

2. Beams

Structural steel product having a profile of a specific cross section, like a H or I, usually used in construction and is designed to support heavy loads.

- 2.1 Parallel Flange I Sections (IPE)
- 2.2 Wide Flange Beams (HE)
- 2.3 Universal Beams (UB)
- 2.4 Universal Columns (UC)
- 2.5 Metric Beams (MB)
- 2.6 Metric Columns (MC)

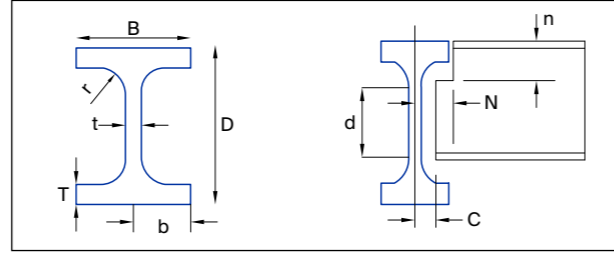
Universal Beams and Columns Standard specifications

The standard specifications used for production of universal beams and columns in this region are listed in this table.

Material	Yield strength			Tensile strength N/mm ²	Min. Elongation L ₀ =5.65√S ₀	Min. Charpy V-notch.	Dimensions & Tolerances
	≤11mm	>11 - <40mm	≥40mm				
AS 3679.1							AS 3679.1
Grade 300	320	300	280	min. 440	22%	27J @ 0°C	
Grade 350	360	340	330	min. 480	20%	27J @ 0°C	
ASTM A36 (1996)	min. 250			400-550	20-21 %	-	ASTM A6
ASTM A572							
Grade 42	min. 290			min. 415	20-24 %	-	
Grade 50	min. 345			min. 450	18-21 %	-	
Grade 60	min. 415			min. 520	16-18 %	-	
Grade 65	min. 450			min. 550	15-17 %	-	
ASTM A992	345 - 450			min. 450	18-21 %	-	
EN 10025	≤16mm	>16 - ≤40mm	>40 - ≤150mm	3-100mm			EN 10034
S275JR	275	265	255 - 225	410-560	18-23 %	27J @ 20°C	
S355JR	355	345	335 - 295	470-630	17-22 %	27J @ 20°C	
S355J0	355	345	335 - 295	470-630	17-22 %	27J @ 0°C	
S355J2	355	345	335 - 295	470-630	17-22 %	27J @ -20°C	
S460M	460	440	430 - 385	500-720	17%	40J @ -20°C	
ETA - 10/0156	≤100mm	>100 - ≤140mm					EN 10034
HISTAR460	460	450		540-720	17%	40J @ -20°C	
JIS 3101	≤16mm	>16 - ≤40mm	>40 - ≤100mm	t<100mm			JIS 3192
SS400	245	235	215	400-510	17-23 %	-	
SS490	285	275	255	490-610	15-21 %	-	
SS540	400	390	-	min. 540	13-17 %	-	
JIS 3106	≤16mm	>16 - ≤40mm	>40mm	t<100mm			
SM400A	245	235	215	400-510	18-24 %	-	
SM400B	245	235	215	400-510	18-24 %	27J @ 0°C	
SM400C	245	235	215	400-510	18-24 %	47J @ 0°C	
SM490A	325	315	295	490-610	17-23 %	-	
SM490B	325	315	295	490-610	17-23 %	27J @ 0°C	
SM490C	325	315	295	490-610	17-23 %	47J @ 0°C	
SM490YA	365	355	335	490-610	15-21 %	-	
SM490YB	365	355	335	490-610	15-21 %	27J @ 0°C	
SM520B	365	355	335	520-640	15-21%	27J @ 0°C	
SM520C	365	355	335	520-640	15-21 %	47J @ 0°C	

