ASTM Pipe Technical Data

Америк стандартын ган хоолойн техникийн дата

Types

Seamless, Welded(Longitudinal/Circumferential Seams/SAWL/ SAWH/HFW)

Stainless Steel Austenitic Alloys

● Body and Trim

A widely used grade that has high strength at elevated temperatures and good corrosion resisting properties for applications in a wide range of corrosive media. Less susceptible to precipitations of carbides and therefore suitable for use where welding conditions do not involve prolonged exposures to temperatures in the 800°F-1600°F (425°C-870°C) range. Excellent mechanical properties as low as -325°F (-198°C). Extensively used in the food and drink processing equipment decorative applications and heat exchangers. Scale resistant in continuous service to 1600°F and 1450°F for intermittent service.

● Type 304L

A low carbon variation of Type 304 with a greatly reduced tendency to inter-crystalline disintegration after welding.

● Type 309

A higher chromium and nickel content than the basic 18/8 types. Primarily a heat resistant alloy containing 25%Cr and 12%Ni with good high tensile and creep strength at elevated temperatures.

Subject to carbide precipitation in range 800°F-1600°F (425°C-870°C). This alloy is easily welded or machined, is ductile and malleable. Resists oxidization up to 2000°F (1095°C) for continuous service. Not recommended for heat resistant applications of a cyclic nature because the different rates of expansion of the scale formed and the parent metal results in progressive scaling. Intermittent service to 1800°F (982°C).

● Type 310

This is a heat resistant alloy containing 25%Cr and 20%Ni suitable for use at elevated temperatures up to 2100°F (1150°C) for continuous service or in applications involving cyclic operation to 1900°F (1038°C) providing reducing sulphur gases are not present. Nonmagnetic at room temperatures in annealed condition with excellent weldability. Mechanical and corrosion resistance properties similar to, but better than Type 304. Offers good resistance to sea water and fuming nitric acid at room temperatures. Used extensively for furnace components, still tubes and fuel lines. Silicon content 1.5%max.

● Type 316

A 18%Cr - 10%Ni - 2 - 3%Mo. alloy that offers the best corrosion resistance of the standard Austenitic grades. This type, with the molybdenum content, is particularly resistant to sulphur, sulphur acids, phosphoric, formic and various hot organic acids. Offers increased resistance to pitting and pinhole type corrosion when in contact with acid vapours and salt solutions of the halide group in general, and has good high temperature and creep strength. Since this grade is not stabilized it is susceptible to inter-granular corrosion when exposed to the critical temperature range 800°F-1600°F (425°C-870°C) and therefore must be heat treated after welding. Extensively used in pulp and paper, chemical, petro-chemical and dyeing industries for the more corrosive service applications. Scale resistance to 1600°F (871°C) max. for continuous and 1500°F (816°C) for intermittent service.

● Type 316L

Low carbon modification of Type 316. Can be welded and heated in the range 800°F-1600°C (425°C-870°C) without damage to corrosion resistance.

● Type 316Ti

A versatile grade of stainless steel which combines the advantages of AISI Type 316, 321 and 316L. Basically Type 316 stainless steel but with the addition of a minimum titanium content of 5 x carbon. This gives the steel particular application in structures subjected to temperatures in the 800°F-1600°C (425°C-870°C)where the steel is in contact with corrosive media. Type 316Tican be stress relieved without risk of inter-granular corrosion.

● Type 321

An 18% Cr-10% Ni titanium-stabilised alloy designed to overcome susceptibility to carbide precipitation and resultant inter-granular corrosion. Can be welded without subsequent annealing.

Corrosion resistance similar to Type 304 but with higher creep resistance suitable for use up to 1600°F (870°C) for intermittent service and up to 1475°F (800°C) for continuous service andcan be used in corrosive applications at these temperatures.

Recommended for use where heavy welded or field-erected equipment cannot be annealed. Also used where it is necessary for equipment to be cooled slowly through sensitizing range or where operating temperature is between 800°C-1600°F (425°C-870°C).

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● Type 347

Similar properties to Type 321 but stabilized by columbium instead of titanium. Superior to Type 321 when subjected to corrosive service in the sensitizing temperature range.

Stainless Steel Martensitic Alloys

● Type 410

Type 410 is a basic hardenable alloy containing 12% Cr; Magnetic in all conditions and can be hardened to Rockwell C36-40 by quenching or air cooling from 1750-1850o F. Not subject to carbide precipitation, but low in impact properties at low temperatures.

Air hardening, they present some difficulty in welding. Widely used wherever good spring properties are needed. Excellent for Bourdon springs, medical instruments and turbine parts.

Stainless Steel Ferritic Alloys

● Type 430

Basic type of straight chromium ferritic alloy steel combining useful corrosion resistance, mechanical properties, ease of formability and low cost. Used extensively as automotive trim.

Resistance to nitric acid permits the use of Type 430 for specific chemical applications. Has good resistance to atmospheric corrosion away from coastal areas. Under oxidizing conditions a tight protective scale is formed on the surface making it useful for equipment subjected to repeated heating and cooling up to 1600°F (870°C). It is magnetic in all tempers and non-hardenable.

Nickel & Nickel Base Alloys

● Nickel 200

Combines excellent mechanical properties with corrosion resistance that is generally good and is outstanding under many conditions of exposure. Strength and hardness may be increased by cold working. Scale resistant in sulphur free atmospheres to 1650°F (900°C). Extensively used in contact with reducing acids, food, chemical processing liquors and caustic solutions. Carbon 0.15% max.

● Nickel 201

Is the low carbon grade of Nickel 200. Carbon content 0.02% max. This alloy has excellent resistance to corrosion and may be used in oxidizing temperatures to 1650°F (900°C).

Recommended for severe manipulation and use in thermocouple tubing in molten salt bath furnaces.

● Incoloy 600*

This alloy is superior in corrosion resistance to commercially pure nickel under oxidizing conditions. Its higher nickel content enables it to retain considerable corrosion resistance under reducing conditions. It resists oxidization at elevated temperatures up to 2150°F (1170°C). Resistant to salt at elevated temperatures up to 1832°F (1000°C). Can be readily welded, brazed and soldered. Extensively used for thermocouple protection tubing, sheathing on electric elements and food processing.

● Incoloy 800*

This alloy has good resistance to oxidization up to 2050°F (1100°C) and retains its strength at elevated temperatures. Has excellent workability and welding properties and is superior to Inconel 600 in resisting sulphur and fused neutral salts; comparable in resistance to oxidization; inferior in resistance to nitriding, halogen gases and molten caustics. Used extensively for sheathing on electric elements, furnace muffles and heat exchangers.

