

U110F

NB 100 – NB 4000



- ▶ **Type U110F**
without vacuum support ring
- ▶ **Type U111F**
with internal vacuum support ring
- ▶ **Type U112F**
with embedded vacuum support ring

Type key ▶ page 20

U 1 1 0 F

- └─ Tie rod variant
- └─ Support ring variant
- └─ Number of arches
- └─ Type

Angular expansion joint with one arch

- Design:** Highly elastic, hydrodynamic, single-arch rubber bellows with full faced rubber flanges and oval backing flanges with support collar and hinge tie rods
Optionally with vacuum support ring
- Nominal diameters:** NB 100 to NB 4000, intermediate sizes possible
- Installation length:** Standard $L_E = 150$ to 400 mm (▶ page 231–233)
Other installation lengths on request
- Pressure:** Depending on the nominal diameter and installation length up to 25 bar
Vacuum-proof up to 0.8 bar absolute, with vacuum support ring up to 0.05 bar absolute
- Movement:** For angular movements (▶ page 231–233)

Application:

Cooling water systems, desalination plants, drinking water supply, plant construction, e.g. in pipelines, on pumps, as dismantling joints, on condensers and vessels



Rubber bellows

Rubber grades			Carrier
up to 100 °C:	EPDM	Cooling water, hot water, seawater, acids, dilute chlorine compounds	Nylon fabric Polyester fabric Kevlar fabric Glass fibre fabric Steel mesh
	Drinking water approved	Drinking water	
	EPDM, white, food grade	Foodstuffs	
	EPDM, abrasion-resistant	Abrasive materials, Water-sand extraction	
	EPDM, insulating	Electrical systems construction	
	IIR	Hot water, acids, bases, gases	
	CSM	Strong acids, bases, chemicals	
	NBR	Oils, petrol, solvents, compressed air	
	NBR, bright, food grade	Oil, fatty foods	
up to 80 °C:	CR	Cooling water, slightly oily water, seawater	
up to 70 °C:	NR	Abrasive materials	
up to 150 °C:	HNBR	Oils, petrol, solvents, compressed air	
up to 180 °C:	FPM	Corrosive chemicals, petroleum distillates	
up to 200 °C:	Silicon (Q)	Air, saltwater atmosphere	
	Silicon (Q), white, food grade	Foodstuffs, medical technology	
PTFE lining:	Permanently embedded against chemical attacks on the interior at the rubber bellows, available starting at NB 300. Take the restriction of the listed movement into account (► page 231–233)		

Flanges

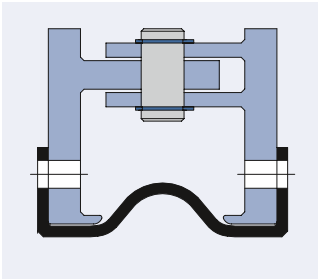
Design:	Single-part, oval backing flanges with support collar, clearance holes and hinge tie rods (control unit type F)
Flange norms:	DIN, ANSI, AWWA, BS, JIS, special measurements (▶ page 280)
Materials:	Carbon steel: 1.0038 (S235JRG2) 1.0570 (S355J2G3) Stainless steel: 1.4301 (X5CrNi18-10) 1.4571 (X6CrNiMoTi17-12-2) Other materials on request
Coating:	Primed, hot-dip galvanised, special paint

Optional accessories

Protective hood:	UV protection cover Ground protective cover Fire protection cover (▶ page 50)
Flow liners:	Cylindrical flow liner Conical flow liner Telescoping flow liner (▶ page 49)

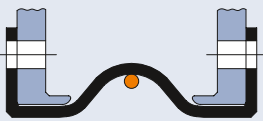
Hinge tie rod

- Design:** Dimensions according to design pressure (test pressure)
- Materials:** Carbon steel or stainless steel
- Coating:** Galvanised or hot-dip galvanised



Type U110F
Hinge tie rod for angular movements on one level with plates and bolts to absorb the reaction forces in the event of pressure and vacuum. Axis of rotation in the middle of the installation gap

