



Designation: **F2897–23 F2897 – 23a**

An American National Standard

Standard Specification for Tracking and Traceability Encoding System of Natural Gas Distribution Components (Pipe, Tubing, Fittings, Valves, and Appurtenances)¹

This standard is issued under the fixed designation F2897; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope*

1.1 This specification defines requirements for the data used in the tracking and traceability base-62 encoding system and the format of the resultant code to characterize various components used in fuel gas piping systems.

1.2 The final output of this specification is a 16 digit alpha-numeric code that defines a standardized approach or methodology for encoding certain characteristics of components that have been established based on consensus recommendations from the respective stakeholder group members. The means of marking or affixing the code to the components, and the means of reading and/or transferring the data or codes are outside the scope of this specification.

NOTE 1—To facilitate compliance with this specification, a web based application has been developed to manage and maintain unique manufacturer identification numbers. The URL for the website is: <http://www.componentid.org>.

1.3 The web based application is only intended to serve as a useful resource for managing the respective manufacturer identification numbers, codes, and other identifiers as per this specification. Any changes to the contents of the web based application are contingent upon subsequent changes to this specification. This specification shall have primacy.

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 ASTM Standards:²

- [A53/A53M Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless](#)
- [A106/A106M Specification for Seamless Carbon Steel Pipe for High-Temperature Service](#)
- [D1600 Terminology for Abbreviated Terms Relating to Plastics](#)
- [D2513 Specification for Polyethylene \(PE\) Gas Pressure Pipe, Tubing, and Fittings](#)
- [F412 Terminology Relating to Plastic Piping Systems](#)

2.2 API Standards:³

- [API 5L Specification for Line Pipe](#)

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

³ Available from American Petroleum Institute (API), 1220 L. St., NW, Washington, DC 20005-4070, <http://www.api.org>.

*A Summary of Changes section appears at the end of this standard

2.3 ANSI Standards:⁴

B31.8 Gas Transmission and Distribution Piping System

B1.20.1 1983 Pipe Threads, General Purpose, Inch

B109.1 Diaphragm-Type Gas Displacement Meters (Under 500 Cubic-feet-per-hour Capacity)

B109.2 Diaphragm-Type Gas Displacement Meters (500 Cubic-feet-per-hour Capacity)

B109.3 Rotary Type Gas Displacement Meters

B109.4 Self-Operated Diaphragm Type Natural Gas Service Regulators

2.4 CFR Standards:⁵

49 CFR Part 192 Pipeline Safety Requirements

3. Terminology

3.1 *Definitions*—Definitions are in accordance with Terminology F412, and abbreviations are in accordance with Terminology D1600, unless otherwise specified.

3.2 The gas industry terminology used in this specification is in accordance with ANSI B31.8 or 49 CFR Part 192, unless otherwise indicated.

3.3 *character, n*—an integer from zero (0) to nine (9) or a letter that is upper case and/or lower case from a to z or A to Z.

3.4 *component, n*—pipe, tubing, fittings, valves, and appurtenances unless specifically stated otherwise.

3.5 *digit, n*—an integer from zero (0) to nine (9).

3.6 *FPT, n*—internal taper thread as defined under ANSI/ASME B1.20.1, or commonly referred to as “female pipe thread”.

3.7 *MPT, n*—external taper thread as defined under ANSI/ASME B1.20.1, or commonly referred to as “male pipe thread”.

3.8 *traceability, n*—identify the origin of materials and parts used to manufacture a given component; and/or the product processing or manufacturing history.

3.9 *tracking, v*—knowing, documenting, and/or collecting information related to the distribution and location of a given component after delivery from the manufacturer or supplier.

4. Gas Distribution Component Traceability Identifier

4.1 *General*—The gas distribution component traceability identifier shall be comprised of sixteen (16) alphanumeric characters that specify respective attributes (data set) for a given component.

4.1.1 The specified number of characters and order for each data set shall conform to Table 1.

4.1.2 The specified number of characters shall be developed using the base-62 encoding system per section 4.9 and the initial input data requirements per Section 5.

4.1.3 The gas distribution component traceability identifier shall be in a format suitable for downloading the character codes into database systems owned and maintained by the end user.

