

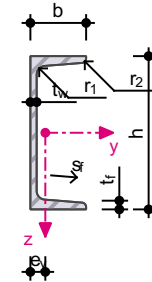


UPN

- EN 10365:2017
- ArcelorMittal (2018)

UPN

Taper flange channels



	Geometry										Sectional Area	Bending
Section	h [mm]	b [mm]	t _w [mm]	t _f [mm]	r ₁ [mm]	r ₂ [mm]	b ₁ [mm]	d [mm]	s _s [mm]	s _f [%]	A [cm ²]	e _y [mm]
UPN 50	50.0	38.0	5.0	7.0	7.0	3.5	19.0	21.0	16.7	8.00	7.10	13.7
UPN 65	65.0	42.0	5.5	7.5	7.5	4.0	21.0	34.0	18.0	8.00	9.00	14.2
UPN 80	80.0	45.0	6.0	8.0	8.0	4.0	22.5	47.0	19.4	8.00	11.00	14.5
UPN 100	100.0	50.0	6.0	8.5	8.5	4.5	25.0	64.0	20.3	8.00	13.50	15.5
UPN 120	120.0	55.0	7.0	9.0	9.0	4.5	27.5	82.0	22.2	8.00	17.00	16.1
UPN 140	140.0	60.0	7.0	10.0	10.0	5.0	30.0	98.0	23.9	8.00	20.40	17.6
UPN 160	160.0	65.0	7.5	10.5	10.5	5.5	32.5	115.0	25.3	8.00	24.00	18.4
UPN 180	180.0	70.0	8.0	11.0	11.0	5.5	35.0	133.0	26.7	8.00	28.00	19.3
UPN 200	200.0	75.0	8.5	11.5	11.5	6.0	37.5	151.0	28.1	8.00	32.20	20.1

UPN 200	200.0	70.0	9.0	11.0	11.0	6.5	37.0	151.0	29.1	8.00	32.20	20.1
UPN 220	220.0	80.0	9.0	12.5	12.5	6.5	40.0	167.0	30.3	8.00	37.40	21.4
UPN 240	240.0	85.0	9.5	13.0	13.0	6.5	42.5	184.0	31.7	8.00	42.30	22.4
UPN 260	260.0	90.0	10.0	14.0	14.0	7.0	45.0	200.0	33.9	8.00	48.30	23.7
UPN 280	280.0	95.0	10.0	15.0	15.0	7.5	47.5	216.0	35.6	8.00	53.30	25.3
UPN 300	300.0	100.0	10.0	16.0	16.0	8.0	50.0	232.0	37.3	8.00	58.80	27.0
UPN 320	320.0	100.0	14.0	17.5	17.5	8.8	43.0	246.0	43.0	5.00	75.80	26.0
UPN 350	350.0	100.0	14.0	16.0	16.0	8.0	43.0	282.0	40.7	5.00	77.30	24.0
UPN 380	380.0	102.0	13.5	16.0	16.0	8.0	44.3	313.0	40.3	5.00	80.40	23.8
UPN 400	400.0	110.0	14.0	18.0	18.0	9.0	48.0	324.0	44.0	5.00	91.50	26.8

	Bending											
Section	I _y [cm ⁴]	I _z [cm ⁴]	I _p [cm ⁴]	I _{p,SC} [cm ⁴]	i _y [mm]	i _z [mm]	i _p [mm]	i _{p,SC} [mm]	max S _y [cm ³]	max S _z [cm ³]	W _{z,min} [cm ³]	W _{z,max} [cm ³]
UPN 50	26.40	9.12	35.52	86.35	19.2	11.3	22.3	34.9	6.48	1.76	−6.66	3.75
UPN 65	57.50	14.10	71.60	143.00	25.2	12.5	28.1	39.9	10.71	2.44	−9.90	5.07
UPN 80	106.00	19.40	125.40	216.81	31.0	13.3	33.7	44.4	15.92	3.17	−13.36	6.36
UPN 100	206.00	29.30	235.30	369.08	39.1	14.7	41.8	52.3	24.48	4.28	−18.90	8.49
UPN 120	364.00	43.20	407.20	588.90	46.2	15.9	48.9	58.9	36.35	5.80	−26.90	11.10
UPN 140	605.00	62.70	667.70	936.12	54.5	17.5	57.2	67.7	51.39	7.67	−35.72	14.80

UPN 160	925.00	85.30	1010.30	1363.50	62.1	18.9	64.9	75.4	68.77	9.67	−46.37	18.30
UPN 180	1350.00	114.00	1464.00	1925.48	69.5	20.2	72.4	82.9	89.57	12.01	−59.12	22.40
UPN 200	1910.00	148.00	2058.00	2640.90	77.0	21.4	79.9	90.6	113.59	14.64	−73.47	27.00
UPN 220	2690.00	197.00	2887.00	3656.78	84.8	23.0	87.9	98.9	145.37	18.18	−91.86	33.60
UPN 240	3600.00	248.00	3848.00	4799.23	92.2	24.2	95.3	106.5	178.35	21.64	−110.92	39.60
UPN 260	4820.00	317.00	5137.00	6362.79	99.9	25.6	103.1	114.8	220.60	26.19	−133.89	47.70
UPN 280	6280.00	399.00	6679.00	8245.73	109.0	27.4	112.4	124.4	265.28	30.99	−157.56	57.20
UPN 300	8030.00	495.00	8525.00	10513.57	117.0	29.0	120.5	133.7	315.38	36.29	−183.32	67.80
UPN 320	10870.00	597.00	11467.00	13468.00	121.0	28.1	124.2	133.3	411.32	44.37	−229.89	80.60
UPN 350	12840.00	570.00	13410.00	15158.64	129.0	27.2	131.8	140.0	447.92	42.78	−237.84	75.00
UPN 380	15760.00	615.00	16375.00	18228.64	140.0	27.7	142.7	150.6	505.38	45.15	−257.94	78.70
UPN 400	20350.00	846.00	21196.00	23928.63	149.0	30.4	152.1	161.7	615.73	57.56	−316.00	102.00

	Bending		Shear			Torsion			Warping			
Section	W _y [cm ³]	W _z [cm ³]	A _y [cm ²]	A _z [cm ²]	y _{SC} [mm]	I _t [cm ⁴]	I _{t,s} [cm ⁴]	W _t [cm ³]	max ω [cm ²]	I _ω [cm ⁶]	i _ω [mm]	W _ω [cm ⁴]
UPN 50	10.60	3.75	3.55	1.74	−24.7	1.12	15.85	1.60	4.30	30.00	5.9	6.98
UPN 65	17.70	5.07	3.97	2.66	−26.0	1.61	31.29	2.15	6.50	80.00	7.5	12.31
UPN 80	26.50	6.36	4.21	3.73	−26.7	2.20	59.67	2.75	8.89	180.00	9.1	20.24
UPN 100	41.20	8.49	4.66	4.88	−29.3	2.81	96.43	3.31	12.75	410.00	10.5	32.14
UPN 120	60.70	11.10	5.20	6.90	−30.3	4.15	163.38	4.61	17.41	900.00	12.4	51.69
UPN 140	86.40	14.80	5.98	8.23	−33.7	5.68	271.41	5.68	22.25	1800.00	13.9	80.90
UPN 160	116.00	18.30	6.57	10.19	−35.6	7.39	400.37	7.04	28.05	3260.00	15.5	116.24
UPN 180	150.00	22.40	7.25	12.26	−37.5	9.55	567.51	8.68	34.49	5570.00	17.0	161.50
UPN 200	191.00	27.00	7.89	14.64	−39.4	11.90	778.03	10.35	41.58	9070.00	18.5	218.13
UPN 220	245.00	33.60	8.99	17.14	−42.0	16.00	1089.54	12.80	48.88	14600.00	20.0	298.70
UPN 240	300.00	39.60	9.73	19.86	−43.9	19.70	1422.11	15.15	57.21	22100.00	21.5	386.29
UPN 260	371.00	47.70	10.80	22.68	−46.6	25.50	1896.59	18.21	65.67	33300.00	22.9	507.08
UPN 280	448.00	57.20	11.94	24.62	−50.2	31.00	2491.86	20.67	74.32	48500.00	24.3	652.55
UPN 300	535.00	67.80	13.10	26.48	−54.1	37.40	3226.44	23.38	83.47	69100.00	25.6	827.88
UPN 320	679.00	80.60	14.71	39.12	−48.2	66.70	4382.08	38.11	91.61	96100.00	26.7	1049.05
UPN 350	734.00	75.00	12.92	43.29	−44.5	61.20	4694.10	38.25	104.35	114000.00	27.4	1092.51

UPN 380	829.00	78.70	12.52	45.82	−45.8	59.10	5470.97	36.94	116.98	146000.00	28.3	1248.12
UPN 400	1020.00	102.00	14.88	49.91	−51.1	81.60	7429.40	45.33	130.30	221000.00	30.4	1696.07

	Warping	Stability		Plasticity								
Section	max S_{ω} [cm ⁴]	r_z [mm]	$r_{y,SC}$ [mm]	$W_{pl,y}$ [cm ³]	$W_{pl,y,pure}$ [cm ³]	$W_{pl,z}$ [cm ³]	$W_{pl,\omega}$ [cm ⁴]	$\alpha_{pl,y}$ [--]	$\alpha_{pl,y,pure}$ [--]	$\alpha_{pl,z}$ [--]	$\alpha_{pl,\omega}$ [--]	$A_{pl,y}$ [cm ²]
UPN 50	3.00	22.0	71.4	13.10	12.40	6.78	13.14	1.236	1.170	1.808	1.882	4.97
UPN 65	5.51	33.2	85.2	21.70	20.21	9.38	24.33	1.226	1.142	1.850	1.977	5.89
UPN 80	8.79	45.6	99.0	32.30	29.77	11.90	39.11	1.219	1.124	1.871	1.932	6.72
UPN 100	15.11	63.3	121.9	49.00	45.42	16.20	67.39	1.189	1.102	1.908	2.097	7.99
UPN 120	24.57	84.4	145.0	72.60	66.51	21.20	110.13	1.196	1.096	1.910	2.131	9.27
UPN 140	38.05	101.3	168.7	103.00	94.20	28.30	170.48	1.192	1.090	1.912	2.107	11.30
UPN 160	55.24	123.8	195.0	138.00	125.25	35.20	247.60	1.190	1.080	1.923	2.130	12.86
UPN 180	77.38	146.1	221.1	179.00	162.22	42.90	347.07	1.193	1.081	1.915	2.149	14.52
UPN 200	105.45	170.2	249.0	228.00	205.26	51.80	472.62	1.194	1.075	1.919	2.167	16.27
UPN 220	143.89	190.5	274.5	292.00	262.59	64.10	644.88	1.192	1.072	1.908	2.159	18.87
UPN 240	187.44	214.1	301.9	358.00	320.97	75.70	839.29	1.193	1.070	1.912	2.173	20.87
UPN 260	245.42	234.8	328.0	442.00	397.01	91.60	1098.91	1.191	1.070	1.920	2.167	23.80
UPN 280	312.59	253.1	353.5	532.00	479.21	109.00	1401.12	1.188	1.070	1.906	2.147	27.00
UPN 300	392.48	271.4	379.6	632.00	571.69	130.00	1759.34	1.181	1.069	1.917	2.125	30.40
UPN 320	485.20	280.1	376.5	826.00	729.66	152.00	2149.49	1.216	1.075	1.886	2.049	32.55
UPN 350	521.56	342.9	431.9	918.00	780.62	143.00	2257.91	1.251	1.064	1.907	2.067	29.76

UPN 380	601.38	394.8	486.4	1010.00	877.85	148.00	2592.27	1.218	1.059	1.881	2.077	30.48
UPN 400	799.94	399.0	501.2	1240.00	1080.43	190.00	3505.56	1.216	1.059	1.863	2.067	37.08

	Plasticity							Other				
Section	A _{pl,z} [cm ²]	N _{pl} [kN]	V _{pl,y} [kN]	V _{pl,z} [kN]	M _{pl,y} [kNm]	M _{pl,z} [kNm]	y _{pl} [mm]	N _u [kN]	G [kg/m]	A _m [m ² /m]	V [cm ³ /m]	A _m /V [1/m]
UPN 50	2.15	167.309	67.432	29.171	3.05	1.62	−3.1	167.309	5.6	0.232	710.00	326.761
UPN 65	3.16	212.286	79.880	42.908	5.03	2.23	−4.4	212.286	7.1	0.273	900.00	303.333
UPN 80	4.32	259.078	91.175	58.613	7.50	2.84	−5.7	259.078	8.6	0.312	1100.00	283.636
UPN 100	5.49	316.190	108.406	74.487	11.51	3.81	−6.8	316.190	10.6	0.372	1350.00	275.556
UPN 120	7.77	399.232	125.773	105.421	17.09	5.00	−8.8	399.232	13.3	0.434	1700.00	255.294
UPN 140	9.10	478.733	153.315	123.466	24.15	6.65	−9.5	478.733	16.0	0.489	2040.00	239.706
UPN 160	11.21	564.383	174.515	152.128	32.32	8.26	−10.9	564.383	18.8	0.546	2400.00	227.500
UPN 180	13.52	657.247	197.003	183.436	42.10	10.12	−11.5	657.247	22.0	0.611	2800.00	218.214
UPN 200	16.02	756.401	220.781	217.389	53.53	12.19	−12.1	756.401	25.3	0.661	3220.00	205.280
UPN 220	18.68	879.999	256.091	253.377	68.51	15.13	−12.9	879.999	29.4	0.718	3740.00	191.979
UPN 240	21.56	994.281	283.091	292.588	84.06	17.85	−13.5	994.281	33.2	0.775	4230.00	183.215
UPN 260	24.60	1134.723	322.912	333.766	103.97	21.60	−14.4	1134.723	37.9	0.834	4830.00	172.671
UPN 280	26.50	1255.462	366.329	359.545	125.02	25.80	−15.8	1255.462	41.8	0.890	5330.00	166.979
UPN 300	28.40	1381.027	412.459	385.324	148.62	30.53	−17.2	1381.027	46.2	0.950	5880.00	161.565
UPN 320	42.35	1780.812	441.630	574.593	193.94	35.70	−14.1	1780.812	59.5	0.982	7580.00	129.551
UPN 350	46.76	1815.558	403.776	634.427	211.34	33.49	−12.9	1815.558	60.7	1.050	7730.00	135.834

UPN 380	49.14	1888.408	413.544	666.718	238.49	35.04	−13.3	1888.408	63.1	1.110	8040.00	138.060
UPN 400	53.48	2150.103	503.091	725.602	290.47	45.27	−15.3	2150.103	71.8	1.180	9150.00	128.962

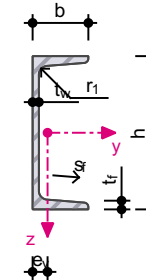


UPN

- DIN 1026-1:2000; NF A 45-202:1986
- ArcelorMittal (2009)

UPN

European Standard Channels



	Geometry										Sectional Area	Bending
Section	h [mm]	b [mm]	t _w [mm]	t _f [mm]	r ₁ [mm]	r ₂ [mm]	b ₁ [mm]	d [mm]	s _s [mm]	s _f [%]	A [cm ²]	e _y [mm]
UPN 50	50.0	38.0	5.0	7.0	7.0	3.5	17.5	21.0	16.7	8.00	7.12	13.8
UPN 65	65.0	42.0	5.5	7.5	7.5	4.0	22.0	34.0	18.0	8.00	9.03	14.2
UPN 80	80.0	45.0	6.0	8.0	8.0	4.0	22.5	47.0	19.4	8.00	11.00	14.5
UPN 100	100.0	50.0	6.0	8.5	8.5	4.5	25.0	64.0	20.3	8.00	13.50	15.5
UPN 120	120.0	55.0	7.0	9.0	9.0	4.5	27.5	82.0	22.2	8.00	17.00	16.1
UPN 140	140.0	60.0	7.0	10.0	10.0	5.0	30.0	98.0	23.9	8.00	20.40	17.6
UPN 160	160.0	65.0	7.5	10.5	10.5	5.5	32.5	115.0	25.3	8.00	24.00	18.4
UPN 180	180.0	70.0	8.0	11.0	11.0	5.5	35.0	133.0	26.7	8.00	28.00	19.3
UPN 200	200.0	75.0	8.5	11.5	11.5	6.0	37.5	151.0	28.1	8.00	32.20	20.1

UPN 200	200.0	70.0	9.0	11.0	11.0	6.5	37.0	151.0	29.1	8.00	32.20	20.1
UPN 220	220.0	80.0	9.0	12.5	12.5	6.5	40.0	167.0	30.3	8.00	37.40	21.4
UPN 240	240.0	85.0	9.5	13.0	13.0	6.5	42.5	184.0	31.7	8.00	42.30	22.4
UPN 260	260.0	90.0	10.0	14.0	14.0	7.0	45.0	200.0	33.9	8.00	48.30	23.7
UPN 280	280.0	95.0	10.0	15.0	15.0	7.5	47.5	216.0	35.6	8.00	53.30	25.3
UPN 300	300.0	100.0	10.0	16.0	16.0	8.0	50.0	232.0	37.3	8.00	58.80	27.0
UPN 320	320.0	100.0	14.0	17.5	17.5	8.8	43.0	246.0	43.0	5.00	75.80	26.0
UPN 350	350.0	100.0	14.0	16.0	16.0	8.0	43.0	282.0	40.7	5.00	77.30	24.0
UPN 380	380.0	102.0	13.5	16.0	16.0	8.0	44.3	313.0	40.3	5.00	80.40	23.8
UPN 400	400.0	110.0	14.0	18.0	18.0	9.0	48.0	324.0	44.0	5.00	91.50	26.8

	Bending											
Section	I _y [cm ⁴]	I _z [cm ⁴]	I _p [cm ⁴]	I _{p,SC} [cm ⁴]	i _y [mm]	i _z [mm]	i _p [mm]	i _{p,SC} [mm]	max S _y [cm ³]	max S _z [cm ³]	W _{z,min} [cm ³]	W _{z,max} [cm ³]
UPN 50	26.40	9.12	35.52	87.62	19.2	11.3	22.3	35.1	6.55	1.78	−6.62	3.75
UPN 65	57.50	14.10	71.60	141.74	25.2	12.5	28.1	39.6	10.61	2.42	−9.95	5.07
UPN 80	106.00	19.40	125.40	216.81	31.0	13.3	33.7	44.4	15.90	3.17	−13.36	6.36
UPN 100	206.00	29.30	235.30	369.08	39.1	14.7	41.8	52.3	24.50	4.28	−18.90	8.49
UPN 120	364.00	43.20	407.20	588.90	46.2	15.9	48.9	58.9	36.30	5.80	−26.90	11.10
UPN 140	605.00	62.70	667.70	936.12	54.5	17.5	57.2	67.7	51.50	7.67	−35.72	14.80

UPN 160	925.00	85.30	1010.30	1363.50	62.1	18.9	64.9	75.4	69.00	9.67	−46.37	18.30
UPN 180	1350.00	114.00	1464.00	1925.48	69.5	20.2	72.4	82.9	89.50	12.01	−59.12	22.40
UPN 200	1910.00	148.00	2058.00	2640.90	77.0	21.4	79.9	90.6	114.00	14.64	−73.47	27.00
UPN 220	2690.00	197.00	2887.00	3656.78	84.8	23.0	87.9	98.9	146.00	18.18	−91.86	33.60
UPN 240	3600.00	248.00	3848.00	4799.23	92.2	24.2	95.3	106.5	179.00	21.64	−110.92	39.60
UPN 260	4820.00	317.00	5137.00	6362.79	99.9	25.6	103.1	114.8	221.00	26.19	−133.89	47.70
UPN 280	6280.00	399.00	6679.00	8245.73	109.0	27.4	112.4	124.4	266.00	30.99	−157.56	57.20
UPN 300	8030.00	495.00	8525.00	10513.57	117.0	29.0	120.5	133.7	316.00	36.29	−183.32	67.80
UPN 320	10870.00	597.00	11467.00	13469.24	121.0	28.1	124.2	133.3	413.00	44.38	−229.86	80.60
UPN 350	12840.00	570.00	13410.00	15158.64	129.0	27.2	131.8	140.0	459.00	42.78	−237.84	75.00
UPN 380	15760.00	615.00	16375.00	18228.64	140.0	27.7	142.7	150.6	507.00	45.15	−257.94	78.70
UPN 400	20350.00	846.00	21196.00	23928.63	149.0	30.4	152.1	161.7	620.00	57.56	−316.00	102.00