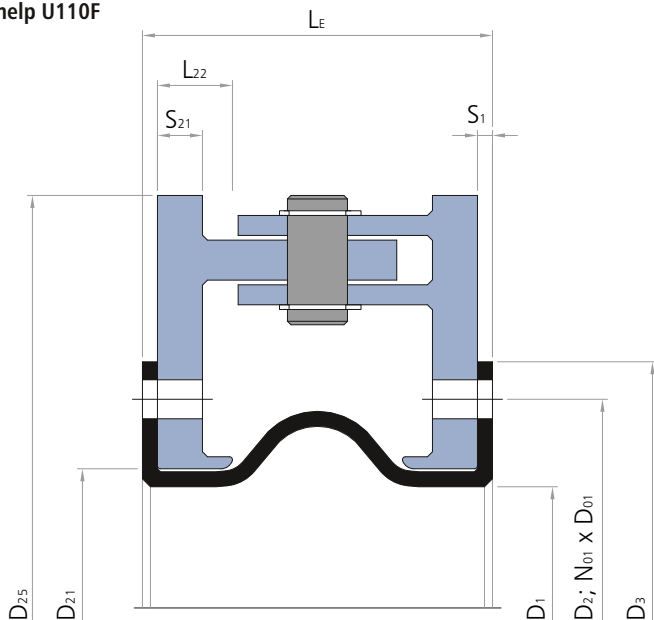
Support rings

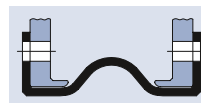
TYPE		Vacuum support ring	Pressure	Movement
U110F		Without	Depending on the nominal diameter up to 25 bar, for vacuum up to 0.8 bar absolute	▶ page 231
U111F		Medium contact, inside the arch apex	Depending on the nominal diameter up to 25 bar, for vacuum up to 0.05 bar absolute	▶ page 232
U112F		No medium contact, embedded into the arch apex of the rubber bellows	Depending on the nominal diameter up to 25 bar, for vacuum up to 0.05 bar absolute	▶ page 233

Materials

- Stainless steel: 1.4301 (X5CrNi18-10) Other materials on request
1.4539 (X1NiCrMoCu25-20-5)
1.4571 (X6CrNiMoTi17-12-2)
- Carbon steel: 1.0570 (S355J2G3) rubber coated

