

HALLIBURTON

Mismatched Iron Connections

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Mismatched Hammer Unions – Ongoing Issue

ALERT 00-15

ADDITIONAL SERIOUS INCIDENTS WITH MISMATCHED HAMMER UNIONS



WHAT HAPPENED:

Safety Alert

ALERT 06-01

From the International Association of Drilling Contractors

MISMATCHED HAMMER UNION RESULTS IN A FATALITY

WHAT HAPPENED:

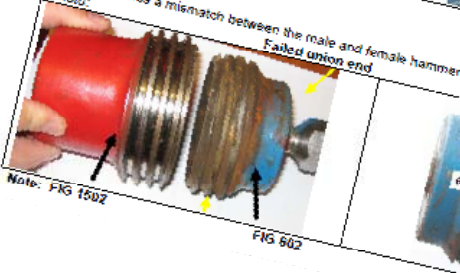
A worker while operating a sand filter valve in a temporary well test setup, sustained severe multiple injuries caused by the impact from a female hammer union, inadvertently dislodged from a side outlet, as well testing was in progress. He was thrown 19 ft from the sand filter equipment. He was evacuated to a regional clinic where he underwent emergency surgery. He later died in the clinic.



He had obtained signed PTW, held toolbox talk and safety meeting with Rig Team and Gas surface facilities. He then went to production. He climbed the lower female hammer union hit him.

WHAT CAUSED IT:

Connection was a mismatch between the male and female hammer union end



been issued on this equipment already, incidents are still occurring. The consequences of mismatching hammer unions can be fatal.

union
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/s 1502
e attempt
brought up



Safety Alert

From the International Association of Drilling Contractors

ALERT 03-16

MISMATCHED HAMMER UNIONS STILL BEING FOUND

WHAT HAPPENED:

Reports continue to come in involving pressurized lines and the unions used on these lines. Employees have been observed mis-matching unions. In addition, employees have been observed hammering on lines while still under pressure. Several accidents within the industry, including a fatality, have occurred due to pressurized lines being improperly connected or being hammered on while under pressure.

WHAT CAUSED IT:

The thread (or male half) of a 2" 602 and 1002 hammer union will make-up to the wing nut (or female half) of a 2" 1502 hammer union leading an oilfield worker to believe he has mated two compatible components that will withstand fluid pressures up to 6,000 psi. As the threads on the two halves are of the same pitch and design, they will actually screw together. However, because there is a 5/16" difference between the diameters of the thread and wing-nut halves described above, the two mismatched components will NOT actually hold high pressures very long. The hammer unions will eventually separate. When the union halves blow apart three immediate hazards are created:

1. The wing-nut becomes an 8 lb. Projectile that moves in an undetermined direction, maybe at personnel.
2. Uncontrolled release of high-pressure fluids that may or may not strike an employee in its path.
3. Uncontrolled release of potential toxic fluids (acids, oils, fuels, diesel base mud) that may cause harm to persons or the environment.



Avoiding the Dangers of Mismatching Hammer Unions

Hammer Unions, also called Wing Unions, are quick make-up and break-out pipe and fitting connectors that have been used in the oil industry since the early 1930s. The primary components in these connectors are a male sub with a spherical sealing surface, a female sub with external acme threads, and a wing nut with internal acme threads to hold the components together. Depending on size, pressure rating and style, the assembly may include an elastomeric seal. One variation of these unions employs separate load shoulder pieces called

segments, which are required to mate sub in some cases. This bulletin describes gun union connection and component conditions are a result of a failure union connections and component mismatched hammer union connections. All manufacturers of hammer union



WARNING
Never connect products with hammer union end connections that are not positively identified as to the manufacturer and

WARNING
Never assemble any combination of male sub, wing nut or segments that are not positively identified to assure

Pressure Rating & Figure Number

- Figure 602 – 6,000 PSI
 - Figure 1002 – 10,000 PSI
 - Figure 1502 – 15,000 PSI
 - Figure 2002 – 20,000 PSI
-
- Note: Sour Gas Service iron has a lower maximum working pressure for a given Figure number (based on material properties). Standard Service components should not be used in Sour Service, due to differing material properties.

