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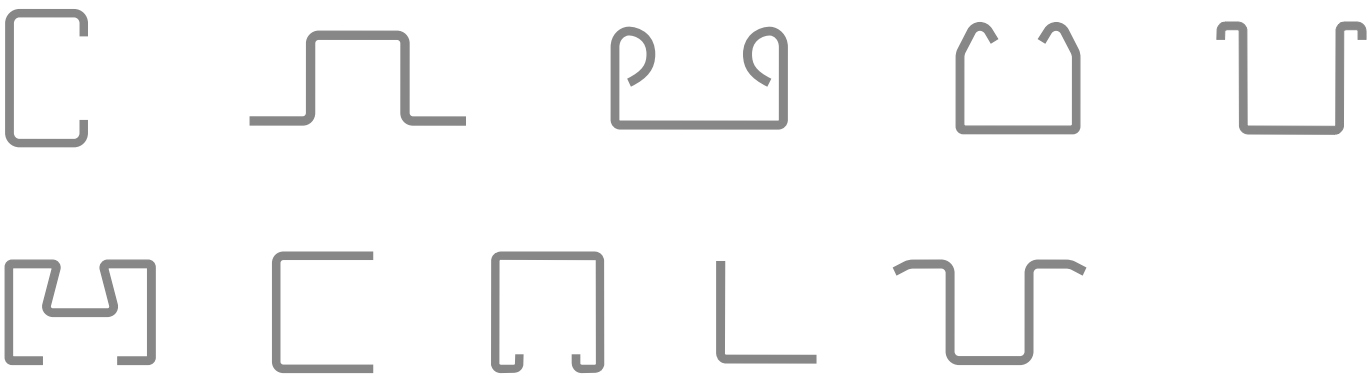
OPEN SECTIONS - (GUTTERS)

EN 10162

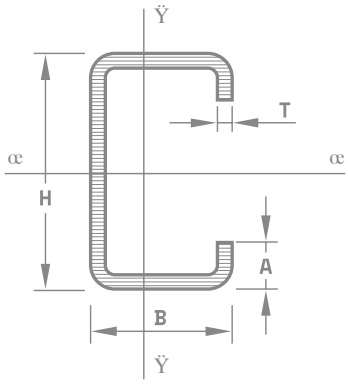
Open sections are produced by progressive cold-forming of steel strips.
The various cross sections obtained can be subjected to welding, punching, drilling, etc. This results in a wide field of applications.
The technical supply conditions are in accordance with EN 10162.

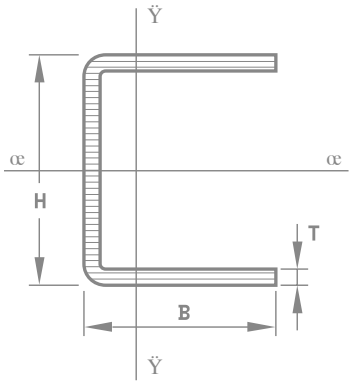
These sections represent effective solutions in several areas and for different purposes, such as: support for road rails, greenhouses, metallic structures, solar parks, automobile parks, trailer chassis, and in architectural works and engineering solutions.

DIMENSIONAL RANGE



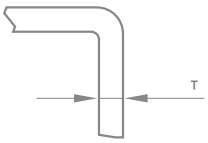
DIMENSIONAL PROPERTIES





Thickness

(T)



According to the thickness tolerances of EN 10051, EN 10131 and EN 10143.

