



# Standard Test Method for Attribute Sampling of Metallic and Inorganic Coatings<sup>1</sup>

This standard is issued under the fixed designation B602; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

## 1. Scope

1.1 This test method gives sampling plans that are intended for use in the inspection of metallic and inorganic coatings for conformance to ASTM standard specifications.

1.2 The plans in this test method, except as noted, have been selected from some of the single sampling plans of MIL-STD-105D. The specific plans selected are identified in **Tables 1-3** of this test method. The plan of **Table 4**, which is used for destructive testing, is not from the Military Standard. This standard does not contain the Military Standard's requirement for tightened inspection when the quality history of a supplier is unsatisfactory.

1.3 The plans are based on inspection by attributes, that is, an article of product is inspected and is classified as either conforming to a requirement placed on it, or as nonconforming. Sampling plans based on inspection by variables are given in Test Method **B762**. Variables plans are applicable when a test yields a numerical value for a characteristic, when the specification imposes a numerical limit on the characteristic, and when certain statistical criteria are met. These are explained in Test Method **B762**.

1.4 The plans in this test method are intended to be generally suitable. There may be instances in which tighter or looser plans or ones that are more discriminating are desired. Additional plans that may serve these needs are given in Guide **B697**. Also, Guide **B697** describes the nature of attribute sampling plans and the several factors that must be considered in the selection of a sampling plan. More information and an even greater selection of plans are given in MIL-STD-105D, MIL-STD-414, ANSI/ASQC Z1.9-1979, Refs (**1-7**)<sup>2</sup>, and in Guide **B697**.

1.5 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appro-*

*priate safety and health practices and determine the applicability of regulatory limitations prior to use.*

## 2. Referenced Documents

2.1 *ASTM Standards:*<sup>3</sup>

**B697** Guide for Selection of Sampling Plans for Inspection of Electrodeposited Metallic and Inorganic Coatings

**B762** Test Method of Variables Sampling of Metallic and Inorganic Coatings

2.2 *ANSI Standard:*<sup>4</sup>

**ANSI/ASQC Z1.9-1979** Sampling Procedures and Tables for Inspection by Variables for Percent Non-Conformance

2.3 *Military Standards:*<sup>5</sup>

**MIL-STD-105D** Sampling Procedures and Tables for Inspection by Attributes

**MIL-STD-414** Sampling Procedures and Tables for Inspection by Variables for Percent Defective

## 3. Terminology

3.1 *Definitions:*

3.1.1 *destructive test*—test that destroys the tested article or makes it nonconforming to a requirement.

3.1.2 *inspection lot*—collection of articles of the same kind that is submitted to inspection for acceptance or rejection as a group.

3.1.3 *nondestructive test*—test that neither destroys the tested article nor makes it nonconforming to a requirement.

3.1.4 *sample*—articles randomly selected from an inspection lot whose quality is used to decide whether or not the inspection lot is of acceptable quality.

## 4. Significance and Use

4.1 Sampling inspection permits the estimation of the overall quality of a group of product articles through the inspection of a relatively small number of product items drawn from the group.

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee B08 on Metallic and Inorganic Coatings and is the direct responsibility of Subcommittee B08.10 on Test Methods.

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<sup>2</sup> The boldface numbers in parentheses refer to the list of references at the end of this standard.

<sup>3</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

<sup>4</sup> Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.

<sup>5</sup> Available from Standardization Documents Order Desk, DODSSP, Bldg. 4, Section D, 700 Robbins Ave., Philadelphia, PA 19111-5098.



TABLE 1 Level I—Sampling Plan for Nondestructive Tests<sup>A</sup>

Inspection Lot Size	Sample Size	Acceptance Number	AQL, %	50/50 Point, %	LQL, %	AOQL,%
1 to 20 <sup>B</sup>	all	0	...	...	...	...
21 to 280	20	0	0.26	3.4	11.0	1.8
281 to 1 200	80	1	0.44	2.1	4.8	1.1
1 201 to 3 200	125	2	0.65	2.1	4.3	1.1
3 201 to 10 000	200	3	0.68	1.8	3.3	0.97
10 001 to 35 000	315	5	0.83	1.8	2.9	1.0
Over 35 000	500	7	0.80	1.5	2.4	0.90

<sup>A</sup> Taken from MIL-STD-105D, Single Sampling Plan, Level II, AQL = 0.65, Normal Inspection.