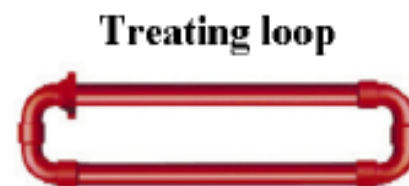
Pressure Rating & Figure Number

High Pressure fluid transfers are conducted via fixed HP Rig manifolding and/or temporary HP (dumb) Iron.

- ❑ Fig 602 – 6,000 psi
- ❑ Fig 1002 – 10,000 psi
- ❑ Fig 1502 – 15,000 psi
- ❑ Fig 2002 – 20,000 psi



Pipework



Treating loop



Tee



Chiksan (Swivel) Joint

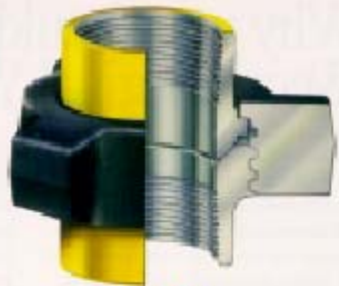


Fig 100
1000 psi
2" to 8"

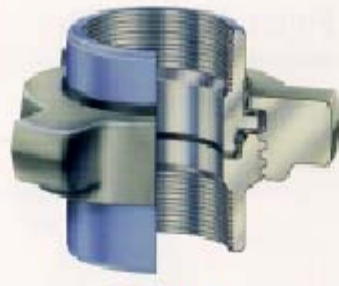


Fig 211
2000 psi
1" to 4"



Fig 602
6000 psi
1" to 4"



Fig 1502
15,000 psi
1" to 4"



Fig 200
2000 psi
1" to 4"



Fig 400
2500 to 4000 psi
2" to 12"

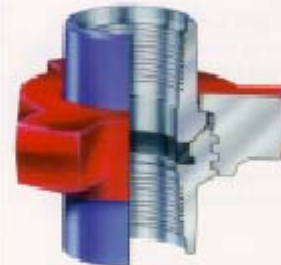


Fig 1002
10,000 psi
1" to 6"

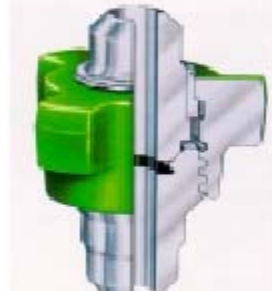


Fig 2002
20,000 psi
2" or 3"



Fig 206
2000 psi
1" to 10"

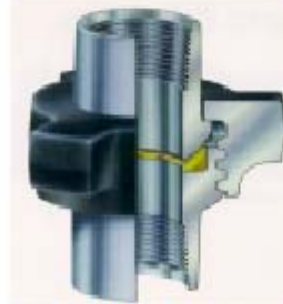


Fig 600
6000 psi
1" to 4"

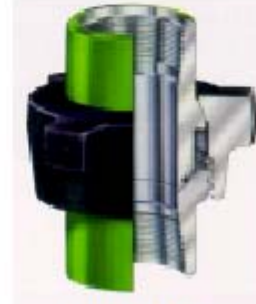


Fig 1003
10,000 psi
2" to 5"

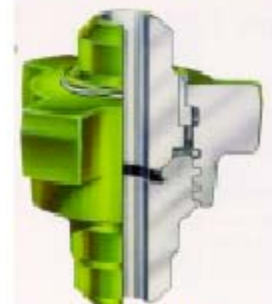


Fig 2202
15,000 psi - H₂S
2" to 3"

