



المهارة الذكية
Smart Skill

MANUFACTURER'S INSTALLATION RECOMMENDATIONS

**Shear Stud Connectors (Type B)
Drawn-Arc Stud Welding**



INSTALLATION RECOMMENDATIONS

1. Scope

These recommendations cover correct field installation of Smart Skill Type B shear stud connectors using the drawn-arc stud welding process, to achieve consistent, code-compliant welds in accordance with ISO 13918, ISO 14555 and AWS D1.1.

2. Equipment Requirements

- Stud welding machine sized to the stud diameter range being installed (refer to Welding Current Table, Section 5).
- SAG-type stud welding gun fitted with the correct stud chuck and ceramic ferrule holder for the stud diameter in use.
- Stable 3-phase power supply at the machine's rated voltage; allowed voltage fluctuation $\pm 10\%$.
- Welding and ground cables sized and length-rated for the machine model (refer to machine technical data).



Drawn-arc stud welding machine (SDA/SDAi series) with SAG welding gun and cables

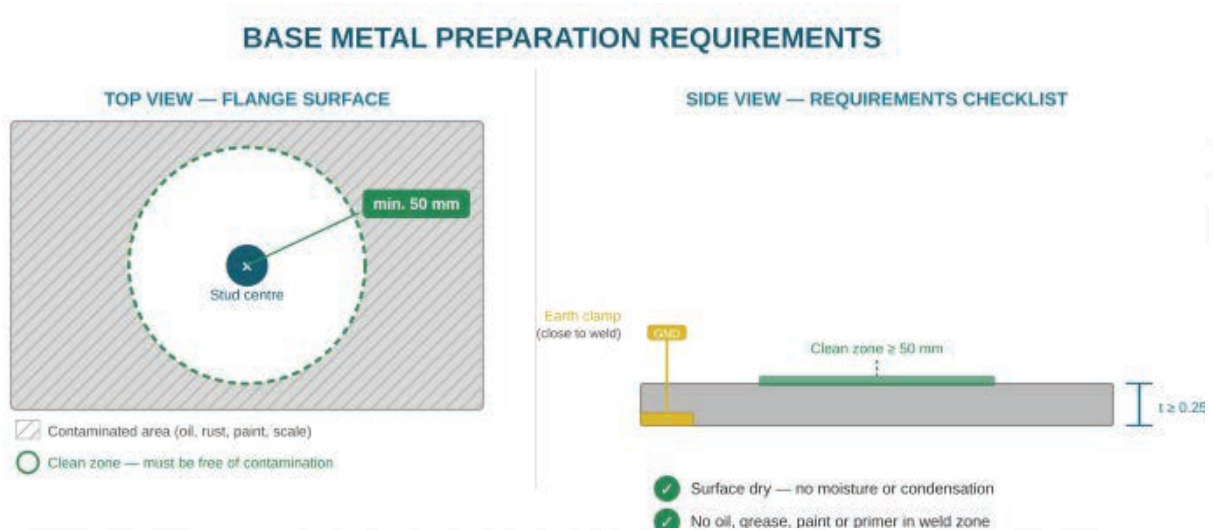


Type B shear stud connectors with matching ceramic ferrule

3. Base Metal Preparation

1. Base metal (steel flange/plate) thickness shall be at least $0.25 \times$ the nominal stud diameter.
2. The weld area and at least 50 mm surrounding it shall be free of oil, grease, paint, primer, mill scale, rust, and moisture.
3. Mark stud locations accurately per the approved layout drawing.
4. Ensure good electrical contact for the ground/earth clamp, attached as close as practicable to the weld location.

INSTALLATION RECOMMENDATIONS



Base metal preparation: minimum 50 mm clean zone around each stud weld location, and earth clamp placement