Outside dimensions

(B/H)

Tolerances

Limited by two radii

Thickness (mm)	≤ 40mm	> 40mm ≤ 100mm	> 100mm ≤ 200mm	> 200mm ≤ 400mm	> 400mm
E ≤ 1,50	± 0,50	± 0,50	± 0,75	± 1,25	Agreed
1,50 < E ≤ 3,00	± 0,75	± 0,75	± 1,00	± 1,50	± 1,75
3,00 < E ≤ 6,00	± 1,00	± 1,00	± 1,25	± 1,75	± 2,00
6,00 < E ≤ 8,00	-	± 1,25	± 1,50	± 2,00	± 2,50
E > 8,00	Agreed	Agreed	Agreed	Agreed	Agreed

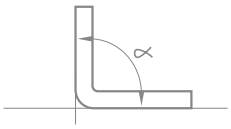
Tolerances

Limited by one radius

Thickness (mm)	≤ 40mm	> 40mm ≤ 100mm	> 100mm ≤ 150mm	> 150mm ≤ 200mm	> 200mm
E ≤ 1,50	± 0,75	± 0,75	± 1,00	Agreed	Agreed
1,50 < E ≤ 3,00	± 0,80	± 1,00	± 1,25	± 1,50	Agreed
3,00 < E ≤ 6,00	± 1,00	± 1,25	± 1,50	± 1,75	± 2,00
6,00 < E ≤ 8,00	± 1,25	± 1,50	± 1,75	± 2,00	± 2,25
E > 8,00	Agreed	Agreed	Agreed	Agreed	Agreed

Squareness

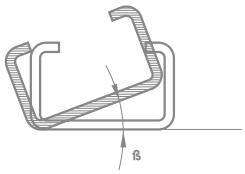
∝



Smaller side of the angle ∝	
≤ 10	± 3°
> 10 ≤ 40	± 1° 45'
> 40 ≤ 80	± 1° 15'
> 80 ≤ 110	± 1°
> 110	± 0° 45'

Torsion

(ß)

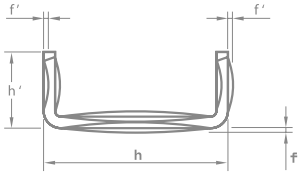


Angular variation

ß ≤ 1°/m

Concavity/convexity

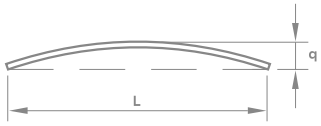
f (f ')



f (f') ≤ 0,8% h (h') with minimum = 0,5mm

Straightness

(q)



Overall length q ≤ 0,002 x L

Length

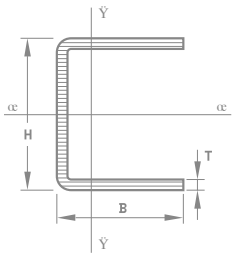
(L)

Length 0 + 50

TABLE OF DIMENSIONS

“U” section

With equal flanges



Dimensions mm			Linear mass kg/m	Sections/strapped	Weight/strapped kg
H	B	T			
20	12	1,5	0,46	208	562
20	15	1,5	0,53	208	661
20	15	2	0,69	208	861
20	20	1,5	0,65	120	468
20	20	2	0,84	120	598
25	20	1,5	0,71	120	504
25	20	2	0,72	120	518
25	20	3	1,31	120	943
25	25	1,5	0,82	128	630
25	25	2	1,07	128	822
25	25	3	1,53	128	1.175
30	20	1,5	0,77	144	665
30	20	2	1	144	864
30	20	3	1,43	144	1236
30	25	1,5	0,88	144	760
30	25	2	1,16	144	1002
30	25	3	1,67	144	1443
30	30	1,5	1	144	855
30	30	2	1,31	144	1.115
30	30	3	1,9	144	1.633
32	27	2	1,25	144	1.063
35	20	1,5	0,83	126	627
35	20	2	1,08	126	816
35	20	3	1,55	126	1172
35	25	1,5	0,94	126	711
35	25	2	1,24	126	937
35	25	3	1,78	126	1346
35	30	1,5	1,06	126	801
35	30	2	1,39	126	1051
35	30	3	2,02	126	1527
35	35	1,5	1,18	126	885
35	35	2	1,55	126	1172
35	35	3	2,26	126	1709
40	20	1,5	0,88	120	634
40	20	2	1,16	120	828

