

siccam[®]



TUBES FOR
TM ECHANICAL
APPLICATIONS

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SEAMLESS TUBES FOR MECHANICAL APPLICATIONS

GENERAL FEATURES

GENERAL DESCRIPTION

The tubes for mechanical applications are suitable for machining by turning or CNC equipments. The wide size range available, with O.D. 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 compliance to the norm EN 10210-1/2 allows the product application for structural purposes as well. This norm is harmonized according to the European Regulation 305/2011 regarding the construction products; therefore the tubes are approved with the relevant CE mark.

The size range of hot rolled tubes offers higher wall thicknesses in comparison to the welded hollow sections. For more information, please check also our catalogue "Structural tubes and bars".

THE PRODUCT NORMS

The hot rolled mechanical tubes contemporarily satisfy different product norms, making them suitable for different applications: mechanical engineering, structures and hydraulic purposes.

In particular this product is supplied with triple marking: E355-EN10297-1 (mechanical) / S355J2H-EN10210-1/2 (structural) / P355N(TC1)-EN 10216-3 (pressure purposes). The product is alternatively available with marking E355K2-EN10297-1 / P355NL1 or P355NL2 (TC1)-EN 10216-3.

For both solutions the delivery condition +N, normalized or normalized formed, grants high impact properties to the product.

PPRESSURE PURPOSES

The compliance to the norm EN 10216-3 allows the product to be used also in the fabrication of components subject to inside pressure, such as hydraulic cylinders, joints, valves, flanges and general piping.

We remind that the norm EN 10216-3 is harmonized according to the European Directive 2014/68/UE, which regulates the pressure equipments.





STEELS TABLE

CHEMICAL/PHYSICAL FEATURES

The various steel grades differ one another from their chemical composition and mechanical properties, these parameters determine also the different possibilities of application for each steel grade.

The tables on the following pages describe the chemical and mechanical limits fixed by the norm for the steel grades 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	Al
	Min.	Max.	Min.	Max.	Min.	Max.	Max.	Max.	Min.
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	0.020
*P355N¹ (EN 10216-3)	-	0.20	-	0.50	0.90	1.70	0.025	0.020	0.020
*E470²	0.16	0.22	0.10	0.50	1.30	1.70	0.030	0.035	0.010

¹Cr ≤ 0.30%; Mo ≤ 0.08%; Ni ≤ 0.50%; Cu ≤ 0.30%; N ≤ 0.020%; Nb ≤ 0.05%; Ti ≤ 0.040%; V ≤ 0.10%; Cr + Cu + Mo ≤ 0.45%; Nb + Ti + V ≤ 0.12%; Al/N ≥ 2.

²N ≤ 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 strength 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
		For nominal w.t. in mm													
		≤ 20	> 20 ≤ 40	> 40 ≤ 50	> 50 ≤ 65	> 65 ≤ 80	> 80 ≤ 100	≤ 20	> 20 ≤ 65	> 65 ≤ 100					
*P355N (EN 10216-3)	+N	355	345	335	325	315	305	from 490 to 650	from 490 to 630	from 450 to 590	22			27	

*Standard stock

☐ Tubes are available with triple marking E355-EN10297-1 / S355J2H-EN10210-1/2 / P355N(TC1)-EN10216-3, for other features please check catalogue "Structural tubes and bars".

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
*P355NL1¹ (EN 10216-3)	-	0.18	-	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
*P355NL2¹ (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
*E420J2²	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
E460K2²	-	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
*E590K2²	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

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

² Nb + V ≤ 0.20 %

MECHANICAL PROPERTIES FOR NON-ALLOY STEELS WITH SPECIFIED IMPACT PROPERTIES

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 properties at -40°C (J min.)
		For nominal w.t. in mm											
		≤ 20	> 20 ≤ 40	> 40 ≤ 50	> 50 ≤ 65	> 65 ≤ 80	> 80 ≤ 100	≤ 20	> 20 ≤ 40	> 40 ≤ 65	> 65 ≤ 100		
*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
*P355NL2 (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 -20°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	34 J at -40°C
*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-EN10297-1 / P355NL1 or P355NL2 (TC1)-EN10216-3.



