

Tack weld beads sometimes fracture during the final welding. How should tacking be carried out?

How to Carry Out Tack Welding

A tack weld is a weld made to hold the parts of a weldment in proper alignment until the final welds are made. A tack weld is generally a short weld made at intermittent points to hold abutting edges together. Tack welding is likely to be done lightly but tack welds should be subject to the same quality requirements as the final welds. Here are tips for making sound tack welds.

- (1) Specify the length of each tack weld and the measurement from center to center of the tack welds in advance. In addition, you should specify multiple-pass weld profiles and throat thickness of the tack weld for tacking thick section components. The recommended minimum length of a tack weld bead, according to the Technical Recommendations for Steel Construction for Buildings of the Japanese Architectural Standard Specification (JASS 6), is shown in **Table 1**.

Table 1 Recommended minimum length of a tack weld bead for steel structures ⁽¹⁾

| Plate thickness (mm) ⁽²⁾ | Min. bead length (mm) ⁽³⁾ |
|-------------------------------------|--------------------------------------|
| 6 max. | 30 |
| Over 6 | 40 |

Note: (1) Applied to SMAW and semi-automatic GMAW.

In the case of high heat input welding by SAW, the minimum length of a tack weld bead should be longer with a larger throat thickness than in the case of SMAW and semi-automatic GMAW to prevent fracturing of the tack weld bead, caused by welding distortion.

- (2) Apply to the thicker component in the case of a dissimilar thickness joint.
- (3) The pitch of tack welds should generally be approximately 400 mm or shorter.

- (2) According to the JASS 6 specification, do not tack welding when the ambient temperature at a welding area is lower than -5°C . When it is in between -5°C and 5°C , preheat the base metal at an appropriate temperature for a distance up to 100 mm from the welding joint.

- (3) In tacking high tensile strength steel and heat-resistant low-alloy steel, a short tack weld bead causes faster cooling rates of the weld and thereby increases the hardness of the heat-affected zone of the base metal, which may cause cracking of the tack weld. In order to prevent this trouble, preheating temperature should be 40-50 $^{\circ}\text{C}$ higher than in the final welding.

- (4) Use low hydrogen electrodes for tacking thick components of mild steel, high tensile strength steel and heat-resistant low-alloy steel to prevent cold cracking of tack welds.

- (5) Avoid tack welding on sharp corners of the components where residual stress is apt to concentrate. **Figure 1** shows typical recommended locations for tack welds on a steel structure as per the Technical Recommendations for Steel Construction for Buildings.

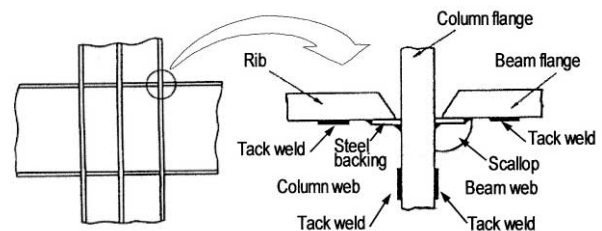


Fig. 1 Recommended tack weld locations for a column-to-beam connection joint

- (6) You should progress symmetrically when you carry out tack welding on strongly restrained thick section components as shown in **Fig. 2**.

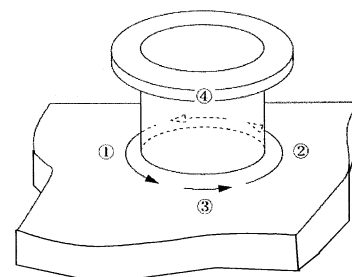


Fig. 2 Symmetrical tack welding on strongly restrained thick section work

- (7) Whether they will be removed or left in place, tack welds should be made using a fillet weld or butt weld procedure qualified per the relevant code. Tack welds to be left in place should be made by welders qualified in accordance with the pertinent specification. They should be examined visually for defects and removed if found to be defective.