Planning help U110F





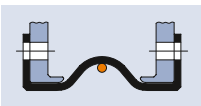
Installation length (L _E) at design pressure												
	up to 10 bar L _E = 150 mm		up to 10 bar L _E = 200 mm		up to 10 bar L _E = 250 mm		up to 10 bar L _E = 300 mm		up to 10 bar L _E = 350 mm		up to 10 bar L _E = 400 mm	
	higher pressures on request											
NB	Movement	A	Movement	A	Movement	A	Movement	A	Movement	A	Movement	A
	 ±°	 cm²	 ±°	 cm²	 ±°	 cm²	 ±°	 cm²	 ±°	 cm²	 ±°	 cm²
100	22.3	177	31.0	254	32.6	260	40.0	353	48.2	491	52.6	616
125	18.2	241	25.6	330	27.1	337	33.9	441	41.9	594	46.3	731
150	15.3	314	21.8	415	23.1	423	29.2	539	36.7	707	41.1	855
175	13.2	415	18.9	531	20.1	539	25.6	670	32.6	855	36.8	1,018
200	11.6	491	16.7	616	17.7	625	22.8	765	29.2	962	33.2	1,134
250	9.3	707	13.5	855	14.4	866	18.6	1,029	24.1	1,257	27.7	1,452
300	7.8	973	11.3	1,146	12.0	1,158	15.6	1,346	20.5	1,605	23.6	1,825
350	6.7	1,288	9.7	1,486	10.4	1,500	13.5	1,713	17.7	2,003	20.5	2,248
400	5.9	1,605	8.5	1,825	9.1	1,840	11.9	2,075	15.6	2,393	18.1	2,660
450	5.2	1,987	7.6	2,231	8.1	2,248	10.6	2,507	14.0	2,856	16.2	3,147
500	4.7	2,402	6.8	2,669	7.3	2,688	9.5	2,971	12.6	3,349	14.7	3,664
550	4.3	2,827	6.2	3,117	6.6	3,137	8.7	3,442	11.5	3,848	13.4	4,185
600	3.9	3,349	5.7	3,664	6.1	3,685	8.0	4,015	10.6	4,453	12.3	4,815
650	3.6	3,848	5.3	4,185	5.6	4,208	7.4	4,560	9.8	5,027	11.4	5,411
700	3.4	4,465	4.9	4,827	5.2	4,852	6.8	5,230	9.1	5,728	10.6	6,138
750	3.1	5,027	4.6	5,411	4.9	5,437	6.4	5,836	8.5	6,362	9.9	6,793
800	2.9	5,741	4.3	6,151	4.6	6,179	6.0	6,604	8.0	7,163	9.3	7,620
850	2.8	6,362	4.0	6,793	4.3	6,822	5.6	7,268	7.5	7,854	8.8	8,332
900	2.6	7,163	3.8	7,620	4.1	7,651	5.3	8,123	7.1	8,742	8.3	9,246
950	2.5	7,854	3.6	8,332	3.9	8,365	5.1	8,858	6.7	9,503	7.9	10,029
1000	2.3	8,742	3.4	9,246	3.7	9,280	4.8	9,799	6.4	10,477	7.5	11,029
1050	2.2	9,503	3.3	10,029	3.5	10,064	4.6	10,605	6.1	11,310	7.1	11,882
1100	2.1	10,496	3.1	11,047	3.3	11,085	4.4	11,652	5.8	12,390	6.8	12,989
1150	2.0	11,310	3.0	11,882	3.2	11,921	4.2	12,509	5.6	13,273	6.5	13,893
1200	2.0	12,370	2.9	12,969	3.1	13,009	4.0	13,623	5.3	14,420	6.2	15,066
1250	1.9	13,273	2.7	13,893	2.9	13,935	3.8	14,569	5.1	15,394	6.0	16,061
1300	1.8	14,420	2.6	15,066	2.8	15,109	3.7	15,770	4.9	16,627	5.8	17,320
1350	1.7	15,394	2.5	16,061	2.7	16,106	3.6	16,787	4.7	17,671	5.5	18,385
