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

Comments

One sided, 30 day pre-exposed, TM0177.

Number of cracks in weld area - 2

Total crack thickness in weld area - 0.024

Material : A516-70-CS
Sulfur : 0.020
Condition : Normalized
Solution : TM0177

Project # : L932343TK
Exposure : One sided,10 Days
pH (INIT) : 2.8
pH (FINL) : 3.9

CLI # : 2280-D
Section # : W8-47,48
File # : W8_47-48.wk4
Date : 10/02/96

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W8 -47	I.D. 1/3	0.2244	0.0059	2.599	0.512	BT,BS	0.45	25.75	6.92
	I.D. 1/3	0.1142	0.0236			BT,BS			
	Mid. 1/3	0.3307	0.0059			BM			
	O.D. 1/3	0.0000	0.0000						
W8 -48	I.D. 1/3	0.1220	0.0177	2.625	0.519	BS,BT	1.96	29.55	31.10
	I.D. 1/3	0.1004	0.0197			BS,BT,H2			
	I.D. 1/3	0.2047	0.0236			H2,BT			
	I.D. 1/3	0.2047	0.0709			BT,BS			
	I.D. 1/3	0.1220	0.0256			BT,BS			
	Mid. 1/3	0.0217	0.0039						
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Sections

Avg. CSR =	1.20	Std. Dev. =	0.25
Avg. CLR =	27.65	Std. Dev. =	3.84
Avg. CTR =	19.01	Std. Dev. =	3.35

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

2/3 Thickness Averages of All Sections

Avg. CSR =	1.20	Std. Dev. =	0.26
Avg. CLR =	27.65	Std. Dev. =	3.91
Avg. CTR =	19.01	Std. Dev. =	3.46

1/3 Thickness Averages of All Sections

Avg. CSR =	1.13	Std. Dev. =	0.27
Avg. CLR =	20.87	Std. Dev. =	3.26
Avg. CTR =	18.06	Std. Dev. =	3.65

Comments

One sided, 30 day pre-exposed, TM0177.

Number of cracks in weld area - 2

Total crack thickness in weld area - 0.043

Material : A516-C
Sulfur : 0.001
Condition : Normalized
Solution : TM0177

Project # : L932343TK
Exposure : One sided,30 Days
pH (INIT) : 2.8
pH (FINL) : 3.9

CLI # : 2280-D
Section # : W8-49,50
File # : W8_49-50.wk4
Date : 10/02/96

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W8 -49	I.D. 1/3	0.1594	0.0413	2.551	0.494	BT,WH2	1.14	9.95	25.10
	I.D. 1/3	0.0945	0.0827			BS,BT,BS			
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						
W8 -50	I.D. 1/3	0.0925	0.0236	2.566	0.502	BS,BT	1.05	22.32	9.41
	Mid. 1/3	0.4803	0.0236			BM			
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Sections

Avg. CSR =	1.10	Std. Dev. =	0.28
Avg. CLR =	16.14	Std. Dev. =	4.94
Avg. CTR =	17.26	Std. Dev. =	4.70

2/3 Thickness Averages of All Sections

Avg. CSR =	1.10	Std. Dev. =	0.30
Avg. CLR =	16.14	Std. Dev. =	5.24
Avg. CTR =	17.26	Std. Dev. =	4.96

1/3 Thickness Averages of All Sections

Avg. CSR =	0.66	Std. Dev. =	0.23
Avg. CLR =	6.78	Std. Dev. =	2.18
Avg. CTR =	14.90	Std. Dev. =	5.32

Crack Locations Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

Comments

One sided, 30 day pre-exposed, TM0177.

Number of cracks in weld area - 1

Total crack thickness in weld area - 0.041

Material : A516-70-CS
Sulfur : 0.020
Condition : Normalized
Solution : TM0177

Project # : L932343TK
Exposure : One sided,10 Days
pH (INIT) : 2.8
pH (FINL) : 3.9

CLI # : 2280-D
Section # : W8-51,52
File # : W8_51-52.wk4
Date : 10/02/96

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W8 -51	I.D. 1/3	0.1496	0.0079	2.636	0.504		0.36	15.53	4.30
	Mid. 1/3	0.2598	0.0138						
	O.D. 1/3	0.0000	0.0000						
W8 -52	I.D. 1/3	0.0610	0.0079	2.576	0.531		0.13	15.82	2.22
	Mid. 1/3	0.3465	0.0039						
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Sections

Avg. CSR =	0.25	Std. Dev. =	0.07
Avg. CLR =	15.68	Std. Dev. =	4.30
Avg. CTR =	3.26	Std. Dev. =	0.85

2/3 Thickness Averages of All Sections

Avg. CSR =	0.25	Std. Dev. =	0.08
Avg. CLR =	15.68	Std. Dev. =	4.54
Avg. CTR =	3.26	Std. Dev. =	0.89

1/3 Thickness Averages of All Sections

Avg. CSR =	0.06	Std. Dev. =	0.03
Avg. CLR =	4.02	Std. Dev. =	1.84
Avg. CTR =	1.52	Std. Dev. =	0.63

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

Comments

One sided, 30 day pre-exposed, TM0177.

Number of cracks in weld area - 0

Total crack thickness in weld area - 0.000

Material : A516-70-CS
Sulfur : 0.020
Condition : Normalized
Solution : TM0177

Project # : L932343TK
Exposure : One sided, 10 Days
pH (INIT) : 2.8
pH (FINL) : 3.9

CLI # : 2280-D
Section # : W8-53,54
File # : W8_53-54.wk4
Date : 10/02/96

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W8 -53	I.D. 1/3	0.2028	0.0827	2.514	0.494	BT,BS	1.35	8.07	16.74
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						
W8 -54	I.D. 1/3	0.0906	0.0059	2.517	0.502	BT	0.46	7.66	11.37
	I.D. 1/3	0.1024	0.0512			BT,BS,BT			
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Sections

Avg. CSR =	0.90	Std. Dev. =	0.35
Avg. CLR =	7.86	Std. Dev. =	2.34
Avg. CTR =	14.05	Std. Dev. =	4.85

2/3 Thickness Averages of All Sections

Avg. CSR =	0.90	Std. Dev. =	0.38
Avg. CLR =	7.86	Std. Dev. =	2.48
Avg. CTR =	14.05	Std. Dev. =	5.16

1/3 Thickness Averages of All Sections

Avg. CSR =	0.90	Std. Dev. =	0.41
Avg. CLR =	7.86	Std. Dev. =	2.64
Avg. CTR =	14.05	Std. Dev. =	5.54

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

Comments

One sided, 30 day pre-exposed, TM0177.

Material : A516-70-CS
Sulfur : 0.020
Condition : Normalized
Solution : TM0177

Project # : L932343TK
Exposure : One sided, 10 Days
pH (INIT) : 2.8
pH (FINL) : 3.9

CLI # : 2280-D
Section # : W8-55,56
File # : W8_55-56.wk4
Date : 10/02/96

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W8 -55	I.D. 1/3	0.0512	0.0039	2.525	0.499	BT	2.11	22.37	18.54
	I.D. 1/3	0.3110	0.0827			BS,BT			
	Mid. 1/3	0.1398	0.0039			BM			
	Mid. 1/3	0.0630	0.0020			BM			
	O.D. 1/3	0.0000	0.0000						
W8 -56	I.D. 1/3	0.1988	0.0217	2.521	0.502	BT	0.34	7.89	4.31
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Sections

Avg. CSR =	1.23	Std. Dev. =	0.51
Avg. CLR =	15.13	Std. Dev. =	3.59
Avg. CTR =	11.43	Std. Dev. =	4.16

2/3 Thickness Averages of All Sections

Avg. CSR =	1.23	Std. Dev. =	0.54
Avg. CLR =	15.13	Std. Dev. =	3.77
Avg. CTR =	11.43	Std. Dev. =	4.42

1/3 Thickness Averages of All Sections

Avg. CSR =	1.20	Std. Dev. =	0.61
Avg. CLR =	11.12	Std. Dev. =	4.11
Avg. CTR =	10.84	Std. Dev. =	4.97

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

Comments

One sided, 30 day pre-exposed, TM0177.

Number of cracks in weld area - 0

Total crack thickness in weld area - 0.000

304L Overlay

Material : A516-70 CS
Sulfur : 0.020
Condition : Normalized
Solution : TM0177

Project # : L932343TK
Exposure : One sided, 10 Days
pH (INIT) : 2.8
pH (FINL) : 3.9

CLI # : 2280-A
Section # : W8-57A,85A
File # : 57A-85A.wk4
Date : 10/02/96

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W8 -57A	I.D. 1/3	0.1496	0.0118	1.246	0.500	BT	0.69	36.65	5.12
	I.D. 1/3	0.0866	0.0039			BT			
	Mid. 1/3	0.2205	0.0098			BM,H2 BM			
	O.D. 1/3	0.0000	0.0000						
W8 -85A	I.D. 1/3	0.0000	0.0000	1.246	0.528		0.71	17.22	4.10
	Mid. 1/3	0.2146	0.0217			BM,H2,H1			
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Four Sections

Avg. CSR =	0.70	Std. Dev. =	0.20
Avg. CLR =	26.94	Std. Dev. =	6.37
Avg. CTR =	4.61	Std. Dev. =	1.23

2/3 Thickness Averages of All Four Sections

Avg. CSR =	0.72	Std. Dev. =	0.22
Avg. CLR =	26.94	Std. Dev. =	6.67
Avg. CTR =	4.72	Std. Dev. =	1.30

1/3 Thickness Averages of All Four Sections

Avg. CSR =	0.54	Std. Dev. =	0.08
Avg. CLR =	18.09	Std. Dev. =	3.96
Avg. CTR =	3.74	Std. Dev. =	0.72

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

Comments

One sided, 30 day pre-exposed, TM0284.

Number of cracks in weld area - 1

Total crack thickness in weld area - 0.010

Material : A516-70 HRS
Sulfur : 0.001
Condition : Normalized
Solution : TM0177

Project # : L932343TK
Exposure : One sided,10 Days
pH (INIT) : 2.8
pH (FINL) : 3.9

CLI # : 3201-B
Section # : W8-57B,85B
File # : 57B-85B.wk4
Date : 10/02/96

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W8 -57B	I.D. 1/3	0.0000	0.0000	1.246	0.500		0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						
W8 -85B	I.D. 1/3	0.0591	0.0059	1.246	0.528	BT	0.20	8.37	5.22
	I.D. 1/3	0.0453	0.0217			BT			
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Four Sections

Avg. CSR =	0.10	Std. Dev. =	0.04
Avg. CLR =	4.19	Std. Dev. =	1.48
Avg. CTR =	2.61	Std. Dev. =	1.07

2/3 Thickness Averages of All Four Sections

Avg. CSR =	0.10	Std. Dev. =	0.04
Avg. CLR =	4.19	Std. Dev. =	1.58
Avg. CTR =	2.61	Std. Dev. =	1.15

1/3 Thickness Averages of All Four Sections

Avg. CSR =	0.10	Std. Dev. =	0.05
Avg. CLR =	4.19	Std. Dev. =	1.69
Avg. CTR =	2.61	Std. Dev. =	1.24

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

Comments

One sided, 30 day pre-exposed, TM0177.

Number of cracks in weld area - 0

Total crack thickness in weld area - 0.000

Material : A516-70 CS
Sulfur :0.020
Condition : Normalized
Solution : TM0177

Project # : L932343TK
Exposure : One sided,10 Days
pH (INIT) :2.8
pH (FINL) : 3.9

CLI # : 2280-A
Section # : W8-58A,86A
File # : 58A-86A.wk4
Date :10/02/96

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W8 -58A	I.D. 1/3	0.1319	0.0039	1.246	0.527	BM	0.08	10.59	0.75
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						
W8 -86A	I.D. 1/3	0.0000	0.0000	1.244	0.522		0.16	20.73	0.75
	Mid. 1/3	0.2579	0.0039			BM			
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Four Sections

Avg. CSR =	0.12	Std. Dev. =	0.05
Avg. CLR =	15.66	Std. Dev. =	5.99
Avg. CTR =	0.75	Std. Dev. =	0.27

2/3 Thickness Averages of All Four Sections

Avg. CSR =	0.12	Std. Dev. =	0.05
Avg. CLR =	15.67	Std. Dev. =	6.42
Avg. CTR =	0.75	Std. Dev. =	0.29

1/3 Thickness Averages of All Four Sections

Avg. CSR =	0.04	Std. Dev. =	0.03
Avg. CLR =	5.30	Std. Dev. =	3.33
Avg. CTR =	0.38	Std. Dev. =	0.24

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

Comments

One sided, 30 day pre-exposed, TM0284.

Number of cracks in weld area - 0

Total crack thickness in weld area - 0.000

Material : A516-70 HRS
Sulfur :0.001
Condition : Normalized
Solution : TM0177

Project # : L932343TK
Exposure : One sided,10 Days
pH (INIT) :2.8
pH (FINL) : 3.9

CLI # : 3201-B
Section # : W8-58B,86B
File # : 58B-86B.wk4
Date :10/02/96

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	Section CSR (%)	Section CLR (%)	Section CTR (%)
W8 -58B	I.D. 1/3	0.0000	0.0000	1.243	0.527		0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						
W8 -86B	I.D. 1/3	0.0472	0.0020	1.244	0.522	BT	0.01	3.80	0.38
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Four Sections

Avg. CSR =	0.01	Std. Dev. =	0.00
Avg. CLR =	1.90	Std. Dev. =	1.01
Avg. CTR =	0.19	Std. Dev. =	0.10

2/3 Thickness Averages of All Four Sections

Avg. CSR =	0.01	Std. Dev. =	0.00
Avg. CLR =	1.90	Std. Dev. =	1.09
Avg. CTR =	0.19	Std. Dev. =	0.11

1/3 Thickness Averages of All Four Sections

Avg. CSR =	0.01	Std. Dev. =	0.00
Avg. CLR =	1.90	Std. Dev. =	1.19
Avg. CTR =	0.19	Std. Dev. =	0.12

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

Comments

One sided, 30 day pre-exposed, TM0177.

Number of cracks in weld area - 0

Total crack thickness in weld area - 0.000

Material : A516-70 CS
Sulfur : 0.020
Condition : Normalized
Solution : TM0177

Project # : L932343TK
Exposure : One sided,10 Days
pH (INIT) : 2.8
pH (FINL) : 3.9

CLI # : 2280-A
Section # : W8-59A,60A
File # : 59A-60A.wk4
Date : 10/02/96

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W8 -59A	I.D. 1/3	0.0000	0.0000	1.245	0.524		0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						
W8 -60A	I.D. 1/3	0.2244	0.0118	1.246	0.518	BT,BS	0.73	45.82	3.42
	Mid. 1/3	0.3465	0.0059			BM			
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Four Sections

Avg. CSR =	0.36	Std. Dev. =	0.13
Avg. CLR =	22.91	Std. Dev. =	8.49
Avg. CTR =	1.71	Std. Dev. =	0.66

2/3 Thickness Averages of All Four Sections

Avg. CSR =	0.36	Std. Dev. =	0.14
Avg. CLR =	22.91	Std. Dev. =	9.08
Avg. CTR =	1.71	Std. Dev. =	0.70

1/3 Thickness Averages of All Four Sections

Avg. CSR =	0.21	Std. Dev. =	0.13
Avg. CLR =	9.01	Std. Dev. =	5.66
Avg. CTR =	1.14	Std. Dev. =	0.72

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

Comments

One sided, 30 day pre-exposed, TM0284.

Number of cracks in weld area - 0

Total crack thickness in weld area - 0.000

Material : A516-70 HRS
Sulfur :0.001
Condition : Normalized
Solution : TM0177

Project # : L932343TK
Exposure : One sided,10 Days
pH (INIT) :2.8
pH (FINL) : 3.9

CLI # : 3201-B
Section # : W8-59B,60B
File # : 59B-60B.wk4
Date :10/02/96

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W8 -59B	I.D. 1/3	0.0000	0.0000	1.245	0.524		0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						
W8 -60B	I.D. 1/3	0.0000	0.0000	1.246	0.518		0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Four Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

2/3 Thickness Averages of All Four Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

1/3 Thickness Averages of All Four Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

Comments

One sided, 30 day pre-exposed, TM0177.

Number of cracks in weld area - 0

Total crack thickness in weld area - 0.000

Material : A285-C CS
Sulfur :0.021
Condition : Not Specified
Solution : TM0177

Project # : L932343TK
Exposure : One sided,10 Days
pH (INIT) :2.8
pH (FINL) : 3.9

CLI # : 4745-C
Section # : W8-61A,62A
File # : 61A-62A.wk4
Date :10/02/96

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W8 -61A	I.D. 1/3	0.2736	0.0315	1.242	0.525	BS,BT	6.53	89.71	33.00
	I.D. 1/3	0.3287	0.0453			BT			
	I.D. 1/3	0.2421	0.0472			BS,BT,BS			
	I.D. 1/3	0.1654	0.0413			BT,H2			
	Mid. 1/3	0.1043	0.0079			H2,BM			
	O.D. 1/3	0.0000	0.0000						
W8 -62A	I.D. 1/3	0.1535	0.0079	1.227	0.522	BS,BT	4.82	63.37	17.72
	I.D. 1/3	0.0295	0.0020			BT			
	I.D. 1/3	0.4252	0.0610			BS,BT			
	I.D. 1/3	0.1693	0.0217			BT			
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Four Sections

Avg. CSR =	5.68	Std. Dev. =	1.05
Avg. CLR =	76.54	Std. Dev. =	10.60
Avg. CTR =	25.36	Std. Dev. =	3.81

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

2/3 Thickness Averages of All Four Sections

Avg. CSR =	5.68	Std. Dev. =	1.09
Avg. CLR =	76.54	Std. Dev. =	10.82
Avg. CTR =	25.36	Std. Dev. =	3.91

1/3 Thickness Averages of All Four Sections

Avg. CSR =	5.61	Std. Dev. =	1.14
Avg. CLR =	72.34	Std. Dev. =	11.26
Avg. CTR =	24.61	Std. Dev. =	4.07

Comments

One sided, 30 day pre-exposed, TM0177.

Number of cracks in weld area - 2

Total crack thickness in weld area - 0.050

Material : A516-70 CS
Sulfur :0.020
Condition : Normalized
Solution : TM0177

Project # : L932343TK
Exposure : One sided,10 Days
pH (INIT) :2.8
pH (FINL) : 3.9

CLI # : 2280-D
Section # : W8-61B,62B
File # : 61B-62B.wk4
Date :10/02/96

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W8 -61B	I.D. 1/3	0.0000	0.0000	1.242	0.525		0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						
W8 -62B	I.D. 1/3	0.0709	0.0157	1.227	0.522	BS,BT,BS	0.81	28.24	8.67
	I.D. 1/3	0.1260	0.0157			BT,H2			
	I.D. 1/3	0.1496	0.0138			BT			
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Four Sections

Avg. CSR =	0.40	Std. Dev. =	0.11
Avg. CLR =	14.12	Std. Dev. =	3.95
Avg. CTR =	4.34	Std. Dev. =	1.16

2/3 Thickness Averages of All Four Sections

Avg. CSR =	0.40	Std. Dev. =	0.12
Avg. CLR =	14.12	Std. Dev. =	4.17
Avg. CTR =	4.34	Std. Dev. =	1.22

1/3 Thickness Averages of All Four Sections

Avg. CSR =	0.40	Std. Dev. =	0.12
Avg. CLR =	14.12	Std. Dev. =	4.42
Avg. CTR =	4.34	Std. Dev. =	1.29

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

Comments

One sided, 30 day pre-exposed, TM0177.

Number of cracks in weld area - 1

Total crack thickness in weld area - 0.016

Material : A285-C
Sulfur :0.021
Condition : Not Specified
Solution : TM0177

Project # : L932343TK
Exposure : One sided,10 Days
pH (INIT) :2.8
pH (FINL) : 3.9

CLI # : 4745-C
Section # : W8-63A,64A
File # : 63A-64A.wk4
Date :10/02/96

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W8 -63A	I.D. 1/3	0.4587	0.0433	1.217	0.524	BT	6.81	62.92	27.80
	I.D. 1/3	0.2402	0.0965			BS,BT,BS			
	Mid. 1/3	0.0669	0.0059			BS,BM			
	O.D. 1/3	0.0000	0.0000						
W8 -64A	I.D. 1/3	0.3563	0.0217	1.217	0.503	BS,BT	4.99	81.04	15.65
	I.D. 1/3	0.4646	0.0472			BS,BT,BS,BT,BS	ERR		
	Mid. 1/3	0.1201	0.0059			BM			
	Mid. 1/3	0.0453	0.0039			BM,H2			
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Four Sections

Avg. CSR =	ERR	Std. Dev. =	1.34
Avg. CLR =	71.98	Std. Dev. =	13.63
Avg. CTR =	21.73	Std. Dev. =	4.99

2/3 Thickness Averages of All Four Sections

Avg. CSR =	5.90	Std. Dev. =	1.40
Avg. CLR =	71.98	Std. Dev. =	14.10
Avg. CTR =	21.73	Std. Dev. =	5.23

1/3 Thickness Averages of All Four Sections

Avg. CSR =	5.80	Std. Dev. =	1.51
Avg. CLR =	62.44	Std. Dev. =	15.69
Avg. CTR =	20.18	Std. Dev. =	5.77

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

Comments

One sided, 30 day pre-exposed, TM0177.