	Bending		Shear			Torsion			Warping			
Section	W _y [cm ³]	W _z [cm ³]	A _y [cm ²]	A _z [cm ²]	y _{SC} [mm]	I _t [cm ⁴]	I _{t,s} [cm ⁴]	W _t [cm ³]	max ω [cm ²]	I _ω [cm ⁶]	i _ω [mm]	W _ω [cm ⁴]
UPN 50	10.60	3.75	3.46	1.69	−24.7	1.12	15.85	1.60	4.30	30.00	5.9	6.98
UPN 65	17.70	5.07	4.03	2.70	−26.0	1.61	31.29	2.15	6.50	80.00	7.5	12.31
UPN 80	26.50	6.36	4.21	3.73	−26.7	2.16	59.67	2.70	8.89	180.00	9.1	20.24
UPN 100	41.20	8.49	4.66	4.88	−29.3	2.81	96.43	3.31	12.75	410.00	10.5	32.14
UPN 120	60.70	11.10	5.20	6.90	−30.3	4.15	163.38	4.61	17.41	900.00	12.4	51.69
UPN 140	86.40	14.80	5.98	8.23	−33.7	5.68	271.41	5.68	22.25	1800.00	13.9	80.90
UPN 160	116.00	18.30	6.57	10.19	−35.6	7.39	400.37	7.04	28.05	3260.00	15.5	116.24
UPN 180	150.00	22.40	7.25	12.26	−37.5	9.55	567.51	8.68	34.49	5570.00	17.0	161.50
UPN 200	191.00	27.00	7.89	14.64	−39.4	11.90	778.03	10.35	41.58	9070.00	18.5	218.13
UPN 220	245.00	33.60	8.99	17.14	−42.0	16.00	1089.54	12.80	48.88	14600.00	20.0	298.70
UPN 240	300.00	39.60	9.73	19.86	−43.9	19.70	1422.11	15.15	57.21	22100.00	21.5	386.29
UPN 260	371.00	47.70	10.80	22.68	−46.6	25.50	1896.59	18.21	65.67	33300.00	22.9	507.08
UPN 280	448.00	57.20	11.94	24.62	−50.2	31.00	2491.86	20.67	74.32	48500.00	24.3	652.55
UPN 300	535.00	67.80	13.10	26.48	−54.1	37.40	3226.44	23.38	83.47	69100.00	25.6	827.88
UPN 320	679.00	80.60	14.70	39.11	−48.2	66.70	4382.08	38.11	91.61	96100.00	26.7	1049.05
UPN 350	734.00	75.00	12.92	43.29	−44.5	61.20	4694.10	38.25	104.35	114000.00	27.4	1092.51

UPN 380	829.00	78.70	12.52	45.82	−45.8	59.10	5470.97	36.94	116.98	146000.00	28.3	1248.12
UPN 400	1020.00	102.00	14.88	49.91	−51.1	81.60	7429.40	45.33	130.30	221000.00	30.4	1696.07

	Warping	Stability		Plasticity								
Section	max S_{ω} [cm ⁴]	r_z [mm]	$r_{y,SC}$ [mm]	$W_{pl,y}$ [cm ³]	$W_{pl,y,pure}$ [cm ³]	$W_{pl,z}$ [cm ³]	$W_{pl,\omega}$ [cm ⁴]	$\alpha_{pl,y}$ [--]	$\alpha_{pl,y,pure}$ [--]	$\alpha_{pl,z}$ [--]	$\alpha_{pl,\omega}$ [--]	$A_{pl,y}$ [cm ²]
UPN 50	3.00	21.2	70.6	13.10	12.54	6.78	13.14	1.236	1.183	1.808	1.882	4.97
UPN 65	5.51	34.0	86.0	21.70	20.06	9.38	24.33	1.226	1.133	1.850	1.977	5.89
UPN 80	8.79	45.6	99.0	32.30	29.77	11.90	39.11	1.219	1.124	1.871	1.932	6.72
UPN 100	15.11	63.3	121.9	49.00	45.42	16.20	67.39	1.189	1.102	1.908	2.097	7.99
UPN 120	24.57	84.4	145.0	72.60	66.51	21.20	110.13	1.196	1.096	1.910	2.131	9.27
UPN 140	38.05	101.3	168.7	103.00	94.20	28.30	170.48	1.192	1.090	1.912	2.107	11.30
UPN 160	55.24	123.8	195.0	138.00	125.25	35.20	247.60	1.190	1.080	1.923	2.130	12.86
UPN 180	77.38	146.1	221.1	179.00	162.22	42.90	347.07	1.193	1.081	1.915	2.149	14.52
UPN 200	105.45	170.2	249.0	228.00	205.26	51.80	472.62	1.194	1.075	1.919	2.167	16.27
UPN 220	143.89	190.5	274.5	292.00	262.59	64.10	644.88	1.192	1.072	1.908	2.159	18.87
UPN 240	187.44	214.1	301.9	358.00	320.97	75.70	839.29	1.193	1.070	1.912	2.173	20.87
UPN 260	245.42	234.8	328.0	442.00	397.01	91.60	1098.91	1.191	1.070	1.920	2.167	23.80
UPN 280	312.59	253.1	353.5	532.00	479.21	109.00	1401.12	1.188	1.070	1.906	2.147	27.00
UPN 300	392.48	271.4	379.6	632.00	571.69	130.00	1759.34	1.181	1.069	1.917	2.125	30.40
UPN 320	485.20	279.9	376.3	826.00	729.71	152.00	2149.49	1.216	1.075	1.886	2.049	32.55
UPN 350	521.56	342.9	431.9	918.00	780.62	143.00	2257.91	1.251	1.064	1.907	2.067	29.76

UPN 380	601.38	394.8	486.4	1010.00	877.85	148.00	2592.27	1.218	1.059	1.881	2.077	30.48
UPN 400	799.94	399.0	501.2	1240.00	1080.43	190.00	3505.56	1.216	1.059	1.863	2.067	37.08

	Plasticity							Other				
Section	A _{pl,z} [cm ²]	N _{pl} [kN]	V _{pl,y} [kN]	V _{pl,z} [kN]	M _{pl,y} [kNm]	M _{pl,z} [kNm]	y _{pl} [mm]	N _u [kN]	G [kg/m]	A _m [m ² /m]	V [cm ³ /m]	A _m /V [1/m]
UPN 50	2.15	169.170	67.432	29.171	3.08	1.64	−3.0	169.170	5.6	0.230	712.00	323.034
UPN 65	3.16	210.914	79.880	42.908	5.00	2.21	−4.4	210.914	7.1	0.270	903.00	299.003
UPN 80	4.32	259.078	91.175	58.613	7.50	2.84	−5.7	259.078	8.6	0.310	1100.00	281.818
UPN 100	5.49	316.190	108.406	74.487	11.51	3.81	−6.8	316.190	10.6	0.370	1350.00	274.074
UPN 120	7.77	399.232	125.773	105.421	17.09	5.00	−8.8	399.232	13.3	0.430	1700.00	252.941
UPN 140	9.10	478.733	153.315	123.466	24.15	6.65	−9.5	478.733	16.0	0.490	2040.00	240.196
UPN 160	11.21	564.383	174.515	152.128	32.32	8.26	−10.9	564.383	18.8	0.550	2400.00	229.167
UPN 180	13.52	657.247	197.003	183.436	42.10	10.12	−11.5	657.247	22.0	0.610	2800.00	217.857
UPN 200	16.02	756.401	220.781	217.389	53.53	12.19	−12.1	756.401	25.3	0.660	3220.00	204.969
UPN 220	18.68	879.999	256.091	253.377	68.51	15.13	−12.9	879.999	29.4	0.720	3740.00	192.513
UPN 240	21.56	994.281	283.091	292.588	84.06	17.85	−13.5	994.281	33.2	0.780	4230.00	184.397
UPN 260	24.60	1134.723	322.912	333.766	103.97	21.60	−14.4	1134.723	37.9	0.830	4830.00	171.843
UPN 280	26.50	1255.462	366.329	359.545	125.02	25.80	−15.8	1255.462	41.8	0.890	5330.00	166.979
UPN 300	28.40	1381.027	412.459	385.324	148.62	30.53	−17.2	1381.027	46.2	0.950	5880.00	161.565
UPN 320	42.35	1780.891	441.630	574.593	193.95	35.71	−14.1	1780.891	59.5	0.980	7580.00	129.288
UPN 350	46.76	1815.558	403.776	634.427	211.34	33.49	−12.9	1815.558	60.7	1.050	7730.00	135.834

UPN 380	49.14	1888.408	413.544	666.718	238.49	35.04	−13.3	1888.408	63.1	1.110	8040.00	138.060
UPN 400	53.48	2150.103	503.091	725.602	290.47	45.27	−15.3	2150.103	71.8	1.180	9150.00	128.962

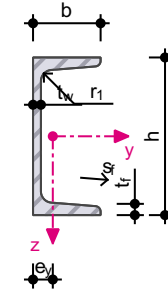


UPN

- DIN 1026-1:2009-09
- Özkan

UPN

UPN Channels



	Geometry									Sectional Area	Bending	
Section	h [mm]	b [mm]	tw [mm]	tf [mm]	r1 [mm]	r2 [mm]	b1 [mm]	d [mm]	sf [%]	A [cm ²]	ey [mm]	Iy [cm ⁴]
UPN 30	30.0	15.0	4.0	4.5	4.5	2.0	7.5	12.1	8.00	2.21	5.2	2.53
UPN 40	40.0	20.0	5.0	5.5	5.0	2.5	10.0	19.0	8.00	3.66	6.7	7.58
UPN 50	50.0	25.0	5.0	6.0	6.0	3.0	12.5	25.7	8.00	4.92	8.1	16.80
UPN 60	60.0	30.0	6.0	6.0	6.0	3.0	15.0	35.5	8.00	6.46	9.1	31.60
UPN 65	65.0	42.0	5.5	7.5	7.5	4.0	21.0	33.7	8.00	9.03	14.2	57.50
UPN 80	80.0	45.0	6.0	8.0	8.0	4.0	22.5	46.6	8.00	11.00	14.5	106.00
UPN 100	100.0	50.0	6.0	8.5	8.5	4.5	25.0	64.3	8.00	13.50	15.5	206.00
UPN 120	120.0	55.0	7.0	9.0	9.0	4.5	27.5	82.1	8.00	17.00	16.1	364.00

UPN 65	14.10	71.60	143.00	25.2	12.5	28.1	39.8	0.00	2.44	−9.90	5.07	17.70
UPN 80	19.40	125.40	216.81	31.0	13.3	33.7	44.4	15.90	3.17	−13.36	6.36	26.50
UPN 100	29.30	235.30	369.08	39.1	14.7	41.8	52.3	24.50	4.28	−18.90	8.49	41.20
UPN 120	43.20	407.20	588.90	46.2	15.9	48.9	58.9	36.30	5.80	−26.90	11.10	60.70
UPN 140	62.70	667.70	936.12	54.5	17.5	57.2	67.7	51.40	7.67	−35.72	14.80	86.40
UPN 160	85.30	1010.30	1363.50	62.1	18.9	64.9	75.4	68.80	9.67	−46.37	18.30	116.00
UPN 180	114.00	1464.00	1925.48	69.5	20.2	72.4	82.9	89.60	12.01	−59.12	22.40	150.00
UPN 200	148.00	2058.00	2640.90	77.0	21.4	79.9	90.6	114.00	14.64	−73.47	27.00	191.00
UPN 220	197.00	2887.00	3656.78	84.8	23.0	87.9	98.9	146.00	18.18	−91.86	33.60	245.00
UPN 240	248.00	3848.00	4799.23	92.2	24.2	95.3	106.5	179.00	21.64	−110.92	39.60	300.00
UPN 260	317.00	5137.00	6362.79	99.9	25.6	103.1	114.8	221.00	26.19	−133.89	47.70	371.00
UPN 280	399.00	6679.00	8245.73	109.0	27.4	112.4	124.4	266.00	30.99	−157.56	57.20	448.00
UPN 300	495.00	8525.00	10513.57	117.0	29.0	120.5	133.7	316.00	36.29	−183.32	67.80	535.00

	Bending	Shear			Torsion			Warping				
Section	W _z [cm ³]	A _y [cm ²]	A _z [cm ²]	y _{SC} [mm]	I _t [cm ⁴]	I _{t,s} [cm ⁴]	W _t [cm ³]	max ω [cm ²]	I _ω [cm ⁶]	i _ω [mm]	W _ω [cm ⁴]	max S _ω [cm ⁴]
UPN 30	0.39	0.76	0.91	−7.4	0.12	1.50	0.28	1.02	0.45	3.2	0.44	0.18
UPN 40	0.86	1.26	1.52	−10.1	0.32	4.51	0.58	1.86	2.47	4.3	1.33	0.55
UPN 50	1.48	1.67	1.93	−13.4	0.48	10.31	0.80	3.00	9.05	5.5	3.01	1.23
UPN 60	2.16	2.04	2.81	−15.0	0.75	18.57	1.25	4.56	25.11	6.9	5.51	2.31
UPN 65	5.07	3.97	2.66	−26.0	1.36	40.43	1.81	6.50	90.94	8.0	13.99	5.51
UPN 80	6.36	4.21	3.73	−26.7	1.87	70.61	2.33	8.89	195.80	9.5	22.01	8.79
UPN 100	8.49	4.66	4.88	−29.3	2.47	132.15	2.91	12.75	479.96	11.4	37.63	15.11
UPN 120	11.10	5.20	6.90	−30.3	3.63	220.07	4.04	17.41	1044.56	13.3	59.99	24.57
UPN 140	14.80	5.98	8.23	−33.7	5.04	361.16	5.04	22.25	2076.38	14.9	93.33	38.05
UPN 160	18.30	6.57	10.19	−35.6	6.57	533.89	6.26	28.05	3764.53	16.6	134.23	55.24
UPN 180	22.40	7.25	12.26	−37.5	8.43	758.09	7.67	34.49	6437.70	18.3	186.65	77.38
UPN 200	27.00	7.89	14.64	−39.4	10.66	1042.61	9.27	41.58	10499.50	19.9	252.51	105.45
UPN 220	33.60	8.99	17.14	−42.0	14.36	1448.09	11.49	48.88	16831.71	21.5	344.35	143.89
UPN 240	39.60	9.73	19.86	−43.6	17.64	1895.40	13.57	57.21	25513.89	23.1	445.96	187.44
UPN 260	47.70	10.80	22.68	−46.6	22.94	2514.81	16.39	65.67	38345.13	24.5	583.90	245.42
UPN 280	57.20	11.94	24.62	−50.2	28.02	3281.75	18.68	74.32	55658.62	26.0	748.87	312.59

UPN 300	67.80	13.10	26.48	-54.1	34.03	4211.12	21.27	83.47	78943.25	27.4	945.81	392.48
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	Stability		Plasticity									
Section	r _z [mm]	r _{y,SC} [mm]	W _{pl,y} [cm ³]	W _{pl,y,pure} [cm ³]	W _{pl,z} [cm ³]	W _{pl,ω} [cm ⁴]	α _{pl,y} [–]	α _{pl,y,pure} [–]	α _{pl,z} [–]	α _{pl,ω} [–]	A _{pl,y} [cm ²]	A _{pl,z} [cm ²]
UPN 30	16.5	31.3	2.18	2.02	0.74	0.82	1.287	1.195	1.887	1.845	1.17	1.02
UPN 40	22.8	43.0	4.84	4.48	1.62	2.46	1.277	1.181	1.880	1.851	1.93	1.72
UPN 50	29.5	56.3	8.40	7.78	2.79	5.51	1.249	1.156	1.886	1.829	2.70	2.20
UPN 60	39.2	69.2	13.09	11.91	4.13	10.33	1.247	1.135	1.913	1.875	3.24	3.24
UPN 65	33.2	85.2	21.41	20.21	9.48	24.33	1.210	1.142	1.870	1.739	5.89	3.16
UPN 80	45.6	99.0	31.90	29.77	12.08	39.11	1.204	1.124	1.899	1.776	6.72	4.32
UPN 100	63.3	121.9	48.97	45.42	16.21	67.39	1.189	1.102	1.909	1.791	7.99	5.49
UPN 120	84.4	145.0	72.71	66.51	21.27	110.13	1.198	1.096	1.916	1.836	9.27	7.77
UPN 140	101.3	168.7	102.78	94.20	28.32	170.48	1.190	1.090	1.913	1.827	11.30	9.10
UPN 160	123.8	195.0	137.55	125.25	35.16	247.60	1.186	1.080	1.921	1.845	12.86	11.21
UPN 180	146.1	221.1	179.13	162.22	43.06	347.07	1.194	1.081	1.923	1.859	14.52	13.52
UPN 200	170.2	249.0	227.77	205.26	51.89	472.62	1.193	1.075	1.922	1.872	16.27	16.02
UPN 220	190.5	274.5	291.51	262.59	64.37	644.88	1.190	1.072	1.916	1.873	18.87	18.68
UPN 240	214.1	301.3	357.70	320.97	75.96	839.29	1.192	1.070	1.918	1.882	20.87	21.56
UPN 260	234.8	328.0	442.44	397.01	91.90	1098.91	1.193	1.070	1.927	1.882	23.80	24.60
UPN 280	253.1	353.5	532.01	479.21	109.80	1401.12	1.188	1.070	1.920	1.871	27.00	26.50

UPN 300	271.4	379.6	632.42	571.69	129.90	1759.34	1.182	1.069	1.916	1.860	30.40	28.40
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	Plasticity						Other				
Section	N _{pl} [kN]	V _{pl,y} [kN]	V _{pl,z} [kN]	M _{pl,y} [kNm]	M _{pl,z} [kNm]	Y _{pl} [mm]	N _u [kN]	G [kg/m]	A _m [m ² /m]	V [cm ³ /m]	A _m /V [1/m]
UPN 30	52.004	15.874	13.839	0.51	0.17	−1.5	52.004	1.7	0.103	221.00	466.063
UPN 40	85.942	26.118	23.404	1.14	0.38	−2.1	85.942	2.9	0.142	366.00	387.978
UPN 50	115.541	36.633	29.849	1.97	0.66	−3.2	115.541	3.9	0.181	492.00	367.886
UPN 60	151.844	43.959	43.959	3.08	0.97	−3.7	151.844	5.1	0.215	646.00	332.817
UPN 65	212.286	79.880	42.908	5.03	2.23	−4.4	212.286	7.1	0.273	903.00	302.326
UPN 80	259.078	91.175	58.613	7.50	2.84	−5.7	259.078	8.6	0.312	1100.00	283.636
UPN 100	316.190	108.406	74.487	11.51	3.81	−6.8	316.190	10.6	0.372	1350.00	275.556
UPN 120	399.232	125.773	105.421	17.09	5.00	−8.8	399.232	13.3	0.434	1700.00	255.294
UPN 140	478.733	153.315	123.466	24.15	6.65	−9.5	478.733	16.0	0.489	2040.00	239.706
UPN 160	564.383	174.515	152.128	32.32	8.26	−10.9	564.383	18.8	0.546	2400.00	227.500
UPN 180	657.247	197.003	183.436	42.10	10.12	−11.5	657.247	22.0	0.611	2800.00	218.214
UPN 200	756.401	220.781	217.389	53.53	12.19	−12.1	756.401	25.3	0.661	3220.00	205.280
UPN 220	879.999	256.091	253.377	68.51	15.13	−12.9	879.999	29.4	0.718	3740.00	191.979
UPN 240	994.281	283.091	292.588	84.06	17.85	−13.5	994.281	33.2	0.775	4230.00	183.215
UPN 260	1134.723	322.912	333.766	103.97	21.60	−14.4	1134.723	37.9	0.834	4830.00	172.671
UPN 280	1255.462	366.329	359.545	125.02	25.80	−15.8	1255.462	41.8	0.890	5330.00	166.979

UPN 300	1381.027	412.459	385.324	148.62	30.53	-17.2	1381.027	46.2	0.950	5880.00	161.565
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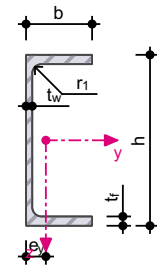


UPE (old version)

Square Edged Channels with Parallel Flange Surfaces

UPE (old version)