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												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
41NiCrMo7-3-2¹	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

¹Cu ≤ 0.25%





MECHANICAL PROPERTIES FOR 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												Temp. (°C)	W.T. (mm)	Min Value: (J min.)
		≤ 8	> 8 ≤ 20	> 20 ≤ 50	> 50 ≤ 80	≤ 8	> 8 ≤ 20	> 20 ≤ 50	> 50 ≤ 80	≤ 8	> 8 ≤ 20	> 20 ≤ 50	> 50 ≤ 80			
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 40¹	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® 650²	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 ImpactFIT 40	-	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 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 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® 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 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 ImpactFIT 40	-	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® 790 ImpactFIT 50³	-	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® 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 ImpactFIT 40	-	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 50³	-	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

¹V+Nb < 0.20%; V + Nb + Ti < 0.22%.

²0.020% < Ti > 0.050%; 0.0010% < B > 0.0050%.

³B ≤ 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	Delivery condition	UNI Norm	DIN Norm	AFNOR Norm	Special steels*
Steelgrade					
E235	Untreated (+AR)	7729 Fe 360	1629 St 37.0	TU 37b	
E275			1629 St. 44.0		
E315					
E355	Untreated (+AR)	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	35,0	
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	9,1	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	8,5	9,2	10,1	10,8	11,9	12,9										
54,0	4,9	6,0	7,4	8,2	9,1	9,8	10,8	11,7	12,8	13,9										
57,0	5,2	6,4	7,9	8,7	9,7	10,5	11,6	12,5	13,7	15,0	16,2									
60,3	5,6	6,8	8,4	9,3	10,3	11,2	12,4	13,4	14,7	16,1	17,5	18,5								
63,5	5,9	7,2	8,9	9,9	10,9	11,9	13,2	14,2	15,7	17,3	18,7	19,8								
67,0	6,2	7,6	9,4	10,5	11,6	12,6	14,0	15,2	16,8	18,5	20,1	21,4	23,2							
70,0	6,5	8,0	9,9	11,0	12,2	13,3	14,8	16,0	17,7	19,5	21,3	22,6	24,6							
73,0	6,8	8,4	10,4	11,5	12,8	13,9	15,5	16,8	18,6	20,6	22,5	23,9	26,1							
76,1	7,1	8,8	10,8	12,1	13,4	14,6	16,3	17,7	19,6	21,7	23,7	25,3	27,7	29,5						
82,5	7,7	9,6	11,8	13,2	14,7	16,0	17,9	19,4	21,6	23,9	26,2	28,0	30,8	33,0	35,4					
88,9	8,4	10,3	12,8	14,3	16,0	17,4	19,4	21,1	23,5	26,1	28,8	30,8	34,0	36,5	39,4					
95,0	9,0	11,1	13,8	15,4	17,2	18,7	21,0	22,8	25,4	28,3	31,2	33,4	37,0	39,8	43,1	46,2	48,1			
