(UPOV)

INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS

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TESTING OF HOMOGENEITY OF
SELF-FERTILIZED AND VEGETATIVELY PROPAGATED SPECIES

0388

Bundessortenamt   8.6.1989
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Testing of Homogeneity of Self-Fertilized and Vegetatively

Propagated Species

1. Introduction

In the first part of the Technical Guidelines the sample
size for testing homogeneity is indicated for different
groups of characteristics. In view to homogeneity testing
the General Introduction (doc. TG/1/2) gives the maximum
number of off-types for varieties of self-fertilized and
vegetatively propagated species for sample sizes up to 137.
For sample sizes higher than that the technical experts
preparing a Technical Guideline have to indicate the maximum
number of off-types which they deem adequate according to
their experience.

The purpose of this document is to provide the experts of the
Technical Working Parties background information and a tool
to compare the level of homogeneity tolerance between
comparable species and characteristics in cases where for
technical reasons different sizes have to be chosen.

2. Parameters defining a sampling scheme

The situation in testing homogeneity can be described by
sampling from a binomial distribution.

4 parameters are necessary:

(1) population standard p, also called nominal standard.

   p is the ratio of off-types in the population (e.g.
   2%, p=0.02), whereas the number of individuals in the
   population is assumed to be very large. Populations
   with standard greater than p are considered as inhomo-
   geneous and such ones with smaller values of p as homo-
   geneous.

(2) sample size n

   n individual plants are drawn at random from the
   population (plot, seed lot).

(3) maximum number of off-types k in the sample

   this is the number of off-types tolerated in the sample
   of size n

(4) acceptance probability

the probability that at most k off-types occur in a sample of size n out of a population with population standard p

i.e. $P(i \leq k) = \sum_{i=0}^{k} \binom{n}{i} p^i (1-p)^{n-i}$

When 3 parameters are given, the 4th can be calculated. This means that a sampling scheme can be described if at least 3 parameters are known.

3. Tables

In tables 1 to 16 the maximum number of off-types and the corresponding samle size is given for different combinations of p and the acceptance probability.

For each value of k the corresponding lower and upper bound of n is listed. In table 1 for k=2 the corresponding sample size n is in the range from 17 to 28 and for k=32 from 488 to 505.

Tables for further combinations can be supplied on request by the author of this paper or by your local statistician.

The use of the tables is illustrated by the following examples:

(1) A sampling scheme is required with acceptance probability 99%, a sample size n of about 1000 and p=1%. Find the maximum number of off-types (see table 11).
Answer: k=17

(2) A sampling scheme is required with acceptance probability and population standard as in example (1). A sample size of only n=500 can be managed. Find the maximum number of off-types (see table 11).
Answer: k=10

(3) p and n as in example (2). An acceptance probability of 95% may be considered as sufficient. Find the tolerable maximum number of off-types (see table 3).
Answer: k=8

(4) A sampling scheme is required as in example (1) yet p is allowed to be 2%. Find k (see table 10).
Answer: k=30

4. The role of sample size

Increasing the sample size causes more work on the one
hand yet on the other hand it provides more evidence on
the true value of the population standard.
The efficiency of two sampling schemes with different
sample sizes yet the same acceptance probability can be
compared by plotting the acceptance probability against
the population standard as was done in figure 1.

The following schemes were compared:

scheme	population standard	acceptance probability	n	k
1	1%	98%	100	3
2	1%	98%	200	5

Figure 1 illustrates that sampling scheme 2 is more effi-
cient if p is greater than 1%. E.g. if p is 4%, i.e. the
population should be considered as inhomogeneous, the
acceptance probability for sampling scheme 1 is 43% and
for scheme 2 19%. In other words: the rejection probabi-
lity for scheme 1 is only 57% and for scheme 2 81%.

In order to provide efficient sampling schemes the sample
size should have a reasonable number which should be in
balance with the amount of work connected with sampling.