1400	1.7	16,627	2.5	17,320	2.6	17,366	3.4	18,074	4.6	18,991	5.3	19,731
1450	1.6	17,671	2.4	18,385	2.5	18,433	3.3	19,162	4.4	20,106	5.2	20,867
1500	1.6	18,991	2.3	19,731	2.4	19,781	3.2	20,536	4.3	21,512	5.0	22,299
1600	1.5	21,512	2.1	22,299	2.3	22,352	3.0	23,154	4.0	24,190	4.7	25,025
1650	1.4	22,698	2.1	23,506	2.2	23,561	2.9	24,384	3.9	25,447	4.5	26,302
1700	1.4	24,190	2.0	25,025	2.2	25,081	2.8	25,930	3.8	27,026	4.4	27,907
1800	1.3	27,055	1.9	27,937	2.0	27,996	2.7	28,893	3.6	30,049	4.2	30,978
1900	1.2	30,018	1.8	30,946	1.9	31,009	2.5	31,952	3.4	33,168	3.9	34,143
1950	1.2	31,416	1.8	32,365	1.9	32,429	2.5	33,394	3.3	34,636	3.8	35,633
2000	1.2	33,168	1.7	34,143	1.8	34,209	2.4	35,199	3.2	36,474	3.7	37,497
2100	1.1	36,474	1.6	37,497	1.7	37,565	2.3	38,603	3.1	39,938	3.6	41,007
2200	1.1	39,938	1.6	41,007	1.7	41,079	2.2	42,164	2.9	43,558	3.4	44,675
2250	1.0	41,548	1.5	42,638	1.6	42,712	2.1	43,818	2.8	45,239	3.3	46,377
2300	1.0	43,558	1.5	44,675	1.6	44,750	2.1	45,882	2.8	47,336	3.3	48,500
2400	1.0	47,336	1.4	48,500	1.5	48,578	2.0	49,757	2.7	51,271	3.1	52,482
2500	0.9	51,271	1.4	52,482	1.5	52,563	1.9	53,789	2.6	55,363	3.0	56,621
2550	0.9	53,093	1.3	54,325	1.4	54,408	1.9	55,655	2.5	57,256	2.9	58,535
2600	0.9	55,363	1.3	56,621	1.4	56,706	1.9	57,979	2.5	59,612	2.9	60,917
2700	0.9	59,612	1.3	60,917	1.4	61,005	1.8	62,325	2.4	64,018	2.8	65,370
2800	0.8	64,018	1.2	65,370	1.3	65,461	1.7	66,829	2.3	68,581	2.7	69,981
2850	0.8	66,052	1.2	67,426	1.3	67,518	1.7	68,906	2.3	70,686	2.6	72,107
2900	0.8	68,581	1.2	69,981	1.3	70,075	1.7	71,489	2.2	73,301	2.6	74,748
3000	0.8	73,301	1.1	74,748	1.2	74,845	1.6	76,307	2.1	78,179	2.5	79,673
3100	0.8	78,179	1.1	79,673	1.2	79,773	1.6	81,282	2.1	83,213	2.4	84,754
3150	0.7	80,425	1.1	81,940	1.2	82,041	1.5	83,571	2.0	85,530	2.4	87,092
3200	0.7	83,213	1.1	84,754	1.1	84,857	1.5	86,413	2.0	88,405	2.3	89,993
3300	0.7	88,405	1.0	89,993	1.1	90,099	1.5	91,702	1.9	93,753	2.3	95,388
3400	0.7	93,753	1.0	95,388	1.1	95,498	1.4	97,148	1.9	99,259	2.2	100,941
3450	0.7	96,211	1.0	97,868	1.1	97,979	1.4	99,650	1.9	101,788	2.2	103,491
3600	0.7	104,922	1.0	106,651	1.0	106,767	1.3	108,511	1.8	110,741	2.1	112,518
3800	0.6	116,718	0.9	118,542	1.0	118,664	1.3	120,503	1.7	122,852	2.0	124,723
4000	0.6	129,143	0.9	131,061	0.9	131,190	1.2	133,123	1.6	135,591	1.9	137,556