Number of cracks in weld area - 1

Total crack thickness in weld area - 0.004

Material : A285-C CS
Sulfur :0.021
Condition : Not Specified
Solution : TM0177

Project # : L932343TK
Exposure : One sided,10 Days
pH (INIT) :2.8
pH (FINL) : 3.9

CLI # : 4745-C
Section # : W8-63A,87A
File # : 63A-87A.wk4
Date :10/02/96

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W8 -63A	I.D. 1/3	0.4587	0.0433	1.217	0.524	BT	6.81	62.92	27.80
	I.D. 1/3	0.2402	0.0965			BS,BT,BS			
	Mid. 1/3	0.0669	0.0059			BS,BM			
	O.D. 1/3	0.0000	0.0000						
W8 -87A	I.D. 1/3	0.5472	0.0728	1.222	0.522	BS,BT,BS	7.69	66.37	24.51
	I.D. 1/3	0.1811	0.0472			BS,BT			
	Mid. 1/3	0.0827	0.0079			BM,BS			
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Four Sections

Avg. CSR =	7.25	Std. Dev. =	1.82
Avg. CLR =	64.64	Std. Dev. =	14.13
Avg. CTR =	26.16	Std. Dev. =	5.80

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

2/3 Thickness Averages of All Four Sections

Avg. CSR =	7.25	Std. Dev. =	1.91
Avg. CLR =	64.64	Std. Dev. =	14.74
Avg. CTR =	26.16	Std. Dev. =	6.06

1/3 Thickness Averages of All Four Sections

Avg. CSR =	7.17	Std. Dev. =	2.02
Avg. CLR =	58.51	Std. Dev. =	15.93
Avg. CTR =	24.84	Std. Dev. =	6.46

Comments

One sided, 30 day pre-exposed, TM0177.

Number of cracks in weld area - 0

Total crack thickness in weld area - 0.000

Material : A516-70 CS
Sulfur :0.020
Condition : Normalized
Solution : TM0177

Project # : L932343TK
Exposure : One sided,10 Days
pH (INIT) :2.8
pH (FINL) : 3.9

CLI # : 2280-D
Section # : W8-63B,87B
File # : 63B-87B.wk4
Date :10/02/96

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W8 -63B	I.D. 1/3	0.0000	0.0000	1.217	0.524		0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						
W8 -87B	I.D. 1/3	0.0000	0.0000	1.220	0.519		0.32	11.94	2.66
	Mid. 1/3	0.1457	0.0138			H2,BM,BS			
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Four Sections

Avg. CSR =	0.16	Std. Dev. =	0.08
Avg. CLR =	5.97	Std. Dev. =	3.18
Avg. CTR =	1.33	Std. Dev. =	0.71

2/3 Thickness Averages of All Four Sections

Avg. CSR =	0.16	Std. Dev. =	0.09
Avg. CLR =	5.97	Std. Dev. =	3.43
Avg. CTR =	1.33	Std. Dev. =	0.76

1/3 Thickness Averages of All Four Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

Comments

One sided, 30 day pre-exposed, TM0177.

Number of cracks in weld area - 1

Total crack thickness in weld area - 0.014

Material : A285-C CS	Project # : L932343TK	CLI # : 4745-C
Sulfur : 0.021	Exposure : One sided,10 Days	Section # : W8-64A,88A
Condition : Not Specified	pH (INIT) : 2.8	File # : 64A-88A.wk4
Solution : TM0177	pH (FINL) : 3.9	Date : 10/02/96

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W8 -64A	I.D. 1/3	0.3563	0.0217	1.217	0.503	BS,BT	4.99	81.04	15.65
	I.D. 1/3	0.4646	0.0472			BS,BT,BS,BT,BS			
	Mid. 1/3	0.1201	0.0059			BM			
	Mid. 1/3	0.0453	0.0039			BM,H2			
	O.D. 1/3	0.0000	0.0000						
W8 -88A	I.D. 1/3	0.2303	0.0531	1.220	0.519	BS,BT	3.32	75.03	20.10
	I.D. 1/3	0.0709	0.0039			BS,BT			
	I.D. 1/3	0.4606	0.0138			BT			
	I.D. 1/3	0.0728	0.0217			BT,BS			
	I.D. 1/3	0.0591	0.0079			BT,BS			
	I.D. 1/3	0.0217	0.0039			BT,BS			
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Four Sections

Avg. CSR =	4.15	Std. Dev. =	0.87
Avg. CLR =	78.03	Std. Dev. =	12.40
Avg. CTR =	17.88	Std. Dev. =	2.94

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

2/3 Thickness Averages of All Four Sections

Avg. CSR =	5.04	Std. Dev. =	0.90
Avg. CLR =	87.37	Std. Dev. =	12.78
Avg. CTR =	22.76	Std. Dev. =	3.03

1/3 Thickness Averages of All Four Sections

Avg. CSR =	4.07	Std. Dev. =	0.97
Avg. CLR =	77.93	Std. Dev. =	13.74
Avg. CTR =	17.64	Std. Dev. =	3.25

Comments

One sided, 30 day pre-exposed, TM0177.

Number of cracks in weld area - 1

Total crack thickness in weld area - 0.004

Material : A516-70 CS
Sulfur : 0.020
Condition : Normalized
Solution : TM0177

Project # : L932343TK
Exposure : One sided, 10 Days
pH (INIT) : 2.8
pH (FINL) : 3.9

CLI # : 2280-D
Section # : W8-64B,88B
File # : 64B-88B.wk4
Date : 10/02/96

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W8 -64B	I.D. 1/3	0.0217	0.0039	1.217	0.503	BT,BS	0.01	1.78	0.78
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						
W8 -88B	I.D. 1/3	0.0335	0.0079	1.217	0.503	BT,BS	0.04	2.75	1.57
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Four Sections

Avg. CSR =	0.03	Std. Dev. =	0.01
Avg. CLR =	2.26	Std. Dev. =	0.84
Avg. CTR =	1.17	Std. Dev. =	0.45

2/3 Thickness Averages of All Four Sections

Avg. CSR =	0.03	Std. Dev. =	0.01
Avg. CLR =	2.26	Std. Dev. =	0.90
Avg. CTR =	1.17	Std. Dev. =	0.48

1/3 Thickness Averages of All Four Sections

Avg. CSR =	0.03	Std. Dev. =	0.01
Avg. CLR =	2.26	Std. Dev. =	0.97
Avg. CTR =	1.17	Std. Dev. =	0.52

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

Comments

One sided, 30 day pre-exposed, TM0177.

Number of cracks in weld area - 0

Total crack thickness in weld area - 0.000

Material : On Weld	Project # : L932343TK	CLI # : On Weld
Sulfur : N/A	Exposure : One sided,10 Days	Section # : W8-65,66
Condition : N/A	pH (INIT) : 2.8	File # : 65-66.wk4
Solution : TM0177	pH (FINL) : 3.9	Date : 10/02/96

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W8 -65	I.D. 1/3	0.0000	0.0000	2.711	0.658		0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						
W8 -66	I.D. 1/3	0.0000	0.0000	2.529	0.619		0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Four Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

2/3 Thickness Averages of All Four Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

1/3 Thickness Averages of All Four Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

Comments

Number of cracks in weld area - 0

Total crack thickness in weld area - 0.000

Material : A285-C CS
Sulfur : 0.021
Condition : Not Specified
Solution : TM0177

Project # : L932343TK
Exposure : One sided,10 Days
pH (INIT) : 2.8
pH (FINL) : 3.9

CLI # : 4745-C
Section # : W8-67A,68A
File # : 67A-68A.wk4
Date : 10/02/96

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W8 -67A	I.D. 1/3	0.1063	0.0354	1.289	0.507	BT,BS	4.71	47.80	32.23
	I.D. 1/3	0.2933	0.0610			BT,BS			
	I.D. 1/3	0.0768	0.0039			H2,H1			
	I.D. 1/3	0.1398	0.0630			H1,H2,H1			
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						
W8 -68A	I.D. 1/3	0.0512	0.0039	1.291	0.503	BS,BT	4.00	31.72	42.27
	I.D. 1/3	0.0453	0.1476			BS,BT,BS			
	I.D. 1/3	0.3130	0.0610			BS,BT,H2			
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Four Sections

Avg. CSR =	4.36	Std. Dev. =	0.91
Avg. CLR =	39.76	Std. Dev. =	7.47
Avg. CTR =	37.25	Std. Dev. =	7.59

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

2/3 Thickness Averages of All Four Sections

Avg. CSR =	4.36	Std. Dev. =	0.95
Avg. CLR =	39.76	Std. Dev. =	7.75
Avg. CTR =	37.25	Std. Dev. =	7.90

1/3 Thickness Averages of All Four Sections

Avg. CSR =	4.36	Std. Dev. =	0.99
Avg. CLR =	39.76	Std. Dev. =	8.04
Avg. CTR =	37.25	Std. Dev. =	8.23

Comments

One sided, 30 day pre-exposed, TM0177.

Number of cracks in weld area - 3

Total crack thickness in weld area - 0.124

Material : A516-70 CS
Sulfur :0.020
Condition : Normalized
Solution : TM0177

Project # : L932343TK
Exposure : One sided,10 Days
pH (INIT) :2.8
pH (FINL) : 3.9

CLI # : 2280-A
Section # : W8-67B,68B
File # : 67B-68B.wk4
Date :10/02/96

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	Section CSR (%)	Section CLR (%)	Section CTR (%)
W8 -67B	I.D. 1/3	0.1220	0.0256	1.289	0.507	BT	0.48	9.47	5.05
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						
W8 -68B	I.D. 1/3	0.0000	0.0000	1.291	0.503		0.62	25.01	3.13
	Mid. 1/3	0.2894	0.0138			H1,H2,BM			
	Mid. 1/3	0.0335	0.0020			BM			
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Four Sections

Avg. CSR =	0.55	Std. Dev. =	0.19
Avg. CLR =	17.24	Std. Dev. =	6.06
Avg. CTR =	4.09	Std. Dev. =	1.42

2/3 Thickness Averages of All Four Sections

Avg. CSR =	0.55	Std. Dev. =	0.21
Avg. CLR =	17.24	Std. Dev. =	6.45
Avg. CTR =	4.09	Std. Dev. =	1.52

1/3 Thickness Averages of All Four Sections

Avg. CSR =	0.24	Std. Dev. =	0.15
Avg. CLR =	4.73	Std. Dev. =	2.98
Avg. CTR =	2.52	Std. Dev. =	1.59

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

Comments

One sided, 30 day pre-exposed, TM0284.

Number of cracks in weld area - 1

Total crack thickness in weld area - 0.014

Material : A285-C CS
Sulfur :0.021
Condition : Not Specified
Solution : TM0177

Project # : L932343TK
Exposure : One sided,10 Days
pH (INIT) :2.8
pH (FINL) : 3.9

CLI # : 4745-C
Section # : W8-69A,70A
File # : 69A-70A.wk4
Date :10/02/96

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W8 -69A	I.D. 1/3	0.2185	0.0492	1.279	0.505	BS,BT,BS	1.70	20.47	10.91
	Mid. 1/3	0.0433	0.0059			BM,BS			
	O.D. 1/3	0.0000	0.0000						
W8 -70A	I.D. 1/3	0.0413	0.0079	1.274	0.508	BT	0.44	15.76	4.65
	Mid. 1/3	0.1594	0.0157			BM			
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Four Sections

Avg. CSR =	1.07	Std. Dev. =	0.44
Avg. CLR =	18.12	Std. Dev. =	5.33
Avg. CTR =	7.78	Std. Dev. =	2.63

2/3 Thickness Averages of All Four Sections

Avg. CSR =	1.07	Std. Dev. =	0.48
Avg. CLR =	18.12	Std. Dev. =	5.65
Avg. CTR =	7.78	Std. Dev. =	2.80

1/3 Thickness Averages of All Four Sections

Avg. CSR =	0.86	Std. Dev. =	0.52
Avg. CLR =	10.16	Std. Dev. =	5.34
Avg. CTR =	5.65	Std. Dev. =	3.04

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

Comments

One sided, 30 day pre-exposed, TM0177.

Number of cracks in weld area - 0

Total crack thickness in weld area - 0.000

Material : A516-70 CS	Project # : L932343TK	CLI # : 2280-A
Sulfur : 0.020	Exposure : One sided, 10 Days	Section # : W8-69B,70B
Condition : Normalized	pH (INIT) : 2.8	File # : 69B-70B.wk4
Solution : TM0177	pH (FINL) : 3.9	Date : 10/02/96

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W8 -69B	I.D. 1/3	0.0000	0.0000	1.279	0.505	BS,BM	0.72	8.77	8.19
	Mid. 1/3	0.1122	0.0413						
	O.D. 1/3	0.0000	0.0000						
W8 -70B	I.D. 1/3	0.0000	0.0000	1.274	0.508		0.23	15.45	5.81
	Mid. 1/3	0.1004	0.0079			BS,BM			
	Mid. 1/3	0.0295	0.0098			BS,BM,BS			
	Mid. 1/3	0.0335	0.0039			BM			
	Mid. 1/3	0.0335	0.0079			BM,BS			
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Four Sections

Avg. CSR =	0.47	Std. Dev. =	0.17
Avg. CLR =	12.11	Std. Dev. =	2.76
Avg. CTR =	7.00	Std. Dev. =	2.00

2/3 Thickness Averages of All Four Sections

Avg. CSR =	0.47	Std. Dev. =	0.18
Avg. CLR =	12.11	Std. Dev. =	2.88
Avg. CTR =	7.00	Std. Dev. =	2.11

1/3 Thickness Averages of All Four Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

Comments

One sided, 30 day pre-exposed, TM0284.

Number of cracks in weld area - 0

Total crack thickness in weld area - 0.000

Material : A285-C CS
Sulfur :0.021
Condition : Not Specified
Solution : TM0177

Project # : L932343TK
Exposure : One sided,10 Days
pH (INIT) :2.8
pH (FINL) : 3.9

CLI # : 4745-C
Section # : W8-71A,72A
File # : 71A-72A.wk4
Date :10/02/96

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W8 -71A	I.D. 1/3	0.2146	0.0551	1.259	0.518	BS,BT,BS	2.31	24.08	25.46
	I.D. 1/3	0.0472	0.0138			BS,BT,BS			
	I.D. 1/3	0.0413	0.0630			BS,BT,H2			
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						
W8 -72A	I.D. 1/3	0.3780	0.0531	1.256	0.507	BS,BT,BS	3.42	41.53	12.81
	I.D. 1/3	0.1437	0.0118			H1,H2,H1			
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Four Sections

Avg. CSR =	2.87	Std. Dev. =	0.85
Avg. CLR =	32.81	Std. Dev. =	8.22
Avg. CTR =	19.14	Std. Dev. =	4.27

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

2/3 Thickness Averages of All Four Sections

Avg. CSR =	2.87	Std. Dev. =	0.89
Avg. CLR =	32.81	Std. Dev. =	8.63
Avg. CTR =	19.14	Std. Dev. =	4.46

1/3 Thickness Averages of All Four Sections

Avg. CSR =	2.87	Std. Dev. =	0.95
Avg. CLR =	32.81	Std. Dev. =	9.10
Avg. CTR =	19.14	Std. Dev. =	4.67

Comments

One sided, 30 day pre-exposed, TM0177.

Number of cracks in weld area - 2

Total crack thickness in weld area - 0.075

Material : A516-70 CS
Sulfur :0.020
Condition : Normalized
Solution : TM0177

Project # : L932343TK
Exposure : One sided,10 Days
pH (INIT) :2.8
pH (FINL) : 3.9

CLI # : 2280-A
Section # : W8-71B,72B
File # : 71B-72B.wk4
Date :10/02/96

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W8 -71B	I.D. 1/3	0.0000	0.0000	1.259	0.518		0.53	27.99	1.90
	Mid. 1/3	0.3524	0.0098			H2,H1,H2,BM			
	O.D. 1/3	0.0000	0.0000						
W8 -72B	I.D. 1/3	0.0000	0.0000	1.256	0.507		0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Four Sections

Avg. CSR =	0.27	Std. Dev. =	0.14
Avg. CLR =	13.99	Std. Dev. =	7.46
Avg. CTR =	0.95	Std. Dev. =	0.51

2/3 Thickness Averages of All Four Sections

Avg. CSR =	0.27	Std. Dev. =	0.15
Avg. CLR =	13.99	Std. Dev. =	8.05
Avg. CTR =	0.95	Std. Dev. =	0.55

1/3 Thickness Averages of All Four Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

Comments

One sided, 30 day pre-exposed, TM0284

Number of cracks in weld area - 1

Total crack thickness in weld area - 0.010

Material : A516-70 CS
Sulfur :0.020
Condition : Normalized
Solution : TM0177

Project # : L932343TK
Exposure : One sided,10 Days
pH (INIT) :2.8
pH (FINL) : 3.9

CLI # : 2280-D
Section # : W8-73A,74A
File # : 73A-74A.wk4
Date :10/02/96

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W8 -73A	I.D. 1/3	0.0177	0.0020	1.248	0.521	BT	0.01	1.42	0.38
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						
W8 -74A	I.D. 1/3	0.0000	0.0000	1.243	0.525		0.55	40.70	2.62
	Mid. 1/3	0.3012	0.0079			BM			
	Mid. 1/3	0.2047	0.0059			BM,H2			
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Four Sections

Avg. CSR =	0.28	Std. Dev. =	0.10
Avg. CLR =	21.06	Std. Dev. =	7.24
Avg. CTR =	1.50	Std. Dev. =	0.46

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

2/3 Thickness Averages of All Four Sections

Avg. CSR =	0.28	Std. Dev. =	0.11
Avg. CLR =	21.06	Std. Dev. =	7.71
Avg. CTR =	1.50	Std. Dev. =	0.49

1/3 Thickness Averages of All Four Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.71	Std. Dev. =	0.45
Avg. CTR =	0.19	Std. Dev. =	0.12

Comments

One sided, 30 day pre-exposed, TM0177.

Number of cracks in weld area - 1

Total crack thickness in weld area - 0.006

Material : A516-70 HRS	Project # : L932343TK	CLI # : 2280-D
Sulfur : 0.001	Exposure : One sided,10 Days	Section # : W8-73B,74B
Condition : Normalized	pH (INIT) : 2.8	File # : 73B,74B.wk4
Solution : TM0177	pH (FINL) : 3.9	Date : 10/02/96

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W8 -73B	I.D. 1/3	0.0000	0.0000	1.248	0.521		0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						
W8 -74B	I.D. 1/3	0.0000	0.0000	1.243	0.525		0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Four Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

2/3 Thickness Averages of All Four Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

1/3 Thickness Averages of All Four Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

Comments

One sided, 30 day pre-exposed, TM0177.

Number of cracks in weld area - 0

Total crack thickness in weld area - 0.000

Material : A516-70 CS
Sulfur : 0.020
Condition : Normalized
Solution : TM0177

Project # : L932343TK
Exposure : One sided, 10 Days
pH (INIT) : 2.8
pH (FINL) : 3.9

CLI # : 2280-D
Section # : W8-75A,76A
File # : 75A-76A.wk4
Date : 10/02/96

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W8 -75A	I.D. 1/3	0.0000	0.0000	1.236	0.528		0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						
W8 -76A	I.D. 1/3	0.0433	0.0079	1.232	0.528	BS,BT	0.05	3.52	1.49
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Four Sections

Avg. CSR =	0.03	Std. Dev. =	0.01
Avg. CLR =	1.76	Std. Dev. =	0.94
Avg. CTR =	0.75	Std. Dev. =	0.40

2/3 Thickness Averages of All Four Sections

Avg. CSR =	0.03	Std. Dev. =	0.02
Avg. CLR =	1.76	Std. Dev. =	1.01
Avg. CTR =	0.75	Std. Dev. =	0.43

1/3 Thickness Averages of All Four Sections

Avg. CSR =	0.03	Std. Dev. =	0.02
Avg. CLR =	1.76	Std. Dev. =	1.10
Avg. CTR =	0.75	Std. Dev. =	0.47

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

Comments

One sided, 30 day pre-exposed, TM0177.

