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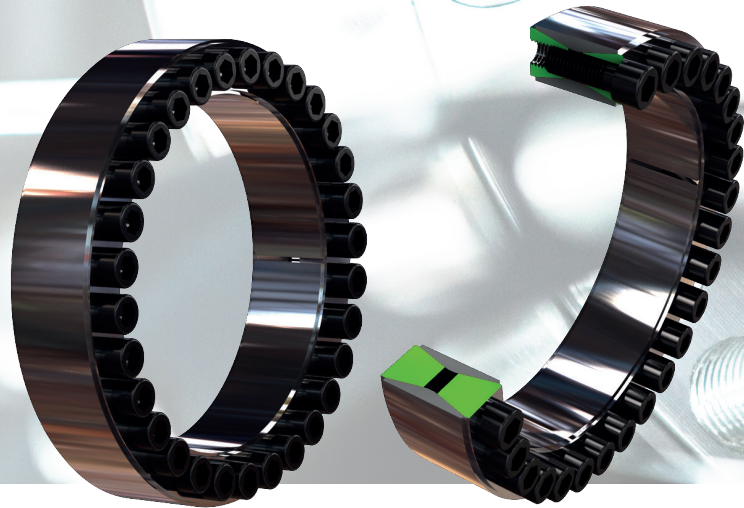
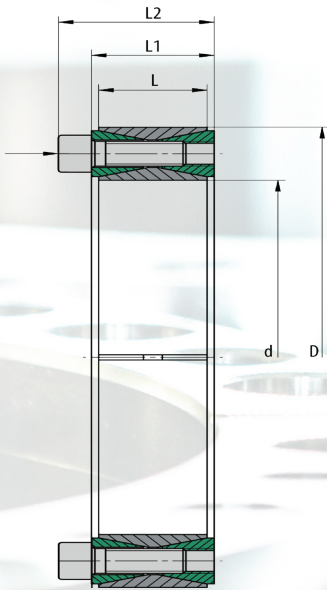
Locking Assemblies

Improved performance with higher bending loads compared to TAS 3020

Main application: Belt drums

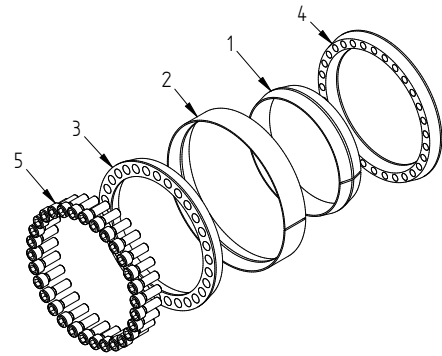


A 3021 transmits radial loads and so bending, but always and directly to the detriment of the bolts, which are cyclically loaded as a result. For this reason, it is less suitable for such a construction than a self-locking system and is generally not recommended for it. The 3021 corresponds to the basic design of 3020, but its screw connection is significantly more resistant to cyclic loads. If an application has so far worked with 3020 but the durability of the screws was limited, it indicates that the loads have overstrained the clamping system. In such cases a 3021 can noticeably improve the durability.



Used symbols

d	[mm]	Shaft diameter	
D	[mm]	Hub inside diameter	
M_t	[kNm]	Max. transmittable torque	$F_{ax}, M_b = 0$
F_{ax}	[kN]	Max. transmittable axial force	$M_b, M_t = 0$
$M_{b,max}$	[kNm]	Max. transmittable bending moment	
$M_{t,max}$	[kNm]	Max. transmittable torque	Applies to $M_{b,max}$
$F_{ax,max}$	[kN]	Max. transmittable axial force	Applies to $M_{b,max}$
p_W	[N/mm ²]	Average pressure on the shaft	
p_N	[N/mm ²]	Average pressure on the hub	
L	[mm]	Length of the inner and outer ring	
L_1	[mm]	Width of the locking device without screws	
L_2	[mm]	Width of the locking device with screws	
Z		Number of clamping screws	
S		Size of the clamping screws	
M_A	[Nm]	Tightening torque of the clamping screws	



Recommended tolerances & surfaces

Shaft	h9 / Rz10
Hub	H9 / Rz10
Taper and roundness	IT9/2

Bending loads

According to technical data sheets for bending utilisation ratios

More properties

- no axial displacement during assembly
- no self-centering
- no self-locking
- Improved durability due to high quality steel 42CrMo4

Ordering information: TAS 3021/d/D (e.g.: TAS 3021/150/200 ... further sizes on request)

Pos.	Designation
1	Inner ring
2	Outer ring
3	Pressure ring 1
4	Pressure ring 2
5	Screw

