WELDING FAULTS

Fitz's Atlas of coating defects

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WELDS

Where a protective coating system is to be applied over a weld/the application of a well brushed-in stripe coat to the prepared surface is strongly recommended to ensure adequate protection and to prevent bridging by the coating system. In addition,any welding faults of the types described below should be appropriately rectified before any coating is applied.

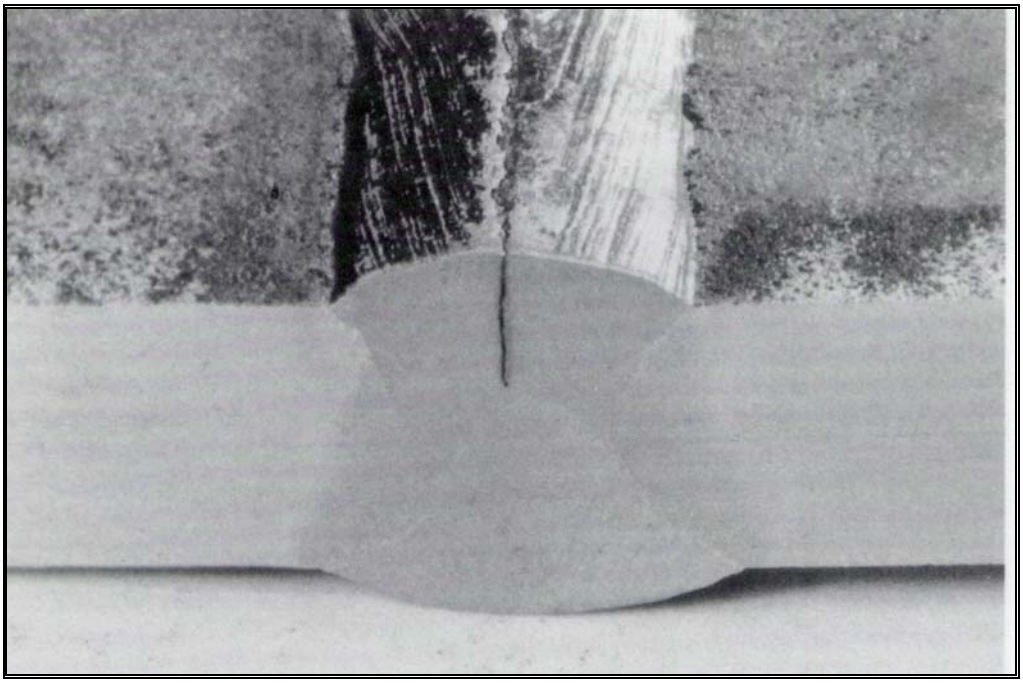
WELDING FAULTS

The following section describes various faults in fusion welds in construction steels. This is not a comprehensive compilation of all likely welding faults, only those which can present problems with the application of coatings unless the faults are rectified prior to the appropriate surface preparation and application of the protective coating system.

All comments are for guidance only.

Photographs within this section are courtesy of The Welding Institute's 'Faults in Fusion Welds'by Woodhead Publishing, Cambridge.

CRACKS



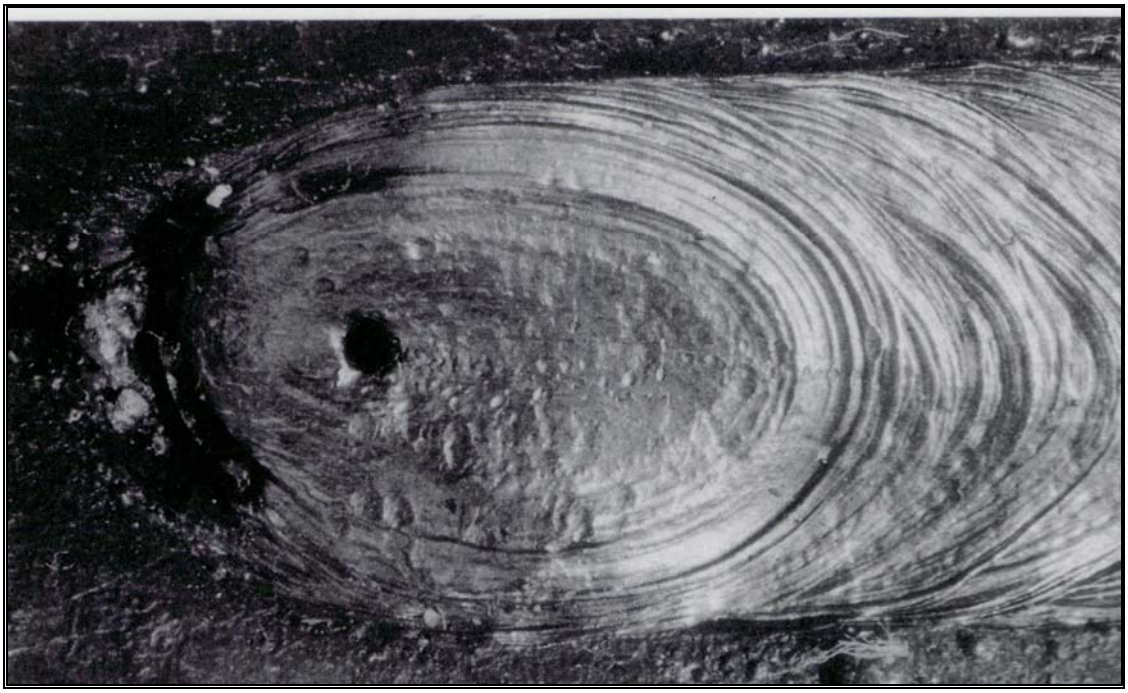
Description: Crack visible at the surface.