NOTE 2—An illustrative example is provided in Appendix X2.

4.2 *Identification of Component Manufacturer*—Each component manufacturer shall be identified by a unique two character code which shall be assigned after completing the required registration and activated by the webmaster of the website <http://www.componentid.org>. The manufacturer identification code shall be unique to that particular company and can only be used by that respective manufacturer/supplier.

⁴ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.

⁵ Available from U.S. Government Publishing Office (GPO), 732 N. Capitol St., NW, Washington, DC 20401, <http://www.gpo.gov>.

TABLE 1 Specified Number of Characters and Order for Gas Distribution Component Traceability Identifier

Data	Number of Character(s) ^A
Component manufacturer	2
Component manufacturer's lot code	4
Component production date	3
Component material	1
Component type	2
Component size	3
Base 62 Index	1

^A The total number of characters is based on the final resultant after applying the base-62 encoding system in this specification. For different initial input data, the requirements and format are in Section 5 of this specification.

4.3 *Identification of Component Manufacturer's Lot Code*—The component manufacturer's lot code shall be identified by a four character code that is developed using the base-62 encoding system per 4.9. The four character code shall be unique in a manner to help ascertain information related to the origin of materials, product processing history, and other information that is agreed upon between the manufacturer and end user.

4.4 *Identification of Component Production Date*—The production date code shall be identified by a three character code that is developed using the base-62 encoding system per 4.9.

4.5 *Identification of Component Material*—The primary material used to manufacture the pipe or component shall be identified by a single character code per 5.5.

4.6 *Identification of Component Type*—Each component type shall be identified by a two character code per 5.6.

4.7 *Identification of Component Size*—Each component size shall be identified by a three character code that is developed using the sizing calculation outlined in 5.7 and the base-62 encoding system per 4.9.

4.8 *Identification of Base 62 Index*—Each component type shall be identified by a single character code per 5.1.

4.9 *Base-62 Encoding System:*

4.9.1 The base-62 positional encoding system shall utilize integer values between zero and nine and both uppercase and lowercase alphabet characters with the assigned place values as shown in Table 2.

4.9.2 The assigned place values shown in Table 2 shall be used to convert the initial input data into the final alphanumeric code.

NOTE 3—Detailed examples of converting an initial integer string to a corresponding base-62 alphanumeric character string and vice-versa can be found in Appendix XI.

NOTE 4—The positional value is the value corresponding to the respective character. For example, the positional value corresponding to the character “r” is 27. The positional value corresponding to the character “T” is 55.

5. Input Data String

5.1 *Base 62 Index*—Each component manufacturer shall determine and establish a single character base 62 index code per Table 3 based on their specific component physical properties.

5.1.1 Unless otherwise specified, the sixteenth character shall be a null value of “0”.

NOTE 5—The base 62 index is a reference value that allows for alternative alphanumeric identifiers. The Annex A1 has been added to allow component manufacturers with additional coefficients corresponding to thicker wall sizes that are not listed in the main body of this specification.

TABLE 2 Positional Values for Base-62 Encoding System

Positional Value	Character	Positional Value	Character
0	0	36	A
1	1	37	B
2	2	38	C
3	3	39	D
4	4	40	E
5	5	41	F
6	6	42	G
7	7	43	H
8	8	44	I
9	9	45	J
10	a	46	K
11	b	47	L
12	c	48	M
13	d	49	N
14	e	50	O
15	f	51	P
16	g	52	Q
17	h	53	R
18	i	54	S
19	j	55	T
20	k	56	U
21	l	57	V
22	m	58	W
23	n	59	X
24	o	60	Y
25	p	61	Z
26	q		
27	r		
28	s		
29	t		
30	u		
31	v		
32	w		
33	x		
34	y		
35	z		

TABLE 3 List of base 62 Index Values

Type	Code
Default	0
Annex A1	1

5.2 *Component Manufacturer*—Each component manufacturer shall establish a unique two (2) digit identifier by completing the required registration and activated by the webmaster of the website <http://www.componentid.org>. The manufacturer identification code shall be unique to that particular company and can only be used by that company. In cases where the company undergoes a change in name, acquired, merged with another company, new two (2) digit identifier must be registered and activated if the “acquiring” or “merged with” company does not already have a registered identifier.