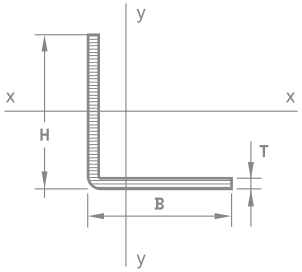
Dimensions mm			**Linear mass** kg/m	**Sections/strapped**	**Weight/strapped** kg
H	B	T			
40	20	3	1,67	120	1.188
40	25	1,5	1	120	720
40	25	2	1,31	120	943
40	25	3	1,9	120	1368
40	30	1,5	1,12	112	753
40	30	2	1,47	112	988
40	30	3	2,14	112	1438
40	35	1,5	1,24	112	833
40	35	2	1,63	112	1095
40	35	3	2,37	112	1.552
40	40	2	1,78	128	1.352
40	40	3	2,61	112	1754
41	29	2	1,46	140	1.201
41	29	3	2,11	140	1.722
45	25	1,5	1,06	126	801
45	25	2	1,39	126	1051
45	25	3	2,02	126	1527
45	30	1,5	1,18	126	892
45	30	2	1,55	126	1172
45	30	3	2,26	126	1709
45	32	2	1,61	126	1.202
45	40	2	1,86	126	1406
45	40	3	2,73	100	1638
50	25	2	1,47	100	864
50	25	2,6	1,88	100	1.098
50	25	3	2,14	100	1.272
50	25	4	2,76	100	1656
50	30	2	1,63	100	978
50	30	3	2,37	100	1.416
50	30	4	3,07	100	1842
50	40	2	1,94	100	1164
50	40	3	2,84	100	1704
50	40	4	3,7	64	1421
50	50	2	2,26	100	1356
50	50	3	3,32	100	1992
50	50	4	4,33	64	1663
60	30	2	1,78	100	1.056
60	30	3	2,61	100	1.554
60	30	4	3,39	100	1.980
60	40	2	2,1	64	806
60	40	3	3,08	64	1.156

Dimensions mm			**Linear mass** kg/m	**Sections/strapped**	**Weight/strapped** kg
H	B	T			
60	40	4	4,01	64	1.494
60	60	3	4,02	64	1544
60	60	4	5,27	64	2024
70	35	3	3,08	100	1.836
70	35	4	4,01	100	2.358
70	40	3	3,32	64	1275
70	40	4	4,33	64	1663
70	50	3	3,79	64	1455
70	50	4	4,96	64	1905
70	70	3	4,73	42	1192
70	70	4	6,21	42	1565
80	40	3	3,55	64	1.359
80	40	4	4,64	64	1.751
80	40	5	5,69	42	1434
80	50	3	4,02	64	1544
80	50	4	5,27	64	2024
80	50	5	6,47	42	1630
80	80	3	5,44	42	1371
80	80	4	7,15	42	1802
90	45	3	4,02	64	1.540
90	45	4	5,27	64	1.978
90	45	5	6,47	42	1630
100	40	3	4,02	64	1544
100	40	4	5,27	64	2024
100	40	5	6,47	42	1630
100	45	3	4,26	64	1.609
100	45	4	5,58	42	1406
100	45	5	6,86	42	1729
100	50	3	4,49	64	1.720
100	50	4	5,9	64	2.231
100	50	5	7,26	42	1830
120	50	3	4,96	42	1.235
120	50	4	6,53	42	1.615
120	50	5	8,04	36	1737
120	60	3	5,44	36	1.171
120	60	4	7,15	36	1.527
120	60	5	8,83	24	1272
140	50	3	5,44	36	1.171
140	50	4	7,15	36	1.527
140	50	5	8,83	24	1272
150	50	3	5,67	36	1.220