Probable Causes: Excessively deep or wide bead. High current and/or welding speed. Large root gap.

Repair: Cut out defective weld length plus 5 mm beyond visible end of crack and reweld.

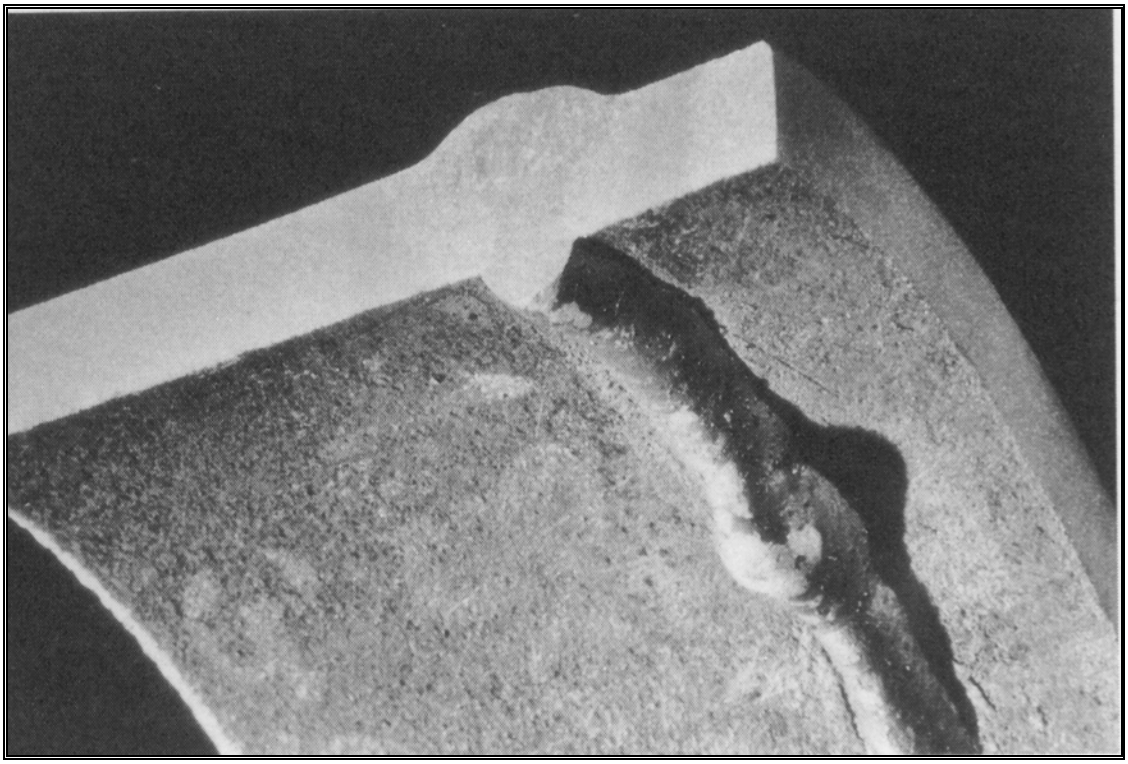
Comment: Protective coatings can mask cracks but rarely successfully bridge cracks. Unless rectified prior to the application of the coating, such cracks can result in premature failure of the coating system, irrespective of any danger that might be caused to the structure by their presence.