5.3 *Component Manufacturer’s Lot Code*—Each component manufacturer shall establish a unique seven (7) digit number for their lot code which shall be used as the input into the base-62 encoding system per 4.9. The 7 digit number shall consist of only integer values and cannot contain any other characters such as alphabetic or ASCII characters.

NOTE 6—The 7 digit code can be developed freely by the manufacturer to define individual production lots in a unique way. Elements of the 7 digit code may possibly include production site, extrusion line, injection molding equipment number, operator, shift, etc. The 7 digit code should be capable of providing pertinent traceability information upon request.

5.4 *Component Production Date*—Each component manufacturer shall provide the production date of the respective component consisting of five (5) digits as input into the base-62 encoding system per 4.9.

5.4.1 The first three digits shall correspond to the particular day of the year.

5.4.2 The final two digits shall correspond to the last two digits of the year.

NOTE 7—For example, the date input represented by 23410 implies the 234th day of 2010.

5.5 *Component Material*—Each component manufacturer shall assign a single character code for the primary material used to manufacture the respective component from **Table 4**.

NOTE 8—Additional material code numbers are reserved for future use and will be activated upon revision of this specification.

NOTE 9—The “Grade” designation for steel materials will vary based on the standard to which it is manufactured. The user should verify the chemical and mechanical properties in accordance to the specific standard that they are utilizing before making their final selection.

5.5.1 For pipe and tubing made from a single material, the code shall be assigned from the list shown in **Table 4**.

5.5.2 For multi-layer pipe and tubing, the inner most layer which is in contact with the natural gas shall be assigned from the list shown in **Table 4**.

5.5.3 For factory assembled transition fittings and risers and transition tees intended to facilitate a change between metallic and non-metallic piping systems, the non-metallic portion shall be identified.

5.5.4 For all components other than factory assembled transition fittings and risers and transition tees, the material code shall correspond to the outer shell or body of the respective component regardless of the piping system to which it is intended to be installed.

5.5.5 For fittings intended to facilitate a change between PE to another thermoplastic piping systems, the material code shall correspond to the outer shell or body of the respective component connecting to the PE pipe.

TABLE 4 List of Material Types

Type	Code
PE2406	A
PE2708	B
PE2708 PLUS	d
PE3408	C
PE3608	D
PE3708	E
PE3710	F
PE4608	G
PE4710	H
PE4710 PLUS	e
PE80	W
PE100	Z
Poly (Vinyl Chloride) – PVC	J
Polyamide 11 – PA11	K
Polyamide 12 – PA12	L
PEX	Y
Steel	M
Stainless Steel	N
Cast Iron	O
Copper	P
Brass	Q
Malleable Iron	R
Ductile Iron	S
Reinforced Epoxy Resin	T
Nylon	U
Glass Filled Nylon	V
Other	X
Steel – GRADE A	0
Steel – GRADE B	1
Steel – GRADE C	2
Steel – GRADE X42	3
Steel – GRADE X46	4
Steel – GRADE X52	5
Steel – GRADE X56	6
Steel – GRADE X60	7
Steel – GRADE X65	8
Steel – GRADE X70	9

NOTE 10—In previous editions of Specification D2513 various thermoplastic materials were approved for use under 49 CFR Part 192 requirements. For those other materials which have subsequently been deleted but still allowed to be used for repair purposes only, for example, PVC, then PE will take precedence.

5.6 *Component Type*—Each component manufacturer shall assign a two (2) character code for their respective component type from Table 5.

NOTE 11—Additional component type code numbers are reserved for future use and will be activated upon revision of this specification.

5.7 *Component Size*—Each component manufacturer shall develop a unique dimensional code, D , corresponding to the size of the respective item. The dimensional code shall be used as input into the base-62 encoding system per 4.9.

5.7.1 The dimensional code shall be calculated using Eq 1 based on the factors from Tables 6-8 corresponding to the dimensions for a given component:

$$D = (C_1 * 378) + C_2 + 1 \quad (1)$$

where:

C_1 = factor corresponding to the first dimension, D_1 , and

C_2 = factor corresponding to the second dimension, D_2 .

