

## // WHEN WELDING IS NOT AN OPTION

# STATS HOT TAP CLAMP VS. WELDING SPLIT TEE FITTINGS

**The STATS Hot Tap Clamp is a mechanical pipeline connection with a flanged branch to facilitate hot tapping into a pressurised line without the requirement for welding split tee fittings.**

**SO WHAT MAKES THE STATS HOT TAP CLAMP A VIABLE ALTERNATIVE TO WELDING, AND WHEN IS IT MOST EFFECTIVE?**

## KEY TAKEAWAYS

- **Dual seals** with integrated test port ensures full MAOP can be applied to the site installation test.
- **Strength** test conducted during manufacturing.
- **Taper locks mounted** in the lock cage provide full axial restraint and transfers BISEP load to the pipe. The **lock cage technology** allows seals to be tested first before setting the locks.
- The clamp comes split in two halves with **bolted side flanges**.
- **Compression seals** are highly compliant to poor pipe conditions.
- **Elastomer seals** selected to suit application; medium, temperature and required life.
- **BISEP hot tap clamps** come with full bore branch – standard 600#.

## HOT TAP CLAMP ADVANTAGES OVER WELDING SPLIT TEE FITTINGS

- Can be used with thin wall applications where welding is not permitted, with no risk of burn through.
- Can be installed in a hazardous area as no hot work is required. For example, this could be a live leak or a zoned area.
- No need for matching material with pipeline for welding.
- No weld procedures or qualification.
- No limits on pipe flow during installation (Including no flow or too high flow).
- Clamps can be tested to full pipeline pressure even when there is no pressure in pipeline during installation. (split tee is limited to critical buckling calculation).
- Hot tap clamps can be removed and re-used when installed temporarily - cost effective solution.
- Not limited by Post-Weld Heat Treatment (PWHT).
- Hot tap clamps can accommodate API 5L tolerances on outside diameter and ovality. Can be designed for higher.
- Hot tap clamps can be held in stock for emergency installation - EPRS.

## APPLICATIONS

- Process Pipe Access. This is achieved with the combination of hot tap clamp and Tethered Tecno Plug to isolate and access process plant pipework in a zoned area.
- Dead Leg Removal. STATS has developed a technique that combines the use of clamp, BISEP and Tecno Plug to remove dead legs. The clamp and BISEP together provide initial isolation, after which, a Tethered Tecno Plug is deployed through a temporary launcher to remove the clamp. The dead leg can then be shortened to 1D length, just longer than the Tecno Plug. If a welded split tee was used then the dead leg would have a split tee remaining with static voids which could encourage corrosion.
- Mid-line valve installation without leaving additional fittings on the line. clamp, BISEP, Tethered Tecno Plug and permanent valve.
- Subsea. This is the largest utilisation of hot tap clamps as they are counted as permanent in subsea codes. This is normally the only option for subsea hot taps, avoiding costly and time consuming hyperbaric welding.

## EMERGENCY PIPELINE REPAIR SYSTEMS

Hot tap clamps can be held in stock by operators to form part of an Emergency Pipeline Repair System (EPRS) to enable emergency repairs and isolation to be performed safely and quickly. Hot tap clamps can be used for structural and non-structural repair clamp applications therefore minimising the required EPRS asset holding.

## SCENARIOS INCLUDE:

- No hot work so can be used in a Zoned environment.
- Clamp and hot tap allows BISEP to be deployed, giving local isolation.
- BISEP with integrated bypass can then re-establish flow in line.
- If pipeline code does not permit permanent clamps, they can be removed. Once welded fittings are procured, weld procedures developed, and pipeline recommissioned for on line welding flow, welded fittings can be installed outboard of the clamps and the same BISEP and bypass can be used to remove the temporary clamps.

## DISADVANTAGES OVER WELDING SPLIT TEE FITTINGS

- Not counted as permanent in B31.3, B31.8 and (B31.4 unless buried). For avoidance of doubt, welding split tee fittings are preferred for permanent hydrocarbon land applications. (Clamps are only normally classed as temporary on hydrocarbon lines).
- For a single application a hot tap clamp will be more expensive unless welding is a major challenge.
- The hot tap clamps are not preferred for high or low temperature applications.