Reduction of movement for expansion joints
with PTFE lining: angular movement: -66 %.

Recommended sizes
Additional possible sizes

Individual fabrication possible

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U111F
▶ with internal vacuum support ring



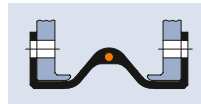
Installation length (L _E) at design pressure												
	up to 10 bar L _E = 150 mm		up to 10 bar L _E = 200 mm		up to 10 bar L _E = 250 mm		up to 10 bar L _E = 300 mm		up to 10 bar L _E = 350 mm		up to 10 bar L _E = 400 mm	
	higher pressures on request											
NB	Movement	A	Movement	A	Movement	A	Movement	A	Movement	A	Movement	A
	 ±°	 cm ²	 ±°	 cm ²	 ±°	 cm ²	 ±°	 cm ²	 ±°	 cm ²	 ±°	 cm ²
100	18.8	177	25.2	254	27.0	260	32.2	353	39.7	491	43.5	616
125	15.2	241	20.6	330	22.2	337	26.7	441	33.6	594	37.2	731
150	12.8	314	17.4	415	18.8	423	22.8	539	29.0	707	32.3	855
175	11.0	415	15.0	531	16.2	539	19.8	670	25.4	855	28.5	1,018
200	9.6	491	13.2	616	14.3	625	17.5	765	22.5	962	25.4	1,134
250	7.7	707	10.6	855	11.5	866	14.1	1,029	18.4	1,257	20.8	1,452
300	6.5	973	8.9	1,146	9.6	1,158	11.9	1,346	15.5	1,605	17.6	1,825
350	5.5	1,288	7.6	1,486	8.3	1,500	10.2	1,713	13.3	2,003	15.2	2,248
400	4.9	1,605	6.7	1,825	7.3	1,840	9.0	2,075	11.7	2,393	13.4	2,660
450	4.3	1,987	6.0	2,231	6.5	2,248	8.0	2,507	10.5	2,856	11.9	3,147
500	3.9	2,402	5.4	2,669	5.8	2,688	7.2	2,971	9.4	3,349	10.8	3,664
550	3.5	2,827	4.9	3,117	5.3	3,137	6.5	3,442	8.6	3,848	9.8	4,185
600	3.2	3,349	4.5	3,664	4.9	3,685	6.0	4,015	7.9	4,453	9.0	4,815
650	3.0	3,848	4.1	4,185	4.5	4,208	5.5	4,560	7.3	5,027	8.3	5,411
700	2.8	4,465	3.8	4,827	4.2	4,852	5.1	5,230	6.8	5,728	7.7	6,138
750	2.6	5,027	3.6	5,411	3.9	5,437	4.8	5,836	6.3	6,362	7.2	6,793
800	2.4	5,741	3.4	6,151	3.6	6,179	4.5	6,604	5.9	7,163	6.8	7,620
850	2.3	6,362	3.2	6,793	3.4	6,822	4.2	7,268	5.6	7,854	6.4	8,332
900	2.2	7,163	3.0	7,620	3.2	7,651	4.0	8,123	5.3	8,742	6.0	9,246
950	2.0	7,854	2.8	8,332	3.1	8,365	3.8	8,858	5.0	9,503	5.7	10,029
1000	1.9	8,742	2.7	9,246	2.9	9,280	3.6	9,799	4.7	10,477	5.4	11,029
1050	1.9	9,503	2.6	10,029	2.8	10,064	3.4	10,605	4.5	11,310	5.2	11,882
1100	1.8	10,496	2.4	11,047	2.7	11,085	3.3	11,652	4.3	12,390	4.9	12,989
1150	1.7	11,310	2.3	11,882	2.5	11,921	3.1	12,509	4.1	13,273	4.7	13,893
1200	1.6	12,370	2.2	12,969	2.4	13,009	3.0	13,623	4.0	14,420	4.5	15,066
1250	1.6	13,273	2.2	13,893	2.3	13,935	2.9	14,569	3.8	15,394	4.3	16,061
