sicam®

TUBES FOR MECHANICAL APPLICATIONS

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TUBES FOR MECHANICAL APPLICATIONS

TUBES FOR MECHANICAL APPLICATIONS

SEAMLESS TUBES FOR MECHANICAL APPLICATIONS

GENERAL FEATURES

GENERAL DESCRIPTION

The tubes for mechanical applications are mainly used in those process in which turning and CNC machines are used. The wide size range available, with OD from 21,3 to 812 mm, gives the possibility to manufacture several kinds of components for different applications: small machine parts, flanges, fittings, Archimedean screws, hydraulic cylinders for heavy machines etc.

STRUCTURAL PURPOSES

The seamless steel tubes for mechanical applications, are available as standard stock with double marking E355-EN 10297-1 / S355J2H-EN 10210, allowing them to be suitable for structural purposes too, thus extending the range of available wall thicknesses respect to structural welded hollow sections.
For more details, please check our catalogue "Commercial and construction tubes".

THE NORM EN 10297-1

The norm EN 10297 specifies the technical delivery conditions for seamless round steel tubes.

PRESSURE PURPOSES

The tubes according to EN 10297-1, are also available as standard stock according to the norm EN 10216-3: seamless steel tubes for pressure purposes , alloy fine grain steel tubes. This product, with designation as E355K2 – EN 10297-1 / P355N (or P355NL1) – EN 10216-3, is supplied in normalized delivery condition and reaches high impact properties at low temperature, resulting particularly suitable for production of hydraulic cylinders.

STEELS TABLE

CHEMICAL/PHYSICAL FEATURES

The various steelgrades differ one another from their chemical composition and mechanical properties, these parameters determine also the different possibilities of application for each steelgrade.
The tables on the following pages describe the chemical and mechanical limits fixed by the norm for the steelgrades that are mainly employed for mechanical applications.

NON-ALLOY QUALITY STEELS:

Standard steels with low carbon content.

CHEMICAL ANALYSIS FOR NON-ALLOY QUALITY STEELS

Steel grade	CHEMICAL ELEMENTS (% on mass)							
	C		Si		Mn		P	S
	Min.	Max.	Min.	Max.	Min.	Max.	Max.	Max.
E235	–	0.17	–	0.35	–	1.20	0.030	0.035
E275	–	0.21	–	0.35	–	1.40	0.030	0.035
E315	–	0.21	–	0.30	–	1.50	0.030	0.035
***E355**	–	0.22	–	0.55	–	1.60	0.030	0.035
***S355J2H** (EN 10210)	–	0.22	–	0.55	–	1.60	0.030	0.030
***E470**[1]	0.16	0.22	0.10	0.50	1.30	1.70	0.030	0.035

[1] Al ≥ 0.010%; N ≤ 0.020%; Nb ≤ 0.07%; 0.08% ≤ V ≤ 0.15%.

MECHANICAL PROPERTIES FOR NON-ALLOY QUALITY STEELS

Steel grade	Delivery condition	Yield strength min. (ReH) (N/mm^2=Mpa)						Tensile strenght min. (Rm) (N/mm^2=Mpa)				Longitudinal elongation min. %	Longitudinal impact properties at -20°C (J min.)
		For nominal w.t. in mm											
		≤ 16	> 16 ≤ 40	> 40 ≤ 65	> 65 ≤ 80	> 80 ≤ 100	> 100 ≤ 120	≤ 16	> 16 ≤ 40	> 40 ≤ 65	> 65 ≤ 100		
E235	**+AR**	235	225	215	205	195	–	360	360	360	340	25	–
E275	**+AR**	275	265	255	245	235	–	410	410	410	380	22	–
E315	**+AR**	315	305	295	280	270	–	450	450	450	420	21	–
***E355**	**+AR**	355	345	335	315	295	–	490	490	490	470	20	–
***E470**	**+AR**	470	430	–	–	–	–	650	600	–	–	17	–
		For nominal w.t. in mm										For nominal w.t. in mm				
		≤ 16	> 16 ≤ 40	> 40 ≤ 63	> 63 ≤ 80	> 80 ≤ 100	> 100 ≤ 120	≤ 3	> 3 ≤ 100	> 100 ≤ 120		≤ 40	> 40 ≤ 63	> 63 ≤ 100	> 100 ≤ 120	
***S355J2H (EN 10210)**	**+AR**	355	345	335	325	315	295	from 510 to 680	from 470 to 630	from 450 to 600		22	21	20	18	27

*Standard stock

☐ Tubes are available with double marking E355 / S355J2H, for other features see catalogue "Commercial and construction tubes".

STEELS TABLE

NON-ALLOY STEELS WITH SPECIFIED IMPACT PROPERTIES

Standard steels with low carbon content and low temperature impact properties.

CHEMICAL ANALYSIS FOR NON-ALLOY STEELS WITH SPECIFIED IMPACT PROPERTIES

Steel grade	CHEMICAL ELEMENTS (% on mass)																			
	C		Si		Mn		P	S	Cr	Mo		Ni		Al	Cu	N	Nb	Ti	V	
	Min.	Max.	Min.	Max.	Min.	Max.	Max.	Max.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Max.	Max.	Max.	Min.	Max.
E275K2	–	0.20	–	0.40	0.50	1.40	0.030	0.030	0.30	–	0.10	–	0.30	0.020	0.35	0.015	0.05	0.03	–	0.05
***E355K2**	–	0.20	–	0.50	0.90	1.65	0.030	0.030	0.30	–	0.10	–	0.50	0.020	0.35	0.015	0.05	0.05	–	0.12
***P355N[2] (EN 10216-3)**	-	0.20	-	0.50	0.90	1.70	0.025	0.020	0.30	-	0.08	-	0.50	0.020	0.30	0.020	0.05	0.040	-	0.10
***P355NL1[2] (EN 10216-3)**	-	0.18	-	0.50	0.90	1.70	0.025	0.015	0.30	-	0.08	-	0.50	0.020	0.30	0.020	0.05	0.040	-	0.10
***E420J2[1]**	0.16	0.22	0.10	0.50	1.30	1.70	0.030	0.035	0.30	–	0.08	–	0.40	0.010	0.30	0.020	0.07	0.05	0.08	0.15
***E460K2[1]**	–	0.20	–	0.60	1.00	1.70	0.030	0.030	0.30	–	0.10	–	0.80	0.020	0.70	0.025	0.05	0.05	–	0.20
***E590K2[1]**	0.16	0.22	0.10	0.50	1.30	1.70	0.030	0.035	0.30	–	0.08	–	0.40	0.010	0.30	0.020	0.07	0.05	0.08	0.15
E730K2	–	0.20	–	0.50	1.40	1.70	0.025	0.025	0.30	0.30	0.45	0.30	0.70	0.020	0.20	0.020	0.05	0.05	–	0.12

[1] Nb + V ≤ 0.20%

[2] Al/N ≥ 2; Cr + Cu + Mo ≤ 0.45 %; Nb + Ti + V ≤ 0.12 %

MECHANICAL PROPERTIES FOR NON-ALLOY STEELS WITH SPECIFIED IMPACT PROPERTIES

Steel grade	Delivery condition	Yield strength min. (ReH) (N/mm^2=Mpa) For nominal w.t. in mm						Tensile strength min. (Rm) (N/mm^2=Mpa) For nominal w.t. in mm				Longitudinal elongation min. %	Longitudinal impact propertiesat -40°C (J min.)
		≤ 20	> 20 ≤ 40	> 40 ≤ 50	> 50 ≤ 65	> 65 ≤ 80	> 80 ≤ 100	≤ 20	> 20 ≤ 40	> 40 ≤ 65	> 65 ≤ 100		
***P355N (EN 10216-3)**	+N	355	345	335	325	315	305	from 490 to 650	from 490 to 630	from 490 to 630	from 450 to 590	22	34
***P355NL1 (EN 10216-3)**	+N	355	345	335	325	315	305	from 490 to 650	from 490 to 630	from 490 to 630	from 450 to 590	22	34
		For nominal w.t. in mm										Longitudinal elongation min. %	Longitudinal impact properties at -40°C (J min.)
		≤ 16	> 16 ≤ 40	> 40 ≤ 65	> 65 ≤ 80	> 80 ≤ 100	> 100 ≤ 120	≤ 16	> 16 ≤ 40	> 40 ≤ 65	> 65 ≤ 100		
E275K2	+N	275	265	255	245	235	–	410	410	410	380	22	40
***E355K2**	+N	355	345	335	315	295	–	490	490	470	470	20	40
***E420J2**	+N	420	400	390	370	360	–	600	560	530	500	19	27
***E460K2**	+N	460	440	430	410	390	–	550	550	550	520	19	40
***E590K2**	+QT	590	540	480	455	420	–	700	650	570	520	16	40
E730K2	+QT	730	670	620	580	540	–	790	750	700	680	15	40

*Standard stock

□ Tubes in steel grade E355K2, available as standard stock, are supplied with double marking E355K2/P355N or E355K2/P355NL1. In both cases the product undergoes to an impact test at a -40°C with minimum average result of 34 Joule.

NON-ALLOY SPECIAL STEELS:

Steels with high carbon content.