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	Geometry						Sectional Area	Bending				
Section	h [mm]	b [mm]	t _w [mm]	t _f [mm]	r ₁ [mm]	d [mm]	A [cm ²]	e _y [mm]	I _y [cm ⁴]	I _z [cm ⁴]	I _p [cm ⁴]	I _{p,SC} [cm ⁴]
UPE (old version) 80	80.0	50.0	4.5	8.0	10.0	44.0	11.30	18.5	118.00	28.30	146.30	302.45
UPE (old version) 100	100.0	55.0	5.0	8.5	10.0	63.0	13.90	19.4	227.00	42.30	269.30	484.72
UPE (old version) 120	120.0	60.0	5.5	9.0	10.0	82.0	16.80	20.4	392.00	60.70	452.70	743.14
UPE (old version) 140	140.0	65.0	6.0	9.5	10.0	101.0	20.00	21.3	630.00	84.30	714.30	1096.43
UPE (old version) 160	160.0	70.0	6.5	10.0	12.0	116.0	23.70	22.1	965.00	114.00	1079.00	1575.86
UPE (old version) 180	180.0	75.0	7.0	10.5	12.0	135.0	27.50	23.1	1400.00	151.00	1551.00	2185.95
UPE (old version) 200	200.0	80.0	7.5	11.0	12.0	154.0	31.60	24.1	1970.00	196.00	2166.00	2959.69
UPE (old version) 220	220.0	85.0	8.0	12.0	12.0	172.0	36.70	25.5	2770.00	256.00	3026.00	4055.71
UPE (old version) 240	240.0	90.0	8.5	13.0	15.0	184.0	42.60	26.8	3820.00	331.00	4151.00	5475.39
UPE (old version) 270	270.0	95.0	9.0	14.0	15.0	212.0	49.30	27.8	5560.00	425.00	5985.00	7648.76
UPE (old version) 300	300.0	100.0	9.5	15.0	15.0	240.0	56.60	28.9	7820.00	538.00	8358.00	10421.15
UPE (old version) 330	330.0	105.0	11.0	16.0	18.0	262.0	67.80	29.0	11010.00	682.00	11692.00	14133.46
UPE (old version) 360	360.0	110.0	12.0	17.0	18.0	290.0	77.90	29.7	14830.00	844.00	15674.00	18586.03
UPE (old version) 400	400.0	115.0	13.6	18.0	18.0	328.0	91.90	29.7	20880.00	1050.00	21930.00	25431.34

	Bending										Shear	
Section	i _y [mm]	i _z [mm]	i _p [mm]	i _{p,SC} [mm]	max S _y [cm ³]	max S _z [cm ³]	W _{z,min} [cm ³]	W _{z,max} [cm ³]	W _y [cm ³]	W _z [cm ³]	A _y [cm ²]	A _z [cm ²]
UPE (old version) 80	32.3	15.8	36.0	51.7	17.30	3.97	−15.29	8.94	29.40	8.94	5.07	2.77
UPE (old version) 100	40.3	17.4	43.9	59.1	26.50	5.38	−21.78	11.80	45.30	11.80	5.57	3.98
UPE (old version) 120	48.3	19.0	51.9	66.5	38.20	7.07	−29.82	15.30	65.40	15.30	6.11	5.36
UPE (old version) 140	56.1	20.5	59.7	74.0	52.50	9.07	−39.59	19.20	90.00	19.20	6.71	6.94
UPE (old version) 160	63.8	21.9	67.5	81.5	70.50	11.41	−51.48	23.80	121.00	23.80	7.33	8.70
UPE (old version) 180	71.5	23.4	75.2	89.2	91.20	14.09	−65.34	30.00	156.00	30.00	8.07	10.59
UPE (old version) 200	79.0	24.9	82.8	96.8	116.00	17.15	−81.38	34.90	197.00	34.90	8.83	12.73
UPE (old version) 220	86.8	26.4	90.7	105.1	147.00	21.21	−100.34	43.00	252.00	43.00	9.86	15.09
UPE (old version) 240	94.7	27.9	98.7	113.4	166.00	25.87	−123.38	52.30	318.00	52.30	11.10	17.59
UPE (old version) 270	106.0	29.4	110.0	124.6	242.00	31.48	−152.71	63.20	412.00	63.20	12.01	21.13
UPE (old version) 300	118.0	30.8	122.0	135.7	307.00	37.81	−186.39	75.40	522.00	75.40	13.01	24.96
UPE (old version) 330	127.0	31.7	130.9	144.4	396.00	46.21	−235.20	89.40	667.00	89.40	14.36	31.90
UPE (old version) 360	138.0	32.9	141.9	154.5	491.00	54.81	−284.18	105.00	824.00	105.00	15.58	38.12
UPE (old version) 400	161.0	33.7	164.5	166.4	631.00	65.48	−353.48	122.00	1050.00	122.00	16.91	47.56

	Shear	Torsion			Warping					Stability		Plasticity
Section	y_{SC} [mm]	I_t [cm ⁴]	$I_{t,s}$ [cm ⁴]	W_t [cm ³]	max ω [cm ²]	I_ω [cm ⁶]	i_ω [mm]	W_ω [cm ⁴]	max S_ω [cm ⁴]	r_z [mm]	$r_{y,SC}$ [mm]	$W_{pl,y}$ [cm ³]
UPE (old version) 80	-37.1	2.08	124.92	2.60	9.66	318.00	10.3	32.92	10.37	26.6	100.8	34.69
UPE (old version) 100	-39.3	2.81	134.01	3.31	13.76	580.00	10.9	42.15	17.59	38.4	117.0	53.08
UPE (old version) 120	-41.5	3.72	226.93	4.13	18.51	1230.00	12.9	66.46	27.77	51.6	134.6	76.35
UPE (old version) 140	-43.7	4.84	353.01	5.09	23.90	2360.00	14.7	98.76	41.47	65.8	153.2	105.06
UPE (old version) 160	-45.7	6.49	516.33	6.49	29.93	4200.00	16.3	140.32	59.71	81.6	173.0	141.03
UPE (old version) 180	-47.9	8.20	736.56	7.81	36.61	7120.00	18.0	194.46	82.95	97.2	193.0	182.50
UPE (old version) 200	-50.1	10.30	1011.48	9.36	43.95	11500.00	19.7	261.69	112.33	113.3	213.5	231.09
UPE (old version) 220	-53.0	13.80	1419.32	11.50	51.47	18400.00	21.3	357.49	152.62	127.7	233.7	294.92
UPE (old version) 240	-55.9	18.90	1895.36	14.54	59.56	28100.00	22.7	471.81	203.05	143.5	255.3	372.97
UPE (old version) 270	-58.1	24.60	2686.79	17.57	71.39	46100.00	24.6	645.74	278.15	171.0	287.2	483.68
UPE (old version) 300	-60.3	31.50	3706.94	21.00	84.16	72700.00	26.4	863.88	372.72	199.7	320.3	613.42
UPE (old version) 330	-70.2	45.20	4882.77	28.25	98.85	111800.00	28.1	1131.00	497.83	236.7	377.1	792.01
UPE (old version) 360	-72.9	58.50	6405.82	34.41	114.11	166400.00	29.9	1458.25	645.27	270.6	416.4	982.47
UPE (old version) 400	-73.9	79.10	8604.89	43.94	135.13	259000.00	31.9	1916.65	860.36	324.9	472.7	1266.12

	Plasticity											
Section	$W_{pl,y,pure}$ [cm ³]	$W_{pl,z}$ [cm ³]	$W_{pl,\omega}$ [cm ⁴]	$W_{pl,y,webs}$ [cm ³]	$W_{pl,z,flanges}$ [cm ³]	$\alpha_{pl,y}$ [--]	$\alpha_{pl,y,pure}$ [--]	$\alpha_{pl,z}$ [--]	$\alpha_{pl,\omega}$ [--]	$A_{pl,y}$ [cm ²]	$A_{pl,z}$ [cm ²]	N_{pl} [kN]
UPE (old version) 80	33.06	15.63	45.28	2.18	38.80	1.180	1.125	1.748	1.375	7.64	3.24	265.826
UPE (old version) 100	50.11	21.02	77.54	4.96	55.63	1.172	1.106	1.781	1.840	8.92	4.57	327.396
UPE (old version) 120	71.48	27.38	123.17	9.25	76.14	1.167	1.093	1.789	1.853	10.31	6.10	395.781
UPE (old version) 140	97.63	34.75	185.17	15.30	100.65	1.167	1.085	1.810	1.875	11.78	7.83	470.981
UPE (old version) 160	130.23	43.23	266.83	21.87	129.50	1.166	1.076	1.816	1.902	13.35	9.75	557.460
UPE (old version) 180	167.56	52.76	371.70	31.89	163.01	1.170	1.074	1.759	1.911	15.01	11.86	646.290
UPE (old version) 200	211.10	63.45	503.59	44.47	201.52	1.173	1.072	1.818	1.924	16.77	14.17	741.935
UPE (old version) 220	269.11	78.22	684.85	59.17	255.51	1.170	1.068	1.819	1.916	19.44	16.64	862.490
UPE (old version) 240	340.16	95.19	910.37	71.94	318.24	1.173	1.070	1.820	1.930	22.30	19.29	1000.192
UPE (old version) 270	439.37	114.78	1249.42	101.12	403.66	1.174	1.066	1.816	1.935	25.34	23.04	1159.757
UPE (old version) 300	555.32	136.72	1670.74	136.80	502.50	1.175	1.064	1.813	1.934	28.57	27.07	1330.602
UPE (old version) 330	709.94	161.73	2226.56	188.77	615.72	1.187	1.064	1.809	1.969	31.84	34.54	1592.802
UPE (old version) 360	875.52	189.25	2877.93	252.30	744.26	1.192	1.063	1.802	1.974	35.36	41.16	1831.092
UPE (old version) 400	1115.27	220.93	3801.62	365.79	909.77	1.206	1.062	1.811	1.983	38.95	51.95	2169.116

	Plasticity					Other				
Section	V _{pl,y} [kN]	V _{pl,z} [kN]	M _{pl,y} [kNm]	M _{pl,z} [kNm]	y _{pl} [mm]	N _u [kN]	G [kg/m]	A _m [m ² /m]	V [cm ³ /m]	A _m /V [1/m]
UPE (old version) 80	103.657	43.959	8.15	3.67	−3.9	265.826	8.9	0.342	1130.00	302.655
UPE (old version) 100	121.092	62.072	12.47	4.94	−5.4	327.396	10.9	0.401	1390.00	288.489
UPE (old version) 120	139.815	82.831	17.94	6.43	−7.1	395.781	13.2	0.460	1680.00	273.810
UPE (old version) 140	159.828	106.235	24.69	8.17	−8.9	470.981	15.7	0.519	2000.00	259.500
UPE (old version) 160	181.129	132.285	33.14	10.16	−10.9	557.460	18.6	0.577	2370.00	243.460
UPE (old version) 180	203.719	160.981	42.89	12.40	−12.7	646.290	21.6	0.636	2750.00	231.273
UPE (old version) 200	227.599	192.323	54.31	14.91	−14.4	741.935	24.8	0.695	3160.00	219.937
UPE (old version) 220	263.757	225.767	69.31	18.38	−15.6	862.490	28.8	0.754	3670.00	205.450
UPE (old version) 240	302.493	261.789	87.65	22.37	−16.4	1000.192	33.4	0.810	4260.00	190.141
UPE (old version) 270	343.806	312.601	113.66	26.97	−18.1	1159.757	38.7	0.889	4930.00	180.325
UPE (old version) 300	387.698	367.346	144.15	32.13	−19.4	1330.602	44.4	0.968	5660.00	171.025
UPE (old version) 330	431.997	468.629	186.12	38.01	−18.7	1592.802	53.2	1.040	6780.00	153.392
UPE (old version) 360	479.755	558.448	230.88	44.47	−18.9	1831.092	61.2	1.120	7790.00	143.774
UPE (old version) 400	528.490	704.871	297.54	51.92	−18.2	2169.116	72.1	1.220	9190.00	132.753

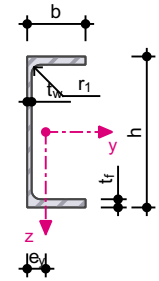


UPE

Parallel Flange Channels

UPE

- EN 10365:2017
- ArcelorMittal (2018)



	Geometry								Sectional Area	Bending		
Section	h [mm]	b [mm]	t _w [mm]	t _f [mm]	h _i [mm]	r ₁ [mm]	d [mm]	s _s [mm]	A [cm ²]	e _y [mm]	I _y [cm ⁴]	I _z [cm ⁴]
UPE 80	80.0	50.0	4.0	7.0	66.0	10.0	46.0	16.9	10.10	18.2	107.00	25.50
UPE 100	100.0	55.0	4.5	7.5	85.0	10.0	65.0	17.9	12.50	19.1	207.00	38.30
UPE 120	120.0	60.0	5.0	8.0	104.0	12.0	80.0	20.0	15.40	19.8	364.00	55.50
UPE 140	140.0	65.0	5.0	9.0	122.0	12.0	98.0	21.0	18.40	21.7	600.00	78.80
UPE 160	160.0	70.0	5.5	9.5	141.0	12.0	117.0	22.0	21.70	22.7	911.00	107.00
UPE 180	180.0	75.0	5.5	10.5	159.0	12.0	135.0	23.0	25.10	24.7	1350.00	144.00
UPE 200	200.0	80.0	6.0	11.0	178.0	13.0	152.0	24.6	29.00	25.6	1910.00	187.00
UPE 220	220.0	85.0	6.5	12.0	196.0	13.0	170.0	26.1	33.90	27.0	2680.00	247.00
UPE 240	240.0	90.0	7.0	12.5	215.0	15.0	185.0	28.3	38.50	27.9	3600.00	311.00
UPE 270	270.0	95.0	7.5	13.5	243.0	15.0	213.0	29.8	44.80	28.9	5250.00	401.00
UPE 300	300.0	100.0	9.5	15.0	270.0	15.0	240.0	33.3	56.60	28.9	7820.00	538.00
UPE 330	330.0	105.0	11.0	16.0	298.0	18.0	262.0	37.5	67.80	29.0	11010.00	681.00
UPE 360	360.0	110.0	12.0	17.0	326.0	18.0	290.0	39.5	77.90	29.7	14830.00	844.00
UPE 400	400.0	115.0	13.5	18.0	364.0	18.0	328.0	42.0	91.90	29.8	20980.00	1045.00

	Bending											
Section	I _p [cm ⁴]	I _{p,SC} [cm ⁴]	i _y [mm]	i _z [mm]	i _p [mm]	i _{p,SC} [mm]	max S _y [cm ³]	max S _z [cm ³]	W _{z,min} [cm ³]	W _{z,max} [cm ³]	W _y [cm ³]	W _z [cm ³]
UPE 80	132.50	271.50	32.6	15.9	36.3	51.8	15.60	3.55	-14.04	8.00	26.80	8.00
UPE 100	245.30	437.80	40.7	17.5	44.3	59.2	24.01	4.84	-20.09	10.60	41.40	10.60
UPE 120	419.50	681.13	48.6	19.0	52.2	66.5	35.17	6.43	-27.99	13.80	60.60	13.80
UPE 140	678.80	1057.98	57.1	20.7	60.7	75.8	49.43	8.42	-36.27	18.20	85.60	18.20
UPE 160	1018.00	1509.13	64.8	22.2	68.5	83.4	65.82	10.62	-47.15	22.60	114.00	22.60
UPE 180	1494.00	2174.15	73.4	23.9	77.2	93.1	86.51	13.30	-58.36	28.60	150.00	28.60
UPE 200	2097.00	2945.11	81.1	25.4	85.0	100.8	109.85	16.27	-73.06	34.50	191.00	34.50
UPE 220	2927.00	4030.16	89.0	27.0	93.0	109.0	140.47	20.17	-91.40	42.50	244.00	42.50
UPE 240	3911.00	5257.56	96.7	28.4	100.8	116.9	173.10	24.05	-111.42	50.10	300.00	50.10
UPE 270	5651.00	7345.85	108.0	29.9	112.1	128.1	225.05	29.42	-138.62	60.70	389.00	60.70
UPE 300	8358.00	10421.15	118.0	30.8	122.0	135.7	305.87	37.81	-186.39	75.60	522.00	75.60
UPE 330	11691.00	14133.46	127.0	31.7	130.9	144.4	394.84	46.21	-234.86	89.70	667.00	89.70
UPE 360	15674.00	18586.03	138.0	32.9	141.9	154.5	489.68	54.81	-284.18	105.00	824.00	105.00
UPE 400	22025.00	25401.44	151.0	33.7	154.7	166.3	629.16	65.38	-351.06	123.00	1050.00	123.00

	Shear			Torsion			Warping					Stability
Section	A _y [cm ²]	A _z [cm ²]	y _{SC} [mm]	I _t [cm ⁴]	I _{t,s} [cm ⁴]	W _t [cm ³]	max ω [cm ²]	I _ω [cm ⁶]	i _ω [mm]	W _ω [cm ⁴]	max S _ω [cm ⁴]	r _z [mm]
UPE 80	4.48	2.47	−37.1	1.47	63.93	2.10	9.87	220.00	9.0	22.29	9.34	27.7
UPE 100	4.95	3.61	−39.3	2.01	119.37	2.68	14.02	530.00	11.0	37.81	15.93	39.7
UPE 120	5.49	4.92	−41.2	2.90	200.06	3.62	18.82	1120.00	12.8	59.52	25.29	54.1
UPE 140	6.32	5.87	−45.4	4.05	333.22	4.50	23.80	2200.00	14.4	92.45	38.90	64.2
UPE 160	6.94	7.44	−47.6	5.20	496.88	5.47	29.80	3960.00	16.2	132.90	55.93	78.9
UPE 180	7.86	8.45	−51.9	6.99	744.44	6.66	35.82	6810.00	17.7	190.11	79.37	89.4
UPE 200	8.52	10.35	−54.1	8.89	1016.77	8.08	43.02	11000.00	19.3	255.70	107.71	105.7
UPE 220	9.67	12.36	−57.0	12.10	1418.10	10.08	50.45	17600.00	20.9	348.86	146.83	119.6
UPE 240	10.46	14.62	−59.1	15.10	1834.18	12.08	58.89	26400.00	22.4	448.27	190.20	137.3
UPE 270	11.33	17.73	−61.4	19.90	2621.45	14.74	70.60	43600.00	24.4	617.58	262.16	164.2
UPE 300	13.01	24.96	−60.3	31.50	3706.94	21.00	84.16	72700.00	26.4	863.88	372.72	199.7
UPE 330	14.31	31.90	−60.0	45.20	4900.26	28.25	98.85	112000.00	28.2	1133.02	497.83	236.7
UPE 360	15.58	38.12	−61.2	58.50	6376.08	34.41	114.11	166000.00	29.9	1454.74	645.01	270.6
UPE 400	16.75	47.86	−60.6	79.10	8626.69	43.94	135.02	259000.00	31.9	1918.21	858.67	324.4

	Stability	Plasticity										
Section	$r_{y,SC}$ [mm]	$W_{pl,y}$ [cm ³]	$W_{pl,y,pure}$ [cm ³]	$W_{pl,z}$ [cm ³]	$W_{pl,y,webs}$ [cm ³]	$W_{pl,z,flanges}$ [cm ³]	$\alpha_{pl,y}$ [--]	$\alpha_{pl,y,pure}$ [--]	$\alpha_{pl,z}$ [--]	$\alpha_{pl,\omega}$ [--]	$A_{pl,y}$ [cm ²]	$A_{pl,z}$ [cm ²]
UPE 80	101.9	31.20	29.69	13.90	2.12	34.30	1.164	1.108	1.738	1.832	6.72	2.92
UPE 100	118.3	48.00	45.21	18.90	4.75	49.50	1.159	1.092	1.783	1.860	7.91	4.16
UPE 120	136.5	70.30	65.66	24.80	8.00	68.16	1.160	1.084	1.797	1.886	9.20	5.60
UPE 140	155.0	98.80	92.48	32.60	12.01	95.65	1.154	1.080	1.791	1.865	11.25	6.55
UPE 160	174.1	132.00	122.34	40.70	18.82	123.36	1.158	1.073	1.801	1.877	12.78	8.28
UPE 180	193.2	173.00	161.24	51.50	25.06	163.01	1.153	1.075	1.801	1.857	15.17	9.32
UPE 200	213.9	220.00	204.05	62.20	34.66	201.52	1.152	1.068	1.803	1.877	16.94	11.34
UPE 220	233.6	281.00	260.47	76.90	46.96	255.51	1.152	1.068	1.809	1.877	19.62	13.52
UPE 240	255.5	347.00	319.61	90.80	59.89	306.56	1.157	1.065	1.812	1.900	21.62	15.92
UPE 270	287.0	451.00	413.87	110.00	85.07	389.88	1.159	1.064	1.812	1.901	24.64	19.24
UPE 300	320.3	613.00	555.32	140.00	136.80	502.50	1.174	1.064	1.852	1.934	28.57	27.07
UPE 330	356.7	792.00	709.94	162.00	188.77	615.72	1.187	1.064	1.806	1.965	31.84	34.54
UPE 360	393.0	982.00	875.52	189.00	252.30	744.26	1.192	1.063	1.800	1.978	35.36	41.16
UPE 400	445.6	1260.00	1113.06	221.00	363.10	909.77	1.200	1.060	1.797	1.980	38.97	51.57