### TABLE OF COMPARISON BETWEEN CONVENTIONAL APPROACH AND NEW TECHNOLOGY INCLUDING THE NON PERMANENT VALVE (NPV).

FEATURE	SPLIT TEE	HOT TAP CLAMP	COMMENTS
<b>Permanence</b>	Most pipeline codes prefer welded connections for permanence. This makes the welded split tee fittings the preferred choice for land based hydrocarbon applications.	Used as permanent for subsea hydrocarbon lines and utilities. It can be accepted for buried B31.4 pipelines but welded would be preferred.	Hot tap clamps are normally used for subsea or temporary applications.
<b>Pipeline Material</b>	Most standard carbon steel API 5L pipes and standard stainless pipes can be welded to split tees, although split tee material for exotic materials can be difficult to source quickly. Also material for sour pipelines can be difficult to source, particularly for thick wall.	As clamps are not welded directly to the pipe, they do not have the same issue. As long as the clamps material is suitable for the pipeline contents, there is no requirement for welding to the parent pipe.	Welded split tees preferred where they can be made from suitable material.
<b>High Pressure / Thickness</b>	When the split tee thickness gets above 31mm (19mm for B31.3) then post weld heat treatment for the on line weld becomes an issue.	As all welds are performed before mobilisation to site, PWHT is not an interest.	Temper bead weld procedures can be qualified for thick wall split tees. These however add huge complexity and cost.
<b>Low Pressure / Thin Wall</b>	Thin wall pipe offers the risk of burn through.	Hot tap clamps can be used for thin wall. Tethered Tecno-plug can then be used to remove the clamp and welding can be done as a butt weld under Tecno Plug isolation.	Hot tap clamps are preferred for thin wall. Split tees preferred where weld is viable.
<b>Pipe Tolerances</b>	Ideally the pipe should be within OD and ovality to keep within the weld root clearance. 1/16" or 1/8" dependent on size.	STATS clamps are designed to API 5L tolerances. We have however designed up to +2.5% as a special in the past.	UT also required for on line welding.  Hot tap clamps offer better EPRS option.

FEATURE	SPLIT TEE	HOT TAP CLAMP	COMMENTS
<b>Pressure Test</b>	Split tees are normally pressure tested prior to splitting at the fabrication facility. However the split line welds and welds to the pipe can only be tested to a factor above the pipeline pressure during the test based on a critical buckling calculation.	Hot tap clamps are strength (pressure) tested in the factory. When bolted onto the pipe, the dual seal hot tap clamp can then test the split line and pipe interface to the full MAOP, independent of the internal pipeline pressure at the time of the test.	Although hot tap clamps offer a clear advantage here, the industry accepts the lower pressure test so split tees preferred.
<b>Pipeline Flow</b>	Welding onto a live pipeline requires flow high enough to prevent burn through, while not too high to cool the weld and cause cracking.	No flow restrictions for installations.	Where pipe flow does not permit on line welding, hot tap clamps can offer a solution.
<b>High / Low Temperature</b>	Split tees have been used on a wide range of temperatures, Wider than clamps.	Hot tap clamps are restricted to the limits of elastomer seals. They can be provided with graphite on bespoke designs, Normally -20 to 180 deg C.	Generally split tee fittings are preferred for high / low temperatures, hot tap clamps are limited by extreme temperature.
<b>Cost for permanent</b>	For a standard application the split tee has the following costs: 1. Split tee design and fabrication with completion plug. 2. Rings for weld qualification. 3. Weld qualification. 4. Site weld. Often the welding can be more than the split tee itself.	For a standard clamp manufacture we need: 1. Clamp manufacture with completion plug. 2. Clamp assembly. The clamp manufacture is normally 3 to 4 times the split tee cost of manufacture.	By the time the welding and test rings etc. are taken into account, the split tee comes out at 30% to 50% lower cost for a permanent installation. Therefore hot tap clamps are only used where split tees are not viable for permanent installations.
<b>Cost for temporary / rental</b>	Split tees are 1 hit tools. Once welded, can't be reused.	Where temporary, the second use of a clamp will make it more economical than welded fittings.	Clamps commonly used for pipeline re-route with four position isolation. Using clamps on the redundant section can offer a significant cost saving.
<b>Dead leg removal</b>	Where a split tee is used the remaining dead leg has a 2D long split tee with potentially another 1D with cap and weld separation. The split tee itself has static void between pipe and tee run pipe.	The hot tap clamp is removed using a Tethered Tecno Plug which can be set immediately adjacent to the header. A completion flange can be used to remove the Tecno Plug and leave maybe 1.5D length of straight spool. Close enough to ensure no stagnant zone. The completion plug can also have a pigging guide. Alternatively the Tethered Tecno Plug can be an abandonment plug so removing the dead leg down to 0.25D.	STATS method for removing dead legs with hot tap clamp, BISEP and Tecno Plug offers significant advantages to alternative solutions.