CHEMICAL ANALYSIS FOR NON-ALLOY SPECIAL STEELS

Steel grade	CHEMICAL ELEMENTS (% on mass)							
	C		Si		Mn		P	S
	Min.	Max.	Min.	Max.	Min.	Max.	Max.	Max.
C22E	0.17	0.24	–	0.40	0.40	0.70	0.035	0.035
C35E	0.32	0.39	–	0.40	0.50	0.80	0.035	0.035
C45E	0.42	0.50	–	0.40	0.50	0.80	0.035	0.035
C60E	0.57	0.65	–	0.40	0.60	0.90	0.035	0.035
38Mn6	0.34	0.42	0.15	0.35	1.40	1.65	0.035	0.035

For all the a.m. steelgrades: Cr ≤ 0.40%; Mo ≤ 0.10%; Ni ≤ 0.40 %; Cr + Mo + Ni ≤ 0.63%.

MECHANICAL PROPERTIES FOR NON-ALLOY SPECIAL STEELS

Steel grade	Delivery condition	Yield strength min. (ReH) (N/mm^2=Mpa)				Tensile strength min. (Rm) (N/mm^2=Mpa)				Longitudinal elongation min. %				Longitudinal impact value		
		For nominal w.t. in mm				For nominal w.t. in mm				For nominal w.t. in mm				Temp. (°C)	W.T.(mm)	Min Value (J min.)
		≤ 16	> 16 ≤ 40	> 40 ≤ 80	//	≤ 16	> 16 ≤ 40	> 40 ≤ 80	//	≤ 16	> 16 ≤ 40	≤ 40 > 80	//			
C22E	**+N**	240	210	210	–	430	410	410	–	24	25	25	–	Impact test is foreseen only for quenched and tempered material (+QT)		
C35E	**+N**	300	270	270	–	550	520	520	–	18	19	19	–			
C45E	**+N**	340	305	305	–	620	580	580	–	14	16	16	–			
C60E	**+N**	390	350	340	–	710	670	670	–	10	11	11	–			
38Mn6	**+N**	400	380	360	–	670	620	570	–	14	15	16	–			
		For nominal w.t. in mm														
		≤ 8	> 8 ≤ 20	> 20 ≤ 50	> 50 ≤ 80	≤ 8	> 8 ≤ 20	> 20 ≤ 50	> 50 ≤ 80	≤ 8	> 8 ≤ 20	>20 ≤50	> 50 ≤ 80			
C22E	**+QT**	340	290	270	260	500	470	440	420	20	22	22	22	+20	≤ 8	50
															> 8≤ 20	50
															> 20≤ 60	40
															> 60≤ 100	40
C35E	**+QT**	430	380	320	290	630	600	550	500	17	19	20	20	+20	≤ 8	35
															> 8≤ 20	
															> 20≤ 60	
															> 60≤ 100	
C45E	**+QT**	490	430	370	340	700	650	630	600	14	16	17	17	+20	≤ 8	25
															> 8≤ 20	
															> 20≤ 60	
															> 60≤ 100	
C60E	**+QT**	580	520	450	420	850	800	750	710	11	13	14	14	–	–	–
38Mn6	**+QT**	620	570	470	400	850	750	650	550	13	14	15	16	+20	≤ 8	36
															> 8≤ 20	40
															> 20≤ 60	40
															> 60≤ 100	–

Note: the impact test is optional according to the norm, in case of need it has to be explicitly required.

STEELS TABLE

ALLOY SPECIAL STEELS:

Steels with a complex chemical composition that helps achieving high mechanical properties.

CHEMICAL ANALYSIS FOR ALLOY SPECIAL STEELS

Steelgrade	CHEMICAL ELEMENTS (% on mass)												
	C		Si	Mn		P	S	Cr		Mo		Ni	
	Min.	Max.	Max.	Min.	Max.	Max.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
41Cr4	0.38	0.45	0.40	0.60	0.90	0.035	0.035	0.90	1.20	–	–	–	–
25CrMo4	0.22	0.29	0.40	0.60	0.90	0.035	0.035	0.90	1.20	0.15	0.30	–	–
30CrMo4	0.27	0.34	0.35	0.35	0.60	0.035	0.035	0.80	1.15	0.15	0.30	–	–
34CrMo4	0.30	0.37	0.40	0.60	0.90	0.035	0.035	0.90	1.20	0.15	0.30	–	–
42CrMo4	0.38	0.45	0.40	0.60	0.90	0.035	0.035	0.90	1.20	0.15	0.30	–	–
36CrNiMo4	0.32	0.40	0.40	0.50	0.80	0.035	0.035	0.90	1.20	0.15	0.30	0.90	1.20
30CrNiMo8	0.26	0.34	0.40	0.30	0.60	0.035	0.035	1.80	2.20	0.30	0.50	1.80	2.20
41NiCrMo7-3-2[1]	0.38	0.44	0.30	0.60	0.90	0.025	0.025	0.70	0.90	0.15	0.30	1.65	2.00

[1]Cu ≤ 0.25%

MECHANICAL PROPERTIES FOR ALLOY SPECIAL STEELS

Steel grade	Delivery condition	Yield strength min. (ReH) (N/mm^2=Mpa) For nominal w.t. in mm				Tensile strength min. (Rm) (N/mm^2=Mpa) For nominal w.t. in mm				Longitudinal elongation min. % For nominal w.t. in mm				Longitudinal impact value		
		≤ 8	> 8 ≤ 20	> 20 ≤ 50	> 50 ≤ 80	≤ 8	> 8 ≤ 20	> 20 ≤ 50	> 50 ≤ 80	≤ 8	>8 ≤ 20	> 20 ≤50	>50 ≤ 80	Temp. (°C)	W.T. (mm)	Min Value. (J min.)
41Cr4	+QT	800	660	560	–	1000	900	800	–	11	12	14	–	+20	≤ 8	30
															> 8≤ 20	35
															> 20≤ 60	35
															> 60≤ 100	–
25CrMo4	+QT	700	600	450	400	900	800	700	650	12	14	15	16	+20	≤ 8	45
															> 8≤ 20	50
															> 20≤ 60	50
															> 60≤ 100	45
30CrMo4	+QT	750	630	520	480	950	850	750	700	12	13	14	15	+20	≤ 8	40
															> 8≤ 20	45
															> 20≤ 60	45
															> 60≤ 100	45
34CrMo4	+QT	800	650	550	500	1000	900	800	750	11	12	14	15	+20	≤ 8	35
															> 8≤ 20	40
															> 20≤ 60	45
															> 60≤ 100	45
42CrMo4	+QT	900	750	650	550	1100	1000	900	800	10	11	12	13	+20	≤ 8	30
															> 8≤ 20	35
															> 20≤ 60	35
															> 60≤ 100	35
36CrNi-Mo4	+QT	900	800	700	600	1100	1000	900	800	10	11	12	13	+20	≤ 8	35
															> 8≤ 20	40
															> 20≤ 60	45
															> 60≤ 100	45
30CrNi-Mo8	+QT	1050	1050	900	800	1250	1250	1100	1000	9	9	10	11	+20	≤ 8	30
															> 8≤ 20	30
															> 20≤ 60	35
															> 60≤ 100	45
41NiCr-Mo7-3-2	+QT	950	870	800	750	1150	1050	1000	900	9	10	11	12	+20	≤ 8	35
															> 8≤ 20	40
															> 20≤ 60	45
															> 60≤ 100	45

Note: the impact test is optional according to the norm, in case of need it has to be explicitly required.

STEELS TABLE

STEELS ACCORDING TO MANUFACTURERS' SPECIFICATIONS:

Steels, whose features are stated by the specifications of each manufacturing mill, not by EN 10297.