5. Sampling schemes in test guidelines

When drafting UPOV test guidelines it is recommended to
use the tables given in the appendix of this document.
After having chosen the sample size and the maximum
number of off-types, the nominal standard and the accep-
tance probability should be indicated as well. Then it
is possible to compare different sampling schemes.

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Fig 1: Comparison of two sampling schemes

Acceptance probability

Population Standard

Table 1:   Acceptance Probability = 95%
--------   Population Standard   = 5%
           n = sample size, k = maximum number of off-types

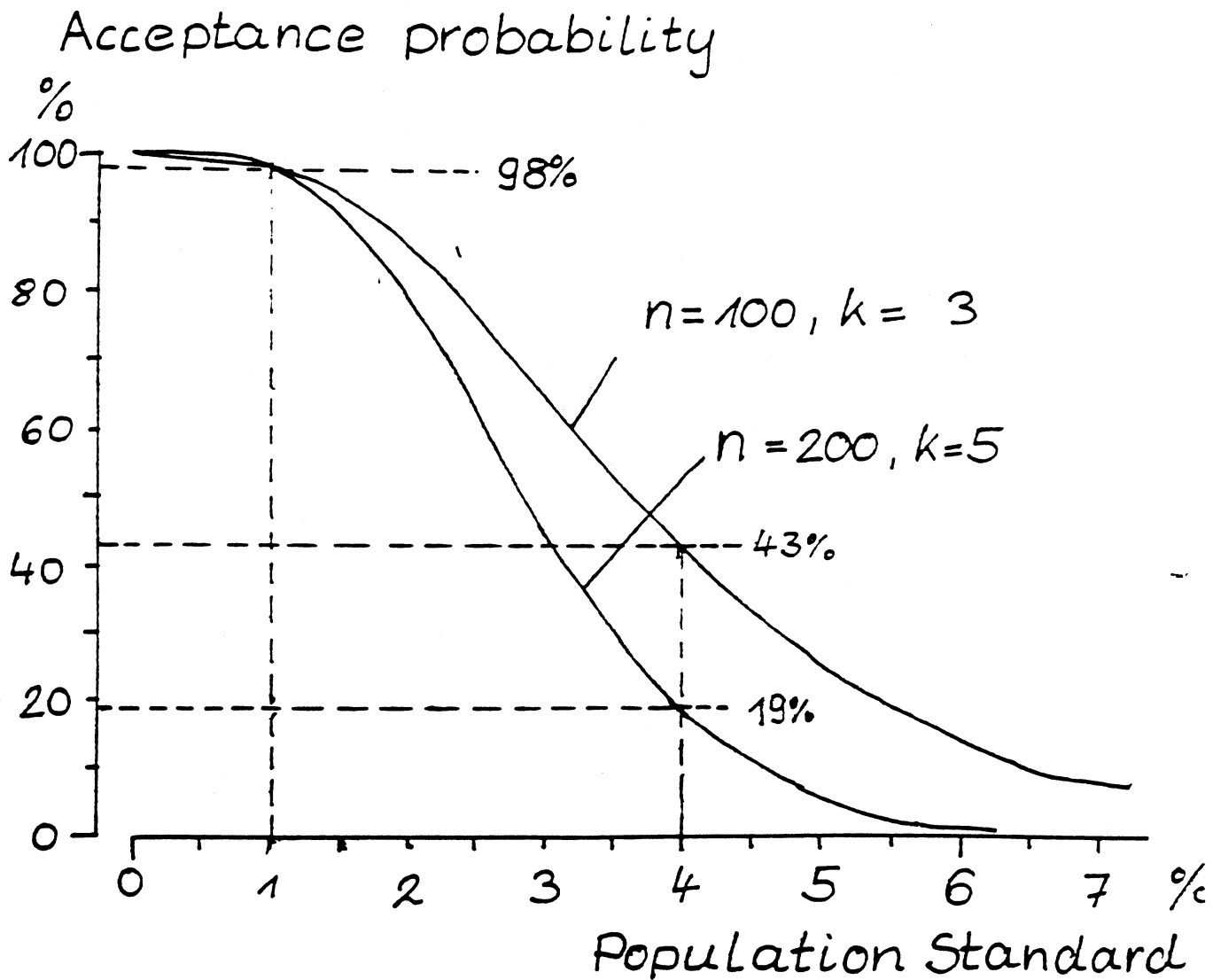| n	k		n	k
1- 7	0		874- 891	54
8- 16	1		892- 909	55
17- 28	2		910- 926	56
29- 40	3		927- 944	57
41- 53	4		945- 962	58
54- 67	5		963- 980	59
68- 81	6		981- 998	60
82- 95	7		999-1016	61
96- 110	8		1017-1034	62
111- 125	9		1035-1052	63
126- 140	10		1053-1070	64
141- 155	11		1071-1088	65
156- 171	12		1089-1106	66
172- 187	13		1107-1124	67
188- 203	14		1125-1142	68
204- 219	15		1143-1160	69
220- 235	16		1161-1178	70
236- 251	17		1179-1197	71
252- 268	18		1198-1215	72
269- 284	19		1216-1233	73
285- 300	20		1234-1251	74
301- 317	21		1252-1269	75
318- 334	22		1270-1287	76
335- 351	23		1288-1306	77
352- 367	24		1307-1324	78
368- 384	25		1325-1342	79
385- 401	26		1343-1360	80
402- 418	27		1361-1378	81
419- 435	28		1379-1397	82
436- 452	29		1398-1415	83
453- 469	30		1416-1433	84
470- 487	31		1434-1451	85
488- 504	32		1452-1470	86
505- 521	33		1471-1488	87
522- 538	34		1489-1506	88
539- 556	35		1507-1525	89
557- 573	36		1526-1543	90
574- 590	37		1544-1561	91
591- 608	38		1562-1580	92
609- 625	39		1581-1598	93
626- 643	40		1599-1616	94
644- 660	41		1617-1635	95
661- 678	42		1636-1653	96
679- 696	43		1654-1671	97
697- 713	44		1672-1690	98
714- 731	45		1691-1708	99
732- 748	46		1709-1727	100
749- 766	47		1728-1745	101
767- 784	48		1746-1763	102
785- 802	49		1764-1782	103
803- 819	50		1783-1800	104
820- 837	51		1801-1819	105
838- 855	52		1820-1837	106
856- 873	53		1838-1856	107