5.7.1.1 The second dimension, D_2 , shall always be the larger dimension for a given component as shown in Eq 2:

$$D_2 > D_1 \quad (2)$$

5.7.2 Only for the case of a pipe, tubing, or other components where either C_1 or C_2 cannot be ascertained from Table 5-7 corresponding to the dimensions of a given component, then the dimensional code, D , shall be set equal to 0 and the resultant base62 dimensional code shall be set equal to 000

5.7.3 For the case of a pipe, tubing, or other in-line components where there is no dimensional change, then $D_1 = D_2$ and $C_1 = C_2$.

5.7.4 For components other than various risers and transition fittings or other using metallic parts, the second dimension, D_2 , shall be expressed by the connection to the main.

5.7.5 In the case of various types of risers and transition fittings or others using metallic parts, the second dimension, D_2 , shall be expressed by the metallic size, for example, MPT or FPT.

NOTE 12—For the case of a 2" IPS SDR9.33 pipe, $D_1 = D_2$ and $C_1 = C_2 = 37$. Then from Eq 1, the resulting value for $D = (37 * 378) + 37 + 1 = 14024$.

NOTE 13—For the case of a 2" IPS SDR9.33 × ½" CTS 0.090 saddle fitting (electrofusion, molded saddle fusion, mechanical), $D_2 = 2$ " IPS with $C_2 = 37$; $D_1 = ½$ " CTS 0.090 with $C_1 = 4$. Then from Eq 1, the resulting value for $D = (4 * 378) + 37 + 1 = 1550$.

6. Keywords

6.1 base-62 encoding system; component; gas distribution; marking; pipe; traceability; tracking

TABLE 5 List of Component Types

Category	Type-General	Subcategory Type	Character
Pipe		Other	10
		Straight	11
		Coiled	12
		Casing	13
		Seamless Line Pipe, API 5L, PSL1, Single Coat	1A
		Seamless Line Pipe, API 5L, PSL1, Dual Coat	1B
		Seamless Line Pipe, API 5L, PSL2, Single Coat	1C
		Seamless Line Pipe, API 5L, PSL2, Dual Coat	1D
		Electric Resistance Weld, API 5L, PSL1, Single Coat	1E
		Electric Resistance Weld, API 5L, PSL1, Dual Coat	1F
		Electric Resistance Weld, API 5L, PSL2, Single Coat	1G
		Electric Resistance Weld, API 5L, PSL2, Dual Coat	1H
		Seamless and Welded, ASTM A53/A53M	1J
		Seamless Carbon Steel, ASTM A106/A106M	1K
		High Frequency Weld, API 5L, PSL2, Single Coat	1L
		High Frequency Weld, API 5L, PSL2, Dual Coat	1M
		Coupling	
Socket fusion	21		
Socket fusion with EFV	22		
Electrofusion	23		
Electrofusion with EFV	24		
Mechanical compression or nut follower	25		
Mechanical compression or nut follower with EFV	26		
Mechanical stab	27		
Mechanical stab with EFV	28		
Mechanical interference fit	29		
Mechanical interference fit with EFV	2A		
Welded	2B		
Threaded	2C		
Flanged	2D		
Adapter Coupling		Other	30
		Compression by male pipe thread	31
		Compression by female pipe thread	32
		Compression by butt fusion	33
		Compression by butt welded	34
		Compression by solvent welded	35
		Compression by stab	39
		Stab by male pipe thread	36
		Stab by female pipe thread	37
		Stab by solvent welded	38
		End caps	
Butt fusion	41		
Socket fusion	42		
Electrofusion	43		
Mechanical compression or nut follower	44		
Mechanical stab	45		
Mechanical interference fit	46		
Welded	47		
Threaded	48		
Fabricated	49		
Elbows			
		Butt fusion 90	51
		Socket fusion 90	52
		Electrofusion 90	53
		Mechanical compression or nut follower 90	54
		Mechanical stab 90	55
		Mechanical interference fit 90	56
		Welded 90	57
		Threaded 90	58
		Fabricated 90	59
		Butt fusion 45	5A
		Socket fusion 45	5B
		Electrofusion 45	5C
		Mechanical compression or nut follower 45	5D
		Mechanical stab 45	5E
		Mechanical interference fit 45	5F
		Welded 45	5G
Threaded 45	5H		
Fabricated 45	5J		
3-way tees		Other	60
		Butt fusion	61
		Socket fusion	62
		Electrofusion	63
		Mechanical compression or nut follower	64
		Mechanical stab	65