Dimensions mm			Linear mass kg/m	Sections/strapped	Weight/strapped kg
H	B	T			
150	50	4	7,47	36	1.594
150	50	5	9,23	24	1329
150	70	3	6,61	36	1428
150	70	4	8,72	36	1884
150	70	5	10,79	24	1554
160	50	3	5,91	36	1277
160	50	4	7,78	36	1680
160	50	5	9,61	24	1384
160	60	3	6,38	36	1378
160	60	4	8,41	36	1817
160	60	5	10,4	24	1498
160	80	3	7,32	24	1054
160	80	4	9,67	24	1392
160	80	5	11,97	24	1724
180	50	3	6,38	36	1378
180	50	4	8,41	36	1817
180	50	5	10,4	24	1498
180	60	3	6,85	36	1480
180	60	4	9,04	36	1953
180	60	5	11,18	24	1610
180	80	3	7,79	24	1122
180	80	4	10,29	24	1482
180	80	5	12,75	24	1836
200	50	3	6,85	24	986
200	50	4	9,04	24	1302
200	50	5	11,18	20	1342
200	60	3	7,32	24	1054
200	60	4	9,67	24	1392
200	60	5	11,97	16	1149
200	80	3	8,26	24	1189
200	80	4	10,92	24	1572
200	80	5	13,54	16	1300

“L” section

With one flange

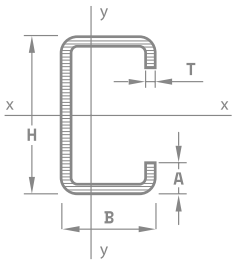


Dimensions mm			Linear mass kg/m	Sections/strapped	Weight/strapped kg
H	B	T			
25	25	2	0,73	200	876
30	20	2	0,73	200	876

Dimensions mm			**Linear mass** kg/m	**Sections/strapped**	**Weight/strapped** kg
H	B	T			
30	20	3	1,07	200	1284
30	30	2	0,89	200	1068
30	30	3	1,30	200	1560
35	25	2	0,89	160	854
35	25	2,5	1,10	160	1056
35	25	3	1,30	160	1248
35	35	2	1,05	160	1008
35	35	3	1,54	160	1478
40	20	2	0,89	100	534
40	20	3	1,30	100	780
40	20	2	0,89	100	534
40	20	3	1,30	100	780
40	30	2	1,05	100	630
40	30	3	1,54	100	924
40	40	2	1,20	100	720
40	40	3	1,77	100	1062
45	45	3	2,01	100	1206
50	25	2	1,13	100	678
50	25	3	1,66	100	996
50	30	2	1,20	100	720
50	30	3	1,77	100	1062
50	50	2	1,52	100	912
50	50	3	2,24	100	1344
50	50	4	2,95	100	1770
60	30	3	2,01	60	724
60	30	4	2,63	60	947
60	60	3	2,72	60	979
60	60	4	3,57	60	1285
70	35	3	2,36	60	850
70	35	4	3,10	60	1116
80	40	3	2,72	60	979
80	40	4	3,57	60	1285
90	45	3	3,07	60	1105
90	45	4	4,05	60	1458
100	50	3	3,42	37	759
100	50	4	4,52	37	1003

“C” section

Symmetrical

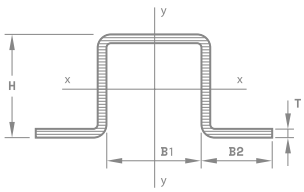


Ref	Dimensions mm				Linear mass kg/m	Sections/strapped	Weight/strapped kg
	H	B	A	T			
C	28	14	8	1,5	0,74	200	888
C	28	14	8	2	0,94	200	1128
C	30	25	9,5	1,5	1,05	156	983
C	30	25	9,5	2	1,36	156	1273
C	30	30	10	1,5	1,18	156	1104
C	30	30	10	2	1,53	120	1102
C	38	40	10	1,5	1,51	100	906
C	38	40	10	2	1,97	100	1182
C	38	40	10	3	2,82	100	1692
C	43	55	10	2	2,52	54	816
C	43	55	10	2,3	2,87	54	930
C	43	55	10	3	3,65	54	1183
C	50	30	10	2	1,85	64	710
C	50	30	10	2,5	2,25	64	836
C	50	30	15	2	2,00	120	1440
C	50	30	15	3	2,87	120	1966
C	50	40	17	2	2,38	64	914
C	50	40	17	3	3,43	64	1317
C	50	40	17	4	4,39	64	1686
C	50	50	17	2	2,70	64	1037
C	50	50	17	3	3,90	64	1448
C	50	50	17	4	5,02	64	1928
C	60	30	15	2	2,16	64	829
C	60	30	15	3	3,10	64	1190
C	60	30	15	4	3,95	64	1517
C	60	60	15	2	3,10	40	744
C	60	60	15	3	4,52	40	1085
C	60	60	15	4	5,84	40	1402
C	70	35	15	2	2,48	64	952
C	70	35	15	3	3,57	64	1371
C	70	35	15	4	4,58	64	1759
C	80	30	20	3	3,81	48	1097
C	80	30	20	3,3	4,14	48	1260
C	80	30	20	4	4,89	48	1550
C	80	40	15	2	2,79	64	1071
C	80	40	15	3	4,05	64	1501
C	80	40	15	4	5,21	48	1500
C	90	45	15	2	3,10	64	1190