CARTER PIPES



Description: Crater resulting from shrinkage at the end of a weld run.
Probable Causes: Incorrect manipulative technique or current decay to allow for crater shrinkage.
Repair: All such porosities must be appropriately filled prior to application of a protective coating system.
Comment: Coatings rarely bridge pores in a metal substrate and if they do, this can lead to premature coating failure.

EXCESS PENETRATION BEAD



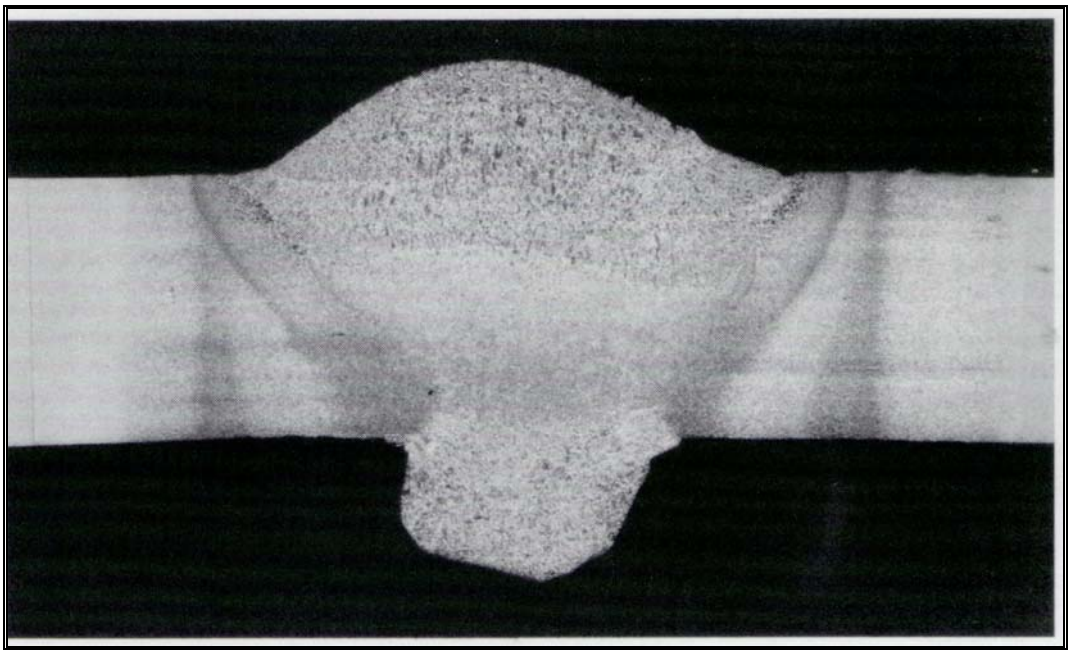
Description: Weld metal normally extends below the parent metal surface but this is only a problem when excessive and exceeds the specification.

Probable Causes: Incorrect edge preparation providing insufficient support at the root, and/or incorrect welding parameters.

Repair: Where sharp changes in contour occur these need to be smoothed to prevent bridging of the protective coating system.

Comment: Thorough brushing in of a stripe coat can be effective but some form of filling may be necessary to prevent bridging of the coating. Any undercuts must be appropriately treated to prevent bridging by the coating system.