CHEMICAL ANALYSIS FOR STEELS ACCORDING TO MANUFACTURERS' SPECIFICATIONS

Steelgrade	CHEMICAL ELEMENTS (% on mass)																							
	C		Si		Mn		P	S	Cr		Mo		Ni		Al		Cu	N	Nb	Ti	V		W	
	Min.	Max.	Min.	Max.	Min.	Max.	Max.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Max.	Max.	Max.	Max.	Min.	Max.	Min.	Max.
Forterior® 630 ImpactFIT 40[1]	0.16	0.22	0.10	0.50	1.30	1.70	0.030	0.035	-	0.30	-	0.08	-	0.40	0.010	0.060	0.25	0.020	0.05	0.03	0.08	0.15	-	-
Forterior® 650[2]	0.20	0.25	0.15	0.50	0.70	1.30	0.025	0.010	-	0.30	-	-	-	-	0.010	0.060	-	0.012	-	-	-	-	-	-
FineXcell® 690	-	0.20	0.15	0.50	-	1.70	0.025	0.015	-	1.00	0.30	0.45	0.30	0.70	0.020	-	0.25	0.015	0.05	0.05	-	0.12	-	-
FineXcell® 690 ImpactFIT 40	0.14	0.18	0.20	0.50	1.20	1.70	0.025	0.015	-	0.80	0.20	0.40	-	0.40	0.015	0.050	0.25	0.020	0.05	0.05	0.05	0.12	0.10	0.35
FineXcell® 690 ImpactFIT 50	-	0.20	-	0.60	-	1.70	0.025	0.015	-	1.50	-	0.70	-	1.50	-	0.060	0.50	0.020	0.05	0.05	-	0.14	-	-
FineXcell® 700	-	0.15	0.10	0.50	-	1.40	0.020	0.010	0.40	0.60	0.20	0.65	1.00	1.50	-	0.020	0.25	0.015	0.05	0.05	-	0.10	-	-
FineXcell® 700 ImpactFIT 40	0.14	0.18	0.20	0.50	1.20	1.70	0.025	0.015	-	0.80	0.20	0.40	-	0.40	0.015	0.050	0.25	0.020	0.05	0.05	0.05	0.12	-	-
FineXcell® 700 ImpactFIT 60	0.14	0.18	0.20	0.50	1.20	1.70	0.025	0.015	-	0.80	0.20	0.40	-	0.40	0.015	0.050	0.25	0.020	0.05	0.05	0.05	0.12	0.10	0.70
FineXcell® 700 TempFIT 300	0.14	0.18	0.20	0.50	1.20	1.70	0.025	0.015	-	0.80	0.20	0.40	-	0.40	0.015	0.050	0.25	0.020	0.05	0.05	0.05	0.12	0.10	0.70
FineXcell® 770	-	0.20	0.20	0.50	1.20	1.70	0.025	0.015	-	0.50	0.20	0.50	0.50	1.20	-	0.020	0.25	0.020	0.05	-	-	0.12	-	-
FineXcell® 780 ImpactFIT 40*	0.14	0.18	0.20	0.50	1.20	1.70	0.025	0.015	-	0.80	0.20	0.40	-	0.40	0.015	0.050	0.25	0.020	0.05	0.05	0.05	0.12	-	-
FineXcell® 790	-	0.18	0.20	0.50	1.20	1.70	0.020	0.010	0.40	1.00	0.20	0.50	0.70	1.70	-	0.020	0.25	0.020	0.05	-	-	0.10	-	-
FineXcell® 800 ImpactFIT 40	0.10	0.18	0.20	0.50	1.20	1.70	0.025	0.015	0.40	0.90	0.20	0.50	-	0.40	0.015	0.050	0.30	0.020	0.06	0.05	0.03	0.12	0.10	0.80
FineXcell® 890	-	0.18	0.20	0.50	-	1.60	0.020	0.010	0.50	0.80	0.20	0.70	1.00	1.70	0.020	0.25	0.020	0.05	-	-	0.10	-	-	-
FineXcell® 890 ImpactFIT 50[3]	-	0.18	-	0.50	-	1.50	0.020	0.10	-	0.90	-	0.50	-	0.40	-	0.050	0.35	0.020	0.06	0.05	-	0.08	-	-
FineXcell® 900 ImpactFIT 40	0.14	0.18	0.20	0.50	1.20	1.70	0.020	0.010	0.40	0.90	0.30	0.70	-	0.40	0.015	0.050	0.35	0.020	0.06	0.05	0.03	0.12	-	-
FineXcell® 960 ImpactFIT 40	0.14	0.18	0.20	0.50	1.20	1.70	0.020	0.010	0.40	0.90	0.30	0.70	-	0.40	0.015	0.050	0.35	0.020	0.06	0.05	0.03	0.12	0.40	0.80

[1] V+Nb < 0.20%; V + Nb + Ti < 0.22%.
[2] 0.020% < Ti > 0.050%; 0.0010% < B > 0.0050%.
[3] B ≤ 0.0008%; W ≤ 1.50%; Zr ≤ 0.15%.

MECHANICAL PROPERTIES FOR STEELS ACCORDING TO MANUFACTURERS' SPECIFICATIONS

Steelgrade	Delivery condition	Yield strength min. (ReH) (N/mm^2=Mpa)							Tensile strength min./max. (Rm) (N/mm^2=Mpa)				Long. elongation min. %	Long. impact values (J min.) ^				
		For nominal w.t. in mm							For nominal w.t. in mm					Temperature °C				
		≤12	>12 ≤25	>25 ≤40	>40 ≤50	>50 ≤65	>65 ≤80	>80 ≤100	≤25	>25 ≤50	>50 ≤80	>80 ≤100		-20	-30	-40	-50	-60
Forterior® 630 ImpactFIT 40	+QT	630	610	580	540	500	470	-	740 930	690 860	620 790	-	16	-	-	27	-	-
Forterior®650*	+AR	400	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		For nominal w.t. in mm							For nominal w.t. in mm					Temperature °C				
		≤16	>16 ≤20	>20 ≤40	>40 ≤50	>50 ≤65	>65 ≤80	>80 ≤100	≤20	>20 ≤40	>40 ≤65	>65 ≤100		-20	-30	-40	-50	-60
FineXcell® 690	+QT	690	690	650	615	580	540	500	770 960	720 900	670 850	620 800	16	40	-	-	-	-
FineXcell® 690 ImpactFIT 40	+QT	690	690	650	-	-	-	-	770 960	720 900	-	-	16	-	-	40	-	-
FineXcell® 690 ImpactFIT 50	+QT	690	690	-	-	-	-	-	700 960	-	-	-	14	-	-	-	27	-
		For nominal w.t. in mm							For nominal w.t. in mm					Temperature °C				
		≤12	>12 ≤20	>20 ≤40	>40 ≤50	>50 ≤65	>65 ≤80	>80 ≤100	≤20	>20 ≤40	>40 ≤65	>65 ≤100		-20	-30	-40	-50	-60
FineXcell® 700	+QT	700	690	690	650	615	580	540	770 960	770 960	700 880	680 860	16	50	-	-	-	-
FineXcell® 700 ImpactFIT 40	+QT	700	690	650	615	580	-	-	770 960	720 900	670 850	-	16	-	-	27	-	-
FineXcell® 700 ImpactFIT60	+QT	700	690	690	650	615	-	-	770 960	770 960	700 880	-	16	-	-	-	-	25
FineXcell® 700 TempFIT 300	+QT	700 510 a +300°C	690 510 a +300°C	690 510 a +300°C	650 470 a +300°C	650 470 a +300°C	-	-	770 960 620 a +300°C	770 960 620 a +300°C	700 880 570 a +300°C	-	16	50	-	-	-	-
FineXcell® 770	+QT	770	750	700	670	640	600	560	820 1000	770 950	720 900	680 860	15	35	-	-	-	-
FineXcell® 780 ImpactFIT 40	+QT	780	770	700	670	640	-	-	820 1000	770 950	720 900	-	15	-	-	27	-	-
FineXcell® 790	+QT	790	790	730	710	700	690	670	850 1030	880 980	770 950	720 900	15	40	-	-	-	-
FineXcell® 800 ImpactFIT 40	+QT	800	790	730	710	700	-	-	850 1030	800 1080	770 950	-	15	-	-	27	-	-
FineXcell® 890	+QT	890	890	850	820	800	-	-	960 1110	920 1070	870 1040	-	14	45	-	-	-	-
		For nominal w.t. in mm							For nominal w.t. in mm					Temperature °C				
		≤16	>16 ≤20	-	-	-	-	-	≤16	>16 ≤20	-	-		-20	-30	-40	-50	-60
FineXcell® 890 ImpactFIT 50	+QT	890	850	-	-	-	-	-	960 1110	920 1070	-	-	14	-	-	-	27	-
		For nominal w.t. in mm							For nominal w.t. in mm					Temperature °C				
		≤12	>12 ≤20	>20 ≤40	>40 ≤50	>50 ≤65	>65 ≤80	>80 ≤100	≤20	>20 ≤40	>40 ≤50	>50 ≤100		-20	-30	-40	-50	-60
FineXcell® 900 ImpactFIT 40	+QT	900	890	850	820	-	-	-	960 1110	920 1070	870 1040	-	14	-	-	35	-	-
		For nominal w.t. in mm							For nominal w.t. in mm					Temperature °C				
		≤16	-	-	-	-	-	-	≤16	-	-	-		-20	-30	-40	-50	-60
FineXcell® 960 ImpactFIT 40	+QT	960	-	-	-	-	-	-	980 1150	-	-	-	10	-	-	27	-	-

*This steelgrade is usually supplied as rolled followed by heat treatment. The mechanical properties stated here are only approximate.

^ The impact values can vary according to the supplied w.t.. At the time of the order it is possible to specify another temperature at which the test has to be effected.

TUBES FOR MECHANICAL APPLICATIONS

STEELS COMPARISON TABLE

This table contains steelgrades which are known but no longer up to date or are present only in manufacturers' specifications.
For each of them, an alternative steelgrade, among the ones codified by EN 10297-1, with similar features is suggested.

EN 10297-1 **Steelgrade**	Delivery condition	UNI Norm	DIN Norm	AFNOR Norm	Special steels*
E235	Untreated (+AR)	7729 Fe 360	1629 St 37.0	TU 37b	
E275			1629 St. 44.0		
E315					
E355		7729 Fe 510	1629 St. 52.0	TU 52b	Mecaval 136M VM355M
E470					20MnV6 MW450
E275K2	Normalized (+N)		1630 St. 44.4N		
E355K2			1630 St. 52.4N		
E420J2			17179 StE 420		
E460K2			17179 StE 460		MW450M
E590K2	Quenched and tempered (+QT)				MW450K
E730K2					FGS78WV
C22E	Normalized (+N) Quenched and tempered (+QT)		17204 Ck22(N) 17204 Ck22(V)		
C35E			17204 Ck35(N) 17204 Ck 35(V)		
C45E			17204 Ck45(N) 17204 Ck45(V)		
C60E			17204 Ck60(N) 17204 Ck60(V)		
38Mn6					
41Cr4	Quenched and tempered (+QT)		17204 41Cr4(V)		
25CrMo4			17204 25CrMo4(V)		
30CrMo4					
34CrMo4			17204 34CrMo4(V)		
42CrMo4			17204 42CrMo4(V)		
36CrNiMo4			17204 36CrNiMo4(V)		
30CrNiMo8			17204 30CrNiMo8(V)		
41NiCrMo7-3-2					
C10E	Annealed (+A) +TH[1] +FP[2] Normalized (+N)				
C15E					
C15R					
16MnCr5					
16MnCrS6					
20NiCrMo2-2					
20NiCrMoS2-2					

*Steels according to manufacturers' specifications, not foreseen by any norm.
[1] Heat treatment required to achieve a hardness value within a specified range.
[2] Heat treatment required to produce a ferritic and pearlitic structure and to achieve a hardness value e within a specified range.