Number of cracks in weld area - 0

Total crack thickness in weld area - 0.000

Material : A516-70 HRS	Project # : L932343TK	CLI # : 3201-B
Sulfur : 0.001	Exposure : One sided,10 Days	Section # : W8-75B,76B
Condition : Normalized	pH (INIT) : 2.8	File # : 75B-76B.wk4
Solution : TM0177	pH (FINL) : 3.9	Date : 10/02/96

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W8 -75B	I.D. 1/3	0.0000	0.0000	1.236	0.528		0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						
W8 -76B	I.D. 1/3	0.0000	0.0000	1.232	0.528		0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Four Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

2/3 Thickness Averages of All Four Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

1/3 Thickness Averages of All Four Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

Comments

One sided, 30 day pre-exposed, TM0177.

Number of cracks in weld area - 0

Total crack thickness in weld area - 0.000

Material : A516-70 CS
Sulfur :0.020
Condition : Normalized
Solution : TM0177

Project # : L932343TK
Exposure : One sided,10 Days
pH (INIT) :2.8
pH (FINL) : 3.9

CLI # : 2280-D
Section # : W8-77A,78A
File # : 77A-78A.wk4
Date :10/02/96

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W8 -77A	I.D. 1/3	0.1614	0.0374	1.219	0.532	BT	1.20	37.46	8.14
	Mid. 1/3	0.2953	0.0059			BM,H2			
	O.D. 1/3	0.0000	0.0000						
W8 -78A	I.D. 1/3	0.0000	0.0000	1.252	0.529		0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Four Sections

Avg. CSR =	0.60	Std. Dev. =	0.25
Avg. CLR =	18.73	Std. Dev. =	7.09
Avg. CTR =	4.07	Std. Dev. =	1.87

2/3 Thickness Averages of All Four Sections

Avg. CSR =	0.60	Std. Dev. =	0.27
Avg. CLR =	18.73	Std. Dev. =	7.59
Avg. CTR =	4.07	Std. Dev. =	2.01

1/3 Thickness Averages of All Four Sections

Avg. CSR =	0.47	Std. Dev. =	0.29
Avg. CLR =	6.62	Std. Dev. =	4.16
Avg. CTR =	3.52	Std. Dev. =	2.21

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

Comments

One sided, 30 day pre-exposed, TM0177.

Number of cracks in weld area - 1

Total crack thickness in weld area - 0.006

Material : A516-70 HRS
Sulfur : 0.001
Condition : Normalized
Solution : TM0177

Project # : L932343TK
Exposure : One sided,10 Days
pH (INIT) : 2.8
pH (FINL) : 3.9

CLI # : 3201-B
Section # : W8-77B,78B
File # : 77B-78.wk4
Date : 10/02/96

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W8 -77B	I.D. 1/3	0.0000	0.0000	1.219	0.532		0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						
W8 -78B	I.D. 1/3	0.0138	0.0020	1.252	0.529	H2,BT	0.00	1.10	0.37
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Four Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.55	Std. Dev. =	0.29
Avg. CTR =	0.19	Std. Dev. =	0.10

2/3 Thickness Averages of All Four Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.55	Std. Dev. =	0.32
Avg. CTR =	0.19	Std. Dev. =	0.11

1/3 Thickness Averages of All Four Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.55	Std. Dev. =	0.35
Avg. CTR =	0.19	Std. Dev. =	0.12

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

Comments

One sided, 30 day pre-exposed, TM0177.

Number of cracks in weld area - 1

Total crack thickness in weld area - 0.002

Material : A285-C CS
Sulfur :0.021
Condition : Not Specified
Solution : TM0177

Project # : L932343TK
Exposure : One sided,10 Days
pH (INIT) :2.8
pH (FINL) : 3.9

CLI # : 4745-C
Section # : W8-79A,80A
File # : 79A-80A.wk4
Date :10/02/96

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W8 -79A	I.D. 1/3	0.1634	0.0650	1.282	0.503	BS,BT,BS	13.07	82.15	37.57
	I.D. 1/3	0.0531	0.0039			BT			
	I.D. 1/3	0.7756	0.0925			BT,BS,BT,BS,BT,H2			
	I.D. 1/3	0.0610	0.0276			BT,BS			
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						
W8 -80A	I.D. 1/3	0.3287	0.0591	1.264	0.518	BS,BT,BS	5.28	45.01	23.56
	I.D. 1/3	0.2402	0.0630			BT,H2,H1			
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Four Sections

Avg. CSR =	9.17	Std. Dev. =	2.67
Avg. CLR =	63.58	Std. Dev. =	15.24
Avg. CTR =	30.57	Std. Dev. =	5.91

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

2/3 Thickness Averages of All Four Sections

Avg. CSR =	9.17	Std. Dev. =	2.81
Avg. CLR =	63.58	Std. Dev. =	15.96
Avg. CTR =	30.57	Std. Dev. =	6.13

1/3 Thickness Averages of All Four Sections

Avg. CSR =	9.17	Std. Dev. =	2.97
Avg. CLR =	63.58	Std. Dev. =	16.77
Avg. CTR =	30.57	Std. Dev. =	6.36

Comments

One sided, 30 day pre-exposed, TM0177.

Number of cracks in weld area - 2

Total crack thickness in weld area - 0.156

Material : A516-70 CS	Project # : L932343TK	CLI # : 2280-A
Sulfur :0.020	Exposure : One sided,10 Days	Section # : W8-79B,80B
Condition : Normalized	pH (INIT) :2.8	File # : 79B-80B.wk4
Solution : TM0177	pH (FINL) : 3.9	Date :10/02/96

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W8 -79B	I.D. 1/3	0.0000	0.0000	1.282	0.503		0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						
W8 -80B	I.D. 1/3	0.0000	0.0000	1.264	0.518		0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Four Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

2/3 Thickness Averages of All Four Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

1/3 Thickness Averages of All Four Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

Comments

One sided, 30 day pre-exposed, TM0284.

Number of cracks in weld area - 0

Total crack thickness in weld area - 0.000

Material : A516-70 CS	Project # : L932343TK	CLI # : 2280-D
Sulfur : 0.020	Exposure : One sided, 10 Days	Section # : W8-81A,82A
Condition : Normalized	pH (INIT) : 2.8	File # : 81A-82A.wk4
Solution : TM0177	pH (FINL) : 3.9	Date : 10/02/96

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W8 -81A	I.D. 1/3	0.0000	0.0000	1.237	0.525		0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						
W8 -82A	I.D. 1/3	0.0000	0.0000	1.228	0.534		0.03	4.33	0.74
	Mid. 1/3	0.0531	0.0039			BM,H2			
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Four Sections

Avg. CSR =	0.02	Std. Dev. =	0.01
Avg. CLR =	2.16	Std. Dev. =	1.15
Avg. CTR =	0.37	Std. Dev. =	0.20

2/3 Thickness Averages of All Four Sections

Avg. CSR =	0.02	Std. Dev. =	0.01
Avg. CLR =	2.16	Std. Dev. =	1.24
Avg. CTR =	0.37	Std. Dev. =	0.21

1/3 Thickness Averages of All Four Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

Comments

One sided, 30 day pre-exposed, TM0177.

Number of cracks in weld area - 1

Total crack thickness in weld area - 0.004

Material : A516-70 HRS
Sulfur :0.001
Condition : Normalized
Solution : TM0177

Project # : L932343TK
Exposure : One sided,10 Days
pH (INIT) :2.8
pH (FINL) : 3.9

CLI # : 3201-B
Section # : W8-81B,82B
File # : 81B-82B.wk4
Date :10/02/96

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W8 -81B	I.D. 1/3	0.0000	0.0000	1.237	0.525		0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						
W8 -82B	I.D. 1/3	0.0000	0.0000	1.228	0.534		0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Four Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

2/3 Thickness Averages of All Four Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

1/3 Thickness Averages of All Four Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

Comments

One sided, 30 day pre-exposed, TM0177.

Number of cracks in weld area - 0

Total crack thickness in weld area - 0.000

Material : A516-70 CS
Sulfur :0.020
Condition : Normalized
Solution : TM0177

Project # : L932343TK
Exposure : One sided,10 Days
pH (INIT) :2.8
pH (FINL) : 3.9

CLI # : 2280-A
Section # : W8-83A,84A
File # : 83A-84A.wk4
Date :10/02/96

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W8 -83A	I.D. 1/3	0.1437	0.0039	1.247	0.523	BT	0.09	11.52	0.75
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						
W8 -84A	I.D. 1/3	0.0118	0.0610	1.258	0.523	BS,BT,H2	0.13	6.26	12.42
	Mid. 1/3	0.0157	0.0020						
	Mid. 1/3	0.0512	0.0020						
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Four Sections

Avg. CSR =	0.11	Std. Dev. =	0.03
Avg. CLR =	8.89	Std. Dev. =	3.04
Avg. CTR =	6.59	Std. Dev. =	2.98

2/3 Thickness Averages of All Four Sections

Avg. CSR =	0.11	Std. Dev. =	0.04
Avg. CLR =	8.89	Std. Dev. =	3.23
Avg. CTR =	6.59	Std. Dev. =	3.20

1/3 Thickness Averages of All Four Sections

Avg. CSR =	0.10	Std. Dev. =	0.04
Avg. CLR =	6.23	Std. Dev. =	3.60
Avg. CTR =	6.21	Std. Dev. =	3.64

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

Comments

One sided, 30 day pre-exposed, TM0284.

Number of cracks in weld area - 1

Total crack thickness in weld area - 0.061

Material : A516-70 HRS
Sulfur :0.001
Condition : Normalized
Solution : TM0177

Project # : L932343TK
Exposure : One sided,10 Days
pH (INIT) :2.8
pH (FINL) : 3.9

CLI # : 3201-B
Section # : W8-83B,84B
File # : 83B-84B.wk4
Date :10/02/96

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W8 -83B	I.D. 1/3	0.1437	0.0039	1.247	0.523	BT	0.09	11.52	0.75
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						
W8 -84B	I.D. 1/3	0.0000	0.0000	1.259	0.523		0.07	9.22	0.75
	Mid. 1/3	0.1161	0.0039			BM			
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Four Sections

Avg. CSR =	0.08	Std. Dev. =	0.03
Avg. CLR =	10.37	Std. Dev. =	3.77
Avg. CTR =	0.75	Std. Dev. =	0.27

2/3 Thickness Averages of All Four Sections

Avg. CSR =	0.08	Std. Dev. =	0.03
Avg. CLR =	10.37	Std. Dev. =	4.03
Avg. CTR =	0.75	Std. Dev. =	0.29

1/3 Thickness Averages of All Four Sections

Avg. CSR =	0.04	Std. Dev. =	0.03
Avg. CLR =	5.76	Std. Dev. =	3.62
Avg. CTR =	0.38	Std. Dev. =	0.24

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

Comments

One sided, 30 day pre-exposed, TM0177.

Number of cracks in weld area - 0

Total crack thickness in weld area - 0.000

Material : A516-70-CS
Sulfur :0.020
Condition : Normalized
Solution : TM0177

Project # : L932343TK
Exposure : One sided,10 Days
pH (INIT) :2.8
pH (FINL) : 3.9

CLI # : 2280-A
Section # : W8-85A,86A
File # : 85A-86A.wk4
Date :10/02/96

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	Section CSR (%)	Section CLR (%)	Section CTR (%)
W8 -85A	I.D. 1/3	0.0000	0.0000	2.491	0.528		0.35	8.61	4.10
	Mid. 1/3	0.2146	0.0217			BM,H2,H1			
	O.D. 1/3	0.0000	0.0000						
W8 -86A	I.D. 1/3	0.0000	0.0000	2.488	0.522		0.08	10.36	0.75
	Mid. 1/3	0.2579	0.0039			BM			
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Four Sections

Avg. CSR =	0.22	Std. Dev. =	0.09
Avg. CLR =	9.49	Std. Dev. =	3.44
Avg. CTR =	2.43	Std. Dev. =	1.09

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

2/3 Thickness Averages of All Four Sections

Avg. CSR =	0.22	Std. Dev. =	0.10
Avg. CLR =	9.49	Std. Dev. =	3.68
Avg. CTR =	2.43	Std. Dev. =	1.18

1/3 Thickness Averages of All Four Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

Comments

One sided, 30 day pre-exposed, TM0284

Number of cracks in weld area - 1

Total crack thickness in weld area - 0.022

Material : A516-70 HRS	Project # : L932343TK	CLI # : 3201-B
Sulfur : 0.001	Exposure : One sided,10 Days	Section # : W8-85B,86B
Condition : Normalized	pH (INIT) : 2.8	File # : 85B-86B.wk4
Solution : TM0177	pH (FINL) : 3.9	Date : 10/02/96

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W8 -85B	I.D. 1/3	0.0591	0.0059	2.491	0.528	BT	0.10	4.19	5.22
	I.D. 1/3	0.0453	0.0217			BT			
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						
W8 -86B	I.D. 1/3	0.0472	0.0020	2.488	0.522	BT	0.01	1.90	0.38
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Four Sections

Avg. CSR =	0.05	Std. Dev. =	0.02
Avg. CLR =	3.04	Std. Dev. =	0.84
Avg. CTR =	2.80	Std. Dev. =	1.07

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

2/3 Thickness Averages of All Four Sections

Avg. CSR =	0.05	Std. Dev. =	0.02
Avg. CLR =	3.04	Std. Dev. =	0.89
Avg. CTR =	2.80	Std. Dev. =	1.14

1/3 Thickness Averages of All Four Sections

Avg. CSR =	0.05	Std. Dev. =	0.02
Avg. CLR =	3.04	Std. Dev. =	0.94
Avg. CTR =	2.80	Std. Dev. =	1.23

Comments

One sided, 30 day pre-exposed, TM0177.

Number of cracks in weld area - 0

Total crack thickness in weld area - 0.000

Material : A285-C	Project # : L932343TK	CLI # : 4745-C
Sulfur : 0.021	Exposure : One sided, 10 Days	Section # : W8-87A,88A
Condition : Normalized	pH (INIT) : 2.8	File # : 89A-90A.wk4
Solution : TM0177	pH (FINL) : 3.9	Date : 10/02/96

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W8 -87A	I.D. 1/3	0.5472	0.0728	2.443	0.522	BS,BT,BS	3.85	33.20	24.51
	I.D. 1/3	0.1811	0.0472			BS,BT			
	Mid. 1/3	0.0827	0.0079			BM,BS			
	O.D. 1/3	0.0000	0.0000						
W8 -89A	I.D. 1/3	0.2303	0.0531	2.439	0.519	BS,BT	1.66	37.53	20.10
	I.D. 1/3	0.0709	0.0039			BS,BT			
	I.D. 1/3	0.4606	0.0138			BT			
	I.D. 1/3	0.0728	0.0217			BT,BS			
	I.D. 1/3	0.0591	0.0079			BT,BS			
	I.D. 1/3	0.0217	0.0039			BT,BS			
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Four Sections

Avg. CSR =	2.75	Std. Dev. =	0.72
Avg. CLR =	35.36	Std. Dev. =	6.39
Avg. CTR =	22.31	Std. Dev. =	4.02

2/3 Thickness Averages of All Four Sections

Avg. CSR =	2.75	Std. Dev. =	0.75
Avg. CLR =	35.36	Std. Dev. =	6.61
Avg. CTR =	22.31	Std. Dev. =	4.16

1/3 Thickness Averages of All Four Sections

Avg. CSR =	2.73	Std. Dev. =	0.79
Avg. CLR =	33.67	Std. Dev. =	6.95
Avg. CTR =	21.55	Std. Dev. =	4.36

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

Comments

One sided, 30 day pre-exposed, TM0177.

Number of cracks in weld area - 0

Total crack thickness in weld area - 0.000

Material : A516-70 CS	Project # : L932343TK	CLI # : 2280-D
Sulfur : 0.020	Exposure : One sided,10 Days	Section # : W8-87B,88B
Condition : Normalized	pH (INIT) : 2.8	File # : 87B-88B.wk4
Solution : TM0177	pH (FINL) : 3.9	Date : 10/02/96

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W8 -87B	I.D. 1/3	0.0000	0.0000	2.443	0.522		0.05	3.38	1.51
	Mid. 1/3	0.0827	0.0079			BM,BS			
	O.D. 1/3	0.0000	0.0000						
W8 -88B	I.D. 1/3	0.0000	0.0000	2.439	0.519		0.16	5.97	2.66
	Mid. 1/3	0.1457	0.0138			H2,BM,BS			
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Four Sections

Avg. CSR =	0.10	Std. Dev. =	0.04
Avg. CLR =	4.68	Std. Dev. =	1.76
Avg. CTR =	2.08	Std. Dev. =	0.78

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

2/3 Thickness Averages of All Four Sections

Avg. CSR =	0.10	Std. Dev. =	0.05
Avg. CLR =	4.68	Std. Dev. =	1.89
Avg. CTR =	2.08	Std. Dev. =	0.84

1/3 Thickness Averages of All Four Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

Comments

One sided, 30 day pre-exposed, TM0177.

Number of cracks in weld area - 1

Total crack thickness in weld area - 0.014

Material : A285-C CS	Project # : L932343TK	CLI # : 4745-C
Sulfur : 0.021	Exposure : One sided,10 Days	Section # : W8-89A,90A
Condition : Not Specified	pH (INIT) : 2.8	File # : 89A-90A.wk4
Solution : TM0177	pH (FINL) : 3.9	Date : 10/02/96

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W8 -89A	I.D. 1/3	0.1949	0.0177	1.229	0.518	BT	4.71	63.91	19.76
	I.D. 1/3	0.2441	0.0276			BT			
	I.D. 1/3	0.3465	0.0571			BS,BT			
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						
W8 -90A	I.D. 1/3	0.4705	0.0630	1.223	0.500	BS,BT	7.65	60.04	25.59
	I.D. 1/3	0.2638	0.0650			BS,BT,BS			
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Four Sections

Avg. CSR =	6.18	Std. Dev. =	1.42
Avg. CLR =	61.97	Std. Dev. =	12.30
Avg. CTR =	22.68	Std. Dev. =	4.69

2/3 Thickness Averages of All Four Sections

Avg. CSR =	6.18	Std. Dev. =	1.49
Avg. CLR =	61.97	Std. Dev. =	12.78
Avg. CTR =	22.68	Std. Dev. =	4.88

1/3 Thickness Averages of All Four Sections

Avg. CSR =	6.18	Std. Dev. =	1.56
Avg. CLR =	61.97	Std. Dev. =	13.24
Avg. CTR =	22.68	Std. Dev. =	5.08

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

Comments

One sided, 30 day pre-exposed, TM0177.

Number of cracks in weld area - 0

Total crack thickness in weld area - 0.000

Material : A516-70 CS
Sulfur :0.020
Condition : Normalized
Solution : TM0177

Project # : L932343TK
Exposure : One sided,10 Days
pH (INIT) :2.8
pH (FINL) : 3.9

CLI # : 2280-D
Section # : W8-89B,90B
File # : 89B-90B.wk4
Date :10/02/96

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W8 -89B	I.D. 1/3	0.0413	0.0039	1.229	0.518	BT	0.72	30.59	4.56
	I.D. 1/3	0.0709	0.0039			BT			
	Mid. 1/3	0.2638	0.0157			BM			
	O.D. 1/3	0.0000	0.0000						
W8 -90B	I.D. 1/3	0.1142	0.0059	1.230	0.500	H2,BT	0.11	9.28	1.18
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Four Sections

Avg. CSR =	0.42	Std. Dev. =	0.17
Avg. CLR =	19.94	Std. Dev. =	5.84
Avg. CTR =	2.87	Std. Dev. =	0.82

2/3 Thickness Averages of All Four Sections

Avg. CSR =	0.42	Std. Dev. =	0.18
Avg. CLR =	19.94	Std. Dev. =	6.18
Avg. CTR =	2.87	Std. Dev. =	0.87

1/3 Thickness Averages of All Four Sections

Avg. CSR =	0.09	Std. Dev. =	0.03
Avg. CLR =	9.21	Std. Dev. =	3.11
Avg. CTR =	1.35	Std. Dev. =	0.43

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

Comments

One sided, 30 day pre-exposed, TM0177.