Ref	Dimensions mm				Linear mass kg/m	Sections/strapped	Weight/strapped kg
	H	B	A	T			
C	90	45	15	3	4,52	64	1682
C	90	45	15	4	5,84	54	1892
C	90	45	20	2	3,26	64	1252
C	90	45	20	3	4,75	64	1824
C	90	45	20	4	6,15	54	1993
C	100	50	15	2	3,42	64	1313
C	100	50	15	3	4,99	64	1916
C	100	50	15	4	6,46	54	2093
C	100	50	20	2	3,57	54	1157
C	100	50	20	3	5,22	54	1691
C	100	50	20	4	6,78	42	1709
C	100	50	25	2	3,73	54	1209
C	100	50	25	3	5,46	54	1769
C	100	50	25	4	7,09	42	1787
C	120	50	20	2	3,89	54	1260
C	120	50	20	3	5,69	54	1844
C	120	50	20	4	7,41	42	1867
C	120	50	25	2	4,05	54	1312
C	120	50	25	3	5,93	54	1921
C	120	50	25	4	7,72	42	1945
C	140	50	20	2	4,20	42	1058
C	140	50	20	3	6,17	42	1555
C	140	50	20	4	8,03	36	1734
C	140	50	25	2	4,36	42	1099
C	140	50	25	3	6,40	42	1613
C	140	50	25	4	8,35	36	1804
C	150	50	20	2	4,36	36	942
C	150	50	20	3	6,40	36	1382
C	150	50	20	4	8,35	36	1804
C	150	50	25	2	4,52	36	976
C	150	50	25	3	6,64	36	1434
C	150	50	25	4	8,66	36	1871
C	160	50	20	2	4,52	36	976
C	160	50	20	3	6,64	36	1434
C	160	50	25	2	4,67	36	1009
C	160	50	25	3	6,87	36	1484
C	180	50	20	2	4,83	36	1043
C	180	50	20	3	7,11	36	1536
C	180	50	25	2	4,99	36	1078
C	180	50	25	3	7,34	36	1585
C	200	60	20	2	5,46	24	786

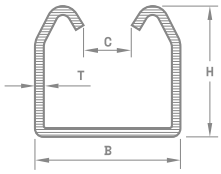
Ref	Dimensions mm				Linear mass kg/m	Sections/strapped	Weight/strapped kg
	H	B	A	T			
C	200	60	20	3	8,05	24	1159
C	200	60	25	2	5,62	24	809
C	200	60	25	3	8,28	24	1192

“Omega” section



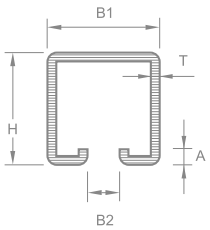
Ref	Dimensions mm				Linear mass kg/m	Sections/strapped	Weight/strapped kg
	H	B1	B2	T			
O	32	70	25	3	3,67	64	1404