SIZES, TOLERANCES AND MASSES

O. D. mm	W.T. mm																	
	4,0	**5,0**	**6,3**	**7,1**	**8,0**	**8,8**	**10,0**	**11,0**	**12,5**	**14,2**	**16,0**	**17,5**	**20,0**	**22,2**	**25,0**	**28,0**	**30,0**	**32,0**
21,3	1,7	2,0	2,3															
26,9	2,3	2,7	3,2															
33,7	2,9	3,5	4,3	4,7	5,1	5,4	5,8											
38,0	3,4	4,1	4,9	5,4	5,9	6,3	6,9											
42,4	3,8	4,6	5,6	6,2	6,8	7,3	8,0											
44,5	4,0	4,9	5,9	6,5	7,2	7,7	8,5	9,0	9,9									
48,3	4,4	5,3	6,5	7,2	7,9	8,6	9,4	10,1	11,0									
51,0	4,6	5,7	6,9	7,7	8,4	9,1	10,1	10,9	11,9	12,9								
54,0	4,9	6,0	7,4	8,2	9,0	9,8	10,9	11,7	12,9	13,9								
57,0	5,2	6,4	7,9	8,8	9,6	10,4	11,6	12,5	13,8	15,0	16,2							
60,3	5,6	6,8	8,4	9,3	10,3	11,1	12,4	13,4	14,8	16,2	17,4	18,5						
63,5	5,9	7,2	8,9	9,9	10,9	11,8	13,2	14,3	15,8	17,3	18,7	19,9						
67,0	6,2	7,6	9,4	10,5	11,6	12,6	14,1	15,2	16,8	18,5	20,1	21,4	23,2					
70,0	6,5	8,0	9,9	11,0	12,2	13,2	14,8	16,0	17,8	19,6	21,2	22,6	24,7					
73,0	6,8	8,4	10,4	11,6	12,8	13,9	15,5	16,9	18,8	20,6	22,4	23,9	26,1					
76,1	7,1	8,8	10,9	12,1	13,4	14,6	16,3	17,7	19,7	21,7	23,7	25,3	27,7	27,7				
82,5	7,7	9,6	11,9	13,2	14,6	15,9	17,9	19,5	21,7	24,0	26,2	28,0	30,8	33,0	35,4			
88,9	8,4	10,3	12,9	14,4	15,9	17,3	19,5	21,2	23,7	26,2	28,7	30,7	34,0	36,5	39,4			
95,0	9,0	11,1	13,8	15,4	17,2	18,9	21,0	23,1	25,4	28,3	31,2	33,4	37,0	39,9	43,0	46,3	48,1	
101,6	9,6	11,9	14,9	16,6	18,4	20,1	22,6	24,7	27,6	30,7	33,7	36,2	40,2	43,5	47,5	50,8	52,9	
108,0	10,3	12,7	15,8	17,7	19,6	21,4	24,2	26,4	29,6	32,9	36,2	39,0	43,4	47,0	51,4	55,2	57,7	
114,3	10,9	13,5	16,8	18,8	20,9	22,8	25,7	28,1	31,6	35,1	38,6	41,7	46,5	50,4	55,3	59,3	62,3	64,9
121,0	11,5	14,3	17,8	19,9	22,3	24,7	27,4	30,2	33,4	37,4	41,4	44,7	49,8	54,1	59,2	64,2	67,3	70,2
127,0	12,1	15,0	18,8	21,0	23,4	25,5	28,9	31,6	35,5	39,6	43,6	47,2	52,8	57,4	63,2	68,3	71,7	75,0
133,0	12,7	15,8	19,8	22,1	24,6	26,9	30,3	33,3	37,4	41,8	46,1	49,9	55,7	60,8	67,1	72,5	76,3	79,7
139,7	13,4	16,6	20,8	23,3	25,9	28,3	32,0	35,1	39,5	44,0	48,6	52,7	59,0	64,3	71,1	77,0	81,1	85,0
146,0		17,4	21,7	24,3	27,2	29,8	33,5	36,6	41,2	46,2	51,3	55,5	62,1	67,8	74,6	81,5	85,8	90,0
152,4		18,2	22,8	25,5	28,4	31,0	35,1	38,5	43,4	48,5	53,6	58,1	65,3	71,3	79,0	85,8	90,5	95,0
159,0		19,0	23,8	26,6	29,6	32,4	36,7	40,3	45,4	50,8	56,2	60,9	68,6	74,8	83,0	90,3	95,3	100,2
165,1		19,7	24,7	27,7	31,0	33,9	38,2	41,8	47,0	52,8	58,8	63,7	71,6	78,2	86,4	94,7	100,0	105,0
168,3		20,1	25,3	28,3	31,5	34,5	39,0	42,9	48,4	54,1	59,9	65,0	73,1	80,0	88,9	96,7	102,0	107,6
171,0		20,5	25,6	28,7	32,2	35,2	39,7	43,4	48,9	54,9	61,2	66,2	74,5	81,5	90,0	98,7	104,3	109,7
177,8		21,3	26,7	30,0	33,4	36,5	41,4	45,4	51,3	57,4	63,6	69,1	77,8	85,2	94,8	103,0	109,0	115,1
191,0			28,7	32,2	36,1	39,5	44,6	48,8	55,0	61,9	69,1	74,9	84,3	92,4	102,3	112,6	119,1	125,5
193,7			29,2	32,8	36,5	40,0	45,3	49,8	56,2	63,0	69,8	75,9	85,7	93,9	105,0	114,0	121,0	127,6
203,0			30,6	34,3	38,5	42,7	47,6	52,8	58,7	66,1	73,8	80,1	90,3	99,0	110,0	121,0	128,0	134,9
216,0			32,6	36,6	41,0	45,0	50,8	55,6	62,7	70,7	78,9	85,7	96,7	106,1	117,8	129,8	137,6	145,2
219,1			33,2	37,2	41,5	45,4	51,6	56,7	64,1	71,9	79,8	86,9	98,2	108,0	120,0	132,0	140,0	147,6
229,0			24,5	38,8	43,6	47,7	54,0	59,1	66,7	75,2	84,0	91,2	103,0	113,0	125,0	138,0	140,0	155,5
244,5			37,1	41,7	46,5	50,9	57,8	63,6	72,0	80,8	89,8	97,8	111,0	122,0	136,0	149,0	147,0	167,7
254,0			38,5	43,2	48,5	53,9	60,2	66,8	74,4	84,0	93,9	102,0	115,0	127,0	141,0	156,0	159,0	175,2
267,0			40,6	45,6	50,9	55,8	63,4	69,7	79,0	88,7	98,6	107,0	122,0	134,0	150,0	165,0	166,0	185,5
273,0			41,6	46,7	52,1	57,1	64,8	71,4	80,9	90,9	101,0	110,0	125,0	137,0	154,0	169,0	175,0	190,2
279,0			42,4	47,6	53,4	58,6	66,3	72,7	82,1	92,7	103,8	112,9	127,7	140,6	156,6	173,3	180,0	194,9
292,0			44,4	49,9	56,0	61,5	69,5	76,2	86,2	97,3	108,9	118,5	134,2	147,7	164,6	182,3	184,2	205,2
298,5				51,1	57,1	62,6	71,1	78,3	88,8	99,8	111,0	121,0	137,0	151,0	170,0	187,0	193,8	210,3
305,0				52,1	58,5	64,2	72,7	79,7	90,1	101,0	113,0	124,0	140,0	154,0	173,0	191,0	198,0	215,4
318,0				54,4	61,2	67,1	76,0	83,3	94,2	106,4	119,2	129,7	147,0	161,9	180,6	200,2	213,1	225,7
323,9				55,6	62,1	68,1	77,4	85,3	96,7	109,0	121,0	132,0	150,0	165,0	186,0	204,0	217,0	230,4
330,0					63,5	69,6	78,8	86,5	97,8	110,0	123,0	134,0	152,0	168,0	187,0	208,0	221,0	235,2
339,7					65,4	71,8	81,3	89,2	100,9	114,0	127,7	139,1	157,7	173,8	194,0	215,2	229,1	242,8
343,0					66,1	72,5	82,0	90,0	102,0	115,0	128,0	140,0	159,0	175,0	195,0	217,0	231,0	245,4
355,6					68,6	74,9	85,2	93,9	107,0	120,0	133,0	146,0	166,0	183,0	205,0	226,0	241,0	255,4
368,0					71,0	78,0	88,3	96,8	109,6	123,9	138,0	151,0	171,6	189,0	211,5	234,8	250,0	265,2
381,0					73,0	80,7	91,5	101,0	114,0	129,0	144,0	158,0	178,0	197,0	220,0	243,8	259,7	275,4
394,0					76,2	83,5	96,8	103,0	117,0	132,0	149,0	162,0	184,0	203,0	227,0	252,0	269,0	285,7
406,4					78,6	85,9	97,8	107,3	122,0	138,0	153,0	168,0	191,0	210,0	237,0	261,0	278,0	295,5
419,0					81,1	88,7	101,0	111,0	126,0	142,0	158,0	173,0	197,0	217,0	245,0	270,0	288,0	305,4
431,8							104,0	114,0	129,0	146,0	164,0	179,0	203,0	224,0	251,0	279,0	298,0	315,5
445,0							107,0	117,0	133,0	150,0	169,0	184,0	209,0	231,0	258,0	287,0	306,0	329,9
457,2					88,6	97,3	110,0	122,0	138,0	156,0	173,0	189,0	216,0	238,0	268,0	296,0	316,0	335,5
470,0					91,1	100,1	113,4	124,5	141,0	159,6	179,0	195,3	222,0	245,2	274,4	305,2	325,5	345,6
482,6								130,0	145,0	164,0	184,0	201,0	228,0	252,0	282,0	314,0	335,0	355,6
508,0						108,3	122,8	135,0	154,0	173,0	193,0	211,0	241,0	266,0	300,0	331,0	353,0	375,6
521,0						111,2	126,0	138,3	156,0	177,0	199,0	217,0	246,0	272,0	305,0	340,0	363,0	385,6
530,0								140,8	159,0	181,0	203,0	221,0	252,0	278,0	311,0	347,0	370,0	393,0
559,0							135,4	148,7	168,4	190,7	214,2	233,6	265,8	293,8	329,1	366,5	391,2	415,9
570,0										194,6	218,6	238,4	271,3	299,9	336,0	374,3	399,5	424,6
584,2									176,2	199,6	224,2	244,6	278,3	307,7	344,8	384,0	410,0	435,8
610,0							148,0	162,5	184,0	208,5	234,2	255,5	290,8	321,6	360,4	401,6	428,8	456,1
622,0										212,8	239,1	260,9	296,9	328,4	368,1	410,2	438,0	465,6
635,0									192,0	217,4	244,2	266,6	303,3	335,6	376,0	419,0	447,6	475,9
660,0							160,3	176,1	199,7	226,3	254,3	277,5	315,9	349,4	391,7	436,7	466,4	495,6
711,2								189,9	215,4	244,1	274,3	299,4	340,9	377,2	423,1	471,8	504,0	536,0
762,0													366,0	405,0	454,4	506,8	541,5	576,1
812,0													390,6	432,4	485,2	511,3	578,5	615,5
	4,0	**5,0**	**6,3**	**7,1**	**8,0**	**8,8**	**10,0**	**11,0**	**12,5**	**14,2**	**16,0**	**17,5**	**20,0**	**22,2**	**25,0**	**28,0**	**30,0**	**32,0**