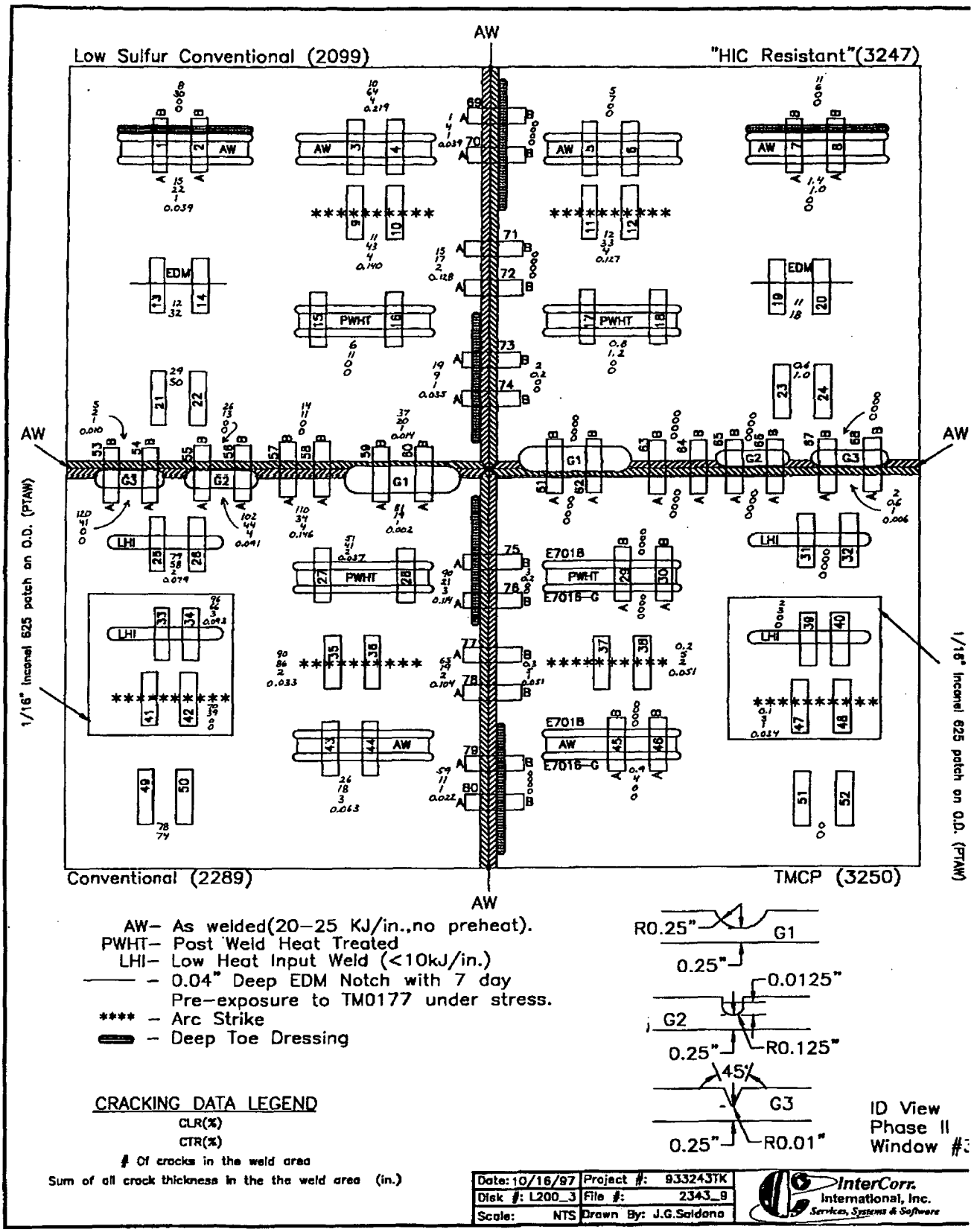
Number of cracks in weld area - 1

Total crack thickness in weld area - 0.006

APPENDIX C

EXPOSURE 3

DETAILED CRACKING RESULTS



Material : A516-70 LSCS
Sulfur : 0.007
Condition : As Rolled
Solution : TM0177

Project # : L932343TK
Exposure : 13 Days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 2099
Section # : W9-1A,2A
File # : W9_1-2A.wk4
Date : 10/13/97

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	Section CSR (%)	Section CLR (%)	Section CTR (%)
W9 -1A	I.D. 1/3	0.1555	0.0650	1.875	0.510	BT	1.08	9.03	15.83
	Mid. 1/3	0.0138	0.0157			BM			
	O.D. 1/3	0.0000	0.0000						
W9 -2A	I.D. 1/3	0.0138	0.0591	1.189	0.510	BS, BT	0.88	20.86	28.56
		0.0492	0.0177			BT			
		0.1240	0.0197			BT			
		0.0197	0.0394			BS, H1, H2			
	Mid. 1/3	0.0413	0.0098			BM			
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Sections

Avg. CSR =	0.98	Std. Dev. =	0.26
Avg. CLR =	14.94	Std. Dev. =	3.12
Avg. CTR =	22.19	Std. Dev. =	4.13

2/3 Thickness Averages of All Sections

Avg. CSR =	0.98	Std. Dev. =	0.28
Avg. CLR =	14.94	Std. Dev. =	3.25
Avg. CTR =	22.19	Std. Dev. =	4.27

1/3 Thickness Averages of All Sections

Avg. CSR =	0.93	Std. Dev. =	0.29
Avg. CLR =	12.84	Std. Dev. =	3.46
Avg. CTR =	19.69	Std. Dev. =	4.60

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

Comments

Number of cracks in weld area - 1

Total crack thickness in weld area - 0.0394

Material : A516-70 LSCS	Project # : L932343TK	CLI # : 2099
Sulfur : 0.007	Exposure : 13 Days	Section # : W9-1B, 2B
Condition : As Rolled	pH (INIT) : 2.8	File # : W9_1,2B.WK4
Solution : TM0177	pH (FINL) : 3.8	Date : 10/13/97

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W9 -1B	I.D. 1/3	0.0315	0.0335	1.875	0.510	BS, BT, BM *	0.59	6.51	31.65
		0.0020	0.0079			BS, BT			
		0.0118	0.0020			BT, BS			
	Mid. 1/3	0.0413	0.0945			BS, BT, BM *			
		0.0276	0.0217			BM			
		0.0079	0.0020			BM			
	O.D. 1/3	0.0000	0.0000						
W9 -2B	I.D. 1/3	0.0197	0.0394	1.189	0.510	BS, BT, BM **	0.50	9.44	28.18
		0.0118	0.0217			BS, BT			
	Mid. 1/3	0.0157	0.0354			BS, BT, BM **			
		0.0315	0.0413			BM			
		0.0079	0.0020			BM			
		0.0256	0.0039			BM			
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Sections

Avg. CSR =	0.54	Std. Dev. =	0.10
Avg. CLR =	7.97	Std. Dev. =	0.87
Avg. CTR =	29.91	Std. Dev. =	4.52

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

2/3 Thickness Averages of All Sections

Avg. CSR =	0.54	Std. Dev. =	0.10
Avg. CLR =	7.97	Std. Dev. =	0.88
Avg. CTR =	29.91	Std. Dev. =	4.65

Comments

Number of cracks in weld area - 0

1/3 Thickness Averages of All Sections

Avg. CSR =	0.14	Std. Dev. =	0.04
Avg. CLR =	2.53	Std. Dev. =	0.63
Avg. CTR =	10.23	Std. Dev. =	2.71

Total crack thickness in weld area - 0.0000

*, ** - Same Crack

Material : A516-70 LSCS
Sulfur : 0.007
Condition : As Rolled
Solution : TM0177

Project # : L932343TK
Exposure : 13 Days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 2099
Section # : W9-3,4
File # : W9_3-4.WK4
Date : 10/13/97

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W9 -3	I.D. 1/3	0.0098	0.0020	2.568	0.507	BT	0.90	8.59	87.36
		0.0177	0.0354			BT			
		0.0138	0.0709			BT			
		0.0138	0.0472			BS, W, H1, H2			
		0.0217	0.0827			BS, W, H1, H2, BT			
		0.0118	0.0039			BT			
		0.0433	0.1398			BT, BM *			
	Mid. 1/3	0.0276	0.0453			BT,BM *			
		0.0197	0.0059			BM			
		0.0098	0.0020			BM			
		0.0138	0.0020			BM			
		0.0177	0.0059			BM			
	O.D. 1/3	0.0000	0.0000						
W9 -4	I.D. 1/3	0.0118	0.0610	2.568	0.508	BT	0.47	10.81	39.91
		0.0335	0.0118			BT			
		0.0098	0.0039			BT			
		0.0433	0.0197			BT			
		0.0177	0.0079			BT			
		0.0394	0.0394			BS, H1, H2,			
		0.0413	0.0492			BS, W, H1, H2,			
		0.0335	0.0039			BT			
		0.0472	0.0059			BT			
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Sections

Avg. CSR =	0.68	Std. Dev. =	0.09
Avg. CLR =	9.70	Std. Dev. =	0.59
Avg. CTR =	63.64	Std. Dev. =	6.33

2/3 Thickness Averages of All Sections

Avg. CSR =	0.68	Std. Dev. =	0.09
Avg. CLR =	9.70	Std. Dev. =	0.59
Avg. CTR =	63.64	Std. Dev. =	6.45

1/3 Thickness Averages of All Sections

Avg. CSR =	0.63	Std. Dev. =	0.10
Avg. CLR =	7.97	Std. Dev. =	0.64
Avg. CTR =	57.62	Std. Dev. =	6.93

Crack Location Codes

B - Base Metal
W - Weld Metal
H1 - Heat Affected Zone 1
H2 - Heat Affected Zone 2
S - Surface
T - ID 1/3
M - Middle 1/3
C - OD 1/3

Comments

* - Same Crack

Number of cracks in weld area - 4

Total crack thickness in weld area - 0.2185

Material : A516-70 HRS	Project # : L932343TK	CLI # : 3247
Sulfur : 0.001	Exposure : 13 Days	Section # : W9-5,6
Condition : Normalized	pH (INIT) : 2.8	File # : W9_5-6.WK4
Solution : TM0177	pH (FINL) : 3.8	Date : 10/13/97

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W9 -5	I.D. 1/3	0.0335	0.0098	2.042	0.471	BT	0.04	2.12	2.51
		0.0098	0.0020			BT			
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						
W9 -6	I.D. 1/3	0.0906	0.0335	2.040	0.470	BS, BT	0.45	7.43	11.73
		0.0610	0.0217			BT, BS			
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Sections

Avg. CSR =	0.25	Std. Dev. =	0.08
Avg. CLR =	4.78	Std. Dev. =	1.30
Avg. CTR =	7.12	Std. Dev. =	2.05

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

2/3 Thickness Averages of All Sections

Avg. CSR =	0.25	Std. Dev. =	0.09
Avg. CLR =	4.78	Std. Dev. =	1.37
Avg. CTR =	7.12	Std. Dev. =	2.16

1/3 Thickness Averages of All Sections

Avg. CSR =	0.25	Std. Dev. =	0.09
Avg. CLR =	4.78	Std. Dev. =	1.45
Avg. CTR =	7.12	Std. Dev. =	2.30

Comments :

Number of cracks in weld area - 0

Total crack thickness in weld area - 0.0000

Material : A516-70 HRS
Sulfur : 0.001
Condition : Normalized
Solution : TM0177

Project # : L932343TK
Exposure : 13 Days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 3247
Section # : W9-7A,8A
File # : W9_ 7-8A .WK4
Date : 10/13/97

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W9 -7A	I.D. 1/3	0.0315	0.0098	1.143	0.505	BS,BT,BS	0.05	2.76	1.95
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						
W9 -8A	I.D. 1/3	0.0000	0.0000	1.150	0.508	*****	0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Sections

Avg. CSR =	0.03	Std. Dev. =	0.01
Avg. CLR =	1.38	Std. Dev. =	0.73
Avg. CTR =	0.97	Std. Dev. =	0.52

2/3 Thickness Averages of All Sections

Avg. CSR =	0.03	Std. Dev. =	0.02
Avg. CLR =	1.38	Std. Dev. =	0.79
Avg. CTR =	0.97	Std. Dev. =	0.56

1/3 Thickness Averages of All Sections

Avg. CSR =	0.03	Std. Dev. =	0.02
Avg. CLR =	1.38	Std. Dev. =	0.87
Avg. CTR =	0.97	Std. Dev. =	0.61

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

Comments

**** - No Cracks

Number of cracks in weld area - 0

Total crack thickness in weld area - 0.0000

Material : A516-70 HRS	Project # : L932343TK	CLI # : 3247
Sulfur : 0.001	Exposure : 13 Days	Section # : W9-7B,8B
Condition : Normalized	pH (INIT) : 2.8	File # : W9_7-8B.WK4
Solution : TM0177	pH (FINL) : 3.8	Date : 10/13/97

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W9 -7B	I.D. 1/3	0.0295	0.0098	1.143	0.505	BS, BT	0.11	5.34	4.29
		0.0315	0.0118			BS, BT, BS			
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						
W9 -8B	I.D. 1/3	0.0059	0.0079	1.150	0.508	BS,BT	0.37	15.75	7.75
		0.0295	0.0020			BT			
		0.0197	0.0059			BT			
		0.0965	0.0197			BS, BT			
	Mid. 1/3	0.0157	0.0020			BM			
		0.0138	0.0020			BM			
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Sections

Avg. CSR =	0.24	Std. Dev. =	0.07
Avg. CLR =	10.54	Std. Dev. =	2.01
Avg. CTR =	6.02	Std. Dev. =	1.07

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

2/3 Thickness Averages of All Sections

Avg. CSR =	0.24	Std. Dev. =	0.08
Avg. CLR =	10.54	Std. Dev. =	2.09
Avg. CTR =	6.02	Std. Dev. =	1.10

1/3 Thickness Averages of All Sections

Avg. CSR =	0.24	Std. Dev. =	0.09
Avg. CLR =	9.26	Std. Dev. =	2.29
Avg. CTR =	5.63	Std. Dev. =	1.19

Comments

Number of cracks in weld area - 0

Total crack thickness in weld area - 0.0000

Material : A516-70 LSCS
Sulfur : 0.007
Condition : As Rolled
Solution : TM0177

Project # : L932343TK
Exposure : 13 Days
pH (INIT) : 2.8
pH (FINAL) : 3.8

CLI # : 2099
Section # : W9-9,10
File # : W9_9-10.WK4
Date : 10/13/97

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W9 -9	I.D. 1/3	0.0256	0.0965	2.018	0.506	BT	0.76	11.32	60.69
		0.0374	0.0256			BS, H1			
		0.0118	0.0413			BS, H1, H2			
		0.0374	0.0276			BS, H1, H2			
		0.0177	0.0650			BT			
		0.0256	0.0197			BT			
		0.0197	0.0039			BT, BM *			
		0.0098	0.0020			BT			
	Mid. 1/3	0.0433	0.0256			BT, BM *			
	O.D. 1/3	0.0000	0.0000						
W9 -10	I.D. 1/3	0.0827	0.0453	1.985	0.506	BS, BT, BS	0.57	9.72	25.68
		0.0256	0.0453			BS, H1, H2, BT			
		0.0079	0.0276			BT			
		0.0630	0.0098			BT			
		0.0138	0.0020			BT			
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Sections

Avg. CSR =	0.67	Std. Dev. =	0.09
Avg. CLR =	10.52	Std. Dev. =	1.09
Avg. CTR =	43.18	Std. Dev. =	4.89

2/3 Thickness Averages of All Sections

Avg. CSR =	0.67	Std. Dev. =	0.09
Avg. CLR =	10.52	Std. Dev. =	1.10
Avg. CTR =	43.18	Std. Dev. =	4.98

1/3 Thickness Averages of All Sections

Avg. CSR =	0.61	Std. Dev. =	0.09
Avg. CLR =	9.44	Std. Dev. =	1.10
Avg. CTR =	40.65	Std. Dev. =	5.14

Crack Location Codes

B - Base Metal
W - Weld Metal
H1 - Heat Affected Zone 1
H2 - Heat Affected Zone 2
S - Surface
T - ID 1/3
M - Middle 1/3
C - OD 1/3

Comments :

Number of cracks in weld area - 4

Total crack thickness in weld area - 0.1398

* - Same Crack

Material : A516-70 HRS	Project # : L932343TK	CLI # : 3247
Sulfur : 0.001	Exposure : 13 Days	Section # : W9-11,12
Condition : Normalized	pH (INIT) : 2.8	File # : W9_11-12.WK4
Solution : TM0177	pH (FINL) : 3.8	Date : 10/13/97

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	Section CSR (%)	Section CLR (%)	Section CTR (%)
W9 -11	I.D. 1/3	0.0059	0.0295	2.320	0.506	BS, H1, H2	0.71	14.34	35.01
		0.0039	0.0335			BS, H1, H2, BT			
		0.0118	0.0236			BS, H1, H2			
		0.0295	0.0157			BS, BT			
		0.1181	0.0098			BT			
		0.0295	0.0098			BS, BT			
		0.1122	0.0512			BT, BS			
		0.0217	0.0039			BT			
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						
W9 -12	I.D. 1/3	0.0630	0.0295	2.219	0.506	BS, BT, BS, BT	0.53	9.12	30.11
		0.0094	0.0402			BS, H1, H2			
		0.0098	0.0256			BT			
		0.0591	0.0039			BT			
		0.0610	0.0531						
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Sections

Avg. CSR =	0.62	Std. Dev. =	0.11
Avg. CLR =	11.73	Std. Dev. =	1.50
Avg. CTR =	32.56	Std. Dev. =	3.39

2/3 Thickness Averages of All Sections

Avg. CSR =	0.62	Std. Dev. =	0.12
Avg. CLR =	11.73	Std. Dev. =	1.54
Avg. CTR =	32.56	Std. Dev. =	3.44

1/3 Thickness Averages of All Sections

Avg. CSR =	0.62	Std. Dev. =	0.12
Avg. CLR =	11.73	Std. Dev. =	1.57
Avg. CTR =	32.56	Std. Dev. =	3.47

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

Comments

Number of cracks in weld area - 4

Total crack thickness in weld area - 0.1268

Material : A516-70 LSCS
Sulfur : 0.007
Condition : As Rolled
Solution : TM0177

Project # : L932343TK
Exposure : 13 Days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 2099
Section # : W9-13,14
File # : W9_13-14.WK4
Date : 10/13/97

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W9 -13	I.D. 1/3	0.0512	0.0256	2.172	0.506	BT	0.63	17.22	33.46
		0.1161	0.0217			BT			
		0.0295	0.0630			BS, BT			
		0.0059	0.0059			BS, BT			
		0.0118	0.0039			BT			
		0.0177	0.0039			BT			
		0.0217	0.0276			BT			
		0.0138	0.0020			BT			
		0.0551	0.0059			BT			
	Mid. 1/3	0.0039	0.0020			BM			
		0.0118	0.0020			BM			
		0.0059	0.0020			BM			
		0.0295	0.0039			BM			
	O.D. 1/3	0.0000	0.0000						
W9 -14	I.D. 1/3	0.0256	0.0492	2.148	0.507	BS, BT	0.37	6.96	29.90
		0.0256	0.0846			BT			
		0.0295	0.0039			BT			
		0.0197	0.0059			BT			
	Mid. 1/3	0.0492	0.0079			BM			
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Sections

Avg. CSR =	0.50	Std. Dev. =	0.07
Avg. CLR =	12.09	Std. Dev. =	1.16
Avg. CTR =	31.68	Std. Dev. =	4.14

2/3 Thickness Averages of All Sections

Avg. CSR =	0.50	Std. Dev. =	0.07
Avg. CLR =	12.09	Std. Dev. =	1.18
Avg. CTR =	31.68	Std. Dev. =	4.24

1/3 Thickness Averages of All Sections

Avg. CSR =	0.48	Std. Dev. =	0.07
Avg. CLR =	9.77	Std. Dev. =	1.25
Avg. CTR =	29.93	Std. Dev. =	4.63

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

Comments 7 Day One-sided Pre-Exposure to TM0177

Material : A516-70 LSCS
Sulfur : 0.007
Condition : As Rolled
Solution : TM0177

Project # : L932343TK
Exposure : 13 Days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 2099
Section # : W9-15,16
File # : W9_15-16.WK4
Date : 10/13/97

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W9 -15	I.D. 1/3	0.0059	0.0020	2.137	0.506	BT	0.24	5.62	18.67
		0.0138	0.0217			BT			
		0.0256	0.0039			BT			
		0.0315	0.0591			BT			
		0.0433	0.0079			BT			
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						
W9 -16	I.D. 1/3	0.0177	0.0020	2.172	0.506	BT	0.21	6.25	4.28
	Mid. 1/3	0.1181	0.0197			BM			
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Sections