● Incoloy 825*

Formerly known as Ni-o-nel* Alloy 825, is a titanium stabilized nickel-chromium-iron-molybdenum-copper alloy. It is fully austenitic and resistant to attack by many mineral and organic acids, particularly under oxidising conditions. Has greatly increased resistance to sulphuric acid and phosphoric acid when fluorides are present than the 300 series stainless steels. This alloy resists stress-corrosion cracking when subjected to a wide range of temperature and the more aggressive mineral acids, chlorine, ammonia and ammonium hydroxide solutions.

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● Titanium

This metal has outstanding strength to weight ratio and excellent corrosion resistance for certain application in the chemical industry.

Used extensively in the aluminium anodising field and in the food industry or the manufacture of fine chemicals when traces of iron, nickel or chromium can ruin the product. Readily fusion welded provided the metal is thoroughly protected from contamination by oxygen, nitrogen and hydrogen by the conventional shielded arc using a tungsten electrode. Used extensively for electrochemical anodes, chlorine applications, sea water, inhibited reducing acids, nitric acid, urea equipment anodising and plating, textile, food, petroleum industries.

● Hastelloy “c”

Excellent corrosion resistance, especially to ferric chloride and cupric chloride. Also to wet chlorine gas and hypochlorite and chlorine dioxide solutions. Has excellent high temperature strength.

Resistant to oxidizing and reducing atmospheres to 2000°F.

Primarily used where exceptional corrosion resistance and high temperature strength are required. Typical are the outer sheath for electric tubular heating elements, thermocouple rakes, probes, photographic processing equipment, and lubricating lines for chemical equipement.

* Monel, Inconel and Incoloy are Registered Trade Names of

The International Nickel Co. Ferralium Alloy is Registered Trade Name of Langley Alloys Ltd.

ASTM Specification for Pipe

Америк стандартын ган хоолойн стандарт

American Society of Testing

● ASTM A53 Grades A & B

This specification covers seamless and welded black and hot-dipped galvanized steel pipe in NPS 1/8 to 26 [DN6 to DN 650], inclusive, with nominal wall thickness.

● ASTM A106 Grades A & B & C

This specification covers seamless carbon steel pipe for high-temperature service in nominal sizes 1/8 to 48 [DN6 to DN 1200] inclusive, with nominal (average) wall thickness as given in ASME B36.10M.

● ASTM A213

This specification covers seamless ferritic and austenitic steel boiler, superheater, and heat-exchanger tubes, designated Grades T5, TP304, etc. The tubing sizes and thicknesses usually furnished to this specification are 1/8 in. [3.2 mm] in insidediameter to 5 in. [127 mm] in outside diameter and 0.015 to 0.500 in. [0.4 to 12.7 mm], inclusive, in minimum wall thickness or, if specified in the order, average wall thickness.

● ASTM A312

This specification covers seamless, straight-seam welded, and heavily cold worked welded austenitic stainless steel pipe intended for high-temperature and general corrosive service.

Grades TP304H, TP309H, TP309HCb, TP310H, TP310HCb, TP316H, TP321H, TP347H, and TP348H are modifications of Grades TP304, TP309Cb, TP309S, TP310Cb, TP310S, TP316, TP321, TP347, and TP348, and are intended for service at temperatures where creep and stress rupture properties are important.

● ASTM A333

This specification covers nominal (average) wall seamless and welded carbon and alloy steel pipe intended for use at low temperatures and in other applications requiring notch toughness. Some product sizes may not be available under this specification because heavier wall thicknesses have an adverse effect on impact properties.

● ASTM A335

This specification covers nominal wall and minimum wall seamless ferritic alloy-steel pipe intended for high-temperature service. Pipe ordered to this specification shall be suitable for bending, flanging (vanstoning), and similar forming operations, and for fusion welding. Selection will depend upon design, service conditions, mechanical properties, and high-temperature characteristics.

● ASTM A358

This specification covers electric-fusion-welded austenitic chromium-nickel stainless steel pipe suitable for corrosive or high-temperature service, or both, or for general applications.

The selection of the proper grade and requirements for heat treatment shall be at the discretion of the purchaser, dependent on the service conditions to be encountered.

● ASTM A403

This specification covers wrought stainless steel fittings for pressure piping applications. Several grades of austenitic stainless steel alloys are included in this specification Grades are designated with a prefix, WP or CR, based on the applicable ASME or MSS dimensional and rating standards, respectively.
The material for fittings shall consist of forgings, bars, plates, or seamless or welded tubular products.