35,0	40,0	45,0	50,0	55,0	60,0	65,0	70,0	75,0	80,0	85,0	90,0	100,0	120,0	O. D. mm
														21,3
														26,9
														33,7
														38,0
														42,4
														44,5
														48,3
														51,0
														54,0
														57,0
														60,3
														63,5
														67,0
														70,0
														73,0
														76,1
														82,5
														88,9
														95,0
														101,6
														108,0
68,5	73,3													114,3
74,2	79,9													121,0
79,3	85,8	91,0												127,0
84,5	91,7	97,7												133,0
90,3	98,3	105,0	110,6											139,7
95,7	104,5	112,0	118,4											146,0
101,0	112,0	119,2	126,3											152,4
106,0	119,0	126,5	134,4	141,1	146,5									159,0
112,3	123,4	133,3	141,9	149,3	155,5									165,1
115,0	126,0	136,8	145,8	153,7	160,3									168,3
117,4	129,2	139,8	149,2	157,3	164,2									171,0
123,0	136,0	147,3	157,5	166,6	174,3									177,8
134,6	149,0	162,0	173,9	184,5	193,8									191,0
136,0	151,0	167,0	179,0	188,1	197,8									193,7
144,0	161,0	178,0	191,0	200,7	211,6									203,0
156,2	173,6	189,8	204,7	218,4	230,8									216,0
158,0	176,0	196,0	211,0	222,6	235,0	247,0								219,1
167,0	186,0	204,0	220,0	236,0	250,0	262,9	274,5							229,0
180,0	201,0	224,0	243,0	257,0	273,0	287,7	301,2							244,5
188,0	211,0	232,0	251,5	270,0	287,0	303,0	317,6							254,0
200,0	223,0	250,0	271,0	287,6	306,0	323,8	340,0	355,1						267,0
205,0	229,0	256,0	275,0	296,0	315,0	33,4	350,4	366,2	380,8	394,1				273,0
210,6	235,8	259,7	282,4	303,8	324,0	343,0	360,8	377,3	392,6	406,7				279,0
164,6	182,3	193,8	221,8	321,5	343,3	363,9	383,2	401,4	418,2	433,9				292,0
227,0	255,0	285,0	306,0	330,3	353,0	374,3	394,5	413,4	431,0	447,5				298,5
232,0	261,0	288,0	314,0	338,0	362,0	384,7	405,7	425,4	444,0	461,2	477,2			305,0
244,3	274,2	303,0	330,5	356,7	381,8	405,5	428,1	449,4	469,5	488,4	506,0			318,0
249,0	280,0	313,0	338,0	370,0	390,0	415,0	438,3	460,4	481,2	500,8	519,1	552,2		323,9
254,0	285,0	316,0	345,0	372,0	399,0	425,0	449,0	471,6	493,2	513,6	532,7	567,2		330,0
263,0	295,6	327,0	357,2	386,2	413,9	440,3	465,6	489,6	512,4	533,9	554,2	591,1		339,7
265,0	298,0	330,0	361,0	390,0	418,0	446,0	471,0	496,0	518,9	540,8	561,5	599,3		343,0
276,0	311,0	349,0	377,0	413,0	437,0	466,0	493,0	519,0	543,7	567,2	589,5	630,3	697,2	355,6
287,0	323,0	358,5	392,0	424,5	455,7	485,0	514,0	541,9	568,2	593,2	617,0	660,9	733,9	368,0
298,0	336,4	372,9	408,0	442,0	475,0	506,0	537,0	566,0	593,8	620,5	645,9	693,0	772,4	381,0
309,0	349,0	387,0	423,0	459,0	493,0	527,0	559,0	590,0	619,5	647,7	674,7	725,0	810,9	394,0
320,0	361,0	406,0	439,0	483,0	513,0	547,0	581,0	613,0	644,0	673,7	702,3	756,0	847,5	406,4
331,0	373,0	421,0	455,0	500,0	531,0	567,0	603,0	636,3	669,0	700,0	730,2	786,7	884,8	419,0
343,0	387,0	430,0	471,0	512,0	551,0	588,0	625,0	660,0	694,1	727,0	758,6	818,3	922,7	431,8
353,0	399,0	443,0	486,0	528,0	569,0	609,0	647,0	684,0	720,0	754,6	787,9	850,8	961,9	445,0
364,0	411,0	464,0	502,0	553,0	587,7	628,7	668,4	707,0	744,0	780,2	815,0	881,0	997,9	457,2
375,5	424,2	471,7	517,9	562,9	606,7	649,2	690,5	730,6	769,4	807,0	843,4	912,5	1035,8	470,0
386,0	437,0	486,0	533,0	580,0	625,0	669,0	712,3	754,0	794,3	833,5	871,4	943,5	1073,0	482,6
408,0	461,0	521,0	565,0	614,0	663,0	710,0	756,0	801,0	844,0	886,7	927,8	1006,0	1148,2	508,0
419,0	474,0	527,0	580,0	631,0	681,0	731,0	778,0	825,0	870,0	914,0	956,6	1038,2	1186,7	521,0
427,0	483,0	538,0	592,0	644,0	695,0	745,0	794,0	842,0	887,8	932,8	976,6	1060,4	1213,3	530,0
452,1	511,8	570,2	627,3	693,3	738,0	791,6	843,8	894,8	944,6	993,2	1040,5	1131,5	1299,1	559,0
461,8	522,8	582,6	641,2	698,5	754,6	809,5	863,1	915,5	966,7	1016,6	1065,4	1159,1	1331,7	570,0
474,0	536,8	598,4	658,7	717,8	775,7	832,3	887,7	941,8	994,7	1046,4	1096,9	1194,0	1373,7	584,2
496,0	561,9	626,6	690,0	752,2	813,2	873,0	931,5	988,8	1044,9	1100,0	1153,0	1257,0	1450,1	610,0
506,7	574,1	640,3	705,3	769,1	831,6	892,8	952,9	1011,7	1069,3	1125,6	1180,8	1287,0	1485,6	622,0
518,0	587,0	654,8	721,3	786,7	850,8	913,7	975,4	1035,8	1095,0	1152,9	1209,6	1319,4	1524,0	635,0
539,8	612,0	683,0	752,7	821,2	888,4	954,4	1019,2	1082,8	1145,0	1206,0	1266,0	1382,0	1598,0	660,0
583,6	662,1	739,3	815,3	890,0	963,6	1035,8	1106,9	1176,7	1245,3	1312,6	1378,7	1507,3	1749,5	711,2
627,5	712,2	795,7	877,9	958,9	1038,7	1117,3	1194,6	1270,7	1345,5	1419,1	1491,5	1632,5	1899,9	762,0
670,7	761,5	851,2	939,6	1026,8	1112,7	1197,4	1280,9	1363,1	1444,1	1523,9	1602,5	1755,9	2047,8	812,0
35,0	40,0	45,0	50,0	55,0	60,0	65,0	70,0	75,0	80,0	85,0	90,0	100,0	120,0	

TOLERANCES

W.T.