Avg. CSR =	0.23	Std. Dev. =	0.06
Avg. CLR =	5.94	Std. Dev. =	1.33
Avg. CTR =	11.48	Std. Dev. =	2.89

2/3 Thickness Averages of All Sections

Avg. CSR =	0.23	Std. Dev. =	0.06
Avg. CLR =	5.94	Std. Dev. =	1.39
Avg. CTR =	11.48	Std. Dev. =	3.03

1/3 Thickness Averages of All Sections

Avg. CSR =	0.12	Std. Dev. =	0.05
Avg. CLR =	3.22	Std. Dev. =	0.66
Avg. CTR =	9.53	Std. Dev. =	3.16

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

Comments

PWHT fillet

Number of cracks in weld area - 0

Total crack thickness in weld area - 0.0000

Material : A516-70 HRS	Project # : L932343TK	CLI # : 3247
Sulfur : 0.001	Exposure : 13 Days	Section # : W9-17,18
Condition : Normalized	pH (INIT) : 2.8	File # : W9_17-18.WK4
Solution : TM0177	pH (FINL) : 3.8	Date : 10/13/97

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W9 -17	I.D. 1/3	0.0000	0.0000	2.492	0.506	****	0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						
W9 -18	I.D. 1/3	0.0394	0.0118	2.495	0.506	BS, BT, BS	0.04	1.58	2.33
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Sections

Avg. CSR =	0.02	Std. Dev. =	0.01
Avg. CLR =	0.79	Std. Dev. =	0.42
Avg. CTR =	1.17	Std. Dev. =	0.62

2/3 Thickness Averages of All Sections

Avg. CSR =	0.02	Std. Dev. =	0.01
Avg. CLR =	0.79	Std. Dev. =	0.45
Avg. CTR =	1.17	Std. Dev. =	0.67

1/3 Thickness Averages of All Sections

Avg. CSR =	0.02	Std. Dev. =	0.01
Avg. CLR =	0.79	Std. Dev. =	0.50
Avg. CTR =	1.17	Std. Dev. =	0.73

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

Comments : **** - No Cracks

Number of cracks in weld area - 0

Total crack thickness in weld area - 0.0000

PWHT fillet

Material : A516-70 HRS
Sulfur : 0.001
Condition : Normalized
Solution : TM0177

Project # : L932343TK
Exposure : 13 Days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 3247
Section # : W9-19,20
File # : W9_19-20.WK4
Date : 10/13/97

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W9 -19	I.D. 1/3	0.0650	0.0236	1.967	0.506	BS, BT	1.20	13.31	21.40
		0.0177	0.0079			BS, BT			
		0.0217	0.0039			BT			
		0.0098	0.0039			BT			
		0.1476	0.0689			BT, BS, BT, BS			
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						
W9 -20	I.D. 1/3	0.1161	0.0295	1.965	0.506	BT	0.52	7.81	15.17
		0.0374	0.0472			BS, BT			
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Sections

Avg. CSR =	0.86	Std. Dev. =	0.24
Avg. CLR =	10.56	Std. Dev. =	2.15
Avg. CTR =	18.28	Std. Dev. =	3.78

2/3 Thickness Averages of All Sections

Avg. CSR =	0.86	Std. Dev. =	0.25
Avg. CLR =	10.56	Std. Dev. =	2.24
Avg. CTR =	18.28	Std. Dev. =	3.94

1/3 Thickness Averages of All Sections

Avg. CSR =	0.86	Std. Dev. =	0.27
Avg. CLR =	10.56	Std. Dev. =	2.33
Avg. CTR =	18.28	Std. Dev. =	4.11

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

Comments : 7 Day One-sided Pre-Exposure to TM0177

Material : A516-70 LSCS
Sulfur : 0.007
Condition : As Rolled
Solution : TM0177

Project # : L932343TK
Exposure : 13 Days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 2099
Section # : W9-21,22
File # : W9_21-22.WK4
Date : 10/13/97

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	Section CSR (%)	Section CLR (%)	Section CTR (%)
W9 -21	I.D. 1/3	0.0650	0.0728	2.090	0.508	BT	5.97	45.68	74.40
		0.0433	0.0413			BT			
		0.0138	0.0039			BT, BM *			
		0.1870	0.0669			BT			
		0.0079	0.0118			BT			
		0.1299	0.0669			BT			
		0.4331	0.0807			BT			
		0.0059	0.0020			BT			
		0.0079	0.0020			BT			
	Mid. 1/3	0.0157	0.0217			BT, BM *			
		0.0276	0.0039			BM			
		0.0177	0.0039			BM			
	O.D. 1/3	0.0000	0.0000						
W9 -22	I.D. 1/3	0.0236	0.0610	2.085	0.508		0.56	12.37	24.80
		0.0689	0.0354						
	Mid. 1/3	0.0433	0.0079						
		0.0059	0.0020						
		0.0217	0.0020						
		0.0945	0.0177						
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Sections

Avg. CSR =	3.27	Std. Dev. =	0.66
Avg. CLR =	29.02	Std. Dev. =	4.21
Avg. CTR =	49.60	Std. Dev. =	5.24

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

2/3 Thickness Averages of All Sections

Avg. CSR =	3.27	Std. Dev. =	0.68
Avg. CLR =	29.02	Std. Dev. =	4.33
Avg. CTR =	49.60	Std. Dev. =	5.33

Comments :
* - Same Crack

1/3 Thickness Averages of All Sections

Avg. CSR =	3.14	Std. Dev. =	0.78
Avg. CLR =	23.60	Std. Dev. =	5.01
Avg. CTR =	43.79	Std. Dev. =	5.98

Material : A516-70 HRS
Sulfur : 0.001
Condition : Normalized
Solution : TM0177

Project # : L932343TK
Exposure : 13 Days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 3247
Section # : W9-23,24
File # : W9_23-24.WK4
Date : 10/13/97

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W9 -23	I.D. 1/3	0.0000	0.0000	2.050	0.507	****	0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						
W9 -24	I.D. 1/3	0.0256	0.0098	2.052	0.507	BS, BT, BS	0.02	1.25	1.94
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Sections

Avg. CSR =	0.01	Std. Dev. =	0.01
Avg. CLR =	0.62	Std. Dev. =	0.33
Avg. CTR =	0.97	Std. Dev. =	0.52

2/3 Thickness Averages of All Sections

Avg. CSR =	0.01	Std. Dev. =	0.01
Avg. CLR =	0.62	Std. Dev. =	0.36
Avg. CTR =	0.97	Std. Dev. =	0.56

1/3 Thickness Averages of All Sections

Avg. CSR =	0.01	Std. Dev. =	0.01
Avg. CLR =	0.62	Std. Dev. =	0.39
Avg. CTR =	0.97	Std. Dev. =	0.61

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

Comments : **** - No Cracks

Material : A516-70 CS
Sulfur : 0.025
Condition : As Rolled
Solution : TM0177

Project # : L932343TK
Exposure : 13 Days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 2289
Section # : W9-25,26
File # : W9_25-26.WK4
Date : 10/13/97

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W9 -25	I.D. 1/3	0.0354	0.0118	1.945	0.518	BS, BT, BS	6.54	115.28	68.78
		0.1850	0.0295			BT			
		0.0354	0.0039			BT			
		0.2067	0.0236			BM, BT, BM, BT *			
		0.1516	0.0610			BT			
		0.0256	0.0374			BS, W, H1, H2			
		0.0846	0.0394			BS, BT			
		0.0433	0.0157			BS, BT, BS			
		0.2618	0.0354			BS, BT			
		0.0335	0.0020			BT			
	Mid. 1/3	0.2992	0.0374			BM, BT, BM, BT *			
		0.1772	0.0256			BM			
		0.1299	0.0079			BM			
		0.5728	0.0256			BM			
	O.D. 1/3	0.0000	0.0000						
W9 -26	I.D. 1/3	0.0256	0.0059	1.945	0.518	BT	1.44	41.80	46.74
		0.1024	0.0394			BT, BS			
		0.0374	0.0079			BT			
		0.0650	0.0098			BT			
		0.0591	0.0256			BT			
		0.0531	0.0413			W, H1			
		0.0335	0.0315			BT			
		0.0079	0.0020			BT			
		0.0472	0.0177			BS, BT, BS			
		0.0256	0.0138			BS, BT			
	Mid. 1/3	0.0197	0.0020			BM			
		0.0748	0.0118			BM			
		0.0394	0.0079			BM			
		0.0335	0.0020			BM			
		0.0689	0.0138			BM			
		0.1201	0.0098			BM			
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Sections

Avg. CSR =	3.99	Std. Dev. =	0.34
Avg. CLR =	78.54	Std. Dev. =	5.60
Avg. CTR =	57.76	Std. Dev. =	3.01

2/3 Thickness Averages of All Sections

Avg. CSR =	3.99	Std. Dev. =	0.35
Avg. CLR =	78.54	Std. Dev. =	5.67
Avg. CTR =	57.76	Std. Dev. =	3.00

1/3 Thickness Averages of All Sections

Avg. CSR =	2.26	Std. Dev. =	0.26
Avg. CLR =	39.07	Std. Dev. =	3.48
Avg. CTR =	43.89	Std. Dev. =	3.26

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

Comments :

Number of cracks in weld area - 2

Total crack thickness in weld area - 0.0787

* - Same crack

Material : A516-70 CS
Sulfur : 0.025
Condition : As Rolled
Solution : TM0177

Project # : L932343TK
Exposure : 13 Days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 2289
Section # : W9- 27,28
File # : W9_27-28.WK4
Date : 10/13/97

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W9 -27	I.D. 1/3	0.2756	0.0945	2.075	0.517	BT, BM, BT *	5.11	39.09	47.98
		0.1240	0.0787			BT, H2			
		0.3307	0.0551			BT			
		0.0118	0.0098			W, H1			
	Mid. 1/3	0.0689	0.0098			BT, BM, BT *			
	O.D. 1/3	0.0000	0.0000						
W9 -28	I.D. 1/3	0.2500	0.0433	2.067	0.516	BS, BT, BS	3.12	62.85	33.95
		0.0571	0.0374			BT, BS			
		0.0394	0.0276			W			
		0.0650	0.0236			BT			
	Mid. 1/3	0.0689	0.0079			BM			
		0.2441	0.0098			BM			
		0.5748	0.0256			BM			
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Sections

Avg. CSR =	4.11	Std. Dev. =	0.67
Avg. CLR =	50.97	Std. Dev. =	7.15
Avg. CTR =	40.96	Std. Dev. =	5.21

2/3 Thickness Averages of All Sections

Avg. CSR =	4.11	Std. Dev. =	0.69
Avg. CLR =	50.97	Std. Dev. =	7.33
Avg. CTR =	40.96	Std. Dev. =	5.31

1/3 Thickness Averages of All Sections

Avg. CSR =	3.25	Std. Dev. =	0.73
Avg. CLR =	27.83	Std. Dev. =	5.34
Avg. CTR =	35.82	Std. Dev. =	5.85

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

Comments : PWHT fillet

Number of cracks in weld area - 2

Total crack thickness in weld area - 0.0374

* - Same Crack

Material : A841 AS	Project # : L932343TK	CLI # : 3250
Sulfur : 0.001	Exposure : 13 Days	Section # : W9-29A,30A
Condition : TMCP	pH (INIT) : 2.8	File # : W9_29-30A.WK4
Solution : TM0177	pH (FINL) : 3.8	Date : 10/13/97

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W9 -29A	I.D. 1/3	0.0000	0.0000	1.142	0.489	*****	0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						
W9 -30A	I.D. 1/3	0.0000	0.0000	1.142	0.488	*****	0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

2/3 Thickness Averages of All Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

1/3 Thickness Averages of All Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

Comments : **** - No Cracks

Number of cracks in weld area - 0

Total crack thickness in weld area - 0.000

E7016 G welding material

Material : A841 AS	Project # : L932343TK	CLI # : 3250
Sulfur : 0.001	Exposure : 13 Days	Section # : W9-29B,30B
Condition : TMCP	pH (INIT) : 2.8	File # : W929-30B.WK4
Solution : TM0177	pH (FINL) : 3.8	Date : 10/13/97

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W9 -29B	I.D. 1/3	0.0000	0.0000	1.142	0.489	****	0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						
W9 -30B	I.D. 1/3	0.0000	0.0000	1.142	0.488	****	0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

2/3 Thickness Averages of All Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

1/3 Thickness Averages of All Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

Comments : **** - No Cracks

Number of cracks in weld area - 1

Total crack thickness in weld area - 0.000

E7018 welding material

Material : A841 AS
Sulfur : 0.001
Condition : TMCP
Solution : TM0177

Project # : L932343TK
Exposure : 13 Days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 3250
Section # : W9-31,32
File # : W9_31-32.WK4
Date : 10/13/97

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W9 -31	I.D. 1/3	0.0000	0.0000	2.060	0.485	****	0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						
W9 -32	I.D. 1/3	0.0000	0.0000	2.034	0.485	****	0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

2/3 Thickness Averages of All Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

1/3 Thickness Averages of All Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

Comments : **** - No Cracks

Number of cracks in weld area - 0

Total crack thickness in weld area - 0.0000

Material : A516-70 CS
Sulfur : 0.025
Condition : As Rolled
Solution : TM0177

Project # : L932343TK
Exposure : 13 Days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 2289
Section # : W9-33,34
File # : W9_33-34.WK4
Date : 10/13/97

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W9 -33	I.D. 1/3	0.0453	0.0020	2.087	0.602	BT	4.55	78.48	34.66
		0.0512	0.0157			BS, BT, BS			
		0.2539	0.0650			BS, BT			
		0.0157	0.0157			BT			
		0.0335	0.0020			BT			
		0.3189	0.0118			BT			
		0.2087	0.0256			BT			
	Mid. 1/3	0.4843	0.0610			BM			
		0.0551	0.0039			BM			
		0.0433	0.0020			BM			
		0.1280	0.0039			BM			
	O.D. 1/3	0.0000	0.0000						
W9 -34	I.D. 1/3	0.0217	0.0059	2.087	0.610	BM, BT BM *	6.08	113.85	96.49
		0.1870	0.0098			BT			
		0.1870	0.0689			BT, BS			
		0.0098	0.0020			BT			
		0.1220	0.0118			BT			
		0.0787	0.0157			BT			
		0.0295	0.0020			BT			
		0.0217	0.0236			BS, H1			
		0.0591	0.0335			H1, W			
		0.0335	0.0354			H2, H1, W, BS			
		0.0650	0.0039			BT			
		0.1594	0.0492			BT, BS, BT			
		0.2264	0.0098			BT			
		0.0118	0.0020			BT			
		0.0787	0.0236			BT			
		0.0807	0.0256			BS, BT, BS			
		0.0787	0.0315			BT			
		0.1063	0.0394			BS, BT, BS			
		0.2461	0.0354			BT			
		0.0531	0.0295			BT			
	Mid. 1/3	0.1476	0.0177			BM, BT, BM *			
		0.1378	0.0413			BM			
		0.2343	0.0709			BM			
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Sections

Avg. CSR =	5.32	Std. Dev. =	0.46
Avg. CLR =	96.16	Std. Dev. =	4.98
Avg. CTR =	65.58	Std. Dev. =	3.38

2/3 Thickness Averages of All Sections

Avg. CSR =	5.32	Std. Dev. =	0.47
Avg. CLR =	96.16	Std. Dev. =	5.00
Avg. CTR =	65.58	Std. Dev. =	3.40

1/3 Thickness Averages of All Sections

Avg. CSR =	3.13	Std. Dev. =	0.30
Avg. CLR =	66.69	Std. Dev. =	4.19
Avg. CTR =	49.04	Std. Dev. =	3.05

Crack Location Codes

B - Base Metal
W - Weld Metal
H1 - Heat Affected Zone 1
H2 - Heat Affected Zone 2
S - Surface
T - ID 1/3
M - Middle 1/3
C - OD 1/3

Comments :

Number of cracks in weld area - 3

Total crack thickness in weld area - 0.0925

* - Same Crack

Material : A516-70 CS
Sulfur : 0.007
Condition : As Rolled
Solution : TM0177

Project # : L932343TK
Exposure : 13 Days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 2289
Section # : W9-35,36
File # : W9_35-36.WK4
Date : 10/13/97

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	Crack Area AxB	CSR (%)	Section CLR (%)	CTR (%)
W9 -35	I.D. 1/3	0.0236	0.0059	2.115	0.515	BS, BT, BS	0.000140	7.13	67.94	64.60
		0.0394	0.0256			BS, BT, BS	0.001008			
		0.2205	0.0217			BT	0.004774			
		0.0020	0.0177			BS, H1	0.000035			
		0.2126	0.0591			BT	0.012555			
		0.1614	0.0256			BT, BM, BT *	0.004131			
		0.4449	0.1083			BT, BS	0.048166			
		0.0571	0.0236			BT	0.001349			
	Mid. 1/3	0.0138	0.0098			BT, BM, BT *	0.000136			
		0.1614	0.0295			BM	0.004766			
		0.1004	0.0059			BM	0.000593			
	O.D. 1/3	0.0000	0.0000				0.000000			
W9 -36	I.D. 1/3	0.1594	0.0394	2.135	0.517	BT	0.006278	9.12	112.67	107.37
		0.2067	0.0295			BT	0.006103			
		0.1890	0.0492			BT	0.009300			
		0.3445	0.0571			BM, BT, BM **	0.019666			
		0.0531	0.0276			BS, BT, BS	0.001465			
		0.1496	0.0295			BT	0.004418			
		0.0846	0.0413			BS, BT, BS	0.003499			
		0.0177	0.0020			BT	0.000035			
		0.2087	0.0492			BT	0.010269			
		0.1516	0.0413			BT	0.006266			
		0.0059	0.0157			BS, H1	0.000093			
		0.2854	0.0787			BS, BT, BS	0.022475			
		0.0827	0.0394			BT, BS	0.003255			
		0.0591	0.0276			BT	0.001628			
	Mid. 1/3	0.2303	0.0197			BM, BT, BM **	0.004534			
		0.1772	0.0079			BM	0.001395			
	O.D. 1/3	0.0000	0.0000				0.000000			

Full Thickness Averages of All Sections

Avg. CSR =	8.12	Std. Dev. =	0.83
Avg. CLR =	90.31	Std. Dev. =	5.27
Avg. CTR =	85.99	Std. Dev. =	4.78

2/3 Thickness Averages of All Sections

Avg. CSR =	8.12	Std. Dev. =	0.84
Avg. CLR =	90.31	Std. Dev. =	5.27
Avg. CTR =	85.99	Std. Dev. =	4.77

1/3 Thickness Averages of All Sections

Avg. CSR =	7.60	Std. Dev. =	0.90
Avg. CLR =	74.25	Std. Dev. =	5.50
Avg. CTR =	78.92	Std. Dev. =	5.01

Crack Location Codes

B - Base Metal
W - Weld Metal
H1 - Heat Affected Zone 1
H2 - Heat Affected Zone 2

S - Surface
T - ID 1/3
M - Middle 1/3
C - OD 1/3

Comments :

Number of cracks in arc strike area - 2

Total crack thickness in arc strike area - 0.0334

*, ** - Same Crack

Material : A841 AS
Sulfur : 0.001
Condition : TMCP
Solution : TM0177

Project # : L932343TK
Exposure : 13 Days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 3250
Section # : W9-37,38
File # : W9_37-38.WK4
Date : 10/13/97

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	Crack Area AxB	Section CSR (%)	Section CLR (%)	Section CTR (%)
W9 -37	I.D. 1/3	0.0059	0.0197	1.889	0.486	BS, H1, H2, BT	0.000116	0.02	0.42	10.53
		0.0020	0.0315			BS, H1, H2, BT	0.000062			
	Mid. 1/3	0.0000	0.0000				0.000000			
	O.D. 1/3	0.0000	0.0000				0.000000			
W9 -38	I.D. 1/3	0.0000	0.0000	1.892	0.487	****	0.000000	0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000				0.000000			
	O.D. 1/3	0.0000	0.0000				0.000000			

Full Thickness Averages of All Sections

Avg. CSR =	0.01	Std. Dev. =	0.00
Avg. CLR =	0.21	Std. Dev. =	0.08
Avg. CTR =	5.27	Std. Dev. =	1.90

2/3 Thickness Averages of All Sections

Avg. CSR =	0.01	Std. Dev. =	0.00
Avg. CLR =	0.21	Std. Dev. =	0.09
Avg. CTR =	5.27	Std. Dev. =	2.02

1/3 Thickness Averages of All Sections

Avg. CSR =	0.01	Std. Dev. =	0.00
Avg. CLR =	0.21	Std. Dev. =	0.10
Avg. CTR =	5.27	Std. Dev. =	2.18

