

# Welding Defects & Prevention

Defects	Causes	Preventive Measure
Fibrous Structures	There are columnar structures present in the fractured part of weld metal, which arise when the properties of weld metal are inferior (rich C, P and S) and the cooling rate of weld metal is too fast	<ol style="list-style-type: none"> <li>1. Select the electrode suitable to base metal.</li> <li>2. Make the travel speed to be slower, and avoid the rapid cooling of weld metal.</li> </ol>
Cracks of Weld Metal	There is one kind of crack which is caused by shrinkage of metals accompanying cooling of metals. When the properties of steels, restraint of joints and shape of bead are inferior, or when the cooling rate of weld metals is too rapid, or improper electrodes are used, these defects are liable to arise.	<ol style="list-style-type: none"> <li>1. Do not use excessive current.</li> <li>2. Avoid rapid cooling of weld metal.</li> <li>3. When the rigidity of joints is great, preheating and peening is required. As another method it is considered to change welding order.</li> <li>4. Select the electrode suitable to base metal. Especially when Si and C are rich, use the low hydrogen type electrodes.</li> <li>5. Don't use the electrodes which absorb moisture.</li> </ol>
Occurrence of blow holes	There are two types of blowholes. One which arises inside of weld metals, the other arises on the surface. If the arc length is not proper, excessive current is used, dirty or inferior base metal is adopted and improper electrodes is used, these defect are liable to occur.	<ol style="list-style-type: none"> <li>1. Use the correct welding current.</li> <li>2. Make the arc length proper.</li> <li>3. Remove the rust, oil and moisture which adhere to the base metals.</li> <li>4. Use the correct electrodes.</li> </ol>
Fish eyes	These defects are the silver grey parts of fish eyes which appear in the fracture parts of weld metals, they are produced when moisture absorbing electrodes are used and cooling rate is too fast.	<ol style="list-style-type: none"> <li>1. Avoid rapid cooling of weld metals.</li> <li>2. Don't use the electrodes which absorb moisture.</li> <li>3. Use the low hydrogen type of electrode.</li> <li>4. Pre-heat the job.</li> </ol>
Inclusion of Slag's	These are the defect are the condition that the slag's are occluded in the weld metals or between weld metals and the base metal. They are produced when welding current is low, speed of manipulation is improper and groove configuration or root interval are improper.	<ol style="list-style-type: none"> <li>1. Raise the welding current.</li> <li>2. Operate with proper welding speed</li> <li>3. Widen the root interval.</li> <li>4. Select the proper electrodes.</li> </ol>

<b>Defects</b>	<b>Causes</b>	<b>Preventive Measures</b>
Undercutting	These defects are deeply cutted groove. When welding current is too excessive, manipulation method of electrodes is improper, they are liable to occur.	<ol style="list-style-type: none"> <li>1. Use the correct welding current.</li> <li>2. Select the proper manipulation speed.</li> <li>3. Avoid the excessive heating of base metal.</li> <li>4. Make the arc length proper.</li> </ol>
Overlapping	They are produced when welding speed is too slow at the state that weld metals does not melt with base metal sufficiently and weld metal put over the surface of base metals.	<ol style="list-style-type: none"> <li>1. Use the correct welding current.</li> <li>2. Use the correct manipulation speed.</li> <li>3. Select the proper electrodes.</li> </ol>
Poor Fusion	Too low a welding current, Improper weaving, Incorrect electrode size.	<ol style="list-style-type: none"> <li>1. Increase current with plate thickness.</li> <li>2. Weave sufficient to melt sides.</li> <li>3. Use electrode small enough to reach the bottom of the vee.</li> </ol>
Porosity	Too fast a travel speed, Excessive weld currents, Moisture in electrodes coating.	<ol style="list-style-type: none"> <li>1. Puddle molten so gas can escape.</li> <li>2. Use recommended current values.</li> <li>3. Protect the electrode as per instruction of manufacturer.</li> </ol>
Poor weld Surface	Improper weaving of electrode. Excessive weld currents. Overheated work.	<ol style="list-style-type: none"> <li>1. Use a more uniform weave.</li> <li>2. Reduce current.</li> <li>3. Keep work at lower temperatures</li> </ol>
Slag inclusions	Using extremely short arc. Improper electrode manipulation. Too low a current.	<ol style="list-style-type: none"> <li>1. Use medium arc length</li> <li>2. Obtain ample molten metal pudding.</li> <li>3. Use recommended current at moderate weld speed.</li> </ol>
Weld cracks	Welds too small. Rigid joints Improper penetration Fast cooling of weld metal.	<ol style="list-style-type: none"> <li>1. Use a larger weld between heavy plates.</li> <li>2. Use design that does not have rigid joint</li> <li>3. Avoid stringer beads for heavy welds.</li> <li>4. Ensure good fusion.</li> </ol>