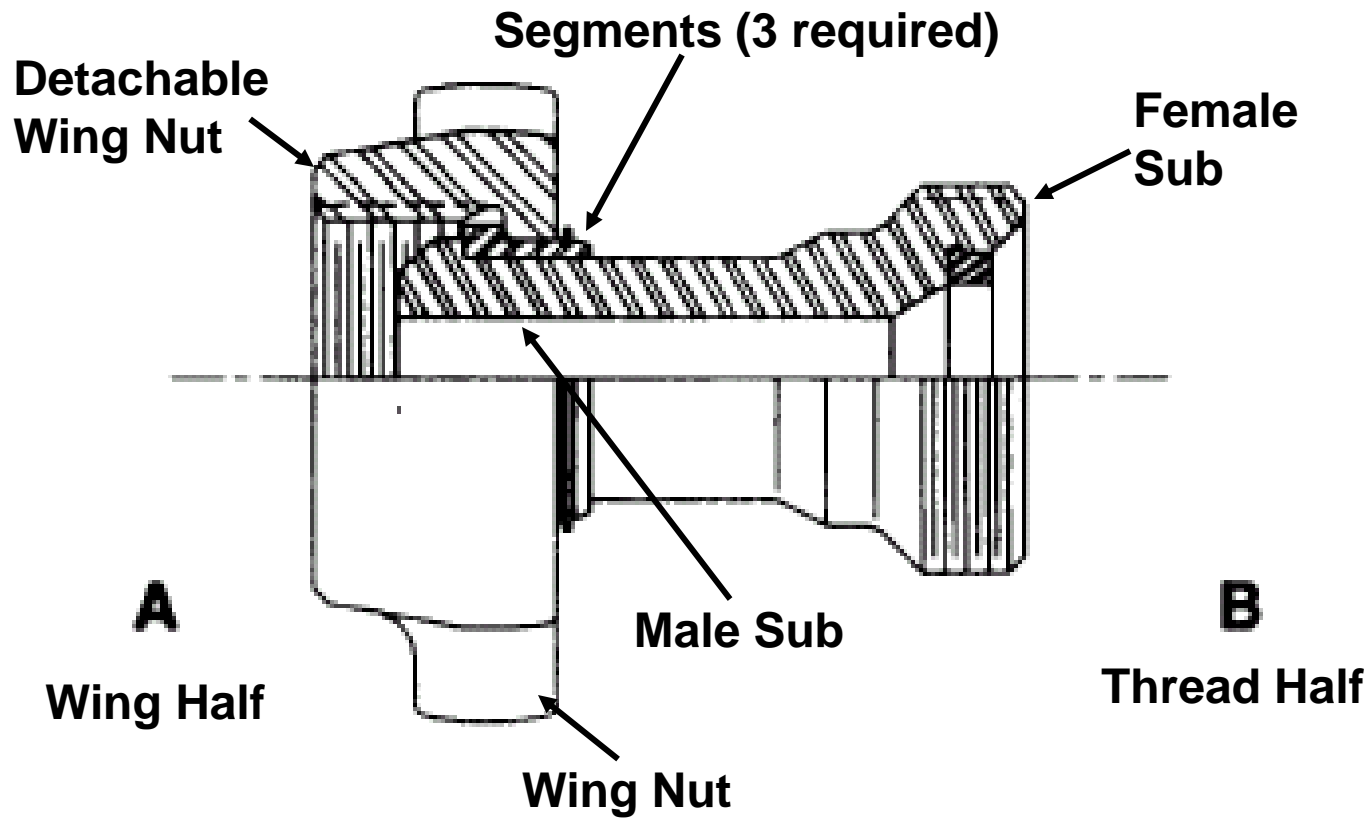
What are “Weco Hammer Unions”?

- They are connectors for temporary pipe & flow line installations
- FMC acquired the original Weco company in the 1950's
 - The design is old, and manufactured by many companies
 - Used in steel & chemical plants, dredging vessels, strip mines & in the oil industry
- More than a dozen design variations
 - Designated by nominal pipe & a 'fig' number

2" 1502



Definitions

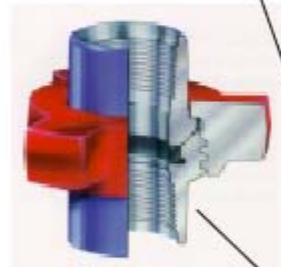


The Hazards

A 2" 1502 Wing Nut will make up to a 2" 602 or 1002 thread half but will fail ... **explosively**.