Table 1:   Acceptance Probability = 95%
--------   Population Standard   = 5%
            n = sample size, k = maximum number of off-types

n	k	n	k
1857-1874	108	2451-2468	140
1875-1893	109	2469-2487	141
1894-1911	110	2488-2506	142
1912-1930	111	2507-2524	143
1931-1948	112	2525-2543	144
1949-1967	113	2544-2562	145
1968-1985	114	2563-2580	146
1986-2004	115	2581-2599	147
2005-2022	116	2600-2618	148
2023-2041	117	2619-2636	149
2042-2059	118	2637-2655	150
2060-2078	119	2656-2674	151
2079-2096	120	2675-2692	152
2097-2115	121	2693-2711	153
2116-2133	122	2712-2730	154
2134-2152	123	2731-2749	155
2153-2171	124	2750-2767	156
2172-2189	125	2768-2786	157
2190-2208	126	2787-2805	158
2209-2226	127	2806-2824	159
2227-2245	128	2825-2842	160
2246-2263	129	2843-2861	161
2264-2282	130	2862-2880	162
2283-2301	131	2881-2899	163
2302-2319	132	2900-2917	164
2320-2338	133	2918-2936	165
2339-2356	134	2937-2955	166
2357-2375	135	2956-2974	167
2376-2394	136	2975-2992	168
2395-2412	137	2993-3011	169
2413-2431	138	3012-3030	170
2432-2450	139		