Table of Comparative Pipe Materials

Ган хоолойн материалын харьцуулалт

Standards			Equivalent Specifications				
Material	Manufacturing	Dimension	ASTM	API	BS	DIN	DIV
A 53	A 53	ANSI-B 36.10	-	5L Gr A	3601-S 360	St 35	BS 3601 ERW 360
A 53	A 53	ANSI-B 36.10	-	5L Gr B	3601-S 410	St 45	BS 3601 ERW 410
A106	A 106/A530	ANSI-B 36.10	-	5L Gr A	3602 HFS 23	St 35.8	
A106	A 106/A530	ANSI-B 36.10	-	5L Gr B	3602 HFS 27	St 45.8	
A333	A333/A530	ANSI-B 36.10	-	-	-	TT St 35	
A333	A333/A530	ANSI-B 36.10	-	-	3603 410	TT St 41	
A333	A333/A530	ANSI-B 36.10	-	-	3603-503	10 Ni 14	
A335	A335/A530	ANSI-B 36.10	-	-	3059-243	15 Mo 3	
A335	A335/A530	ANSI-B 36.10	-	-	3604-620	13 Cr Mo 44	
A335	A335/A530	ANSI-B 36.10	-	-	3604-620	13 Cr Mo 44	
A335	A335/A530	ANSI-B 36.10	-	-	3604-622	10 Cr Mo 910	
A335	A335/A530	ANSI-B 36.10	-	-	3604-625	12 Cr Mo 195	
DIN 1626/2	DIN 1626/2	DIN 2458					
DIN 17100	DIN 2440/2441	DIN 2440/2441	A 120	-	1387		ISO-65
DIN 1626/3	DIN 1626/3	DIN 2458					
DIN 17100	DIN 1626/3	DIN 2458	A 53 Gr A	5L1-Gr A	3601 ERW 320		
DIN 1626/3-4	DIN 1626/3-4	DIN 2458	A 53 Gr B	5L Gr B	3601 ERW 410		Euronorm 25 Fe 430 A
DIN 17100	DIN 1626/3-4	DIN 2458	A 53 Gr B	5L Gr B	4360-43C		Euronorm 25 Fe 430 B
DIN 17100	DIN 1626/3-4	DIN 2458	A 53 Gr B	5L Gr B	4360-43C		Euronorm 25 Fe 430 C
DIN 17100	DIN 1626/3-4	DIN 2458	A381-Y52	5LX-X52	4360-50C		Euronorm 25 Fe 510C/FG 36
DIN 1629/3	DIN 1629/3	DIN 2448	A 53 Gr A	5L Gr A	3601-S 360		
DIN 1629/3	DIN 1629/3	DIN 2448	A 53 Gr B	5L Gr B	3601-S 410		
DIN 1629/3	DIN 1629/3	DIN 2448	A252 Gr 3	5LX-X52	1775-HFS23		A519-1518
DIN 17175	DIN 17175	DIN 2448	A106 Gr A	5L Gr A	3602-HFS 360		BS3059 pt 2360
DIN 17175	DIN 17175	DIN 2448	A106 Gr B	5L Gr B	3602-HFS 410		BS3601 S 410
DIN 17175	DIN 17175	DIN 2448	A335 P1		3059-243		
DIN 17175	DIN 17175	DIN 2448	A335 P11-P12		3604-620		BS 3059-620
DIN 17175	DIN 17175	DIN 2448	A335 P22		3604-622	-	BS 3059-622/440
Vd TUV 1207	DIN 17175	DIN 2448	A335 P5		3604-625	-	
BS 1387	BS 1387	BS 1387	A120		-	St 33	
BS 3059	BS 3059	BS 3059	A106 Gr A	5L Gr A	-	St 35	
BS 3059	BS 3059	BS 3059	A 53 Gr A	5L Gr A	-	St 34-2	
BS 3059	BS 3059	BS 3059	A106 Gr A	5L Gr A	-	St 35.8	BS 3602 pt1 HFS 360
BS 3059	BS 3059	BS 3059	A106 Gr B	5L Gr B	-	St 45.8	BS 3602 pt1 ERW 360
BS 3059	BS 3059	BS 3059	A335 P1	-	-	15 Mo 3	BS 3602 pt1 HFS 410
BS 3059	BS 3059	BS 3059	A335 P11/P12	-	-	13 Cr Mo 44	BS 3602 pt1 ERW 410
BS 3059	BS 3059	BS 3059	A335 P22	-	-	10 Cr Mo 910	BS 3602 pt2 SAW 410
BS 3601	BS 3601	BS 3600	A106 Gr A	5L Gr A	-	St 35.8	
BS 3601	BS 3601	BS 3600	A 53 Gr A	5L Gr A	-	St 34-2	
BS 3601	BS 3601	BS 3600	A106 Gr A	5L Gr A	-	St 35.8	
BS 3601	BS 3601	BS 3600	A 53 Gr A	5L Gr A	-	St 37.2	
BS 3601	BS 3601	BS 3600	A106 Gr B	5L Gr B	-	St 45.8	
BS 3601	BS 3601	BS 3600	A 53 Gr B	5L Gr B	-	St 44.3	
BS 3601	BS 3601	BS 3600	A 53 Gr B	5L Gr B	-	St 44.3	
BS 3603	BS 3603	BS 3600	A333 Gr 6	-	-	TT St 41	
BS 3603	BS 3603	BS 3600	A333 Gr 3	-	-	10 Ni 14	
BS 3604	BS 3604	BS 3600	A335 P11/P12	-	-	13 Cr Mo 44	
BS 3604	BS 3604	BS 3600	A335-P22	-	-	10 Cr Mo 910	
BS 3604	BS 3604	BS 3600	A335-P5	-	-	12 Cr Mo 195	
BS 4360	BS 4360	-	A 53 Gr B	5L Gr B/5LX-X42	-	St 45/St 44.3	Euronorm 25 Fe 430 C
BS 4360	BS 4360	-	-	5LX-X52	-	St 52.3	Euronorm 25 Fe 510 C
BS 4360	BS 4360	-	-	5LX-X52 (N)	-	St 52.3	Euronorm 25 Fe 510 D/Fg 36