TABLE 5 *Continued*

Category	Type-General	Subcategory Type	Character	
Reducer		Mechanical interference fit	66	
		Welded	67	
		Threaded	68	
		Fabricated	69	
		Other	70	
		Butt fusion	71	
		Socket fusion	72	
		Electrofusion	73	
		Mechanical compression or nut follower	74	
		Mechanical stab	75	
		Mechanical interference fit	76	
		Butt Fusion with EFV	7A	
		Socket Fusion with EFV	7B	
		Electrofusion with EFV	7C	
		Mechanical compression or nut follower with EFV	7D	
		Mechanical Stab with EFV	7E	
		Mechanical interference fit with EFV	7F	
		Welded	77	
	Tapping tees		Threaded	78
		Fabricated	79	
		Other	80	
		Saddle heat fusion by butt fusion outlet	81	
		Saddle heat fusion by butt fusion outlet with EFV	82	
		Saddle heat fusion by socket outlet	83	
		Saddle heat fusion by socket outlet with EFV	84	
		Saddle heat fusion by mechanical compression outlet	85	
		Saddle heat fusion by mechanical compression outlet with EFV	86	
		Saddle heat fusion by stab outlet	87	
		Saddle heat fusion by stab outlet with EFV	88	
		Electrofusion by butt fusion outlet	89	
		Electrofusion by butt fusion outlet with EFV	8A	
		Electrofusion by socket outlet	8B	
		Electrofusion by socket outlet with EFV	8C	
		Electrofusion by mechanical compression outlet	8D	
		Electrofusion by mechanical compression outlet with EFV	8E	
		Electrofusion by stab outlet	8F	
		Electrofusion by stab outlet with EFV	8G	
		Mechanical by butt fusion outlet	8H	
		Mechanical by butt fusion outlet with EFV	8J	
		Mechanical by socket outlet	8K	
		Mechanical by socket outlet with EFV	8L	
		Mechanical by mechanical compression outlet	8M	
		Mechanical by mechanical compression outlet with EFV	8N	
		Mechanical by stab outlet	8P	
		Mechanical by stab outlet with EFV	8Q	
		Mechanical by mechanical interference fit	8R	
		Mechanical by mechanical interference fit with EFV	8S	
High Volume Tapping Tees			Other	90
			Electrofusion by butt fusion	91
			Saddle heat fusion by butt fusion	92
			Mechanical by compression outlet	93
		Electrofusion by socket outlet	94	
		Saddle heat fusion by socket outlet	95	
		Mechanical by stab outlet	96	
Branch Saddle		Mechanical by mechanical interference fit	97	
		Other	B0	
		Electrofusion	B1	
		Saddle heat fusion	B2	
Mechanical saddle		Mechanical	B3	
		No outlet	S1	
Service tee or Valve tee		Other	D0	
		Welded by welded	D1	
		Welded by butt fusion	D2	
		Welded by thread	D3	
		Welded by compression or nut follower	D4	
		Welded by mechanical interference fit	D5	
		Welded by stab	DD	
		Thread by welded	D6	
		Thread by compression or nut follower	D7	
		Thread by mechanical interference fit	DE	
		Thread by stab	DF	
		Thread by thread	DG	
		Thread by butt fusion	DH	
		Mechanical saddle by welded	D8	
		Mechanical saddle by Butt fusion	D9	