Table 2:   Acceptance Probability = 95%
--------   Population Standard   = 2%
           n = sample size, k = maximum number of off-types

n	k	n	k
1- 18	0	2176-2219	54
19- 41	1	2220-2264	55
42- 69	2	2265-2308	56
70- 99	3	2309-2353	57
100- 131	4	2354-2398	58
132- 165	5	2399-2442	59
166- 200	6	2443-2487	60
201- 236	7	2488-2532	61
237- 273	8	2533-2577	62
274- 310	9	2578-2622	63
311- 348	10	2623-2667	64
349- 386	11	2668-2712	65
387- 425	12	2713-2757	66
426- 464	13	2758-2802	67
465- 504	14	2803-2847	68
505- 544	15	2848-2892	69
545- 584	16	2893-2837	70
585- 624	17	2938-2983	71
625- 665	18	2984-3028	72
666- 706	19	3029-3073	73
707- 747	20	3074-3118	74
748- 789	21	3119-3164	75
790- 830	22	3165-3209	76
831- 872	23	3210-3255	77
873- 914	24	3256-3300	78
915- 956	25	3301-3345	79
957- 998	26	3346-3391	80
999-1040	27	3392-3436	81
1041-1083	28	3437-3482	82
1084-1126	29	3483-3528	83
1127-1168	30	3529-3573	84
1169-1211	31	3574-3619	85
1212-1254	32	3620-3664	86
1255-1297	33	3665-3710	87
1298-1340	34	3711-3756	88
1341-1383	35	3757-3801	89
1384-1427	36	3802-3847	90
1428-1470	37	3848-3893	91
1471-1514	38	3894-3939	92
1515-1557	39	3940-3985	93
1558-1601	40	3986-4030	94
1602-1645	41	4031-4076	95
1646-1689	42	4077-4122	96
1690-1732	43	4123-4168	97
1733-1776	44	4169-4214	98
1777-1820	45	4215-4260	99
1821-1864	46	4261-4306	100
1865-1909	47	4307-4352	101
1910-1953	48	4353-4398	102
1954-1997	49	4399-4444	103
1998-2041	50	4445-4490	104
2042-2086	51	4491-4536	105
2087-2130	52	4537-4582	106
2131-2175	53	4583-4628	107

Table 2:   Acceptance Probability = 95%
--------   Population Standard   = 2%
           n = sample size, k = maximum number of off-types

n	k		n	k
4629-4674	108		5322-5368	123
4675-4720	109		5369-5414	124
4721-4766	110		5415-5460	125
4767-4813	111		5461-5507	126
4814-4859	112		5508-5553	127
4860-4905	113		5554-5600	128
4906-4951	114		5601-5646	129
4952-4997	115		5647-5693	130
4998-5044	116		5694-5739	131
5045-5090	117		5740-5786	132
5091-5136	118		5787-5832	133
5137-5182	119		5833-5878	134
5183-5229	120		5879-5925	135
5230-5275	121		5926-5972	136
5276-5321	122		5973-6018	137

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Table 3:   Acceptance Probability = 95%
--------   Population Standard   = 1%
           n = sample size, k = maximum number of off-types

n	k		n	k
1- 35	0		2851-2937	37
36- 82	1		2938-3023	38
83- 137	2		3024-3111	39
138- 198	3		3112-3198	40
199- 262	4		3199-3285	41
263- 329	5		3286-3373	42
330- 399	6		3374-3461	43
400- 471	7		3462-3548	44
472- 544	8		3549-3636	45
545- 618	9		3637-3724	46
619- 694	10		3725-3813	47
695- 771	11		3814-3901	48
772- 848	12		3902-3989	49
849- 927	13		3990-4078	50
928-1006	14		4079-4167	51
1007-1085	15		4168-4256	52
1086-1166	16		4257-4344	53
1167-1246	17		4345-4433	54
1247-1328	18		4434-4522	55
1329-1410	19		4523-4612	56
1411-1492	20		4613-4701	57
1493-1575	21		4702-4790	58
1576-1658	22		4791-4880	59
1659-1741	23		4881-4969	60
1742-1825	24		4970-5059	61
1826-1909	25		5060-5149	62
1910-1993	26		5150-5238	63
1994-2078	27		5239-5328	64
2079-2163	28		5329-5418	65
2164-2248	29		5419-5508	66
2249-2333	30		5509-5598	67
2334-2419	31		5599-5689	68
2420-2505	32		5690-5779	69
2506-2591	33		5780-5869	70
2592-2677	34		5870-5959	71
2678-2763	35		5960-6050	72
2764-2850	36			