Table of Comparative Pipe Property

Ган хоолойн үзүүлэлтийн хүснэгт

Mechanical Properties					Chemical Analysis (Ladle)							
Material	Tensile Strength N/mm2	Yield Pointmin N/mm2	Elongtion % Min	C %	Si %	Mn %	P % max.	S % max.	Mo %	Cr %	Ni %	Div
A 53-Gr A	min. 330	205	variable	max. 0.25	-	max. 0.95	0.05	0.06				
A 53-Gr B	min. 415	240	variable	max. 0.30	-	max. 1.20	0.035	0.035				
A 106-Gr A	min. 330	205	28	max. 0.25	min. 0.10	0.27-0.93	0.048	0.058				
A 106-Gr B	min. 415	240	22	max. 0.30	min. 0.10	0.29-1.06	0.035	0.035				
A 333 Gr 1	min. 379	207	28	max. 0.30	-	0.40-1.06	0.05	0.06				
A 333 Gr 6	min. 414	241	22	max. 0.30	min. 0.10	0.29-1.06	0.048	0.058				
A 333 Gr 3	min. 448	241	22	max. 0.19	0.18-0.37	0.31-0.64	0.05	0.05			3.18-3.82	
A 335 Gr P1	min. 379	207	22	0.10-0.20	0.10-0.50	0.30-0.80	0.045	0.045	0.44-0.65	-		
A 335 Gr P11	min. 414	207	22	max. 0.15	0.50-1.00	0.30-0.60	0.03	0.03	0.44-0.65	1.00-1.50		
A 335 Gr P12	min. 414	207	22	max. 0.15	max. 0.50	0.30-0.61	0.045	0.045	0.44-0.65	0.80-1.25		
A 335 Gr P22	min. 414	207	22	max. 0.15	max. 0.50	0.30-0.60	0.03	0.03	0.87-1.13	1.90-2.60		
A 335 Gr P5	min. 414	207	22	max. 0.15	max. 0.50	0.30-0.60	0.03	0.03	0.45-0.65	4.00-6.00		
St. 33	290-540	185	18	-	-	-	-					
St. 34-2	335-410	205	28	max. 0.15	-	-	0.05	0.05				
St. 37-2	340-470	235	25	max. 0.17	-	-	0.05	0.05				N max. 0.009
St. 42-2	410-490	255	20	max. 0.25	-	-	0.06	0.05				N max. 0.009
St. 44-2	410-540	275	22	max. 0.21	-	-	0.05	0.05				
St. 44-3	410-540	275	22	max. 0.20	-	-	0.04	0.04				
St. 52-3	490-630	355	22	max. 0.20	max. 0.55	max. 1.60	0.04	0.04				
St. 35	340-440	235	25	max. 0.18	-	-	0.05	0.05				
St. 45	440-540	255	21	max. 0.25	-	-	0.05	0.05				
St. 52	510-610	355	22	max. 0.20	max. 0.55	max. 1.50	0.05	0.05				
St. 35.8	360-480	235	25	max. 0.17	0.10-0.35	0.40-0.80	0.04	0.04				
St. 45.8	410-530	255	21	max. 0.21	0.10-0.35	0.40-1.20	0.04	0.04				
15Mo3	450-600	270	22	0.12-0.20	0.10-0.35	0.40-0.80	0.035	0.035	0.25-0.35	-		
13 Cr Mo 44	440-590	290	22	0.10-0.18	0.10-0.35	0.40-0.70	0.035	0.035	0.45-0.65	0.70-1.10		
10 Cr Mo 910	450-600	280	20	0.08-0.15	max. 0.55	0.40-0.70	0.035	0.035	0.90-1.20	2.00-2.50		
12 Cr Mo 19.5	410-540	176	21	max. 0.15	0.30-0.50	0.30-0.60	0.03	0.03	0.45-0.65	4.0-6.0		
TT St. 35	345-445	225	25	max. 0.17	max. 0.35	min. 0.40	0.045	0.045				
TT St. 41	445-540	265	21	max. 0.20	max. 0.35	min. 0.45	0.045	0.045				
10 Ni 14	445-640	345	20	max. 0.12	0.10-0.35	0.30-0.60	0.035	0.035			3.20-3.80	
St. E 36	500-640	345	22	max. 0.20	0.10-0.50	0.90-1.60	0.04	0.04				
BS 1387	325-465	-	20	-	-	-	0.06	0.06				
BS3059 pt1-HFS 320	320-480	195	25	max. 0.16	-	0.30-0.70	0.05	0.05				
BS3059 pt1-ERW 320	320-480	195	25	max. 0.19	-	0.30-0.70	0.05	0.05				
BS3059 pt2 360	360-500	215	24	max. 0.17	max. 0.35	0.40-0.80	0.045	0.045				
BS3059 pt2 440	440-580	245	21	0.12-0.18	0.10-0.35	0.90-1.20	0.04	0.035				
BS3059 pt2 243	450-600	250	22	0.12-0.20	0.10-0.35	0.40-0.80	0.04	0.04	0.25-0.35			Al met 0.020 max
BS3059 pt2 620	460-610	180	22	0.10-0.15	0.10-0.35	0.40-0.70	0.04	0.04	0.45-0.65	0.90-1.20		Al met 0.020 max
BS3059 pt2 622-440	440-590	175	20	0.08-0.15	max. .050	0.40-0.70	0.04	0.04	0.90-1.20	2.00-2.50		Al met 0.020 max
BS3601 S320	320-440	195	25	max. 0.16	-	0.30-0.70	0.05	0.05				
BS3601 ERW 320	320-440	195	25	max. 0.16	-	0.30-0.70	0.05	0.05				
BS3601 S360	360-480	215	24	max. 0.17	max. 0.35	0.40-0.80	0.05	0.05				
BS3601 ERW 360	360-480	215	24	max. 0.17	max. 0.35	0.40-0.80	0.05	0.05				
BS3601 S410	410-530	235	22	max. 0.21	max. 0.35	0.40-1.20	0.05	0.05				
BS3601 ERW 410	410-530	235	22	max. 0.21	max. 0.35	0.40-1.20	0.05	0.05				
BS3601 SAW 410	410-530	235	22	max. 0.25	-	max. 1.20	0.05	0.05				
BS3603 HFS 410	410-530	235	22	max. 0.20	max. 0.35	0.60-1.20	0.045	0.045				Al met 0.015 max
BS3603 HFS 503	440-590	245	16	max. 0.15	0.15-0.35	0.30-0.80	0.025	0.02			3.25-3.75	
BS3604-620 (N)	460-610	180	22	0.10-0.15	0.10-0.35	0.40-0.70	0.04	0.04	0.45-0.65	0.70-1.10		Al met 0.020 max
BS3604-622	490-640	275	20	0.08-0.15	max. 0.50	0.40-0.70	0.04	0.04	0.90-1.20	2.00-2.50		Al met 0.020 max
BS3604-625	450-600	170	20	max. 0.15	max. 0.50	0.30-0.60	0.04	0.04	0.45-0.65	4.00-6.00		
BS4360-43C	430-540	255	22	max. 0.21	max. 0.40	max. 1.20	0.05	0.05				
BS4360-50C	490-640	355	20	max. 0.20	max. 0.40	max. 1.40	0.05	0.05				Nb 0.003-0.10
BS4360-50D	490-640	355	20	max. 0.20	max. 0.40	max. 1.40	0.04	0.04				V 0.003-0.15

Pipe Schedule (ASTM Standard)