± 12,5%

± 15%

± 20%

OUTSIDE DIAMETER
± 1% on the nominal size, with a minimum ± 0.5 mm.

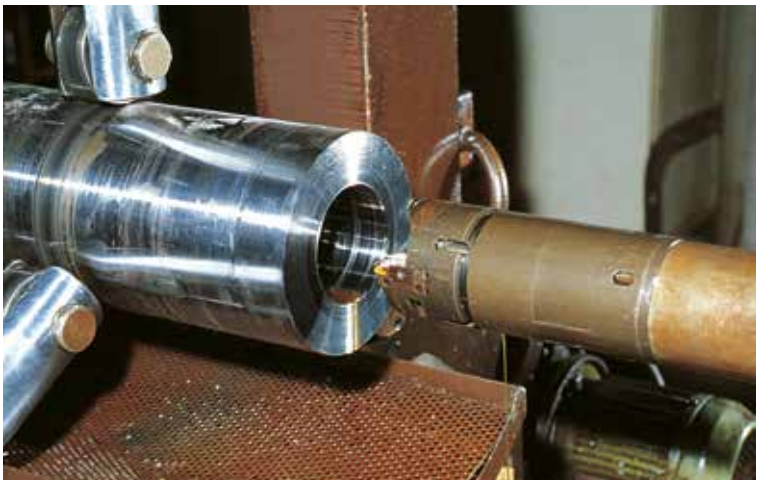
STRAIGHTNESS
For OD ≥ 33.7 mm, the maximum allowed deviation on straightness (in mm) corresponds to 1.5‰ on the total tube length.

Note: the norm EN 10297-1 does not state any tolerance on ovality, eccentricity or inner diameter: these parameters are settled by what stated on OD and w.t.

HOT ROLLED SEAMLESS CYLINDER TUBES (BORED AND HONED)

GENERAL DESCRIPTION

When a non-standard size cylinder is required (either a special OD or a thicker wall than what is available in the CDS tube range), then the tube can be made from a hot rolled tube with specific quality features.
Two processes are necessary to transform a normal hot rolled tube into a tube suitable for cylinders. The tube must be bored first and then honed to reach ID tolerance H8 according to EN 20286.
The mechanical and chemical properties of these tubes are still those of the base tube.



STEEL GRADES

This kind of product is available as standard stock in steel grades E355, according to EN 10297-1, E355K2/ P355N or E355K2/P355NL1 according to EN 10297-1 and EN 10216-3.

SIZES AND TOLERANCES

O.D., w.t. and outside straightness follow the tolerances stated by the norm EN 10297-1.
The tolerances on the I.D. are ruled by tolerance H8 according to EN 20286 instead, as resumed here below.

I.D. honed mm	I.D. tolerance mm	O.D. mm	W.T. raw mm	Mass raw Kg/m
60	-0/+0,046	**88,9**	17,5	30,7
	-0/+0,046	**95**	20,0	37,0
	-0/+0,046	**114,3**	30,0	62,3
63	-0/+0,046	**76,1**	8,0	13,4
	-0/+0,046	**82,5**	12,5	21,7
	-0/+0,046	**88,9**	16,0	28,7
	-0/+0,046	**95**	17,5	33,4
	-0/+0,046	**101,6**	22,2	43,5
	-0/+0,046	**108**	25,0	51,4
66	-0/+0,046	**88,9**	14,2	26,2
	-0/+0,046	**95**	17,5	33,4
	-0/+0,046	**101,6**	22,0	43,5
	-0/+0,046	**108**	25,0	51,4
70	-0/+0,046	**95**	16,0	31,2
	-0/+0,046	**101,6**	17,5	36,2
	-0/+0,046	**108**	22,2	47,0
	-0/+0,046	**114,3**	25,0	55,3
	-0/+0,046	**121**	30,0	67,3
75	-0/+0,046	**101,6**	16,0	33,7
	-0/+0,046	**108**	20,0	43,4
	-0/+0,046	**114,3**	22,2	50,4
80	-0/+0,046	**101,6**	14,2	30,7
	-0/+0,046	**108**	16,0	36,3
	-0/+0,046	**114,3**	20,0	46,5
	-0/+0,046	**121**	25,0	59,2
	-0/+0,046	**127**	28,0	68,3
	-0/+0,046	**133**	30,0	76,3
	-0/+0,046	**139,7**	35,0	90,3

I.D. honed mm	I.D. tolerance mm	O.D. mm	W.T. raw mm	Mass raw Kg/m
85	-0/+0,054	**101,6**	10,0	22,5
	-0/+0,054	**114,3**	17,5	41,7
	-0/+0,054	**121**	22,2	54,1
	-0/+0,054	**127**	25,0	63,2
	-0/+0,054	**139,7**	30,0	81,1
88	-0/+0,054	**108**	12,5	29,6
	-0/+0,054	**114,3**	16,0	38,6
90	-0/+0,054	**114,3**	14,2	35,1
	-0/+0,054	**121**	17,5	44,7
	-0/+0,054	**127**	22,2	57,4
	-0/+0,054	**133**	25,0	67,1
	-0/+0,054	**139,7**	28,0	77,0
	-0/+0,054	**152,4**	35,0	101,0
95	-0/+0,054	**114,3**	12,5	31,6
100	-0/+0,054	**121**	12,5	33,4
	-0/+0,054	**127**	16,0	43,6
	-0/+0,054	**133**	20,0	55,7
	-0/+0,054	**139,7**	22,0	64,3
	-0/+0,054	**146**	25,0	74,6
	-0/+0,054	**152,4**	30,0	90,5
	-0/+0,054	**159**	35,0	106,0
	-0/+0,054	**177,8**	45,0	147,0
101	-0/+0,054	**114,3**	8,0	20,9
105	-0/+0,054	**127**	14,2	39,6
	-0/+0,054	**133**	16,0	46,1
	-0/+0,054	**139,7**	20,0	59,0

TUBES FOR MECHANICAL APPLICATIONS

SIZES AND TOLERANCES

I.D. honed mm	I.D. tolerance mm	O.D. mm	W.T. raw mm	Mass raw Kg/m
110	-0/+0,054	**127**	10,0	28,9
	-0/+0,054	**133**	14,2	41,8
	-0/+0,054	**139,7**	17,5	52,7
	-0/+0,054	**146**	22,2	67,7
	-0/+0,054	**152,4**	25,0	79,0
	-0/+0,054	**159**	30,0	95,3
	-0/+0,054	**168,3**	35,0	115,0
	-0/+0,054	**177,8**	40,0	136,0
115	-0/+0,054	**127**	8,0	23,4
	-0/+0,054	**133**	12,5	37,4
	-0/+0,054	**139,7**	16,0	48,6
	-0/+0,054	**146**	20,0	62,1
	-0/+0,054	**168,3**	30,0	102,0
120	-0/+0,054	**139,7**	14,2	43,9
	-0/+0,054	**146**	16,0	51,3
	-0/+0,054	**152,4**	20,0	65,3
	-0/+0,054	**159**	22,2	74,8
	-0/+0,054	**168,3**	28,0	96,7
	-0/+0,054	**177,8**	35,0	123,0
125	-0/+0,063	**146**	14,2	46,1
	-0/+0,063	**152,4**	16,0	53,6
	-0/+0,063	**159**	20,0	68,6
	-0/+0,063	**168,3**	25,0	88,9
	-0/+0,063	**177,8**	30,0	109,0
	-0/+0,063	**193,7**	40,0	151,0
	-0/+0,063	**203**	45,0	178,0
127	-0/+0,063	**146**	12,5	41,2
	-0/+0,063	**152,4**	16,0	53,6

I.D. honed mm	I.D. tolerance mm	O.D. mm	W.T. raw mm	Mass raw Kg/m
130	-0/+0,063	**152,4**	14,2	48,5
	-0/+0,063	**159**	17,5	60,9
	-0/+0,063	**168,3**	22,2	80,0
	-0/+0,063	**177,8**	30,0	109,0
	-0/+0,063	**193,7**	40,0	151,0
135	-0/+0,063	**159**	14,2	50,8
	-0/+0,063	**168,3**	20,0	73,1
	-0/+0,063	**177,8**	25,0	94,8
	-0/+0,063	**193,7**	35,0	136,0
140	-0/+0,063	**168,3**	17,5	65,0
	-0/+0,063	**177,8**	22,2	85,2
	-0/+0,063	**193,7**	30,0	121,0
	-0/+0,063	**203**	35,0	144,0
	-0/+0,063	**219,1**	45,0	196,0
145	-0/+0,063	**168,3**	14,2	54,1
	-0/+0,063	**177,8**	20,0	77,8
	-0/+0,063	**193,7**	30,0	121,0
150	-0/+0,063	**168,3**	12,5	48,4
	-0/+0,063	**177,8**	16,0	63,6
	-0/+0,063	**193,7**	25,0	105,0
	-0/+0,063	**203**	30,0	128,0
	-0/+0,063	**219,1**	40,0	176,0
	-0/+0,063	**229**	45,0	204,0
152	-0/+0,063	**177,8**	16,0	63,6
155	-0/+0,063	**177,8**	14,2	57,4
	-0/+0,063	**193,7**	22,2	93,9
	-0/+0,063	**219,1**	40,0	176,0