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Table 4: Acceptance Probability = 95%
-------- Population Standard   = 0.5%
          n = sample size, k = maximum number of off-types

n	k		n	k
1- 71	0		2818-2981	20
72- 164	1		2982-3147	21
165- 274	2		3148-3313	22
275- 395	3		3314-3479	23
396- 523	4		3480-3647	24
524- 658	5		3648-3815	25
659- 797	6		3816-3983	26
798- 940	7		3984-4152	27
941-1086	8		4153-4322	28
1087-1235	9		4323-4492	29
1236-1386	10		4493-4663	30
1387-1540	11		4664-4834	31
1541-1695	12		4835-5006	32
1696-1851	13		5007-5177	33
1852-2009	14		5178-5350	34
2010-2169	15		5351-5523	35
2170-2329	16		5524-5696	36
2330-2491	17		5697-5869	37
2492-2653	18		5870-6043	38
2654-2817	19			

Table 5: Acceptance Probability = 95%
-------- Population Standard   = 0.4%
          n = sample size, k = maximum number of off-types

n	k		n	k
1- 89	0		2711-2911	16
90- 205	1		2912-3113	17
206- 342	2		3114-3316	18
343- 493	3		3317-3520	19
494- 654	4		3521-3726	20
655- 822	5		3727-3933	21
823- 996	6		3934-4140	22
997-1175	7		4141-4348	23
1176-1358	8		4349-4558	24
1359-1544	9		4559-4768	25
1545-1733	10		4769-4978	26
1734-1924	11		4979-5190	27
1925-2118	12		5191-5402	28
2119-2313	13		5403-5614	29
2314-2511	14		5615-5828	30
2512-2710	15		5829-6043	31

Table 6:   Acceptance Probability = 95%
--------   Population Standard   = 0.3%
           n = sample size, k = maximum number of off-types

n	k		n	k
1- 118	0		2824-3084	13
119- 273	1		3085-3347	14
274- 456	2		3348-3613	15
457- 657	3		3614-3881	16
658- 872	4		3881-4150	17
873-1096	5		4151-4421	18
1097-1328	6		4422-4693	19
1329-1566	7		4694-4967	20
1567-1810	8		4968-5242	21
1811-2058	9		5243-5519	22
2059-2310	10		5520-5797	23
2311-2565	11		5798-6076	24
2566-2823	12			

Table 7:   Acceptance Probability = 95%
--------   Population Standard   = 0.2%
           n = sample size, k = maximum number of off-types

n	k		n	k
1- 178	0		2715-3086	9
179- 409	1		3087-3464	10
410- 683	2		3465-3846	11
684- 986	3		3847-4234	12
987-1307	4		4235-4625	13
1308-1644	5		4626-5020	14
1645-1991	6		5021-5418	15
1992-2349	7		5419-5819	16
2350-2714	8		5820-6223	17

Table 8:   Acceptance Probability = 95%
--------   Population Standard   = 0.1%
           n = sample size, k = maximum number of off-types

n	k		n	k
1- 355	0		2615-3286	5
356- 818	1		3287-3982	6
819-1367	2		3983-4696	7
1368-1971	3		4697-5427	8
1972-2614	4		5428-6170	9