Америк стандартын ган хоолойн хэмжээ

DN	NPS	OD	Schedule and Wall Thickness (mm)																	
	inch	mm	5S	5	10S	10	20	30	STD	40S	40	60	XS	80S	80	100	120	140	160	XXS
6	1/8	10.3			1.24	1.24		1.45	1.73	1.73	1.73		2.41	2.41	2.41					
8	1/4	13.7			1.65	1.65		1.85	2.24	2.24	2.24		3.02	3.02	3.02					
10	3/8	17.1			1.65	1.65		1.85	2.31	2.31	2.31		3.20	3.20	3.20					
15	1/2	21.3	1.65	1.65	2.11	2.11		2.41	2.77	2.77	2.77		3.73	3.73	3.73				4.78	7.47
20	3/4	26.7	1.65	1.65	2.11	2.11		2.41	2.87	2.87	2.87		3.91	3.91	3.91				5.56	7.82
25	1	33.4	1.65	1.65	2.77	2.77		2.90	3.38	3.38	3.38		4.55	4.55	4.55				6.35	9.09
32	1 1/4	42.2	1.65	1.65	2.77	2.77		2.97	3.56	3.56	3.56		4.85	4.85	4.85				6.35	9.70
40	1 1/2	48.3	1.65	1.65	2.77	2.77		3.18	3.68	3.68	3.68		5.08	5.08	5.08				7.14	10.15
50	2	60.3	1.65	1.65	2.77	2.77		3.18	3.91	3.91	3.91		5.54	5.54	5.54				8.74	11.07
65	2 1/2	73.0	2.11	2.11	3.05	3.05		4.78	5.16	5.16	5.16		7.01	7.01	7.01				9.53	14.02
80	3	88.9	2.11	2.11	3.05	3.05		4.78	5.49	5.49	5.49		7.62	7.62	7.62				11.13	15.24
90	3 1/2	101.6	2.11	2.11	3.05	3.05		4.78	5.74	5.74	5.74		8.08	8.08	8.08					
100	4	114.3	2.11	2.11	3.05	3.05		4.78	6.02	6.02	6.02		8.56	8.56	8.56		11.13		13.49	17.12
125	5	141.3	2.77	2.77	3.40	3.40			6.55	6.55	6.55		9.53	9.53	9.53		12.70		15.88	19.05
150	6	168.3	2.77	2.77	3.40	3.40			7.11	7.11	7.11		10.97	10.97	10.97		14.27		18.26	21.95
200	8	219.1	2.77	2.77	3.76	3.76	6.35	7.04	8.18	8.18	8.18	10.31	12.70	12.70	12.70	15.09	18.26	20.62	23.01	22.23
250	10	273.1	3.40	3.40	4.19	4.19	6.35	7.80	9.27	9.27	9.27	12.70	12.70	12.70	15.09	18.26	21.44	25.40	28.58	25.40
300	12	323.9	3.96	3.96	4.57	4.57	6.35	8.38	9.53	9.53	10.31	14.27	12.70	12.70	17.48	21.44	25.40	28.58	33.32	25.40
350	14	355.6	3.96	3.96	4.78	6.35	7.92	9.53	9.53	9.53	11.13	15.09	12.70	12.70	19.05	23.83	27.79	31.75	35.71	
400	16	406.4	4.19	4.19	4.78	6.35	7.92	9.53	9.53	9.53	12.70	16.66	12.70	12.70	21.44	26.19	30.96	36.53	40.49	
450	18	457.0	4.19	4.19	4.78	6.35	7.92	11.13	9.53	9.53	14.27	19.05	12.70	12.70	23.83	29.36	34.93	39.67	45.24	
500	20	508.0	4.78	4.78	5.54	6.35	9.53	12.70	9.53	9.53	15.09	20.62	12.70	12.70	26.19	32.54	38.10	44.45	50.01	
550	22	559.0	4.78	4.78	5.54	6.35	9.53	12.70	9.53			22.23	12.70		28.58	34.93	41.28	47.63	53.98	
600	24	610.0	5.54	5.54	6.35	6.35	9.53	14.27	9.53	9.53	17.48	24.61	12.70	12.70	30.96	38.89	46.02	52.37	59.54	
650	26	660.0				7.92	12.70		9.53				12.70							
700	28	711.0				7.92	12.70	15.88	9.53				12.70							
750	30	762.0	6.35		7.92	7.92	12.70	15.88	9.53				12.70							
800	32	813.0				7.92	12.70	15.88	9.53		17.48		12.70							
850	34	864.0				7.92	12.70	15.88	9.53		17.48		12.70							
900	36	914.0				7.92	12.70	15.88	9.53		19.05		12.70							
950	38	965.0							9.53				12.70							
1000	40	1016.0							9.53				12.70							
1050	42	1067.0							9.53				12.70							
1100	44	1118.0							9.53				12.70							
1150	46	1168.0							9.53				12.70							
1200	48	1219.0							9.53				12.70							
1300	52	1321.0																		
1400	56	1422.0																		
1500	60	1524.0																		
1600	64	1625.3																		
1700	68	1727.0												Weight = Kg/m (plain end mass) Weight = (OD-T)×T×0.02466Note(1) 5S, 10S,40S, 80S - ASME B36.19 5, 10, 20, 30, 40, 60, 80, 100, 120, 140, 160, STD, XS, XXS- ASME B36.10					
1800	72	1829.0																		
1900	76	1930.0																		
2000	80	2032.0																		

Pipe Size (ISO and EN Standard)

Олон улсын стандартын болон Европ стандартын ган хоолойн хэмжээ

Outside diameter Series 1	Ranges of preferred thickness (mm)						
	A	B	C	D	E	F	G
10.2	1.6	-	-	-	1.6	2	2.3
13.5	1.6	-	-	1.6	2	2.3	2.6
17.2	1.6	-	-	1.6	2	2.3	3.2
21.3	1.6	-	-	1.8	2	3.2	4
26.9	1.6	-	-	1.8	2	3.2	4
33.7	1.6	2	-	2	2.3	3.2	4.6
42.4	1.6	2	-	2.3	2.6	3.6	5
48.3	1.6	2	-	2.3	2.6	3.6	5
60.3	1.6	2	2.3	2.3	2.9	4	5.6
76.1	1.6	2.3	2.6	2.6	2.9	5	7.1
88.9	2	2.3	2.9	2.9	3.2	5.6	8
114.3	2	2.6	2.9	3.2	3.6	6.3	8.8
139.7	2	2.6	3.2	3.6	4	6.3	10
168.3	2	2.6	3.2	4	4.5	7.1	11
219.1	2	2.6	3.6	4.5	6.3	8	12.5
273	2	3.6	4	5	6.3	10	14.2
323.9	2.6	4	4.5	5.6	7.1	10	16
355.6	2.6	4	5	5.6	8	11	17.5
406.4	2.6	4	5	6.3	8.8	12.5	20
457	3.2	4	5	6.3	10	14.2	22.2
508	3.2	5	5.6	6.3	11	16	25
610	3.2	5.6	6.3	6.3	12.5	17.5	30
711	4	6.3	7.1	7.1	14.2	20	32
813	4	7.1	8	8	16	22.2	36
914	4	8	8.8	10	17.5	25	40
1016	4	8.8	10	10	20	28	45
1067	-	8.8	10	11	-	-	-
1118	-	8.8	10	11	-	-	-
1219	-	10	11	12.5	-	-	-
1422	-	12.5	14.2	14.2	-	-	-
1626	-	14.2	16	16	-	-	-
1829	-	14.2	16	17.5	-	-	-
2032	-	16	17.5	20	-	-	-
2235	-	17.5	20	22.2	-	-	-
2540	-	20	22.2	25	-	-	-

Pipe Size (ISO and EN Standard)

