





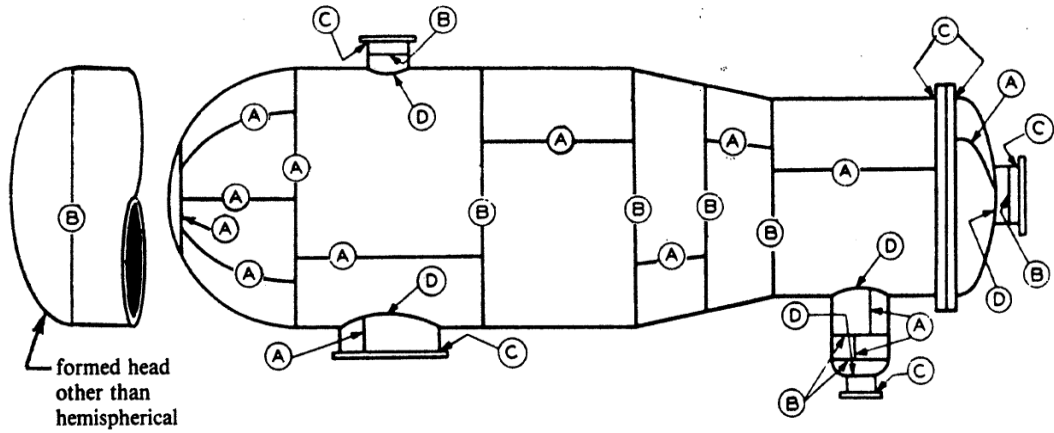


TYPES OF WELDED JOINTS

TYPES CODE UW-12		JOINT EFFICIENCY, E When the Joint:		
		a. Fully Radio- graphed	b. Spot Examined	c. Not Examined
1	 <p>Butt joints as attained by double-welding or by other means which will obtain the same quality of deposited weld metal on the inside and outside weld surface.</p> <p>Backing strip if used shall be removed after completion of weld.</p>	1.00	0.85	0.70
2	 <p>Single-welded butt joint with backing strip which remains in place after welding</p> <p><i>For circumferential joint only</i></p>	0.90	0.80	0.65
3	 <p>Single-welded butt joint without use of backing strip</p>	—	—	0.60
4	 <p>Double-full fillet lap joint</p>	—	—	0.55
5	 <p>Single-full fillet lap joint with plug welds</p>	—	—	0.50
6	 <p>Single full fillet lap joint without plug welds</p>	—	—	0.45

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DESIGN CONDITION	JOINT TYPE AND CATEGORY	RADIOGRAPHIC EXAMINATION	JOINT EFFICIENCY	POST WELD HEAT TREATMENT
1. The design is based on joint efficiency 1.0 or 0.9 (See design conditions listed below when full radiography is mandatory.) UW-11 UW-12(d)	All category A and D butt welds in vessel sections and heads	Full		Per Code UCS-56
	All category B or C butt welds (but not including those in nozzles or communicating chambers) which intersects the category A welds in vessel sections or heads or connect seamless vessel sections or heads	Spot	Type (1) 1.0 Type (2) 0.9	
		None	0.85 0.80	
Category A and B butt welds in vessel sections and heads shall be of Type (1) or Type (2)	Joints B and C butt welds in nozzles and communicating chambers that neither exceed 10 in. nom pipe size nor 1 1/8 in wall thickness do not require	any radiographic examination except as required for ferritic steel with tensile properties enhanced by heat treatment UHT-57		
2. Full radiographic examination is not mandatory UW-11(b)	Type (1) or Type (2) butt welded joints	Spot	Type (1) 0.85 Type (2) 0.80	Per Code UCS-56

DESIGN OF WELDED JOINTS (CONT.)

DESIGN CONDITION	JOINT TYPE AND CATEGORY	RADIOGRAPHIC EXAMINATION	JOINT EFFICIENCY	POST WELD HEAT TREATMENT
3. Full radiographic examination is not mandatory. The vessel is designed for external pressure only. UW-11(c)	Any type of welded joints.	None	Type (1) 0.70 Type (2) 0.65 Type (3) 0.60 Type (4) 0.55 Type (5) 0.50 Type (6) 0.45	Per Code USC-56
4. Vessels containing lethal substances. UW-2(a) <small>Joints B and C butt welds in nozzles and communicating chambers that neither exceed 10 in. in nom. pipe size or 1/4 in wall thickness do not require any radiographic examination except as required for ferritic steel with tensile properties enhanced by heat treatment UHT-57.</small>	Joints A shall be Type No. (1) UW-2(a)(1)(a)	Full	1.0	Vessels fabricated of carbon or low alloy steel shall be post weld heat treated UW-2(a)
	Joints B and C shall be Type No. (1) or Type No. (2) UW-2(a)(1)(b)		1.0 Type (1) 0.9 Type (2)	
	Joints D shall be full penetration welds extending through the entire thickness of the vessel or nozzle wall UW-2(a)(1)(d). Joints of category C for the fabricated lap joint stub ends UW2(a)(1)(c).	All butt welded joints in shell and heads shall be fully radiographed except exchanger tubes and exchangers UW-2(a)(2) and (3) and per UW-11(a)(4)		
5. Vessels operated below -20°F or impact test is required for the material or weld metal UW-2(b)	Joints A shall be Type No. (1) (except for austenitic chromium nickel stainless steel). Joints B shall be Type No. (1) or No. (2). UW-2(b)(1) and (2). Joints C full penetration welds extending through the entire section of the joint UW-2(b)(3). Joints D full penetration welds extending through the entire section at the joint UW-2(b)(4).	Full Spot No	Type (1) Type (2) 1.0 0.90 0.85 0.80 0.70 0.65	Per Code UCS-56
6. Unfired steam boilers with design pressure exceeding 50 psi <small>See note above in this column at design condition 4:</small>	Joints A shall be Type No. (1). Joints B shall be Type No. (1) or No. (2) UW-2(c)	All butt welded joints in shell heads shall be fully radiographed except under the provisions of UW-11(a)(4) UW-2(c)	1.0 1.0 Type (1) 0.9 Type (2)	Vessels fabricated of carbon or low alloy steel shall be post weld heat treated UW-2(c)

DESIGN OF WELDED JOINTS (CONT.)

DESIGN CONDITION	JOINT TYPE AND CATEGORY	RADIOGRAPHIC EXAMINATION	JOINT EFFICIENCY	POST WELD HEAT TREATMENT
7. Pressure vessels subject to direct firing	Joints A shall be type No. (1) Joints B shall be type No. (1) or No. (2) when the thickness exceeds 5/8 in. No welded joints of type (3) are permitted for either A or B joints in any thickness UW-2(d)	Full Spot No	Type (1) Type (2) 1.0 0.90 0.85 0.80 0.70 0.65	When the thickness at welded joints of carbon steels (P-No. 1) exceeds 5/8 in. and all thicknesses for low alloy steels (other than P-No. 1) post weld heat treatment is mandatory
8. Electroslag welding	All but welds UW-11(a) (6)	Full	1.0 Type (1) 0.9 Type (2)	Per Code UCS-56
9. Final closure of vessels	Any welds UW-11(a) (7)	Full Ultrasonic examination when the construction does not permit radiographs	1.0 Type (1) 0.9 Type (2)	Per Code UCS-56
10. Seamless vessel sections or heads UW-11(a) (5) (b) UW-12(d)	Joints connecting vessel sections and heads	Spot	1.0*	Per Code UCS-56
		None or when A or B welds are type 3, 4, 5, 6	0.85*	
11. Joints completed by pressure UW-12(f)	Any Welds		Not greater than .80	