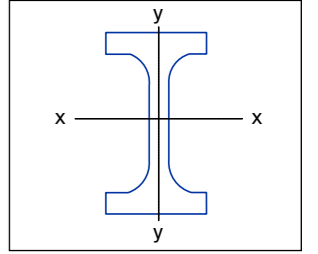


2.1 Parallel Flange I Sections (IPE)



Section designation	Dimensions												
	Mass per Metre	Depth of Section	Width of Section	Thickness		Root Radius	Depth between Fillets	Area of Section	Ratios for Local Buckling		Dimensions for Detailing		
				Flange	Web				Flange	Web	End clearance	Notch	
	kg/m	D mm	B mm	T mm	t mm	r mm	d mm	A cm ²	b/T	d/t		C mm	N mm
IPE AA 80	4.9	78.0	46.0	4.2	3.2	5.0	59.6	6.3	3.90	18.6	4	32	10
IPE A 80	5.0	78.0	46.0	4.2	3.3	5.0	59.6	6.4	3.89	18.1	4	32	10
IPE 80	6.0	80.0	46.0	5.2	3.8	5.0	59.6	7.6	3.10	15.7	4	32	12
IPE AA 100	6.7	97.6	55.0	4.5	3.6	7.0	74.6	8.6	4.16	20.7	4	36	12
IPE A 100	6.9	98.0	55.0	4.7	3.6	7.0	74.6	8.8	3.98	20.7	4	36	12
IPE 100	8.1	100.0	55.0	5.7	4.1	7.0	74.6	10.3	3.24	18.2	4	36	14
IPE AA 120	8.4	117.0	64.0	4.8	3.8	7.0	93.4	10.7	4.81	24.6	4	42	12
IPE A 120	8.7	117.6	64.0	5.1	3.8	7.0	93.4	11.0	4.53	24.6	4	42	14
IPE 120	10.4	120.0	64.0	6.3	4.4	7.0	93.4	13.2	3.62	21.2	4	40	14
IPE AA 140	10.1	136.6	73.0	5.2	3.8	7.0	112.2	12.8	5.31	29.5	4	46	14
IPE A 140	10.5	137.4	73.0	5.6	3.8	7.0	112.2	13.4	4.93	29.5	4	46	14
IPE 140	12.9	140.0	73.0	6.9	4.7	7.0	112.2	16.4	3.93	23.9	4	46	14
IPE AA 160	12.3	156.4	82.0	5.6	4.0	9.0	131.2	15.7	5.36	32.8	4	50	14
IPE A 160	12.7	157.0	82.0	5.9	4.0	9.0	127.2	16.2	5.08	31.8	4	50	16
IPE 160	15.8	160.0	82.0	7.4	5.0	9.0	127.2	20.1	3.99	25.4	5	50	18
IPE AA 180	14.9	176.4	91.0	6.2	4.3	9.0	146.0	19.0	5.54	34.0	4	54	16
IPE A 180	15.4	177.0	91.0	6.5	4.3	9.0	146.0	19.6	5.28	34.0	4	54	16
IPE 180	18.8	180.0	91.0	8.0	5.3	9.0	146.0	23.9	4.23	27.5	5	54	18
IPE O 180	21.3	182.0	92.0	9.0	6.0	9.0	146.0	27.1	3.78	24.3	5	54	18
IPE AA 200	18.0	196.4	100.0	6.7	4.5	12.0	159.0	22.9	5.34	35.3	4	58	20
IPE A 200	18.4	197.0	100.0	7.0	4.5	12.0	159.0	23.5	5.11	35.3	4	58	20
IPE 200	22.4	200.0	100.0	8.5	5.6	12.0	159.0	28.5	4.14	28.4	5	58	22
IPE O 200	25.1	202.0	102.0	9.5	6.2	12.0	159.0	32.0	3.78	25.6	5	58	22
IPE AA 220	21.2	216.4	110.0	7.4	4.7	12.0	177.6	27.0	5.49	37.8	4	64	20
IPE A 220	22.2	217.0	110.0	7.7	5.0	12.0	177.6	28.3	5.26	35.5	5	64	20
IPE 220	26.2	220.0	110.0	9.2	5.9	12.0	177.6	33.4	4.35	30.1	5	64	22
IPE O 220	29.4	222.0	112.0	10.2	6.6	12.0	177.6	37.4	3.99	26.9	5	64	24
IPE AA 240	24.9	236.4	120.0	8.0	4.8	15.0	190.4	31.7	5.33	39.7	4	68	24

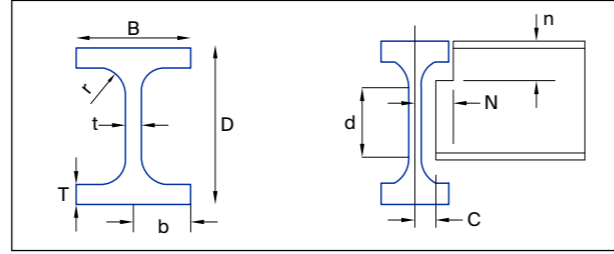
Dimensions EN10365
 Specification EN10025
 Size Range IPE AA 80 to IPE 750 x 196