Олон улсын стандартын болон Европ стандартын ган хоолойн хэмжээ

Outside Diameter mm Series			Thickness(mm)																		
			0.5	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.3	2.6	2.9	3.2	3.6	4	4.5	5	5.4	5.6
1	2	3	Masses Per Length(kg/m)																		
10.2			0.120	0.142	0.185	0.227	0.266	0.304	0.339	0.373	0.404	0.448	0.487								
	12		0.142	0.169	0.221	0.271	0.320	0.366	0.410	0.453	0.493	0.550	0.603	0.651	0.694						
	12.7		0.150	0.179	0.235	0.289	0.340	0.390	0.438	0.484	0.528	0.590	0.648	0.701	0.750						
13.5			0.160	0.191	0.251	0.308	0.364	0.418	0.470	0.519	0.567	0.635	0.699	0.758	0.813	0.879					
		14	0.166	0.198	0.260	0.321	0.379	0.435	0.489	0.542	0.592	0.664	0.731	0.794	0.852	0.923					
	16		0.191	0.228	0.300	0.370	0.438	0.504	0.568	0.630	0.691	0.777	0.859	0.937	1.01	1.10	1.18				
17.2			0.206	0.246	0.324	0.400	0.474	0.546	0.616	0.684	0.750	0.845	0.936	1.02	1.10	1.21	1.3	1.41			
		18	0.216	0.257	0.339	0.419	0.497	0.573	0.647	0.719	0.789	0.891	0.987	1.08	1.17	1.28	1.38	1.50			
	19		0.228	0.272	0.359	0.444	0.527	0.608	0.687	0.764	0.838	0.947	1.05	1.15	1.25	1.37	1.48	1.61	1.73		
	20		0.240	0.287	0.379	0.469	0.556	0.642	0.726	0.808	0.888	1.00	1.12	1.22	1.33	1.46	1.58	1.72	1.85		
21.3			0.256	0.306	0.404	0.501	0.595	0.687	0.777	0.866	0.952	1.08	1.20	1.32	1.43	1.57	1.71	1.86	2.01	2.12	
		22	0.265	0.317	0.418	0.518	0.616	0.711	0.805	0.897	0.986	1.12	1.24	1.37	1.48	1.63	1.78	1.94	2.10	2.21	
	25		0.302	0.361	0.477	0.592	0.704	0.815	0.923	1.03	1.13	1.29	1.44	1.58	1.72	1.90	2.07	2.28	2.47	2.61	2.68
		25.4	0.307	0.367	0.485	0.602	0.716	0.829	0.939	1.05	1.15	1.31	1.46	1.61	1.75	1.94	2.11	2.32	2.52	2.66	2.73
26.9			0.326	0.389	0.515	0.639	0.761	0.880	0.998	1.11	1.23	1.40	1.56	1.72	1.87	2.07	2.26	2.49	2.70	2.86	2.94
		30	0.364	0.435	0.576	0.715	0.852	0.987	1.12	1.25	1.38	1.57	1.76	1.94	2.11	2.34	2.56	2.83	3.08	3.28	3.37
	31.8		0.386	0.462	0.612	0.760	0.906	1.05	1.19	1.33	1.47	1.67	1.87	2.07	2.26	2.50	2.74	3.03	3.30	3.52	3.62
	32		0.388	0.465	0.616	0.765	0.911	1.06	1.20	1.34	1.48	1.68	1.89	2.08	2.27	2.52	2.76	3.05	3.33	3.54	3.65
33.7			0.409	0.490	0.649	0.806	0.962	1.12	1.27	1.42	1.56	1.78	1.99	2.20	2.41	2.67	2.93	3.24	3.54	3.77	3.88
		35	0.425	0.509	0.675	0.838	1.00	1.16	1.32	1.47	1.63	1.85	2.08	2.30	2.51	2.79	3.06	3.38	3.70	3.94	4.06
	38		0.462	0.553	0.734	0.912	1.09	1.26	1.44	1.61	1.78	2.02	2.27	2.51	2.75	3.05	3.35	3.72	4.07	4.34	4.47
	40		0.487	0.583	0.773	0.962	1.15	1.33	1.52	1.70	1.87	2.14	2.40	2.65	2.90	3.23	3.55	3.94	4.32	4.61	4.75
42.4			0.517	0.619	0.821	1.02	1.22	1.42	1.61	1.80	1.99	2.27	2.55	2.82	3.09	3.44	3.79	4.21	4.61	4.93	5.08
		44.5	0.543	0.650	0.862	1.07	1.28	1.49	1.69	1.90	2.10	2.39	2.69	2.98	3.26	3.63	4.00	4.44	4.87	5.21	5.37
48.3				0.706	0.937	1.17	1.39	1.62	1.84	2.06	2.28	2.61	2.93	3.25	3.56	3.97	4.37	4.86	5.34	5.71	5.90
	51			0.746	0.990	1.23	1.47	1.71	1.95	2.18	2.42	2.76	3.10	3.44	3.77	4.21	4.64	5.16	5.67	6.07	6.27
		54		0.790	1.05	1.31	1.56	1.82	2.07	2.32	2.56	2.93	3.30	3.65	4.01	4.47	4.93	5.49	6.04	6.47	6.68
	57			0.835	1.11	1.38	1.65	1.92	2.19	2.45	2.71	3.10	3.49	3.87	4.25	4.74	5.23	5.83	6.41	6.87	7.10
60.3				0.883	1.17	1.46	1.75	2.03	2.32	2.60	2.88	3.29	3.70	4.11	4.51	5.03	5.55	6.19	6.82	7.31	7.55
	63.5			0.931	1.24	1.54	1.84	2.14	2.44	2.74	3.03	3.47	3.90	4.33	4.76	5.32	5.87	6.55	7.21	7.74	8.00
	70				1.37	1.70	2.04	2.37	2.70	3.03	3.35	3.84	4.32	4.80	5.27	5.90	6.51	7.27	8.01	8.60	8.89
		73			1.42	1.78	2.12	2.47	2.82	3.16	3.50	4.01	4.51	5.01	5.51	6.16	6.81	7.60	8.38	9.00	9.31
76.1					1.49	1.85	2.22	2.58	2.94	3.30	3.65	4.19	4.71	5.24	5.75	6.44	7.11	7.95	8.77	9.42	9.74
		82.5			1.61	2.01	2.41	2.80	3.19	3.58	3.97	4.55	5.12	5.69	6.26	7.00	7.74	8.66	9.56	10.3	10.6
88.9					1.74	2.17	2.60	3.02	3.44	3.87	4.29	4.91	5.53	6.15	6.76	7.57	8.38	9.37	10.3	11.1	11.6
	101.6						2.97	3.46	3.95	4.43	4.91	5.63	6.35	7.06	7.77	8.70	9.63	10.8	11.9	12.8	13.3
		108					3.16	3.68	4.20	4.71	5.23	6.00	6.76	7.52	8.27	9.27	10.3	11.5	12.7	13.7	14.1
114.3							3.35	3.90	4.45	4.99	5.54	6.35	7.16	7.97	8.77	9.83	10.9	12.2	13.5	14.5	15.0
	127								4.95	5.56	6.17	7.07	7.98	8.88	9.77	11.0	12.1	13.6	15.0	16.2	16.8
	133								5.18	5.82	6.46	7.41	8.36	9.30	10.2	11.5	12.7	14.3	15.8	17.0	17.6