101,6	9,6	11,9	14,8	16,5	18,5	20,1	22,6	24,6	27,5	30,6	33,8	36,3	40,2	43,4	47,2	50,8	52,9			
108,0	10,3	12,7	15,8	17,7	19,7	21,5	24,2	26,3	29,4	32,8	36,3	39,0	43,4	47,0	51,1	55,2	57,7			
114,3	10,9	13,5	16,8	18,8	21,0	22,9	25,7	28,0	31,4	35,0	38,8	41,8	46,5	50,4	55,0	59,6	62,3	64,9	68,4	
121,0	11,5	14,3	17,8	19,9	22,3	24,3	27,4	29,8	33,4	37,4	41,4	44,6	49,8	54,1	59,2	64,2	67,3	70,2	74,2	
127,0	12,1	15,0	18,7	21,0	23,5	25,6	28,8	31,5	35,3	39,5	43,8	47,2	52,7	57,3	62,9	68,3	71,7	74,9	79,4	
133,0	12,7	15,8	19,7	22,0	24,6	26,9	30,3	33,1	37,1	41,6	46,1	49,8	55,7	60,6	66,6	72,5	76,2	79,7	84,5	
139,7	13,4	16,6	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	81,1	85,0	90,3	
146,0		17,4	21,7	24,3	27,2	29,8	33,5	36,6	41,1	46,1	51,3	55,4	62,1	67,7	74,6	81,4	85,8	89,9	95,8	
152,4		18,2	22,7	25,4	28,5	31,1	35,1	38,3	43,1	48,4	53,8	58,2	65,3	71,2	78,5	85,9	90,5	95,0	101,3	
159,0		19,0	23,7	26,6	29,8	32,6	36,7	40,1	45,1	50,7	56,4	61,0	68,5	74,9	82,6	90,4	95,4	100,2	107,0	
165,1		19,7	24,7	27,7	31,0	33,9	38,2	41,8	47,0	52,8	58,8	63,7	71,5	78,2	86,3	94,6	99,9	105,0	112,2	
168,3		20,1	25,2	28,2	31,6	34,6	39,0	42,7	48,0	53,9	60,1	65,0	73,1	79,9	88,3	96,8	102,3	107,5	115,0	
171,0		20,5	25,6	28,7	32,1	35,2	39,7	43,4	48,8	54,9	61,1	66,2	74,4	81,4	90,0	98,7	104,3	109,6	117,3	
177,8		21,3	26,6	29,9	33,5	36,7	41,4	45,2	50,9	57,3	63,8	69,1	77,8	85,1	94,2	103,4	109,3	115,0	123,2	
191,0			28,7	32,2	36,1	39,5	44,6	48,8	55,0	61,9	69,0	74,8	84,3	92,4	102,3	112,5	119,1	125,4	134,6	
193,7			29,1	32,7	36,6	40,1	45,3	49,5	55,8	62,8	70,1	76,0	85,6	93,8	104,0	114,4	121,1	127,5	136,9	
203,0			30,5	34,3	38,5	42,1	47,6	52,1	58,7	66,1	73,7	80,0	90,2	98,9	109,7	120,8	127,9	134,9	144,9	
216,0			32,6	36,6	41,0	44,9	50,8	55,6	62,7	70,6	78,9	85,6	96,6	106,0	117,7	129,8	137,5	145,1	156,2	
219,1			33,0	37,1	41,6	45,6	51,5	56,4	63,7	71,7	80,1	87,0	98,2	107,7	119,6	131,9	139,8	147,6	158,8	
229,0			34,6	38,8	43,6	47,8	54,0	59,1	66,7	75,2	84,0	91,2	103,0	113,2	125,7	138,7	147,2	155,4	167,4	
244,5			37,0	41,5	46,6	51,1	57,8	63,3	71,5	80,6	90,1	97,9	110,7	121,6	135,3	149,4	158,6	167,6	180,7	
254,0			38,5	43,2	48,5	53,2	60,1	65,9	74,4	83,9	93,9	102,0	115,4	126,8	141,1	156,0	165,6	175,1	188,9	
267,0			40,5	45,5	51,1	56,0	63,3	69,4	78,4	88,5	99,0	107,6	121,8	134,0	149,1	165,0	175,3	185,4	200,1	
273,0			41,4	46,5	52,3	57,3	64,8	71,0	80,3	90,6	101,4	110,2	124,7	137,2	152,8	169,1	179,7	190,1	205,3	
279,0			42,3	47,6	53,4	58,6	66,3	72,7	82,1	92,7	103,7	112,8	127,7	140,5	156,5	173,2	184,1	194,8	210,5	
292,0			44,4	49,9	56,0	61,4	69,5	76,2	86,1	97,2	108,8	118,4	134,1	147,6	164,5	182,2	193,7	205,1	221,7	