Surface Area	Properties											
	Second Moment of Area		Radius of Gyration		Elastic Modulus		Plastic Modulus		Buckling Parameter	Torsional Index	Warping Constant	Torsional Constant
	Axis x-x	Axis y-y	Axis x-x	Axis y-y	Axis x-x	Axis y-y	Axis x-x	Axis y-y				
	Per metre	cm ⁴	cm ⁴	cm	cm	cm ³	cm ³	cm ³	cm ³	u	x	H dm ³
0.325	64.1	6.85	3.19	1.04	16.4	3	18.9	4.70	3.044	16.6	0.000090	0.38
0.325	64.4	6.85	3.18	1.04	16.5	3	19.0	4.70	3.025	16.5	0.000090	0.39
0.328	80.1	8.49	3.24	1.05	20.0	4	23.2	5.80	3.065	14.3	0.000120	0.67
0.396	136	12.6	3.98	1.21	27.9	5	31.9	7.20	3.279	18.7	0.000270	0.67
0.397	141	13.1	4.01	1.22	28.8	5	33.0	7.50	3.299	18.2	0.000280	0.73
0.400	171	15.9	4.07	1.24	34.2	6	39.4	9.20	3.333	15.8	0.000350	1.16
0.470	244	21.1	4.79	1.41	41.7	7	47.6	10.4	3.536	21.9	0.000660	0.89
0.472	257	22.4	4.83	1.42	43.8	7	49.9	11.0	3.577	21.2	0.000710	1.00
0.475	318	27.7	4.90	1.45	53.0	9	60.7	13.6	3.601	17.9	0.000890	1.69
0.546	407	33.8	5.64	1.63	59.7	9	67.6	14.5	3.818	24.8	0.00146	1.15
0.547	435	36.4	5.70	1.65	63.3	10	71.6	15.5	3.847	23.6	0.00158	1.34
0.551	541	44.9	5.74	1.65	77.3	12	88.3	19.3	3.854	19.6	0.00198	2.40
0.625	659	51.7	6.48	1.81	84.3	13	95.2	19.7	4.038	25.5	0.00293	1.75
0.619	689	54.4	6.53	1.83	87.8	13	99.1	20.7	4.062	24.7	0.00309	1.93
0.623	869	68.3	6.58	1.84	109	17	124	26.1	4.075	20.5	0.00396	3.54
0.693	1,020	78.1	7.32	2.03	116	17	131	26.7	4.282	26.9	0.00564	2.43
0.694	1,060	81.9	7.37	2.05	120	18	135	28.0	4.286	26.1	0.00593	2.67
0.698	1,320	101	7.42	2.05	146	22	166	34.6	4.299	21.8	0.00743	4.73
0.705	1,500	117	7.45	2.08	165	26	189	39.9	4.321	19.7	0.00874	6.65
0.763	1,530	112	8.19	2.21	156	22	176	35.0	4.472	26.3	0.0101	3.81
0.764	1,590	117	8.23	2.23	162	23	182	36.5	4.496	25.5	0.0105	4.14
0.768	1,940	142	8.26	2.24	194	29	221	44.6	4.492	22.0	0.0130	6.92
0.779	2,210	169	8.32	2.30	219	33	249	51.9	4.547	20.1	0.0156	9.36
0.843	2,220	165	9.07	2.47	205	30	230	46.5	4.727	27.2	0.0179	5.06
0.843	2,320	171	9.05	2.46	214	31	240	48.5	4.709	26.4	0.0187	5.68
0.848	2,770	205	9.11	2.48	252	37	285	58.1	4.725	22.9	0.0227	9.03
0.858	3,130	240	9.16	2.53	282	43	321	66.9	4.777	21.0	0.0268	12.2
0.917	3,150	231	9.97	2.70	267	39	298	60.0	4.949	26.4	0.0301	7.61