4. Lift & Protrusion Settings

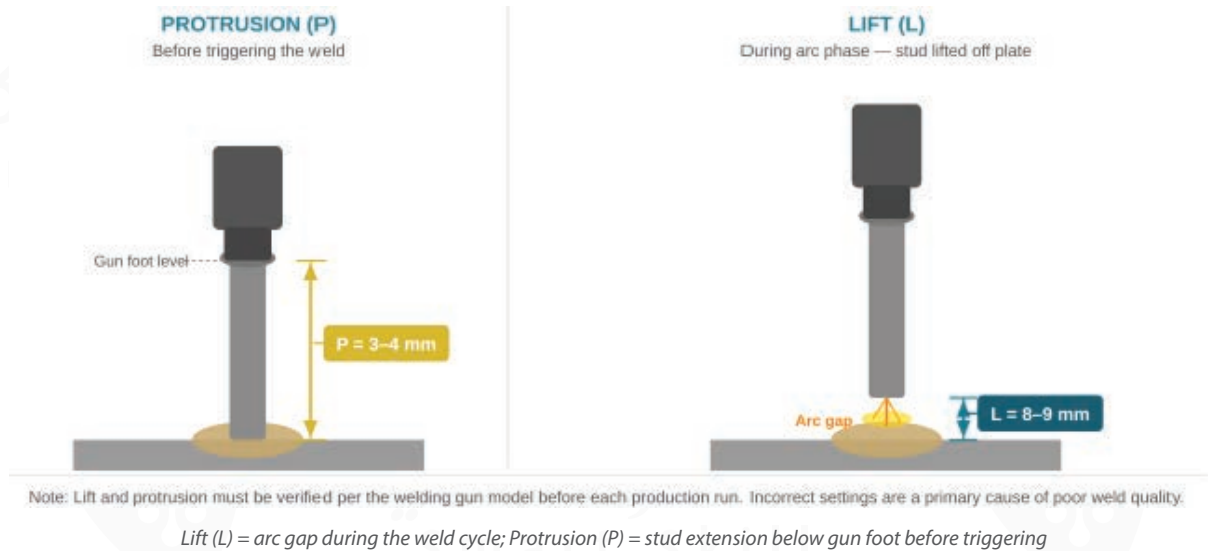
Lift and protrusion control the arc gap and plunge depth during the weld cycle and must be set correctly for the stud diameter and welding gun model. Typical recommended settings:

Stud Diameter	Lift	Protrusion
M13	8 - 9 mm	3 - 4 mm
M16	8 - 9 mm	3 - 4 mm
M19	8 - 9 mm	3 - 4 mm
M22	8 - 9 mm	3 - 4 mm
M25	8 - 9 mm	3 - 4 mm

Note: confirm exact lift/protrusion against the specific welding gun and machine model documentation.

INSTALLATION RECOMMENDATIONS

LIFT & PROTRUSION SETTINGS-WELDING GUN



5. Recommended Welding Current & Time (Indicative)

PPE is mandatory during the drawn-arc stud welding process. Not required for ordinary handling of the unwelded connector under normal conditions.

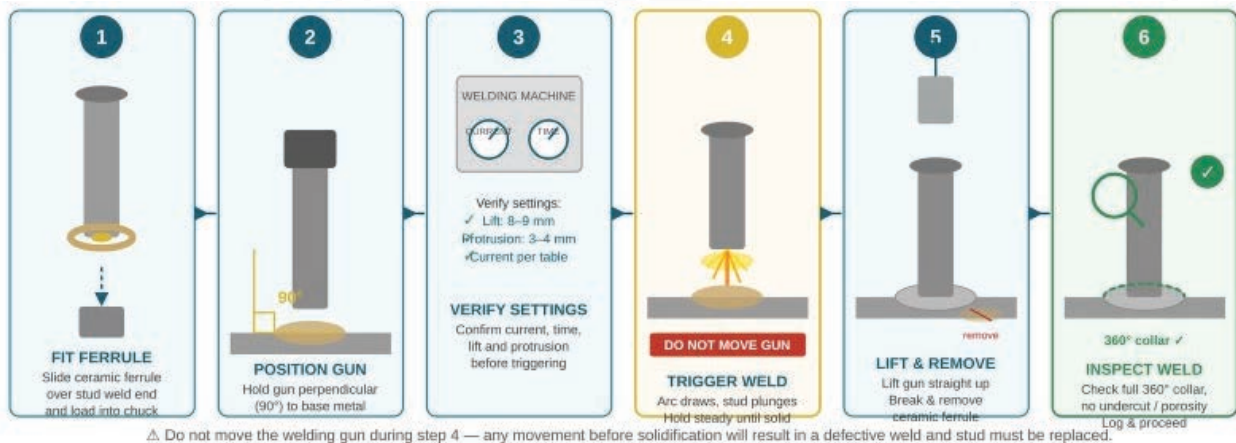
Stud Diameter	Welding Current (A)	Welding Time (s)
M13	1100	0.9
M16	1300	1.0
M19	1900	1.15
M22	2300	1.25
M25	2800	1.75

Note: Values are indicative and subject to local power supply and base metal conditions. Always perform and approve a trial weld before mass production welding.