298,5				51,0	57,3	62,8	71,1	78,0	88,1	99,5	111,4	121,2	137,3	151,2	168,5	186,7	198,5	210,2	227,3	
305,0				52,1	58,6	64,2	72,7	79,7	90,1	101,8	114,0	124,0	140,5	154,8	172,5	191,2	203,4	215,3	232,9	
318,0				54,4	61,1	67,1	75,9	83,2	94,1	106,3	119,1	129,6	146,9	161,9	180,6	200,1	213,0	225,6	244,1	
323,9				55,4	62,3	68,3	77,4	84,8	95,9	108,4	121,4	132,2	149,8	165,1	184,2	204,2	217,3	230,2	249,2	
330,0					63,5	69,7	78,9	86,5	97,8	110,5	123,8	134,8	152,8	168,4	187,9	208,4	221,8	235,1	254,5	
339,7					65,4	71,8	81,3	89,1	100,8	113,9	127,7	139,0	157,6	173,7	193,9	215,1	229,0	242,7	262,9	
343,0					66,1	72,5	82,1	90,0	101,8	115,1	129,0	140,4	159,2	175,5	196,0	217,4	231,5	245,3	265,7	
355,6					68,5	75,2	85,2	93,4	105,7	119,5	133,9	145,8	165,4	182,4	203,7	226,1	240,8	255,2	276,6	
368,0					71,0	77,9	88,2	96,8	109,5	123,8	138,8	151,2	171,6	189,2	211,4	234,7	249,9	265,0	287,3	
381,0					73,6	80,7	91,4	100,3	113,5	128,4	144,0	156,8	178,0	196,3	219,4	243,6	259,6	275,3	298,5	
394,0					76,1	83,6	94,7	103,8	117,5	132,9	149,1	162,4	184,4	203,5	227,4	252,6	269,2	285,5	309,7	
406,4					78,6	86,2	97,7	107,2	121,4	137,3	154,0	167,8	190,5	210,2	235,0	261,2	278,3	295,3	320,4	
419,0					81,0	89,0	100,8	110,6	125,2	141,7	158,9	173,2	196,7	217,1	242,8	269,9	287,7	305,3	331,3	
431,8							104,0	114,1	129,2	146,2	164,0	178,7	203,0	224,1	250,7	278,7	297,1	315,3	342,3	
445,0								107,2	117,7	133,3	150,8	169,2	184,4	209,5	231,4	258,8	287,8	306,9	325,8	353,7
457,2					88,6	97,3	110,2	121,0	137,0	155,1	174,0	189,7	215,5	238,0	266,3	296,2	315,9	335,4	364,2	
470,0					91,1	100,0	113,4	124,5	141,0	159,5	179,1	195,2	221,8	245,0	274,2	305,1	325,4	345,5	375,3	
482,6								127,9	144,8	163,9	184,0	200,6	228,1	251,9	282,0	313,8	334,7	355,4	386,2	
508,0							108,3	122,8	134,8	152,7	172,8	194,0	211,6	240,6	265,8	297,6	331,3	353,5	408,1	
521,0							111,1	126,0	138,3	156,7	177,4	199,2	217,2	247,0	272,9	305,6	340,3	363,1	419,3	
530,0								140,7	159,4	180,5	202,7	221,1	251,4	277,9	311,2	346,5	369,7	392,8	427,0	
559,0							135,3	148,6	168,4	190,7	214,2	233,6	265,7	293,7	329,1	366,5	391,2	415,7	452,1	
570,0										194,5	218,5	238,3	271,1	299,8	335,8	374,1	399,3	424,4	461,6	
584,2										176,1	199,5	224,1	244,5	278,1	307,5	344,6	383,9	409,8	435,6	473,8
610,0							147,9	162,4	184,1	208,5	234,3	255,6	290,9	321,6	360,5	401,7	428,9	455,9	496,1	
622,0										212,7	239,0	260,8	296,8	328,2	367,9	410,0	437,8	465,4	506,4	
635,0										191,8	217,3	244,1	266,4	303,2	335,3	375,9	418,9	447,4	517,6	
660,4							160,3	176,1	19											