602



1002



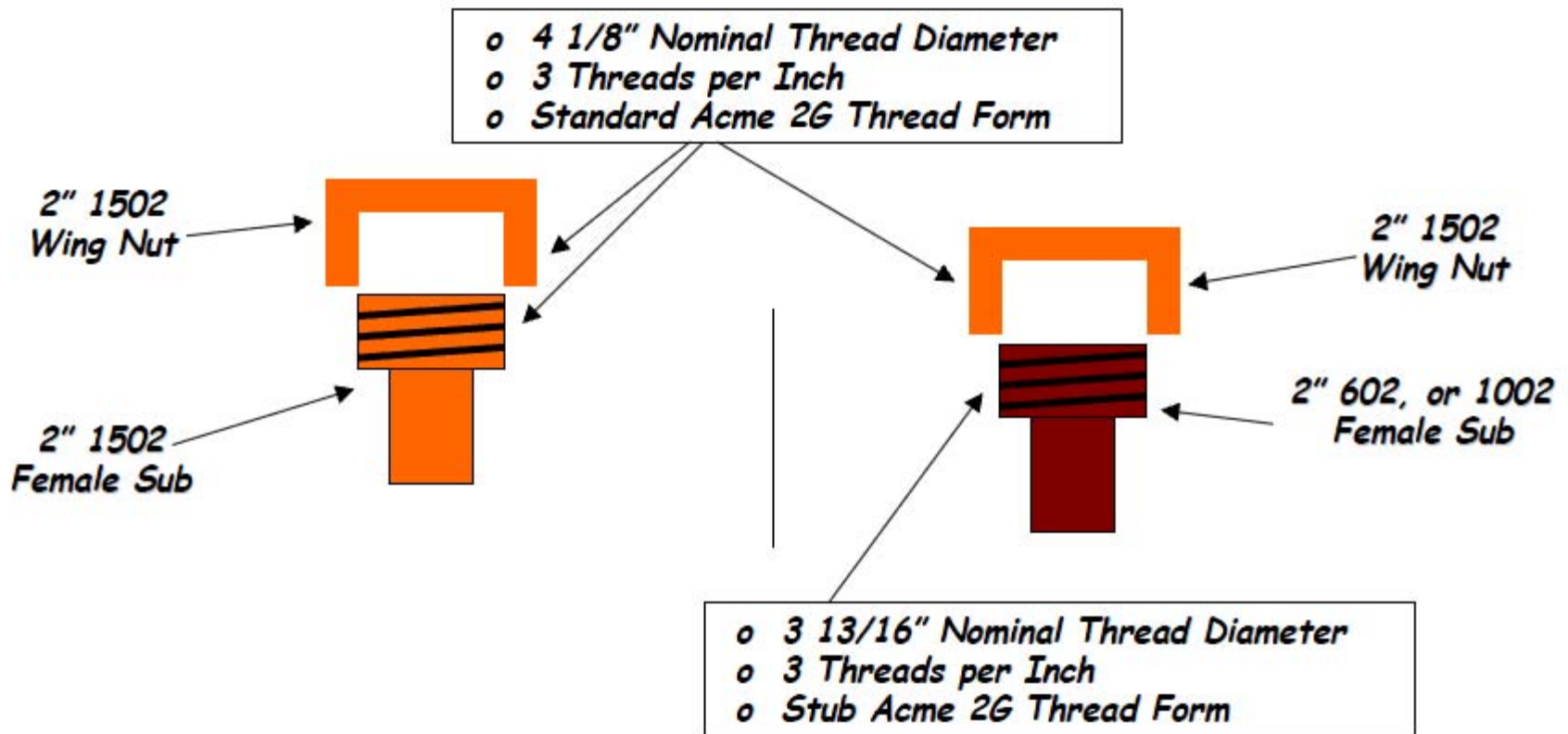
1502

Series (Figure)	Standard Working Pressure	Nominal Pipe Sizes (dia - inches)
100	1,000	2, 2½, 3, 4, 6, 8
200	2,000	1, 1¼, 1½, 2, 2½, 3, 4
206	2,000	1, 1¼, 1½, 2, 2½, 3, 4, 6, 8, 10
207	2,000	3, 4, 6, 8, 10
211	2,000	1, 1¼, 1½, 2, 2½, 3, 4
400	2,500	5, 6, 8, 10, 12
400	4,000	2, 2½, 3, 4
600	6,000	1, 1½, 2, 2½, 3, 4
602	6,000	1, 1¼, 1½, 2, 2½, 3, 4
1002	10,000	1, 1¼, 1½, 2, 2½, 3, 4, 5, 6
1003	10,000	2, 3, 4, 5
1502	15,000	1, 1½, 2, 2½, 3, 4
2002	20,000	2, 3
2202	15,000	2, 2½, 3

Potentially Fatal Combinations

The Hazards

A 2" 1502 Wing Nut will make up to a 2" 602 or 1002 thread half and will hold some pressure ! However ...
... it will fail **explosively**.



Dangerous Union Connection

- Same iron size *BUT* different Figure number and different pressure rating. Examples:
 - 2" 602 thread half & 2" 1502 wing half
 - 2" 1002 thread half & 2" 1502 wing half

Note the minimal thread engagement of wing nut thread and female sub thread.

This combination will make up, but will fail under pressure.