Table 9:   Acceptance Probability = 99%
--------   Population Standard   = 5%
            n = sample size, k = maximum number of off-types

n	k		n	k
1- 3	0		810- 826	55
4- 9	1		827- 843	56
10- 17	2		844- 860	57
18- 26	3		861- 877	58
27- 37	4		878- 894	59
38- 48	5		895- 911	60
49- 60	6		912- 928	61
61- 72	7		929- 945	62
73- 85	8		946- 962	63
86- 98	9		963- 979	64
99- 111	10		980- 997	65
112- 124	11		998-1014	66
125- 138	12		1015-1031	67
139- 152	13		1032-1048	68
153- 167	14		1049-1066	69
168- 181	15		1067-1083	70
182- 196	16		1084-1100	71
197- 210	17		1101-1118	72
211- 225	18		1119-1135	73
226- 240	19		1136-1153	74
241- 255	20		1154-1170	75
256- 270	21		1171-1187	76
271- 286	22		1188-1205	77
287- 301	23		1206-1222	78
302- 317	24		1223-1240	79
318- 332	25		1241-1257	80
333- 348	26		1258-1275	81
349- 364	27		1276-1292	82
365- 380	28		1293-1310	83
381- 395	29		1311-1327	84
396- 411	30		1328-1345	85
412- 427	31		1346-1362	86
428- 444	32		1363-1380	87
445- 460	33		1381-1398	88
461- 476	34		1399-1415	89
477- 492	35		1416-1433	90
493- 508	36		1434-1451	91
509- 525	37		1452-1468	92
526- 541	38		1469-1486	93
542- 558	39		1487-1504	94
559- 574	40		1505-1521	95
575- 591	41		1522-1539	96
592- 607	42		1540-1557	97
608- 624	43		1558-1574	98
625- 640	44		1575-1592	99
641- 657	45		1593-1610	100
658- 674	46		1611-1628	101
675- 690	47		1629-1645	102
691- 707	48		1646-1663	103
708- 724	49		1664-1681	104
725- 741	50		1682-1699	105
742- 758	51		1700-1717	106
759- 775	52		1718-1734	107
776- 792	53		1735-1752	108
793- 809	54		1753-1770	109

Table 9: Acceptance Probability = 99%
-------- Population Standard = 5%
n = sample size, k = maximum number of off-types

n	k		n	k
1771-1788	110		2401-2418	145
1789-1806	111		2419-2436	146
1807-1824	112		2437-2454	147
1825-1842	113		2455-2472	148
1843-1859	114		2473-2491	149
1860-1877	115		2492-2509	150
1878-1895	116		2510-2527	151
1896-1913	117		2528-2545	152
1914-1931	118		2546-2563	153
1932-1949	119		2564-2581	154
1950-1967	120		2582-2600	155
1968-1985	121		2601-2618	156
1986-2003	122		2619-2636	157
2004-2021	123		2637-2654	158
2022-2039	124		2655-2672	159
2040-2057	125		2673-2691	160
2058-2075	126		2692-2709	161
2076-2093	127		2710-2727	162
2094-2111	128		2728-2745	163
2112-2129	129		2746-2764	164
2130-2147	130		2765-2782	165
2148-2165	131		2783-2800	166
2166-2183	132		2801-2818	167
2184-2201	133		2819-2837	168
2202-2219	134		2838-2855	169
2220-2237	135		2856-2873	170
2238-2255	136		2874-2891	171
2256-2273	137		2892-2910	172
2274-2291	138		2911-2928	173
2292-2309	139		2929-2946	174
2310-2327	140		2947-2964	175
2328-2346	141		2965-2983	176
2347-2364	142		2984-3001	177
2365-2382	143		3002-3019	178
2383-2400	144			

