

CAVITIES

WORMHOLE POROSITY

Resulting from entrapment of gas between solidifying dendrites of weld metal, often showing a herring bone array,

Causes

The gas may arise from contamination of surfaces to be welded or be prevented from escaping by joint crevices.

UNIFORM POROSITY

Resulting from entrapment of gas in solidified weld metal.

Causes

Gas may originate from dampness, grease, consumables, workpiece, nitrogen contamination from atmosphere,
May be due to CO if insufficient deoxidant is used.

PREVENTION

Remove the source of gas; ensure correct shielding gas flow; use consumables with high levels of deoxidant; remove primer paint, locally.

RESTART POROSITY

Unstable arc conditions at weld start where protection may be incomplete and temperature gradients have not had time to equilibrate, coupled with inadequate manipulative technique.

PREVENTION

Improve the welders restart technique
Start on a run on tab if practicable.

SURFACE POROSITY

Causes

Excessive contamination from grease, dampness or atmospheric entrainment.

Occasionally caused by excessive sulphur in parent metal or consumable

PREVENTION

As for uniform porosity

Reduce sulphur content as appropriate.

CRATER PIPES

Resulting from shrinkage at the end of a weld run.

Causes

Incorrect manipulative technique or current decay to allow for crater shrinkage

PREVENTION

Improve welders technique, use welding set with a current decay facility

Use a run off tab

MICROPOROSITY

Resulting from shrinkage at, or just below, the surface of a submerged arc weld.

Causes

High welding speed with deep weld pool.

LINEAR INCLUSIONS

Causes

Incomplete removal of slag in multipass welds, often associated with the presence of undercut or irregular surfaces in underlying passes.

ISOLATED INCLUSIONS

Causes

Normally caused by the presence of mill scale or rust on prepared surfaces or electrodes with coverings which are cracked or damaged. May also arise from isolated undercut from multipass welds.

LACK OF FUSION AND PENETRATION.

Causes

Incorrect welding conditions, such as too low a current or incorrect torch/gun angle.

Incorrect edge preparation such as too large a root face.

Linear Misalignment

Causes

Incorrect assembly and/or distortion during fabrication.

EXCESSIVE WELD METAL

Only a problem if weld metal size exceeds specification.

OVERLAP

Causes

Poor manipulative technique or insufficient heat input with current or voltage too low.

UNDERCUT

Resulting from the washing away of the edge preparation when molten

Causes

Poor welding technique and/or unbalanced welding conditions.

Excessive penetration

Incorrect edge preparation providing insufficient support at the root and/or incorrect welding parameters

ROOT CONCAVITY

Causes

Shrinkage of molten pool at weld root, resulting from incorrect weld preparation or insufficient heat input. May also be caused by incorrect welding technique or too high gas backing pressure.

MISCELLANEOUS FAULTS

STRAY ARCING

Accidental contact of electrode or welding torch with plate surface remote from weld. These usually result in small hard cracks just beneath the surface which may contain cracks or act as stress raisers.

RECTIFICATION

Short isolated lengths of crack can be cut out and rewelded. Extensive cracking may not be possible to rectify.

PREVENTION

Use the appropriate procedures which may include hydrogen controlled welding consumables.

Pre heat and minimum interpass temperatures

Heat input as specified even for tack welds

Parent metal composition within limits specified

HYDROGEN INDUCED WELD METAL CRACKING.

Causes

Weld metal alloyed as much as or more than parent steel, usually in thick sections with insufficient consumable drying or preheat.

High restraint - excessive gap - sharp notch in root run.

PREVENTION

As for HAZ cracking.

LAMELLAR TEARING

Causes

Poor ductility in through thickness direction because of non metallic inclusions

Only found in rolled plate

Occurs mainly in high restraint joints

RECTIFICATION

Gouge out cracked areas Butter affected plate with low strength weld metal.