EXCESS PENETRATION BEAD



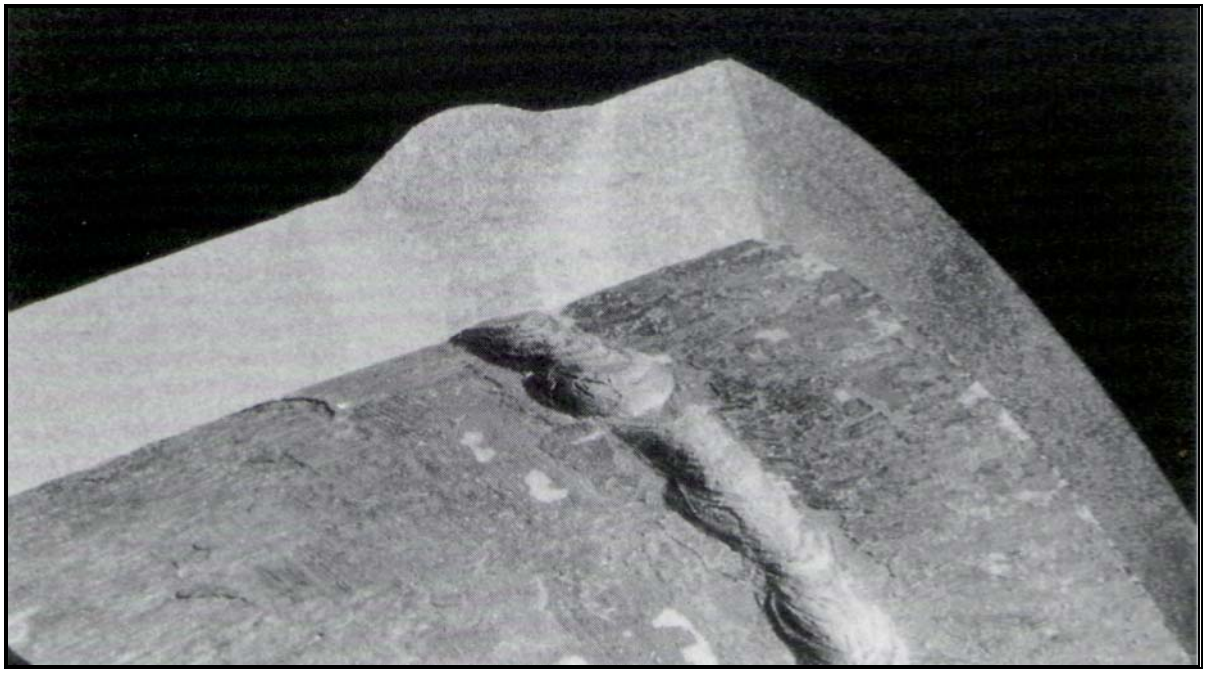
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ROOT CONCAVITY



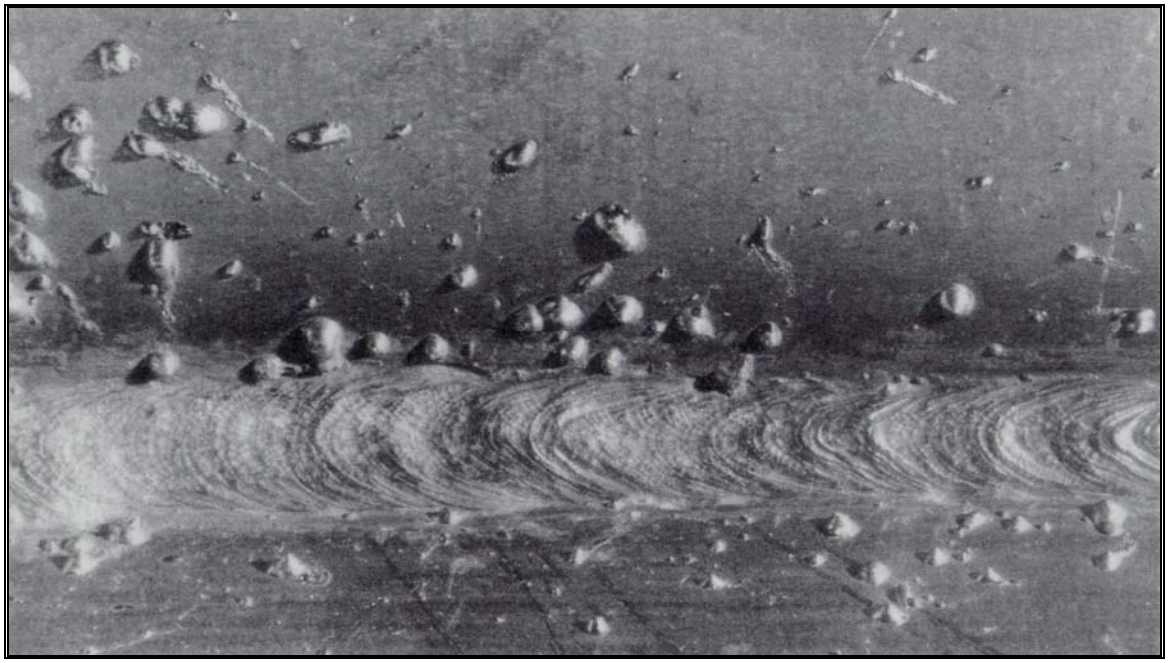
Description: Shrinkage at the weld root resulting in a deep pit along the weld.

