

به نام خدا



مرکز دانلود رایگان
مهندسی متالورژی و مواد

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مقایسه حد پذیرش عیوب براساس استانداردها

STANDARD	ISO5817-EN25817						ASME			AWS D1.1			API 1104	
	ISO 6520 reference	Remarks	t mm	Limits for Imperfections for quality levels			Acceptance Levels			Acceptance Criteria			اصالت سطح (نوع هر نوع بارگذاری)	اصالت سطح (نوع هر نوع بارگذاری)
				D	C	B	Level I	Level II	Level III					
Crack	100	---	≥ 0.5	Not permitted	Not permitted	Not permitted	none	none	none	هرگونه ترک غیرقابل پذیرش می باشد مستقل از سایز و محل قرارگیری آن	×	×	×	---
Crater crack	104	---	≥ 0.5	Not permitted	Not permitted	Not permitted	---	---	---	تمامی چاله ها باید پر شوند، غیر از چاله هایی که در انتهای جوش های نبشی منقطع خارج از طول موثر جوش قرار دارند.	×	×	×	---
Crack, surface	---	---	---	---	---	---	none	Maximum Length 3mm	Maximum Length 6.5mm	هرگونه ترک غیرقابل پذیرش می باشد مستقل از سایز و محل قرارگیری آن	×	×	×	---
crazing	---	---	---	---	---	---	none	Maximum dimension of crazing, 13mm	Maximum dimension of crazing, 25mm	هرگونه ترک غیرقابل پذیرش می باشد مستقل از سایز و محل قرارگیری آن	×	×	×	---
Surface pore	2017	Maximum dimension of a single pore for - butt welds - fillet welds	0.5t to 3	$d \leq 0.3s$ $d \leq 0.3a$	Not permitted	Not permitted	none	Maximum of 25 pits in porous area of size listed in level II	Maximum of 50 pits in porous area of size listed in level III	تعداد حفرات گازی لوله ای شکل در جوش های شیباری نفوذ کامل، در صورتی که جوش عمود بر جهت تنش کششی باشد هیچ حفره گازی لوله ای شکل مجاز نمی باشد. برای سایر جوش های شیباری و نبشی مجموع قطر حفرات لوله ای قابل رویت با قطر 1 mm یا بیشتر، نباید از 10 mm در هر 25 mm طول جوش و از 20 mm در هر 200 mm طول جوش تجاوز نماید. تعداد حفرات گازی لوله ای شکل در جوش های شیباری نبشی نباید بیشتر از یک عدد در هر 100 mm طول جوش باشد و حداکثر قطر آن نباید از 2.5 mm تجاوز نماید. استثنای این برای جوش های نبشی اجزای تحت فشار است که در این مورد با توافق سازنده و تایید مهندسان مجاز است.	×	---	---	---
			> 3	$d \leq 0.3s$, but max 3mm $d \leq 0.3a$, but max 3mm	$d \leq 0.2s$, but max 2mm $d \leq 0.2a$, but max 2mm	Not permitted					---	---	---	---
Air bubble	---	---	---	---	---	---	none	Maximum diameter 1.5mm, $\frac{2}{in^2}$	Maximum diameter 3mm, $\frac{4}{in^2}$	---	---	---	---	---
Wormhole	---	---	---	---	---	---	none	Maximum diameter 3mm	Maximum diameter 6.5mm	---	---	---	---	---
Pit (pinhole)	---	---	---	---	---	---	none	Maximum diameter 0.4mm, depth less than 1 percent of wall thickness	Maximum diameter 0.8mm, depth less than 20 percent of wall thickness	---	---	---	---	---
End crater pipe	2025		0.5t to 3	$h \leq 0.2t$	Not permitted	Not permitted	---	---	---	---	---	---	---	---
Lack of fusion Micro lack of fusion	401	only detectable by micro examination	≥ 0.5	Not permitted	Not permitted	Not permitted	---	---	---	یابستنی ذوب کامل بین لایه های جوشی و همچنین بین فلز جوش و فلز پایه وجود داشته باشد.	×	×	×	---
			permitted	permitted	permitted	---	---	---	---	---				
Incomplete root penetration	4021		≥ 0.5	Short imperfections: $h \leq 0.2t$, but max 2mm	Not permitted	Not permitted	---	---	---	---	---	---	---	---
Lock of fill out	---	---	---	---	---	---	none	Maximum diameter, 6.5mm	Maximum diameter, 9.5mm	---	---	---	---	---