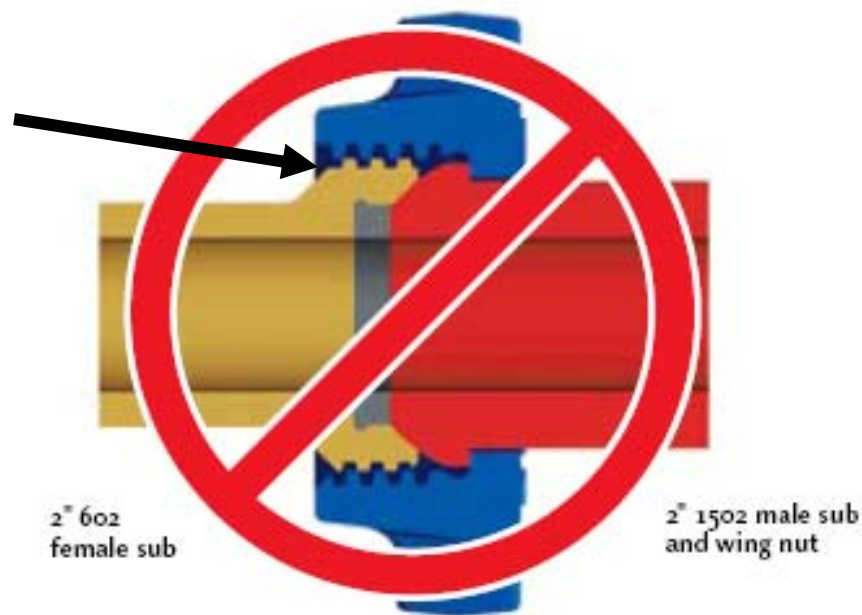


Photo Courtesy of FMC

Mismatching Swivel Joints

FMC Technologies

Safety & Technical Alert

**Avoiding the Dangers of
Mismatching Swivel Joint
Components**



Mismatching Swivel Joints

Avoiding the Dangers of Mismatching

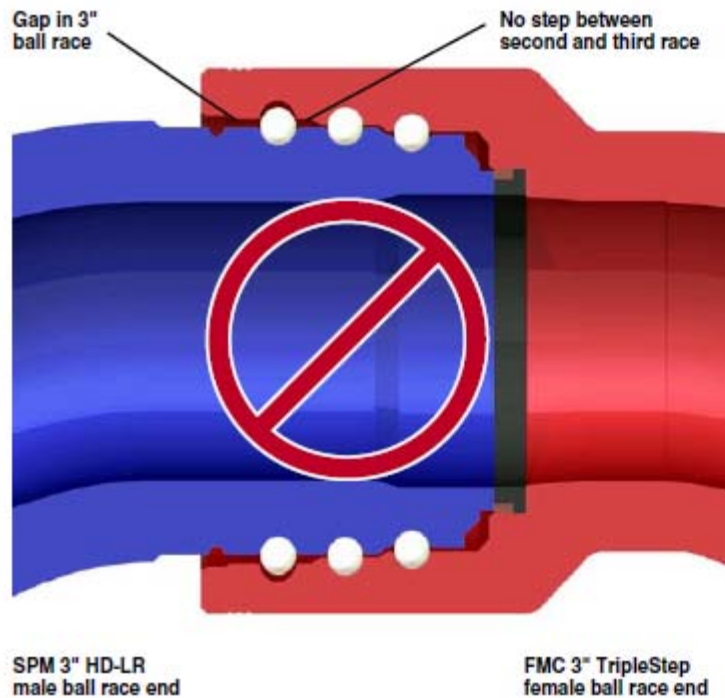


Figure 1: Dangerous Mismatch to be Avoided

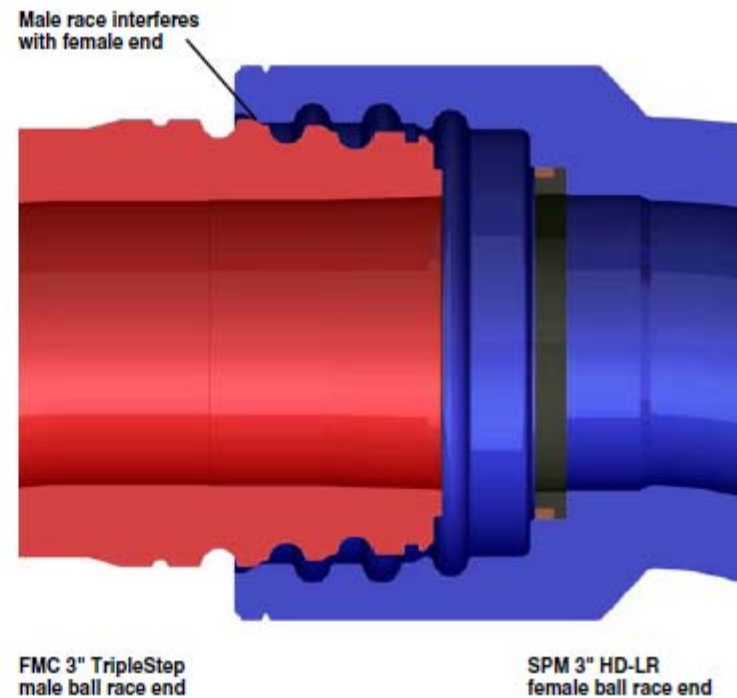


Figure 2: Mismatch Avoided

Mismatching Swivel Joints

Swivel Joint Components

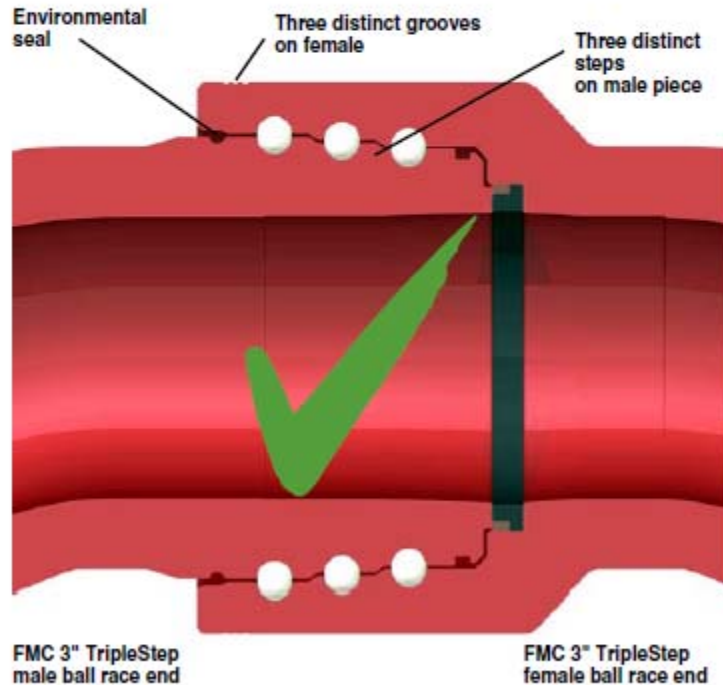


Figure 3: Matching Assembly