	Plasticity						Other				
Section	N _{pl} [kN]	V _{pl,y} [kN]	V _{pl,z} [kN]	M _{pl,y} [kNm]	M _{pl,z} [kNm]	y _{pl} [mm]	N _u [kN]	G [kg/m]	A _m [m ² /m]	V [cm ³ /m]	A _m /V [1/m]
UPE 80	236.686	91.175	39.618	7.34	3.28	−4.1	236.686	7.9	0.343	1010.00	339.604
UPE 100	293.908	107.355	56.476	11.29	4.44	−5.7	293.908	9.8	0.402	1250.00	321.600
UPE 120	362.410	124.823	75.979	16.53	5.83	−7.8	362.410	12.1	0.460	1540.00	298.701
UPE 140	432.910	152.637	88.869	23.23	7.66	−7.8	432.910	14.4	0.520	1840.00	282.609
UPE 160	509.402	173.362	112.307	30.93	9.57	−9.6	509.402	17.0	0.579	2170.00	266.820
UPE 180	590.242	205.856	126.485	40.66	12.06	−9.5	590.242	19.7	0.639	2510.00	254.582
UPE 200	681.726	229.837	153.858	51.73	14.62	−11.4	681.726	22.8	0.697	2900.00	240.345
UPE 220	795.936	266.199	183.436	66.16	18.07	−12.5	795.936	26.6	0.756	3390.00	223.009
UPE 240	905.252	293.402	216.066	81.53	21.35	−14.4	905.252	30.2	0.813	3850.00	211.169
UPE 270	1053.890	334.275	261.009	106.02	25.90	−16.2	1053.890	35.2	0.892	4480.00	199.107
UPE 300	1330.602	387.698	367.346	144.15	32.13	−19.4	1330.602	44.4	0.968	5660.00	171.025
UPE 330	1592.802	431.997	468.629	186.12	38.01	−18.7	1592.802	53.2	1.043	6780.00	153.835
UPE 360	1831.092	479.755	558.448	230.88	44.47	−18.9	1831.092	61.2	1.121	7790.00	143.902
UPE 400	2160.562	528.734	699.688	296.76	51.90	−18.3	2160.562	72.1	1.218	9190.00	132.535

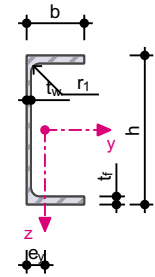


UPE

Square Edged Channels with Parallel Flange Surfaces

UPE

- DIN 1026-2:2002-10
- SZS



	Geometry								Sectional Area	Bending		
Section	h [mm]	b [mm]	t _w [mm]	t _f [mm]	h _i [mm]	r ₁ [mm]	d [mm]	k [mm]	A [cm ²]	e _y [mm]	I _y [cm ⁴]	I _z [cm ⁴]
UPE 80	80.0	50.0	4.0	7.0	66.0	10.0	46.0	17.0	10.07	18.2	107.20	25.41
UPE 100	100.0	55.0	4.5	7.5	85.0	10.0	65.0	17.5	12.50	19.1	206.90	38.21
UPE 120	120.0	60.0	5.0	8.0	104.0	12.0	80.0	20.0	15.42	19.8	363.50	55.40
UPE 140	140.0	65.0	5.0	9.0	122.0	12.0	98.0	21.0	18.42	21.7	599.50	78.70
UPE 160	160.0	70.0	5.5	9.5	141.0	12.0	117.0	21.5	21.67	22.7	911.10	106.80
UPE 180	180.0	75.0	5.5	10.5	159.0	12.0	135.0	22.5	25.11	24.7	1353.00	143.70
UPE 200	200.0	80.0	6.0	11.0	178.0	13.0	152.0	24.0	29.01	25.6	1909.00	187.30
UPE 220	220.0	85.0	6.5	12.0	196.0	13.0	170.0	25.0	33.87	27.0	2682.00	246.40
UPE 240	240.0	90.0	7.0	12.5	215.0	15.0	185.0	27.5	38.52	27.9	3599.00	310.90
UPE 270	270.0	95.0	7.5	13.5	243.0	15.0	213.0	28.5	44.84	28.9	5255.00	401.00
UPE 300	300.0	100.0	9.5	15.0	270.0	15.0	240.0	30.0	56.62	28.9	7823.00	537.70
UPE 330	330.0	105.0	11.0	16.0	298.0	18.0	262.0	34.0	67.77	29.0	11008.00	681.50
UPE 360	360.0	110.0	12.0	17.0	326.0	18.0	290.0	35.0	77.91	29.7	14825.00	843.70
UPE 400	400.0	115.0	13.5	18.0	364.0	18.0	328.0	36.0	91.93	29.8	20981.00	1045.00

	Bending											
Section	I _p [cm ⁴]	I _{p,SC} [cm ⁴]	i _y [mm]	i _z [mm]	i _p [mm]	i _{p,SC} [mm]	max S _y [cm ³]	max S _z [cm ³]	W _{z,min} [cm ³]	W _{z,max} [cm ³]	W _y [cm ³]	W _z [cm ³]
UPE 80	132.61	271.50	32.6	15.9	36.3	51.9	15.60	3.55	-13.99	7.98	26.80	7.98
UPE 100	245.11	437.80	40.7	17.5	44.3	59.2	24.01	4.84	-20.05	10.63	41.37	10.63
UPE 120	418.90	681.13	48.6	19.0	52.1	66.5	35.17	6.43	-27.94	13.79	60.58	13.79
UPE 140	678.20	1057.98	57.1	20.7	60.7	75.8	49.43	8.42	-36.22	18.19	85.64	18.19
UPE 160	1017.90	1509.13	64.8	22.2	68.5	83.5	65.82	10.62	-47.06	22.58	113.90	22.58
UPE 180	1496.70	2174.15	73.4	23.9	77.2	93.1	86.51	13.30	-58.24	28.56	150.40	28.56
UPE 200	2096.30	2945.11	81.1	25.4	85.0	100.8	109.85	16.27	-73.17	34.43	190.90	34.43
UPE 220	2928.40	4030.16	89.0	27.0	93.0	109.1	140.47	20.17	-91.18	42.51	243.90	42.51
UPE 240	3909.90	5257.56	96.7	28.4	100.7	116.8	173.10	24.05	-111.38	50.08	299.90	50.08
UPE 270	5656.00	7345.85	108.3	29.9	112.4	128.0	225.05	29.42	-138.62	60.69	389.20	60.69
UPE 300	8360.70	10421.15	117.6	30.8	121.6	135.7	305.87	37.81	-186.29	75.58	521.50	75.58
UPE 330	11689.50	14133.46	127.4	31.7	131.3	144.4	394.84	46.21	-235.03	89.66	667.10	89.66
UPE 360	15668.70	18586.03	137.9	32.9	141.8	154.5	489.68	54.81	-284.08	105.10	823.60	105.10
UPE 400	22026.00	25401.44	151.1	33.7	154.8	166.2	629.16	65.38	-351.06	122.60	1049.00	122.60

	Shear			Torsion			Warping					Stability
Section	A _y [cm ²]	A _z [cm ²]	y _{SC} [mm]	I _t [cm ⁴]	I _{t,s} [cm ⁴]	W _t [cm ³]	max ω [cm ²]	I _ω [cm ⁶]	i _ω [mm]	W _ω [cm ⁴]	max S _ω [cm ⁴]	r _z [mm]
UPE 80	4.45	2.48	−37.7	1.46	81.73	2.09	9.87	248.80	9.6	25.21	9.32	27.7
UPE 100	4.93	3.61	−39.7	2.01	147.98	2.68	14.02	590.10	11.6	42.09	15.93	39.7
UPE 120	5.47	4.91	−41.8	2.88	244.44	3.61	18.82	1238.00	13.5	65.80	25.29	54.1
UPE 140	6.31	5.86	−45.9	4.04	402.62	4.49	23.80	2418.00	15.1	101.62	38.86	64.2
UPE 160	6.92	7.45	−48.1	5.20	586.69	5.47	29.80	4303.00	16.9	144.41	55.93	78.9
UPE 180	7.83	8.48	−52.4	6.99	871.24	6.66	35.82	7368.00	18.4	205.69	79.48	89.4
UPE 200	8.54	10.34	−54.5	8.88	1185.96	8.08	43.02	11880.00	20.1	276.15	107.71	105.7
UPE 220	9.62	12.38	−57.4	12.05	1634.98	10.04	50.45	18898.00	21.7	374.58	146.83	119.6
UPE 240	10.46	14.61	−59.6	15.13	2129.51	12.10	58.89	28449.00	23.3	483.06	190.52	137.3
UPE 270	11.33	17.77	−61.8	19.92	2986.01	14.76	70.60	46533.00	25.2	659.12	262.16	164.2
UPE 300	13.00	24.98	−60.6	31.54	4124.23	21.03	84.16	76676.00	27.1	911.13	372.72	199.7
UPE 330	14.33	31.89	−60.4	45.20	5431.98	28.25	98.85	117920.00	28.9	1192.91	497.83	236.7
UPE 360	15.57	38.10	−61.5	58.52	7041.74	34.42	114.11	174450.00	30.6	1528.79	645.01	270.6
UPE 400	16.75	47.86	−60.9	79.17	9308.25	43.98	135.02	269020.00	32.5	1992.42	858.98	324.4

	Stability	Plasticity										
Section	$r_{y,SC}$ [mm]	$W_{pl,y}$ [cm ³]	$W_{pl,y,pure}$ [cm ³]	$W_{pl,z}$ [cm ³]	$W_{pl,\omega}$ [cm ⁴]	$W_{pl,y,webs}$ [cm ³]	$W_{pl,z,flanges}$ [cm ³]	$\alpha_{pl,y}$ [--]	$\alpha_{pl,y,pure}$ [--]	$\alpha_{pl,z}$ [--]	$\alpha_{pl,\omega}$ [--]	$A_{pl,y}$ [cm ²]
UPE 80	103.1	31.20	29.69	14.10	40.83	2.12	34.30	1.164	1.108	1.766	1.620	6.72
UPE 100	119.2	48.00	45.21	18.90	70.31	4.75	49.50	1.160	1.093	1.778	1.670	7.91
UPE 120	137.6	70.33	65.66	25.28	112.28	8.00	68.16	1.161	1.084	1.833	1.706	9.20
UPE 140	156.0	98.84	92.48	33.22	172.41	12.01	95.65	1.154	1.080	1.826	1.697	11.25
UPE 160	175.0	131.60	122.34	41.49	249.42	18.82	123.36	1.155	1.074	1.837	1.727	12.78
UPE 180	194.1	173.00	161.24	52.30	353.05	25.06	163.01	1.150	1.072	1.831	1.716	15.17
UPE 200	214.8	220.10	204.05	63.28	479.93	34.66	201.52	1.153	1.069	1.838	1.738	16.94
UPE 220	234.5	281.50	260.47	78.25	654.88	46.96	255.51	1.154	1.068	1.841	1.748	19.62
UPE 240	256.5	346.90	319.61	92.18	851.55	59.89	306.56	1.157	1.066	1.841	1.763	21.62
UPE 270	287.8	451.10	413.87	111.60	1173.78	85.07	389.88	1.159	1.063	1.839	1.781	24.64
UPE 300	321.0	613.40	555.32	136.60	1670.74	136.80	502.50	1.176	1.065	1.807	1.834	28.57
UPE 330	357.5	791.90	709.94	156.20	2226.56	188.77	615.72	1.187	1.064	1.742	1.866	31.84
UPE 360	393.6	982.30	875.52	177.80	2877.93	252.30	744.26	1.193	1.063	1.692	1.882	35.36
UPE 400	446.1	1263.00	1113.06	191.40	3798.08	363.10	909.77	1.204	1.061	1.561	1.906	38.97

	Plasticity							Other				
Section	A _{pl,z} [cm ²]	N _{pl} [kN]	V _{pl,y} [kN]	V _{pl,z} [kN]	M _{pl,y} [kNm]	M _{pl,z} [kNm]	y _{pl} [mm]	N _u [kN]	G [kg/m]	A _m [m ² /m]	V [cm ³ /m]	A _m /V [1/m]
UPE 80	2.92	236.686	91.175	39.618	7.34	3.28	-4.1	236.686	7.9	0.343	1007.00	341.013
UPE 100	4.16	293.908	107.355	56.476	11.29	4.44	-5.7	293.908	9.8	0.402	1250.00	321.920
UPE 120	5.60	362.410	124.823	75.979	16.53	5.83	-7.8	362.410	12.1	0.460	1542.00	298.119
UPE 140	6.55	432.910	152.637	88.869	23.23	7.66	-7.8	432.910	14.5	0.520	1842.00	282.139
UPE 160	8.28	509.402	173.362	112.307	30.93	9.57	-9.6	509.402	17.0	0.579	2167.00	267.051
UPE 180	9.32	590.242	205.856	126.485	40.66	12.06	-9.5	590.242	19.7	0.639	2511.00	254.361
UPE 200	11.34	681.726	229.837	153.858	51.73	14.62	-11.4	681.726	22.8	0.697	2901.00	240.193
UPE 220	13.52	795.936	266.199	183.436	66.16	18.07	-12.5	795.936	26.6	0.756	3387.00	223.147
UPE 240	15.92	905.252	293.402	216.066	81.53	21.35	-14.4	905.252	30.2	0.813	3852.00	211.085
UPE 270	19.24	1053.890	334.275	261.009	106.02	25.90	-16.2	1053.890	35.2	0.892	4484.00	198.952
UPE 300	27.07	1330.602	387.698	367.346	144.15	32.13	-19.4	1330.602	44.4	0.968	5662.00	170.982
UPE 330	34.54	1592.802	431.997	468.629	186.12	38.01	-18.7	1592.802	53.2	1.043	6777.00	153.903
UPE 360	41.16	1831.092	479.755	558.448	230.88	44.47	-18.9	1831.092	61.2	1.121	7791.00	143.884
UPE 400	51.57	2160.562	528.734	699.688	296.76	51.90	-18.3	2160.562	72.2	1.218	9193.00	132.492

	Other	
Section	d ₀ [mm]	w [mm]
UPE 80	13.0	34.0
UPE 100	13.0	35.0
UPE 120	13.0	36.0
UPE 140	17.0	40.0
UPE 160	21.0	43.0
UPE 180	21.0	43.0
UPE 200	21.0	45.0
UPE 220	25.0	51.0
UPE 240	25.0	54.0
UPE 270	28.0	58.0
UPE 300	28.0	60.0
UPE 330	28.0	64.0
UPE 360	28.0	65.0
UPE 400	28.0	67.0

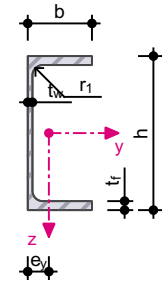


UPE

UPE Channels

UPE

- DIN 1026-2:2002-10
- Özkan



	Geometry							Sectional Area	Bending			
Section	h [mm]	b [mm]	t _w [mm]	t _f [mm]	r ₁ [mm]	d [mm]	s _s [mm]	A [cm ²]	e _y [mm]	I _y [cm ⁴]	I _z [cm ⁴]	I _p [cm ⁴]
UPE 80	80.0	50.0	4.0	7.0	10.0	46.0	16.9	10.10	18.2	107.20	25.41	132.61
UPE 100	100.0	55.0	4.5	7.5	10.0	65.0	17.9	12.50	19.1	206.90	38.21	245.11
UPE 120	120.0	60.0	5.0	8.0	12.0	80.0	20.0	15.40	19.8	363.50	55.40	418.90
UPE 140	140.0	65.0	5.0	9.0	12.0	98.0	21.0	18.40	21.7	599.50	78.70	678.20
UPE 160	160.0	70.0	5.5	9.5	12.0	117.0	22.0	21.70	22.7	911.10	106.80	1017.90
UPE 180	180.0	75.0	5.5	10.5	12.0	135.0	23.0	25.10	24.7	1353.00	143.70	1496.70
UPE 200	200.0	80.0	6.0	11.0	13.0	152.0	24.6	29.00	25.6	1909.00	187.30	2096.30
UPE 220	220.0	85.0	6.5	12.0	13.0	170.0	26.1	33.90	27.0	2682.00	246.40	2928.40
UPE 240	240.0	90.0	7.0	12.5	15.0	185.0	28.3	38.50	27.9	3599.00	310.90	3909.90
UPE 270	270.0	95.0	7.5	13.5	15.0	213.0	29.8	44.80	28.9	5255.00	401.00	5656.00
UPE 300	300.0	100.0	9.5	15.0	15.0	240.0	33.3	56.60	28.9	7823.00	537.70	8360.70

	Bending											Shear
Section	$I_{p,SC}$ [cm ⁴]	i_y [mm]	i_z [mm]	i_p [mm]	$i_{p,SC}$ [mm]	max S_y [cm ³]	max S_z [cm ³]	$W_{z,min}$ [cm ³]	$W_{z,max}$ [cm ³]	W_y [cm ³]	W_z [cm ³]	A_y [cm ²]
UPE 80	271.50	32.6	15.9	36.3	51.8	15.60	3.55	-13.99	7.98	26.80	7.98	4.45
UPE 100	437.80	40.7	17.5	44.3	59.2	24.01	4.84	-20.05	10.63	41.37	10.63	4.93
UPE 120	681.13	48.6	19.0	52.1	66.5	35.17	6.43	-27.94	13.79	60.58	13.79	5.47
UPE 140	1057.98	57.1	20.7	60.7	75.8	49.43	8.42	-36.22	18.19	85.64	18.19	6.31
UPE 160	1509.13	64.8	22.2	68.5	83.4	65.82	10.62	-47.06	22.58	113.90	22.58	6.92
UPE 180	2174.15	73.4	23.9	77.2	93.1	86.51	13.30	-58.24	28.56	150.40	28.56	7.83
UPE 200	2945.11	81.1	25.4	85.0	100.8	109.85	16.27	-73.17	34.43	190.90	34.43	8.54
UPE 220	4030.16	89.0	27.0	93.0	109.0	140.47	20.17	-91.18	42.51	243.90	42.51	9.62
UPE 240	5257.56	96.7	28.4	100.7	116.9	173.10	24.05	-111.38	50.08	299.90	50.08	10.46
UPE 270	7345.85	108.3	29.9	112.4	128.1	225.05	29.42	-138.62	60.69	389.20	60.69	11.33
UPE 300	10421.15	117.6	30.8	121.6	135.7	305.87	37.81	-186.29	75.58	521.50	75.58	13.00

	Shear		Torsion			Warping					Stability	
Section	A_z [cm ²]	y_{SC} [mm]	I_t [cm ⁴]	$I_{t,s}$ [cm ⁴]	W_t [cm ³]	max ω [cm ²]	I_ω [cm ⁶]	i_ω [mm]	W_ω [cm ⁴]	max S_ω [cm ⁴]	r_z [mm]	$r_{y,SC}$ [mm]
UPE 80	2.48	-37.1	1.47	63.93	2.10	9.87	220.00	9.0	22.29	9.34	27.7	101.9
UPE 100	3.61	-39.3	2.01	1.19	2.68	14.02	53.00	3.5	3.78	15.93	39.7	118.3
UPE 120	4.91	-41.2	2.90	200.06	3.62	18.82	1120.00	12.8	59.52	25.29	54.1	136.5
UPE 140	5.86	-45.4	4.05	333.22	4.50	23.80	2200.00	14.4	92.45	38.90	64.2	155.0
UPE 160	7.45	-47.6	5.20	496.88	5.47	29.80	3960.00	16.2	132.90	55.93	78.9	174.1
UPE 180	8.48	-51.9	6.99	744.44	6.66	35.82	6810.00	17.7	190.11	79.37	89.4	193.2
UPE 200	10.34	-54.1	8.89	1016.77	8.08	43.02	11000.00	19.3	255.70	107.71	105.7	213.9
UPE 220	12.38	-57.0	12.05	1419.71	10.04	50.45	17610.00	20.9	349.05	146.83	119.6	233.6
UPE 240	14.61	-59.1	15.14	1836.96	12.11	58.89	26420.00	22.4	448.61	190.20	137.3	255.5
UPE 270	17.77	-61.4	19.91	2615.44	14.75	70.60	43550.00	24.3	616.87	262.16	164.2	287.0
UPE 300	24.98	-60.3	31.52	3702.86	21.01	84.16	72660.00	26.4	863.40	372.72	199.7	320.3

	Plasticity											
Section	$W_{pl,y}$ [cm ³]	$W_{pl,y,pure}$ [cm ³]	$W_{pl,z}$ [cm ³]	$W_{pl,\omega}$ [cm ⁴]	$W_{pl,y,webs}$ [cm ³]	$W_{pl,z,flanges}$ [cm ³]	$\alpha_{pl,y}$ [--]	$\alpha_{pl,y,pure}$ [--]	$\alpha_{pl,z}$ [--]	$\alpha_{pl,\omega}$ [--]	$A_{pl,y}$ [cm ²]	$A_{pl,z}$ [cm ²]
UPE 80	31.23	29.69	14.28	40.83	2.12	34.30	1.165	1.108	1.789	1.832	6.72	2.92
UPE 100	48.01	45.21	19.34	70.31	4.75	49.50	1.161	1.093	1.819	18.597	7.91	4.16
UPE 120	70.33	65.66	25.28	112.28	8.00	68.16	1.161	1.084	1.833	1.886	9.20	5.60
UPE 140	98.84	92.48	33.22	172.41	12.01	95.65	1.154	1.080	1.826	1.865	11.25	6.55
UPE 160	131.80	122.34	41.49	249.42	18.82	123.36	1.157	1.074	1.837	1.877	12.78	8.28
UPE 180	173.00	161.24	52.30	353.05	25.06	163.01	1.150	1.072	1.831	1.857	15.17	9.32
UPE 200	220.10	204.05	63.28	479.93	34.66	201.52	1.153	1.069	1.838	1.877	16.94	11.34
UPE 220	281.60	260.47	78.25	654.88	46.96	255.51	1.155	1.068	1.841	1.876	19.62	13.52
UPE 240	346.90	319.61	92.18	851.55	59.89	306.56	1.157	1.066	1.841	1.898	21.62	15.92
UPE 270	451.10	413.87	111.60	1173.78	85.07	389.88	1.159	1.063	1.839	1.903	24.64	19.24
UPE 300	613.40	555.32	136.60	1670.74	136.80	502.50	1.176	1.065	1.807	1.935	28.57	27.07