W.T. mm												O.D. mm	
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	
													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
													114,3
73,3													121,0
79,9													127,0
85,8	91,0												133,0
91,7	97,6												139,7
98,3	105,0	110,6											146,0
104,5	112,0	118,3											152,4
110,8	119,1	126,2											159,0
117,3	126,4	134,3	141,0	146,4									165,1
123,3	133,2	141,9	149,3	155,4									168,3
126,5	136,8	145,8	153,6	160,2									171,0
129,2	139,8	149,1	157,3	164,2									177,8
135,9	147,3	157,5	166,5	174,2									191,0
148,9	161,9	173,8	184,4	193,7									193,7
151,5	164,9	177,1	188,0	197,7									203,0
160,7	175,3	188,6	200,6	211,5									216,0
173,5	189,7	204,6	218,3	230,7									219,1
176,6	193,1	208,4	222,5	235,3	246,9								229,0
186,3	204,1	220,6	235,9	249,9	262,8	274,3							244,5
201,6	221,3	239,7	256,9	272,9	287,6	301,1							254,0
211,0	231,8	251,4	269,8	286,9	302,8	317,5							267,0
223,8	246,2	267,4	287,4	306,1	323,6	339,9	354,9						273,0
229,7	252,9	274,8	295,5	315,0	333,3	350,3	366,0	380,6	393,9				279,0
235,6	259,6	282,2	303,7	323,9	342,9	360,6	377,1	392,4	406,5				292,0
248,5	274,0	298,3	321,3	343,1	363,7	383,0	401,2	418,0	433,7				298,5
254,9	281,2	306,3	330,1	352,7	374,1	394,3	413,2	430,9	447,3				305,0
261,3	288,4	314,3	338,9	362,3	384,5	405,5	425,2	443,7	460,9	477,0			318,0
274,1	302,8	330,3	356,5	381,6	405,4	427,9	449,2	469,3	488,2	505,8			323,9
279,9	309,4	337,6	364,5	390,3	414,8	438,1	460,1	481,0	500,5	518,9	551,9		330,0
285,9	316,1	345,1	372,8	399,3	424,6	448,6	471,4	493,0	513,3	532,4	566,9		339,7
295,5	326,9	357,0	386,0	413,7	440,1	465,3	489,3	512,1	533,6	553,9	590,8		343,0
298,7	330,5	361,1	390,4	418,5	445,4	471,0	495,4	518,6	540,6	561,3	599,0		355,6
311,2	344,5	376,6	407,5	437,2	465,6	492,8	518,7	543,5	567,0	589,2	630,0	696,9	368,0
323,4	358,3	391,9	424,3	455,5	485,5	514,2	541,7	567,9	592,9	616,7	660,6	733,6	381,0
336,2	372,7	407,9	442,0	474,7	506,3	536,6	565,7	593,5	620,2	645,6	692,6	772,0	394,0
349,0	387,1	424,0	459,6	494,0	527,1	559,0	589,7	619,2	647,4	674,4	724,7	810,5	406,4
361,3	400,9	439,2	476,4	512,3	547,0	580,4	612,7	643,6	673,4	701,9	755,2	847,1	419,0
373,7	414,8	454,8	493,5	530,9	567,2	602,2	635,9	668,5	699,8	729,9	786,3	884,4	431,8
386,3	429,0	470,5	510,8	549,9	587,7	624,3	659,6	693,7	726,6	758,3	817,9	922,3	445,0
399,3	443,7	486,8	528,7	569,4	608,8	647,0	684,0	719,8	754,3	787,5	850,4	961,3	457,2
411,3	457,2	501,9	545,3	587,4	628,4	668,1	706,6	743,8	779,8	814,6	880,5	997,4	470,0
424,0	471,4	517,6	562,6	606,4	648,9	690,2	730,2	769,0	806,6	843,0	912,0	1035,3	482,6
436,4	485,4	533,2	579,7	625,0	669,1	711,9	753,5	793,9	833,0	870,9	943,1	1072,5	508,0
461,4	513,6	564,5	614,1	662,6	709,8	755,7	800,5	844,0	886,3	927,3	1005,7	1147,7	521,0
474,2	528,0	580,5	631,8	681,8	730,6	778,2	824,5	869,6	913,5	956,1	1037,7	1186,1	530,0
483,1	538,0	591,6	644,0	695,1	745,0	793,7	841,1	887,4	932,3	976,1	1059,9	1212,7	559,0
511,7	570,1	627,3	683,3	738,0	791,5	843,7	894,8	944,5	993,1	1040,4	1131,4	1298,5	570,0
522,6	582,3	640,9	698,2	754,3	809,1	862,7	915,1	966,2	1016,2	1064,8	1158,5	1331,0	584,2
536,6	598,1	658,4	717,4	775,3	831,9	887,2	941,3	994,2	1045,9	1096,3	1193,5	1373,0	610,0
562,0	626,7	690,2	752,4	813,4	873,2	931,7	989,0	1045,1	1100,0	1153,6	1257,1	1449,4	622,0
573,8	640,0	705,0	768,7	831,2	892,4	952,4	1011,2	1068,8	1125,1	1180,2	1286,7	1484,9	635,0
586,6	654,4	721,0	786,3	850,4	913,2	974,9	1035,3	1094,4	1152,3	1209,0	1318,7	1523,3	660,0
611,7	682,6	752,3	820,7	888,0	953,9	1018,7	1082,2	1144,5	1205,6	1265,4	1381,3	1598,4	711,2
661,8	739,0	814,9	889,6	963,1	1035,3	1106,3	1176,1	1244,7	1312,0	1378,1	1506,5	1748,7	762,0
711,9	795,3	877,5	958,5	1038,2	1116,7	1194,0	1270,0	1344,8	1418,4	1490,8	1631,8	1899,0	812,0
761,2	850,8	939,1	1026,3	1112,2	1196,8	1280,3	1362,5	1443,4	1523,2	1601,7	1755,0	2046,9	
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.