Crack Location Codes

B - Base Metal
W - Weld Metal
H1 - Heat Affected Zone 1
H2 - Heat Affected Zone 2
S - Surface
T - ID 1/3
M - Middle 1/3
C - OD 1/3

Comments : **** - No Cracks

Number of cracks in weld area - 2

Total crack thickness in weld area - 0.0512

Material : A841 AS
Sulfur : 0.001
Condition : TMCP
Solution : TM0177

Project # : L932343TK
Exposure : 13 Days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 3250
Section # : W9-39,40
File # : W9_39-40.WK4
Date : 10/13/97

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	Crack Area AxB	Section CSR (%)	Section CLR (%)	Section CTR (%)
W9 -39	I.D. 1/3	0.0000	0.0000	1.985	0.516	****	0.000000	0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000				0.000000			
	O.D. 1/3	0.0000	0.0000				0.000000			
W9 -40	I.D. 1/3	0.0906	0.0354	2.044	0.570	BS, BT, BS	0.003209	0.28	4.43	6.22
	Mid. 1/3	0.0000	0.0000				0.000000			
	O.D. 1/3	0.0000	0.0000				0.000000			

Full Thickness Averages of All Sections

Avg. CSR =	0.14	Std. Dev. =	0.07
Avg. CLR =	2.22	Std. Dev. =	1.18
Avg. CTR =	3.11	Std. Dev. =	1.66

2/3 Thickness Averages of All Sections

Avg. CSR =	0.14	Std. Dev. =	0.08
Avg. CLR =	2.22	Std. Dev. =	1.27
Avg. CTR =	3.11	Std. Dev. =	1.79

1/3 Thickness Averages of All Sections

Avg. CSR =	0.14	Std. Dev. =	0.09
Avg. CLR =	2.22	Std. Dev. =	1.39
Avg. CTR =	3.11	Std. Dev. =	1.95

Crack Location Codes

B - Base Metal
W - Weld Metal
H1 - Heat Affected Zone 1
H2 - Heat Affected Zone 2

S - Surface
T - ID 1/3
M - Middle 1/3
C - OD 1/3

Comments : **** - No Cracks

Number of cracks in weld area - 0

Total crack thickness in weld area - 0.0000

Material : A516-70 CS
Sulfur : 0.007
Condition : As Rolled
Solution : TM0177

Project # : L932343TK
Exposure : 13 Days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 2289
Section # : W9-41,42
File # : W9_41-42.WK4
Date : 10/13/97

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	Crack Area AxB	CSR (%)	Section CLR (%)	CTR (%)
W9 -41	I.D. 1/3	0.0433	0.0039	2.235	0.607	BT	0.000171	4.09	93.01	44.43
		0.1516	0.0354			BT	0.005371			
		0.0591	0.0059			BT	0.000349			
		0.0492	0.0039			BT	0.000194			
		0.0138	0.0039			BT	0.000054			
		0.1594	0.0295			BT, BS	0.004708			
		0.1102	0.0413			BS, BT, BS	0.004557			
		0.0787	0.0276			BT	0.002170			
		0.0906	0.0512			BT, BS	0.004635			
		0.0276	0.0059			BM, BT, BM *	0.000163			
	Mid. 1/3	0.3543	0.0138			BM, BT, BM *	0.004883			
		0.7579	0.0354			BM	0.026854			
		0.1535	0.0079			BM	0.001209			
		0.0295	0.0039			BM	0.000116			
	O.D. 1/3	0.0000	0.0000				0.000000			
W9 -42	I.D. 1/3	0.0413	0.0177	2.215	0.607	BS, BT, BS	0.000732	4.13	47.81	33.08
		0.0276	0.0020			BT	0.000054			
		0.0098	0.0039			BT	0.000039			
		0.1594	0.0531			BS, BT, BS	0.008475			
		0.3799	0.0827			BT, BS	0.031411			
	Mid. 1/3	0.0492	0.0039			BM	0.000194			
		0.3917	0.0374			BM	0.014651			
	O.D. 1/3	0.0000	0.0000				0.000000			

Full Thickness Averages of All Sections

Avg. CSR =	4.11	Std. Dev. =	0.56
Avg. CLR =	70.41	Std. Dev. =	7.35
Avg. CTR =	38.75	Std. Dev. =	3.41

2/3 Thickness Averages of All Sections

Avg. CSR =	4.11	Std. Dev. =	0.57
Avg. CLR =	70.41	Std. Dev. =	7.50
Avg. CTR =	38.75	Std. Dev. =	3.46

1/3 Thickness Averages of All Sections

Avg. CSR =	2.34	Std. Dev. =	0.49
Avg. CLR =	31.48	Std. Dev. =	3.89
Avg. CTR =	30.32	Std. Dev. =	3.71

Crack Location Codes

B - Base Metal
W - Weld Metal
H1 - Heat Affected Zone 1
H2 - Heat Affected Zone 2

S - Surface
T - ID 1/3
M - Middle 1/3
C - OD 1/3

Comments :

Number of cracks in arc strike area - 0

Total crack thickness in arc strike area - 0.0000

* - Same Crack

Material : A516-70 CS
Sulfur : 0.007
Condition : As Rolled
Solution : TM0177

Project # : L932343TK
Exposure : 13 Days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 2289
Section # : W9-43,44
File # : W9_43-44.WK4
Date : 10/13/97

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	Crack Area AxB	CSR (%)	Section CLR (%)	CTR (%)
W9 -43	I.D. 1/3	0.0512	0.0039	2.174	0.513	BT	0.000202	2.71	42.56	26.48
		0.0236	0.0098			BS, BT	0.000233			
		0.0217	0.0039			BT	0.000085			
		0.0315	0.0394			BS, H1, H2	0.001240			
		0.0098	0.0098			BT	0.000097			
		0.0138	0.0020			BS, H1	0.000027			
		0.0197	0.0059			BM, BT, BM *	0.000116			
	Mid. 1/3	0.5335	0.0512			BM, BT, BM *	0.027303			
		0.1299	0.0059			BM	0.000767			
		0.0689	0.0020			BM	0.000136			
		0.0217	0.0020			BM	0.000043			
	O.D. 1/3	0.0000	0.0000				0.000000			
W9 -44	I.D. 1/3	0.0059	0.0217	2.174	0.513	BS, H1, H2	0.000128	0.35	9.51	8.83
		0.1713	0.0217			BT	0.003708			
	Mid. 1/3	0.0295	0.0020			BM	0.000058			
	O.D. 1/3	0.0000	0.0000				0.000000			

Full Thickness Averages of All Sections

Avg. CSR =	1.53	Std. Dev. =	0.50
Avg. CLR =	26.03	Std. Dev. =	5.13
Avg. CTR =	17.65	Std. Dev. =	2.57

2/3 Thickness Averages of All Sections

Avg. CSR =	1.53	Std. Dev. =	0.52
Avg. CLR =	26.03	Std. Dev. =	5.32
Avg. CTR =	17.65	Std. Dev. =	2.64

1/3 Thickness Averages of All Sections

Avg. CSR =	0.26	Std. Dev. =	0.08
Avg. CLR =	8.01	Std. Dev. =	1.89
Avg. CTR =	11.51	Std. Dev. =	2.11

Crack Location Codes

B - Base Metal
W - Weld Metal
H1 - Heat Affected Zone 1
H2 - Heat Affected Zone 2
S - Surface
T - ID 1/3
M - Middle 1/3
C - OD 1/3

Comments :

Number of cracks in weld area - 3

Total crack thickness in weld area - 0.0631

* - Same Crack

Material : A841 AS
Sulfur : 0.001
Condition : TMCP
Solution : TM0177

Project # : L932343TK
Exposure : 13 Days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 3250
Section # : W9-45A,46A
File # : W945-46A.WK4
Date : 10/13/97

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W9 -45A	I.D. 1/3	0.0394	0.0374	2.225	0.485	BS, BT, BS	0.14	1.77	7.71
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						
W9 -46A	I.D. 1/3	0.0000	0.0000	2.225	0.485	****	0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Sections

Avg. CSR =	0.07	Std. Dev. =	0.04
Avg. CLR =	0.88	Std. Dev. =	0.47
Avg. CTR =	3.86	Std. Dev. =	2.05

2/3 Thickness Averages of All Sections

Avg. CSR =	0.07	Std. Dev. =	0.04
Avg. CLR =	0.88	Std. Dev. =	0.51
Avg. CTR =	3.86	Std. Dev. =	2.22

1/3 Thickness Averages of All Sections

Avg. CSR =	0.07	Std. Dev. =	0.04
Avg. CLR =	0.88	Std. Dev. =	0.56
Avg. CTR =	3.86	Std. Dev. =	2.42

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

Comments : **** - No Cracks

Number of cracks in weld area - 0

Total crack thickness in weld area - 0.0000

E1760 G wedling material

Material : A841 AS
Sulfur : 0.001
Condition : TMCP
Solution : TM0177

Project # : L932343TK
Exposure : 13 Days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 3250
Section # : W9-45B,46B
File # : W945-46B.WK4
Date : 10/13/97

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W9 -45B	I.D. 1/3	0.0000	0.0000	2.225	0.485	****	0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						
W9 -46B	I.D. 1/3	0.0000	0.0000	2.225	0.485	****	0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

2/3 Thickness Averages of All Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

1/3 Thickness Averages of All Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

Comments : **** - No Cracks

Number of cracks in weld area - 0

Total crack thickness in weld area - 0.0000

E1780 welding material

Material : A841 AS
Sulfur : 0.001
Condition : TMCP
Solution : TM0177

Project # : L932343TK
Exposure : 13 Days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 3250
Section # : W9-47,48
File # : W9_47-48.WK4
Date : 10/13/97

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W9 -47	I.D. 1/3	0.0039	0.0335	2.208	0.568	H1, H2, BT	0.01	0.18	5.89
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						
W9 -48	I.D. 1/3	0.0000	0.0000	2.208	0.568	****	0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000						
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Sections

Avg. CSR =	0.01	Std. Dev. =	0.00
Avg. CLR =	0.09	Std. Dev. =	0.05
Avg. CTR =	2.95	Std. Dev. =	1.57

2/3 Thickness Averages of All Sections

Avg. CSR =	0.01	Std. Dev. =	0.00
Avg. CLR =	0.09	Std. Dev. =	0.05
Avg. CTR =	2.95	Std. Dev. =	1.69

1/3 Thickness Averages of All Sections

Avg. CSR =	0.01	Std. Dev. =	0.00
Avg. CLR =	0.09	Std. Dev. =	0.06
Avg. CTR =	2.95	Std. Dev. =	1.85

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

Comments : **** - No Cracks

Number of cracks in arc strike area - 1

Total crack thickness in arc strike area - 0.0335

Material : A516-70 CS
Sulfur : 0.007
Condition : As Rolled
Solution : TM0177

Project # : L932343TK
Exposure : 13 Days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 2289
Section # : W9-49,50
File # : W9_49-50.WK4
Date : 10/13/97

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W9 -49	I.D. 1/3	0.0768	0.0197	2.365	0.517	BT	5.65	80.24	82.62
		0.0217	0.0020			BT			
		0.2382	0.0807			BT, BS			
		0.0433	0.0315			BT			
		0.2185	0.0807			BS, BT, BS			
		0.0433	0.0039			BT			
		0.0256	0.0039			BT			
		0.0512	0.0236			BS, BT, BS			
		0.2992	0.0472			BT			
		0.1122	0.0394			BT, BS			
		0.0217	0.0020			BT			
		0.0886	0.0433			BT			
	Mid. 1/3	0.1969	0.0079			BM			
		0.1181	0.0020			BM			
		0.0906	0.0079			BM			
		0.0472	0.0039			BM			
		0.0177	0.0020			BM			
		0.0276	0.0020			BM			
		0.0197	0.0020			BM			
		0.1280	0.0197			BM			
		0.0118	0.0020			BM			
	O.D. 1/3	0.0000	0.0000						
W9 -50	I.D. 1/3	0.0512	0.0020	2.365	0.517	BT	4.67	76.74	65.49
		0.2067	0.0197			BT			
		0.0118	0.0020			BT			
		0.0335	0.0177			BT, BS			
		0.0059	0.0020			BT			
		0.3386	0.0787			BT			
		0.0138	0.0020			BT			
		0.1102	0.0098			BT			
		0.0354	0.0020			BT			
		0.0591	0.0256			BS, BT, BS			
		0.0610	0.0354			BS, BT			
		0.0315	0.0039			BT			
		0.1831	0.0197			BT			
		0.0433	0.0039			BT, BS			
		0.1535	0.0472			BS, BT, BS			
		0.1594	0.0394			BS, BT			
	Mid. 1/3	0.1378	0.0098			BM			
		0.1299	0.0138			BM			
		0.0492	0.0039			BM			
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Sections

Avg. CSR =	5.16	Std. Dev. =	0.45
Avg. CLR =	78.49	Std. Dev. =	3.49
Avg. CTR =	74.06	Std. Dev. =	4.16

2/3 Thickness Averages of All Sections

Avg. CSR =	5.16	Std. Dev. =	0.45
Avg. CLR =	78.49	Std. Dev. =	3.50
Avg. CTR =	74.06	Std. Dev. =	4.20

1/3 Thickness Averages of All Sections

Avg. CSR =	4.80	Std. Dev. =	0.51
Avg. CLR =	57.89	Std. Dev. =	3.79
Avg. CTR =	66.63	Std. Dev. =	4.65

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

Comments :

Material : A841
Sulfur : 0.001
Condition : TMCP
Solution : TM0177

Project # : L932343TK
Exposure : 13 Days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 3250
Section # : W9-51,52
File # : W9_51-52.WK4
Date : 10/13/97

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	Crack Area AxB	CSR (%)	Section CLR (%)	CTR (%)
W9 -51	I.D. 1/3	0.0000	0.0000	2.092	0.490	****	0.000000	0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000				0.000000			
	O.D. 1/3	0.0000	0.0000				0.000000			
W9 -52	I.D. 1/3	0.0000	0.0000	2.092	0.490	****	0.000000	0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000				0.000000			
	O.D. 1/3	0.0000	0.0000				0.000000			

Full Thickness Averages of All Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

2/3 Thickness Averages of All Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

1/3 Thickness Averages of All Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

Crack Location Codes

B - Base Metal
W - Weld Metal
H1 - Heat Affected Zone 1
H2 - Heat Affected Zone 2

S - Surface
T - ID 1/3
M - Middle 1/3
C - OD 1/3

Comments : **** - No Cracks

Material : A516-70 CS
Sulfur : 0.007
Condition : As Rolled
Solution : TM0177

Project # : L932343TK
Exposure : 13 Days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 2289
Section # : W9-53A,54A
File # : W95354A.WK4
Date : 10/13/97

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	Crack Area AxB	CSR (%)	Section CLR (%)	CTR (%)
W9 -53A	I.D. 1/3	0.0512	0.0335	1.020	0.517	BT,BS	0.001713	8.77	125.06	44.55
		0.2953	0.0945			BT	0.027900			
		0.0492	0.0098			BM,BT,BM BT,BM*	0.000484			
		0.0157	0.0020			BT	0.000031			
	Mid. 1/3	0.3327	0.0295			BM,BT,BM BT,BM*	0.009823			
		0.0394	0.0157			BM	0.000620			
		0.1142	0.0098			BM	0.001124			
		0.1614	0.0079			BM	0.001271			
		0.0689	0.0098			BM	0.000678			
		0.1476	0.0177			BM	0.002616			
	O.D. 1/3	0.0000	0.0000				0.000000			
W9 -54A	I.D. 1/3	0.0965	0.0394	1.040	0.517	BT, BS	0.003798	6.40	114.51	37.31
		0.1417	0.0197			BT	0.002790			
		0.1969	0.0197			BT	0.003875			
		0.4350	0.0295			BT	0.012846			
		0.1535	0.0630			BT, BS	0.009672			
	Mid. 1/3	0.1043	0.0098			BM	0.001027			
		0.0453	0.0079			BM	0.000357			
		0.0177	0.0039			BM	0.000070			
	O.D. 1/3	0.0000	0.0000				0.000000			

Full Thickness Averages of All Sections

Avg. CSR =	7.59	Std. Dev. =	1.12
Avg. CLR =	119.79	Std. Dev. =	10.99
Avg. CTR =	40.93	Std. Dev. =	4.17

2/3 Thickness Averages of All Sections

Avg. CSR =	7.59	Std. Dev. =	1.15
Avg. CLR =	119.79	Std. Dev. =	11.12
Avg. CTR =	40.93	Std. Dev. =	4.24

1/3 Thickness Averages of All Sections

Avg. CSR =	5.92	Std. Dev. =	1.36
Avg. CLR =	69.38	Std. Dev. =	12.12
Avg. CTR =	30.08	Std. Dev. =	5.13

Crack Location Codes

B - Base Metal
W - Weld Metal
H1 - Heat Affected Zone 1
H2 - Heat Affected Zone 2
S - Surface
T - ID 1/3
M - Middle 1/3
C - OD 1/3

Comments :

Number of cracks in weld area - 0

Total crack thickness in weld area - 0.0000

* - Same Crack

Material : A516-70 LSCS
Sulfur : 0.001
Condition : Normalized
Solution : TM0177

Project # : L932343TK
Exposure : 13 Days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 2099
Section # : W9-53B,54B
File # : W953-54B.WK4
Date : 10/13/97

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	Crack Area AxB	CSR (%)	Section CLR (%)	CTR (%)
W9 -53B	I.D. 1/3	0.0000	0.0000	1.020	0.517		0.000000	0.06	2.89	1.90
	Mid. 1/3	0.0295	0.0098			BM	0.000291			
	O.D. 1/3	0.0000	0.0000				0.000000			
W9 -54B	I.D. 1/3	0.0000	0.0000	1.040	0.517		0.000000	0.11	6.62	3.05
	Mid. 1/3	0.0413	0.0098			W	0.000407			
		0.0276	0.0059			BM	0.000163			
	O.D. 1/3	0.0000	0.0000				0.000000			

Full Thickness Averages of All Sections

Avg. CSR =	0.08	Std. Dev. =	0.02
Avg. CLR =	4.76	Std. Dev. =	1.33
Avg. CTR =	2.47	Std. Dev. =	0.70

2/3 Thickness Averages of All Sections

Avg. CSR =	0.08	Std. Dev. =	0.03
Avg. CLR =	4.76	Std. Dev. =	1.40
Avg. CTR =	2.47	Std. Dev. =	0.74

1/3 Thickness Averages of All Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

Crack Location Codes

B - Base Metal
W - Weld Metal
H1 - Heat Affected Zone 1
H2 - Heat Affected Zone 2

S - Surface
T - ID 1/3
M - Middle 1/3
C - OD 1/3

Comments :

Number of cracks in weld area - 1

Total crack thickness in weld area - 0.0098

Material : A516-70 CS
Sulfur : 0.007
Condition : As Rolled
Solution : TM0177

Project # : L932343TK
Exposure : 13 Days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 2289
Section # : W9-55A,56A
File # : W955-56A.WK4
Date : 10/13/97

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	Section CSR (%)	Section CLR (%)	Section CTR (%)
W9 -55A	I.D. 1/3	0.0236	0.0079	1.015	0.507	BT	4.33	103.56	38.83
		0.0394	0.0079			BT			
		0.0472	0.0059			BT			
		0.1358	0.0374			BT			
		0.0472	0.0059			BT			
		0.1161	0.0197			BM, BT, BM *			
		0.1339	0.0236			BT, BS			
		0.0906	0.0197			BT, BS			
	Mid. 1/3	0.0512	0.0157			BM, BT, BM *			
		0.0335	0.0039			BM			
		0.2736	0.0236			BM, H2, H1			
		0.0591	0.0256			BM, H2, H1,BS			
	O.D. 1/3	0.0000	0.0000						
W9 -56A	I.D. 1/3	0.1988	0.0512	1.174	0.507	BS, BT	9.13	100.60	50.09
		0.3307	0.0591			BT			
		0.1969	0.0866			BT			
	Mid. 1/3	0.0827	0.0098			BM			
		0.0571	0.0059			BM			
		0.2067	0.0197			BM, H2, H1			
		0.1083	0.0217			BM, H2, H1,BS			
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Sections

Avg. CSR =	6.73	Std. Dev. =	0.94
Avg. CLR =	102.08	Std. Dev. =	8.50
Avg. CTR =	44.46	Std. Dev. =	4.04

2/3 Thickness Averages of All Sections

Avg. CSR =	6.73	Std. Dev. =	0.97
Avg. CLR =	102.08	Std. Dev. =	8.55
Avg. CTR =	44.46	Std. Dev. =	4.09

