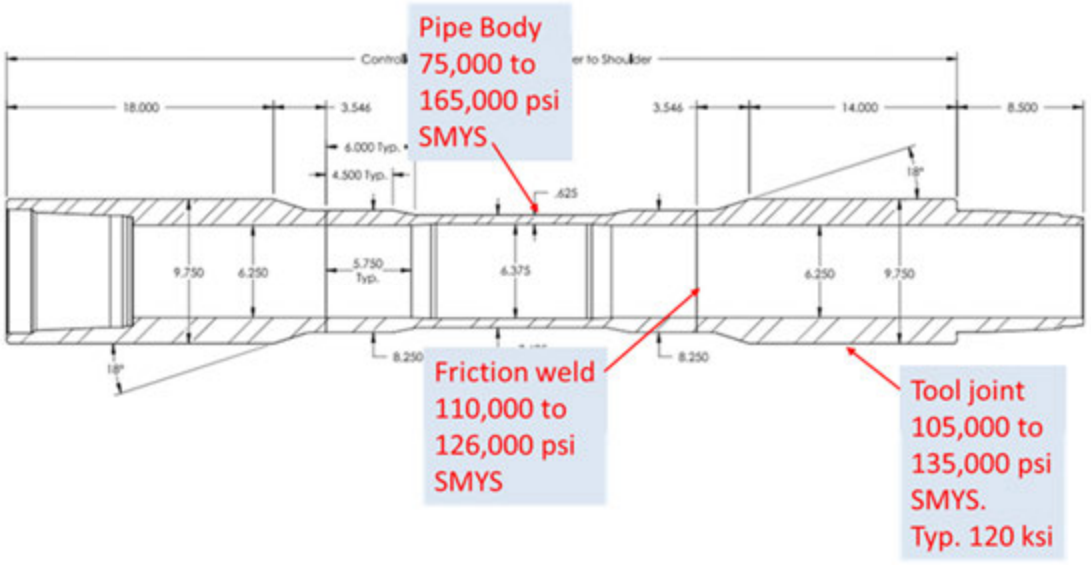
Engineering Bulletin	WORKSTRINGS INTERNATIONAL	**Document #:** BLTN-016
		Revision: B
API Upset Designations		**Created By:** Blake A. Johnson
		Release Date: Oct 11, 2016

Background

The purpose of the bulletin is to define the different categories of upsets that characterize drill pipe and landing string. The three types of upsets that categorize drill pipe tubes are internal, external, and internal-external upsets.

Details

Upsets are developed by heating the ends of the tube and forging them to thicken the walls. This provides additional weld cross sectional area where the tube and the tool joint are to be mated. The weld yield strength is usually less than the pipe body yield strength and the tool joint yield strength. This additional area is required to assure that the weld tensile strength is at least 110% of the pipe body yield strength. Upset dimensions are different for each style and tube OD size (e.g. 4”, 5”, 6 5/8”, etc). The below SMYS values are for reference only.



Internal Upset

An internal upset (IU) will have an internal diameter significantly smaller than the tube. Internal upset tubes do feature a minor external upset. The upset on the OD of the tube, while minor, can still affect which elevator bushings are compatible. Such as upset is often used to maximize elevator capacity. The IU tube is most commonly used with slim-hole connections with smaller tool joint ODs and special applications like the StimTech/Work Tech joints with near flush OD. The trade-off is restricted fluid flow compared to other upsets.

Internal-External Upset

An internal-external upset (IEU) will have both an increased outer diameter and decreased inner diameter in comparison to the rest of the tube. With the upset in both directions, this option offers the best solution to a balance in strength at the weld area and hydraulic performance. IEU upsets are used primarily for drilling applications. API Specification 5DP Table C.1 list the common configurations for drilling with API connections. Most of the drill pipe configurations in API Specification 5DP have IEU upsets.

External Upset

An external upset (EU) will have an outer diameter significantly larger than the tube, and larger than the IU and IEU of the same tube size. Externally upset tubes do feature a minor internal upset. This increase in the outer diameter provides the necessary strength at the weld area, while also providing a larger ID which improves fluid-flow characteristics through the ID thereby providing a reduced pressure drop compared to IU pipe. The larger ID also allows passage for larger wireline tools, subsea well head crown plugs and other completion tools. This configuration is especially common for pipe used for well completions, but is also used for drilling applications on pipe, 4” and smaller.

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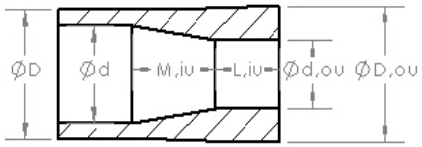
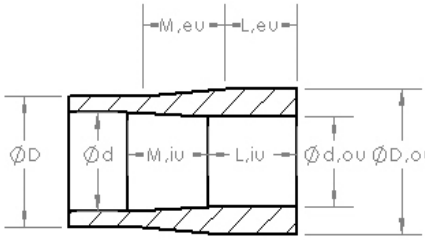
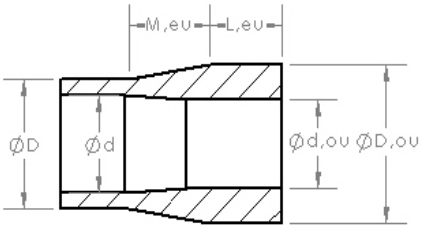


Internal Upset



Internal-External Upset



External Upset

Extended Internal Upset

Development of the extended $M_{,IU}$ length in early 1990's greatly increased the fatigue resistance of drill pipe and tubing, and is often referred to as EIU.

Other Special Applications

API specifies an IU upset for 4" drill pipe with NC40 connections with a 5.250" tool joint OD and an EU upset for 4" drill pipe with and NC46 connections with a 6.000" tool joint OD. Special upsets with reduced outside diameter, often referred to as D_{TE}, are used to increase the elevator capacity. Two common sizes of this are:

- 4" IU with a maximum D_{TE} of 4.100" versus 4.188" per API
- 4 1/2" IEU with a maximum D_{TE} of 4.600" versus 4.688" per API

For additional support on upsets, or any other questions, please contact WSI Engineering.

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