3021

																Applies to M_b max	
d mm	D mm	M_t kNm	F_{ax} kN	M_b max* kNm	p_w^* N/mm ²	p_N^* N/mm ²	M_t max kNm	F_{ax} max kN	Z Pcs.	S	M_A Nm	L mm	L_1 mm	L_2 mm	Weight kg		
130	x 180	19.5	300	16.0	180	130	11.1	171	19	M12 x 035	125	34	38	52	3.51		
140	x 190	25.4	363	9.6	202	149	23.5	335	23	M12 x 035	125	34	38	52	3.85		
150	x 200	27.2	363	14.4	189	141	23.1	307	23	M12 x 035	125	34	38	52	4.07		
160	x 210	31.5	394	13.2	192	146	28.6	358	25	M12 x 035	125	34	38	52	4.3		
170	x 225	36.2	426	28.2	175	132	22.6	266	21	M14 x 040	190	38	44	60	5.78		
180	x 235	42.0	466	28.5	181	139	30.8	342	23	M14 x 040	190	38	44	60	6.05		
190	x 250	52.0	547	36.4	166	126	37.1	391	27	M14 x 045	190	46	52	68	8.25		
200	x 260	56.8	568	39.7	164	126	40.5	405	28	M14 x 045	190	46	52	68	8.65		
220	x 285	74.8	680	50.9	164	127	54.8	499	25	M16 x 050	295	50	56	74	11.22		
240	x 305	84.9	707	57.7	156	123	62.2	519	26	M16 x 050	295	50	56	74	12.20		
260	x 325	106.1	816	48.8	167	133	94.2	725	30	M16 x 050	295	50	56	74	13.20		
280	x 355	132.1	944	89.8	149	118	96.9	692	29	M18 x 060	405	60	66	86.5	19.20		
300	x 375	146.4	976	90.8	144	115	114.9	766	30	M18 x 060	405	60	66	86.5	20.50		
320	x 405	202.1	1,263	139.4	145	115	146.3	914	30	M20 x 070	580	72	78	100.5	29.60		
340	x 425	221.8	1,305	142.0	141	113	170.5	1,003	31	M20 x 070	580	72	78	100.5	31.1		
360	x 455	301.8	1,676	178.0	147	116	243.6	1,354	32	M22 x 080	780	84	90	116	42.2		
380	x 475	328.5	1,729	203.7	144	115	257.7	1,356	33	M22 x 080	780	84	90	116	44.0		
400	x 495	349.8	1,749	216.9	138	112	274.4	1,372	34	M22 x 080	780	84	90	116	46.0		
420	x 515	399.7	1,903	195.8	143	117	348.4	1,659	37	M22 x 080	780	84	90	116	50.0		
440	x 545	477.8	2,172	253.2	136	110	405.1	1,842	37	M24 x 090	1000	96	102	130	64.6		
460	x 565	513.0	2,230	282.1	134	109	428.4	1,863	38	M24 x 090	1000	96	102	130	67.4		
480	x 585	549.4	2,289	313.1	132	108	451.4	1,881	39	M24 x 090	1000	96	102	130	71.0		
500	x 605	601.6	2,406	306.8	133	110	517.5	2,070	41	M24 x 090	1000	96	102	130	72.6		
520	x 630	640.9	2,465	346.1	131	108	539.5	2,075	42	M24 x 090	1000	96	102	130	80.0		
540	x 650	681.4	2,524	354.3	129	107	582.1	2,156	43	M24 x 090	1000	96	102	130	82		
560	x 670	739.5	2,641	362.4	130	109	644.7	2,302	45	M24 x 090	1000	96	102	130	85		
580	x 690	800.0	2,759	360.0	131	110	714.4	2,464	47	M24 x 090	1000	96	102	130	88		
600	x 710	845.2	2,817	388.8	130	110	750.5	2,502	48	M24 x 090	1000	96	102	130	91		
620	x 730	891.6	2,876	401.2	128	109	796.2	2,568	49	M24 x 090	1000	96	102	130	93		
640	x 750	976.7	3,052	371.1	132	112	903.4	2,823	52	M24 x 090	1000	96	102	130	96		
660	x 770	1,018.6	3,087	356.5	129	111	954.2	2,892	54	M24 x 090	1000	96	102	130	99		
680	x 790	1,049.5	3,087	356.8	125	108	987.0	2,903	54	M24 x 090	1000	96	102	130	102		
700	x 810	1,080.4	3,087	356.5	122	105	1,019.9	2,914	54	M24 x 090	1000	96	102	130	104		
720	x 830	1,111.2	3,087	355.6	118	103	1,052.8	2,924	54	M24 x 090	1000	96	102	130	107		
740	x 850	1,184.4	3,201	367.2	120	104	1,126.1	3,043	56	M24 x 090	1000	96	102	130	110		
760	x 870	1,259.9	3,315	378.0	121	105	1,201.8	3,163	58	M24 x 090	1000	96	102	130	113		
780	x 890	1,315.3	3,373	381.4	119	105	1,258.8	3,228	59	M24 x 090	1000	96	102	130	116		
800	x 910	1,371.9	3,430	384.1	118	104	1,317.0	3,293	60	M24 x 090	1000	96	102	130	118		

* M_b max is the maximum transmittable bending moment for the locking assembly.

