

How to read Make-up Torque(MUT) THEN Tension curves?

At torque levels up to the make-up torque of the tool joint, the Make-up Torque THEN Tension curves are used to determine the drill pipe capacity.

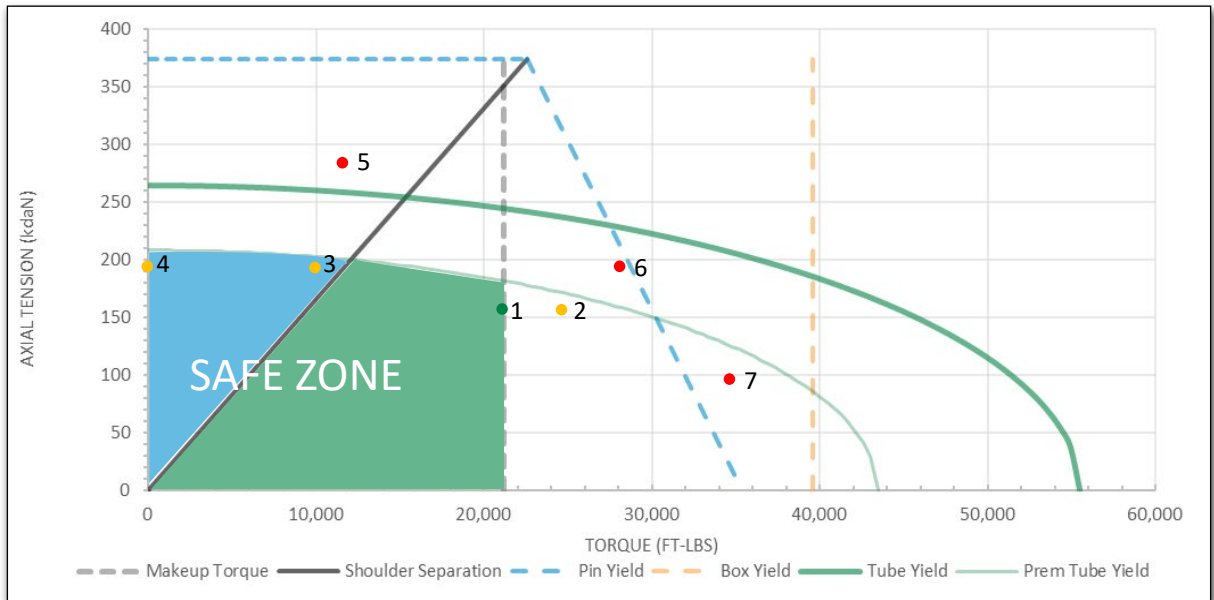
- Refer to the **premium tube yield curve** when the pipe is running in downhole;
- The **green shade zone** is the safe working zone;
- In the **blue shade zone**, pulling & torsion can be performed **ONLY** with connections made up at the MUT*, shoulder separation can occur if lower torque has been applied in connection.

*(Recommended) MUT is 60% value of connection torsional yield strength

Pipe				NEW	API PREMIUM
Pipe size	in	4.500	mm	114.3	110.9
Pipe weight	lb/ft	16.60	kg/m	24.70	6.8
Upset Type	IEU		X-Sec Area	cm ²	22.4
Tube grade	S135		Section Modulus	cm ³	54.8
Range	2		Polar Section Modulus	cm ³	109.7
Tube Yield	MPa	931	Tensile Yield	kdaN	208
ID	mm	97.2	Torsional Yield	ft-lbs	43,500
			80% Torsional Yield	ft-lbs	34,800
			Internal Pressure Yield	MPa	111.7
			Collapse Yield	MPa	75.8
			D/t	13.35	16.19
			Connection/Tube Torsional Ratio	0.638	

Tool Joint				NEW
Connection Type	DS40	OD	mm	133.4
Material Yield Strength	MPa	Tensile Yield Strength	kdaN	374
OD	mm	Torsional Yield Strength	ft-lbs	35,400
ID	mm	Recommended Makeup Torque	ft-lbs	21,200

Torsional Yield & MUT are based on the lower value of Box or Pin



- GOOD** - Connection at/less than MUT, applied axial tension less than new tube yield, safe to operate.
- CAUTION/DANGER** - The connection has been torqued higher than Recommended MUT, this can cause the connection to fail prematurely. Some manufacturers may allow additional room above the recommended MUT such as "max MUT", the dashed line could be offset to the right.
- CAUTION** - If the connection is made up at this torque while applying tension (pulling), the shoulder will likely separate. If the connection is made up at MUT, pulling the pipe with tension and torsion in the Safe Zone is OK.
- CAUTION** - Pipe in downhole with connection at MUT, pulling pipe less than the tube yield with 0 torque applied, it is still in the operating safe zone
- DANGER** - Operates exceeds tube load, tube can fail prematurely.
- DANGER** - The connection has been made up higher than MUT (28,000ft-lbs vs 21,200ft-lbs) and higher than premium tube yield, which can cause premature failure.
- DANGER** - The connection has been made up way higher than MUT and pin yield, pin connection can fail prematurely.