SIZES AND TOLERANCES

I.D. honed mm	I.D. tolerance mm	O.D. mm	W.T. raw mm	Mass raw Kg/m
160	-0/+0,063	**193,7**	20,0	85,7
	-0/+0,063	**203**	25,0	110,0
	-0/+0,063	**219,1**	35,0	158,0
	-0/+0,063	**229**	40,0	186,0
	-0/+0,063	**244,5**	50,0	243,0
165	-0/+0,063	**193,7**	17,5	75,9
	-0/+0,063	**203**	22,2	99,0
170	-0/+0,063	**193,7**	14,2	63,0
	-0/+0,063	**203**	20,0	90,3
	-0/+0,063	**219,1**	30,0	140,0
	-0/+0,063	**229**	35,0	167,0
	-0/+0,063	**244,5**	45,0	224,0
175	-0/+0,063	**193,7**	12,5	56,2
	-0/+0,063	**203**	16,0	73,8
	-0/+0,063	**219,1**	25,0	120,0
180	-0/+0,063	**193,7**	10,0	45,3
	-0/+0,063	**203**	14,2	66,1
	-0/+0,063	**219,1**	25,0	120,0
	-0/+0,063	**229**	30,0	147,0
	-0/+0,063	**244,5**	40,0	201,0
	-0/+0,063	**254**	45,0	235,0
185	-0/+0,072	**219,1**	22,2	108,0
	-0/+0,072	**254**	40,0	211,0
190	-0/+0,072	**219,1**	17,5	86,9
	-0/+0,072	**229**	25,0	125,0
	-0/+0,072	**244,5**	30,0	159,0
	-0/+0,072	**254**	35,0	188,0

I.D. honed mm	I.D. tolerance mm	O.D. mm	W.T. raw mm	Mass raw Kg/m
200	-0/+0,072	**219,1**	12,5	64,1
	-0/+0,072	**229**	17,5	91,2
	-0/+0,072	**244,5**	28,0	149,0
	-0/+0,072	**254**	30,0	166,0
	-0/+0,072	**267**	40,0	223,0
	-0/+0,072	**273**	45,0	256,0
	-0/+0,072	**298,5**	60,0	353,0
	-0/+0,072	**305**	60,0	362,0
210	-0/+0,072	**229**	12,5	66,7
	-0/+0,072	**244,5**	22,2	122,0
	-0/+0,072	**254**	28,0	156,0
	-0/+0,072	**267**	35,0	200,0
	-0/+0,072	**273**	35,0	205,0
215	-0/+0,072	**244,5**	17,5	97,8
	-0/+0,072	**254**	25,0	141,0
	-0/+0,072	**267**	30,0	175,0
	-0/+0,072	**273**	35,0	205,0
	-0/+0,072	**298,5**	50,0	306,0
220	-0/+0,072	**244,5**	16,0	89,8
	-0/+0,072	**254**	22,2	127,0
	-0/+0,072	**267**	30,0	175,0
	-0/+0,072	**273**	30,0	180,0
	-0/+0,072	**298,5**	45,0	285,0
	-0/+0,072	**323,9**	60,0	390,0
225	-0/+0,072	**244,5**	12,5	72,0
	-0/+0,072	**254**	20,0	115,0
	-0/+0,072	**267**	28,0	165,0
	-0/+0,072	**273**	30,0	180,0
	-0/+0,072	**298,5**	45,0	285,0
	-0/+0,072	**323,9**	68,0	390,0

SIZES AND TOLERANCES

I.D. honed mm	I.D. tolerance mm	O.D. mm	W.T. raw mm	Mass raw Kg/m
230	-0/+0,072	**254**	16,0	93,9
	-0/+0,072	**267**	25,0	150,0
	-0/+0,072	**273**	25,0	154,0
	-0/+0,072	**298,5**	40,0	255,0
	-0/+0,072	**323,9**	50,0	338,0
235	-0/+0,072	**254**	12,5	74,4
	-0/+0,072	**273**	22,2	137,0
240	-0/+0,072	**267**	17,5	107,0
	-0/+0,072	**273**	20,0	125,0
	-0/+0,072	**298,5**	35,0	227,0
	-0/+0,072	**305**	40,0	261,0
250	-0/+0,072	**267**	12,5	79,0
	-0/+0,072	**273**	14,2	90,9
	-0/+0,072	**298,5**	30,0	198,0
	-0/+0,072	**305**	35,0	232,0
	-0/+0,072	**323,9**	40,0	280,0
	-0/+0,072	**330**	45,0	316,0
	-0/+0,072	**343**	60,0	418,0
254	-0/+0,081	**267**	12,5	79,0
	-0/+0,081	**273**	14,2	90,9
260	-0/+0,081	**298,5**	25,0	170,0
	-0/+0,081	**323,9**	40,0	280,0
	-0/+0,081	**330**	40,0	285,0
	-0/+0,081	**343**	50,0	361,0
270	-0/+0,081	**298,5**	16,0	111,0
	-0/+0,081	**305**	22,2	154,0
	-0/+0,081	**323,9**	35,0	249,0
	-0/+0,081	**355,6**	50,0	377,0

I.D. honed mm	I.D. tolerance mm	O.D. mm	W.T. raw mm	Mass raw Kg/m
280	-0/+0,081	**298,5**	12,5	88,8
	-0/+0,081	**305**	16,0	113,0
	-0/+0,081	**323,9**	25,0	186,0
	-0/+0,081	**330**	30,0	221,0
	-0/+0,081	**343**	35,0	265,0
	-0/+0,081	**355,6**	45,0	349,0
	-0/+0,081	**368**	50,0	391,0
	-0/+0,081	**406,4**	80,0	644,0
290	-0/+0,081	**323,9**	22,2	165,0
	-0/+0,081	**343**	30,0	231,0
	-0/+0,081	**355,6**	40,0	311,0
	-0/+0,081	**368**	45,0	358,0
300	-0/+0,081	**323,9**	16,0	121,0
	-0/+0,081	**330**	20,0	152,0
	-0/+0,081	**343**	25,0	195,0
	-0/+0,081	**355,6**	35,0	276,0
	-0/+0,081	**368**	40,0	323,0
	-0/+0,081	**381**	45,0	372,0
	-0/+0,081	**406,4**	60,0	513,0
305	-0/+0,081	**323,9**	14,2	109,0
	-0/+0,081	**343**	25,0	195,0
	-0/+0,081	**355,6**	30,0	241,0
320	-0/+0,089	**343**	16,0	128,0
	-0/+0,089	**355,6**	22,2	183,0
	-0/+0,089	**368**	30,0	249,0
	-0/+0,089	**381**	35,0	298,0
	-0/+0,089	**406,4**	50,0	439,0
	-0/+0,089	**419**	60,0	531,0

SIZES AND TOLERANCES

I.D. honed mm	I.D. tolerance mm	O.D. mm	W.T. raw mm	Mass raw Kg/m
330	-0/+0,089	**355,6**	16,0 1	33,0
	-0/+0,089	**381**	30,0	259,0
	-0/+0,089	**394**	40,0	349,0
340	-0/+0,089	**394**	35,0	309,0
	-0/+0,089	**406,4**	40,0	361,0
	-0/+0,089	**419**	45,0	421,0
350	-0/+0,089	**368**	12,5	109,0
	-0/+0,089	**394**	30,0	269,0
	-0/+0,089	**406,4**	35,0	320,0
	-0/+0,089	**419**	40,0	373,0
	-0/+0,089	**457,2**	60,0	587,0
	-0/+0,089	**445**	55,0	528,0
360	-0/+0,089	**406,4**	30,0	278,0
	-0/+0,089	**419**	35,0	331,0
	-0/+0,089	**445**	50,0	486,0
	-0/+0,089	**457,2**	60,0	587,0
	-0/+0,089	**470**	60,0	606,0
370	-0/+0,089	**419**	30,0	288,0
	-0/+0,089	**457,2**	50,0	502,0
380	-0/+0,089	**406,4**	16,0	153,0
	-0/+0,089	**419**	25,0	245,0
	-0/+0,089	**457,2**	45,0	464,0
	-0/+0,089	**508**	70,0	756,0
400	-0/+0,089	**419**	14,2	142,0
	-0/+0,089	**445**	30,0	306,0
	-0/+0,089	**457,2**	35,0	364,0
	-0/+0,089	**470**	40,0	423,0
	-0/+0,089	**508**	60,0	663,0

I.D. honed mm	I.D. tolerance mm	O.D. mm	W.T. raw mm	Mass raw Kg/m
420	-0/+0,097	**457,2**	25,0	266,0
	-0/+0,097	**508**	50,0	565,0
	-0/+0,097	**558,8**	85,0	993,0
430	-0/+0,097	**508**	45,0	521,0
450	-0/+0,097	**470**	16,0	179,0
	-0/+0,097	**508**	35,0	408,0
	-0/+0,097	**521**	40,0	474,0
	-0/+0,097	**558,8**	60,0	738,0
500	-0/+0,097	**530**	20,0	252,0
	-0/+0,097	**558,8**	35,0	451,0
	-0/+0,097	**609,6**	60,0	814,0
600	-0/+0,110	**660,4**	40,0	612,0

Note: the present table reports only the most common sizes; on request it is possible to supply other sizes and tolerances as well.