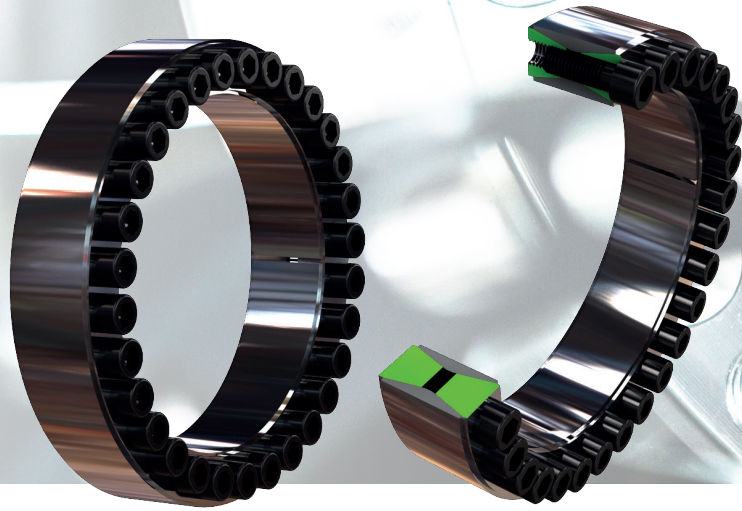
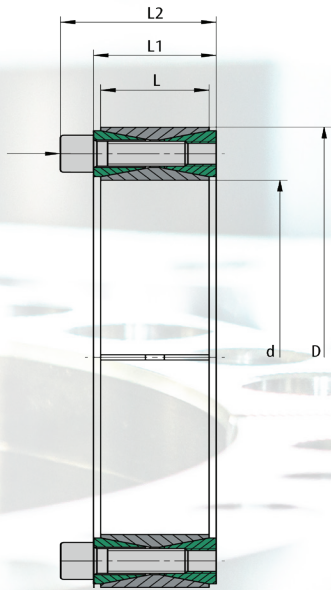
For materials of the shaft and hub the additional pressure generated by bending moment needs to be considered.

p_w and p_N do not include the additional pressure due to the bending moment.

Further information can be found on the corresponding additional data sheets for different bending moment utilisation ratios.

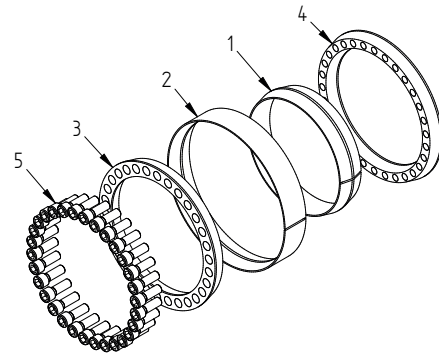
3021

For different bending moment utilisation ratios



Used symbols

d	[mm]	Shaft diameter	
D	[mm]	Hub inside diameter	
Z		Number of clamping screws	
S		Size of the clamping screws	
M_A	[Nm]	Tightening torque of the clamping screws	
M_t	[kNm]	Max. transmittable torque	$F_{ax}, M_b = 0$
p_w	[N/mm ²]	Average pressure on the shaft	
p_N	[N/mm ²]	Average pressure on the hub	
$M_b^{**\%}$	[kNm]	**% of max. bending moment	
$M_{t,max}$	[kNm]	Transmittable torque at indicated M_b **% and specified torque	
$p_{w,max}$	[N/mm ²]	Max. surface pressure on shaft at **% bending moment	
$p_{N,max}$	[N/mm ²]	Max. surface pressure on hub at **% bending moment	
$p_{w,min}$	[N/mm ²]	Min. surface pressure on shaft at **% bending moment	
$p_{N,min}$	[N/mm ²]	Min. surface pressure on hub at **% bending moment	
$F_{ax,max}$	[kN]	Max. transmittable axial force at **% bending moment	
$D_{N,min}$	[mm]	Min. hub outer diameter depending of the hub yield point Rp0,2	



