

02 / FAULT RECOGNITION

Fusion fault guide

Recognise warning signs in electrofusion and butt fusion, preserve evidence and escalate safely.

Do not diagnose from appearance alone. Possible causes below are prompts for a competent investigation, not a verdict or a repair instruction. Follow the approved procedure and equipment safety instructions. Do not pressure-test, conceal or put a suspect joint into service to see whether it holds.

Electrofusion: signs that need attention [1]

Cycle stopped, error code or power interruption

Possible concern: The fusion energy may not have been delivered as intended; a supply, connection or equipment issue needs investigation.

Safe response: Record the exact code and cycle log. Keep the joint identified and restrained. Do not immediately restart or re-energise it.

Pipe position marks moved or alignment changed

Possible concern: Insertion, restraint or external loading may have changed during fusion or cooling.

Safe response: Do not move the joint back and assume it is sound. Record when movement was noticed and refer it for assessment.

Visible molten material escaping or unusual deformation

Possible concern: Preparation, fit, loading or process control may be wrong.

Safe response: Keep clear of hot material. Follow the unit's safe shutdown instructions if needed; report and quarantine the joint.

Damp, dirty or incompletely scraped preparation

Possible concern: A clean fusion interface has not been established.

Safe response: Before fusion, stop and resolve preparation under the manufacturer's procedure. If fusion already occurred, report the suspect joint; wiping afterwards cannot correct the interface.

Indicator looks different from expected

Possible concern: Indicator behaviour alone does not establish the quality of the joint.

Safe response: Check the exact fitting instructions, cycle record and preparation evidence. Do not re-fuse solely to make an indicator rise.

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Butt fusion: observe, record, refer

Check the full circumference and the recorded process, using the acceptance criteria for the approved procedure. [2, 3]

Uneven bead or visible misalignment

Possible concern: Alignment, facing, support, clamping or differences between components need checking.

Safe response: Record the location and extent. A photograph is useful, but acceptance requires the specified dimensional checks.

Contamination, voids, cracking or an abnormal bead surface

Possible concern: Cleanliness, pipe condition or the heating/jointing process may be involved.

Safe response: Identify and hold the joint. Do not trim away a defect or heat the bead to improve its appearance.

Unexpected bead size or profile

Possible concern: A change in material, heating, pressure, timing or movement may be involved.

Safe response: Compare the actual record with the approved procedure. Do not adjust the next weld by eye.

Facing, heating, changeover or cooling step was interrupted

Possible concern: A required stage may not have been completed within the approved limits.

Safe response: Record the interruption and settings. Leave the joint under the required restraint and obtain a competent decision.

A neat bead is not proof of a sound weld. Visual inspection has limits. Bead examination cannot rule out every embedded defect or cold fusion. Any bead removal, testing or further inspection must follow the project inspection plan and be done by competent personnel. [2, 3]

Do not mix procedures

Electrofusion and butt fusion use different preparation and process controls. Do not copy heater temperatures, pressures, times, cooling periods or acceptance limits from a different machine, material or jointing specification.

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What to do with a suspect joint

A clear record allows the supervisor, inspector and manufacturer to assess the concern without losing the evidence.

Use this reporting sequence

- 1. Make the situation safe.** Follow equipment and site safety instructions. Keep people clear of electrical, hot-surface and moving-part hazards.
- 2. Identify and hold.** Mark the joint status and prevent covering, loading, testing or commissioning until authorised. Maintain the required restraint and cooling conditions.
- 3. Preserve evidence.** Retain the fitting details, fusion log and photographs. Do not erase error records or alter the joint for appearance.
- 4. Escalate.** Notify the supervisor/inspector and obtain manufacturer advice where required. Record the disposition and the authority for it.

Information to capture

Joint ID and location; date/time; operative; pipe material, diameter and SDR; fitting type and batch; machine ID; procedure/revision; preparation observations; weather/shelter; actual cycle log or error code; cooling status; photographs; and the person notified.

No automatic second fusion. Some manufacturers provide restricted procedures for particular interrupted cycles. These are product-specific. Do not treat them as permission to reheat every failed or suspect joint. Obtain the required technical decision before any repeat fusion. [1]

Quick revision check

Does “cycle complete” prove the pipe was scraped correctly? No; the machine record does not prove surface preparation.

Can a raised indicator replace the joint record? No.

Can a good-looking butt-fusion bead rule out all internal faults? No. [1-3]

Sources and scope

[1] Aliaxis, **FRIALEN assembly instructions**. 12614_en_2026-03-16, sections 7 and 8; particularly 8.2.4-8.2.6 (pp. 31-33). [Open source](#)

[2] **Water UK, WIS 4-32-08**. Issue 4, June 2016, sections 4 and 5: butt fusion and electrofusion controls/inspection. Referenced study source, not a substitute for the applicable project specification. [Open source](#)

[3] **TWI, How do I inspect the quality of butt fusion welds?**. Visual examination and its limitations. No numerical limits have been transferred into this guide. [Open source](#)

Original study aid, v1.0, 07 October 2026. Not a weld acceptance certificate, failure analysis or manufacturer repair procedure. No source-organisation endorsement is claimed.