

Welding Defects & Fixes

Comprehensive Troubleshooting Chart

This guide identifies common welding defects, their causes, and solutions across all major welding processes. Use this reference to diagnose and correct weld quality issues systematically.

Porosity (Gas Pockets/Holes)

Cause	Visual Indicator	Solution
Contaminated base metal	Random holes throughout weld	Clean metal thoroughly, remove rust/paint/oil
Insufficient gas coverage	Porosity on weld surface	Increase gas flow rate, check for leaks
Excessive gas flow	Porosity (turbulent flow)	Reduce gas flow to 15-25 CFH
Drafty conditions	Surface and subsurface holes	Shield work area from wind/drafts
Contaminated wire/rod	Scattered porosity	Use clean filler metal, check storage
Moisture in gas line	Clustered porosity	Purge gas lines, check cylinder/regulator
Excessive travel speed	Elongated pores	Slow down travel speed
Arc length too long	Widespread surface porosity	Shorten arc length/stick-out

Cracks (Hot and Cold)

Type/Cause	Location	Solution
Hot cracking (high sulfur)	Center of weld bead	Use low-sulfur base metal, preheat
Cold cracking (hydrogen)	Heat affected zone (HAZ)	Preheat, use low-hydrogen electrodes, post-heat
Rapid cooling	Longitudinal cracks	Reduce cooling rate, preheat thick sections
High restraint	Transverse cracks at ends	Reduce joint restraint, sequence welds properly
Crater cracks	Weld crater at end	Fill craters properly, use crater fill function
Underbead cracking	Below weld in HAZ	Preheat, reduce hydrogen, lower heat input
Weld metal too hard	Through weld metal	Use proper filler metal, post-weld heat treat
Poor joint design	Root or toe cracks	Improve joint preparation, increase groove angle

Incomplete Fusion & Lack of Penetration

2025 Best Welding Helmet Reference Guide

Cause	Description	Solution
Travel speed too fast	Lack of sidewall fusion	Slow down travel speed significantly
Amperage too low	Incomplete root penetration	Increase amperage/heat input
Electrode too large	Cannot reach root	Use smaller electrode diameter
Improper technique	Cold lap on vertical	Improve weave/pause technique
Incorrect angle	One-sided lack of fusion	Maintain proper work and travel angles
Dirty base metal	Fusion discontinuity	Clean joint faces thoroughly
Excessive gap	Melt-through or cold lap	Improve fit-up, reduce root opening
Arc voltage too high	Wide, shallow bead	Reduce voltage, use short arc

Undercut

Cause	Description	Solution
Amperage too high	Deep groove at toe	Reduce amperage 10-15%
Travel speed too fast	Intermittent undercut	Slow down, allow puddle to fill
Incorrect angle	Undercut on one side	Adjust work angle, point toward undercut
Excessive weave	Both sides undercut	Reduce weave width, pause at edges
Arc too long	Wide, shallow undercut	Shorten arc length
Improper filler addition	Inconsistent undercut	Add filler more consistently
Vertical up too fast	Undercut at top edge	Slow vertical travel, use shelf technique

Overlap & Excessive Reinforcement

Defect	Cause	Solution
Cold lap/overlap	Travel speed too slow	Increase travel speed
Cold lap/overlap	Amperage too low	Increase heat input
Cold lap/overlap	Improper angle	Adjust electrode angle
Excessive convexity	Too much filler	Reduce wire speed or filler addition
Excessive reinforcement	Travel too slow	Increase travel speed
High crown	Voltage too low	Increase voltage slightly

Spatter & Arc Problems

Problem	Cause	Solution
Excessive spatter	Voltage too low	Increase voltage 1-2V
Excessive spatter	Wire speed too high	Reduce wire feed speed
Excessive spatter	Wrong gas/contaminated	Use C25, check gas purity
Excessive spatter	Dirty base metal	Clean metal surface
Arc wander	Magnetic arc blow	Change ground location, reduce amperage
Unstable arc	Poor ground connection	Clean and tighten ground clamp
Erratic wire feed	Liner/drive roll issues	Clean liner, check drive roll tension

Distortion & Warping

Cause: Uneven heating and cooling, excessive heat input, poor clamping

Prevention Solutions:

- Use proper welding sequence (skip welding, back-step method)
- Minimize heat input (use lower amperage, faster travel)
- Preheat thick sections uniformly
- Use fixtures and clamps to control movement
- Balance welds on opposite sides of neutral axis
- Tack weld more frequently on long seams
- Consider peening (controlled hammering) between passes

DISCLAIMER: This information is provided for educational purposes only. Always follow manufacturer guidelines, local codes, and safety regulations. Welding involves significant hazards including burns, electric shock, fumes, and fire. Proper training, certification, and safety equipment are essential before attempting any welding operations.

For more welding resources, visit: <https://bestweldinghelmet.net>