

Rig-Site NACE-Compliant Casing-Head Welding

18-5/8" 4130 casing head welded to J-55 casing on a sour-service gas well — **qualified to full NACE compliance in the field, not the workshop.**

SCOPE Casing-head installation & welding	ENVIRONMENT Sour service (H ₂ S)	LOCATION Rig site — field execution	STANDARD NACE MR0175 / ISO 15156
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THE CHALLENGE

A sour-service gas well required an 18-5/8" 4130 casing head to be welded onto J-55 casing and qualified to full NACE compliance — with the work carried out at the rig site rather than returned to a workshop.

In sour (H₂S-bearing) service, a weld cannot simply be strong. It must resist sulfide stress cracking, which means hardness across the weld and heat-affected zone has to be held within the limits of **NACE MR0175 / ISO 15156** — and proven, not assumed.

Executing this in the field, rather than in a controlled workshop, removes many of the conveniences that make sour-service qualification straightforward.

WHY IT WAS DIFFICULT

- **Dissimilar metallurgy.** Welding 4130 low-alloy steel to J-55 casing demands a procedure that satisfies hardness and toughness requirements across two different materials in one joint.
- **Sour-service hardness control.** Preheat, inter-pass temperature and post-weld heat treatment (PWHT) all had to be controlled and recorded to keep the weld and HAZ below NACE hardness limits.
- **Field conditions.** Achieving workshop-grade control — chart-recorded PWHT, controlled cooling, full NDE — at the rig site, on the wellhead, with no margin for rework.

THE STAKES

The casing head is a primary pressure-containing component of the wellhead. On a sour gas well, a weld that fails to meet NACE requirements is not a cosmetic issue — it is a well-integrity and safety risk over the entire life of the well.

The operator therefore needed more than a completed weld. They needed a weld that could be **verified against code** and documented — an auditable result, delivered without the schedule and cost penalty of a workshop return.

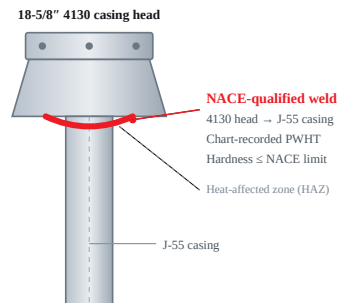
The requirement was clear: workshop-standard sour-service qualification, achieved in the field.

NACE MR0175 / ISO 15156 sour-service compliance	ASME IX Qualified welding procedure & welders	Rig-site Field-executed, workshop-standard control	Verified PWHT · hardness · NDE, fully documented
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THE SOLUTION

IWS approached the joint as a **qualified engineering procedure**, not a field weld. A welding procedure specification (WPS), supported by qualified procedure and welder records, was established for the 4130-to-J-55 joint in sour service.

- **Metallurgy & consumables.** Filler metal and technique selected so the completed weld and heat-affected zone meet NACE MR0175 / ISO 15156 hardness limits across the dissimilar joint.
- **Controlled thermal cycle.** Documented preheat and inter-pass temperature control, with chart-recorded post-weld heat treatment (PWHT) to relieve stress and bring hardness within specification.
- **Field-executed, workshop-disciplined.** The full procedure was carried out at the rig site — the control normally reserved for a workshop, applied on the wellhead.
- **Verification built in.** Non-destructive examination (MPI/UT) and hardness verification performed on the completed joint, generating the records the operator needed.



Schematic — casing-head weld joint (illustrative, not to scale)

THE RESULT

The casing head was installed and welded to full NACE compliance **at the rig site**, with the completed joint verified by material and hardness testing and supported by full documentation.

The job became a **benchmark for the company** — among the first rig-site casing-head installations IWS delivered to full NACE compliance, establishing a **repeatable field procedure** for sour-service wells.

"The value wasn't only the completed weld — it was a weld we could verify against code and hand over with the records to prove it, without sending the head back to a workshop."

— IWS PROJECT ENGINEERING

VERIFICATION & RECORDS

- **Procedure qualification** to ASME IX, with WPS and supporting qualified-procedure records.
- **Hardness verification** across weld and HAZ within NACE MR0175 / ISO 15156 limits.
- **Chart-recorded PWHT** with documented preheat and inter-pass control.
- **NDE sign-off** (MPI / UT) on the completed joint before the well returned to service.

"Qualification proven by testing and documentation — not asserted. That is the standard we hold on every well."

— IWS WELDING ENGINEERING

KEY TAKEAWAYS

For IWS, this case demonstrates the core of how we work: wellhead welding treated as auditable engineering, executed in the field to workshop standards.

- **Field = workshop standard.** Full NACE-compliant sour-service qualification achieved at the rig site, removing the cost and schedule of a workshop return.
- **Verified, not asserted.** Hardness, PWHT and NDE records prove compliance against code — an auditable result the operator can rely on.
- **Repeatable procedure.** The job established a documented field procedure that can be applied across sour-service wells, onshore and offshore.

WHY IT MATTERS

The casing head is a primary pressure-containing barrier. Proving its weld to NACE MR0175 / ISO 15156 — in the field, with records — protects well integrity over the full life of a sour gas well.

This capability is why operators turn to IWS when the scope demands verified sour-service welding.