1/3 Thickness Averages of All Sections

Avg. CSR =	5.23	Std. Dev. =	1.12
Avg. CLR =	62.16	Std. Dev. =	8.80
Avg. CTR =	32.03	Std. Dev. =	4.80

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

Comments :

Number of cracks in weld area - 4

Total crack thickness in weld area - 0.0906

* - Same Crack

Material : A516-70 LSCS
Sulfur : 0.001
Condition : As Rolled
Solution : TM0177

Project # : L932343TK
Exposure : 13 Days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 2099
Section # : W9-55B,56B
File # : W955-56B.WK4
Date : 10/13/97

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	Section CSR (%)	Section CLR (%)	Section CTR (%)
W9 -55B	I.D. 1/3	0.0000	0.0000	1.015	0.507		3.60	39.37	17.86
	Mid. 1/3	0.2854	0.0512			BM			
		0.0098	0.0020			BM			
		0.1043	0.0374			BM			
	O.D. 1/3	0.0000	0.0000						
W9 -56B	I.D. 1/3	0.0000	0.0000	1.174	0.517		0.98	13.58	7.23
	Mid. 1/3	0.1594	0.0374			BM			
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Sections

Avg. CSR =	2.29	Std. Dev. =	0.74
Avg. CLR =	26.48	Std. Dev. =	7.72
Avg. CTR =	12.55	Std. Dev. =	3.33

2/3 Thickness Averages of All Sections

Avg. CSR =	2.29	Std. Dev. =	0.78
Avg. CLR =	26.48	Std. Dev. =	8.16
Avg. CTR =	12.55	Std. Dev. =	3.51

1/3 Thickness Averages of All Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

Crack Location Codes

B - Base Metal
W - Weld Metal
H1 - Heat Affected Zone 1
H2 - Heat Affected Zone 2
S - Surface
T - ID 1/3
M - Middle 1/3
C - OD 1/3

Comments :

Number of cracks in weld area - 0

Total crack thickness in weld area - 0.0000

Material : A516-70 CS
Sulfur : 0.007
Condition : As Rolled
Solution : TM0177

Project # : L932343TK
Exposure : 13 Days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 2289
Section # : W9-57A,58A
File # : W957-58A.WK4
Date : 10/13/97

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	Crack Area AxB	CSR (%)	Section CLR (%)	CTR (%)
W9 -57A	I.D. 1/3	0.1535	0.0276	1.150	0.516	BT	0.004232	12.66	128.21	35.86
		0.7008	0.0906			BT, H2, H1	0.063457			
		0.0965	0.0197			BT, H2, H1	0.001899			
	Mid. 1/3	0.0984	0.0020			BM	0.000194			
		0.0551	0.0138			BM	0.000760			
		0.2264	0.0157			BM	0.003565			
		0.0610	0.0138			BM	0.000841			
		0.0827	0.0020			BM	0.000163			
	O.D. 1/3	0.0000	0.0000				0.000000			
W9 -58A	I.D. 1/3	0.1969	0.0354	1.150	0.516	BS, BT	0.006975	6.68	92.61	32.81
		0.3366	0.0630			BT	0.021204			
		0.0866	0.0315			BT	0.002728			
		0.2441	0.0335			BT, H2, H1, W	0.008169			
	Mid. 1/3	0.0886	0.0039			BM	0.000349			
		0.1122	0.0020			BM, H2, H1	0.000221			
	O.D. 1/3	0.0000	0.0000				0.000000			

Full Thickness Averages of All Sections

Avg. CSR =	9.67	Std. Dev. =	2.24
Avg. CLR =	110.41	Std. Dev. =	13.54
Avg. CTR =	34.33	Std. Dev. =	4.40

2/3 Thickness Averages of All Sections

Avg. CSR =	9.67	Std. Dev. =	2.33
Avg. CLR =	110.41	Std. Dev. =	13.83
Avg. CTR =	34.33	Std. Dev. =	4.51

1/3 Thickness Averages of All Sections

Avg. CSR =	9.16	Std. Dev. =	2.77
Avg. CLR =	78.91	Std. Dev. =	16.56
Avg. CTR =	29.18	Std. Dev. =	5.23

Crack Location Codes

B - Base Metal
W - Weld Metal
H1 - Heat Affected Zone 1
H2 - Heat Affected Zone 2
S - Surface
T - ID 1/3
M - Middle 1/3
C - OD 1/3

Comments :

Number of cracks in weld area - 4

Total crack thickness in weld area - 0.1458

Material : A516-70 LSCS
Sulfur : 0.001
Condition : Normalized
Solution : TM0177

Project # : L932343TK
Exposure : 13 Days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 2099
Section # : W9-57B,58B
File # : W957-58B.WK4
Date : 10/13/97

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	Crack Area AxB	CSR (%)	Section CLR (%)	CTR (%)
W9 -57B	I.D. 1/3	0.0079	0.0256	1.150	0.506	BS,BT	0.000202	0.03	0.68	5.06
	Mid. 1/3	0.0000	0.0000				0.000000			
	O.D. 1/3	0.0000	0.0000				0.000000			
W9 -58B	I.D. 1/3	0.3228	0.0886	1.150	0.506	BT	0.028598	4.91	28.07	17.51
	Mid. 1/3	0.0000	0.0000				0.000000			
	O.D. 1/3	0.0000	0.0000				0.000000			

Full Thickness Averages of All Sections

Avg. CSR =	2.47	Std. Dev. =	1.31
Avg. CLR =	14.38	Std. Dev. =	7.47
Avg. CTR =	11.28	Std. Dev. =	4.75

2/3 Thickness Averages of All Sections

Avg. CSR =	2.47	Std. Dev. =	1.41
Avg. CLR =	14.38	Std. Dev. =	8.05
Avg. CTR =	11.28	Std. Dev. =	5.10

1/3 Thickness Averages of All Sections

Avg. CSR =	2.47	Std. Dev. =	1.54
Avg. CLR =	14.38	Std. Dev. =	8.80
Avg. CTR =	11.28	Std. Dev. =	5.53

Crack Location Codes

B - Base Metal
W - Weld Metal
H1 - Heat Affected Zone 1
H2 - Heat Affected Zone 2
S - Surface
T - ID 1/3
M - Middle 1/3
C - OD 1/3

Comments :

Number of cracks in weld area - 0

Total crack thickness in weld area - 0.000

Material : A516-70 CS
Sulfur : 0.007
Condition : As Rolled
Solution : TM0177

Project # : L932343TK
Exposure : 13 Days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 2289
Section # : W9-59A,60A
File # : W959-60A.WK4
Date : 10/13/97

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	Crack Area AxB	CSR (%)	Section CLR (%)	CTR (%)
W9 -59A	I.D. 1/3	0.0591	0.0236	1.140	0.516	BS, BT, BS	0.001395	1.61	50.77	13.35
		0.1161	0.0354			BT	0.004115			
	Mid. 1/3	0.4035	0.0098			BM	0.003972			
	O.D. 1/3	0.0000	0.0000				0.000000			
W9 -60A	I.D. 1/3	0.0413	0.0098	1.140	0.516	BT	0.000407	3.27	111.89	24.03
		0.0315	0.0039			BT	0.000124			
		0.2539	0.0276			BT	0.006998			
		0.0354	0.0098			BT	0.000349			
		0.0413	0.0079			BT	0.000326			
		0.0965	0.0079			BS, BT	0.000760			
	Mid. 1/3	0.0394	0.0020			BM	0.000078			
		0.1496	0.0138			BM	0.002062			
		0.2992	0.0098			BM	0.002945			
		0.1811	0.0276			BM	0.004991			
		0.0728	0.0020			BM	0.000143			
		0.0335	0.0020			H1	0.000066			
	O.D. 1/3	0.0000	0.0000				0.000000			

Full Thickness Averages of All Sections

Avg. CSR =	2.44	Std. Dev. =	0.33
Avg. CLR =	81.33	Std. Dev. =	9.28
Avg. CTR =	18.69	Std. Dev. =	1.98

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

2/3 Thickness Averages of All Sections

Avg. CSR =	2.44	Std. Dev. =	0.33
Avg. CLR =	81.33	Std. Dev. =	9.46
Avg. CTR =	18.69	Std. Dev. =	2.01

1/3 Thickness Averages of All Sections

Avg. CSR =	1.23	Std. Dev. =	0.33
Avg. CLR =	29.61	Std. Dev. =	5.82
Avg. CTR =	12.21	Std. Dev. =	2.15

Comments :

Number of cracks in weld area - 1

Total crack thickness in weld area - 0.0020

Material : A516-70 LSCS
Sulfur : 0.007
Condition : As Rolled
Solution : TM0177

Project # : L932343TK
Exposure : 13 Days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 2099
Section # : W9-59B,60B
File # : W959-60B.WK4
Date : 10/13/97

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	Crack Area AxB	CSR (%)	Section CLR (%)	CTR (%)
W9 -59B	I.D. 1/3	0.0000	0.0000	1.140	0.510	W	0.000000	9.66	54.39	17.76
	Mid. 1/3	0.6201	0.0906			BM	0.056149			
	O.D. 1/3	0.0000	0.0000				0.000000			
W9 -60B	I.D. 1/3	0.1516	0.1024	1.140	0.510	BT	0.015516	2.86	20.38	22.77
	Mid. 1/3	0.0807	0.0138			BS, H1, H2	0.001112			
	O.D. 1/3	0.0000	0.0000				0.000000			

Full Thickness Averages of All Sections

Avg. CSR =	6.26	Std. Dev. =	2.61
Avg. CLR =	37.38	Std. Dev. =	14.56
Avg. CTR =	20.26	Std. Dev. =	6.79

2/3 Thickness Averages of All Sections

Avg. CSR =	6.26	Std. Dev. =	2.80
Avg. CLR =	37.38	Std. Dev. =	15.60
Avg. CTR =	20.26	Std. Dev. =	7.24

1/3 Thickness Averages of All Sections

Avg. CSR =	1.33	Std. Dev. =	0.84
Avg. CLR =	6.65	Std. Dev. =	4.18
Avg. CTR =	10.04	Std. Dev. =	6.31

Crack Location Codes

B - Base Metal
W - Weld Metal
H1 - Heat Affected Zone 1
H2 - Heat Affected Zone 2
S - Surface
T - ID 1/3
M - Middle 1/3
C - OD 1/3

Comments :

Number of cracks in weld area - 1

Total crack thickness in weld area - 0.0138

Material : A841 AS
Sulfur : 0.001
Condition : TMCP
Solution : TM0177

Project # : L932343TK
Exposure : 13 Days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 3250
Section # : W9-61A,62A
File # : W961-62A.WK4
Date : 10/13/97

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	Crack Area AxB	CSR (%)	Section CLR (%)	CTR (%)
W9 -61A	I.D. 1/3	0.0000	0.0000	1.095	0.492	****	0.000000	0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000				0.000000			
	O.D. 1/3	0.0000	0.0000				0.000000			
W9 -62A	I.D. 1/3	0.0000	0.0000	1.100	0.490	****	0.000000	0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000				0.000000			
	O.D. 1/3	0.0000	0.0000				0.000000			

Full Thickness Averages of All Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

2/3 Thickness Averages of All Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

1/3 Thickness Averages of All Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

Crack Location Codes

B - Base Metal
W - Weld Metal
H1 - Heat Affected Zone 1
H2 - Heat Affected Zone 2
S - Surface
T - ID 1/3
M - Middle 1/3
C - OD 1/3

Comments : **** No cracks

Number of cracks in weld area - 0

Total crack thickness in weld area - 0.0000

Material : A516-70 HRS
Sulfur : 0.001
Condition : Normalized
Solution : TM0177

Project # : L932343TK
Exposure : 13 Days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 3247
Section # : W9-61B,62B
File # : W961-62B.WK4
Date : 10/13/97

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	Crack Area AxB	CSR (%)	Section CLR (%)	CTR (%)
W9 -61B	I.D. 1/3	0.0000	0.0000	1.092	0.508	****	0.000000	0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000				0.000000			
	O.D. 1/3	0.0000	0.0000				0.000000			
W9 -62B	I.D. 1/3	0.0000	0.0000	1.100	0.510	****	0.000000	0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000				0.000000			
	O.D. 1/3	0.0000	0.0000				0.000000			

Full Thickness Averages of All Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

2/3 Thickness Averages of All Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

1/3 Thickness Averages of All Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

Crack Location Codes

B - Base Metal
W - Weld Metal
H1 - Heat Affected Zone 1
H2 - Heat Affected Zone 2
S - Surface
T - ID 1/3
M - Middle 1/3
C - OD 1/3

Comments : **** No cracks

Number of cracks in weld area - 0

Total crack thickness in weld area - 0.0000

Material : A841 AS
Sulfur : 0.001
Condition : TMCP
Solution : TM0177

Project # : L932343TK
Exposure : 13 Days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 3250
Section # : W9-63A,64A
File # : W963-64A.WK4
Date : 10/13/97

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	Crack Area AxB	CSR (%)	Section CLR (%)	CTR (%)
W9 -63A	I.D. 1/3	0.0000	0.0000	1.120	0.491	****	0.000000	0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000				0.000000			
	O.D. 1/3	0.0000	0.0000				0.000000			
W9 -64A	I.D. 1/3	0.0000	0.0000	1.120	0.491	****	0.000000	0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000				0.000000			
	O.D. 1/3	0.0000	0.0000				0.000000			

Full Thickness Averages of All Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

2/3 Thickness Averages of All Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

1/3 Thickness Averages of All Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

Crack Location Codes

B - Base Metal
W - Weld Metal
H1 - Heat Affected Zone 1
H2 - Heat Affected Zone 2
S - Surface
T - ID 1/3
M - Middle 1/3
C - OD 1/3

Comments : **** No cracks

Number of cracks in weld area - 0

Total crack thickness in weld area - 0.0000

Material : A516-70 HRS
Sulfur : 0.001
Condition : Normalized
Solution : TM0177

Project # : L932343TK
Exposure : 13 Days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 3247
Section # : W9-63B,64B
File # : W963-64B.WK4
Date : 10/13/97

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	Crack Area AxB	CSR (%)	Section CLR (%)	CTR (%)
W9 -63B	I.D. 1/3	0.0000	0.0000	1.120	0.510	****	0.000000	0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000				0.000000			
	O.D. 1/3	0.0000	0.0000				0.000000			
W9 -64B	I.D. 1/3	0.0000	0.0000	1.120	0.510	****	0.000000	0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000				0.000000			
	O.D. 1/3	0.0000	0.0000				0.000000			

Full Thickness Averages of All Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

2/3 Thickness Averages of All Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

1/3 Thickness Averages of All Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

Crack Location Codes

B - Base Metal
W - Weld Metal
H1 - Heat Affected Zone 1
H2 - Heat Affected Zone 2
S - Surface
T - ID 1/3
M - Middle 1/3
C - OD 1/3

Comments : **** No cracks

Number of cracks in weld area - 0

Total crack thickness in weld area - 0.0000

Material : A841 AS
Sulfur : 0.001
Condition : TMCP
Solution : TM0177

Project # : L932343TK
Exposure : 13 Days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 3250
Section # : W9-65A,66A
File # : W965-66A.WK4
Date : 10/13/97

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	Crack Area AxB	CSR (%)	Section CLR (%)	CTR (%)
W9 -65A	I.D. 1/3	0.0000	0.0000	1.120	0.487	****	0.000000	0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000				0.000000			
	O.D. 1/3	0.0000	0.0000				0.000000			
W9 -66A	I.D. 1/3	0.0000	0.0000	1.120	0.487	****	0.000000	0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000				0.000000			
	O.D. 1/3	0.0000	0.0000				0.000000			

Full Thickness Averages of All Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

2/3 Thickness Averages of All Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

1/3 Thickness Averages of All Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

Crack Location Codes

B - Base Metal
W - Weld Metal
H1 - Heat Affected Zone 1
H2 - Heat Affected Zone 2
S - Surface
T - ID 1/3
M - Middle 1/3
C - OD 1/3

Comments : **** No cracks

Number of cracks in weld area - 0

Total crack thickness in weld area - 0.0000

Material : A516-70 HRS
Sulfur : 0.001
Condition : Normalized
Solution : TM0177

Project # : L932343TK
Exposure : 13 Days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 3247
Section # : W9-65B,66B
File # : W965-66B.WK4
Date : 10/13/97

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	Crack Area AxB	CSR (%)	Section CLR (%)	CTR (%)
W9 -65B	I.D. 1/3	0.0000	0.0000	1.120	0.508	****	0.000000	0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000				0.000000			
	O.D. 1/3	0.0000	0.0000				0.000000			
W9 -66B	I.D. 1/3	0.0000	0.0000	1.120	0.508	****	0.000000	0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000				0.000000			
	O.D. 1/3	0.0000	0.0000				0.000000			

Full Thickness Averages of All Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

2/3 Thickness Averages of All Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

1/3 Thickness Averages of All Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

Crack Location Codes

B - Base Metal
W - Weld Metal
H1 - Heat Affected Zone 1
H2 - Heat Affected Zone 2
S - Surface
T - ID 1/3
M - Middle 1/3
C - OD 1/3

Comments : **** No cracks

Number of cracks in weld area - 0

Total crack thickness in weld area - 0.0000

Material : A841 AS
Sulfur : 0.001
Condition : TMCP
Solution : TM0177

Project # : L932343TK
Exposure : 13 Days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 3250
Section # : W9-67A,68A
File # : W967-68A.WK4
Date : 10/13/97

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	Crack Area AxB	CSR (%)	Section CLR (%)	CTR (%)
W9 -67A	I.D. 1/3	0.0394	0.0059	0.970	0.485	W, BS	0.000233	0.05	4.06	1.22
	Mid. 1/3	0.0000	0.0000				0.000000			
	O.D. 1/3	0.0000	0.0000				0.000000			
W9 -68A	I.D. 1/3	0.0000	0.0000	0.970	0.485	****	0.000000	0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000				0.000000			
	O.D. 1/3	0.0000	0.0000				0.000000			

Full Thickness Averages of All Sections

Avg. CSR =	0.02	Std. Dev. =	0.01
Avg. CLR =	2.03	Std. Dev. =	1.08
Avg. CTR =	0.61	Std. Dev. =	0.32

2/3 Thickness Averages of All Sections

Avg. CSR =	0.02	Std. Dev. =	0.01
Avg. CLR =	2.03	Std. Dev. =	1.17
Avg. CTR =	0.61	Std. Dev. =	0.35

1/3 Thickness Averages of All Sections

Avg. CSR =	0.02	Std. Dev. =	0.02
Avg. CLR =	2.03	Std. Dev. =	1.28
Avg. CTR =	0.61	Std. Dev. =	0.38

Crack Location Codes

B - Base Metal
W - Weld Metal
H1 - Heat Affected Zone 1
H2 - Heat Affected Zone 2
S - Surface
T - ID 1/3
M - Middle 1/3
C - OD 1/3

Comments : **** No cracks

Number of cracks in weld area - 1

Total crack thickness in weld area - 0.0059

Material : A516-70 HRS
Sulfur : 0.001
Condition : Normalized
Solution : TM0177

Project # : L932343TK
Exposure : 13 Days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 3247
Section # : W9-67B,68B
File # : W967-68B.WK4
Date : 10/13/97

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	Crack Area AxB	CSR (%)	Section CLR (%)	CTR (%)
W9 -67B	I.D. 1/3	0.0000	0.0000	0.970	0.507	****	0.000000	0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000				0.000000			
	O.D. 1/3	0.0000	0.0000				0.000000			
W9 -68B	I.D. 1/3	0.0000	0.0000	0.970	0.507	****	0.000000	0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000				0.000000			
	O.D. 1/3	0.0000	0.0000				0.000000			

Full Thickness Averages of All Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

2/3 Thickness Averages of All Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

1/3 Thickness Averages of All Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

Crack Location Codes

B - Base Metal
W - Weld Metal
H1 - Heat Affected Zone 1
H2 - Heat Affected Zone 2
S - Surface
T - ID 1/3
M - Middle 1/3
C - OD 1/3

Comments : **** No cracks

Number of cracks in weld area - 0

Total crack thickness in weld area - 0.0000

Material : A516-70 LSCS
Sulfur : 0.007
Condition : As Rolled
Solution : TM0177

Project # : L932343TK
Exposure : 13 Days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 2099
Section # : W9-69A,70A
File # : W969-70A.WK4
Date : 10/13/97

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	Crack Area AxB	CSR (%)	Section CLR (%)	CTR (%)
W9 -69A	I.D. 1/3	0.0000	0.0000	1.033	0.502	****	0.000000	0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000				0.000000			
	O.D. 1/3	0.0000	0.0000				0.000000			
W9 -70A	I.D. 1/3	0.0236	0.0394	1.041	0.502	BS, H1, H2	0.000930	0.18	2.27	7.84
	Mid. 1/3	0.0000	0.0000				0.000000			
	O.D. 1/3	0.0000	0.0000				0.000000			