“Apolo” section



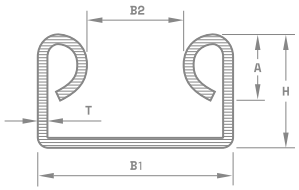
Ref	Dimensions mm				Linear mass kg/m	Sections/strapped	Weight/strapped kg
	H	B	C	T			
F 71 GALVA	19	25	8	1	0,54	120	390
F 72 GALVA	35	28	5,5	1	0,85	121	617,1
F 73 PRETA	30	33	10	2	1,62	121	1174
F 73 GALVA	30	33	10	2	1,64	121	1191
F 74 GALVA	51	43	10	2,5	2,84	90	1534
F 74 PRETA	51	43	10	2,3	2,84	90	1534
F 75 PRETA	49	50	16	2,3	2,72	81	1321,92
F 76 PRETA	67	57	12	2,6	4,16	49	1223

F35 Galva



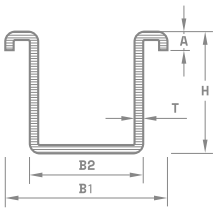
Ref	Dimensions mm					Linear mass kg/m	Sections/strapped	Weight/strapped kg
	H	B1	B2	A	T			
F 35 GALVA	35	35	10	5	1,5	1,46	50	438

F77 Galva



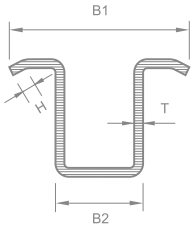
Ref	Dimensions mm					Linear mass kg/m	Sections/strapped	Weight/strapped kg
	H	B1	B2	A	T			
F 77 GALVA	17	26	10	10	1,25	0,84	117	592

F78 Galva



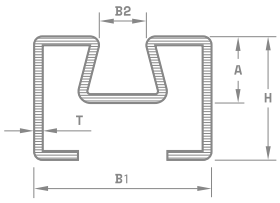
Ref	Dimensions mm					Linear mass kg/m	Sections/strapped	Weight/strapped kg
	H	B1	B2	A	T			
F 78 GALVA	38	47	25	9	1,5	1,48	121	1075

F79 Galva



Ref	Dimensions mm					Linear mass kg/m	Sections/strapped	Weight/strapped kg
	H	B1	B2	A	T			
F 79 GALVA	5	65	30		1,5	1,74	100	1044

F80 Galva



Ref	Dimensions mm					Linear mass kg/m	Sections/strapped	Weight/strapped kg
	H	B1	B2	A	T			
F 80 GALVA	35	35	10	22	1,25	1,56	121	1132,56
F 80 GALVA	35	35	10	22	1,5	1,85	121	1343

STEEL GRADES

Steel grade	Chemical properties Nominal thickness < 16mm % by mass								Mechanical properties R_{eH} mín. Thickness (mm)	R_m Thickness (mm)		$L_0 = 80$mm Thickness (mm)					$L_0 = 5{,}65$ Thickness (mm)
	C % máx.	Si % máx.	Mn % máx.	P % máx.	S % máx.	N % máx.	Cu % máx.	CEV % máx.	≤ 16	< 3	≥ 3 ≤ 100	≤ 1	> 1 ≤ 1,5	> 1,5 ≤ 2	> 2 ≤ 2,5	> 2,5 ≤ 3	> 3 ≤ 40
S235JR	0,19	-	1,50	0,045	0,045	0,014	0,60	0,35	235	360 a 510	360 a 510	17	18	19	20	21	26
S275JR	0,24	-	1,60	0,045	0,045	0,014	0,60	0,40	275	430 a 580	410 a 560	15	16	17	18	19	23
S275J0	0,21	-	1,60	0,040	0,040	0,014	0,60	0,40	275	430 a 580	410 a 560	-	-	-	-	-	-
S275J2	0,21	-	1,60	0,035	0,035	-	0,60	0,40	275	430 a 580	410 a 560	13	14	15	16	17	21
S355JR	0,27	0,60	1,70	0,045	0,045	0,014	0,60	0,45	355	510 a 680	470 a 630	14	15	16	17	18	22
S355J0	0,23	0,60	1,70	0,040	0,040	0,014	0,60	0,45	355	510 a 680	470 a 630	-	-	-	-	-	-
S355J2	0,23	0,60	1,70	0,035	0,035	-	0,60	0,45	355	510 a 680	470 a 630	-	-	-	-	-	-