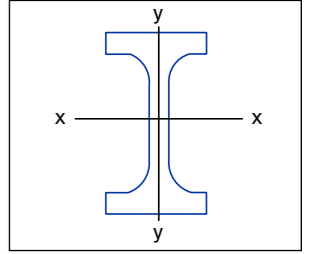


2.1 Parallel Flange I Sections (IPE)



Section designation	Dimensions												
	Mass per Metre	Depth of Section	Width of Section	Thickness		Root Radius	Depth between Fillets	Area of Section	Ratios for Local Buckling		Dimensions for Detailing		
				Flange	Web				Flange	Web	End clearance	Notch	
	kg/m	D mm	B mm	T mm	t mm	r mm	d mm	A cm ²	b/T	d/t		C mm	N mm
IPE A 240	26.2	237.0	120.0	8.3	5.2	15.0	190.4	33.3	5.11	36.6	5	68	24
IPE 240	30.7	240.0	120.0	9.8	6.2	15.0	190.4	39.1	4.28	30.7	5	68	26
IPE O 240	34.3	242.0	122.0	10.8	7.0	15.0	190.4	43.7	3.94	27.2	6	68	26
IPE A 270	30.7	267.0	135.0	8.7	5.5	15.0	219.6	39.2	5.72	39.9	5	76	24
IPE 270	36.1	270.0	135.0	10.2	6.6	15.0	219.6	45.9	4.82	33.3	5	76	26
IPE O 270	42.3	274.0	136.0	12.2	7.5	15.0	219.6	53.8	4.04	29.3	6	76	28
IPE A 300	36.5	297.0	150.0	9.2	6.1	15.0	248.6	46.5	6.19	40.8	5	82	26
IPE 300	42.2	300.0	150.0	10.7	7.1	15.0	248.6	53.8	5.28	35.0	6	82	26
IPE O 300	49.3	304.0	152.0	12.7	8.0	15.0	248.6	62.8	4.49	31.1	6	82	28
IPE A 330	43.0	327.0	160.0	10.0	6.5	18.0	271.0	54.7	5.88	41.7	5	88	28
IPE 330	49.1	330.0	160.0	11.5	7.5	18.0	271.0	62.6	5.07	36.1	6	88	30
IPE O 330	57.0	334.0	162.0	13.5	8.5	18.0	271.0	72.6	4.35	31.9	6	88	32
IPE A 360	50.2	357.6	170.0	11.5	6.6	18.0	298.6	64.0	5.54	45.2	5	92	30
IPE 360	57.1	360.0	170.0	12.7	8.0	18.0	298.6	72.7	4.96	37.3	6	92	32
IPE O 360	66.0	364.0	172.0	14.7	9.2	18.0	298.6	84.1	4.31	32.5	7	92	34
IPE A 400	57.4	397.0	180.0	12.0	7.0	21.0	331.0	73.1	5.46	47.3	6	98	34
IPE 400	66.3	400.0	180.0	13.5	8.6	21.0	331.0	84.5	4.79	38.5	6	96	36
IPE O 400	75.7	404.0	182.0	15.5	9.7	21.0	331.0	96.4	4.20	34.1	7	98	38
IPE V 400	84.0	408.0	182.0	17.5	10.6	21.0	331.0	107	3.70	31.2	7	96	40
IPE A 450	67.2	447.0	190.0	13.1	7.6	21.0	378.8	85.6	5.36	49.8	6	102	36
IPE 450	77.6	450.0	190.0	14.6	9.4	21.0	378.8	98.8	4.75	40.3	7	102	36
IPE O 450	92.4	456.0	192.0	17.6	11.0	21.0	378.8	118	3.95	34.4	8	102	40
IPE V 450	107	460.0	194.0	19.6	12.4	21.0	378.8	132	3.56	30.5	8	102	42
IPE A 500	79.4	497.0	200.0	14.5	8.4	21.0	426.0	101	5.16	50.7	6	106	36
IPE 500	90.7	500.0	200.0	16.0	10.2	21.0	426.0	116	4.62	41.8	7	106	38
IPE O 500	107	506.0	202.0	19.0	12.0	21.0	426.0	137	3.89	35.5	8	106	40
IPE V 500	129	514.0	204.0	23.0	14.2	21.0	426.0	164	3.21	30.0	9	106	44
IPE A 550	92.1	547.0	210.0	15.7	9.0	24.0	467.6	117	4.87	52.0	7	112	40