INSTALLATION RECOMMENDATIONS

6. Step-by-Step Installation Procedure

STEP-BY-STEP INSTALLATION PROCEDURE



Six-step drawn-arc stud welding installation sequence - follow in order for every stud

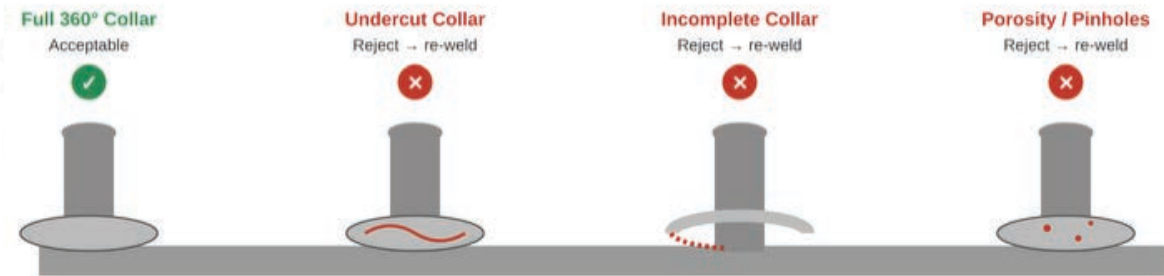
1. Fit the ceramic ferrule over the stud weld end and load the stud into the gun chuck.
2. Position the gun perpendicular (90°) to the work surface at the marked location; ensure firm, flush contact of the ferrule with the base metal.
3. Verify lift, protrusion, current, and time settings on the welding machine before starting.
4. Trigger the weld; do NOT move the gun until the weld cycle is complete and the pool has visibly solidified.
5. Lift the gun straight up, then break and remove the ceramic ferrule.
6. Visually check for a complete 360° weld collar with no undercut, porosity, or incomplete fusion. Record in the daily inspection log.

7. Trial Welds & Bend Testing

- Perform a minimum of two trial welds at the start of each shift, after any change in base metal thickness/grade, stud diameter, welding position, or equipment/operator change.
- Bend trial weld studs 15°–30° from vertical; acceptance requires no cracking at the weld collar or in the heat-affected zone.
- Only proceed to production welding once trial welds pass inspection and bend testing.

INSTALLATION RECOMMENDATIONS

WELD COLLAR VISUAL INSPECTION CRITERIA



Inspect 100% of welds visually; verify a continuous, uniform 360° fillet collar free of cracks, undercut, porosity, or incomplete fusion.

Weld collar inspection: full 360° fillet required (left), common rejects (right)

STUD BEND TEST - ACCEPTANCE CRITERIA

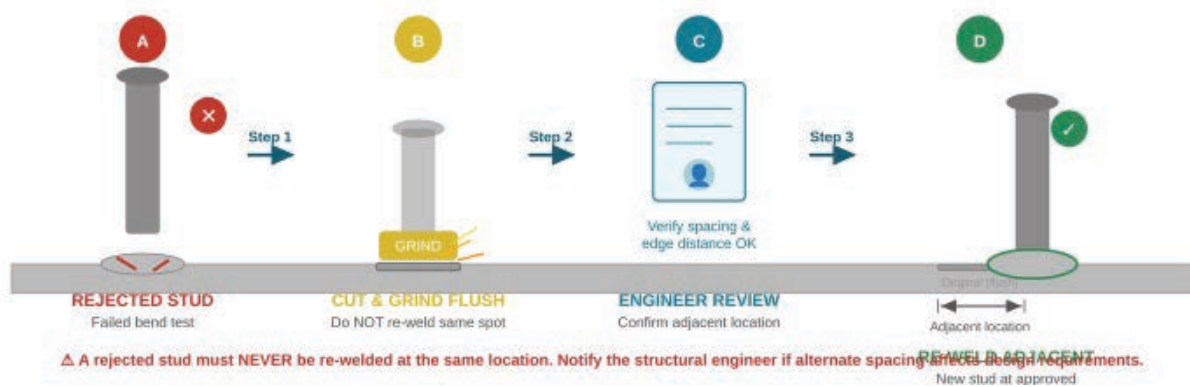


Bend test: bend 15°–30° - accept if no cracking at collar / HAZ

8. Common Defects & Corrective Action

Defect	Likely Cause	Corrective Action
Incomplete weld collar	Low current / short weld time / contaminated surface	Increase current/time; clean base metal; re-weld at adjacent location
Porosity in weld	Damaged/incorrect ferrule, moisture on surface, insufficient flux	Replace ferrule, ensure dry surface, verify stud flux integrity
Stud not vertical	Incorrect gun positioning, gun movement during weld	Re-train operator; ensure firm gun contact and no movement during cycle
Weld fracture on bend test	Excessive current, contaminated base metal, incorrect lift/protrusion	Re-calibrate settings, clean surface, repeat trial weld

REJECTED STUD — REMOVAL & RE-WELD PROCEDURE





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