Continuous undercut intermittent undercut	5011 5012	Smooth transition is required, this is not regarded as a systematic imperfection.	0.5t to 3	Short imperfections: $h \leq 0.2t$	Short imperfections: $h \leq 0.1t$	Not permitted	---	---	---	برای قطعاتی با ضخامت کمتر از 2.5mm عمق سوختگی کنار جوش نباید از 1mm تجاوز نماید. البته به شرطی که مجموع طول این عیب در هر 300mm خط جوش از 5mm تجاوز نکند. عمق آن حداکثر تا 2mm مجاز خواهد بود برای ضخامت های بزرگتر یا مساوی 2.5mm. حداکثر عمق مجاز سوختگی کنار، برای هر طولی از جوش، 2mm می باشد.	×	---	---	---
			> 3	$h \leq 0.2t$ but max 1mm	$h \leq 0.1t$ but max 0.5mm	$h \leq 0.05t$ but max 0.5mm	---	---	---	---	در اعضای اصلی سازه، هنگامی که جهت تنش کششی عمود بر راستای جوش است، سوختگی کنار حداکثر تا عمق 2.5mm مجاز می باشد. برای تمامی حالت های دیگر، عمق این عیب نباید از 1mm تجاوز نماید.	---	×	×
Shrinkage groove	5013	smooth transition is required	0.5t to 3	$h \leq 0.2 mm + 0.1t$	Short imperfections $h \leq 0.1t$	Not permitted	---	---	---	---	---	---	---	---
			> 3	Short imperfections $h \leq 0.2t$ but max 2mm	Short imperfections $h \leq 0.1t$ but max 1mm	Short imperfections $h \leq 0.05t$ but max 0.5mm	---	---	---	---	---			
Excess weld metal (but weld)	502		≥ 0.5	$h \leq 1mm + 0.25b$ but max 10mm	$h \leq 1mm + 0.15b$ but max 7mm	$h \leq 1mm + 0.1b$ but max 5mm	---	---	---	میزان گرده جوش نباید بیش از 2mm باشد.	×	×	×	---
Excessive convexity (filler weld)	503		≥ 0.5	$h \leq 0.5mm + 0.25b$ but max 5mm	$h \leq 1mm + 0.15b$ but max 4mm	$h \leq 1mm + 0.1b$ but max 3mm	---	---	---	---	---	---	---	---
			---	---	---	---	---	---	---	---	---	---	---	---
Excess penetration	504		0.5t to 3	$h \leq 1mm + 0.6b$	$h \leq 1mm + 0.3b$	$h \leq 1mm + 0.1b$	---	---	---	---	---	---	---	---
			> 3	$h \leq 1mm + 1b$ but max 5mm	$h \leq 1mm + 0.6b$ but max 4mm	$h \leq 1mm + 0.2b$ but max 3mm	---	---	---	---	---			
Incorrect weld toe	505	- butt welds - fillet welds	≥ 0.5	$\alpha \geq 90^\circ$	$\alpha \geq 110^\circ$	$\alpha \geq 150^\circ$	---	---	---	---	---	---	---	---
			≥ 0.5	$\alpha \geq 90^\circ$	$\alpha \geq 110^\circ$	$\alpha \geq 110^\circ$	---	---	---	---	---			
Overlap	506		≥ 0.5	$h \leq 0.2b$	Not permitted	Not permitted	---	---	---	غیرقابل پذیرش می باشد.	×	×	×	---
Sagging Incompletely fillet groove	509 511	Smooth transition is required	0.5t to 3	Short imperfections $h \leq 0.25t$	Short imperfections $h \leq 0.1t$	Not permitted	---	---	---	---	×	×	×	---
			> 3	Short imperfections $h \leq 0.25t$ but max 2mm	Short imperfections $h \leq 0.1t$ but max 1mm	Short imperfections $h \leq 0.05t$ but max 0.5mm	---	---	---	---	---			
Burn through	510		≥ 0.5	Not permitted	Not permitted	Not permitted	none	none	none	---	---	---	---	---
Excessive asymmetry of fillet weld	512		≥ 0.5	$h \leq 2mm + 0.2a$	$h \leq 2mm + 0.15a$	$h \leq 1.5mm + 0.15a$	---	---	---	غیرقابل پذیرش می باشد.	×	×	×	---
Root concavity	515	Smooth transition is required	0.5t to 3	$h \leq 0.2mm + 0.1t$	Short imperfections $h \leq 0.1t$	Not permitted	---	---	---	---	---	---	---	---
			> 3	Short imperfections $h \leq 0.2t$ but max 2mm	Short imperfections $h \leq 0.1t$ but max 1mm	Short imperfections $h \leq 0.05t$ but max 0.5mm	---	---	---	---	---			
Root porosity	516	Spongy formation at the root of a weld due to bubbling of the weld metal at the moment of solidification	≥ 0.5	Locally permitted	Not permitted	Not permitted	---	---	---	---	---	---	---	---
Poor restart	517	---	≥ 0.5	Permitted, the limit depends on the type of imperfection occurred due to restart	Not permitted	Not permitted	---	---	---	---	---	---	---	---