Pipe Size (ISO and EN Standard)

Олон улсын стандартын болон Европ стандартын ган хоолойн хэмжээ

Outside Diameter mm Series			Thickness(mm)																		
			0.5	0.6	0.8	1	1.2	1.4	1.6	1.8	2	2.3	2.6	2.9	3.2	3.6	4	4.5	5	5.4	5.6
1	2	3	Masses Per Length(kg/m)																		
139.7									5.45	6.12	6.79	7.79	8.79	9.78	10.8	12.1	13.4	15.0	16.6	17.9	18.5
		141.3							5.51	6.19	6.87	7.88	8.89	9.90	10.9	12.2	13.5	15.2	16.8	18.1	18.7
		152.4							5.95	6.69	7.42	8.51	9.61	10.7	11.8	13.2	14.6	16.4	18.2	19.6	20.3
		159							6.21	6.98	7.74	8.89	10.0	11.2	12.3	13.8	15.3	17.1	19.0	20.5	21.2
168.3									6.58	7.39	8.20	9.42	10.6	11.8	13.0	14.6	16.2	18.2	20.1	21.7	22.5
		177.8								7.81	8.67	9.95	11.2	12.5	13.8	15.5	17.1	19.2	21.3	23.0	23.8
		193.7								8.52	9.46	10.9	12.3	13.6	15.0	16.9	18.7	21.0	23.3	25.1	26.0
219.1										9.65	10.7	12.3	13.9	15.5	17.0	19.1	21.2	23.8	26.4	28.5	29.5
		244.5									12.0	13.7	15.5	17.3	19.0	21.4	23.7	26.6	29.5	31.8	33.0
273											13.4	15.4	17.3	19.3	21.3	23.9	26.5	29.8	33.0	35.6	36.9
323.9													20.6	23.0	25.3	28.4	31.6	35.4	39.3	42.4	44.0
355.6													22.6	25.2	27.8	31.3	34.7	39.0	43.2	46.6	48.3
406.4													25.9	28.9	31.8	35.8	39.7	44.6	49.5	53.4	55.4
457															35.8	40.3	44.7	50.2	55.7	60.1	62.3
508															39.8	44.8	49.7	55.9	62.0	66.9	69.4
		559													43.9	49.3	54.7	61.5	68.3	73.7	76.4
610															47.9	53.8	59.8	67.2	74.6	80.5	83.5
		660															64.7	72.7	80.8	87.2	90.4
711																	69.7	78.4	87.1	94.0	97.4
	762																74.8	84.1	93.3	101	104
813																	79.8	89.7	99.6	108	112
		864															84.8	95.4	106	114	119
913																	89.8	101	112	121	125
1016																	99.8	112	125	135	140
1067																			131	141	147
1118																			137	148	154
	1168																		143	155	161
1219																			150	162	168
	1321																				182
1422																					196
	1524																				
1626																					
	1727																				
1829																					
	1930																				
2032																					
	2134																				
2235																					
	2337																				
	2438																				
2540																					

Pipe Size (ISO and EN Standard)

Олон улсын стандартын болон Европ стандартын ган хоолойн хэмжээ

Outside Diameter mm Series			Thickness(mm)																						
			6.3	7.1	8	8.8	10	11	12.5	14.2	16	17.5	20	22.2	25	28	30	32	36	40	45	50	55	60	65
1	2	3	Masses Per Length(kg/m)																						
10.2																									
	12																								
	12.7																								
13.5																									
		14																							
	16																								
17.2																									
		18																							
	19																								
	20																								
21.3																									
		22																							
	25		2.91																						
		25.4	2.97																						
26.9			3.20	3.47	3.73																				
		30	3.68	4.01	4.34																				
	31.8		3.96	4.32	4.70																				
	32		3.99	4.36	4.74																				
33.7			4.26	4.66	5.07	5.40																			
		35	4.46	4.89	5.33	5.69																			
	38		4.93	5.41	5.92	6.34	6.91																		
	40		5.24	5.76	6.31	6.77	7.40																		
42.4			5.61	6.18	6.79	7.29	7.99																		
		44.5	5.94	6.55	7.20	7.75	8.51	9.09	9.86																
48.3			6.53	7.21	7.95	8.57	9.45	10.1	11.0																
	51		6.94	7.69	8.48	9.16	10.1	10.9	11.9																
		54	7.41	8.21	9.08	9.81	10.9	11.7	12.8	13.9															
	57		7.88	8.74	9.67	10.5	11.6	12.5	13.7	15.0															
60.3			8.39	9.32	10.3	11.2	12.4	13.4	14.7	16.1	17.5														
	63.5		8.89	9.88	10.9	11.9	13.2	14.2	15.7	17.3	18.7														
	70		9.90	11.1	12.2	13.3	14.8	16.0	17.7	19.5	21.3	22.7													
		73	10.4	11.5	12.8	13.9	15.5	16.8	18.7	20.6	22.5	24.0													
76.1			10.8	12.1	13.4	14.6	16.3	17.7	19.6	21.7	23.7	25.3	27.7												
		82.5	11.8	13.2	14.7	16.0	17.9	19.4	21.6	23.9	26.2	28.1	30.8	33.0											
88.9			12.8	14.3	16.0	17.4	19.5	21.1	23.6	26.2	28.8	30.8	34.0	36.5	39.4										
	101.6		14.8	16.5	18.5	20.1	22.6	24.6	27.5	30.6	33.8	36.3	40.2	43.5	47.2	50.8									
		108	15.8	17.7	19.7	21.5	24.2	26.3	29.4	32.8	36.3	39.1	43.4	47.0	51.2	55.2	57.7								
114.3			16.8	18.8	21.0	22.9	25.7	28.0	31.4	35.1	38.8	41.8	46.5	50.1	55.1	59.6	62.4	64.9							
	127		18.8	21.0	23.5	25.7	28.9	31.5	35.3	39.5	43.8	47.3	52.8	57.4	62.9	68.4	71.8	75.0	80.8						
	133		19.7	22.0	24.7	27.0	30.3	33.1	37.1	41.6	46.2	49.8	55.7	60.7	66.6	72.5	76.2	79.7	86.1	91.7					
139.7			20.7	23.2	26.0	28.4	32.0	34.9	39.2	43.9	48.8	52.7	59.0	64.3	70.7	77.1	81.2	85.0	92.1	98.4					