	Plasticity						Other				
Section	N _{pl} [kN]	V _{pl,y} [kN]	V _{pl,z} [kN]	M _{pl,y} [kNm]	M _{pl,z} [kNm]	y _{pl} [mm]	N _u [kN]	G [kg/m]	A _m [m ² /m]	V [cm ³ /m]	A _m /V [1/m]
UPE 80	236.686	91.175	39.618	7.34	3.28	-4.1	236.686	7.9	0.340	1010.00	336.634
UPE 100	293.908	107.355	56.476	11.29	4.44	-5.7	293.908	9.8	0.400	1250.00	320.000
UPE 120	362.410	124.823	75.979	16.53	5.83	-7.8	362.410	12.1	0.460	1540.00	298.701
UPE 140	432.910	152.637	88.869	23.23	7.66	-7.8	432.910	14.4	0.520	1840.00	282.609
UPE 160	509.402	173.362	112.307	30.93	9.57	-9.6	509.402	17.0	0.580	2170.00	267.281
UPE 180	590.242	205.856	126.485	40.66	12.06	-9.5	590.242	19.7	0.640	2510.00	254.980
UPE 200	681.726	229.837	153.858	51.73	14.62	-11.4	681.726	22.8	0.700	2900.00	241.379
UPE 220	795.936	266.199	183.436	66.16	18.07	-12.5	795.936	26.6	0.760	3390.00	224.189
UPE 240	905.252	293.402	216.066	81.53	21.35	-14.4	905.252	30.2	0.810	3850.00	210.390
UPE 270	1053.890	334.275	261.009	106.02	25.90	-16.2	1053.890	35.2	0.890	4480.00	198.661
UPE 300	1330.602	387.698	367.346	144.15	32.13	-19.4	1330.602	44.4	0.970	5660.00	171.378



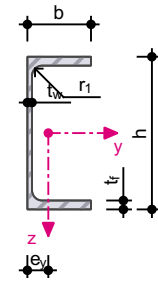
UPE

Channels with Parallel Flanges



UPE

- DIN 1026-2:2002-10
- Feronia



	Geometry						Sectional Area	Bending				
Section	h [mm]	b [mm]	t _w [mm]	t _f [mm]	r ₁ [mm]	d [mm]	A [cm ²]	e _y [mm]	I _y [cm ⁴]	I _z [cm ⁴]	I _p [cm ⁴]	I _{p,SC} [cm ⁴]
UPE 80	80.0	50.0	4.0	7.0	10.0	46.0	10.07	18.2	107.20	25.41	132.61	271.50
UPE 100	100.0	55.0	4.5	7.5	10.0	65.0	12.50	19.1	206.90	38.21	245.11	437.80
UPE 120	120.0	60.0	5.0	8.0	12.0	80.0	15.42	19.8	363.50	55.40	418.90	681.13
UPE 140	140.0	65.0	5.0	9.0	12.0	98.0	18.42	21.7	599.50	78.70	678.20	1057.98
UPE 160	160.0	70.0	5.5	9.5	12.0	117.0	21.67	22.7	911.10	106.80	1017.90	1509.13
UPE 180	180.0	75.0	5.5	10.5	12.0	135.0	25.11	24.7	1353.00	143.70	1496.70	2174.15
UPE 200	200.0	80.0	6.0	11.0	13.0	152.0	29.01	25.6	1909.00	187.30	2096.30	2945.11
UPE 220	220.0	85.0	6.5	12.0	13.0	170.0	33.87	27.0	2682.00	246.40	2928.40	4030.16
UPE 240	240.0	90.0	7.0	12.5	15.0	185.0	38.52	27.9	3599.00	310.90	3909.90	5257.56
UPE 270	270.0	95.0	7.5	13.5	15.0	213.0	44.84	28.9	5255.00	401.00	5656.00	7345.85
UPE 300	300.0	100.0	9.5	15.0	15.0	240.0	56.62	28.9	7823.00	537.70	8360.70	10421.15

	Bending										Shear	
Section	i _y [mm]	i _z [mm]	i _p [mm]	i _{p,SC} [mm]	max S _y [cm ³]	max S _z [cm ³]	W _{z,min} [cm ³]	W _{z,max} [cm ³]	W _y [cm ³]	W _z [cm ³]	A _y [cm ²]	A _z [cm ²]
UPE 80	32.6	15.9	36.3	51.9	15.61	3.55	-13.99	7.98	26.80	7.98	4.45	2.48
UPE 100	40.7	17.5	44.3	59.2	24.01	4.84	-20.05	10.63	41.37	10.63	4.93	3.61
UPE 120	48.6	19.0	52.1	66.5	35.16	6.43	-27.94	13.79	60.58	13.79	5.47	4.91
UPE 140	57.1	20.7	60.7	75.8	49.42	8.42	-36.22	18.19	85.64	18.19	6.31	5.86
UPE 160	64.8	22.2	68.5	83.5	65.81	10.62	-47.06	22.58	113.90	22.58	6.92	7.45
UPE 180	73.4	23.9	77.2	93.1	86.50	13.30	-58.24	28.56	150.40	28.56	7.83	8.48
UPE 200	81.1	25.4	85.0	100.8	110.00	16.27	-73.17	34.43	190.90	34.43	8.54	10.34
UPE 220	89.0	27.0	93.0	109.1	140.70	20.17	-91.18	42.51	243.90	42.51	9.62	12.38
UPE 240	96.7	28.4	100.7	116.8	173.40	24.05	-111.38	50.08	299.90	50.08	10.46	14.61
UPE 270	108.3	29.9	112.4	128.0	225.50	29.42	-138.62	60.69	389.20	60.69	11.33	17.77
UPE 300	117.6	30.8	121.6	135.7	306.70	37.81	-186.29	75.58	521.50	75.58	13.00	24.98

	Shear	Torsion			Warping					Stability		
Section	y _{SC} [mm]	I _t [cm ⁴]	I _{t,s} [cm ⁴]	W _t [cm ³]	max ω [cm ²]	I _ω [cm ⁶]	i _ω [mm]	W _ω [cm ⁴]	max S _ω [cm ⁴]	r _z [mm]	r _{y,SC} [mm]	c/t _f [–]
UPE 80	–37.1	1.46	74.78	2.09	9.87	238.00	9.4	24.12	9.32	27.7	101.9	5.140
UPE 100	–39.3	2.01	137.58	2.68	14.02	569.00	11.4	40.59	15.93	39.7	118.3	5.400
UPE 120	–41.2	2.88	200.06	3.61	18.82	1120.00	12.8	59.52	25.29	54.1	136.5	5.380
UPE 140	–45.4	4.04	333.30	4.49	23.80	2200.00	14.4	92.45	38.86	64.2	155.0	5.330
UPE 160	–47.6	5.20	496.88	5.47	29.80	3960.00	16.2	132.90	55.93	78.9	174.1	5.530
UPE 180	–51.9	6.99	744.28	6.66	35.82	6810.00	17.7	190.11	79.48	89.4	193.2	5.480
UPE 200	–54.1	8.88	1016.77	8.08	43.02	11000.00	19.3	255.70	107.71	105.7	213.9	5.550
UPE 220	–57.0	12.05	1419.71	10.04	50.45	17610.00	20.9	349.05	146.83	119.6	233.6	5.460
UPE 240	–59.1	15.13	1836.59	12.10	58.89	26420.00	22.4	448.61	190.52	137.3	255.5	5.440
UPE 270	–61.4	19.92	2615.44	14.76	70.60	43550.00	24.3	616.87	262.16	164.2	287.0	5.370
UPE 300	–60.3	31.54	3703.52	21.03	84.16	72660.00	26.4	863.40	372.72	199.7	320.3	5.030

	Stability	Plasticity										
Section	c/t_w [--]	$W_{pl,y}$ [cm ³]	$W_{pl,y,pure}$ [cm ³]	$W_{pl,z}$ [cm ³]	$W_{pl,\omega}$ [cm ⁴]	$W_{pl,y,webs}$ [cm ³]	$W_{pl,z,flanges}$ [cm ³]	$\alpha_{pl,y}$ [--]	$\alpha_{pl,y,pure}$ [--]	$\alpha_{pl,z}$ [--]	$\alpha_{pl,\omega}$ [--]	$A_{pl,y}$ [cm ²]
UPE 80	11.500	31.20	29.69	14.10	40.83	2.12	34.30	1.164	1.108	1.766	1.693	6.72
UPE 100	14.400	48.00	45.21	18.90	70.31	4.75	49.50	1.160	1.093	1.778	1.732	7.91
UPE 120	16.000	70.33	65.66	25.28	112.28	8.00	68.16	1.161	1.084	1.833	1.886	9.20
UPE 140	19.600	98.84	92.48	33.22	172.41	12.01	95.65	1.154	1.080	1.826	1.865	11.25
UPE 160	21.300	131.60	122.34	41.49	249.42	18.82	123.36	1.155	1.074	1.837	1.877	12.78
UPE 180	24.500	173.00	161.24	52.30	353.05	25.06	163.01	1.150	1.072	1.831	1.857	15.17
UPE 200	25.300	220.10	204.05	63.28	479.93	34.66	201.52	1.153	1.069	1.838	1.877	16.94
UPE 220	26.200	281.50	260.47	78.25	654.88	46.96	255.51	1.154	1.068	1.841	1.876	19.62
UPE 240	26.400	346.90	319.61	92.18	851.55	59.89	306.56	1.157	1.066	1.841	1.898	21.62
UPE 270	28.400	451.10	413.87	111.60	1173.78	85.07	389.88	1.159	1.063	1.839	1.903	24.64
UPE 300	25.300	613.40	555.32	136.60	1670.74	136.80	502.50	1.176	1.065	1.807	1.935	28.57

	Plasticity							Other				
Section	A _{pl,z} [cm ²]	N _{pl} [kN]	V _{pl,y} [kN]	V _{pl,z} [kN]	M _{pl,y} [kNm]	M _{pl,z} [kNm]	y _{pl} [mm]	N _u [kN]	G [kg/m]	A _m [m ² /m]	V [cm ³ /m]	A _m /V [1/m]
UPE 80	2.92	236.686	91.175	39.618	7.34	3.28	−4.1	236.686	7.9	0.343	1007.00	341.013
UPE 100	4.16	293.908	107.355	56.476	11.29	4.44	−5.7	293.908	9.8	0.402	1250.00	321.920
UPE 120	5.60	362.410	124.823	75.979	16.53	5.83	−7.8	362.410	12.1	0.460	1542.00	298.119
UPE 140	6.55	432.910	152.637	88.869	23.23	7.66	−7.8	432.910	14.5	0.520	1842.00	282.139
UPE 160	8.28	509.402	173.362	112.307	30.93	9.57	−9.6	509.402	17.0	0.579	2167.00	267.051
UPE 180	9.32	590.242	205.856	126.485	40.66	12.06	−9.5	590.242	19.7	0.639	2511.00	254.361
UPE 200	11.34	681.726	229.837	153.858	51.73	14.62	−11.4	681.726	22.8	0.697	2901.00	240.193
UPE 220	13.52	795.936	266.199	183.436	66.16	18.07	−12.5	795.936	26.6	0.756	3387.00	223.147
UPE 240	15.92	905.252	293.402	216.066	81.53	21.35	−14.4	905.252	30.2	0.813	3852.00	211.085
UPE 270	19.24	1053.890	334.275	261.009	106.02	25.90	−16.2	1053.890	35.2	0.892	4484.00	198.952
UPE 300	27.07	1330.602	387.698	367.346	144.15	32.13	−19.4	1330.602	44.4	0.968	5662.00	170.982

	Other		
Section	A _w [cm ²]	d ₀ [mm]	w [mm]
UPE 80	2.64	13.0	34.0
UPE 100	3.83	13.0	35.0
UPE 120	5.20	13.0	36.0
UPE 140	6.10	17.0	40.0
UPE 160	7.75	21.0	43.0
UPE 180	8.74	21.0	43.0
UPE 200	10.68	21.0	45.0
UPE 220	12.74	25.0	51.0
UPE 240	15.05	25.0	54.0
UPE 270	18.23	28.0	58.0
UPE 300	25.65	28.0	60.0

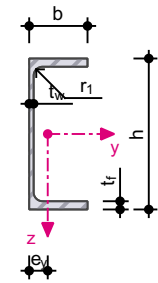


UPE

Channels with Parallel Flanges

UPE

- DIN 1026-2:2002-10
- ArcelorMittal (2009)



	Geometry								Sectional Area	Bending		
Section	h [mm]	b [mm]	t _w [mm]	t _f [mm]	h _i [mm]	r ₁ [mm]	d [mm]	s _s [mm]	A [cm ²]	e _y [mm]	I _y [cm ⁴]	I _z [cm ⁴]
UPE 80	80.0	50.0	4.0	7.0	66.0	10.0	46.0	16.9	10.10	18.2	107.00	25.50
UPE 100	100.0	55.0	4.5	7.5	85.0	10.0	65.0	17.9	12.50	19.1	207.00	38.30
UPE 120	120.0	60.0	5.0	8.0	104.0	12.0	80.0	20.0	15.40	19.8	364.00	55.50
UPE 140	140.0	65.0	5.0	9.0	122.0	12.0	98.0	21.0	18.40	21.7	600.00	78.80
UPE 160	160.0	70.0	5.5	9.5	141.0	12.0	117.0	22.0	21.70	22.7	911.00	107.00
UPE 180	180.0	75.0	5.5	10.5	159.0	12.0	135.0	23.0	25.10	24.7	1350.00	144.00
UPE 200	200.0	80.0	6.0	11.0	178.0	13.0	152.0	24.6	29.00	25.6	1910.00	187.00
UPE 220	220.0	85.0	6.5	12.0	196.0	13.0	170.0	26.1	33.90	27.0	2680.00	247.00
UPE 240	240.0	90.0	7.0	12.5	215.0	15.0	185.0	28.3	38.50	27.9	3600.00	311.00
UPE 270	270.0	95.0	7.5	13.5	243.0	15.0	213.0	29.8	44.80	28.9	5250.00	401.00
UPE 300	300.0	100.0	9.5	15.0	270.0	15.0	240.0	33.3	56.60	28.9	7820.00	538.00
UPE 330	330.0	105.0	11.0	16.0	298.0	18.0	262.0	37.5	67.80	29.0	11010.00	681.00
UPE 360	360.0	110.0	12.0	17.0	326.0	18.0	290.0	39.5	77.90	29.7	14830.00	844.00
UPE 400	400.0	115.0	13.5	18.0	364.0	18.0	328.0	42.0	91.90	29.8	20980.00	1045.00

	Bending											
Section	I _p [cm ⁴]	I _{p,SC} [cm ⁴]	i _y [mm]	i _z [mm]	i _p [mm]	i _{p,SC} [mm]	max S _y [cm ³]	max S _z [cm ³]	W _{z,min} [cm ³]	W _{z,max} [cm ³]	W _y [cm ³]	W _z [cm ³]
UPE 80	132.50	271.50	32.6	15.9	36.3	51.8	15.60	3.55	-14.04	7.98	26.80	7.98
UPE 100	245.30	437.80	40.7	17.5	44.3	59.2	24.01	4.84	-20.09	10.60	41.40	10.60
UPE 120	419.50	681.13	48.6	19.0	52.2	66.5	35.17	6.43	-27.99	13.79	60.58	13.79
UPE 140	678.80	1057.98	757.1	20.7	757.4	75.8	49.43	8.42	-36.27	18.19	85.64	18.19
UPE 160	1018.00	1509.13	64.8	22.2	68.5	83.4	65.82	10.62	-47.15	22.58	113.90	22.58
UPE 180	1494.00	2174.15	73.4	23.9	77.2	93.1	86.51	13.30	-58.36	28.56	150.40	28.56
UPE 200	2097.00	2945.11	81.1	25.4	85.0	100.8	109.85	16.27	-73.06	34.43	190.90	34.43
UPE 220	2927.00	4030.16	89.0	27.0	93.0	109.0	140.47	20.17	-91.40	42.51	243.90	42.51
UPE 240	3911.00	5257.56	96.7	28.4	100.8	116.9	173.10	24.05	-111.42	50.08	299.90	50.08
UPE 270	5651.00	7345.85	108.3	29.9	112.4	128.1	225.05	29.42	-138.62	60.69	389.20	60.69
UPE 300	8358.00	10421.15	117.6	30.8	121.6	135.7	305.87	37.81	-186.39	75.58	521.50	75.58
UPE 330	11691.00	14133.46	127.4	31.7	131.3	144.4	394.84	46.21	-234.86	89.66	667.10	89.66
UPE 360	15674.00	18586.03	137.9	32.9	141.8	154.5	489.68	54.81	-284.18	105.10	823.60	105.10
UPE 400	22025.00	25401.44	151.1	33.7	154.8	166.3	629.16	65.38	-351.06	122.60	1049.00	122.60

	Shear			Torsion			Warping					Stability
Section	A _y [cm ²]	A _z [cm ²]	y _{SC} [mm]	I _t [cm ⁴]	I _{t,s} [cm ⁴]	W _t [cm ³]	max ω [cm ²]	I _ω [cm ⁶]	i _ω [mm]	W _ω [cm ⁴]	max S _ω [cm ⁴]	r _z [mm]
UPE 80	4.48	2.47	−37.1	1.47	65.10	2.10	9.87	222.00	9.0	22.50	9.34	27.7
UPE 100	4.95	3.61	−39.3	2.01	119.37	2.68	14.02	530.00	11.0	37.81	15.93	39.7
UPE 120	5.49	4.92	−41.2	2.90	200.06	3.62	18.82	1120.00	12.8	59.52	25.29	54.1
UPE 140	6.32	5.87	−45.4	4.05	333.22	4.50	23.80	2200.00	14.4	92.45	38.90	64.2
UPE 160	6.94	7.44	−47.6	5.20	496.88	5.47	29.80	3960.00	16.2	132.90	55.93	78.9
UPE 180	7.86	8.45	−51.9	6.99	744.44	6.66	35.82	6810.00	17.7	190.11	79.37	89.4
UPE 200	8.52	10.35	−54.1	8.89	1016.77	8.08	43.02	11000.00	19.3	255.70	107.71	105.7
UPE 220	9.67	12.36	−57.0	12.05	1418.10	10.04	50.45	17600.00	20.9	348.86	146.83	119.6
UPE 240	10.46	14.62	−59.1	15.14	1834.18	12.11	58.89	26400.00	22.4	448.27	190.20	137.3
UPE 270	11.33	17.73	−61.4	19.91	2621.45	14.75	70.60	43600.00	24.4	617.58	262.16	164.2
UPE 300	13.01	24.96	−60.3	31.52	3706.94	21.01	84.16	72700.00	26.4	863.88	372.72	199.7
UPE 330	14.31	31.90	−60.0	45.18	4900.26	28.24	98.85	112000.00	28.2	1133.02	497.83	236.7
UPE 360	15.58	38.12	−61.2	58.49	6376.08	34.41	114.11	166000.00	29.9	1454.74	645.01	270.6
UPE 400	16.75	47.86	−60.6	79.14	8626.69	43.97	135.02	259000.00	31.9	1918.21	858.67	324.4

