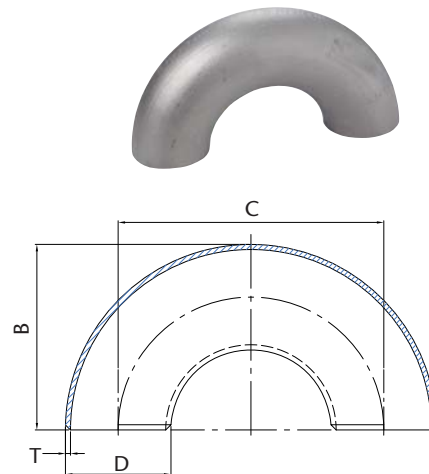
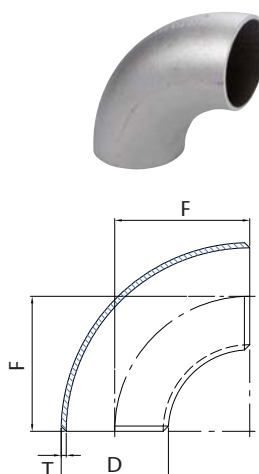
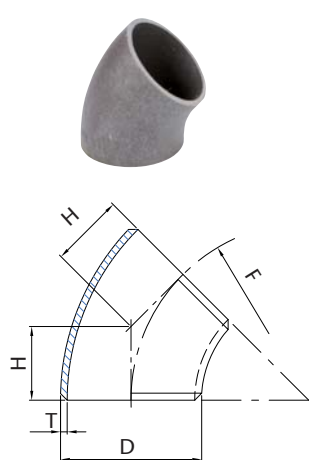


4.3. DIMENSIONS AND TOLERANCES

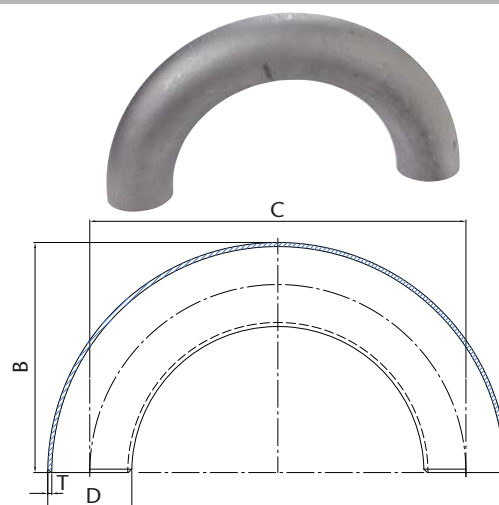
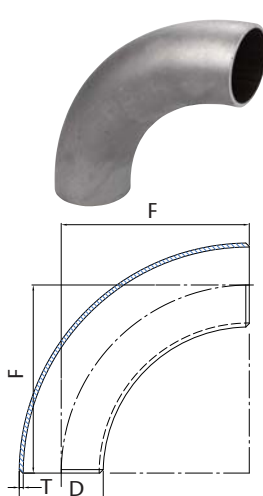
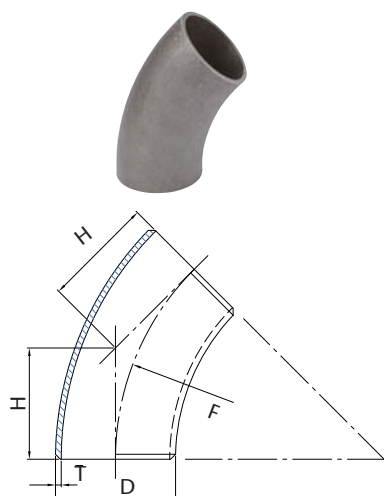
4.3.1. DIMENSIONS (EN 10253-1)

3D TYPE (45°, 90° and 180° ELBOWS)