TABLE 5 *Continued*

Category Type-General	Subcategory Type	Character
Service saddles	Mechanical saddle by thread	DA
	Mechanical saddle by compression or nut follower	DB
	Mechanical saddle by mechanical interference fit	DC
	Mechanical saddle by stab	DJ
	Other	E0
Flanges	Single strap	E1
	Double strap	E2
	Other	FH
	Blind	FB
	Lap-Joint	FL
	Socket Weld	FX
	Slip-On	FS
Transition Fitting	Threaded	FT
	Weld-Neck	FW
	PE Flange Adapter Assembly	FP
	Other	T0
	Welded end	T1
Riser	Thread end	T2
	Flanged end	T3
	Socket weld by butt fusion	TX
	Other	R0
	Factory Assembled, Anodeless	R1
Valve	Factory Assembled, Anodeless, Flexible	R2
	Factory Assembled, Non-Anodeless	R3
	Field Assembled, Anodeless	R4
	Field Assembled, Anodeless, Flexible	R5
	Field Assembled, Non-Anodeless	R6
	Other	V0
	Ball valve	V1
Excess Flow Valve Meter set assembly and components	Butterfly valve	V2
	Check valve	V3
	Relief valve	V4
	Gate valve	V5
	Needle valve	V6
	Plug valve	V7
	Excess flow valve	EF
	Other	M0
	Diaphragm meter	M1
	Rotary meter	M2
Regulator	Meter set assembly	M3
	Meter bar	M4
	Meter swivel	M5
	Meter nut	M6
	Ultrasonic meter	M7
	Turbine meter	M8
	Remote shut off meter	M9
	Other	RX
	Pilot	RP
	Service	RS
Filter	Relief	RR
	Other	F0
	Pilot	F1
Anode	Service and mains	F2
	Strainer	F3
	Other	A0
	Cast iron	A1
Pressure control fitting	Graphite	A2
	Magnesium	A3
	Zinc	A4
	Other	P0
	Split repair	P1
Union	Bottom out	P2
	Top tap	P3
	Non-insulated	U1
Repair clamp	Insulated	UX
	Other	C0
	Repair clamps	C1

TABLE 6 C₁ and C₂ Factors Corresponding to Standard Dimensions (D₁ or D₂) for CTS and IPS Sizes, in. (mm)