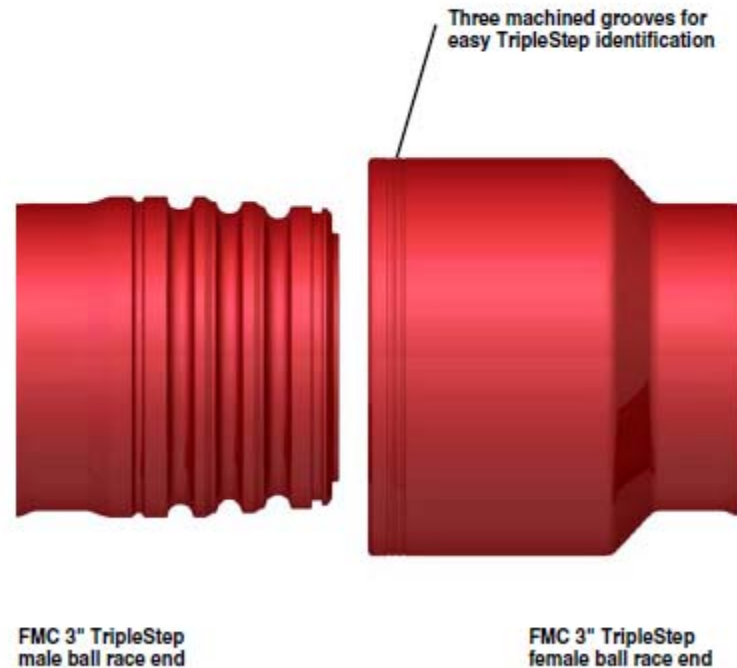


Figure 4: Identification of TripleStep Swivel Joint

Basic Practices / Issues

- All union connections must be positively identified as compatible for size, Figure number and pressure rating prior to assembly. Ensure iron qualification band is present, accurate and current.
- Damaged union connections must be immediately removed from service and rendered unusable.
- The dangerous connections presented here are an Industry-wide problem. These dangers are most likely when connecting