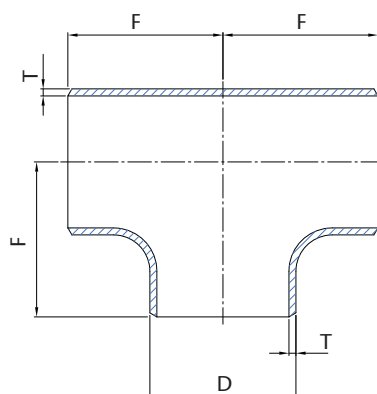


CODE			SIZE		3D ELBOW (45°, 90°, 180°)						
45°	90°	180°	SIZE	DN	D (mm)	T (mm)	H (mm)	F (mm)	C (mm)	B (mm)	
					Outside diameter	Wall thickness	Center to face	Radius	Center to center	Height	
C3450021	C3XXXX21	C3180021	1/2"	15	21,3	2,0	12	29,0	56	38	
C3450027	C3XXXX27	C3180027	3/4"	20	26,9	2,3	12	29,0	57	43	
-----	C3XXXX30	-----			30,0	*	14	33,5	66	48	
C3450033	C3XXXX33	C3180033	1"	25	33,7	2,6	16	38,0	76	56	
-----	C3XXXX38	-----			38,0	2,6	19	45,0	90	64	
C3450042	C3XXXX42	C3180042	1 1/4"	32	42,4	2,6	20	48,0	95	70	
-----	C3XXXX44	-----			44,5	2,6	22	51,0	102	73	
C3450048	C3XXXX48	C3180048	1 1/2"	40	48,3	2,6	24	57,0	114	83	
-----	C3XXXX51	-----			51,0	*	26	63,5	125	88	
-----	C3XXXX54	-----			54,0	2,6	28	68,5	137	95	
-----	C3XXXX57	-----			57,0	2,9	29	72,0	144	100	
C3450060	C3XXXX60	C3180060	2"	50	60,3	2,9	35	76,0	152	106	
-----	C3XXXX70	-----			70,0	2,9	38	92,0	184	127	
C3450076	C3XXXX76	C3180076	2 1/2"	65	76,1	2,9	44	95,0	191	132	
C3450089	C3XXXX89	C3180089	3"	80	88,9	3,2	47	114,0	229	159	
C3450101	C3XXX101	C3180101	3 1/2"	90	101,6	3,6	55	133,0	267	184	
-----	C3XXX108	-----			108,0	3,6	58	142,5	285	196	
C3450114	C3XXX114	C3180114	4"	100	114,3	3,6	63	152,0	305	210	
-----	C3XXX133	-----			133,0	4,0	75	181,0	362	247	
C3450139	C3XXX139	C3180139	5"	125	139,7	4,0	79	190,0	381	262	
-----	C3XXX159	-----			159,0	4,5	90	216,0	432	295	
C3450168	C3XXX168	C3180168	6"	150	168,3	4,5	95	229,0	457	313	
C3450193	C3XXX193	-----	7"	175	193,7	5,6	112	270,0	540	367	
C3450219	C3XXX219	-----	8"	200	219,1	6,3	127	305,0	610	414	
-----	C3XXX244	-----			244,5	6,3	141	340,0	680	462	
C3450273	C3XXX273	-----	10"	250	273,0	6,3	159	381,0	762	518	
-----	C3XXX324	-----	12"	300	323,9	7,1	190	457,0	914	619	
-----	C3XXX355	-----	14"	350	355,6	8,0	222	533,0	1067	711	
-----	C3XXX406	-----	16"	400	406,4	8,8	254	610,0	1219	813	
-----	C3XXX457	-----	18"	450	457,2	*	284	686,0	1371	914	
-----	C3XXX508	-----	20"	500	508,0	*	316	762,0	1524	1016	
-----	C3XXX609	-----	24"	600	609,6	*	379	914,0	1828	1219	

SD TYPE (45°, 90° and 180° ELBOWS)