Pipe Size (ISO and EN Standard)

Олон улсын стандартын болон Европ стандартын ган хоолойн хэмжээ

Outside Diameter mm Series			Thickness(mm)																						
			6.3	7.1	8	8.8	10	11	12.5	14.2	16	17.5	20	22.2	25	28	30	32	36	40	45	50	55	60	65
1	2	3	Masses Per Length(kg/m)																						
		141.3	21.0	23.5	26.3	28.8	32.4	35.3	39.7	44.5	49.4	53.4	59.8	65.2	71.7	78.2	82.3	86.3	93.5	99.9					
		152.4	22.7	25.4	28.5	31.2	35.1	38.4	43.1	48.4	53.8	58.2	65.3	71.3	78.5	85.9	90.6	95.0	103	111	119				
		159	23.7	26.6	29.8	32.6	36.7	40.1	45.2	50.7	56.4	61.1	68.6	74.9	82.6	90.5	95.4	100	109	117	127				
168.3			25.2	28.2	31.6	34.6	39.0	42.7	48.0	54.0	60.1	65.1	73.1	80.0	88.3	96.9	102	108	117	127	137	146			
		177.8	26.6	29.9	33.5	36.7	41.4	45.2	51.0	57.3	63.8	69.2	77.8	85.2	94.2	103	109	115	126	136	147	158	167		
		193.7	29.1	32.7	36.6	40.1	45.3	49.6	55.9	62.9	70.1	76.0	85.7	93.9	104	114	121	128	140	152	165	177	188	198	
219.1			33.1	37.1	41.6	45.6	51.6	56.5	63.7	71.8	80.1	87.0	98.2	108	120	132	140	148	163	177	193	209	223	235	247
		244.5	37.0	41.6	46.7	51.2	57.8	63.3	71.5	80.6	90.2	98.0	111	122	135	149	159	168	185	202	221	240	267	273	288
273			41.4	46.6	52.3	57.3	64.9	71.7	80.3	90.6	101	110	125	137	153	169	180	190	210	230	253	275	296	315	333
323.9			49.3	55.5	62.3	68.4	77.4	84.9	96.0	108	121	132	150	165	184	204	217	230	256	280	310	338	365	390	415
355.6			54.3	61.0	68.6	75.3	85.2	93.5	106	120	134	146	166	183	204	226	141	255	284	311	345	377	408	437	466
406.4			62.2	69.9	78.6	86.3	97.8	107	121	137	154	168	191	210	235	261	278	295	329	361	401	439	477	513	547
457			70.0	78.8	88.6	97.3	110	121	137	155	174	190	216	238	266	296	316	335	374	411	457	502	545	587	628
508			77.9	87.7	98.6	108	123	135	153	173	194	212	241	266	298	331	354	376	419	462	514	565	614	663	710
		559	85.9	96.6	109	119	135	149	168	191	214	234	266	294	329	367	391	416	464	512	570	628	684	738	792
610			93.8	106	119	130	148	162	184	209	234	256	291	322	361	402	429	456	510	562	627	691	753	814	874
		660	102	114	129	141	160	176	200	226	254	277	316	349	392	436	466	496	554	612	683	752	821	888	954
711			109	123	139	152	173	190	215	244	274	299	341	377	423	472	504	536	599	662	739	815	890	963	1036
	762		117	132	149	163	185	204	231	262	294	321	366	405	454	507	548	576	645	712	796	878	959	1039	1117
813			125	141	159	175	198	218	247	280	314	343	391	433	486	542	579	616	690	763	852	941	1028	1114	1199
		864	133	150	169	186	211	231	262	298	335	365	416	461	517	577	617	657	735	813	909	1004	1097	1190	1281
913			141	159	179	196	223	245	278	315	354	387	441	488	548	612	654	696	780	862	964	1065	1165	1264	1361
1016			157	177	199	219	248	273	309	351	395	431	491	544	611	682	729	777	870	963	1078	1191	1303	1415	1524
1067			165	186	209	230	261	286	325	369	415	453	516	572	642	717	767	817	915	1013	1134	1254	1373	1490	1606
1118			173	195	219	241	273	300	341	387	435	475	542	600	674	753	805	857	961	1063	1191	1317	1442	1556	1688
	1168		180	203	229	252	286	314	356	404	455	497	566	627	705	787	842	896	1005	1113	1246	1379	1510	1639	1768
1219			188	212	239	263	298	328	372	422	475	519	591	655	736	822	880	937	1050	1163	1303	1441	1579	1715	1850
	1321		204	230	259	285	323	355	403	458	515	563	942	711	799	893	955	1017	1141	1264	1416	1567	1717	1866	2013
1422			220	248	279	307	348	383	435	493	555	606	692	766	861	963	1030	1097	1231	1363	1528	1692	1854	2015	2175
	1524		236	266	299	329	373	410	466	529	595	650	742	822	924	1033	1105	1177	1321	1464	1641	1818	1993	2166	2339
1626			252	283	319	351	399	438	497	564	635	694	792	878	987	1103	1181	1258	1412	1565	1755	1943	2131	2317	2502
	1727			301	339	373	423	466	529	600	675	738	842	933	1049	1173	1256	1338	1501	1664	1867	2068	2268	2467	2664
1829				319	359	395	449	493	560	636	715	782	892	989	1112	1244	1331	1418	1592	1765	1980	2194	2406	2618	2828
	1930				379	417	474	521	591	671	755	825	942	1044	1175	1313	1406	1498	1682	1864	2092	2318	2543	2767	2990
2032					399	439	499	548	623	707	795	869	992	1100	1237	1384	1481	1578	1772	1965	2205	2444	2682	2918	3153
	2134					461	524	576	654	742	836	913	1043	1156	1300	1454	1557	1659	1863	2066	2318	2570	2820	3069	3317
2235						483	549	604	685	778	876	957	1093	1211	1363	1524	1631	1739	1952	2165	1430	2694	2957	3218	3479
	2337						574	631	717	813	916	1001	1143	1267	1425	1594	1707	1819	2043	2266	2544	2820	3095	3369	3642
	2438						599	658	748	849	956	1045	1193	1323	1488	1664	1782	1899	2133	2366	2656	2945	3232	3519	3804
2540							624	686	779	885	996	1089	1243	1378	1551	1735	1857	1979	2223	2466	2769	3070	3371	3670	3967