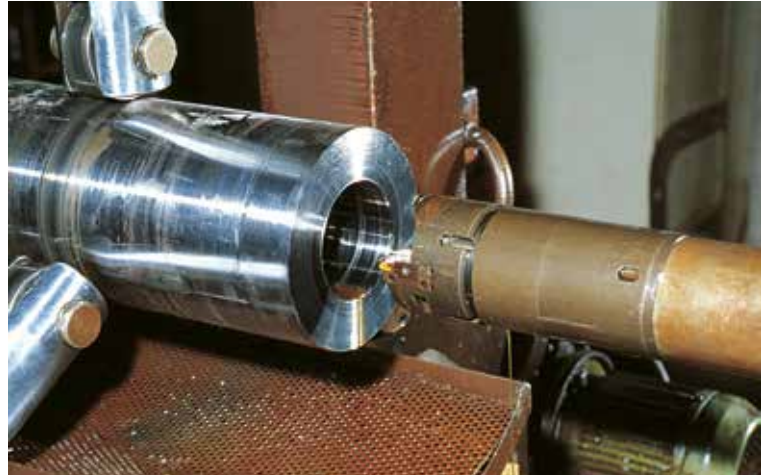
HOT ROLLED SEAMLESS CYLINDER TUBES (BORED AND HONED)

