ASTM

Specification / Classification			ASTM A53		ASTM A500				ASTM A513										
			A	B	A		B		MT 1010	MT 1015	MTX 1015	MT 1020	MTX 1020	1025	1026	1030	1035	4130	8630
Application			Ordinary piping		General structural purposes				Machine structural purposes										
Chemical composition(%)	C(Max.)		0.25	0.30	Heat 0.26	Product 0.30	Heat 0.26	Product 0.30	0.05 - 0.15	0.10 - 0.20	0.10 - 0.20	0.15 - 0.25	0.15 - 0.25	0.22 - 0.28	0.22 - 0.28	0.27 - 0.34	0.31 - 0.38	0.28 - 0.33	0.28 - 0.33
	Si(Max.)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.15 -0.35	0.15 -0.35
	Mn(Max.)		0.95	1.20	-	-	-	-	0.30 - 0.60	0.30 - 0.60	0.60 - 0.90	0.30 - 0.60	0.70 - 1.00	0.30 - 0.60	0.60 - 0.90	0.60 - 0.90	0.60 - 0.90	0.40 - 0.60	0.70 - 0.90
	P(Max.)		0.05	0.05	0.035	0.045	0.035	0.045	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035
	S(Max.)		0.045	0.045	0.035	0.045	0.035	0.045	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.040	0.040
	Others		-	-	Cu 0.20 (Min.)	Cu 0.18 (Min.)	Cu 0.20 (Min.)	Cu 0.18 (Min.)	-	-	-	-	-	-	-	-	-	Cr 0.80-1.10 Mo 0.15-0.25	Cr 0.40-0.60 Mo 0.15-0.25 Ni 0.40-0.70
Mechanical properties	Tensile strength (min.)	PSI	48000	6000	R 45000	S 45000	R 58000	S 58000											
		MPa	330	415	310	310	400	400											
		kgf/mm^2	33.8	42.2	31.6	31.6	40.8	40.8											
	Yield point (min.)	PSI	30000	35000	33000	39000	42000	46000											
		MPa	205	240	228	269	290	317											
		kgf/mm^2	21.1	24.6	23.3	27.4	29.6	32.3											
	Elongation (Min.)		e = 625,000 $A^{0.2}$/ $U^{0.9}$		25 (56t + 17.5)		23 (61t + 12)												

Type	Grade	Tensile strength Min. (PSI)	Yield point Min. (PSI)	Elongation Min(%)
As-welded	1010	45000	32000	15
	1015	48000	35000	15
	1020	52000	38000	12
	1025	56000	40000	12
	1030	62000	45000	10
	1035	66000	50000	10
Normalized	1010	40000	25000	30
	1015	45000	30000	30
	1020	50000	35000	25
	1025	55000	37000	25
	1030	60000	40000	25
	1035	65000	45000	20
Sink-drawn	1010	50000	40000	8
	1015	55000	45000	8
	1020	60000	50000	8
	1025	65000	55000	7
	1030	70000	62000	7
	1035	80000	70000	7
Mandrel-drawn	1010	60000	50000	5
	1015	65000	55000	5
	1020	70000	60000	5
	1025	75000	65000	5
	1030	85000	75000	5
	1035	90000	80000	5
Mandrel-drawn stress-relieved	1010	55000	45000	12
	1015	60000	50000	12
	1020	65000	55000	10
	1025	70000	60000	10
	1030	80000	70000	10
	1035	85000	75000	10

Flattening test	H : Distance between Flattening plates(mm) H` : Inside disance between flattening plates(mm) D : Outside diameter of the pipe(mm) D` : Inside diameter of the pipe(mm)	NPS2 over Weld H = 2/3D Base metal H = 1/3D	Weld H = 2/3D Base metal H = 1/3D Soundness Test H = Contact Welded part is located at 90 degree	Welded part H = 2/3D Base metal H = 1/3D Welded part is located at 90 degree	
		Welded part is located at 90 degree			
Bending test	Bending angle X Inside radius (D : Outside diameter of the pipe)	NPS2 below 90° X 12D close coiling 180° X 8D	-	-	
Hydrostatic test	P : Test pressure (PSI, MPa) D : Outside diameter(mm) t : Thickness(mm)	$P = \frac{2St}{D}$	-	$P = \frac{2St}{D}$ s = allowable fiber stress of 14000PSI or 96.5MPa	
NDT (Non-Destructive Test)		Ultrasonic Test or Eddy current test	-	Eddy - Current Test or Ultrasonic Test or Flux leakage Test	
Others		Weight of zinc coating Average : Min. 550g/m^2 Individual : Min. 490g/m^2	-	Flaring Test ID` = 1.15D`(60° tool) D` : Inside diameter ID` : Enlarged inside diameter	