Full Thickness Averages of All Sections

Avg. CSR =	0.09	Std. Dev. =	0.05
Avg. CLR =	1.13	Std. Dev. =	0.60
Avg. CTR =	3.92	Std. Dev. =	2.09

2/3 Thickness Averages of All Sections

Avg. CSR =	0.09	Std. Dev. =	0.05
Avg. CLR =	1.13	Std. Dev. =	0.65
Avg. CTR =	3.92	Std. Dev. =	2.25

1/3 Thickness Averages of All Sections

Avg. CSR =	0.09	Std. Dev. =	0.06
Avg. CLR =	1.13	Std. Dev. =	0.71
Avg. CTR =	3.92	Std. Dev. =	2.46

Crack Location Codes

B - Base Metal
W - Weld Metal
H1 - Heat Affected Zone 1
H2 - Heat Affected Zone 2
S - Surface
T - ID 1/3
M - Middle 1/3
C - OD 1/3

Comments : **** No cracks

Number of cracks in weld area - 1

Total crack thickness in weld area - 0.0394

Material : A516-70 HRS
Sulfur : 0.001
Condition : Normalized
Solution : TM0177

Project # : L932343TK
Exposure : 13 Days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 3247
Section # : W9-69B,70B
File # : W969-70B.WK4
Date : 10/13/97

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	Crack Area AxB	CSR (%)	Section CLR (%)	CTR (%)
W9 -69B	I.D. 1/3	0.0000	0.0000	1.033	0.507	****	0.000000	0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000				0.000000			
	O.D. 1/3	0.0000	0.0000				0.000000			
W9 -70B	I.D. 1/3	0.0000	0.0000	1.041	0.507	****	0.000000	0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000				0.000000			
	O.D. 1/3	0.0000	0.0000				0.000000			

Full Thickness Averages of All Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

2/3 Thickness Averages of All Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

1/3 Thickness Averages of All Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

Comments : **** No cracks

Number of cracks in weld area - 0

Total crack thickness in weld area - 0.0000

Material : A516-70 LSCS
Sulfur : 0.007
Condition : As Rolled
Solution : TM0177

Project # : L932343TK
Exposure : 13 Days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 2099
Section # : W9-71A,72A
File # : W971-72A.WK4
Date : 10/13/97

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	Crack Area AxB	CSR (%)	Section CLR (%)	CTR (%)
W9 -71A	I.D. 1/3	0.0157	0.0630	1.056	0.508	W, H1,H2	0.000992	0.18	1.49	12.40
	Mid. 1/3	0.0000	0.0000				0.000000			
	O.D. 1/3	0.0000	0.0000				0.000000			
W9 -72A	I.D. 1/3	0.1555 0.0276	0.0354 0.0650	1.062	0.508	BT,BM * BS, H1, H2	0.005510 0.001790	1.66	28.55	22.48
	Mid. 1/3	0.1201	0.0138			BT, BM *	0.001655			
	O.D. 1/3	0.0000	0.0000				0.000000			

Full Thickness Averages of All Sections

Avg. CSR =	0.92	Std. Dev. =	0.27
Avg. CLR =	15.02	Std. Dev. =	4.53
Avg. CTR =	17.44	Std. Dev. =	4.52

2/3 Thickness Averages of All Sections

Avg. CSR =	0.92	Std. Dev. =	0.29
Avg. CLR =	15.02	Std. Dev. =	4.80
Avg. CTR =	17.44	Std. Dev. =	4.76

1/3 Thickness Averages of All Sections

Avg. CSR =	0.77	Std. Dev. =	0.31
Avg. CLR =	9.36	Std. Dev. =	4.34
Avg. CTR =	16.08	Std. Dev. =	5.12

Crack Location Codes

B - Base Metal
W - Weld Metal
H1 - Heat Affected Zone 1
H2 - Heat Affected Zone 2
S - Surface
T - ID 1/3
M - Middle 1/3
C - OD 1/3

Comments :

Number of cracks in weld area - 2

Total crack thickness in weld area - 0.1280

* - Same cracks

Material : A516-70 HRS
Sulfur : 0.001
Condition : Normalized
Solution : TM0177

Project # : L932343TK
Exposure : 13 Days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 3247
Section # : W9-71B,72B
File # : W971-72B.WK4
Date : 10/13/97

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	Crack Area AxB	CSR (%)	Section CLR (%)	CTR (%)
W9 -71B	I.D. 1/3	0.0000	0.0000	1.056	0.505	****	0.000000	0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000				0.000000			
	O.D. 1/3	0.0000	0.0000				0.000000			
W9 -72B	I.D. 1/3	0.0000	0.0000	1.062	0.508	****	0.000000	0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000				0.000000			
	O.D. 1/3	0.0000	0.0000				0.000000			

Full Thickness Averages of All Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

2/3 Thickness Averages of All Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

1/3 Thickness Averages of All Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

Crack Location Codes

B - Base Metal
W - Weld Metal
H1 - Heat Affected Zone 1
H2 - Heat Affected Zone 2
S - Surface
T - ID 1/3
M - Middle 1/3
C - OD 1/3

Comments : **** No cracks

Number of cracks in weld area - 0

Total crack thickness in weld area - 0.0000

Material : A516-70 LSCS
Sulfur : 0.007
Condition : As Rolled
Solution : TM0177

Project # : L932343TK
Exposure : 13 Days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 2099
Section # : W9-73A,74A
File # : W973-74A.WK4
Date : 10/13/97

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	Crack Area AxB	CSR (%)	Section CLR (%)	CTR (%)
W9 -73A	I.D. 1/3	0.0177	0.0276	1.080	0.508	BS, BT	0.000488	1.98	28.80	12.40
	Mid. 1/3	0.2933	0.0354			BM,H2	0.010393			
	O.D. 1/3	0.0000	0.0000				0.000000			
W9 -74A	I.D. 1/3	0.0079	0.0098	1.085	0.508	BS,BT	0.000078	0.34	9.98	5.43
	Mid. 1/3	0.1004	0.0177			BM	0.001779			
	O.D. 1/3	0.0000	0.0000				0.000000			

Full Thickness Averages of All Sections

Avg. CSR =	1.16	Std. Dev. =	0.50
Avg. CLR =	19.39	Std. Dev. =	7.39
Avg. CTR =	8.91	Std. Dev. =	2.31

2/3 Thickness Averages of All Sections

Avg. CSR =	1.16	Std. Dev. =	0.54
Avg. CLR =	19.39	Std. Dev. =	7.92
Avg. CTR =	8.91	Std. Dev. =	2.43

1/3 Thickness Averages of All Sections

Avg. CSR =	0.05	Std. Dev. =	0.03
Avg. CLR =	1.18	Std. Dev. =	0.54
Avg. CTR =	3.68	Std. Dev. =	1.74

Crack Location Codes

B - Base Metal
W - Weld Metal
H1 - Heat Affected Zone 1
H2 - Heat Affected Zone 2
S - Surface
T - ID 1/3
M - Middle 1/3
C - OD 1/3

Comments :

Number of cracks in weld area - 1

Total crack thickness in weld area - 0.0354

Material : A516-70 HRS
Sulfur : 0.007
Condition : Normalized
Solution : TM0177

Project # : L932343TK
Exposure : 13 Days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 3247
Section # : W9-73B,74B
File # : W973-74B.WK4
Date : 10/13/97

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	Crack Area AxB	CSR (%)	Section CLR (%)	CTR (%)
W9 -73B	I.D. 1/3	0.0000	0.0000	1.080	0.508	****	0.000000	0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000				0.000000			
	O.D. 1/3	0.0000	0.0000				0.000000			
W9 -74B	I.D. 1/3	0.0374	0.0020	1.085	0.508	BT	0.000074	0.01	3.45	0.39
	Mid. 1/3	0.0000	0.0000				0.000000			
	O.D. 1/3	0.0000	0.0000				0.000000			

Full Thickness Averages of All Sections

Avg. CSR =	0.01	Std. Dev. =	0.00
Avg. CLR =	1.72	Std. Dev. =	0.92
Avg. CTR =	0.19	Std. Dev. =	0.10

2/3 Thickness Averages of All Sections

Avg. CSR =	0.01	Std. Dev. =	0.00
Avg. CLR =	1.72	Std. Dev. =	0.99
Avg. CTR =	0.19	Std. Dev. =	0.11

1/3 Thickness Averages of All Sections

Avg. CSR =	0.01	Std. Dev. =	0.00
Avg. CLR =	1.72	Std. Dev. =	1.08
Avg. CTR =	0.19	Std. Dev. =	0.12

Crack Location Codes

B - Base Metal
W - Weld Metal
H1 - Heat Affected Zone 1
H2 - Heat Affected Zone 2
S - Surface
T - ID 1/3
M - Middle 1/3
C - OD 1/3

Comments : **** No cracks

Number of cracks in weld area - 0

Total crack thickness in weld area - 0.0000

Material : A516-70 CS
Sulfur : 0.007
Condition : As Rolled
Solution : TM0177

Project # : L932343TK
Exposure : 13 Days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 2289
Section # : W9-75A,76A
File # : W975-76A.WK4
Date : 10/13/97

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	CSR (%)	Section CLR (%)	CTR (%)
W9 -75A	I.D. 1/3	0.1240	0.0157	1.114	0.514	BT	3.98	94.18	22.98
		0.2165	0.0492			BT, BM, H2, H1 *			
		0.0394	0.0039			BS, BT			
	Mid. 1/3	0.2185	0.0197			BT, BM, H2, H1 *			
		0.2677	0.0039			BM			
		0.1831	0.0256			BM			
	O.D. 1/3	0.0000	0.0000						
W9 -76A	I.D. 1/3	0.1102	0.0236	1.118	0.516	BT	3.21	85.92	19.07
		0.0138	0.0039			BT			
		0.2165	0.0177			BT			
		0.0551	0.0059			BT			
		0.0138	0.0020			BT, BS			
		0.1378	0.0256			BT, H2, H1			
	Mid. 1/3	0.4134	0.0197			BM, H2			
	O.D. 1/3	0.0000	0.0000						

Full Thickness Averages of All Sections

Avg. CSR =	3.60	Std. Dev. =	0.50
Avg. CLR =	90.05	Std. Dev. =	10.20
Avg. CTR =	21.03	Std. Dev. =	2.48

2/3 Thickness Averages of All Sections

Avg. CSR =	3.60	Std. Dev. =	0.51
Avg. CLR =	90.05	Std. Dev. =	10.35
Avg. CTR =	21.03	Std. Dev. =	2.52

1/3 Thickness Averages of All Sections

Avg. CSR =	2.01	Std. Dev. =	0.47
Avg. CLR =	41.53	Std. Dev. =	6.78
Avg. CTR =	14.33	Std. Dev. =	2.62

Crack Location Codes

B - Base Metal
W - Weld Metal
H1 - Heat Affected Zone 1
H2 - Heat Affected Zone 2
S - Surface
T - ID 1/3
M - Middle 1/3
C - OD 1/3

Comments :

Number of cracks in weld area - 3

Total crack thickness in weld area - 0.1142

* - Same Crack

Material : A841 AS
Sulfur : 0.001
Condition : TMCP
Solution : TM0177

Project # : L932343TK
Exposure : 13 Days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 3250
Section # : W9-75B,76B
File # : W975-76B.WK4
Date : 10/13/97

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	Crack Area AxB	CSR (%)	Section CLR (%)	CTR (%)
W9 -75B	I.D. 1/3	0.0000	0.0000	1.114	0.490	****	0.000000	0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000				0.000000			
	O.D. 1/3	0.0000	0.0000				0.000000			
W9 -76B	I.D. 1/3	0.0591	0.0020	1.118	0.488	BT	0.000116	0.02	5.28	0.40
	Mid. 1/3	0.0000	0.0000				0.000000			
	O.D. 1/3	0.0000	0.0000				0.000000			

Full Thickness Averages of All Sections

Avg. CSR =	0.01	Std. Dev. =	0.01
Avg. CLR =	2.64	Std. Dev. =	1.41
Avg. CTR =	0.20	Std. Dev. =	0.11

2/3 Thickness Averages of All Sections

Avg. CSR =	0.01	Std. Dev. =	0.01
Avg. CLR =	2.64	Std. Dev. =	1.52
Avg. CTR =	0.20	Std. Dev. =	0.12

1/3 Thickness Averages of All Sections

Avg. CSR =	0.01	Std. Dev. =	0.01
Avg. CLR =	2.64	Std. Dev. =	1.66
Avg. CTR =	0.20	Std. Dev. =	0.13

Crack Location Codes

B - Base Metal
W - Weld Metal
H1 - Heat Affected Zone 1
H2 - Heat Affected Zone 2
S - Surface
T - ID 1/3
M - Middle 1/3
C - OD 1/3

Comments : **** No cracks

Number of cracks in weld area - 0

Total crack thickness in weld area - 0.0000

Material : A516-70 CS
Sulfur : 0.007
Condition : As Rolled
Solution : TM0177

Project # : L932343TK
Exposure : 13 Days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 2289
Section # : W9-77A,78A
File # : W977-78A.WK4
Date : 10/13/97

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	Crack Area AxB	CSR (%)	Section CLR (%)	CTR (%)
W9 -77A	I.D. 1/3	0.0512	0.0315	1.128	0.515	BT	0.001612	1.37	56.19	12.23
		0.1220	0.0079			BM,BT,BM,BT,BM*	0.000961			
	Mid. 1/3	0.2264	0.0157			BM,BT,BM,BT,BM*	0.003565			
		0.2343	0.0079			BM	0.001845			
	O.D. 1/3	0.0000	0.0000				0.000000			
W9 -78A	I.D. 1/3	0.0768	0.0315	1.134	0.517	BT, BS	0.002418	5.98	73.95	26.27
		0.0531	0.0630			W, H1, H2	0.003348			
	Mid. 1/3	0.7087	0.0413			BM, H2, H1	0.029295			
	O.D. 1/3	0.0000	0.0000				0.000000			

Full Thickness Averages of All Sections

Avg. CSR =	3.68	Std. Dev. =	1.19
Avg. CLR =	65.07	Std. Dev. =	15.58
Avg. CTR =	19.25	Std. Dev. =	3.62

Crack Location Codes

B - Base Metal
W - Weld Metal
H1 - Heat Affected Zone 1
H2 - Heat Affected Zone 2
S - Surface
T - ID 1/3
M - Middle 1/3
C - OD 1/3

2/3 Thickness Averages of All Sections

Avg. CSR =	3.68	Std. Dev. =	1.26
Avg. CLR =	65.07	Std. Dev. =	16.33
Avg. CTR =	19.25	Std. Dev. =	3.74

1/3 Thickness Averages of All Sections

Avg. CSR =	0.71	Std. Dev. =	0.20
Avg. CLR =	13.41	Std. Dev. =	3.57
Avg. CTR =	12.96	Std. Dev. =	3.87

Comments :

Number of cracks in weld area - 2

Total crack thickness in weld area - 0.1043

* - Same Crack

Material : A841 AS
Sulfur : 0.001
Condition : TMCP
Solution : TM0177

Project # : L932343TK
Exposure : 13 Days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 3250
Section # : W9-77B,78B
File # : W977-78B.WK4
Date : 10/13/97

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	Crack Area AxB	CSR (%)	Section CLR (%)	CTR (%)
W9 -77B	I.D. 1/3	0.0000	0.0000	1.128	0.484	****	0.000000	0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000				0.000000			
	O.D. 1/3	0.0000	0.0000				0.000000			
W9 -78B	I.D. 1/3	0.0059	0.0512	1.134	0.485	W, H1, H2	0.000302	0.05	0.52	10.55
	Mid. 1/3	0.0000	0.0000				0.000000			
	O.D. 1/3	0.0000	0.0000				0.000000			

Full Thickness Averages of All Sections

Avg. CSR =	0.03	Std. Dev. =	0.01
Avg. CLR =	0.26	Std. Dev. =	0.14
Avg. CTR =	5.28	Std. Dev. =	2.81

2/3 Thickness Averages of All Sections

Avg. CSR =	0.03	Std. Dev. =	0.02
Avg. CLR =	0.26	Std. Dev. =	0.15
Avg. CTR =	5.28	Std. Dev. =	3.03

1/3 Thickness Averages of All Sections

Avg. CSR =	0.03	Std. Dev. =	0.02
Avg. CLR =	0.26	Std. Dev. =	0.16
Avg. CTR =	5.28	Std. Dev. =	3.32

Crack Location Codes

B - Base Metal
W - Weld Metal
H1 - Heat Affected Zone 1
H2 - Heat Affected Zone 2
S - Surface
T - ID 1/3
M - Middle 1/3
C - OD 1/3

Comments : **** No cracks

Number of cracks in weld area - 1

Total crack thickness in weld area - 0.0512

Material : A516-70 CS
Sulfur : 0.007
Condition : As Rolled
Solution : TM0177

Project # : L932343TK
Exposure : 13 Days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 2289
Section # : W9-79A,80A
File # : W979-80A.WK4
Date : 10/13/97

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	Crack Area AxB	CSR (%)	Section CLR (%)	CTR (%)
W9 -79A	I.D. 1/3	0.1142	0.0217	1.146	0.517	BT	0.002472	1.41	45.18	8.76
		0.2598	0.0217			BT, H2, H1	0.005627			
	Mid. 1/3	0.1437	0.0020			BM	0.000283			
	O.D. 1/3	0.0000	0.0000				0.000000			
W9 -80A	I.D. 1/3	0.1102	0.0118	1.141	0.517	BT	0.001302	3.08	72.63	13.71
		0.1378	0.0394			BT	0.005425			
	Mid. 1/3	0.5807	0.0197			BM	0.011431			
	O.D. 1/3	0.0000	0.0000				0.000000			

Full Thickness Averages of All Sections

Avg. CSR =	2.25	Std. Dev. =	0.54
Avg. CLR =	58.90	Std. Dev. =	13.35
Avg. CTR =	11.23	Std. Dev. =	2.30

2/3 Thickness Averages of All Sections

Avg. CSR =	2.25	Std. Dev. =	0.57
Avg. CLR =	58.90	Std. Dev. =	13.96
Avg. CTR =	11.23	Std. Dev. =	2.39

1/3 Thickness Averages of All Sections

Avg. CSR =	1.25	Std. Dev. =	0.36
Avg. CLR =	27.19	Std. Dev. =	7.28
Avg. CTR =	9.14	Std. Dev. =	2.48

Crack Location Codes

B - Base Metal
W - Weld Metal
H1 - Heat Affected Zone 1
H2 - Heat Affected Zone 2
S - Surface
T - ID 1/3
M - Middle 1/3
C - OD 1/3

Comments :

Number of cracks in weld area - 1

Total crack thickness in weld area - 0.0217

Material : A841 AS
Sulfur : 0.001
Condition : TMCP
Solution : TM0177

Project # : L932343TK
Exposure : 13 Days
pH (INIT) : 2.8
pH (FINL) : 3.8

CLI # : 3250
Section # : W9-79B,80B
File # : W979-80BA.WK4
Date : 10/13/97

Section	I.D. 1/3 Mid. 1/3, or O.D. 1/3	Crack Length A (in)	Crack Thickness B (in)	Specimen Width W (in)	Specimen Thickness T (in)	Crack Location	Crack Area AxB	Section CSR (%)	Section CLR (%)	Section CTR (%)
W9 -79B	I.D. 1/3	0.0000	0.0000	1.146	0.517	****	0.000000	0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000				0.000000			
	O.D. 1/3	0.0000	0.0000				0.000000			
W9 -80B	I.D. 1/3	0.0000	0.0000	1.141	0.517	****	0.000000	0.00	0.00	0.00
	Mid. 1/3	0.0000	0.0000				0.000000			
	O.D. 1/3	0.0000	0.0000				0.000000			

Full Thickness Averages of All Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

2/3 Thickness Averages of All Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

1/3 Thickness Averages of All Sections

Avg. CSR =	0.00	Std. Dev. =	0.00
Avg. CLR =	0.00	Std. Dev. =	0.00
Avg. CTR =	0.00	Std. Dev. =	0.00

Crack Location Codes

B - Base Metal	S - Surface
W - Weld Metal	T - ID 1/3
H1 - Heat Affected Zone 1	M - Middle 1/3
H2 - Heat Affected Zone 2	C - OD 1/3

Comments : **** - No cracks

Number of cracks in weld area - 0

Total crack thickness in weld area - 0.0000

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