<sup>B</sup> The smallest lots are 100 % inspected, and so there is no sampling risk. For this reason, there are no AQL, etc.

TABLE 2 Level II—Sampling Plan for Nondestructive Tests<sup>A</sup>

Inspection Lot Size	Sample Size	Acceptance Number	AQL, %	50/50 Point, %	LQL, %	AOQL,%
1 to 8 <sup>B</sup>	all	0	...	...	...	...
9 to 90	8	0	0.64	8.3	25	4.6
91 to 280	32	1	1.1	5.2	12	2.6
281 to 500	50	2	1.7	5.3	10	2.7
501 to 1 200	80	3	1.7	4.6	8.2	2.4
1 201 to 3 200	125	5	2.1	4.5	7.4	2.5
3 201 to 10 000	200	7	2.0	3.9	5.9	2.2
10 001 to 35 000	315	10	2.0	3.4	4.9	2.1
Over 35 000	500	14	1.9	2.9	4.0	1.9

<sup>A</sup> Taken from MIL-STD-105D, Single Sampling Plan, Level II, AQL = 1.5, Normal Inspection.

<sup>B</sup> The smallest lots are 100 % inspected, and so there is no sampling risk. For this reason, there are no AQL, etc.

TABLE 3 Level III— Sampling Plan for Nondestructive Tests<sup>A</sup>

Inspection Lot Size	Sample Size	Acceptance Number	AQL, %	50/50 Point, %	LQL, %	AOQL,%
1 to 5 <sup>B</sup>	all	0	...	...	...	...
6 to 50	5	0	1.0	12.9	37	7.4
51 to 150	20	1	1.8	8.2	18	4.2
151 to 280	32	2	2.6	8.2	16	4.3
281 to 500	50	3	2.8	7.3	13	3.9
501 to 1 200	80	5	3.3	7.1	11	4.0
1 201 to 3 200	125	7	3.2	6.1	9.4	3.6
3 201 to 16 000	200	10	3.1	7.3	7.7	3.3
16 001 to 35 000	315	14	2.9	4.7	6.4	3.0
Over 35 000	500	21	3.0	4.3	5.6	2.9

<sup>A</sup> Taken from MIL-STD-105D, Single Sampling Plan, Level II, AQL = 2.5, Normal Inspection.

<sup>B</sup> The smallest lots are 100 % inspected, and so there is no sampling risk. For this reason, there are no AQL, etc.

TABLE 4 Sampling Plan for Destructive Test<sup>A</sup>

Inspection Lot Size	Sample Size	Acceptance Number	AQL,%	50/50 Point, %	LQL,%
1 to 25	2	0	2.5	29	68
26 to 1 200	13	1	2.8	13	27
1201 to 35 000	32	2	2.6	8.3	16
Over 35 000	55	3	2.5	6.6	12

<sup>A</sup> AOQLs are not given because destructive tests cannot be used to screen rejected lots. This plan is not found in MIL-STD-105D.

## 5. General

5.1 In sampling inspection, a relatively small number of articles (the sample) is selected randomly from a larger number of articles (the inspection lot) and is inspected for conformance to the requirements placed on the articles. Based on the results, a decision is made either to accept or reject the inspection lot. Sampling is used, rather than inspection of every article in a lot, to reduce cost. Also, some test methods are destructive, in which cases sampling inspection must be used to avoid destroying the lot.

5.2 There is always a risk that a sample will not be representative of the lot from which it is drawn. The larger the sample, the smaller this risk, but, the larger the cost of inspection. So the selection of a sampling plan involves the balancing of the costs of inspection against the consequences of accepting an undesirable number of nonconforming articles. If every article in an inspection lot conforms to its requirements, every article in the sample will conform also. Such lots will always be accepted. If only a few articles in an

4.2 The selection of a sampling plan provides purchasers and sellers a means of identifying the minimum quality levels that are considered to be satisfactory.