Table 10: Acceptance Probability = 99%
--------- Population Standard   = 2%
           n = sample size, k = maximum number of off-types

n	k	n	k
1- 7	0	2012-2053	55
8- 22	1	2054-2095	56
23- 42	2	2096-2138	57
43- 65	3	2139-2180	58
66- 90	4	2181-2223	59
91- 118	5	2224-2266	60
119- 147	6	2267-2308	61
148- 177	7	2309-2351	62
178- 208	8	2352-2394	63
209- 241	9	2395-2437	64
242- 274	10	2438-2480	65
275- 307	11	2481-2523	66
308- 342	12	2524-2566	67
343- 377	13	2567-2609	68
378- 412	14	2610-2652	69
413- 448	15	2653-2695	70
449- 484	16	2696-2738	71
485- 521	17	2739-2782	72
522- 558	18	2783-2825	73
559- 595	19	2826-2868	74
596- 632	20	2869-2912	75
633- 670	21	2913-2955	76
671- 708	22	2956-2999	77
709- 747	23	3000-3042	78
748- 785	24	3043-3086	79
786- 824	25	3087-3130	80
825- 863	26	3131-3173	81
864- 902	27	3174-3217	82
903- 942	28	3218-3261	83
943- 981	29	3262-3304	84
982-1021	30	3305-3348	85
1022-1061	31	3349-3392	86
1062-1101	32	3393-3436	87
1102-1141	33	3437-3480	88
1142-1182	34	3481-3524	89
1183-1222	35	3525-3568	90
1223-1263	36	3569-3612	91
1264-1303	37	3613-3656	92
1304-1344	38	3657-3700	93
1345-1385	39	3701-3744	94
1386-1426	40	3745-3788	95
1427-1467	41	3789-3832	96
1468-1509	42	3833-3877	97
1510-1550	43	3878-3921	98
1551-1591	44	3922-3965	99
1592-1633	45	3966-4009	100
1634-1675	46	4010-4054	101
1676-1716	47	4055-4098	102
1717-1758	48	4099-4142	103
1759-1800	49	4143-4187	104
1801-1842	50	4188-4231	105
1843-1884	51	4232-4276	106
1885-1926	52	4277-4320	107
1927-1968	53	4321-4365	108
1969-2011	54	4366-4409	109

Table 10:   Acceptance Probability = 99%
---------   Population Standard   = 2%
            n = sample size, k = maximum number of off-types

n	k		n	k
4410-4454	110		5215-5259	128
4455-4498	111		5260-5304	129
4499-4543	112		5305-5349	130
4544-4587	113		5350-5394	131
4588-4632	114		5395-5439	132
4633-4677	115		5440-5484	133
4678-4721	116		5485-5529	134
4722-4766	117		5530-5574	135
4767-4811	118		5575-5619	136
4812-4856	119		5620-5665	137
4857-4900	120		5666-5710	138
4901-4945	121		5711-5755	139
4946-4990	122		5756-5800	140
4991-5035	123		5801-5845	141
5036-5080	124		5846-5890	142
5081-5125	125		5891-5936	143
5126-5169	126		5937-5981	144
5170-5214	127		5982-6026	145

Table 11:   Acceptance Probability = 99%
---------   Population Standard   =   1%
            n = sample size, k = maximum number of off-types

n	k		n	k
1- 15	0		2765-2846	40
16- 44	1		2847-2929	41
45- 83	2		2930-3011	42
84- 129	3		3012-3094	43
130- 180	4		3095-3177	44
181- 234	5		3178-3260	45
235- 292	6		3261-3343	46
293- 353	7		3344-3426	47
354- 415	8		3427-3510	48
416- 479	9		3511-3593	49
480- 545	10		3594-3677	50
546- 612	11		3678-3761	51
613- 681	12		3762-3846	52
682- 750	13		3847-3930	53
751- 821	14		3931-4014	54
822- 893	15		4015-4099	55
894- 965	16		4100-4184	56
966-1038	17		4185-4268	57
1039-1112	18		4269-4353	58
1113-1186	19		4354-4439	59
1187-1261	20		4440-4524	60
1262-1337	21		4525-4609	61
1338-1413	22		4610-4695	62
1414-1489	23		4696-4780	63
1490-1566	24		4781-4866	64
1567-1644	25		4867-4952	65
1645-1722	26		4953-5038	66
1723-1800	27		5039-5124	67
1801-1879	28		5125-5210	68
1880-1958	29		5211-5296	69
1959-2037	30		5297-5382	70
2038-2117	31		5383-5469	71
2118-2197	32		5470-5555	72
2198-2277	33		5556-5642	73
2278-2358	34		5643-5728	74
2359-2439	35		5729-5815	75
2440-2520	36		5816-5902	76
2521-2601	37		5903-5989	77
2602-2683	38		5990-6076	78
2684-2764	39			

