

1) Cleaning

Before inspection, the connections should be cleaned by using one of the following methods:

- a nonmetallic brush and cleaning solvent.
- steam clean with water and cleaning solvent.
- a rotary bristle brush with jetted water and / or cleaning solvents.

The use of wire brushes or other abrasive methods is forbidden as this will damage the anti-galling surface treatment (phosphate for low-alloy materials and glass bead blasting and copper plating if required).

Note: Diesel is not recommended as a cleaning solvent.

2) Inspection

All inspections shall be carried out by trained personnel with satisfactory visual acuity to detect surface imperfection. The minimum illumination level at the inspection surface shall be min. 500 lux.

Connection inspection will only be visual. Perform a thorough visual inspection of each connection.

Pipes should be placed on a rack, ca. 1m high, so that the joints may be rolled 360 degrees to facilitate complete cleaning and inspection.

Inspect all connections for damage such as out-of-round, handling damage, dents, mashed areas, rust and scale. Seal areas and thread roots must be free of longitudinal or transverse cuts, scratches, corrosion pitting, rust and scale.

3) Connection classification

After inspection, pipe can be classified under one of the following categories:

- thread and seal in perfect condition. These products can be run / re-run without any further repair work (the surface treatment shall be in suitable condition).
- thread that must be hand repaired. Seal shall be in perfect condition (particularly $\leq 4 \frac{1}{2}$ "
- pin connections that must be re-cut at a TPS TECHNISEAL licensed workshop and couplings must be changed.

Marking of inspected pipe ends with a coloured band around pin or box:

- red band → connection rejected
- white band → connection accepted
- blue band → internal coating or Teflon ring damaged

4) Connections to be hand repaired

Identify rejected pipe end.

Perform the repair work in accordance to Attachment 1

- no repair of seal area $\leq 4 \frac{1}{2}$ " (Tubing)
- individual small (not groups) of circumferential shallow scratches and corrosion pittings on seal (except on $\leq 4 \frac{1}{2}$ ") may be smooth grinded with rotaded laminated brush or scotch brite wheel
- damaged thread elements may be repaired by using file and or special profile scotch brite wheel

After repair connection should be checked visual and/or with field templates.

Unless the pipe will be used immediately apply a new layer of storage compound and re-install clean and dry thread protector.

5) Connections to be re-cut

Identify rejected pipe end. Send the damaged product to the nearest TPS TECHNISEAL licensed workshop. If one of the two threaded ends (Pin End and Coupling) is acceptable, apply a new layer of storage compound and re-install clean and dry thread protector.

Note: You will find our licensed workshops on our website: www.tpsd.de "TPS Licencee Network"

6) Hand repair operation

Any hand repair operation must be performed by an Inspector / Specialist.

7) Hand repair evaluation

Any connection which has been hand repaired, will only be considered acceptable if the damage has been completely removed and the hand repair has not significantly changed the shape of the repaired area.

If after repairing, the connection is not acceptable, the product shall be classified as "Connection to be re-cut" and shall be sent to the nearest TPS TECHNISEAL licensed workshop, the coupling shall be changed if not acceptable.

If after repairing, the connection is acceptable, apply a new layer of storage compound and reinstall a clean and dry protector.

TPS recommend performing a new thread surface treatment if the material's base colour can be seen on all pin for casing size, for tubing >80ksi and all couplings by using Molycote or equivalent. All products subjected to hand repair shall be clearly identified with the legend "Repaired" and the red coloured band should be replaced by a white colour band.

8) Deformation due to over-torque

If the bucking unit has not been set to the required parameters of the connection, then deformation due to over-torquing might occur.

Depending on the intensity of the over-torquing, the following deformations might occur:

The torque shoulder on the coupling is crowned and constricted in direction of the bore. Also a gap between the two torque shoulders of the pin and coupling could be occur.

These characteristics can be measured with a straight edge and the gap with a feeler gauge. Connections with such damages shall not be released for re-use.

Note:

- all types of over-torquing shall be rejected for recut or changing the coupling

9) Straightness

The required straightness of the connection to the base tube can be checked by rolling the tubes on the rack and by drifttesting the pipe with the specified drift mandrel.

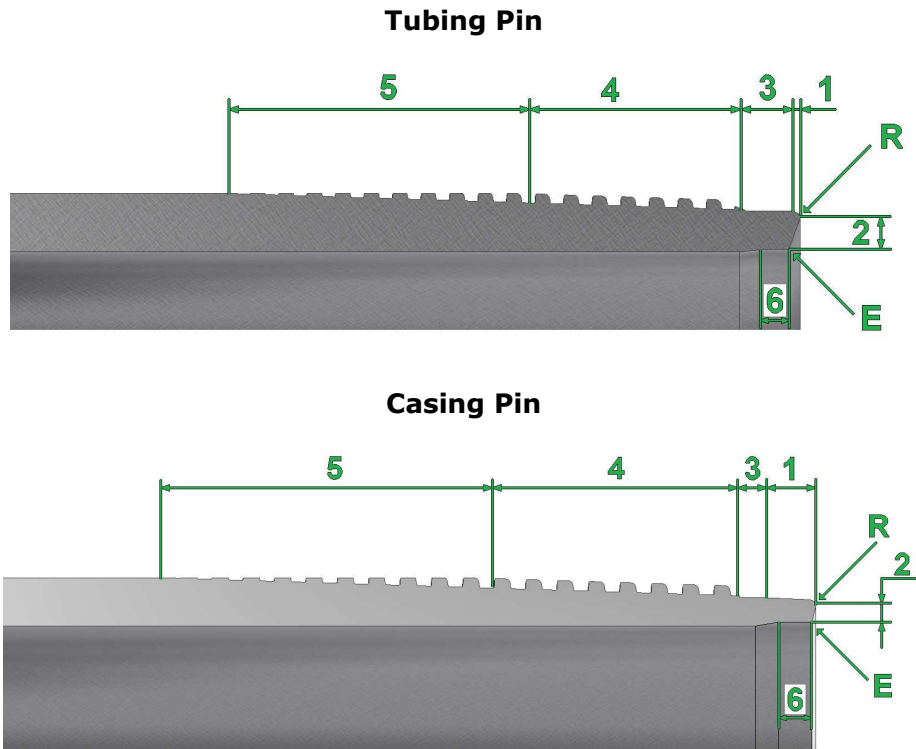
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Established and released on 25 May, 2016 by:

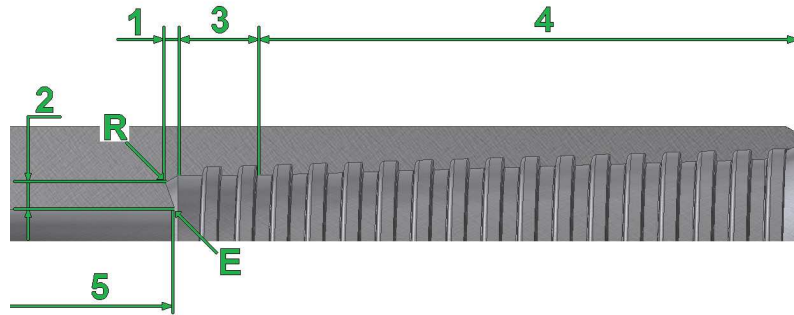
A. Kessler and J. Spent

Attachement 1:

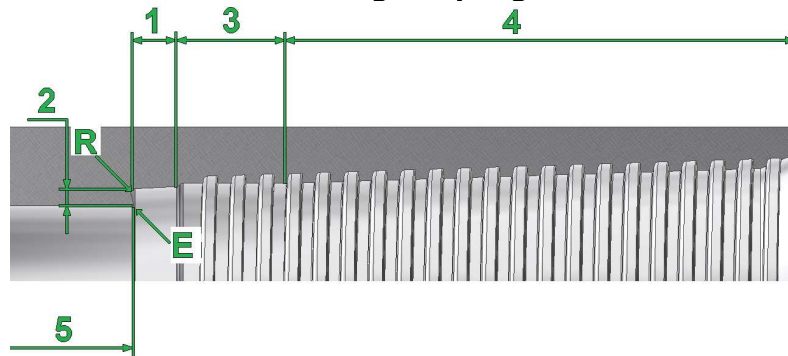


Pin element	Zone	Rust / Friction marks	Pitting	Dent	Scratch	Galling
Seal	1	Re-cut the connection (1)	Re-cut the connection (1)	Re-cut the connection	Re-cut the connection (1)	Re-cut the connection
Torque Shoulder	2	Re-cut the connection (1)	Re-cut the connection (1)	Re-cut the connection (1)	Re-cut the connection (1)	Re-cut the connection
Radius between seal and shoulder	R	remove to smooth surface	remove to smooth surface (1)	Re-cut the connection	remove to smooth surface (1)	remove to smooth surface
Edge between torque shoulder and internal bore	E	remove to smooth surface	-	Re-cut the connection (1)	remove to smooth surface (1)	remove to smooth surface (1)
Cylindrical section	3	remove to smooth surface (1)	remove to smooth surface (1)	remove to smooth surface (1)	remove to smooth surface (1)	remove to smooth surface (1)
Perfect thread length	4	remove to smooth surface	remove to smooth surface (1)	remove to smooth surface	remove to smooth surface (1)	Re-cut the connection
Non-perfect thread length	5	remove to smooth surface (1)	remove to smooth surface (1)	remove to smooth surface (1)	remove to smooth surface (1)	remove to smooth surface (1)
Internal bore	6	remove to smooth surface (1)	remove to smooth surface (1)	remove to smooth surface	remove to smooth surface (1)	remove to smooth surface (1)

Tubing Coupling



Casing Coupling



Coupling element	Zone	Rust / Friction marks	Pitting	Dent	Scratch	Galling
Seal	1	change the coupling (1)	change the coupling (1)	change the coupling	change the coupling (1)	change the coupling
Torque Shoulder	2	change the coupling (1)	change the coupling (1)	change the coupling (1)	change the coupling (1)	change the coupling (1)
Radius between seal and shoulder	R	remove to smooth surface (1)	remove to smooth surface (1)	change the coupling	change the coupling (1)	change the coupling (1)
Edge between torque shoulder and internal bore	E	remove to smooth surface	-	change the coupling	remove to smooth surface (1)	remove to smooth surface (1)
Cylindrical section	3	remove to smooth surface (1)	remove to smooth surface (1)	remove to smooth surface	remove to smooth surface (1)	remove to smooth surface (1)
Thread length	4	remove to smooth surface	remove to smooth surface (1)	remove to smooth surface	remove to smooth surface (1)	change the coupling (1)
Internal bore	5	remove to smooth surface (1)	remove to smooth surface (1)	remove to smooth surface	remove to smooth surface (1)	remove to smooth surface (1)

(1) Minor imperfections may be accepted by a connection specialist or can be removed with abrasive fleece/emery paper. Repair is only allowed if it is performed by an Inspector / Specialist.

Burrs: Any burrs should be removed by abrasive fleece or emery paper paper or rotary scotch brite wheel.

Note: After any field repair the application of Moly-disulfide spray, prior to applying the thread compound, pipes with the dimension of $\geq 5''$ or >80 ksi on the pin end and for all couplings, is recommended.