1300	1.5	14,420	2.1	15,066	2.2	15,109	2.8	15,770	3.7	16,627	4.2	17,320
1350	1.4	15,394	2.0	16,061	2.2	16,106	2.7	16,787	3.5	17,671	4.0	18,385
1400	1.4	16,627	1.9	17,320	2.1	17,366	2.6	18,074	3.4	18,991	3.9	19,731
1450	1.3	17,671	1.9	18,385	2.0	18,433	2.5	19,162	3.3	20,106	3.7	20,867
1500	1.3	18,991	1.8	19,731	1.9	19,781	2.4	20,536	3.2	21,512	3.6	22,299
1600	1.2	21,512	1.7	22,299	1.8	22,352	2.3	23,154	3.0	24,190	3.4	25,025
1650	1.2	22,698	1.6	23,506	1.8	23,561	2.2	24,384	2.9	25,447	3.3	26,302
1700	1.1	24,190	1.6	25,025	1.7	25,081	2.1	25,930	2.8	27,026	3.2	27,907
1800	1.1	27,055	1.5	27,937	1.6	27,996	2.0	28,893	2.6	30,049	3.0	30,978
1900	1.0	30,018	1.4	30,946	1.5	31,009	1.9	31,952	2.5	33,168	2.9	34,143
1950	1.0	31,416	1.4	32,365	1.5	32,429	1.9	33,394	2.4	34,636	2.8	35,633
2000	1.0	33,168	1.3	34,143	1.5	34,209	1.8	35,199	2.4	36,474	2.7	37,497
2100	0.9	36,474	1.3	37,497	1.4	37,565	1.7	38,603	2.3	39,938	2.6	41,007
2200	0.9	39,938	1.2	41,007	1.3	41,079	1.6	42,164	2.2	43,558	2.5	44,675
2250	0.9	41,548	1.2	42,638	1.3	42,712	1.6	43,818	2.1	45,239	2.4	46,377
2300	0.8	43,558	1.2	44,675	1.3	44,750	1.6	45,882	2.1	47,336	2.4	48,500
2400	0.8	47,336	1.1	48,500	1.2	48,578	1.5	49,757	2.0	51,271	2.3	52,482
2500	0.8	51,271	1.1	52,482	1.2	52,563	1.4	53,789	1.9	55,363	2.2	56,621
2550	0.8	53,093	1.1	54,325	1.1	54,408	1.4	55,655	1.9	57,256	2.1	58,535
2600	0.7	55,363	1.0	56,621	1.1	56,706	1.4	57,979	1.8	59,612	2.1	60,917
2700	0.7	59,612	1.0	60,917	1.1	61,005	1.3	62,325	1.8	64,018	2.0	65,370
2800	0.7	64,018	1.0	65,370	1.0	65,461	1.3	66,829	1.7	68,581	1.9	69,981
2850	0.7	66,052	0.9	67,426	1.0	67,518	1.3	68,906	1.7	70,686	1.9	72,107
2900	0.7	68,581	0.9	69,981	1.0	70,075	1.2	71,489	1.6	73,301	1.9	74,748
3000	0.6	73,301	0.9	74,748	1.0	74,845	1.2	76,307	1.6	78,179	1.8	79,673
3100	0.6	78,179	0.9	79,673	0.9	79,773	1.2	81,282	1.5	83,213	1.8	84,754
3150	0.6	80,425	0.9	81,940	0.9	82,041	1.1	83,571	1.5	85,530	1.7	87,092
3200	0.6	83,213	0.8	84,754	0.9	84,857	1.1	86,413	1.5	88,405	1.7	89,993
3300	0.6	88,405	0.8	89,993	0.9	90,099	1.1	91,702	1.4	93,753	1.6	95,388
3400	0.6	93,753	0.8	95,388	0.9	95,498	1.1	97,148	1.4	99,259	1.6	100,941
3450	0.6	96,211	0.8	97,868	0.8	97,979	1.0	99,650	1.4	101,788	1.6	103,491
3600	0.5	104,922	0.7	106,651	0.8	106,767	1.0	108,511	1.3	110,741	1.5	112,518
3800	0.5	116,718	0.7	118,542	0.8	118,664	0.9	120,503	1.3	122,852	1.4	124,723
4000	0.5	129,143	0.7	131,061	0.7	131,190	0.9	133,123	1.2	135,591	1.4	137,556