CODE			SIZE							
45°	90°	180°	SIZE	DN	D (mm)	T (mm)	H (mm)	F (mm)	C (mm)	B (mm)
					Outside diameter	Wall thickness	Center to face	Radius	Center to center	Height
C5450021	C5XXXX21	-----	1/2"	15	21,3	2,0	18	42,5	85	53
C5450027	C5XXXX27	C5180027	3/4"	20	26,9	2,3	24	57,5	115	71
C5450033	C5XXXX33	C5180033	1"	25	33,7	2,6	30	72,5	145	89
C5450042	C5XXXX42	C5180042	1 1/4"	32	42,4	2,6	38	92,5	185	114
C5450048	C5XXXX48	C5180048	1 1/2"	40	48,3	2,6	45	107,5	215	132
C5450060	C5XXXX60	C5180060	2"	50	60,3	2,9	56	135,0	270	165
-----	C5XXXX70	-----			70,0	2,9	66	160,0	320	195
C5450076	C5XXXX76	C5180076	2 1/2"	65	76,1	2,9	73	175,0	350	213
C5450089	C5XXXX89	C5180089	3"	80	88,9	3,2	86	205,0	410	250
C5450101	C5XXX101	-----	3 1/2"	90	101,6	3,6	98	235,0	470	286
-----	C5XXX108	-----			108,0	3,6	105	253,0	506	306
C5450114	C5XXX114	C5180114	4"	100	114,3	3,6	112	270,0	540	327
-----	C5XXX133	-----			133,0	4,0	129	311,5	623	378
-----	C5XXX139	-----	5"	125	139,7	4,0	137	330,0	660	400
-----	C5XXX159	-----			159,0	4,5	155	375,0	750	454
-----	C5XXX168	-----	6"	150	168,3	4,5	162	390,0	780	474
-----	C5XXX219	-----	8"	200	219,1	6,3	211	510,0	1020	620
-----	C5XXX273	-----	10"	250	273,0	6,3	269	650,0	1300	786
-----	C5XXX324	-----	12"	300	323,9	7,1	321	775,0	1550	937

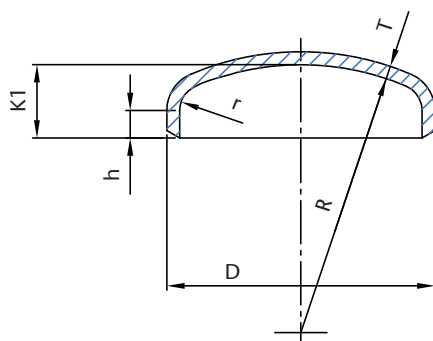

TEE


CODE	SIZE			Equal tee			
Tes	Tamaño	DN	D (mm)		T (mm)	2F (mm)	F (mm)
			Outside diameter		Wall thickness	Lenght	Center to face
CTDXXX21	1/2"	15	21,3	*	2,0	50	25
CTDXXX27	3/4"	20	26,9		2,3	58	29
CTDXXX33	1"	25	33,7		2,6	76	38
CTDXXX42	1 1/4"	32	42,4		2,6	96	48
CTDXXX48	1 1/2"	40	48,3		2,6	114	57
CTDXXX60	2"	50	60,3		2,9	128	64
CTDXXX76	2 1/2"	65	76,1		2,9	152	76
CTDXXX89	3"	80	88,9		3,2	172	86
CTDXX101	3 1/2"	90	101,6		3,6	190	95
CTDXX114	4"	100	114,3		3,6	210	105
CTDXX139	5"	125	139,7		4,0	248	124
CTDXX168	6"	150	168,3		4,5	286	143
CTDXX219	8"	200	219,1		6,3	356	178
CTDXX273	10"	250	273,0		6,3	432	216
CTDXX323	12"	300	323,9		7,1	508	254
CTDXX355	14"	350	355,6		8,0	558	279
CTDXX406	16"	400	406,4		8,8	610	305