GENERAL DESCRIPTION

When the required size for a cylinder product can not be offered as cold drawn tubes it can be obtained machining hot rolled tubes with specific quality features.

In order to reach the inside diameter tolerance H8 according to ISO 286-2, the tube must be bored as first, removing most part of the material in excess, then honed reaching the definitive size and the intended surface condition.

The mechanical and chemical properties of the tubes don't change after machining.



STEEL GRADES

The inside bored and honed tubes are available as standard stock in the following steel grades: E355 and E355K2, according to the norm EN10297-1; P355N, P355NL1 and P355NL2, according to the norm EN10216-3.





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
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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
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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
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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

SIZES AND TOLERANCES

I.D. honed mm	I.D. tolerance mm	O.D. mm	W.T. raw mm	Mass raw Kg/m
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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
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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
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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
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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
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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
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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
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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
-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
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330	-0/+0,089	355,6	16,0	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
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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 mechanical tubes consists of the following steel grades E355/S355J2H/P355N, E355K2/P355NL1/P355NL2, E470, E420J2, E460K2 and E590K2. It is possible to supply material in all existing steel grades stated in this catalogue, upon request and with a minimum quantity according to mill conditions.

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.



TUBES FOR MECHANICAL APPLICATIONS



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This catalogue replaces the previous one.

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TUBES FOR MECHANICAL APPLICATIONS



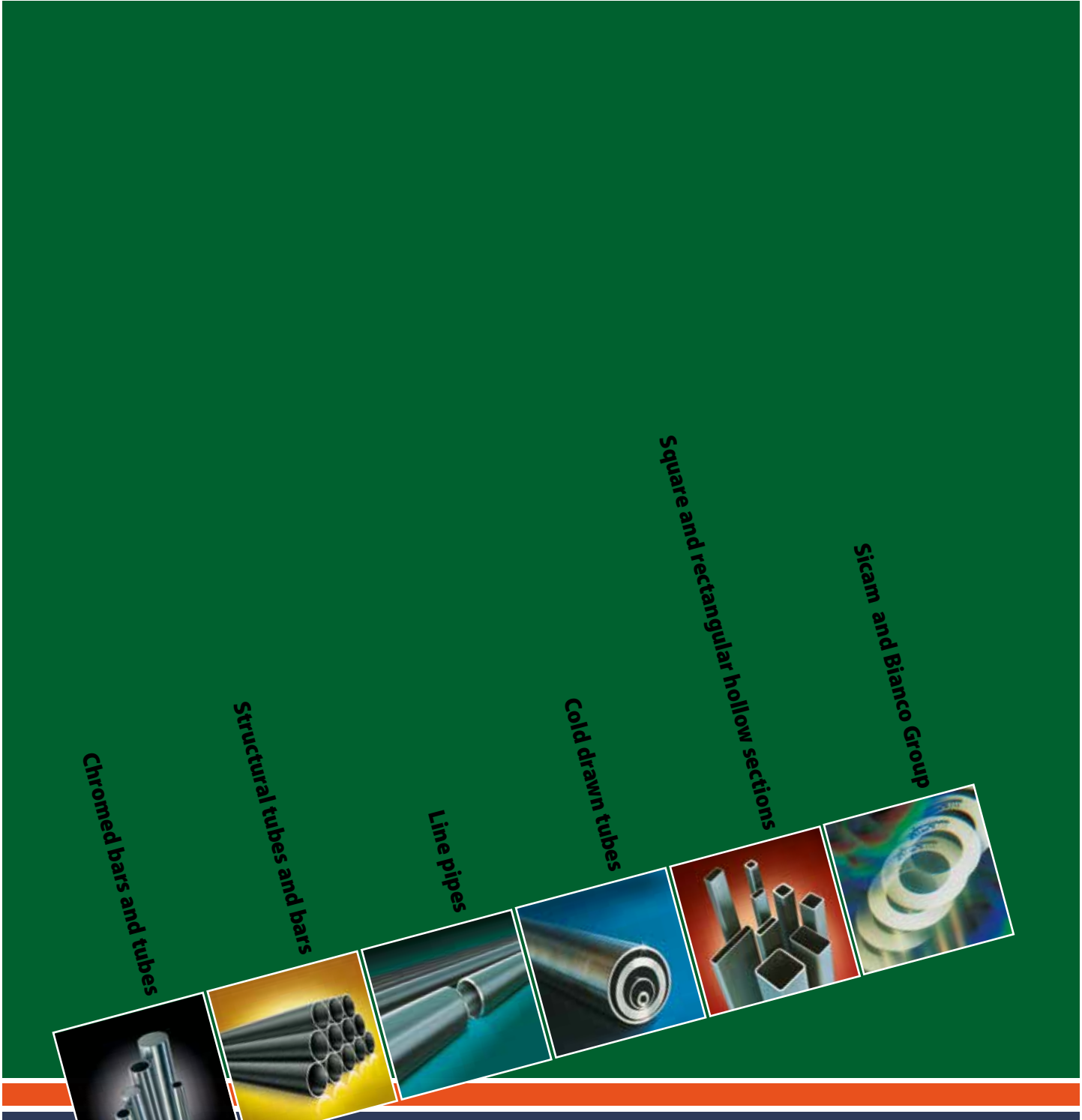
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SICAM VIDEO