Reduction of movement for expansion joints
with PTFE lining: angular movement: -0 %.

Recommended sizes
Additional possible sizes

Individual fabrication possible





Installation length (L _E) at design pressure												
	up to 10 bar L _E = 150 mm		up to 10 bar L _E = 200 mm		up to 10 bar L _E = 250 mm		up to 10 bar L _E = 300 mm		up to 10 bar L _E = 350 mm		up to 10 bar L _E = 400 mm	
	higher pressures on request											
NB	Movement	 A cm ²	Movement	 A cm ²	Movement	 A cm ²	Movement	 A cm ²	Movement	 A cm ²	Movement	 A cm ²
	 ±°		 ±°		 ±°		 ±°		 ±°		 ±°	
100	13.0	177	18.3	254	19.8	260	24.2	353	31.0	491	34.2	616
125	10.4	241	14.8	330	16.1	337	19.8	441	25.6	594	28.5	731
150	8.7	314	12.4	415	13.5	423	16.7	539	21.8	707	24.4	855
175	7.5	415	10.7	531	11.6	539	14.4	670	18.9	855	21.2	1,018
200	6.6	491	9.4	616	10.2	625	12.7	765	16.7	962	18.8	1,134
250	5.3	707	7.5	855	8.2	866	10.2	1,029	13.5	1,257	15.2	1,452
300	4.4	973	6.3	1,146	6.8	1,158	8.5	1,346	11.3	1,605	12.8	1,825
350	3.8	1,288	5.4	1,486	5.9	1,500	7.3	1,713	9.7	2,003	11.0	2,248
400	3.3	1,605	4.7	1,825	5.1	1,840	6.4	2,075	8.5	2,393	9.6	2,660
450	2.9	1,987	4.2	2,231	4.6	2,248	5.7	2,507	7.6	2,856	8.6	3,147
500	2.6	2,402	3.8	2,669	4.1	2,688	5.1	2,971	6.8	3,349	7.7	3,664
550	2.4	2,827	3.4	3,117	3.7	3,137	4.7	3,442	6.2	3,848	7.0	4,185
600	2.2	3,349	3.1	3,664	3.4	3,685	4.3	4,015	5.7	4,453	6.5	4,815
650	2.0	3,848	2.9	4,185	3.2	4,208	4.0	4,560	5.3	5,027	6.0	5,411
700	1.9	4,465	2.7	4,827	2.9	4,852	3.7	5,230	4.9	5,728	5.5	6,138
750	1.8	5,027	2.5	5,411	2.7	5,437	3.4	5,836	4.6	6,362	5.2	6,793
800	1.6	5,741	2.4	6,151	2.6	6,179	3.2	6,604	4.3	7,163	4.9	7,620
850	1.5	6,362	2.2	6,793	2.4	6,822	3.0	7,268	4.0	7,854	4.6	8,332
900	1.5	7,163	2.1	7,620	2.3	7,651	2.9	8,123	3.8	8,742	4.3	9,246
950	1.4	7,854	2.0	8,332	2.2	8,365	2.7	8,858	3.6	9,503	4.1	10,029
1000	1.3	8,742	1.9	9,246	2.1	9,280	2.6	9,799	3.4	10,477	3.9	11,029
1050	1.3	9,503	1.8	10,029	2.0	10,064	2.5	10,605	3.3	11,310	3.7	11,882
1100	1.2	10,496	1.7	11,047	1.9	11,085	2.3	11,652	3.1	12,390	3.5	12,989
1150	1.1	11,310	1.6	11,882	1.8	11,921	2.2	12,509	3.0	13,273	3.4	13,893
1200	1.1	12,370	1.6	12,969	1.7	13,009	2.1	13,623	2.9	14,420	3.2	15,066
1250	1.1	13,273	1.5	13,893	1.6	13,935	2.1	14,569	2.7	15,394	3.1	16,061
1300	1.0	14,420	1.5	15,066	1.6	15,109	2.0	15,770	2.6	16,627	3.0	17,320
1350	1.0	15,394	1.4	16,061	1.5	16,106	1.9	16,787	2.5	17,671	2.9	18,385
1400	0.9	16,627	1.4	17,320	1.5	17,366	1.8	18,074	2.5	18,991	2.8	19,731
1450	0.9	17,671	1.3	18,385	1.4	18,433	1.8	19,162	2.4	20,106	2.7	20,867
1500	0.9	18,991	1.3	19,731	1.4	19,781	1.7	20,536	2.3	21,512	2.6	22,299
1600	0.8	21,512	1.2	22,299	1.3	22,352	1.6	23,154	2.1	24,190	2.4	25,025
1650	0.8	22,698	1.1	23,506	1.2	23,561	1.6	24,384	2.1	25,447	2.4	26,302
1700	0.8	24,190	1.1	25,025	1.2	25,081	1.5	25,930	2.0	27,026	2.3	27,907
1800	0.7	27,055	1.1	27,937	1.1	27,996	1.4	28,893	1.9	30,049	2.2	30,978
1900	0.7	30,018	1.0	30,946	1.1	31,009	1.4	31,952	1.8	33,168	2.0	34,143
1950	0.7	31,416	1.0	32,365	1.1	32,429	1.3	33,394	1.8	34,636	2.0	35,633
2000	0.7	33,168	0.9	34,143	1.0	34,209	1.3	35,199	1.7	36,474	1.9	37,497
2100	0.6	36,474	0.9	37,497	1.0	37,565	1.2	38,603	1.6	39,938	1.9	41,007
2200	0.6	39,938	0.9	41,007	0.9	41,079	1.2	42,164	1.6	43,558	1.8	44,675
2250	0.6	41,548	0.8	42,638	0.9	42,712	1.1	43,818	1.5	45,239	1.7	46,377
2300	0.6	43,558	0.8	44,675	0.9	44,750	1.1	45,882	1.5	47,336	1.7	48,500
2400	0.5	47,336	0.8	48,500	0.9	48,578	1.1	49,757	1.4	51,271	1.6	52,482
2500	0.5	51,271	0.8	52,482	0.8	52,563	1.0	53,789	1.4	55,363	1.6	56,621
2550	0.5	53,093	0.7	54,325	0.8	54,408	1.0	55,655	1.3	57,256	1.5	58,535
2600	0.5	55,363	0.7	56,621	0.8	56,706	1.0	57,979	1.3	59,612	1.5	60,917
2700	0.5	59,612	0.7	60,917	0.8	61,005	1.0	62,325	1.3	64,018	1.4	65,370
2800	0.5	64,018	0.7	65,370	0.7	65,461	0.9	66,829	1.2	68,581	1.4	69,981
2850	0.5	66,052	0.7	67,426	0.7	67,518	0.9	68,906	1.2	70,686	1.4	72,107
2900	0.5	68,581	0.7	69,981	0.7	70,075	0.9	71,489	1.2	73,301	1.3	74,748
3000	0.4	73,301	0.6	74,748	0.7	74,845	0.9	76,307	1.1	78,179	1.3	79,673
3100	0.4	78,179	0.6	79,673	0.7	79,773	0.8	81,282	1.1	83,213	1.3	84,754
3150	0.4	80,425	0.6	81,940	0.7	82,041	0.8	83,571	1.1	85,530	1.2	87,092
3200	0.4	83,213	0.6	84,754	0.6	84,857	0.8	86,413	1.1	88,405	1.2	89,993
3300	0.4	88,405	0.6	89,993	0.6	90,099	0.8	91,702	1.0	93,753	1.2	95,388
3400	0.4	93,753	0.6	95,388	0.6	95,498	0.8	97,148	1.0	99,259	1.1	100,941
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