Pos.	Designation
1	Inner ring
2	Outer ring
3	Pressure ring 1
4	Pressure ring 2
5	Screw

Recommended tolerances & surfaces

Shaft	h9 / Rz10
Hub	H9 / Rz10
Taper and roundness	IT9/2

More properties

- no axial displacement during assembly
- no self-centering
- no self-locking
- Improved durability due to high quality steel 42CrMo4

Ordering information: TAS 3021/d/D (e.g: TAS 3021/150/200 ...
further sizes on request)

d	D	Z	S	M _A	Without M _b			M _b 80%	M _{t max}	Applies to M _b 80%				D _N min at R _{p0.2} [N/mm ²]				
					M _t	P _w	P _N			M _{t max}	P _w max	P _N max	P _w min	P _N min	F _{ax max}	250	350	450
mm	mm	Pcs.		Nm	kNm	N/mm ²	N/mm ²	kNm	kNm	N/mm ²	N/mm ²	N/mm ²	N/mm ²	kN	mm	mm	mm	
130	x	180	19	M12 x 035	125	19.5	180	130	12.8	14.7	324	233	35	27	226	-	402	319
140	x	190	23	M12 x 035	125	25.4	202	149	7.7	24.2	283	208	121	90	345	-	376	313
150	x	200	23	M12 x 035	125	27.2	189	141	11.5	24.6	302	225	76	58	328	-	429	347
160	x	210	25	M12 x 035	125	31.5	192	146	10.6	29.7	290	220	95	73	371	-	439	358
170	x	225	21	M14 x 040	190	36.2	175	132	22.6	28.3	331	249	18	15	333	-	548	419
180	x	235	23	M14 x 040	190	42.0	181	139	22.8	35.2	330	252	32	25	391	-	581	442
190	x	250	27	M14 x 045	190	52.0	166	126	29.1	43.1	289	219	43	34	454	-	520	425
200	x	260	28	M14 x 045	190	56.8	164	126	31.8	47.0	291	223	36	29	470	-	552	448
220	x	285	25	M16 x 050	295	74.8	164	127	40.7	62.8	290	223	38	31	571	-	604	490
240	x	305	26	M16 x 050	295	84.9	156	123	46.2	71.2	287	225	26	21	593	-	653	528
260	x	325	30	M16 x 050	295	106.1	167	133	39.0	98.6	269	214	64	52	759	-	662	545
280	x	355	29	M18 x 060	405	132.1	149	118	71.9	110.8	270	212	28	23	792	-	716	592
300	x	375	30	M18 x 060	405	146.4	144	115	72.6	127.1	258	205	30	25	848	-	735	614
320	x	405	30	M20 x 070	580	202.1	145	115	111.5	168.5	260	204	31	26	1,053	-	789	661
340	x	425	31	M20 x 070	580	221.8	141	113	113.6	190.6	251	200	32	27	1,121	-	813	685
360	x	455	32	M22 x 080	780	301.8	147	116	142.4	266.0	242	191	52	42	1,478	-	839	716