to iron from multiple companies (Contractors – Customer – Rig) or by cross mixing manufactures union components.
- All companies should have iron maintenance and certification program

List of DON'TS

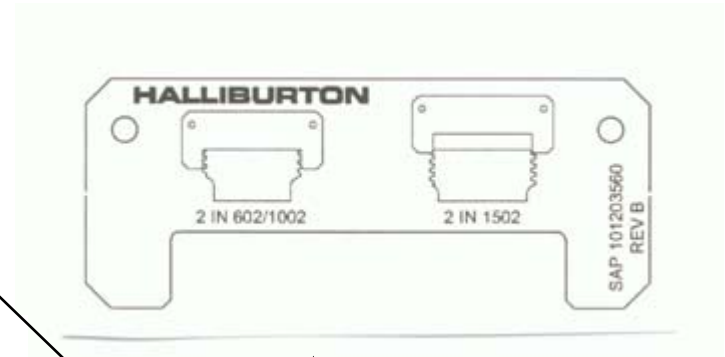
- ***Do NOT use 2" 602/1002 union components in pumping service***
- ***Do NOT mix Standard Service and Sour Service components***
- ***Do NOT use Standard Service components in Sour Service***
- ***Do NOT use line pipe connections greater than 1" nominal.***
- ***Do NOT use de-rated pipework***