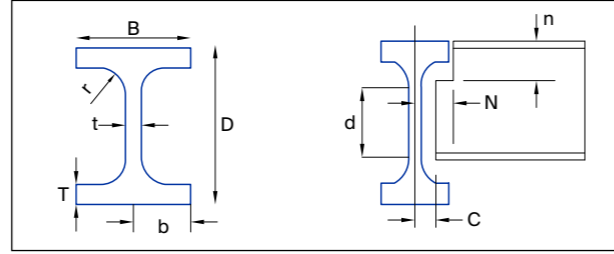
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Surface Area	Properties											
	Second Moment of Area		Radius of Gyration		Elastic Modulus		Plastic Modulus		Buckling Parameter	Torsional Index	Warping Constant	Torsional Constant
	Per metre	Axis x-x	Axis y-y	Axis x-x	Axis y-y	Axis x-x	Axis y-y	Axis x-x	Axis y-y	u	x	H dm ³
m ²	cm ⁴	cm ⁴	cm	cm	cm ³	cm ³	cm ³	cm ³				
0.918	3,290	240	9.94	2.68	278	40	312	62.4	4.936	25.6	0.0313	8.50
0.922	3,890	284	9.97	2.69	324	47	367	73.9	4.941	22.6	0.0374	13.0
0.932	4,370	329	10.0	2.74	361	54	410	84.4	4.976	20.8	0.0437	17.1
1.04	4,920	358	11.2	3.02	368	53	413	82.3	5.232	28.3	0.0595	10.4
1.04	5,790	420	11.2	3.02	429	62	484	97.0	5.230	24.9	0.0706	15.9
1.05	6,950	514	11.4	3.09	507	76	575	118	5.289	21.7	0.0876	25.0
1.16	7,170	519	12.4	3.34	483	69	542	107	5.495	30.3	0.107	13.3
1.16	8,360	604	12.5	3.35	557	81	628	125	5.498	26.8	0.126	19.9
1.17	9,990	746	12.6	3.45	658	98	744	153	5.580	23.4	0.158	31.0
1.25	10,200	685	13.7	3.54	626	86	702	133	5.664	29.9	0.172	19.6
1.25	11,800	788	13.7	3.55	713	99	804	154	5.666	26.8	0.199	28.1
1.27	13,900	960	13.8	3.64	833	119	943	185	5.738	23.7	0.246	42.2
1.35	14,500	944	15.1	3.84	812	111	907	172	5.911	29.9	0.282	27.4
1.35	16,300	1,040	15.0	3.79	904	123	1,020	191	5.859	27.3	0.314	37.4
1.37	19,000	1,250	15.1	3.86	1,050	146	1,190	227	5.910	24.2	0.380	55.7
1.46	20,300	1,170	16.7	4.00	1,020	130	1,140	202	6.041	30.9	0.432	36.2
1.47	23,100	1,320	16.6	3.95	1,160	146	1,310	229	5.988	28.0	0.490	51.3
1.48	26,800	1,560	16.7	4.03	1,320	172	1,500	269	6.046	25.1	0.588	73.3
1.49	30,100	1,770	16.8	4.06	1,480	194	1,680	304	6.074	22.9	0.673	99.6
1.60	29,800	1,500	18.7	4.19	1,330	158	1,490	246	6.181	33.0	0.705	47.1
1.61	33,700	1,680	18.5	4.12	1,500	176	1,700	276	6.118	29.9	0.791	66.7
1.62	40,900	2,080	18.7	4.21	1,800	217	2,050	341	6.183	25.7	0.998	109
1.64	46,200	2,400	18.7	4.26	2,010	247	2,300	389	6.218	23.5	1.16	149
1.74	42,900	1,940	20.6	4.38	1,730	194	1,950	302	6.322	34.2	1.12	64.3
1.74	48,200	2,140	20.4	4.31	1,930	214	2,190	336	6.257	31.1	1.25	89.1
1.76	57,800	2,620	20.6	4.38	2,280	260	2,610	409	6.307	26.9	1.55	143
1.78	70,700	3,270	20.7	4.46	2,750	320	3,170	506	6.368	22.9	1.97	242
1.87	60,000	2,430	22.6	4.55	2,190	232	2,480	362	6.451	34.4	1.71	89.3