380	x	475	33	M22 x 080	780	328.5	144	115	162.9	285.2	247	197	40	33	1,501	-	897	759
400	x	495	34	M22 x 080	780	349.8	138	112	173.5	303.7	243	195	34	28	1,519	-	928	787
420	x	515	37	M22 x 080	780	399.7	143	117	156.7	367.7	233	189	53	44	1,751	-	943	806
440	x	545	37	M24 x 090	1000	477.8	136	110	202.6	432.7	221	178	51	42	1,967	-	954	828
460	x	565	38	M24 x 090	1000	513.0	134	109	225.7	460.7	224	182	43	36	2,003	-	1,005	867
480	x	585	39	M24 x 090	1000	549.4	132	108	250.5	488.9	228	186	35	30	2,037	-	1,058	908
500	x	605	41	M24 x 090	1000	601.6	133	110	245.5	549.3	224	184	42	36	2,197	-	1,085	934
520	x	630	42	M24 x 090	1000	640.9	131	108	276.9	578.0	229	188	33	28	2,223	-	1,149	984
540	x	650	43	M24 x 090	1000	681.4	129	107	283.5	619.7	226	187	32	28	2,295	-	1,179	1,011
560	x	670	45	M24 x 090	1000	739.5	130	109	289.9	680.4	226	188	35	30	2,430	-	1,220	1,045
580	x	690	47	M24 x 090	1000	800.0	131	110	288.0	746.4	223	187	40	34	2,574	-	1,250	1,073
600	x	710	48	M24 x 090	1000	845.2	130	110	311.0	785.9	225	189	34	30	2,620	-	1,302	1,112
620	x	730	49	M24 x 090	1000	891.6	128	109	321.0	831.8	224	189	33	29	2,683	-	1,336	1,142
640	x	750	52	M24 x 090	1000	976.7	132	112	296.9	930.4	217	185	46	40	2,908	-	1,348	1,160
660	x	770	54	M24 x 090	1000	1,018.6	129	111	285.2	977.9	209	178	50	43	2,963	-	1,351	1,171
680	x	790	54	M24 x 090	1000	1,049.5	125	108	285.5	1,009.9	203	174	48	42	2,970	1,864	1,362	1,187
700	x	810	54	M24 x 090	1000	1,080.4	122	105	285.2	1,042.0	197	169	47	41	2,977	1,849	1,374	1,204
720	x	830	54	M24 x 090	1000	1,111.2	118	103	284.5	1,074.2	191	165	46	40	2,984	1,837	1,386	1,220
740	x	850	56	M24 x 090	1000	1,184.4	120	104	293.7	1,147.4	193	167	46	41	3,101	1,906	1,429	1,255
760	x	870	58	M24 x 090	1000	1,259.9	121	105	302.4	1,223.0	194	169	47	42	3,219	1,974	1,471	1,290
780	x	890	59	M24 x 090	1000	1,315.3	119	105	305.2	1,279.4	192	167	47	42	3,281	1,998	1,497	1,315
800	x	910	60	M24 x 090	1000	1,371.9	118	104	307.3	1,337.0	189	166	48	43	3,343	2,021	1,522	1,339