Chromed bars and tubes

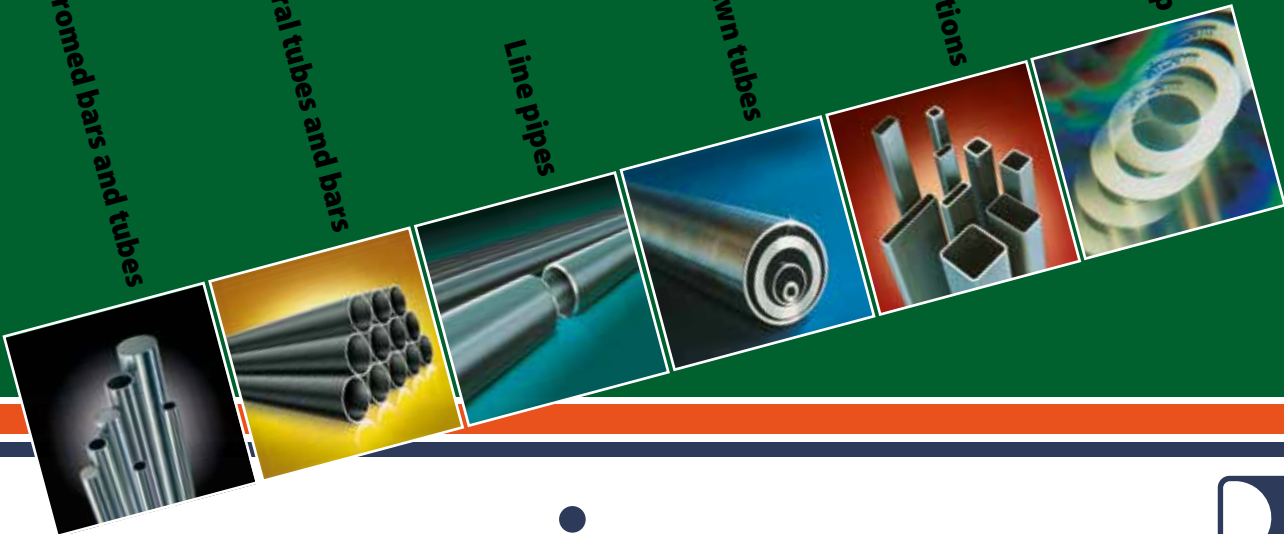
Structural tubes and bars

Line pipes

Cold drawn tubes

Square and rectangular hollow sections

Sicam and Bianco Group



sicam®



Bianco Group