* DIN 2615-1 not standardised in EN



CAP



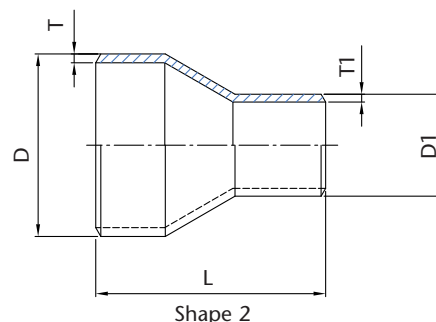
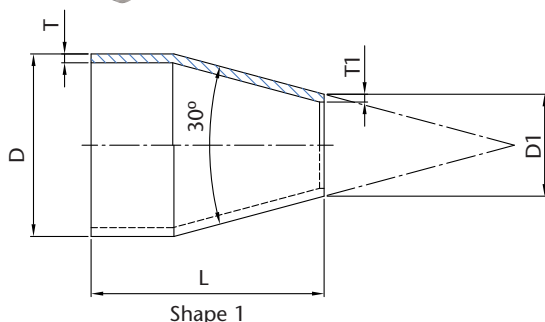
CODE	SIZE			CAP				
Tapas	Tamaño	DN	D (mm)		T (mm)	h (mm)	k1 (mm)	T+k1 (mm)
			Outside diameter		Wall thickness	Height h	Height h	Total Height T+K1
CCXXXX27	3/4"	20	26,9	*	2,3	4	11,0	13,3
CCXXXX34	1"	25	33,7		2,6	4	11,0	13,6
-----			38,0		2,6	4	11,0	13,6
CCXXXX42	1 1/4"	32	42,4		2,6	4	11,0	13,6
-----			44,5		2,6	4	11,0	13,6
CCXXXX48	1 1/2"	40	48,3		2,6	4	11,5	14,1
-----			54,0		2,6	4	12,5	15,1
-----			57,0		2,9	4	13,0	15,9
CCXXXX60	2"	50	60,3		2,9	6	16,5	19,4
CCXXXX70			70,0		2,9	6	17,5	20,4
CCXXXX76	2 1/2"	65	76,1		2,9	6	18,5	21,4
CCXXXX89	3"	80	88,9		3,2	8	23,0	26,2
CCXXX101	3 1/2"	90	101,6		3,6	8	24,5	28,1
CCXXX108			108,0		3,6	8	25,5	29,1
CCXXX114	4"	100	114,3		3,6	8	26,0	29,6
CCXXX133			133,0		4,0	10	32,0	36,0
CCXXX140	5"	125	139,7		4,0	12	35,5	39,5
CCXXX159			159,0		4,5	15	43,0	47,5
CCXXX168	6"	150	168,3		4,5	15	44,5	49,0
CCXXX193	7"	175	193,7		5,6	20	56,0	61,6
CCXXX219	8"	200	219,1		6,3	30	68,5	74,8
CCXXX245			244,5		6,3	30	75,0	81,3
CCXXX273	10"	250	273,0		6,3	40	90,0	96,3
CCXXX324	12"	300	323,9		7,1	40	99,0	106,1
CCXXX356	14"	350	355,6		8,0	40	106,0	114,0
CCXXX406	16"	400	406,4		8,8	50	125,0	133,8

Note 1: the radius R is approximately the same as D
 Note 2: the radius r is approximately the same as 0,1 D