Risk Mitigation Ideas

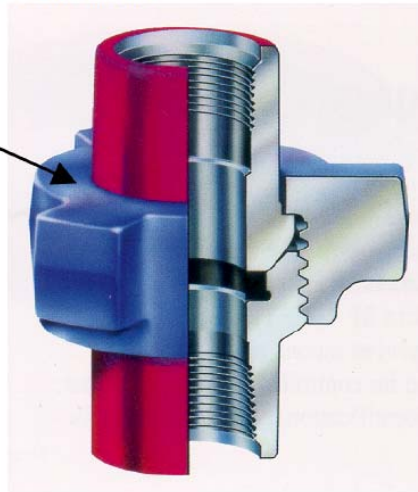
- Stringent Industry / Company guidelines/ policies on iron-management processes. *Requires commitment & strong controls mechanisms*
- Increase focus/awareness at field level through training/ on site induction discussions/ tool box meetings/ display posters. SOP's / JSA's to address mismatched iron. *Human dependence*
- Move away from the use of 602's. Do we need them? *Challenge with some operators.*
- Clearly tag / label iron. *Identification*
- Mandate the use of go-no-go gauges. *Perhaps the last line of defense!*

GO / NO-GO Gauges

- When there is uncertainty – use the GO / NO-GO Gauge to ensure it is a 1502 Thread Half (female union).
- Identify markings



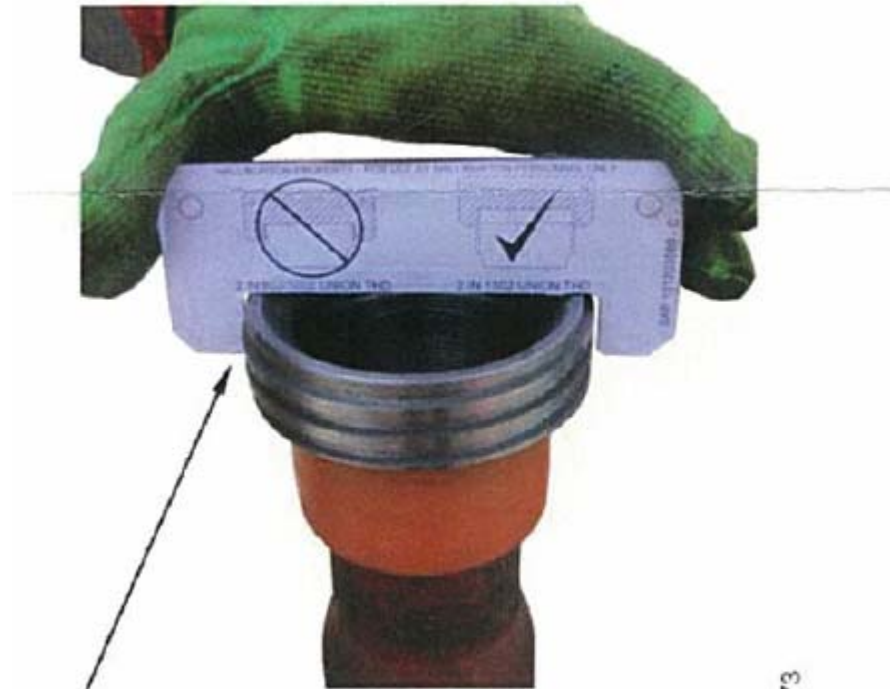
Find the Identification Markings (2" 1502) on the Wing Nut ... Here



Types of Go-No-Go Gauges

GO / NO-GO Gauge Usage Procedure

- If the gauge fits over the threads as shown below, the connection is unsafe; **do not use**



If gauge slides over threads, union is unsafe – DO NOT USE

DN011073

GO / NO-GO Gauge Usage Procedure

- If the gauge does not fit over the threads as shown below, the connection is **safe**



Questions/ Comments