Steel grade	**Coating type**	**Chemical properties**								**Mechanical properties**			
		Nominal thickness % by mass								Coating symbols	R_e (MPa)	R_m (MPa)	A_{80} min. %
		C % máx.	Si % máx.	Mn % máx.	P % máx.	S % máx.	Ti % máx. [a)]	Al_{total} % mín.	Nb % máx.				
DX51D	+Z;+ZF;+ZA;+ZM;+AZ;+AS	0,18	0,50	1,20	0,12	0,045	0,30	-	-	+Z;+ZF;+ZA;+ZM;+AZ;+AS	-	270-500	22
DX52D	+Z;+ZF;+ZA;+ZM;+AZ;+AS	0,12	0,50	0,60	0,10	0,045	0,30	-	-	+Z;+ZF;+ZA;+ZM;+AZ;+AS	140-300	270-420	26
DX53D	+Z;+ZF;+ZA;+ZM;+AZ;+AS	0,12	0,50	0,60	0,10	0,045	0,30	-	-	+Z;+ZF;+ZA;+ZM;+AZ;+AS	140-260	270-380	30
											$R_{p\,0,2}$ min.	R_m min.	A_{80} min.
S250GD	+Z;+ZF;+ZA;+ZM;+AZ;+AS	0,20	0,60	1,70	0,10	0,045	-	-	-	+Z;+ZF;+ZA;+ZM;+AZ;+AS	250	330	19
S280GD	+Z;+ZF;+ZA;+ZM;+AZ;+AS	0,20	0,60	1,70	0,10	0,045	-	-	-	+Z;+ZF;+ZA;+ZM;+AZ;+AS	280	360	18
S350GD	+Z;+ZF;+ZA;+ZM;+AZ;+AS	0,20	0,60	1,70	0,10	0,045	-	-	-	+Z;+ZF;+ZA;+ZM;+AZ;+AS	350	420	16

[a)] By agreement upon inquiry and ordering, the Ti content for the steel grades mentioned in this table may be reduced to <0.05%, meaning that the steel grade is unalloyed.

SUPPLY CONDITIONS

PACKAGING

The material is available in geometric ties, strapped with steel bands, in hexagonal, square, and/or rectangular shapes. To facilitate handling (loading/unloading), all the ties are supplied with polyester straps suitable for the weight of the tie.

LABELING

Each tie is supplied with a label attached by a metal clip, ensuring the identification of the product and consequently its traceability.

SURFACE PROTECTION

During manufacture, all tubes are coated with a protective oil, which has a high hydrophobing power, to protect the surface against corrosion. Unless otherwise stated by the customer at the time of the order/inquiry.

CERTIFICATE

On shipment, all orders are accompanied by the respective inspection certificate according to EN 10204, in accordance with the product's applicable standard.

SUPPLY OPTIONS

DIP GALVANIZATION

Hot-dip galvanized tubes can be supplied, according to EN 10240 A.1/A.2 or ISO 1461, providing greater protection against corrosion.

SPECIAL TOLERANCES

Special tolerances must be requested when inquiring/ordering.

SUITABILITY FOR GALVANIZATION

Possibility of supplying tubes with chemical properties that guarantee their suitability for hot-dip galvanization.

CARBON EQUIVALENT VALUE (CEV)

Possibility to specify the CEV value at the time of inquiry/order.

LENGTH

Capacity to supply tubes with specific lengths, requested at the time of inquiry/order.

SPECIFIC (OR SPECIAL) DEFORMATION OPERATIONS

Tubes can be supplied, according to the most demanding deformation capabilities.

PACKAGING

The ties can be configured, according to the client's indications, at the time of the inquiry/order. Possibility of using packaging with anticorrosion protection (VCI).

LABORATORY TESTS

Possibility of requesting specific laboratory tests, not foreseen in the applicable standard (anisotropy, salt fog, metallography, thickness elongation, among others).

APPLICATION AREAS

INDUSTRY

CONSTRUCTION

ENERGY

ENGINEERING
AND ARCHITECTURE