* Measurements not standardised. Subject to possible technical changes



CONCENTRIC REDUCER



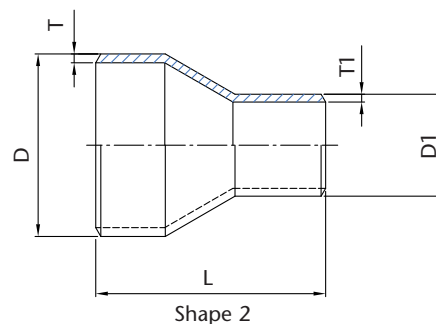
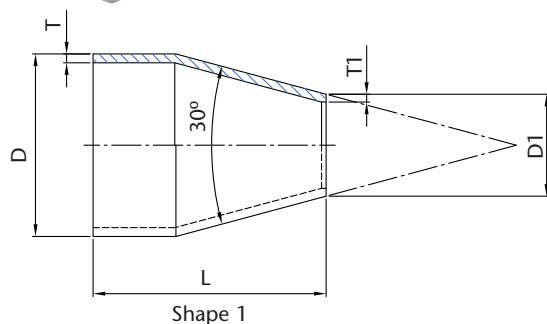
CODE	SIZE			Concentric reducer				
Reducers	Measure	DN	D x D1 (mm)	1	2	T x T1 (mm)	Shape 1: L (mm)	Shape 2: L (mm)
			Outside diameter			Wall thickness	Lenght	Total Lenght
CRXX2721	3/4" x 1/2"	20 x 15	26,9 x 21,3	*		2,3 x 2,0	38,0	38,0
CRXX3321	1" x 1/2"	25 x 15	33,7 x 21,3	*		2,6 x 2,0	50,0	51,0
CRXX3327	1" x 3/4"	25 x 20	33,7 x 26,9			2,6 x 2,3	35,0	51,0
CRXX4221	1 1/4" x 1/2"	32 x 15	42,4 x 21,3	*		2,6 x 2,0	50,0	51,0
CRXX4227	1 1/4" x 3/4"	32 x 20	42,4 x 26,9			2,6 x 2,3	51,0	51,0
CRXX4233	1 1/4" x 1"	32 x 25	42,4 x 33,7			2,6 x 2,6	39,0	51,0
CRXX4821	1 1/2" x 1/2"	40 x 15	48,3 x 21,3	**	**	2,6 x 2,0		64,0
CRXX4827	1 1/2" x 3/4"	40 x 20	48,3 x 26,9			2,6 x 2,3	67,0	64,0
CRXX4833	1 1/2" x 1"	40 x 25	48,3 x 33,7			2,6 x 2,6	55,0	64,0
CRXX4842	1 1/2" x 1 1/4"	40 x 32	48,3 x 42,4			2,6 x 2,6	38,0	64,0
CRXX6027	2" x 3/4"	50 x 20	60,3 x 26,9	*	**	2,9 x 2,3	76,0	76,0
CRXX6033	2" x 1"	50 x 25	60,3 x 33,7			2,9 x 2,6	77,0	76,0
CRXX6042	2" x 1 1/4"	50 x 32	60,3 x 42,4			2,9 x 2,6	61,0	76,0
CRXX6048	2" x 1 1/2"	50 x 40	60,3 x 48,3			2,9 x 2,6	50,0	76,0
CRXX7633	2 1/2" x 1"	65 x 25	76,1 x 33,7	*	**	2,9 x 2,6	90,0	89,0
CRXX7642	2 1/2" x 1 1/4"	65 x 32	76,1 x 42,4			2,9 x 2,6	95,0	89,0
CRXX7648	2 1/2" x 1 1/2"	65 x 40	76,1 x 48,3			2,9 x 2,6	84,0	89,0
CRXX7660	2 1/2" x 2"	65 x 50	76,1 x 60,3			2,9 x 2,9	63,0	89,0
CRXX8942	3" x 1 1/4"	80 x 32	88,9 x 42,4	*	**	3,2 x 2,6	90,0	89,0
CRXX8948	3" x 1 1/2"	80 x 40	88,9 x 48,3			3,2 x 2,6	108,0	89,0
CRXX8960	3" x 2"	80 x 50	88,9 x 60,3			3,2 x 2,9	86,0	89,0
CRXX8976	3" x 2 1/2"	80 x 65	88,9 x 76,1			3,2 x 2,9	56,0	89,0
CRX10160	3 1/2" x 2"	90 x 50	101,6 x 60,3	**	**	3,6 x 2,9		100,0
CRX10176	3 1/2" x 2 1/2"	90 x 65	101,6 x 76,1	**	**	3,6 x 2,9		100,0
CRX10189	3 1/2" x 3"	90 x 80	101,6 x 88,9	**	**	3,6 x 3,2		100,0
CRX10860			108,0 x 60,3	**	**	3,6 x 2,9		100,0
CRX10876			108,0 x 76,1	**	**	3,6 x 2,9		100,0
CRX10889			108,0 x 88,9	**	**	3,6 x 3,2		100,0
CRX11448	4" x 1 1/2"	100 x 40	114,3 x 48,3	*	**	3,6 x 2,6	100,0	102,0
CRX11460	4" x 2"	100 x 50	114,3 x 60,3			3,6 x 2,9	143,0	102,0
CRX11476	4" x 2 1/2"	100 x 65	114,3 x 76,1			3,6 x 2,9	114,0	102,0
CRX11489	4" x 3"	100 x 80	114,3 x 88,9			3,6 x 3,2	90,0	102,0
CR114101	4" x 3 1/2"	100 x 90	114,3 x 101,6	**	**	3,6 x 3,6		102,0
CRX13376			133,0 x 76,1	**	**	4,0 x 2,9		127,0
CRX13389			133,0 x 88,9	**	**	4,0 x 3,2		127,0
CR133101			133,0 x 101,6	**	**	4,0 x 3,6		127,0
CR133108			133,0 x 108,0	**	**	4,0 x 3,6		127,0

