

# Hoisting and Rigging: Visual Structural Weld Inspection Criteria and Form

Department: Field Safety and Building Inspection

Program: Hoisting and Rigging

Owner: Program Manager

Authority: ES&H Manual, Chapter 41, Hoisting and Rigging<sup>1</sup>

Equipment serial number \_\_\_\_\_

## Base materials

Carbon steel  Stainless steel  Aluminum  Other – specify \_\_\_\_\_

Carbon steel: specifications, if known \_\_\_\_\_

All others: alloy, if known \_\_\_\_\_

Weld filler alloy, if known \_\_\_\_\_

## Yes No

- Is the weld painted?
- Is surface corrosion within acceptable limits?
- Does the weld size match the engineering drawing?
- Does the weld type (joint design) match the engineering drawing?
- Is the weld joint "prequalified" per the American Institute of Steel Construction (AISC)?

*Inspection criteria for the following "discontinuity categories" (in bold) are on page 2 of this form.*

## Yes No

- Is the weld bead and base material free of visible **cracks**?
- Does the weld appear to have good **fusion**?
- Is the weld bead free of **craters**?
- Is the **weld profile** acceptable?
- Is the **inspection timing** within the allowable time limit for the material?
- Is the weld bead **size** uniform?
- Is the **undercut** acceptable for material thickness and loading condition?
- Is the weld free of unacceptable **porosity**?

Observations and explanatory detail for any box checked "no" \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

Inspector \_\_\_\_\_ Inspection date \_\_\_\_\_

1 SLAC Environment, Safety, and Health Manual (SLAC-I-720-0A29Z-001), Chapter 41, "Hoisting and Rigging", [http://www-group.slac.stanford.edu/esh/hazardous\\_activities/hoisting\\_rigging/policies.htm](http://www-group.slac.stanford.edu/esh/hazardous_activities/hoisting_rigging/policies.htm)

## Hoisting and Rigging: Visual Structural Weld Inspection Criteria and Form

Discontinuity Category and Inspection Criteria		Non-tubular connections		Tubular connections	
		Statically loaded	Cyclically loaded	All loads	
<i>Source: American Welding Society (AWS) D1.1/D1.1M:2002 Structural Welding Code - Steel</i>					
Crack prohibition	Any crack is unacceptable, regardless of size or location		X	X	X
Weld to base metal fusion	Thorough fusion must exist between adjacent layers of weld metal and between weld metal and base-metal		X	X	X
Crater cross section	All craters must be filled to the specified weld size, except for the ends of intermittent fillet welds outside of their effective length		X	X	X
Weld profiles	Weld profiles must be in conformance with AWS D1.1 Section 5.24		X	X	X
Inspection timing	Visual inspection of welds in all steels may begin immediately after the completed welds have cooled to ambient temperature. Acceptance criteria for ASTM-A514, A517, and A709 Grade 100 and 100W steels must be based on visual inspection performed not less than 48 hours after completion of the weld.		X	X	X
Undersized welds	The size of a fillet weld in any continuous weld may be less than the specified nominal size (L) without correction by the following amounts (U):		X	X	X
	L, specified nominal weld size, inches, [mm] less than or equal to 3/16 [5] 1/4 [6] greater than or equal to 5/16 [8]	U, allowable decrease from L, in, [mm] less than or equal to 1/16 [2] less than or equal to 3/32 [2.5] less than or equal to 1/8 [3]			
	In all cases, the undersize portion of the weld shall not exceed 10% of the weld length. On web-to-flange welds on girders, underrun shall be prohibited at the ends for a length equal to twice the width of the flange.				
Undercut	(A) For material less than 1 in. [25 mm] thick, undercut shall not exceed 1/32 in. [1 mm], with the following exception: undercut shall not exceed 1/16 in. [2 mm] for any accumulated length up to 2 in. [50 mm] in any 12 in. [300 mm]. For material equal to or greater than 1 in. thick, undercut shall not exceed 1/16 in. [2 mm] for any length of weld.		X		
	(B) In primary members, undercut shall be no more than 0.01 in. [25 mm] deep when the weld is transverse to tensile stress under any design loading condition. Undercut shall be no more than 1/32 in. [1 mm] deep for all other cases.			X	X
Porosity	(A) CJP groove welds in butt joints transverse to the direction of computed tensile stress shall have no visible piping porosity. For all other groove welds and for fillet welds, the sum of the visible piping porosity 1/32 in. [1 mm] or greater in diameter shall not exceed 3/8 in. [10 mm] in any linear inch of weld and shall not exceed 3/4 in. [20 mm] in any 12 in. [300 mm] length of weld.		X		
	(B) The frequency of piping porosity in fillet welds shall not exceed one in each 4 in. [100 mm] of weld length and the maximum diameter shall not exceed 3/32 in. [2.5 mm]. Exception: for fillet welds connecting stiffeners to web, the sum of the diameters of piping porosity shall not exceed 3/8 in. [10 mm] in any linear inch of weld and shall not exceed 3/4 in [20 mm] in any 12 in. [300 mm] length of weld.			X	X
	(C) CJP groove welds in butt joints transverse to the direction of computed tensile stress shall have no piping porosity. For all other groove welds, the frequency of piping porosity shall not exceed one in 4 in. [100 mm] of length and the maximum diameter shall not exceed 3/32 in. [2.5 mm].			X	X