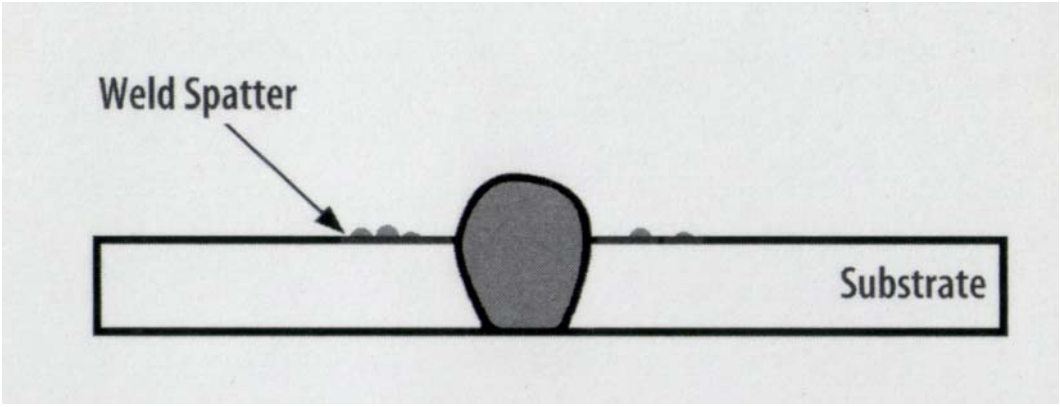
Probable Causes: Shrinkage of molten pool at the weld root, resulting from incorrect weld preparation or insufficient heat input. Also from incorrect welding technique.

Repair: Ensure the edges are smooth with no sharp changes in contour.

Comment: All sharp edges must be ground smooth in accordance with the specification, prior to surface preparation and application of the coating system.

SPATTER





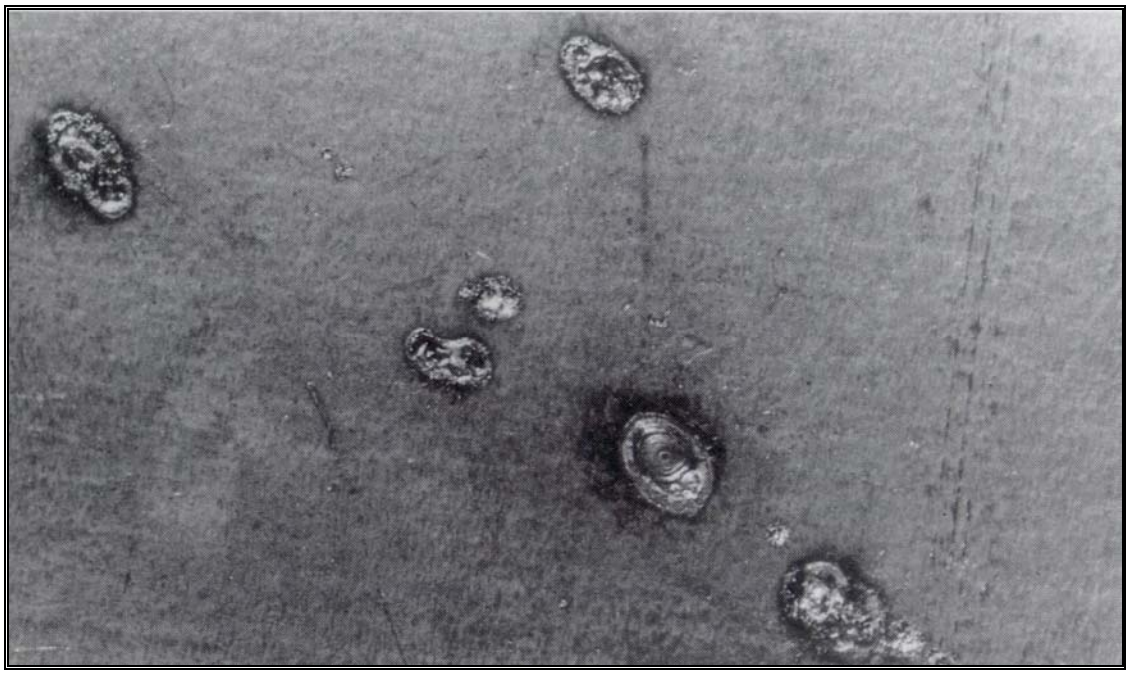
Description: Globules of metal which adhere to the metal surface, often some distance from the weld.