1: shape 1
2: shape 2

* Measurements in accordance with DIN 2616-2 not standardised in EN
** Measurements not standardised. Subject to possible technical changes.



CONCENTRIC REDUCER



CODE	SIZE			Concentric reducer				
Reducers	Measure	DN	D x D1 (mm)			T x T1 (mm)	Shape 1: L (mm)	Shape 2: L (mm)
			Outside diameter	1	2	Wall thickness	Lenght	Total Lenght
CR133114			133,0 x 114,3	**	**	4,0 x 3,6		127,0
CRX13960	5" x 2"	125 x 50	139,7 x 60,3	*	**	4,0 x 2,9	127,0	127,0
CRX13976	5" x 2 1/2"	125 x 65	139,7 x 76,1			4,0 x 2,9	159,0	127,0
CRX13989	5" x 3"	125 x 80	139,7 x 88,9			4,0 x 3,2	135,0	127,0
CR139101	5" x 3 1/2"	125 x 90	139,7 x 101,6	**	**	4,0 x 3,6		127,0
CR139108			139,7 x 108,0	**	**	4,0 x 3,6		127,0
CR139114	5" x 4"	125 x 100	139,7 x 114,3			4,0 x 3,6	88,0	127,0
CRX15989			159,0 x 88,9	**	**	4,5 x 3,2		140,0
CR159108			159,0 x 108,0	**	**	4,5 x 3,6		140,0
CR159114			159,0 x 114,3	**	**	4,5 x 3,6		140,0
CR159133			159,0 x 133,0	**	**	4,5 x 4,0		140,0
CR159139			159,0 x 139,7	**	**	4,5 x 4,0		140,0
CRX16876	6" x 2 1/2"	150 x 65	168,3 x 76,1	*	**	4,5 x 2,9	140,0	140,0
CRX16889	6" x 3"	150 x 80	168,3 x 88,9			4,5 x 3,2	189,0	140,0
CR168114	6" x 4"	150 x 100	168,3 x 114,3			4,5 x 3,6	141,0	140,0
CR168139	6" x 5"	150 x 125	168,3 x 139,7			4,5 x 4,0	94,0	140,0
CR193114			193,7 x 114,3	**	**	5,6 x 3,6		152,0
CR193133			193,7 x 133,0	**	**	5,6 x 4,0		152,0
CR193159			193,7 x 159,0	**	**	5,6 x 4,5		152,0
CR193168			193,7 x 168,3	**	**	5,6 x 4,5		152,0
CR219114	8" x 4"	200 x 100	219,1 x 114,3			6,3 x 3,6	210,0	152,0
CR219133			219,1 x 133,0	**	**	6,3 x 4,0		152,0
CR219139	8" x 5"	200 x 125	219,1 x 139,7			6,3 x 4,0	170,0	152,0
CR219159			219,1 x 159,0	**	**	6,3 x 4,5		152,0
CR219168	8" x 6"	200 x 150	219,1 x 168,3			6,3 x 4,5	130,0	152,0
CR273139	10" x 5"	250 x 125	273,0 x 139,7			6,3 x 4,0	250,0	178,0
CR273168	10" x 6"	250 x 150	273,0 x 168,3			6,3 x 4,5	220,0	178,0
CR273219	10" x 8"	250 x 200	273,0 x 219,1			6,3 x 6,3	130,0	178,0
CR323168	12" x 6"	300 x 150	323,9 x 168,3			7,1 x 4,5	290,0	203,0
CR323219	12" x 8"	300 x 200	323,9 x 219,1			7,1 x 6,3	215,0	203,0
CR323273	12" x 10"	300 x 250	323,9 x 273,0			7,1 x 6,3	130,0	203,0
CR355219	14" x 8"	350 x 200	355,6 x 219,1			8,0 x 6,3	255,0	330,0
CR355273	14" x 10"	350 x 250	355,6 x 273,0			8,0 x 6,3	125,0	330,0
CR355323	14" x 12"	350 x 300	355,6 x 323,9			8,0 x 7,1	100,0	330,0
CR406273	16" x 10"	400 x 250	406,4 x 273,0			8,8 x 6,3	250,0	356,0
CR406323	16" x 12"	400 x 300	406,4 x 323,9			8,8 x 7,1	175,0	356,0
CR406355	16" x 14"	400 x 350	406,4 x 355,6			8,8 x 8,0	130,0	356,0

