General Information

High Yield Fittings Flanges & Pipe

High Yield Piping Systems

The High Yield term refers to a group of materials that have a higher yield and tensile strength than regular carbon steel. Regular carbon steel has a minimum yield strength of 35 ksi, while High Yield is manufactured with a minimum yield strength anywhere from 42 ksi to 70 ksi. Along with the higher strength there are more stringent chemical, dimensional, and mechanical requirements for the material. These enhanced properties allow for the following: higher pressures, increased flow, longer lifespan, and safer operation. The applications for High Yield product in high pressure oil and gas transmission/distribution systems include pipelines, compressor stations, metering and regulating stations, and mains. Most of the pipelines constructed in the past 20 years have been using High yield materials. Older pipelines that were constructed with A106/A105/A234 WPB are being replaced by High Yield.

High Yield is produced in several different grades. The grades are separated by their yield strength. Y52 yield and Y65 are the most common. Y52 is dominant on sizes 12" and below. Y65 is dominant on 18" to 24", and Y70 is primarily seen in large diameters only.

High Yield Pipe Specifications

API 5L specifies the manufacturing of two product levels (PSL1 and PSL2) of seamless and welded steel pipe for the use of a pipeline in the transportation of oil and natural gas. PSL1 is a standard quality for line pipe where PSL2 contains additional chemical, mechanical properties, and testing requirements. This specification has a wide range of grades from material similar to A106 Gr B above X70 High Yield

High Yield fitting Specifications

ASTM A860 and MSS SP-75 both are standards that govern the manufacture of high-strength butt-weld fittings. ASTM A860 is a more stringent specification. The primary differences are the Charpy impact testing, chemistry, and thermal processing requirements. A fitting can be manufactured to meet both specifications. Most pipelines in the US require MSS SP-75. ASTM A860 is more common outside of the US and in colder environments.

STD is dominant on 12" and below. XH is dominant on 18" and above. On 16" and above 3R 90s and 45s are very common because of their piggability. (Some A860 fittings are dual certified with A420 WPL6)

* This information is provided for quick references, always consult applicable ASME, ASTM and Manufacture's standards.

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Grade	MSS/ASTM Yield Strength	MSS/ASTM Tensile Strength	ASTM Tensile Strength	MSS Elongation	ASTM Elongation	MSS Charpy Test	ASTM Charpy Test
	Min. ksi	Min. ksi	Max ksi	min. %		(avg./min.) ft-lbs @ 20°F	(avg./min.) ft-lbs @ -50°F
WPHY-42	42	60	85	25		≥20/15	>30/25
WPHY-46	46	63	88	25			
WPHY-52	52	66	91	25			
WPHY-60	60	75	100	20			
WPHY-65	65	77	102	20			
WPHY-70	70	80	105	18	20		

High Yield Flange Specifications

ASTM A694 governs the manufacture of high-strength flanges. The flange grades are designated by an "F" followed by the yield and range from F42 to F70. (Some F42 and F52 are dual certified to ASTM A350 LF2) Class 600 is the most common.

General Notes:

HY fittings and flanges may satisfy the requirements of multiple grades providing a technical review is performed against the applicable requirements. For example, virtually all Y65 fittings may also meet Y60 but generally not the other way around. Virtually all Y52 fittings may also meet Y46 and Y42 requirements but generally not the other way around. Regarding/restamping authorization should be obtained from the certifying manufacturer.

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