STOCK FACILITY

STEEL GRADES

Our standard stock of tubes for mechanical applications consists in steel grades E355/S355J2H, E355K2/P355N/ P355NL1, E470, E420J2, E460K2 and E590K2. It is possible to supply material in all the existing steel grades stated in this catalogue upon request and with a minimum quantity to be agreed.

SIZES

All the standard sizes according to the norm and stated in the table "Sizes, tolerances and masses" are to be considered as normal stock supply. It is possible to supply also special sizes upon request and with a minimum quantity to be agreed.

CERTIFICATES AND MARKINGS

Mill test certificates (3.1 EN 10204) can be supplied with all deliveries. All tubes in random lengths are marked with manufacturer logo, steelgrade and norm, size and traceability reference.
In case of tubes in fixed lengths, SICAM applies its identifying labels.

TOLERANCES

The tolerances to be applied on all supplied tubes are stated by the reference norm. Upon request it is possible to arrange special supplies for tubes with more restricted tolerances.

CUTTING TO FIXLENGTH

All tubes for mechanical applications can be supplied cut to fixlength, the quick delivery and the quality of the service are granted by modern automatic cutting machines with band saws. The standard tolerance on fixlength is – 0 / + 5 mm, more restricted tolerances can be agreed at the moment of the order.

ADDITIONAL WORKING PROCESSES

Upon request it is possible to supply tubes with working processes like sandblasting, boring and external turning. Tolerances and technical features are to be agreed at the time of order.

LENGTHS

All the material can be supplied in random lengths, from 4 to 13.5 m, and cut to fixlength.

PACKING

Tubes are loose or in bundles tightened with iron strips, according to sizes. Tubes cut to fixlength are supplied stripped on a wire with polyester bands in order to unload and move the material easily.
Upon request it is possible to arrange special packings: metal or wooden cases, pallets, etc.

PROTECTIONS

All honed tubes are supplied with ends protected by plastic caps, iuta paper or film.

DELIVERIES

Inland, through carriers.

Lloyd's Register
LRQA

CERTIFICATE OF APPROVAL

This is to certify that the Quality Management System of:

S.I.C.A.M. S.p.A.
Via Marziana, 21
27020 Parona Lomellina (Pavia) – Italia

has been approved by Lloyd's Register Quality Assurance
to the following Quality Management System Standards:

ISO 9001:2008

The Quality Management System is applicable to:

Stockholding of carbon steel pipes and tubes, hollow sections, hollow bars, chrome plat bars and solid bars for Italian and foreign companies active in the mechanical and liftin equipment industry, civil and industrial construction industry, in the field of cylinders pneumatics and hydraulics and in the petrochemical and plant design industry.

Transferring of traceability reference on the above mentioned product, upon client's dem

This certificate is valid only in association with the certificate schedule bearing the same number which the locations applicable to this approval are listed.

Approval Certificate
No: LRC 0160006/QMS/U/EN

Original Approval: 12th December 1995
Current Certificate: 14th February 2014
Certificate Expiry: 11th December 2016

Issued by: Lloyd's Register Quality Assurance Italy Srl
for and on behalf of Lloyd's Register Quality Assurance Limited

This document is subject to the provision below:
Via Cadorna, 89 20090 Vimodrone (MI)

Lloyd's Register
LRQA

CERTIFICATO DI APPROVAZIONE

Si certifica che il Sistema di Gestione per la Qualità di:

S.I.C.A.M. S.p.A.
Via Marziana, 21
27020 Parona Lomellina (Pavia) - Italia

è stato approvato dal Lloyd's Register Quality Assurance Italy Srl
per conformità alle seguenti norme di gestione:

UNI EN ISO 9001:2008

Il Sistema di Gestione per la Qualità si applica a:

Commercializzazione con deposito di tubi in acciaio al carbonio, profilati cavi chiusi, barre forate, barre cromate e tondi, per aziende operanti nei settori dell'industria meccanica, della cilindristica, dell'oleodinamica e della pneumatica, dell'industria del petrolio, della petrolchimica e dell'impiantistica, delle costruzioni meccaniche, metalliche civili e industriali e del sollevamento, sia italiane che estere.

Riporto di riferimenti di rintracciabilità sui prodotti sopra citati, su richiesta del cliente.

La validità di questo certificato è vincolata all'allegato dello stesso numero che elenca le ubicazioni oggetto dell'approvazione.

Certificato di Approvazione
N.: LRC 0160006/QMS/A/IT

Approvazione Originaria: 12 Dicembre 1995
Certificato Attuale: 14 Febbraio 2014
Settore EA: 17 – 29 - 31
Scadenza Certificato: 11 Dicembre 2016

Emesso da: Lloyd's Register Quality Assurance Italy Srl

ACCREDIA

Questo documento è soggetto alle condizioni sotto riportate
Via Cadorna 89 – 20090 Vimodrone (MI)

Contents

SICAM S.p.A.

SOCIETA ITALIANA COMMERCIO ACCIAI E METALLI

This catalogue replaces the previous one.
Contents of this publication are given as indicative information without any responsibility from our side for any possible mistake.

Edition
January 2016

Available on Google play

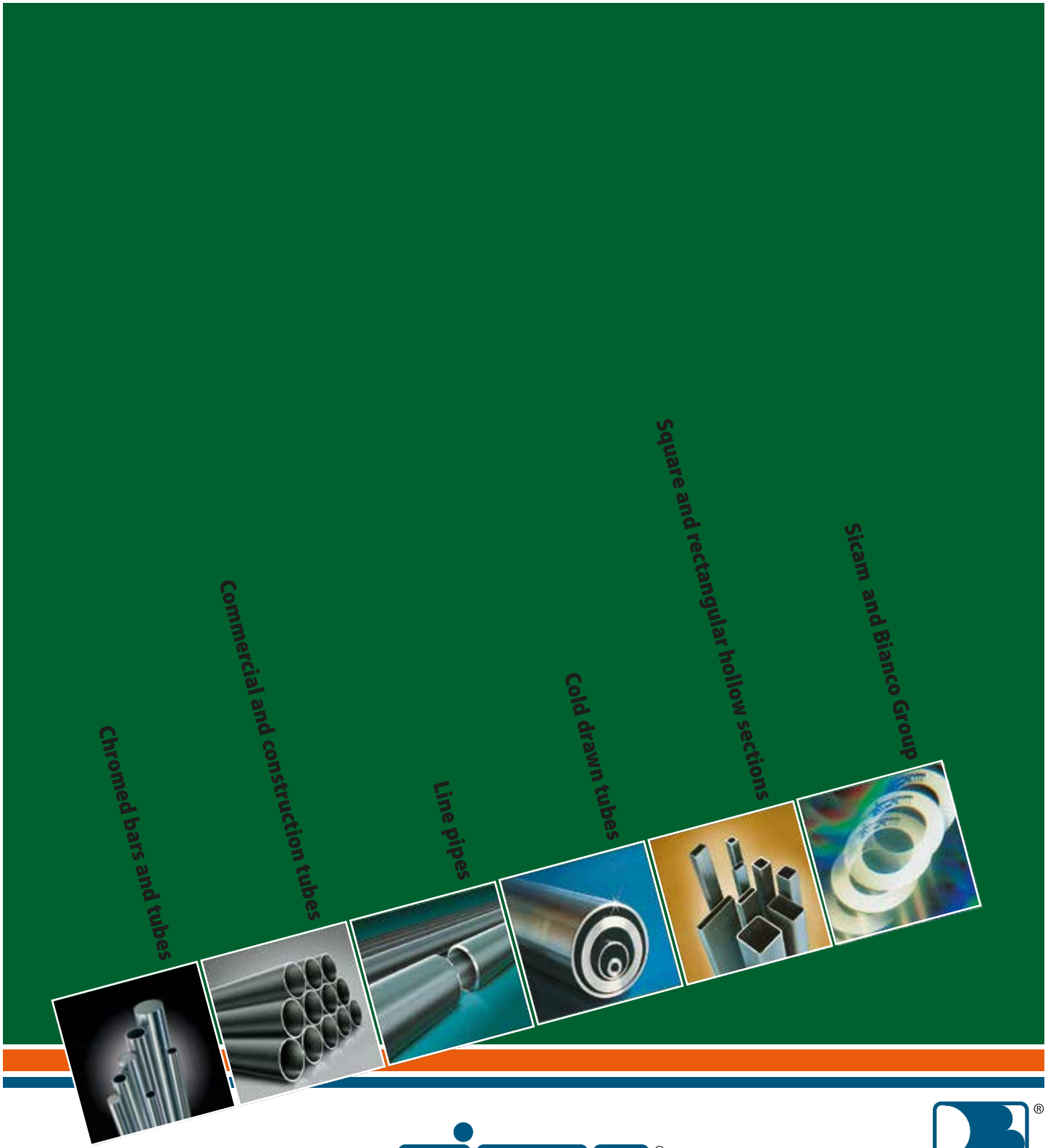
Available on App Store

TUBES FOR MECHANICAL APPLICATIONS

SICAMTUBI.COM

SICAMTUBI.NET

SICAM VIDEO



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