1: shape 1
2: shape 2

* Measurements in accordance with DIN 2616-2 not standardised in EN
** Measurements not standardised. Subject to possible technical changes.

4.3.2. TOLERANCES (EN 10253-1)

The tolerances for the parameters specified are presented in the following:

- A) Tolerances on outside diameters (D and D1) : this will be the highest value which results by applying the following condition from $\pm 1\%$ or the condition from $\pm 0,5$ mm (diameters measured at the ends).
- B) Tolerances on inside diameters (not applicable to bevel ends or to tops): this must be greater than 80% of the interior theoretic diameter (DI) calculated as $DI = D - 2T$ (being T the thickness).
- C) Tolerances for oval (Ov): this is 2% in the soldered ends and 4% in the body of the elbows.

It is calculated as $Ov = 200 \cdot (D_{max} - D_{min}) / (D_{max} + D_{min})$ where:

Dmax is the maximum diameter measured in the section under consideration
Dmin is the minimum diameter measured in the same section

- D) Tolerances for thickness (T) in the soldered ends: according to the following table

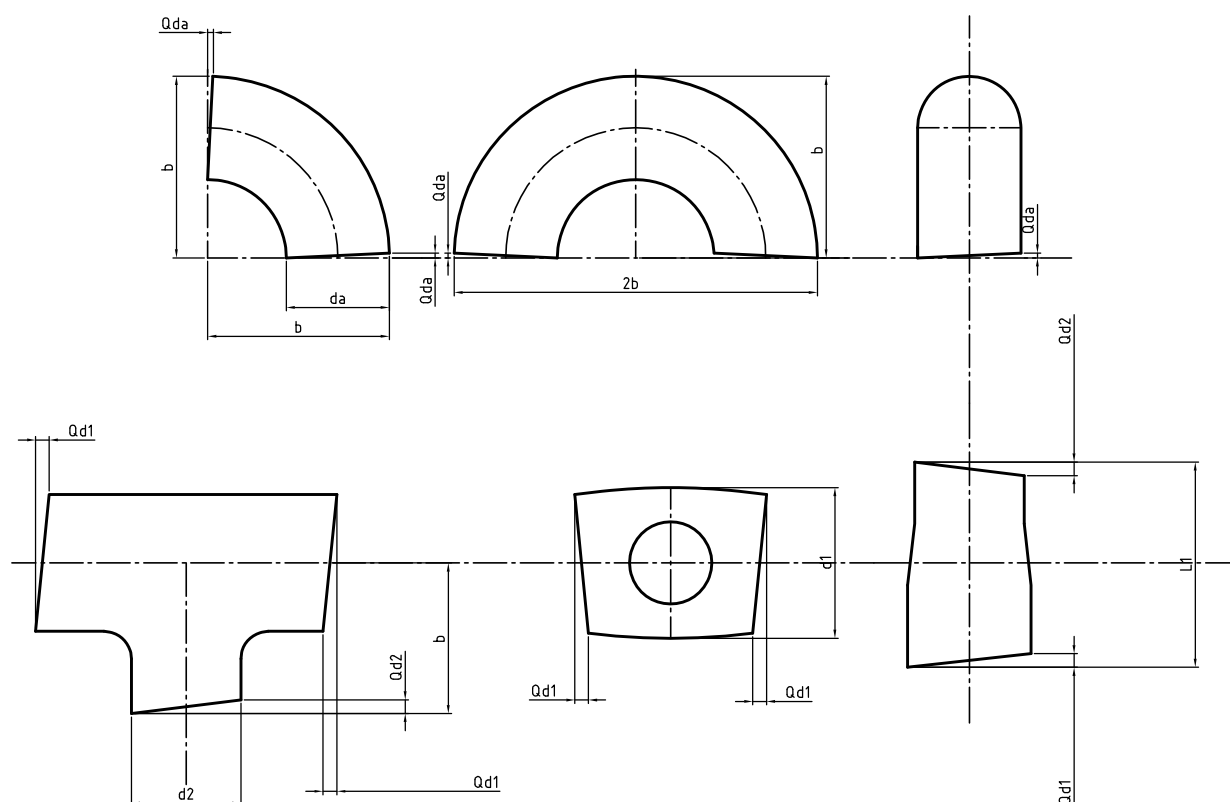
T (mm)	Tol inferior (%)	Tol superior (%)
≤ 4	- 12,5	+ 20
> 4	- 12,5	+ 15

Note: the minimum tolerance on the overall wall thickness is 12,5%

- E) Tolerances on general dimensions: according to the following table

Tolerances on overall sizes (mm)					
D	F-G-H	B	C	K	L
$\leq 114,3$	± 2	± 7	± 7	± 4	± 2
$114,3 < D \leq 114,4$	± 2	± 7	± 7	± 7	± 3