	Stability	Plasticity										
Section	$r_{y,SC}$ [mm]	$W_{pl,y}$ [cm ³]	$W_{pl,y,pure}$ [cm ³]	$W_{pl,z}$ [cm ³]	$W_{pl,y,webs}$ [cm ³]	$W_{pl,z,flanges}$ [cm ³]	$\alpha_{pl,y}$ [--]	$\alpha_{pl,y,pure}$ [--]	$\alpha_{pl,z}$ [--]	$\alpha_{pl,\omega}$ [--]	$A_{pl,y}$ [cm ²]	$A_{pl,z}$ [cm ²]
UPE 80	101.9	31.20	29.69	14.10	2.12	34.30	1.164	1.108	1.767	1.815	6.72	2.92
UPE 100	118.3	48.00	45.21	18.90	4.75	49.50	1.159	1.092	1.783	1.860	7.91	4.16
UPE 120	136.5	70.33	65.66	25.28	8.00	68.16	1.161	1.084	1.833	1.886	9.20	5.60
UPE 140	155.0	98.84	92.48	33.22	12.01	95.65	1.154	1.080	1.826	1.865	11.25	6.55
UPE 160	174.1	131.60	122.34	41.49	18.82	123.36	1.155	1.074	1.837	1.877	12.78	8.28
UPE 180	193.2	173.00	161.24	52.30	25.06	163.01	1.150	1.072	1.831	1.857	15.17	9.32
UPE 200	213.9	220.10	204.05	63.28	34.66	201.52	1.153	1.069	1.838	1.877	16.94	11.34
UPE 220	233.6	281.50	260.47	78.25	46.96	255.51	1.154	1.068	1.841	1.877	19.62	13.52
UPE 240	255.5	346.90	319.61	92.18	59.89	306.56	1.157	1.066	1.841	1.900	21.62	15.92
UPE 270	287.0	451.10	413.87	111.60	85.07	389.88	1.159	1.063	1.839	1.901	24.64	19.24
UPE 300	320.3	613.40	555.32	136.60	136.80	502.50	1.176	1.065	1.807	1.934	28.57	27.07
UPE 330	356.7	791.90	709.94	156.20	188.77	615.72	1.187	1.064	1.742	1.965	31.84	34.54
UPE 360	393.0	982.30	875.52	177.80	252.30	744.26	1.193	1.063	1.692	1.978	35.36	41.16
UPE 400	445.6	1263.00	1113.06	191.40	363.10	909.77	1.204	1.061	1.561	1.980	38.97	51.57

	Plasticity						Other				
Section	N _{pl} [kN]	V _{pl,y} [kN]	V _{pl,z} [kN]	M _{pl,y} [kNm]	M _{pl,z} [kNm]	y _{pl} [mm]	N _u [kN]	G [kg/m]	A _m [m ² /m]	V [cm ³ /m]	A _m /V [1/m]
UPE 80	236.686	91.175	39.618	7.34	3.28	-4.1	236.686	7.9	0.343	1010.00	340.016
UPE 100	293.908	107.355	56.476	11.29	4.44	-5.7	293.908	9.8	0.402	1250.00	321.933
UPE 120	362.410	124.823	75.979	16.53	5.83	-7.8	362.410	12.1	0.460	1540.00	298.506
UPE 140	432.910	152.637	88.869	23.23	7.66	-7.8	432.910	14.4	0.520	1840.00	282.445
UPE 160	509.402	173.362	112.307	30.93	9.57	-9.6	509.402	17.0	0.579	2170.00	266.682
UPE 180	590.242	205.856	126.485	40.66	12.06	-9.5	590.242	19.7	0.639	2510.00	254.462
UPE 200	681.726	229.837	153.858	51.73	14.62	-11.4	681.726	22.8	0.697	2900.00	240.290
UPE 220	795.936	266.199	183.436	66.16	18.07	-12.5	795.936	26.6	0.756	3390.00	222.962
UPE 240	905.252	293.402	216.066	81.53	21.35	-14.4	905.252	30.2	0.813	3850.00	211.201
UPE 270	1053.890	334.275	261.009	106.02	25.90	-16.2	1053.890	35.2	0.892	4480.00	199.135
UPE 300	1330.602	387.698	367.346	144.15	32.13	-19.4	1330.602	44.4	0.968	5660.00	171.047
UPE 330	1592.802	431.997	468.629	186.12	38.01	-18.7	1592.802	53.2	1.043	6780.00	153.768
UPE 360	1831.092	479.755	558.448	230.88	44.47	-18.9	1831.092	61.2	1.121	7790.00	143.845
UPE 400	2160.562	528.734	699.688	296.76	51.90	-18.3	2160.562	72.1	1.218	9190.00	132.486

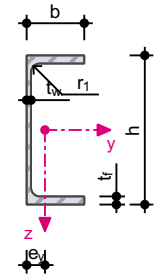


UPE

Channels with Parallel Flanges

UPE

- DIN 1026-2:2002-10
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	Geometry						Sectional Area	Bending				
Section	h [mm]	b [mm]	t _w [mm]	t _f [mm]	r ₁ [mm]	d [mm]	A [cm ²]	e _y [mm]	I _y [cm ⁴]	I _z [cm ⁴]	I _p [cm ⁴]	I _{p,SC} [cm ⁴]
UPE 80	80.0	50.0	4.0	7.0	10.0	46.0	10.07	18.2	107.20	25.41	132.61	271.50
UPE 100	100.0	55.0	4.5	7.5	10.0	65.0	12.50	19.1	206.90	38.21	245.11	437.80
UPE 120	120.0	60.0	5.0	8.0	12.0	80.0	15.42	19.8	363.50	55.40	418.90	681.13
UPE 140	140.0	65.0	5.0	9.0	12.0	98.0	18.42	21.7	599.50	78.70	678.20	1057.98
UPE 160	160.0	70.0	5.5	9.5	12.0	117.0	21.67	22.7	911.10	106.80	1017.90	1509.13
UPE 180	180.0	75.0	5.5	10.5	12.0	135.0	25.11	24.7	1353.00	143.70	1496.70	2174.15
UPE 200	200.0	80.0	6.0	11.0	13.0	152.0	29.01	25.6	1909.00	187.30	2096.30	2945.11
UPE 220	220.0	85.0	6.5	12.0	13.0	170.0	33.87	27.0	2682.00	246.40	2928.40	4030.16
UPE 240	240.0	90.0	7.0	12.5	15.0	185.0	38.52	27.9	3599.00	310.90	3909.90	5257.56
UPE 270	270.0	95.0	7.5	13.5	15.0	213.0	44.84	28.9	5255.00	401.00	5656.00	7345.85
UPE 300	300.0	100.0	9.5	15.0	15.0	240.0	56.62	28.9	7823.00	537.70	8360.70	10421.15
UPE 330	330.0	105.0	11.0	16.0	18.0	262.0	67.77	29.0	11008.00	681.50	11689.50	14133.46
UPE 360	360.0	110.0	12.0	17.0	18.0	290.0	77.91	29.7	14825.00	843.70	15668.70	18586.03
UPE 400	400.0	115.0	13.5	18.0	18.0	328.0	91.93	29.8	20981.00	1045.00	22026.00	25401.44

	Bending										Shear	
Section	i _y [mm]	i _z [mm]	i _p [mm]	i _{p,SC} [mm]	max S _y [cm ³]	max S _z [cm ³]	W _{z,min} [cm ³]	W _{z,max} [cm ³]	W _y [cm ³]	W _z [cm ³]	A _y [cm ²]	A _z [cm ²]
UPE 80	32.6	15.9	36.3	51.9	15.61	3.55	−13.99	7.98	26.80	7.98	4.45	2.48
UPE 100	40.7	17.5	44.3	59.2	24.01	4.84	−20.05	10.63	41.37	10.63	4.93	3.61
UPE 120	48.6	19.0	52.1	66.5	35.16	6.43	−27.94	13.79	60.58	13.79	5.47	4.91
UPE 140	57.1	20.7	60.7	75.8	49.42	8.42	−36.22	18.19	85.64	18.19	6.31	5.86
UPE 160	64.8	22.2	68.5	83.5	65.81	10.62	−47.06	22.58	113.90	22.58	6.92	7.45
UPE 180	73.4	23.9	77.2	93.1	86.50	13.30	−58.24	28.56	150.40	28.56	7.83	8.48
UPE 200	81.1	25.4	85.0	100.8	110.00	16.27	−73.17	34.43	190.90	34.43	8.54	10.34
UPE 220	89.0	27.0	93.0	109.1	140.70	20.17	−91.18	42.51	243.90	42.51	9.62	12.38
UPE 240	96.7	28.4	100.7	116.8	173.40	24.05	−111.38	50.08	299.90	50.08	10.46	14.61
UPE 270	108.3	29.9	112.4	128.0	225.50	29.42	−138.62	60.69	389.20	60.69	11.33	17.77
UPE 300	117.6	30.8	121.6	135.7	306.70	37.81	−186.29	75.58	521.50	75.58	13.00	24.98
UPE 330	127.4	31.7	131.3	144.4	395.90	46.21	−235.03	89.66	667.10	89.66	14.33	31.89
UPE 360	137.9	32.9	141.8	154.5	491.20	54.81	−284.08	105.10	823.60	105.10	15.57	38.10
UPE 400	151.1	33.7	154.8	166.2	631.30	65.38	−351.06	122.60	1049.00	122.60	16.75	47.86

	Shear	Torsion			Warping					Stability		
Section	y _{SC} [mm]	I _t [cm ⁴]	I _{t,s} [cm ⁴]	W _t [cm ³]	max ω [cm ²]	I _ω [cm ⁶]	i _ω [mm]	W _ω [cm ⁴]	max S _ω [cm ⁴]	r _z [mm]	r _{y,SC} [mm]	c/t _f [–]
UPE 80	–37.1	1.46	74.78	2.09	9.87	238.00	9.4	24.12	9.32	27.7	101.9	5.140
UPE 100	–39.3	2.01	137.58	2.68	14.02	569.00	11.4	40.59	15.93	39.7	118.3	5.400
UPE 120	–41.2	2.88	200.06	3.61	18.82	1120.00	12.8	59.52	25.29	54.1	136.5	5.380
UPE 140	–45.4	4.04	333.30	4.49	23.80	2200.00	14.4	92.45	38.86	64.2	155.0	5.330
UPE 160	–47.6	5.20	496.88	5.47	29.80	3960.00	16.2	132.90	55.93	78.9	174.1	5.530
UPE 180	–51.9	6.99	744.28	6.66	35.82	6810.00	17.7	190.11	79.48	89.4	193.2	5.480
UPE 200	–54.1	8.88	1016.77	8.08	43.02	11000.00	19.3	255.70	107.71	105.7	213.9	5.550
UPE 220	–57.0	12.05	1419.71	10.04	50.45	17610.00	20.9	349.05	146.83	119.6	233.6	5.460
UPE 240	–59.1	15.13	1836.59	12.10	58.89	26420.00	22.4	448.61	190.52	137.3	255.5	5.440
UPE 270	–61.4	19.92	2615.44	14.76	70.60	43550.00	24.3	616.87	262.16	164.2	287.0	5.370
UPE 300	–60.3	31.54	3703.52	21.03	84.16	72660.00	26.4	863.40	372.72	199.7	320.3	5.030
UPE 330	–60.0	45.20	4882.77	28.25	98.85	111800.00	28.1	1131.00	497.83	236.7	356.7	4.750
UPE 360	–61.2	58.52	6406.85	34.42	114.11	166400.00	29.9	1458.25	645.01	270.6	393.0	4.710
UPE 400	–60.6	79.17	8627.77	43.98	135.02	259000.00	31.9	1918.21	858.98	324.4	445.6	4.640

	Stability	Plasticity										
Section	c/t_w [--]	$W_{pl,y}$ [cm ³]	$W_{pl,y,pure}$ [cm ³]	$W_{pl,z}$ [cm ³]	$W_{pl,\omega}$ [cm ⁴]	$W_{pl,y,webs}$ [cm ³]	$W_{pl,z,flanges}$ [cm ³]	$\alpha_{pl,y}$ [--]	$\alpha_{pl,y,pure}$ [--]	$\alpha_{pl,z}$ [--]	$\alpha_{pl,\omega}$ [--]	$A_{pl,y}$ [cm ²]
UPE 80	11.500	31.20	29.69	14.10	40.83	2.12	34.30	1.164	1.108	1.766	1.693	6.72
UPE 100	14.400	48.00	45.21	18.90	70.31	4.75	49.50	1.160	1.093	1.778	1.732	7.91
UPE 120	16.000	70.33	65.66	25.28	112.28	8.00	68.16	1.161	1.084	1.833	1.886	9.20
UPE 140	19.600	98.84	92.48	33.22	172.41	12.01	95.65	1.154	1.080	1.826	1.865	11.25
UPE 160	21.300	131.60	122.34	41.49	249.42	18.82	123.36	1.155	1.074	1.837	1.877	12.78
UPE 180	24.500	173.00	161.24	52.30	353.05	25.06	163.01	1.150	1.072	1.831	1.857	15.17
UPE 200	25.300	220.10	204.05	63.28	479.93	34.66	201.52	1.153	1.069	1.838	1.877	16.94
UPE 220	26.200	281.50	260.47	78.25	654.88	46.96	255.51	1.154	1.068	1.841	1.876	19.62
UPE 240	26.400	346.90	319.61	92.18	851.55	59.89	306.56	1.157	1.066	1.841	1.898	21.62
UPE 270	28.400	451.10	413.87	111.60	1173.78	85.07	389.88	1.159	1.063	1.839	1.903	24.64
UPE 300	25.300	613.40	555.32	136.60	1670.74	136.80	502.50	1.176	1.065	1.807	1.935	28.57
UPE 330	23.800	791.90	709.94	156.20	2226.56	188.77	615.72	1.187	1.064	1.742	1.969	31.84
UPE 360	24.200	982.30	875.52	177.80	2877.93	252.30	744.26	1.193	1.063	1.692	1.974	35.36
UPE 400	24.300	1263.00	1113.06	191.40	3798.08	363.10	909.77	1.204	1.061	1.561	1.980	38.97

	Plasticity							Other				
Section	A _{pl,z} [cm ²]	N _{pl} [kN]	V _{pl,y} [kN]	V _{pl,z} [kN]	M _{pl,y} [kNm]	M _{pl,z} [kNm]	y _{pl} [mm]	N _u [kN]	G [kg/m]	A _m [m ² /m]	V [cm ³ /m]	A _m /V [1/m]
UPE 80	2.92	236.686	91.175	39.618	7.34	3.28	-4.1	236.686	7.9	0.343	1007.00	341.013
UPE 100	4.16	293.908	107.355	56.476	11.29	4.44	-5.7	293.908	9.8	0.402	1250.00	321.920
UPE 120	5.60	362.410	124.823	75.979	16.53	5.83	-7.8	362.410	12.1	0.460	1542.00	298.119
UPE 140	6.55	432.910	152.637	88.869	23.23	7.66	-7.8	432.910	14.5	0.520	1842.00	282.139
UPE 160	8.28	509.402	173.362	112.307	30.93	9.57	-9.6	509.402	17.0	0.579	2167.00	267.051
UPE 180	9.32	590.242	205.856	126.485	40.66	12.06	-9.5	590.242	19.7	0.639	2511.00	254.361
UPE 200	11.34	681.726	229.837	153.858	51.73	14.62	-11.4	681.726	22.8	0.697	2901.00	240.193
UPE 220	13.52	795.936	266.199	183.436	66.16	18.07	-12.5	795.936	26.6	0.756	3387.00	223.147
UPE 240	15.92	905.252	293.402	216.066	81.53	21.35	-14.4	905.252	30.2	0.813	3852.00	211.085
UPE 270	19.24	1053.890	334.275	261.009	106.02	25.90	-16.2	1053.890	35.2	0.892	4484.00	198.952
UPE 300	27.07	1330.602	387.698	367.346	144.15	32.13	-19.4	1330.602	44.4	0.968	5662.00	170.982
UPE 330	34.54	1592.802	431.997	468.629	186.12	38.01	-18.7	1592.802	53.2	1.043	6777.00	153.903
UPE 360	41.16	1831.092	479.755	558.448	230.88	44.47	-18.9	1831.092	61.2	1.121	7791.00	143.884
UPE 400	51.57	2160.562	528.734	699.688	296.76	51.90	-18.3	2160.562	72.2	1.218	9193.00	132.492

	Other		
Section	A _w [cm ²]	d ₀ [mm]	w [mm]
UPE 80	2.64	13.0	34.0
UPE 100	3.83	13.0	35.0
UPE 120	5.20	13.0	36.0
UPE 140	6.10	17.0	40.0
UPE 160	7.75	21.0	43.0
UPE 180	8.74	21.0	43.0
UPE 200	10.68	21.0	45.0
UPE 220	12.74	25.0	51.0
UPE 240	15.05	25.0	54.0
UPE 270	18.23	28.0	58.0
UPE 300	25.65	28.0	60.0
UPE 330	32.78	28.0	64.0
UPE 360	39.12	28.0	65.0
UPE 400	49.14	28.0	67.0

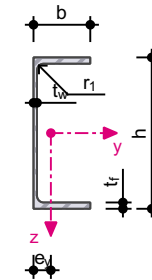


UPE

- ČSN 42 5572
- Feronia

UPE

Square Edged Channels with Parallel Flange Surfaces



	Geometry						Sectional Area	Bending				
Section	h [mm]	b [mm]	t _w [mm]	t _f [mm]	r ₁ [mm]	d [mm]	A [cm ²]	e _y [mm]	I _y [cm ⁴]	I _z [cm ⁴]	I _p [cm ⁴]	I _{p,SC} [cm ⁴]
UPE 200	200.0	76.0	5.2	9.0	9.5	163.0	23.50	23.3	1540.00	137.00	1677.00	2266.18
UPE 220	220.0	82.0	5.4	9.5	10.0	181.0	26.90	25.0	2130.00	183.00	2313.00	3099.54
UPE 240	240.0	90.0	5.6	10.0	10.5	199.0	30.80	27.5	2930.00	254.00	3184.00	4286.81
UPE 270	270.0	95.0	6.0	10.5	11.0	227.0	35.40	28.2	4210.00	322.00	4532.00	5867.35
UPE 300	300.0	100.0	6.5	11.0	12.0	254.0	40.70	28.6	5870.00	403.00	6273.00	7880.41

	Bending										Shear	
Section	i _y [mm]	i _z [mm]	i _p [mm]	i _{p,SC} [mm]	max S _y [cm ³]	max S _z [cm ³]	W _{z,min} [cm ³]	W _{z,max} [cm ³]	W _y [cm ³]	W _z [cm ³]	A _y [cm ²]	A _z [cm ²]
UPE 200	80.9	24.1	84.4	98.2	88.37	12.50	-58.91	26.00	154.00	26.00	6.43	9.07
UPE 220	89.1	26.1	92.8	107.3	111.11	15.42	-73.23	32.10	194.00	32.10	7.25	10.38
UPE 240	97.6	28.7	101.7	118.0	139.60	19.45	-92.21	40.70	244.00	40.70	8.37	11.77
UPE 270	109.0	30.1	113.1	128.7	178.64	23.43	-114.39	48.10	312.00	48.10	8.89	14.35
UPE 300	120.0	31.5	124.1	139.1	225.33	28.02	-140.83	56.50	392.00	56.50	9.46	17.35

	Shear	Torsion			Warping					Stability		Plasticity
Section	y _{SC} [mm]	I _t [cm ⁴]	I _{t,s} [cm ⁴]	W _t [cm ³]	max ω [cm ²]	I _ω [cm ⁶]	i _ω [mm]	W _ω [cm ⁴]	max S _ω [cm ⁴]	r _z [mm]	r _{y,SC} [mm]	W _{pl,y} [cm ³]
UPE 200	-50.3	4.91	907.03	5.46	42.07	8810.00	19.7	209.41	83.37	113.9	214.5	177.17
UPE 220	-54.3	6.21	1236.94	6.54	50.12	14200.00	21.4	283.34	113.17	127.3	235.8	222.76
UPE 240	-60.1	7.90	1673.58	7.90	60.04	23300.00	23.3	388.04	156.46	137.5	257.6	279.88
UPE 270	-61.7	9.91	2291.05	9.44	72.32	37500.00	25.3	518.50	211.47	166.7	290.2	358.23
UPE 300	-63.1	12.40	3046.20	11.27	85.79	58200.00	27.2	678.39	280.05	198.6	324.8	451.96

	Plasticity											
Section	$W_{pl,y,pure}$ [cm ³]	$W_{pl,z}$ [cm ³]	$W_{pl,\omega}$ [cm ⁴]	$W_{pl,y,webs}$ [cm ³]	$W_{pl,z,flanges}$ [cm ³]	$\alpha_{pl,y}$ [--]	$\alpha_{pl,y,pure}$ [--]	$\alpha_{pl,z}$ [--]	$\alpha_{pl,\omega}$ [--]	$A_{pl,y}$ [cm ²]	$A_{pl,z}$ [cm ²]	N_{pl} [kN]
UPE 200	162.71	47.21	372.87	34.54	156.64	1.150	1.057	1.816	1.781	13.21	9.93	553.040
UPE 220	204.46	58.20	506.83	44.23	195.92	1.148	1.054	1.813	1.789	15.07	11.37	631.345
UPE 240	257.16	73.79	700.50	55.44	247.50	1.147	1.054	1.813	1.805	17.44	12.88	723.705
UPE 270	327.07	87.46	947.59	77.29	306.23	1.148	1.048	1.818	1.828	19.32	15.57	832.191
UPE 300	409.89	102.48	1255.62	104.84	372.90	1.153	1.046	1.814	1.851	21.28	18.79	956.255