D ₁ or D ₂			Factor C ₁ or C ₂	D ₁ or D ₂			Factor C ₁ or C ₂
Diameter	SDR	Wall Thickness in. (mm)		Diameter	SDR	Wall Thickness in. (mm)	
¼ in. CTS	—	0.062 (1.58)	1	2 in. IPS	9.33	0.255 (6.48)	37
⅜ in. CTS	—	0.062 (1.58)	2	2 in. IPS	11	0.216 (5.49)	38
½ in. CTS	—	0.062 (1.58)	3	2 in. IPS	13.5	0.176 (4.47)	39
½ in. CTS	—	0.090 (2.27)	4	3 in. IPS	11	0.318 (8.08)	40
½ in. CTS	—	0.104 (2.64)	5	3 in. IPS	11.5	0.304 (7.72)	41
¾ in. CTS	—	0.062 (1.58)	6	3 in. IPS	13.5	0.259 (6.58)	42
¾ in. CTS	—	0.077 (1.95)	7	4 in. IPS	9.33	0.482 (12.24)	43
¾ in. CTS	—	0.090 (2.27)	8	4 in. IPS	11	0.409 (10.39)	44
1 in. CTS	—	0.062 (1.58)	9	4 in. IPS	11.5	0.391 (9.93)	45
1 in. CTS	—	0.090 (2.27)	10	4 in. IPS	13.5	0.333 (8.46)	46
1 in. CTS	—	0.099 (2.51)	11	4 in. IPS	15.5	0.290 (7.37)	47
1 in. CTS	—	0.101 (2.56)	12	4 in. IPS	17	0.265 (6.73)	48
1 in. CTS	—	0.121 (3.07)	13	6 in. IPS	11	0.602 (15.29)	49
1¼ in. CTS	—	0.062 (1.58)	14	6 in. IPS	11.5	0.576 (14.63)	50
1¼ in. CTS	—	0.090 (2.27)	15	6 in. IPS	13.5	0.491 (12.47)	51
1¼ in. CTS	—	0.121 (3.07)	16	6 in. IPS	17	0.390 (9.91)	52
1¾ in. CTS	—	0.062 (1.58)	17	6 in. IPS	21	0.315 (8.00)	53
½ in. IPS	9.33	0.090 (2.29)	18	8 in. IPS	11	0.784 (19.91)	54
½ in. IPS	11	0.076 (1.93)	19	8 in. IPS	11.5	0.750 (19.05)	55
¾ in. IPS	11	0.095 (2.41)	20	8 in. IPS	13.5	0.639 (16.23)	56
¾ in. IPS	D	0.090 (2.29)	21	8 in. IPS	17	0.507 (12.90)	57
1 in. IPS	9.33	0.140 (3.56)	22	8 in. IPS	21	0.411 (10.44)	58
1 in. IPS	9.9	0.133 (3.38)	23	10 in. IPS	11	0.977 (24.82)	59
1 in. IPS	11	0.120 (3.05)	24	10 in. IPS	11.5	0.935 (23.75)	60
1 in. IPS	13.5	0.097 (2.46)	25	10 in. IPS	13.5	0.796 (20.22)	61
1 in. IPS	D	0.090 (2.29)	26	10 in. IPS	17	0.632 (16.05)	62
1¼ in. IPS	9.33	0.178 (4.52)	27	10 in. IPS	21	0.512 (13.00)	63
1¼ in. IPS	10	0.166 (4.22)	28	12 in. IPS	11	1.159 (29.44)	64
1¼ in. IPS	11	0.151 (3.84)	29	12 in. IPS	11.5	1.109 (28.17)	65
1¼ in. IPS	13.5	0.123 (3.12)	30	12 in. IPS	13.5	0.944 (23.98)	66
1¼ in. IPS	17	0.098 (2.49)	31	12 in. IPS	17	0.750 (19.05)	67
1¼ in. IPS	D	0.090 (2.29)	32	12 in. IPS	21	0.607 (15.42)	68
1½ in. IPS	11	0.173 (4.39)	33	14 in. IPS	11	1.273 (32.33)	69
1½ in. IPS	13.5	0.141 (3.58)	34	14 in. IPS	13.5	1.037 (26.34)	70
1½ in. IPS	17	0.112 (2.85)	35	14 in. IPS	17	0.824 (20.93)	71
1½ in. IPS	D	0.090 (2.29)	36	14 in. IPS	21	0.667 (16.94)	72
				16 in. IPS	11	1.455 (36.96)	73
				16 in. IPS	13.5	1.185 (30.10)	74
				16 in. IPS	17	0.941 (23.90)	75
				16 in. IPS	21	0.762 (19.35)	76
				18 in. IPS	11	1.636 (41.55)	77
				18 in. IPS	13.5	1.333 (33.86)	78
				18 in. IPS	17	1.059 (26.90)	79
				18 in. IPS	21	0.857 (21.77)	80
				20 in. IPS	11	1.818 (46.18)	81
				20 in. IPS	13.5	1.481 (37.62)	82
				20 in. IPS	17	1.176 (29.87)	83
				20 in. IPS	21	0.952 (24.18)	84
				22 in. IPS	11	2.000 (50.8)	85
				22 in. IPS	13.5	1.630 (41.40)	86
				22 in. IPS	17	1.294 (32.87)	87
				22 in. IPS	21	1.048 (26.62)	88
				24 in. IPS	11	2.182 (55.43)	89
				24 in. IPS	13.5	1.778 (45.16)	90
				24 in. IPS	17	1.412 (35.86)	91
				24 in. IPS	21	1.143 (29.03)	92

TABLE 7 C₁ and C₂ Factors Corresponding to Dimensions (D₁ or D₂) for MPT and FPT Sizes

D ₁ or D ₂	Factor C ₁ or C ₂	D ₁ or D ₂	Factor C ₁ or C ₂
½ in. MPT	101	½ in. FPT	121
¾ in. MPT	102	¾ in. FPT	122
1 in. MPT	103	1 in. FPT	123
1¼ in. MPT	104	1¼ in. FPT	124
1½ in. MPT	105	1½ in. FPT	125
2 in. MPT	106	2 in. FPT	126
3 in. MPT	107	3 in. FPT	127
4 in. MPT	108	4 in. FPT	128
6 in. MPT	109	6 in. FPT	129
8 in. MPT	110	8 in. FPT	130
10 in. MPT	111	10 in. FPT	131
12 in. MPT	112	12 in. FPT	132

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