Probable Causes: Incorrect welding conditions/such as too high a welding current and/or contaminated consumables or preparations giving rise to explosions within the arc and weld pool.

Repair: Grind or needle gun off all globules to leave a smooth surface, prior to full surface preparation.

Comment: Weld spatter can rarely be successfully coated and can result in premature coating breakdown.

STRAY ARCING



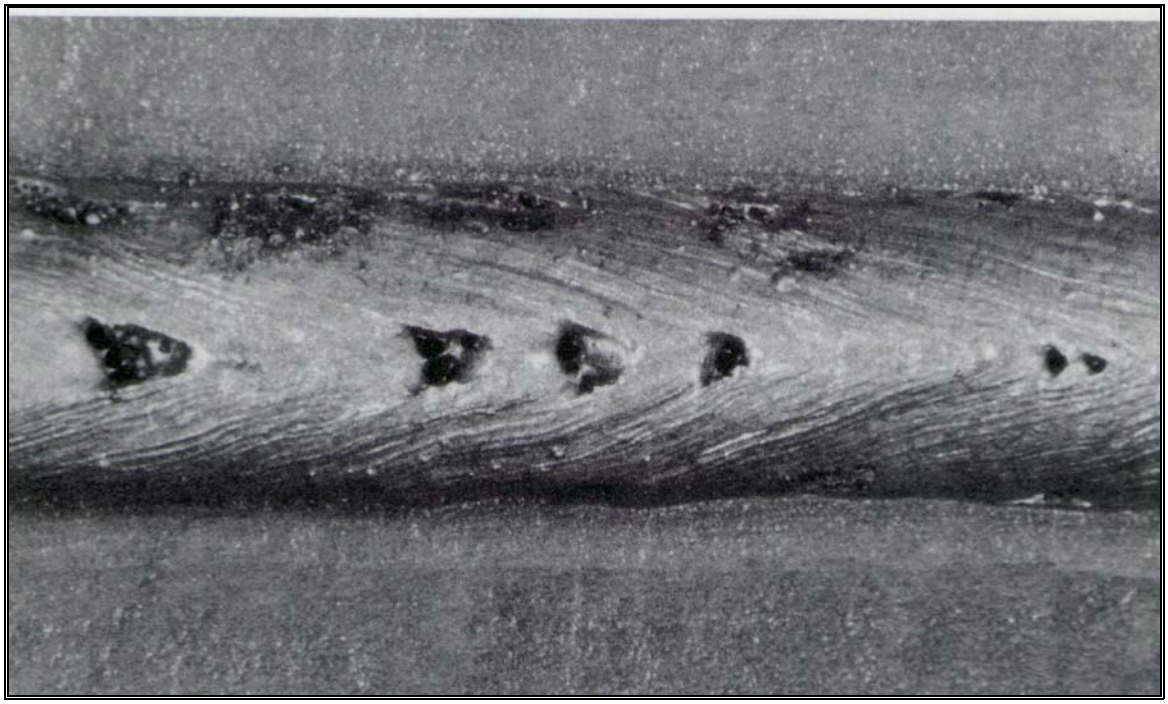
Description: Small hard spots/craters or rough surface features.

Probable Causes: Accidental contact of electrode orwelding torch with plate surface remote from the weld.

Repair: Grind smooth, blast clean or use other appropriate treatment to ensure the surface is sufficiently prepared for adequate adhesion of the protective coating.

Comment: The application of a protective coating to rough insufficiently prepared areas can lead to premature coating failure.