Insufficient throat thickness	5213	Not applicable to processes with proof of greater depth of penetration	0.5t to 3	Short imperfections $h \leq 0.2mm + 0.1a$	Short imperfections $h \leq 0.2mm$	Not permitted	---	---	---	---	---	×	×	×
			> 3	Short imperfections $h \leq 0.3mm + 0.1a$ but max 2mm	Short imperfections $h \leq 0.3mm + 0.1a$ but max 1mm	Not permitted	---	---	---	---	---	---	---	---
Excessive throat thickness	5214	the actual throat thickness of the fillet weld is too large	≥ 0.5	unlimited	$h \leq 1mm + 0.2a$ but max 4mm	$h \leq 1mm + 0.15a$ but max 3mm	---	---	---	---	---	---	---	---
Stray arc	601	---	≥ 0.5	Permitted if the properties of the parent metal are not affected	Not permitted	Not permitted	---	---	---	---	---	---	---	---
Splatter	602	---	≥ 0.5	Acceptance depends on application, e.g. material, corrosion protection	---	---	---	---	---	---	---	---	---	---
Chip	---	---	---	---	---	---	none	Maximum dimension of break 3mm	Maximum dimension of break 6.5mm	---	---	---	---	---
Delamination edge	---	---	---	---	---	---	none	Maximum dimension 3mm	Maximum dimension 6.5mm	---	---	---	---	---
Delamination internal	---	---	---	---	---	---	none	none	none	---	---	---	---	---
Foreign inclusion	---	---	---	---	---	---	none	Maximum dimension 0.8mm, $1/0.09m^2$	Maximum dimension 1.5mm, $1/0.09m^2$	---	---	---	---	---
Fracture	---	---	---	---	---	---	none	Maximum dimension 21mm	Maximum dimension 29mm	---	---	---	---	---
Scratch	---	---	---	---	---	---	none	Maximum length 25mm maximum depth 0.125mm	Maximum length 25mm maximum depth 0.25mm	---	---	---	---	---
Short Pimple	---	---	---	---	---	---	none	none	none	---	---	---	---	---
Dry-spot	---	---	---	---	---	---	none	Maximum diameter, 9.5mm	Maximum diameter, 14mm	---	---	---	---	---
Blister	---	---	---	---	---	---	none	Maximum diameter, 3mm	Maximum diameter, 6.5mm	---	---	---	---	---
Fish-eye	---	---	---	---	---	---	none	Maximum diameter, 9.5mm	Maximum diameter, 13mm	---	---	---	---	---
Orange-peel	---	---	---	---	---	---	none	Maximum diameter, 14mm	Maximum diameter, 29mm	---	---	---	---	---
Pre-gel	---	---	---	---	---	---	none	Maximum dimension, 6.5mm	Maximum dimension, 13mm	---	---	---	---	---
Resin-pocket	---	---	---	---	---	---	none	Maximum diameter, 3mm	Maximum diameter, 6.5mm	---	---	---	---	---
Resin-rich edge	---	---	---	---	---	---	none	Maximum, 0.4mm from the edge	Maximum, 0.8mm from the edge	---	---	---	---	---
Shrink mark	---	---	---	---	---	---	none	Maximum diameter, 9.5mm, depth not greater than 25 percent of wall thickness	Maximum diameter, 14mm, depth not greater than 25 percent of wall thickness	---	---	---	---	---
Wash	---	---	---	---	---	---	none	Maximum dimension, 21mm	Maximum dimension, 29mm	---	---	---	---	---
Wrinkles	---	---	---	---	---	---	none	Maximum length surface side, 13mm, depth less than 10 percent of wall thickness	Maximum length surface side, 25mm, depth less than 15 percent of wall thickness	---	---	---	---	---
Time of inspection	---	---	---	---	---	---	---	---	---	بازرسی چشمی جوش برای انواع فولادها با فاصله بعد از اتمام جوشکاری و رسیدن به دمای محیط قابل اجراء می باشد. استثنای این فولادها A709, A514, A517, A518 است. ساعت پس از تکمیل جوش باید حداکثر 48 ساعت پس از تکمیل جوش انجام شود.	×	×	×	---

Symbols: Z : حداقل اندازه زنی اجزای جوش گوشه ای، a : حداقل ضخامت گلوئی جوش گوشه ای، α : زاویه پنجه جوش، b : مقدار عرض برآمدگی جوش، t : ضخامت لوله یا ورق، h : طول یا عرض ناپیوستگی