d	D	Z	S	M _A	Without M _b			M _b 60%	M _{t,max}	Applies to M _b 60%					D _N min at R _{p0.2} [N/mm ²]			
					M _t	p _w	p _N			M _{t,max}	p _w max	p _N max	p _w min	p _N min	F _{ax,max}	250	350	450
mm	mm	Pcs.		Nm	kNm	N/mm ²	N/mm ²	kNm	kNm	N/mm ²	N/mm ²	N/mm ²	N/mm ²	kN	mm	mm	mm	
130	x	180	19	M12 x 035	125	19.5	180	130	9.6	17.0	288	207	71	52	261	-	356	296
140	x	190	23	M12 x 035	125	25.4	202	149	5.8	24.7	263	193	141	105	353	-	354	301
150	x	200	23	M12 x 035	125	27.2	189	141	8.6	25.8	273	204	104	79	344	-	390	326
160	x	210	25	M12 x 035	125	31.5	192	146	7.9	30.5	265	201	119	91	381	-	405	340
170	x	225	21	M14 x 040	190	36.2	175	132	16.9	32.0	292	220	58	45	376	-	470	384
180	x	235	23	M14 x 040	190	42.0	181	139	17.1	38.3	293	223	69	54	426	-	500	405
190	x	250	27	M14 x 045	190	52.0	166	126	21.8	47.2	259	196	74	57	497	-	470	398
200	x	260	28	M14 x 045	190	56.8	164	126	23.8	51.5	259	199	68	53	515	-	495	418
220	x	285	25	M16 x 050	295	74.8	164	127	30.5	68.3	258	199	70	55	621	-	542	458
240	x	305	26	M16 x 050	295	84.9	156	123	34.6	77.5	254	199	58	47	646	-	582	491
260	x	325	30	M16 x 050	295	106.1	167	133	29.3	102.0	243	194	90	73	784	-	606	515
280	x	355	29	M18 x 060	405	132.1	149	118	53.9	120.6	240	188	58	47	861	-	648	554
300	x	375	30	M18 x 060	405	146.4	144	115	54.5	135.9	230	183	58	47	906	-	670	577
320	x	405	30	M20 x 070	580	202.1	145	115	83.7	183.9	231	182	60	48	1,150	-	720	622
340	x	425	31	M20 x 070	580	221.8	141	113	85.2	204.8	224	178	59	48	1,205	-	745	646
360	x	455	32	M22 x 080	780	301.8	147	116	106.8	282.2	219	172	76	60	1,568	1,060	780	681
380	x	475	33	M22 x 080	780	328.5	144	115	122.2	304.9	221	176	66	54	1,605	-	826	718
400	x	495	34	M22 x 080	780	349.8	138	112	130.1	324.7	216	174	60	49	1,623	1,171	855	745
420	x	515	37	M22 x 080	780	399.7	143	117	117.5	382.0	211	171	76	62	1,819	1,189	879	768
440	x	545	37	M24 x 090	1000	477.8	136	110	151.9	453.0	200	161	73	59	2,059	1,171	896	792
460	x	565	38	M24 x 090	1000	513.0	134	109	169.3	484.2	202	164	66	54	2,105	1,237	938	827
480	x	585	39	M24 x 090	1000	549.4	132	108	187.9	516.2	204	167	60	50	2,151	1,308	982	863
500	x	605	41	M24 x 090	1000	601.6	133	110	184.1	572.8	201	165	65	54	2,291	1,340	1,011	890
520	x	630	42	M24 x 090	1000	640.9	131	108	207.7	606.4	205	168	57	48	2,332	1,425	1,064	933
540	x	650	43	M24 x 090	1000	681.4	129	107	212.6	647.4	202	167	57	48	2,398	1,456	1,092	960
560	x	670	45	M24 x 090	1000	739.5	130	109	217.4	706.9	202	168	59	50	2,524	1,514	1,131	992
580	x	690	47	M24 x 090	1000	800.0	131	110	216.0	770.3	200	168	63	53	2,656	1,553	1,162	1,020
600	x	710	48	M24 x 090	1000	845.2	130	110	233.3	812.4	201	170	58	50	2,708	1,621	1,205	1,055
620	x	730	49	M24 x 090	1000	891.6	128	109	240.7	858.4	200	169	57	49	2,769	1,660	1,236	1,083
640	x	750	52	M24 x 090	1000	976.7	132	112	222.7	950.9	196	167	68	58	2,972	1,676	1,259	1,106
660	x	770	54	M24 x 090	1000	1,018.6	129	111	213.9	995.9	189	161	69	60	3,018	1,659	1,268	1,121
680	x	790	54	M24 x 090	1000	1,049.5	125	108	214.1	1,027.4	184	157	67	59	3,022	1,657	1,282	1,138
700	x	810	54	M24 x 090	1000	1,080.4	122	105	213.9	1,059.0	178	153	65	57	3,026	1,656	1,296	1,155
720	x	830	54	M24 x 090	1000	1,111.2	118	103	213.4	1,090.6	173	150	64	56	3,029	1,656	1,311	1,173
740	x	850	56	M24 x 090	1000	1,184.4	120	104	220.3	1,163.7	174	151	65	57	3,145	1,714	1,350	1,206
760	x	870	58	M24 x 090	1000	1,259.9	121	105	226.8	1,239.3	176	153	65	58	3,261	1,771	1,389	1,239
780	x	890	59	M24 x 090	1000	1,315.3	119	105	228.9	1,295.2	174	152	65	58	3,321	1,798	1,415	1,264
800	x	910	60	M24 x 090	1000	1,371.9	118	104	230.5	1,352.4	172	150	65	58	3,381	1,824	1,440	1,288

