



TUBE FORGINGS OF AMERICA, INC.
QUALITY PROCEDURE

Procedure #: 33.02
Revision: 6
Last Modified: 11/11/2022

Scraper Bar Tee Installation Tangent Only

Revision History

<u>Rev #</u>	<u>Rev Date</u>	<u>Revised By</u>	<u>Changes Made</u>
0	12/10/2015	smarshall	New
1	09/01/2016	smarshall	Add 1/4" plate to "installation guide", Add min weld length to 5.6.2, Add arc burn requirement to 6.2.1.1. Updated scraper bar spacing in tee detail. 6-30-16 FURTHER MODIFIED 5.6 PER RH REQUEST 7-8-16 Added to 6.2.1.1
2	06/19/2017	smarshall	Modify MT inspection process, update welding processes and stress relieving requirements.
3	05/08/2018	smarshall	Revised section 2.3 to further define calibration verification.
4	06/28/2019	smarshall	Modified exhibit #2 to correct the fillet weld detail.
5	07/01/2021	smarshall	Add post weld operator inspection - 5.8. Revised 3.1, Exhibit #1 to reflect current materials used. Revised Exhibit #2, bar design.
6	11/11/2022	smarshall	Modified Exhibit #2 and revised section 5.6 to change the minimum fillet weld length.

Approvals

<u>Approved By</u>	<u>Approve Date</u>
Scot Marshall	10/07/2022
Bryan White	10/18/2022
Suresh Suntheralingam	10/07/2022
Bill Park	10/07/2022
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1.0 Purpose

The purpose of this procedure is to provide a standardized method for the installation of scraper bars in tees without welding in the crotch area of tees.

2.0 General Requirements

- 2.1 All bars shall be installed by TFA certified welders qualified per the requirements of ASME Section IX.
- 2.2 Magnetic Particle examination shall be performed by qualified inspectors per TFA NDE procedure 1.01 E709.
- 2.3 Verify the accuracy and calibration status of ALL gauges that are about to be utilized for inspection.
- 2.4 An approved WPS must be utilized for the correct material, welding process, and electrode combination.
 - 2.4.1 Refer to controlled document #23weldmatrix for approved WPS/PQR/WPQ applications.
- 2.5 An American Welding Society (AWS) qualified Certified Weld Inspector (CWI) shall participate in welding procedure and operator qualifications as well as the inspection/approval of welds.

3.0 Material

- 3.1 Scraper bar material to be from hot rolled mild carbon steel plate with a minimum yield of 35,000 psi. i.e., A36, ABS Grade A, A516 grade 70, or equivalent.
- 3.2 Filler metal to be used must be AWS ER70S6, E7018 or equivalent for WPB.
- 3.3 Filler metal to be used must be AWS ER80S-D2 or equivalent for WPHY Grade.

4.0 Dimensions

- 4.1 The thickness and number of scraper bars to be installed in tees up to 36" OD is shown in the TFA Scraper TEE-Bar Installation Guide (See [Exhibit #1](#) attached).

5.0 Procedure

- 5.1 Bars shall be cut to fit on the inside diameter of the outlet in line with the run, per [Exhibit#2](#).
- 5.2 Bars shall be equally spaced in the outlet lengthwise to run parallel with the run and centered with the bar width perpendicular to the outlet face of the tee, per [Exhibit#3](#).



- 5.3 One bar shall be on the centerline when odd numbers of bars are required.
- 5.4 Bars shall be spaced to straddle the centerline when even numbers of bars are required.
- 5.5 Preheat the weld joint per the applicable WPS.
- 5.6 The fillet weld shall be full penetration running on both sides of the scraper bar(s) along the length of the outlet straight tangent.
- 5.6.1 Fillet weld length shall be as long as possible on the straight tangent of the tee branch (refer to installation detail).
- 5.6.2 A cover pass wrapping the bevel root face side and / or run side of the scraper bar(s) is preferred (refer to installation detail).
- 5.6.2.1 The cover pass shall not extend into the flow line of the run and shall satisfy the clearance tolerance of exhibit #2.
- 5.6.3 TFA Barring Procedure 33.01 shall be utilized if the minimum fillet weld length cannot be achieved (refer to installation detail).
- 5.7 Post weld heat shall be applied to the completed joint per the applicable WPS.
- 5.8 Post weld inspection by the welding operator:
- 5.8.1 After all welding, blending, and cleanup is complete and prior to routing for inspection by a CWI, the product must be checked for weld defects such as lack of fusion, pinhole porosity, and rollover issues.
- 5.8.2 Utilize a rosebud torch and apply heat to the weld while assuring not to exceed the post heat temperature per the applicable WPS. Common weld defects should start to glow bright orange in just a few seconds.
- 5.8.3 Rejectable indications shall be removed by grinding or repair welded per the applicable WPS. The welding operator shall route product to the next operation after assuring a quality weld.
- 5.9 All barred tees must be stress relieved OR normalized per procedure 11.01 after all welding is complete.
- 5.9.1 At the discretion of the Quality Assurance Manager, all barred tees that require thermal treatment post welding in order to achieve enhanced mechanical properties may circumvent the requirements of 5.9 and move directly to final thermal treatment.