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Table 12: Acceptance Probability = 99%
Population Standard = 0.5%
n = sample size, k = maximum number of off-types

n	k		n	k
1- 30	0		2671-2822	22
31- 87	1		2823-2975	23
88- 165	2		2976-3129	24
166- 257	3		3130-3284	25
258- 358	4		3285-3439	26
359- 467	5		3440-3596	27
468- 583	6		3597-3753	28
584- 703	7		3754-3911	29
704- 828	8		3912-4071	30
829- 956	9		4071-4229	31
957-1088	10		4230-4389	32
1089-1222	11		4390-4549	33
1223-1359	12		4550-4710	34
1360-1498	13		4711-4872	35
1499-1639	14		4873-5034	36
1640-1782	15		5035-5197	37
1783-1926	16		5198-5360	38
1927-2072	17		5361-5523	39
2073-2220	18		5524-5687	40
2221-2369	19		5688-5851	41
2370-2519	20		5852-6017	42
2520-2670	21			

Table 13: Acceptance Probability = 99%
Population Standard = 0.4%
n = sample size, k = maximum number of off-types

n	k		n	k
1- 37	0		2591-2774	18
38- 109	1		2775-2960	19
110- 206	2		2961-3147	20
207- 321	3		3148-3336	21
322- 447	4		3337-3526	22
448- 584	5		3527-3717	23
585- 728	6		3718-3910	24
729- 879	7		3911-4103	25
880-1034	8		4104-4298	26
1035-1195	9		4299-4494	27
1196-1359	10		4495-4690	28
1360-1527	11		4691-4888	29
1528-1698	12		4889-5086	30
1699-1872	13		5087-5285	31
1873-2048	14		5286-5485	32
2049-2227	15		5486-5585	33
2228-2407	16		5686-5887	34
2408-2590	17		5888-6089	35

Table 14:   Acceptance Probability = 99%
---------   Population Standard   =   0.3%
            n = sample size, k = maximum number of off-types

n	k		n	k
1- 49	0		2731-2968	15
50- 146	1		2969-3209	16
147- 275	2		3210-3452	17
276- 427	3		3453-3698	18
428- 596	4		3699-3945	19
597- 778	5		3946-4195	20
779- 970	6		4196-4447	21
971-1171	7		4448-4700	22
1172-1379	8		4701-4955	23
1380-1593	9		4956-5212	24
1594-1812	10		5213-5470	25
1813-2035	11		5471-5729	26
2036-2263	12		5730-5990	27
2264-2495	13		5991-6252	28
2496-2730	14			

Table 15:   Acceptance Probability = 99%
---------   Population Standard   =   0.2%
            n = sample size, k = maximum number of off-types

n	k		n	k
1- 74	0		2717-3052	11
75- 218	1		3053-3394	12
219- 412	2		3395-3741	13
413- 640	3		3742-4093	14
641- 894	4		4094-4450	15
895-1166	5		4451-4811	16
1167-1455	6		4812-5176	17
1456-1755	7		5177-5545	18
1756-2067	8		5546-5916	19
2068-2388	9		5917-6291	20
2389-2716	10			

Table 16:   Acceptance Probability = 99%
---------   Population Standard   =   0.1%
            n = sample size, k = maximum number of off-types

n	k		n	k
1- 148	0		2333-2908	6
149- 436	1		2909-3509	7
437- 824	2		3510-4132	8
825-1280	3		4133-4773	9
1281-1786	4		4774-5430	10
1787-2332	5		5431-6102	11

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