d	D	Z	S	M _A	Without M _b			M _b 40%	M _{t max}	Applies to M _b 40%					D _N min at R _{p0.2} [N/mm ²]			
					M _t	P _w	P _N			M _{t max}	P _w max	P _N max	P _w min	P _N min	F _{ax max}	250	350	450
mm	mm	Pcs.		Nm	kNm	N/mm ²	N/mm ²	kNm	kNm	N/mm ²	N/mm ²	N/mm ²	N/mm ²	kN	mm	mm	mm	
130	x	180	19	M12 x 035	125	19.5	180	130	6.4	18.4	252	181	108	78	283	-	320	276
140	x	190	23	M12 x 035	125	25.4	202	149	3.9	25.1	243	178	162	119	358	-	333	289
150	x	200	23	M12 x 035	125	27.2	189	141	5.8	26.6	245	183	132	100	354	-	358	308
160	x	210	25	M12 x 035	125	31.5	192	146	5.3	31.1	241	183	143	110	389	-	375	323
170	x	225	21	M14 x 040	190	36.2	175	132	11.3	34.4	253	190	97	74	405	-	414	353
180	x	235	23	M14 x 040	190	42.0	181	139	11.4	40.4	256	195	106	82	449	-	441	374
190	x	250	27	M14 x 045	190	52.0	166	126	14.6	49.9	228	173	105	80	526	584	429	374
200	x	260	28	M14 x 045	190	56.8	164	126	15.9	54.5	228	174	100	77	545	616	449	391
220	x	285	25	M16 x 050	295	74.8	164	127	20.3	72.0	227	175	101	79	654	676	493	429
240	x	305	26	M16 x 050	295	84.9	156	123	23.1	81.7	222	174	91	72	681	720	526	458
260	x	325	30	M16 x 050	295	106.1	167	133	19.5	104.3	218	174	115	93	802	765	560	488
280	x	355	29	M18 x 060	405	132.1	149	118	35.9	127.1	210	165	88	70	908	783	592	521
300	x	375	30	M18 x 060	405	146.4	144	115	36.3	141.8	201	160	87	70	946	802	615	544
320	x	405	30	M20 x 070	580	202.1	145	115	55.8	194.2	203	160	88	70	1,214	862	662	587
340	x	425	31	M20 x 070	580	221.8	141	113	56.8	214.5	196	156	87	70	1,261	886	687	611
360	x	455	32	M22 x 080	780	301.8	147	116	71.2	293.2	195	154	99	79	1,629	931	729	649
380	x	475	33	M22 x 080	780	328.5	144	115	81.5	318.2	195	156	92	74	1,675	986	767	682
400	x	495	34	M22 x 080	780	349.8	138	112	86.7	338.9	190	153	86	70	1,694	1,011	792	706
420	x	515	37	M22 x 080	780	399.7	143	117	78.3	391.9	188	153	98	80	1,866	1,049	823	734
440	x	545	37	M24 x 090	1000	477.8	136	110	101.3	466.9	179	144	94	76	2,122	1,051	844	759
460	x	565	38	M24 x 090	1000	513.0	134	109	112.9	500.4	179	145	89	73	2,176	1,099	879	790
480	x	585	39	M24 x 090	1000	549.4	132	108	125.3	534.9	180	147	84	69	2,229	1,150	916	821
500	x	605	41	M24 x 090	1000	601.6	133	110	122.7	589.0	178	147	88	73	2,356	1,187	946	849
520	x	630	42	M24 x 090	1000	640.9	131	108	138.4	625.8	180	148	82	68	2,407	1,246	990	887
540	x	650	43	M24 x 090	1000	681.4	129	107	141.7	666.5	178	147	81	68	2,469	1,276	1,017	912
560	x	670	45	M24 x 090	1000	739.5	130	109	144.9	725.2	178	148	83	69	2,590	1,326	1,053	944
580	x	690	47	M24 x 090	1000	800.0	131	110	144.0	786.9	177	149	86	72	2,714	1,367	1,085	972
600	x	710	48	M24 x 090	1000	845.2	130	110	155.5	830.8	178	150	82	70	2,769	1,416	1,121	1,003
620	x	730	49	M24 x 090	1000	891.6	128	109	160.5	877.0	176	149	80	69	2,829	1,450	1,150	1,030
640	x	750	52	M24 x 090	1000	976.7	132	112	148.5	965.3	175	149	89	76	3,017	1,486	1,180	1,057
660	x	770	54	M24 x 090	1000	1,018.6	129	111	142.6	1,008.6	169	145	89	77	3,056	1,489	1,195	1,074
680	x	790	54	M24 x 090	1000	1,049.5	125	108	142.7	1,039.8	164	141	87	75	3,058	1,495	1,210	1,092
700	x	810	54	M24 x 090	1000	1,080.4	122	105	142.6	1,070.9	159	137	84	73	3,060	1,502	1,226	1,110
720	x	830	54	M24 x 090	1000	1,111.2	118	103	142.2	1,102.1	155	134	82	72	3,061	1,510	1,242	1,128
740	x	850	56	M24 x 090	1000	1,184.4	120	104	146.9	1,175.3	156	136	83	73	3,176	1,560	1,279	1,160
760	x	870	58	M24 x 090	1000	1,259.9	121	105	151.2	1,250.8	157	137	84	74	3,291	1,610	1,315	1,191
780	x	890	59	M24 x 090	1000	1,315.3	119	105	152.6	1,306.4	156	136	83	73	3,350	1,637	1,341	1,216
800	x	910	60	M24 x 090	1000	1,371.9	118	104	153.7	1,363.3	154	135	83	73	3,408	1,664	1,366	1,240