	Plasticity					Other				
Section	V _{pl,y} [kN]	V _{pl,z} [kN]	M _{pl,y} [kNm]	M _{pl,z} [kNm]	y _{pl} [mm]	N _u [kN]	G [kg/m]	A _m [m ² /m]	V [cm ³ /m]	A _m /V [1/m]
UPE 200	179.257	134.755	41.63	11.09	−12.5	553.040	18.4	0.690	2350.00	293.617
UPE 220	204.425	154.224	52.35	13.68	−13.6	631.345	21.1	0.750	2690.00	278.810
UPE 240	236.621	174.752	65.77	17.34	−14.5	723.705	24.2	0.820	3080.00	266.234
UPE 270	262.129	211.250	84.18	20.55	−17.1	832.191	27.8	0.900	3540.00	254.237
UPE 300	288.789	254.870	106.21	24.08	−19.8	956.255	31.9	0.980	4070.00	240.786

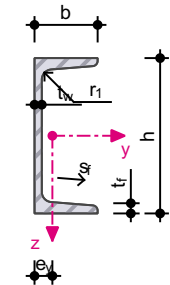


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U-Section with Tapered Flange Surfaces



	Geometry									Sectional Area	Bending	
Section	h [mm]	b [mm]	t _w [mm]	t _f [mm]	r ₁ [mm]	r ₂ [mm]	b ₁ [mm]	d [mm]	s _f [%]	A [cm ²]	e _y [mm]	I _y [cm ⁴]
U 30	30.0	33.0	5.0	7.0	7.0	3.5	16.5	1.2	8.00	5.44	13.4	6.39
U 40	40.0	35.0	5.0	7.0	7.0	3.5	17.5	11.1	8.00	6.21	13.3	14.10
U 50	50.0	38.0	5.0	7.0	7.0	3.5	19.0	20.8	8.00	7.12	13.7	26.40
U 60	60.0	30.0	6.0	6.0	6.0	3.0	15.0	35.5	8.00	6.46	9.1	31.60
U 65	65.0	42.0	5.5	7.5	7.5	4.0	21.0	33.7	8.00	9.03	14.2	57.50
U 80	80.0	45.0	6.0	8.0	8.0	4.0	22.5	46.6	8.00	11.00	14.5	106.00
U 100	100.0	50.0	6.0	8.5	8.5	4.5	25.0	64.3	8.00	13.50	15.5	206.00
U 120	120.0	55.0	7.0	9.0	9.0	4.5	27.5	82.1	8.00	17.00	16.1	364.00
U 140	140.0	60.0	7.0	10.0	10.0	5.0	30.0	97.9	8.00	20.40	17.6	605.00

U 140	140.0	60.0	7.0	10.0	10.0	5.0	30.0	97.0	8.00	20.40	17.0	800.00
U 160	160.0	65.0	7.5	10.5	10.5	5.5	32.5	115.6	8.00	24.00	18.4	925.00
U 180	180.0	70.0	8.0	11.0	11.0	5.5	35.0	133.4	8.00	28.00	19.3	1350.00
U 200	200.0	75.0	8.5	11.5	11.5	6.0	37.5	151.1	8.00	32.20	20.1	1910.00
U 220	220.0	80.0	9.0	12.5	12.5	6.5	40.0	167.0	8.00	37.40	21.4	2690.00
U 240	240.0	85.0	9.5	13.0	13.0	6.5	42.5	184.7	8.00	42.30	22.4	3600.00
U 260	260.0	90.0	10.0	14.0	14.0	7.0	45.0	200.6	8.00	48.30	23.7	4820.00
U 280	280.0	95.0	10.0	15.0	15.0	7.5	47.5	216.3	8.00	53.30	25.3	6280.00
U 300	300.0	100.0	10.0	16.0	16.0	8.0	50.0	232.1	8.00	58.80	27.0	8030.00
U 400	400.0	110.0	14.0	18.0	18.0	9.0	48.0	325.0	5.00	91.50	26.8	20350.00

	Bending											
Section	I _z [cm ⁴]	I _p [cm ⁴]	I _{p,SC} [cm ⁴]	i _y [mm]	i _z [mm]	i _p [mm]	i _{p,SC} [mm]	max S _y [cm ³]	max S _z [cm ³]	W _{z,min} [cm ³]	W _{z,max} [cm ³]	W _y [cm ³]
U 30	5.33	11.72	45.20	10.8	9.9	14.7	28.8	2.79	1.15	−3.98	2.68	4.26
U 40	6.68	20.78	60.56	15.0	10.4	18.3	31.2	4.44	1.40	−5.02	3.08	7.05
U 50	9.12	35.52	86.35	19.2	11.3	22.3	34.8	6.49	1.76	−6.66	3.75	10.60
U 60	4.51	36.11	53.09	22.1	8.4	23.6	28.7	6.55	1.14	−4.96	2.16	10.50
U 65	14.10	71.60	143.00	25.2	12.5	28.1	39.8	10.71	2.44	−9.90	5.07	17.70
U 80	19.40	125.40	216.81	31.0	13.3	33.7	44.4	15.90	3.17	−13.36	6.36	26.50

U 100	29.30	235.30	369.08	39.1	14.7	41.8	52.3	24.50	4.28	−18.90	8.49	41.20
U 120	43.20	407.20	588.90	46.2	15.9	48.9	58.9	36.30	5.80	−26.90	11.10	60.70
U 140	62.70	667.70	936.12	54.5	17.5	57.2	67.7	51.40	7.67	−35.72	14.80	86.40
U 160	85.30	1010.30	1363.50	62.1	18.9	64.9	75.4	68.80	9.67	−46.37	18.30	116.00
U 180	114.00	1464.00	1925.48	69.5	20.2	72.4	82.9	89.60	12.01	−59.12	22.40	150.00
U 200	148.00	2058.00	2640.90	77.0	21.4	79.9	90.6	114.00	14.64	−73.47	27.00	191.00
U 220	197.00	2887.00	3656.78	84.8	23.0	87.9	98.9	146.00	18.18	−91.86	33.60	245.00
U 240	248.00	3848.00	4799.23	92.2	24.2	95.3	106.5	179.00	21.64	−110.92	39.60	300.00
U 260	317.00	5137.00	6362.79	99.9	25.6	103.1	114.8	221.00	26.19	−133.89	47.70	371.00
U 280	399.00	6679.00	8245.73	109.0	27.4	112.4	124.4	266.00	30.99	−157.56	57.20	448.00
U 300	495.00	8525.00	10513.57	117.0	29.0	120.5	133.7	316.00	36.29	−183.32	67.80	535.00
U 400	846.00	21196.00	23928.63	149.0	30.4	152.1	161.7	618.00	57.56	−316.00	102.00	1020.00

	Bending	Shear			Torsion			Warping				
Section	W _z [cm ³]	A _y [cm ²]	A _z [cm ²]	y _{sc} [mm]	I _t [cm ⁴]	I _{t,s} [cm ⁴]	W _t [cm ³]	max ω [cm ²]	I _ω [cm ⁶]	i _ω [mm]	W _ω [cm ⁴]	max S _ω [cm ⁴]
U 30	2.68	3.73	0.85	−20.2	0.91	4.46	1.30	1.90	5.22	3.4	2.75	1.10
U 40	3.08	3.41	1.29	−21.7	1.00	8.55	1.43	2.97	12.95	4.6	4.36	1.87
U 50	3.75	3.55	1.74	−23.5	1.12	14.89	1.60	4.30	29.07	5.8	6.76	3.00
U 60	2.16	2.04	2.81	−14.4	0.94	13.98	1.57	4.56	21.79	6.4	4.78	2.31
U 65	5.07	3.97	2.66	−25.1	1.61	30.07	2.15	6.50	78.43	7.4	12.07	5.51
U 80	6.36	4.21	3.73	−25.9	2.16	52.79	2.70	8.89	169.30	8.8	19.04	8.79
U 100	8.49	4.66	4.88	−28.6	2.81	97.76	3.31	12.75	412.80	10.6	32.36	15.11
U 120	11.10	5.20	6.90	−29.6	4.15	162.14	4.61	17.41	896.60	12.3	51.49	24.57
U 140	14.80	5.98	8.23	−33.0	5.68	269.01	5.68	22.25	1792.00	13.8	80.54	38.05
U 160	18.30	6.57	10.19	−34.9	7.39	393.53	7.04	28.05	3232.00	15.4	115.24	55.24
U 180	22.40	7.25	12.26	−36.9	9.55	558.78	8.68	34.49	5527.00	16.9	160.25	77.38
U 200	27.00	7.89	14.64	−38.8	11.90	761.31	10.35	41.58	8972.00	18.4	215.78	105.45
U 220	33.60	8.99	17.14	−41.4	16.00	1063.58	12.80	48.88	14425.00	19.9	295.12	143.89
U 240	39.60	9.73	19.86	−43.3	19.70	1391.90	15.15	57.21	21864.00	21.3	382.16	187.44
U 260	47.70	10.80	22.68	−45.9	25.50	1855.47	18.21	65.67	32937.00	22.8	501.55	245.42
U 280	57.20	11.94	24.62	−49.6	31.00	2439.12	20.67	74.32	47984.00	24.1	645.61	312.59

U 300	67.80	13.10	26.48	-53.3	37.40	3151.06	23.38	83.47	68288.00	25.5	818.15	392.48
U 400	102.00	14.88	49.91	-51.2	81.60	7161.58	45.33	130.30	216980.00	30.1	1665.22	799.94

	Stability		Plasticity									
Section	r _z [mm]	r _{y,SC} [mm]	W _{pl,y} [cm ³]	W _{pl,y,pure} [cm ³]	W _{pl,z} [cm ³]	W _{pl,ω} [cm ⁴]	α _{pl,y} [--]	α _{pl,y,pure} [--]	α _{pl,z} [--]	α _{pl,ω} [--]	A _{pl,y} [cm ²]	A _{pl,z} [cm ²]
U 30	10.0	50.4	5.59	5.45	4.56	4.68	1.312	1.279	1.703	1.705	4.27	1.15
U 40	15.5	58.9	8.88	8.56	5.55	8.11	1.260	1.214	1.803	1.861	4.55	1.65
U 50	22.0	69.0	12.98	12.40	6.89	13.14	1.225	1.170	1.838	1.943	4.97	2.15
U 60	39.2	68.0	13.09	11.91	4.13	10.33	1.247	1.135	1.913	2.161	3.24	3.24
U 65	33.2	83.4	21.41	20.21	9.48	24.33	1.210	1.142	1.870	2.016	5.89	3.16
U 80	45.6	97.4	31.90	29.77	12.08	39.11	1.204	1.124	1.899	2.054	6.72	4.32
U 100	63.3	120.5	48.97	45.42	16.21	67.39	1.189	1.102	1.909	2.082	7.99	5.49
U 120	84.4	143.6	72.71	66.51	21.27	110.13	1.198	1.096	1.916	2.139	9.27	7.77
U 140	101.3	167.3	102.78	94.20	28.32	170.48	1.190	1.090	1.913	2.117	11.30	9.10
U 160	123.8	193.6	137.55	125.25	35.16	247.60	1.186	1.080	1.921	2.149	12.86	11.21
U 180	146.1	219.9	179.13	162.22	43.06	347.07	1.194	1.081	1.923	2.166	14.52	13.52
U 200	170.2	247.8	227.77	205.26	51.89	472.62	1.193	1.075	1.922	2.190	16.27	16.02
U 220	190.5	273.3	291.51	262.59	64.37	644.88	1.190	1.072	1.916	2.185	18.87	18.68
U 240	214.1	300.7	357.70	320.97	75.96	839.29	1.192	1.070	1.918	2.196	20.87	21.56
U 260	234.8	326.6	442.44	397.01	91.90	1098.91	1.193	1.070	1.927	2.191	23.80	24.60
U 280	253.1	352.3	532.01	479.21	109.80	1401.12	1.188	1.070	1.920	2.170	27.00	26.50

U 300	271.4	378.0	632.42	571.69	129.90	1759.34	1.182	1.069	1.916	2.150	30.40	28.40
U 400	399.0	501.4	1236.03	1080.43	192.63	3505.56	1.212	1.059	1.889	2.105	37.08	53.48

	Plasticity						Other					
Section	N _{pl} [kN]	V _{pl,y} [kN]	V _{pl,z} [kN]	M _{pl,y} [kNm]	M _{pl,z} [kNm]	y _{pl} [mm]	N _u [kN]	G [kg/m]	A _m [m ² /m]	V [cm ³ /m]	A _m /V [1/m]	A _w [cm ²]
U 30	127.829	57.934	15.603	1.31	1.07	−1.6	127.829	4.3	0.174	544.00	319.853	0.80
U 40	145.971	61.733	22.387	2.09	1.31	−2.3	145.971	4.9	0.199	621.00	320.451	1.30
U 50	167.309	67.432	29.171	3.05	1.62	−3.1	167.309	5.6	0.232	712.00	325.843	1.80
U 60	151.844	43.959	43.959	3.08	0.97	−3.7	151.844	5.1	0.215	646.00	332.817	2.88
U 65	212.286	79.880	42.908	5.03	2.23	−4.4	212.286	7.1	0.273	903.00	302.326	2.75
U 80	259.078	91.175	58.613	7.50	2.84	−5.7	259.078	8.6	0.312	1100.00	283.636	3.84
U 100	316.190	108.406	74.487	11.51	3.81	−6.8	316.190	10.6	0.372	1350.00	275.556	4.98
U 120	399.232	125.773	105.421	17.09	5.00	−8.8	399.232	13.3	0.434	1700.00	255.294	7.14
U 140	478.733	153.315	123.466	24.15	6.65	−9.5	478.733	16.0	0.489	2040.00	239.706	8.40
U 160	564.383	174.515	152.128	32.32	8.26	−10.9	564.383	18.8	0.546	2400.00	227.500	10.40
U 180	657.247	197.003	183.436	42.10	10.12	−11.5	657.247	22.0	0.611	2800.00	218.214	12.60
U 200	756.401	220.781	217.389	53.53	12.19	−12.1	756.401	25.3	0.661	3220.00	205.280	15.00
U 220	879.999	256.091	253.377	68.51	15.13	−12.9	879.999	29.4	0.718	3740.00	191.979	17.60
U 240	994.281	283.091	292.588	84.06	17.85	−13.5	994.281	33.2	0.775	4230.00	183.215	20.30
U 260	1134.723	322.912	333.766	103.97	21.60	−14.4	1134.723	37.9	0.834	4830.00	172.671	23.20
U 280	1255.462	366.329	359.545	125.02	25.80	−15.8	1255.462	41.8	0.890	5330.00	166.979	25.00

U 300	1381.027	412.459	385.324	148.62	30.53	-17.2	1381.027	46.2	0.950	5880.00	161.565	26.80
U 400	2150.103	503.091	725.602	290.47	45.27	-15.3	2150.103	71.8	1.182	9150.00	129.180	51.00

	Other	
Section	d ₀ [mm]	w [mm]
U 30	0.0	0.0
U 40	0.0	0.0
U 50	0.0	0.0
U 60	0.0	0.0
U 65	0.0	0.0
U 80	0.0	0.0
U 100	11.0	36.0
U 120	13.0	37.0
U 140	13.0	37.0
U 160	17.0	43.0
U 180	21.0	45.0
U 200	21.0	46.0
U 220	21.0	47.0
U 240	25.0	54.0
U 260	25.0	56.0
U 280	28.0	60.0

U 300	28.0	61.0
U 400	28.0	67.0

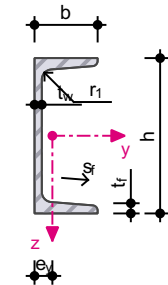


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U-Section with Tapered Flange Surfaces



	Geometry									Sectional Area	Bending	
Section	h [mm]	b [mm]	t _w [mm]	t _f [mm]	r ₁ [mm]	r ₂ [mm]	b ₁ [mm]	d [mm]	s _f [%]	A [cm ²]	e _y [mm]	I _y [cm ⁴]
U 30x15	30.0	15.0	4.0	4.5	4.5	2.0	7.5	12.1	8.00	2.21	5.2	2.53
U 30	30.0	33.0	5.0	7.0	7.0	3.5	16.5	1.2	8.00	5.44	13.4	6.39
U 40x20	40.0	20.0	5.0	5.5	5.5	2.5	10.0	19.0	8.00	3.66	6.7	7.58
U 40	40.0	35.0	5.0	7.0	7.0	3.5	17.5	11.1	8.00	6.21	13.3	14.13
U 50x25	50.0	25.0	5.0	6.0	6.0	3.0	12.5	25.7	8.00	4.92	8.1	16.84
U 50	50.0	38.0	5.0	7.0	7.0	3.5	19.0	20.8	8.00	7.12	13.7	26.50
U 60	60.0	30.0	6.0	6.0	6.0	3.0	15.0	35.5	8.00	6.46	9.1	31.59
U 65	65.0	42.0	5.5	7.5	7.5	4.0	21.0	33.7	8.00	9.03	14.2	57.53
U 80	80.0	45.0	6.0	8.0	8.0	4.0	22.5	46.6	8.00	11.02	14.5	105.90

U 80	80.0	40.0	6.0	8.0	8.0	4.0	22.0	40.0	8.00	11.92	14.0	188.00
U 100	100.0	50.0	6.0	8.5	8.5	4.5	25.0	64.3	8.00	13.45	15.5	205.30
U 120	120.0	55.0	7.0	9.0	9.0	4.5	27.5	82.1	8.00	16.99	16.1	364.30
U 140	140.0	60.0	7.0	10.0	10.0	5.0	30.0	97.9	8.00	20.37	17.6	604.80
U 160	160.0	65.0	7.5	10.5	10.5	5.5	32.5	115.6	8.00	24.01	18.4	924.70
U 180	180.0	70.0	8.0	11.0	11.0	5.5	35.0	133.4	8.00	27.97	19.3	1354.00
U 200	200.0	75.0	8.5	11.5	11.5	6.0	37.5	151.1	8.00	32.18	20.1	1911.00
U 220	220.0	80.0	9.0	12.5	12.5	6.5	40.0	167.0	8.00	37.44	21.4	2691.00
U 240	240.0	85.0	9.5	13.0	13.0	6.5	42.5	184.7	8.00	42.31	22.4	3599.00
U 260	260.0	90.0	10.0	14.0	14.0	7.0	45.0	200.6	8.00	48.28	23.7	4824.00
U 280	280.0	95.0	10.0	15.0	15.0	7.5	47.5	216.3	8.00	53.42	25.3	6276.00
U 300	300.0	100.0	10.0	16.0	16.0	8.0	50.0	232.1	8.00	58.76	27.0	8028.00
U 320	320.0	100.0	14.0	17.5	17.5	8.8	43.0	247.4	5.00	75.78	26.0	10870.00
U 350	350.0	100.0	14.0	16.0	16.0	8.0	43.0	283.3	5.00	77.25	24.0	12840.00
U 380	380.0	102.0	13.5	16.0	16.0	8.0	44.3	313.1	5.00	80.35	23.8	15760.00
U 400	400.0	110.0	14.0	18.0	18.0	9.0	48.0	325.0	5.00	91.49	26.8	20350.00

	Bending											
Section	I _z [cm ⁴]	I _p [cm ⁴]	I _{p,SC} [cm ⁴]	i _y [mm]	i _z [mm]	i _p [mm]	i _{p,SC} [mm]	max S _y [cm ³]	max S _z [cm ³]	W _{z,min} [cm ³]	W _{z,max} [cm ³]	W _y [cm ³]

U 30x15	0.38	2.91	4.40	10.7	4.2	11.5	14.1	1.09	0.19	−0.74	0.39	1.69
U 30	5.10	11.49	45.20	10.8	9.7	14.5	28.8	2.79	1.15	−3.81	2.60	4.26
U 40x20	1.14	8.72	13.16	14.4	5.6	15.5	19.0	2.42	0.43	−1.70	0.86	3.79
U 40	6.68	20.81	60.56	15.1	10.4	18.3	31.2	4.44	1.40	−5.02	3.08	7.07
U 50x25	2.49	19.33	29.64	18.5	7.1	19.8	24.6	4.20	0.75	−3.06	1.48	6.73
U 50	9.10	35.60	86.35	19.3	11.3	22.4	34.8	6.49	1.76	−6.65	3.74	10.60
U 60	4.51	36.10	53.09	22.1	8.4	23.6	28.7	6.55	1.14	−4.96	2.16	10.53
U 65	13.98	71.51	143.00	25.2	12.4	28.1	39.8	10.71	2.44	−9.82	5.04	17.70
U 80	19.36	125.26	216.81	31.0	13.3	33.7	44.4	15.95	3.17	−13.34	6.35	26.48
U 100	29.15	234.45	369.08	39.1	14.7	41.8	52.4	24.48	4.28	−18.80	8.45	41.07
U 120	43.06	407.36	588.90	46.3	15.9	49.0	58.9	36.35	5.80	−26.82	11.10	60.72
U 140	62.49	667.29	936.12	54.5	17.5	57.2	67.8	51.39	7.67	−35.60	14.70	86.40
U 160	85.05	1009.75	1363.50	62.1	18.8	64.9	75.4	68.77	9.67	−46.24	18.20	115.60
U 180	113.50	1467.50	1925.48	69.6	20.1	72.4	83.0	89.56	12.01	−58.86	22.40	150.40
U 200	147.80	2058.80	2640.90	77.1	21.4	80.0	90.6	113.90	14.64	−73.37	26.90	191.10
U 220	195.90	2886.90	3656.78	84.8	22.9	87.8	98.8	145.70	18.18	−91.35	33.50	244.70
U 240	247.40	3846.40	4799.23	92.2	24.2	95.3	106.5	178.80	21.64	−110.65	39.50	299.90
U 260	317.30	5141.30	6362.79	100.0	25.6	103.2	114.8	221.20	26.19	−134.02	47.80	371.10
U 280	398.20	6674.20	8245.73	108.0	27.3	111.4	124.2	266.00	30.99	−157.25	57.20	448.30
U 300	493.20	8521.20	10513.57	117.0	29.0	120.5	133.8	316.20	36.29	−182.65	67.60	535.20