6.0 Supplemental Requirements

6.1 A visual inspection shall be performed on the scraper bar fillet welds before and after the final thermal treatment.

6.1.1 Discontinuities identified by visual inspection shall be validated by MT inspection.

6.2 A first piece inspection shall be performed after fabrication is complete and prior to final thermal treatment.

6.2.1 Inspection shall be conducted by an AWS certified weld inspector (CWI).

6.3 Magnetic particle inspection shall be performed on the scraper bar fillet welds after the final thermal treatment.

6.3.1 Lack of penetration, incomplete fusion, cracks, arc burn or excessive undercut and/or overlap shall be repaired and re-inspected.

6.3.1.1 Arc burn shall be removed by grinding. Complete removal shall be verified by use of an etchant capable of exposing the affected area, i.e. Muriatic or Nitric Acid.

Note: Refer to the applicable SDS and follow the required safety precautions for utilizing such etchant.

6.3.2 Porosity, slag inclusions and other rounded indications greater than 1/8" (individually or collectively) in any 2" length of weld shall be repaired.

6.4 Welds shall be free of slag and scale prior to magnetic particle examination.

6.5 Welds that require repair after final heat treat shall be reworked with the applicable thermal treatment and then scheduled for final magnetic particle inspection.

6.5.1 Repairs that require welding shall be re-processed like the original weld.

1) Pre and post weld heat treatment.

2) Full Stress Relieve or Normalize.

3) MT inspection.

3) Final thermal treatment.



4) Visual / MT inspection

6.6 The heat lot number of the scraper bar material used shall be recorded on the work order.

6.7 The welding personnel and the welder used for installing the scraper bars shall be recorded on the work order.



Exhibit #1: INSTALLATION GUIDE

		BRANCH																			
		2 - 4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36			
RUN	2 - 4	1/4"/ 3/8"																			
	6	3/8"	3/8"																		
	8	3/8"	3/8"	3/8"																	
	10	3/8"	3/8"	3/8"	3/8"																
	12	3/8"	3/8"	3/8"	3/8"	3/8"															
	14	3/8"	3/8"	3/8"	3/8"	3/8"	1/2"														
	16	3/8"	3/8"	3/8"	3/8"	3/8"	1/2"	1/2"													
	18	3/8"	3/8"	3/8"	3/8"	3/8"	1/2"	1/2"	1/2"												
	20	3/8"	3/8"	3/8"	3/8"	3/8"	1/2"	1/2"	1/2"	1/2"											
	22	3/8"	3/8"	3/8"	3/8"	3/8"	1/2"	1/2"	1/2"	1/2"	1/2"										
	24	3/8"	3/8"	3/8"	3/8"	3/8"	1/2"	1/2"	1/2"	1/2"	1/2"	5/8"									
	26	3/8"	3/8"	3/8"	3/8"	3/8"	1/2"	1/2"	1/2"	1/2"	1/2"	5/8"	5/8"								
	28	3/8"	3/8"	3/8"	3/8"	3/8"	1/2"	1/2"	1/2"	1/2"	1/2"	5/8"	5/8"	5/8"							
	30	3/8"	3/8"	3/8"	3/8"	3/8"	1/2"	1/2"	1/2"	1/2"	1/2"	5/8"	5/8"	5/8"	5/8"						
	32	3/8"	3/8"	3/8"	3/8"	3/8"	1/2"	1/2"	1/2"	1/2"	1/2"	5/8"	5/8"	5/8"	5/8"	5/8"					
	34	3/8"	3/8"	3/8"	3/8"	3/8"	1/2"	1/2"	1/2"	1/2"	1/2"	5/8"	5/8"	5/8"	5/8"	5/8"	5/8"				
	36	3/8"	3/8"	3/8"	3/8"	3/8"	1/2"	1/2"	1/2"	1/2"	1/2"	5/8"	5/8"	5/8"	5/8"	5/8"	5/8"	5/8"			
		1 BAR				2 BARS				3 BARS				4 BARS				5 BARS			



Exhibit #2: INSTALLATION DETAIL