d	D	Z	S	M _A	Without M _b			M _b 20%	M _t max	Applies to M _b 20%				D _N min at R _{p0.2} [N/mm ²]				
					M _t	p _w	p _N			p _w max	p _N max	p _w min	p _N min	F _{ax} max	250	350	450	
mm	mm	Pcs.		Nm	kNm	N/mm ²	N/mm ²	kNm	kNm	N/mm ²	N/mm ²	N/mm ²	N/mm ²	kN	mm	mm	mm	
130	x	180	19	M12 x 035	125	19.5	180	130	3.2	19.2	216	156	144	104	295	373	290	258
140	x	190	23	M12 x 035	125	25.4	202	149	1.9	25.3	222	164	182	134	362	416	315	278
150	x	200	23	M12 x 035	125	27.2	189	141	2.9	27.0	217	162	160	121	361	434	331	292
160	x	210	25	M12 x 035	125	31.5	192	146	2.6	31.4	217	165	168	128	393	463	350	308
170	x	225	21	M14 x 040	190	36.2	175	132	5.6	35.7	214	161	136	103	421	484	370	327
180	x	235	23	M14 x 040	190	42.0	181	139	5.7	41.6	218	167	144	110	462	526	395	347
190	x	250	27	M14 x 045	190	52.0	166	126	7.3	51.5	197	149	135	103	542	498	394	353
200	x	260	28	M14 x 045	190	56.8	164	126	7.9	56.2	196	150	132	102	562	521	411	368
220	x	285	25	M16 x 050	295	74.8	164	127	10.2	74.1	195	151	133	103	674	572	452	404
240	x	305	26	M16 x 050	295	84.9	156	123	11.5	84.1	189	148	124	98	701	604	480	430
260	x	325	30	M16 x 050	295	106.1	167	133	9.8	105.6	192	153	141	113	813	664	520	464
280	x	355	29	M18 x 060	405	132.1	149	118	18.0	130.9	179	141	119	94	935	673	544	491
300	x	375	30	M18 x 060	405	146.4	144	115	18.2	145.3	172	138	115	92	969	697	568	514
320	x	405	30	M20 x 070	580	202.1	145	115	27.9	200.1	174	137	117	93	1,251	750	613	555
340	x	425	31	M20 x 070	580	221.8	141	113	28.4	220.0	169	135	114	91	1,294	777	638	579
360	x	455	32	M22 x 080	780	301.8	147	116	35.6	299.7	171	135	123	98	1,665	832	683	620
380	x	475	33	M22 x 080	780	328.5	144	115	40.7	326.0	169	135	118	95	1,716	871	714	648
400	x	495	34	M22 x 080	780	349.8	138	112	43.4	347.1	164	132	112	91	1,735	893	737	670
420	x	515	37	M22 x 080	780	399.7	143	117	39.2	397.7	166	135	121	99	1,894	941	773	701
440	x	545	37	M24 x 090	1000	477.8	136	110	50.6	475.1	158	127	115	93	2,159	954	797	728
460	x	565	38	M24 x 090	1000	513.0	134	109	56.4	509.9	157	127	111	91	2,217	991	827	756
480	x	585	39	M24 x 090	1000	549.4	132	108	62.6	545.8	156	128	108	89	2,274	1,028	857	783
500	x	605	41	M24 x 090	1000	601.6	133	110	61.4	598.5	156	128	110	91	2,394	1,067	889	811
520	x	630	42	M24 x 090	1000	640.9	131	108	69.2	637.2	156	128	106	88	2,451	1,110	925	844
540	x	650	43	M24 x 090	1000	681.4	129	107	70.9	677.7	153	127	105	87	2,510	1,139	951	869
560	x	670	45	M24 x 090	1000	739.5	130	109	72.5	736.0	154	129	106	89	2,629	1,183	985	899
580	x	690	47	M24 x 090	1000	800.0	131	110	72.0	796.7	154	129	109	91	2,747	1,224	1,017	928
600	x	710	48	M24 x 090	1000	845.2	130	110	77.8	841.6	154	130	106	90	2,805	1,261	1,047	955
620	x	730	49	M24 x 090	1000	891.6	128	109	80.2	887.9	152	129	104	89	2,864	1,291	1,074	980
640	x	750	52	M24 x 090	1000	976.7	132	112	74.2	973.8	153	130	110	94	3,043	1,338	1,110	1,011
660	x	770	54	M24 x 090	1000	1,018.6	129	111	71.3	1,016.1	149	128	109	94	3,079	1,353	1,129	1,031
680	x	790	54	M24 x 090	1000	1,049.5	125	108	71.4	1,047.1	145	124	106	91	3,080	1,364	1,146	1,049
700	x	810	54	M24 x 090	1000	1,080.4	122	105	71.3	1,078.0	141	121	103	89	3,080	1,376	1,163	1,068
720	x	830	54	M24 x 090	1000	1,111.2	118	103	71.1	1,109.0	137	118	100	87	3,080	1,389	1,180	1,087
740	x	850	56	M24 x 090	1000	1,184.4	120	104	73.4	1,182.1	138	120	101	88	3,195	1,433	1,214	1,117
760	x	870	58	M24 x 090	1000	1,259.9	121	105	75.6	1,257.6	139	121	102	89	3,309	1,476	1,248	1,147
780	x	890	59	M24 x 090	1000	1,315.3	119	105	76.3	1,313.1	138	120	101	89	3,367	1,504	1,274	1,171
800	x	910	60	M24 x 090	1000	1,371.9	118	104	76.8	1,369.7	136	120	101	89	3,424	1,531	1,299	1,195