SURFACE POROSITY



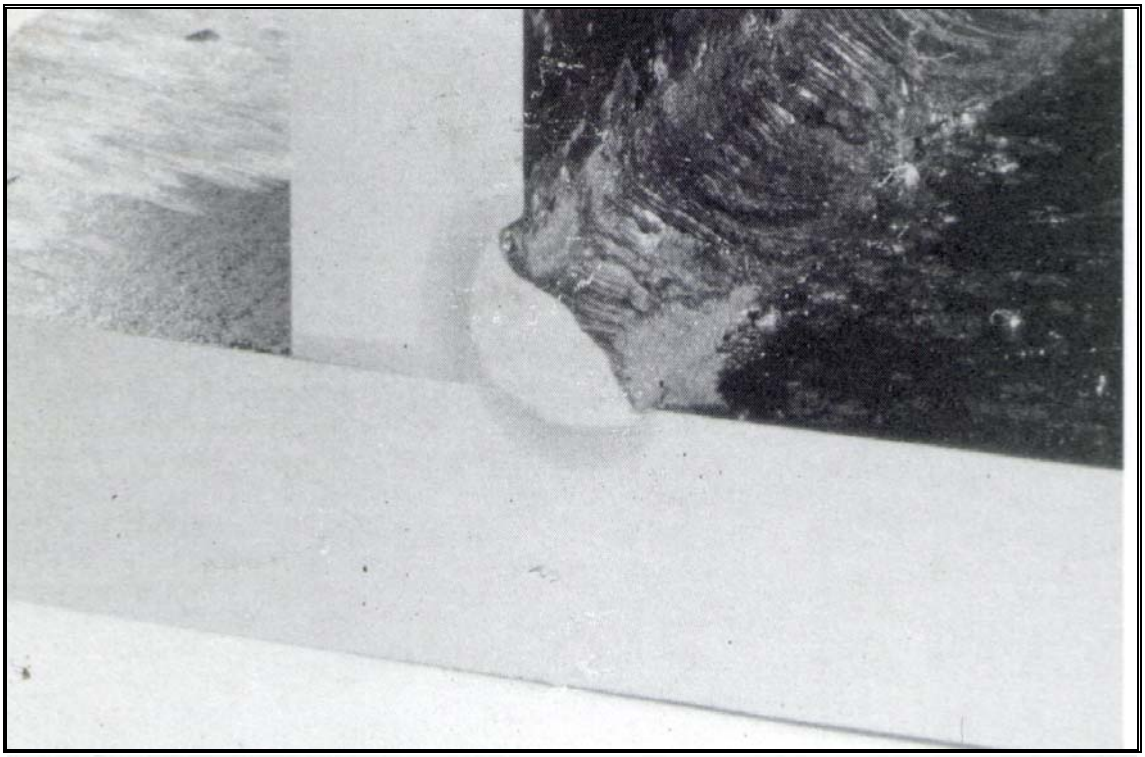
Description: Pores visible at the surface of a weld.

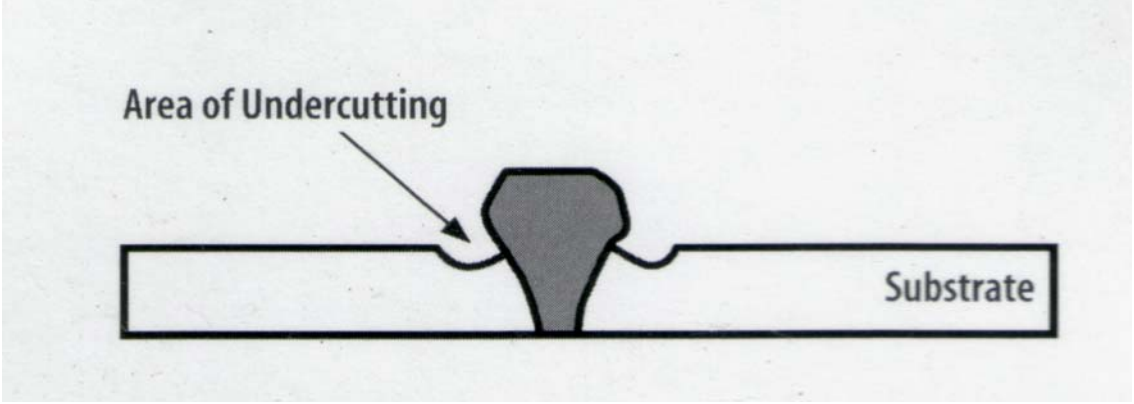
Probable Causes: Excessive contamination from grease, dampness or atmospheric entrainment. Occasionally caused by excessive sulphur in consumables or parent metal.

Repair: All such porosities must be appropriately filled prior to application of a protective coating system.

Comment: Coatings rarely bridge pores in a metal substrate and if they do, this can lead to premature coating failure.

UNDERCUT





Description: Undercut cavity which results from washing away of the edge preparation when molten.

Probable Causes: Poor welding technique and/or unbalanced welding conditions.

Repair: All such undercuts must be appropriately prepared, rewelded or filled prior to application of the coating system.

Comment: Coatings rarely bridge undercuts in a metal substrate and if they do, this can lead to premature coating failure.