$219,1 < D \leq 406,4$	± 3	± 7	± 10	± 7	± 5

- F) Tolerances on the shape of the accessories brackets, alignments, etc (Q) : these are calculated as the highest value which results from applying the condition of 1% to the diameter D in the point measured or 1mm.



G) Finishing of the ends: the finishing is defined according to the thickness of the ends, so

- Thicknesses inferior to 3mm: bevelling is not needed
 - Similar thicknesses or superior to 3mm : these must be bevelled ($30^{\circ} -0^{\circ}/+5^{\circ}$ with a flat front of $1,6 \pm 0,8$ mm)
both been free of cutting burr
- Note: the extremes of the arched ends (tops) with the diameter similar or superior to 159 mm must be bevelled ($30^{\circ} -0^{\circ}/+5^{\circ}$ with a flat front of $1,6 \pm 0,8$ mm)

H) Surface aspect: depending on the type of sand blasting carried out, the parts must have the outside and inside surfaces relatively smooth.

I) Imperfections: imperfections are allowed provided that the resulting thickness is between the limits of the tolerance. Imperfections deriving from the mechanical process should not be greater than 1,6 mm or 12,5 % of the thickness of the greater of the two values.

J) Repairs: the reparation of surface imperfections is permitted on condition that the resulting thickness is within the tolerances allowed. After repairing, the exterior diameter can be reduced locally below the minimum specified (see figure A) provided that the resulting thickness is within the limits of the tolerances permitted.