U 320	596.60	11466.60	13469.24	120.0	28.1	123.2	133.3	412.60	44.38	−229.71	80.60	679.30
U 350	570.90	13410.90	15158.64	129.0	27.2	131.8	140.1	449.60	42.78	−238.21	75.10	734.00
U 380	615.20	16375.20	18228.64	140.0	27.7	142.7	150.6	507.40	45.15	−258.03	78.70	829.20
U 400	851.10	21201.10	23928.63	149.0	30.5	152.1	161.7	618.00	57.56	−317.90	102.00	1018.00

	Bending	Shear			Torsion			Warping				
Section	W _z [cm ³]	A _y [cm ²]	A _z [cm ²]	y _{sc} [mm]	I _t [cm ⁴]	I _{t,s} [cm ⁴]	W _t [cm ³]	max ω [cm ²]	I _ω [cm ⁶]	i _ω [mm]	W _ω [cm ⁴]	max S _ω [cm ⁴]
U 30x15	0.39	0.77	0.91	−6.9	0.16	1.24	0.35	1.02	0.41	3.0	0.40	0.18
U 30	2.60	3.41	0.85	−20.2	0.89	4.46	1.27	1.90	5.22	3.4	2.75	1.10
U 40x20	0.86	1.26	1.51	−9.4	0.38	3.70	0.69	1.86	2.24	4.1	1.20	0.55
U 40	3.08	3.41	1.30	−21.7	0.98	8.55	1.40	2.97	12.95	4.6	4.36	1.87
U 50x25	1.48	1.67	1.94	−12.7	0.57	8.03	0.95	3.00	7.98	5.2	2.66	1.23
U 50	3.74	3.53	1.75	−23.5	1.10	14.89	1.57	4.30	29.07	5.8	6.76	3.00
U 60	2.16	2.04	2.81	−14.4	0.87	13.98	1.46	4.56	21.79	6.4	4.78	2.31
U 65	5.04	3.90	2.66	−25.1	1.57	30.07	2.10	6.50	78.43	7.4	12.07	5.51
U 80	6.35	4.19	3.72	−25.9	2.16	52.79	2.70	8.89	169.30	8.8	19.04	8.79
U 100	8.45	4.61	4.85	−28.6	2.82	97.76	3.32	12.75	412.80	10.6	32.36	15.11
U 120	11.10	5.17	6.91	−29.6	4.15	162.14	4.61	17.41	896.60	12.3	51.49	24.57
U 140	14.70	5.94	8.22	−33.0	5.72	269.00	5.72	22.25	1792.00	13.8	80.54	38.07
U 160	18.20	6.53	10.19	−34.9	7.44	393.53	7.08	28.05	3232.00	15.4	115.24	55.24
U 180	22.40	7.19	12.34	−36.9	9.52	558.78	8.66	34.49	5527.00	16.9	160.25	77.38
U 200	26.90	7.87	14.66	−38.8	12.01	761.31	10.44	41.58	8972.00	18.4	215.78	105.45
U 220	33.50	8.89	17.16	−41.4	16.16	1063.58	12.93	48.88	14425.00	19.9	295.12	143.89

U 240	39.50	9.68	19.85	−43.3	19.83	1391.90	15.25	57.21	21864.00	21.3	382.16	187.44
U 260	47.80	10.82	22.71	−45.9	25.77	1855.47	18.41	65.67	32937.00	22.8	501.55	245.42
U 280	57.20	11.89	24.59	−49.6	31.41	2439.12	20.94	74.32	47984.00	24.1	645.61	312.59
U 300	67.60	13.01	26.47	−53.3	38.04	3151.06	23.78	83.47	68288.00	25.5	818.15	392.48
U 320	80.60	14.68	39.11	−48.1	68.06	4213.37	38.89	91.61	94232.00	26.5	1028.66	485.20
U 350	75.10	12.97	43.29	−44.6	62.01	4494.50	38.76	104.35	111550.00	27.1	1069.03	521.56
U 380	78.70	12.52	45.82	−45.2	61.68	5285.21	38.55	116.98	143500.00	28.1	1226.75	601.38
U 400	102.00	15.06	49.91	−51.2	82.98	7161.58	46.10	130.30	216980.00	30.1	1665.22	799.94

	Stability		Plasticity									
Section	r _z [mm]	r _{y,SC} [mm]	W _{pl,y} [cm ³]	W _{pl,y,pure} [cm ³]	W _{pl,z} [cm ³]	W _{pl,ω} [cm ⁴]	α _{pl,y} [--]	α _{pl,y,pure} [--]	α _{pl,z} [--]	α _{pl,ω} [--]	A _{pl,y} [cm ²]	A _{pl,z} [cm ²]
U 30x15	16.5	30.3	2.18	2.02	0.74	0.82	1.290	1.197	1.887	2.033	1.17	1.02
U 30	10.0	50.4	5.59	5.45	4.56	4.68	1.311	1.278	1.755	1.705	4.27	1.15
U 40x20	22.8	41.6	4.86	4.50	1.62	2.46	1.282	1.186	1.885	2.045	1.92	1.72
U 40	15.5	58.9	8.88	8.56	5.55	8.11	1.257	1.211	1.803	1.861	4.55	1.65
U 50x25	29.5	54.9	8.40	7.78	2.79	5.51	1.248	1.155	1.886	2.073	2.70	2.20
U 50	22.0	69.0	12.98	12.40	6.89	13.14	1.225	1.170	1.843	1.943	4.97	2.15
U 60	39.2	68.0	13.09	11.91	4.13	10.33	1.243	1.131	1.913	2.161	3.24	3.24
U 65	33.2	83.4	21.41	20.21	9.48	24.33	1.210	1.142	1.881	2.016	5.89	3.16
U 80	45.6	97.4	31.90	29.77	12.08	39.11	1.205	1.124	1.902	2.054	6.72	4.32
U 100	63.3	120.5	48.97	45.42	16.21	67.39	1.192	1.106	1.918	2.082	7.99	5.49
U 120	84.4	143.6	72.71	66.51	21.27	110.13	1.197	1.095	1.916	2.139	9.27	7.77
U 140	101.3	167.3	102.78	94.20	28.32	170.48	1.190	1.090	1.926	2.117	11.30	9.10
U 160	123.8	193.6	137.55	125.25	35.16	247.60	1.190	1.084	1.932	2.149	12.86	11.21
U 180	146.1	219.9	179.13	162.22	43.06	347.07	1.191	1.079	1.923	2.166	14.52	13.52
U 200	170.2	247.8	227.77	205.26	51.89	472.62	1.192	1.074	1.929	2.190	16.27	16.02
U 220	190.5	273.3	291.51	262.59	64.37	644.88	1.191	1.073	1.922	2.185	18.87	18.68

U 240	214.1	300.7	357.70	320.97	75.96	839.29	1.193	1.070	1.923	2.196	20.87	21.56
U 260	234.8	326.6	442.44	397.01	91.90	1098.91	1.192	1.070	1.923	2.191	23.80	24.60
U 280	253.1	352.3	532.01	479.21	109.80	1401.12	1.187	1.069	1.920	2.170	27.00	26.50
U 300	271.4	378.0	632.42	571.69	129.90	1759.34	1.182	1.068	1.922	2.150	30.40	28.40
U 320	279.9	376.1	825.32	729.71	151.96	2149.49	1.215	1.074	1.885	2.090	32.55	42.35
U 350	342.9	432.1	899.31	780.62	142.52	2257.91	1.225	1.064	1.898	2.112	29.76	46.76
U 380	394.8	485.2	1014.84	877.85	149.11	2592.27	1.224	1.059	1.895	2.113	30.48	49.14
U 400	399.0	501.4	1236.03	1080.43	192.63	3505.56	1.214	1.061	1.889	2.105	37.08	53.48

	Plasticity						Other					
Section	N _{pl} [kN]	V _{pl,y} [kN]	V _{pl,z} [kN]	M _{pl,y} [kNm]	M _{pl,z} [kNm]	y _{pl} [mm]	N _u [kN]	G [kg/m]	A _m [m ² /m]	V [cm ³ /m]	A _m /V [1/m]	A _w [cm ²]
U 30x15	52.004	15.874	13.839	0.51	0.17	−1.5	52.004	1.7	0.103	221.30	465.432	0.84
U 30	127.829	57.934	15.603	1.31	1.07	−1.6	127.829	4.3	0.174	543.90	319.912	0.80
U 40x20	86.383	26.118	23.404	1.14	0.38	−2.1	86.383	2.9	0.142	365.70	388.296	1.45
U 40	145.971	61.733	22.387	2.09	1.31	−2.3	145.971	4.9	0.199	621.10	320.399	1.30
U 50x25	115.541	36.633	29.849	1.97	0.66	−3.2	115.541	3.9	0.181	491.60	368.186	1.90
U 50	167.309	67.432	29.171	3.05	1.62	−3.1	167.309	5.6	0.232	711.90	325.888	1.80
U 60	151.844	43.959	43.959	3.08	0.97	−3.7	151.844	5.1	0.215	646.10	332.766	2.88
U 65	212.286	79.880	42.908	5.03	2.23	−4.4	212.286	7.1	0.273	903.20	302.259	2.75
U 80	259.078	91.175	58.613	7.50	2.84	−5.7	259.078	8.7	0.312	1102.00	283.122	3.84
U 100	316.190	108.406	74.487	11.51	3.81	−6.8	316.190	10.6	0.372	1345.00	276.580	4.98
U 120	399.232	125.773	105.421	17.09	5.00	−8.8	399.232	13.3	0.434	1699.00	255.444	7.14
U 140	478.733	153.315	123.466	24.15	6.65	−9.5	478.733	16.0	0.489	2037.00	240.059	8.40
U 160	564.383	174.515	152.128	32.32	8.26	−10.9	564.383	18.8	0.546	2401.00	227.405	10.40
U 180	657.247	197.003	183.436	42.10	10.12	−11.5	657.247	22.0	0.611	2797.00	218.448	12.60
U 200	756.401	220.781	217.389	53.53	12.19	−12.1	756.401	25.3	0.661	3218.00	205.407	15.00
U 220	879.999	256.091	253.377	68.51	15.13	−12.9	879.999	29.4	0.718	3744.00	191.774	17.60

U 240	994.281	283.091	292.588	84.06	17.85	−13.5	994.281	33.2	0.775	4231.00	183.172	20.30
U 260	1134.723	322.912	333.766	103.97	21.60	−14.4	1134.723	37.9	0.834	4828.00	172.742	23.20
U 280	1255.462	366.329	359.545	125.02	25.80	−15.8	1255.462	41.9	0.890	5342.00	166.604	25.00
U 300	1381.027	412.459	385.324	148.62	30.53	−17.2	1381.027	46.1	0.950	5876.00	161.675	26.80
U 320	1780.891	441.630	574.593	193.95	35.71	−14.1	1780.891	59.5	0.982	7578.00	129.586	39.90
U 350	1815.558	403.776	634.427	211.34	33.49	−12.9	1815.558	60.6	1.050	7725.00	135.922	44.50
U 380	1888.408	413.544	666.718	238.49	35.04	−13.3	1888.408	63.1	1.110	8035.00	138.146	47.00
U 400	2150.103	503.091	725.602	290.47	45.27	−15.3	2150.103	71.8	1.180	9149.00	128.976	51.00

	Other	
Section	d ₀ [mm]	w [mm]
U 30x15	0.0	0.0
U 30	0.0	0.0
U 40x20	0.0	0.0
U 40	0.0	0.0
U 50x25	0.0	0.0
U 50	0.0	0.0
U 60	0.0	0.0
U 65	0.0	0.0
U 80	0.0	0.0
U 100	11.0	36.0
U 120	13.0	37.0
U 140	13.0	37.0
U 160	17.0	43.0
U 180	21.0	45.0
U 200	21.0	46.0
U 220	21.0	47.0

U 240	25.0	54.0
U 260	25.0	56.0
U 280	28.0	60.0
U 300	28.0	61.0
U 320	25.0	63.0
U 350	28.0	65.0
U 380	28.0	65.0
U 400	28.0	67.0

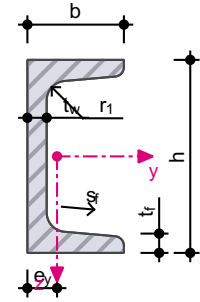


U

Hot Rolled Round Edged Channels

U

- DIN 1026
- Hempel Metals



	Geometry									Sectional Area	Bending	
Section	h [mm]	b [mm]	t _w [mm]	t _f [mm]	r ₁ [mm]	r ₂ [mm]	b ₁ [mm]	d [mm]	s _f [%]	A [cm ²]	e _y [mm]	I _y [cm ⁴]
U 30x15x4/4	30.0	15.0	4.0	4.0	4.0	2.0	5.5	13.7	8.75	2.12	5.0	2.43
U 30x33x5/7	30.0	33.0	5.0	7.0	7.0	3.5	14.0	0.7	8.75	5.55	13.5	6.46
U 40x20x3/3	40.0	20.0	3.0	3.0	3.0	1.5	8.5	27.0	8.75	2.24	5.7	5.14
U 50x25x3/3	50.0	25.0	3.0	3.0	3.0	1.5	11.0	36.6	8.75	2.84	6.7	10.48
U 60x30x6/6	60.0	30.0	6.0	6.0	6.0	3.0	12.0	34.9	8.75	6.57	9.2	32.24
U 80x40x5/5	80.0	45.0	5.0	5.0	5.0	2.5	20.0	57.3	8.75	8.07	12.4	78.00
U 100x50x4/4	100.0	50.0	4.0	4.0	4.0	2.0	23.0	80.6	8.75	7.72	12.0	118.32
U 100x50x6/6	100.0	50.0	6.0	6.0	6.0	3.0	22.0	73.2	8.75	11.37	13.4	167.76

	Bending											
Section	I_z [cm ⁴]	I_p [cm ⁴]	$I_{p,SC}$ [cm ⁴]	i_y [mm]	i_z [mm]	i_p [mm]	$i_{p,SC}$ [mm]	max S_y [cm ³]	max S_z [cm ³]	$W_{z,min}$ [cm ³]	$W_{z,max}$ [cm ³]	W_y [cm ³]
U 30x15x4/4	0.36	2.79	4.11	10.7	4.1	11.5	13.9	1.04	0.18	−0.72	0.36	1.62
U 30x33x5/7	5.18	11.64	46.22	10.8	9.7	14.5	28.9	2.84	1.17	−3.84	2.65	4.31
U 40x20x3/3	0.71	5.85	8.63	15.1	5.6	16.2	19.6	1.56	0.27	−1.25	0.50	2.57
U 50x25x3/3	1.40	11.89	17.48	19.2	7.0	20.4	24.8	2.51	0.42	−2.09	0.77	4.19
U 60x30x6/6	4.63	36.86	54.42	22.1	8.4	23.7	28.8	6.66	1.17	−5.02	2.23	10.75
U 80x40x5/5	13.15	91.14	147.13	31.1	12.8	33.6	42.7	11.58	2.19	−10.58	4.04	19.50
U 100x50x4/4	14.40	132.72	193.30	39.1	13.7	41.5	50.0	13.85	2.21	−11.99	3.79	23.66
U 100x50x6/6	22.46	190.21	279.74	38.4	14.1	40.9	49.6	20.07	3.37	−16.72	6.14	33.55

	Bending	Shear			Torsion			Warping				
Section	W_z [cm ³]	A_y [cm ²]	A_z [cm ²]	y_{sc} [mm]	I_t [cm ⁴]	$I_{t,s}$ [cm ⁴]	W_t [cm ³]	max ω [cm ²]	I_ω [cm ⁶]	i_ω [mm]	W_ω [cm ⁴]	max S_ω [cm ⁴]
U 30x15x4/4	0.36	0.70	0.90	−8.1	0.11	1.38	0.26	1.06	0.43	3.2	0.41	0.17
U 30x33x5/7	2.65	3.41	0.84	−26.0	0.74	4.88	1.06	1.90	5.46	3.4	2.88	1.10
U 40x20x3/3	0.50	0.68	0.95	−11.6	0.06	2.99	0.22	2.14	1.90	4.7	0.89	0.37
U 50x25x3/3	0.77	0.84	1.21	−14.7	0.08	6.12	0.28	3.45	6.27	6.0	1.82	0.76
U 60x30x6/6	2.23	2.05	2.78	−16.9	0.75	18.57	1.25	4.56	25.11	6.8	5.51	2.31
U 80x40x5/5	4.04	2.65	3.14	−27.7	0.65	48.19	1.31	9.78	151.30	10.1	15.47	6.37
U 100x50x4/4	3.79	2.19	3.31	−30.0	0.40	69.55	1.01	14.40	297.27	12.4	20.64	8.64
U 100x50x6/6	6.14	3.36	4.84	−29.4	1.33	97.93	2.21	13.81	401.35	12.0	29.07	12.16

	Stability		Plasticity									
Section	r _z [mm]	r _{y,SC} [mm]	W _{pl,y} [cm ³]	W _{pl,y,pure} [cm ³]	W _{pl,z} [cm ³]	W _{pl,ω} [cm ⁴]	α _{pl,y} [--]	α _{pl,y,pure} [--]	α _{pl,z} [--]	α _{pl,ω} [--]	A _{pl,y} [cm ²]	A _{pl,z} [cm ²]
U 30x15x4/4	16.8	33.1	2.08	1.91	0.69	0.77	1.284	1.180	1.905	1.875	1.04	1.04
U 30x33x5/7	9.5	61.5	5.67	5.53	4.64	4.68	1.317	1.283	1.752	1.629	4.27	1.15
U 40x20x3/3	27.1	50.3	3.12	2.82	0.96	1.66	1.214	1.099	1.933	1.875	1.11	1.11
U 50x25x3/3	37.1	66.4	5.02	4.52	1.51	3.41	1.196	1.079	1.961	1.875	1.41	1.41
U 60x30x6/6	36.9	70.7	13.36	12.18	4.26	10.33	1.244	1.133	1.913	1.875	3.24	3.24
U 80x40x5/5	56.7	112.1	23.16	21.07	7.99	28.58	1.188	1.081	1.979	1.847	4.25	3.75
U 100x50x4/4	91.6	151.6	27.78	24.91	7.78	38.71	1.174	1.052	2.054	1.875	3.84	3.84
U 100x50x6/6	74.1	132.9	40.13	36.19	12.04	54.51	1.196	1.079	1.961	1.875	5.64	5.64

	Plasticity						Other				
Section	N _{pl} [kN]	V _{pl,y} [kN]	V _{pl,z} [kN]	M _{pl,y} [kNm]	M _{pl,z} [kNm]	y _{pl} [mm]	N _u [kN]	G [kg/m]	A _m [m ² /m]	V [cm ³ /m]	A _m /V [1/m]
U 30x15x4/4	49.871	14.110	14.110	0.49	0.16	−1.5	49.871	1.7	0.106	212.22	499.308
U 30x33x5/7	130.406	57.934	15.603	1.33	1.09	−1.5	130.406	4.4	0.170	554.92	306.297
U 40x20x3/3	52.728	15.060	15.060	0.73	0.23	−2.9	52.728	1.8	0.148	224.37	659.650
U 50x25x3/3	66.828	19.131	19.131	1.18	0.35	−3.9	66.828	2.2	0.187	284.37	658.188
U 60x30x6/6	154.511	43.959	43.959	3.14	1.00	−3.7	154.511	5.2	0.218	657.49	331.089
U 80x40x5/5	189.549	57.663	50.879	5.44	1.88	−7.3	189.549	6.3	0.318	806.59	394.327
U 100x50x4/4	181.471	52.100	52.100	6.53	1.83	−8.1	181.471	6.1	0.380	772.22	492.225
U 100x50x6/6	267.311	76.522	76.522	9.43	2.83	−7.7	267.311	8.9	0.374	1137.49	329.094