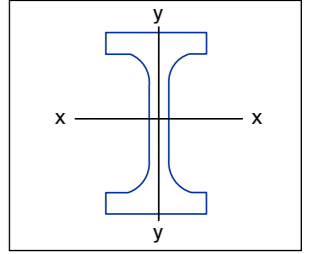


2.1 Parallel Flange I Sections (IPE)



Section designation	Dimensions												
	Mass per Metre	Depth of Section	Width of Section	Thickness		Root Radius	Depth between Fillets	Area of Section	Ratios for Local Buckling		Dimensions for Detailing		
				Flange	Web				Flange	Web	End clearance	Notch	
	kg/m	D mm	B mm	T mm	t mm	r mm	d mm	A cm ²	b/T	d/t		C mm	N mm
IPE 550	106	550.0	210.0	17.2	11.1	24.0	467.6	134	4.39	42.1	8	110	42
IPE O 550	123	556.0	212.0	20.2	12.7	24.0	467.6	156	3.75	36.8	8	110	46
IPE V 550	159	566.0	216.0	25.2	17.1	24.0	467.6	202	2.99	27.3	11	110	50
IPE A 600	108	597.0	220.0	17.5	9.8	24.0	514.0	137	4.63	52.4	7	116	42
IPE 600	122	600.0	220.0	19.0	12.0	24.0	514.0	156	4.21	42.8	8	114	44
IPE O 600	154	610.0	224.0	24.0	15.0	24.0	514.0	197	3.35	34.3	10	116	48
IPE V 600	184	618.0	228.0	28.0	18.0	24.0	514.0	234	2.89	28.6	11	116	52
IPE 750 x 134	134	750.0	264.0	15.5	12.0	17.0	685.0	171	7.03	57.1	8	136	34
IPE 750 x 147	147	753.0	265.0	17.0	13.2	17.0	685.0	188	6.41	51.9	9	136	34
IPE 750 x 173	173	762.0	267.0	21.6	14.4	17.0	685.0	221	5.06	47.6	9	138	40
IPE 750 x 196	196	770.0	268.0	25.4	15.6	17.0	685.0	251	4.30	43.9	10	138	44
IPE 750 x 220	220	779.0	266.0	30.0	16.5	17.0	685.1	281	3.59	41.5	10	136	48

Dimensions EN10365
 Specification EN10025
 Size Range IPE AA 80 to IPE 750 x 196



Surface Area	Properties											
	Second Moment of Area		Radius of Gyration		Elastic Modulus		Plastic Modulus		Buckling Parameter	Torsional Index	Warping Constant	Torsional Constant
	Axis x-x	Axis y-y	Axis x-x	Axis y-y	Axis x-x	Axis y-y	Axis x-x	Axis y-y	u	x	H dm ³	J cm ⁴
Per metre	cm ⁴	cm ⁴	cm	cm	cm ³	cm ³	cm ³	cm ³				
m ²	cm ⁴	cm ⁴	cm	cm	cm ³	cm ³	cm ³	cm ³				
1.88	67,100	2,670	22.4	4.45	2,440	254	2,790	401	6.365	31.4	1.88	123
1.89	79,200	3,220	22.5	4.55	2,850	304	3,260	481	6.428	27.6	2.30	187
1.92	102,000	4,260	22.5	4.59	3,620	395	4,200	632	6.449	22.5	3.12	372
2.01	82,900	3,120	24.6	4.77	2,780	283	3,140	442	6.603	34.7	2.61	122
2.01	92,100	3,390	24.3	4.66	3,070	308	3,510	486	6.510	31.9	2.85	165
2.04	118,000	4,520	24.5	4.79	3,880	404	4,470	640	6.600	26.1	3.86	316
2.07	142,000	5,570	24.6	4.88	4,580	488	5,320	780	6.653	22.7	4.85	506
2.50	151,000	4,790	29.7	5.30	4,020	362	4,640	570	6.910	49.5	6.44	120
2.51	166,000	5,290	29.8	5.31	4,410	399	5,110	631	6.917	45.4	7.14	157
2.53	206,000	6,870	30.5	5.57	5,400	515	6,220	810	7.105	37.8	9.39	270
2.55	240,000	8,180	31.0	5.71	6,240	610	7,170	959	7.201	33.0	11.3	406
2.56	278,000	9,440	31.5	5.80	7,140	710	8,200	1,110	7.272	28.8	13.2	607