4.3 Because sampling plans will only yield estimates of the quality of a product, the results of the inspection are subject to error. Through the use of sampling plans, the risk of error is known and controlled.

inspection lot are nonconforming, the chances are that the sample will indicate that the lot is acceptable; but there is a small chance that the sample will indicate that the lot is unacceptable. The larger the proportion of nonconforming articles in an inspection lot, the more likely it will be that the sample will indicate that the lot is unacceptable. In the extreme case of every article in an inspection lot being nonconforming, a sample will always indicate that the lot is unacceptable.

5.3 For a given sampling plan, the chance of accepting an inspection lot that contains nonconforming items is often described in terms of the Acceptance Quality Level (AQL) and the Limiting Quality Level (LQL). The AQL is the quality level that is considered to be acceptable. The LQL is the quality level that is considered to be barely tolerable. A sampling plan is selected that will accept most submitted inspection lots of AQL quality and reject most lots of LQL quality. In this test method the AQL given for a sampling plan is the quality level of lots (expressed as the percentage of nonconforming articles) that have a 95 % chance of being accepted. The LQL is the quality level of lots that have a 10 % chance of being accepted or, in other words, a 90 % chance of being rejected. Also given with each sampling plan in this test method, is the quality level of an inspection lot that has a 50 % chance of being accepted. This is called the 50/50 point.

5.4 If all of the articles in a rejected inspection lot are inspected, and if nonconforming articles are removed and replaced with conforming articles, and then if the now 100 % conforming lot is resubmitted, the average quality level for a series of lots taken as a whole will be better because of the addition of the 100 % conforming lot. When the incoming lots are of a good quality level, the average quality level of a series of lots will be even better when the rejected lots are screened and resubmitted. When incoming lots are of a poor quality level, the average quality of a series of lots will again be good because many of the incoming lots will be rejected and upgraded. At intermediate quality levels of incoming lots, the average quality level of a series of lots will not be as good as in either of the above cases. The poorest average quality level that can result from the use of a given sampling plan when screening of rejected lots is done is called the Average Outgoing Quality Limit (AOQL). If corrective action is taken by the supplier so that there is a low rejection rate of initially supplied lots, the average quality level will be better than the AOQL (Note 1). This 100 % inspection of rejected lots cannot, of course, be used if the inspection test method is destructive. Screening of rejected lots will substantially increase the cost of inspection if the incoming lots are much worse than AQL quality. Screening is to be used only when required by the purchaser.

NOTE 1—The AOQLs given for Tables 1-3 are strictly correct only when the sample is small with respect to the lot. If the sample is consistently a significant part of the lot, the correct AOQL will be smaller than the tabulated value. The correct values are obtained by multiplying the tabulated values by:

$$1 - \text{sample size/lot size}$$

5.5 This test method contains four sampling plans. Three are intended to be used when the inspection methods are nondestructive. One of these (Table 2) is considered to be standard

and is the one that is followed unless the user of this method specifies either a higher quality level (Table 1) or a lower one (Table 3). The fourth plan is intended to be used when the inspection methods are destructive. This last plan utilizes smaller samples and so reduces the cost of inspection but with a sacrifice in the ability to distinguish between acceptable and unacceptable lots.

## 6. Ordering Information

6.1 Unless otherwise specified by the purchaser, the sampling plan given in Table 2 will be used for nondestructive testing, and the plan given in Table 4 for destructive testing.

6.2 When either a nondestructive or a destructive test can be used to inspect an article for conformance to a particular requirement, the purchaser should specify which test is to be used. When a test is neither clearly nondestructive nor destructive (see Note 2, 8.3), the purchaser should specify which it is considered to be.

## 7. Formation of Inspection Lot

7.1 An inspection lot shall be formed from articles that are of the same kind, that have been produced to the same specification, and that have been coated by a single supplier at one time or at approximately the same time under essentially identical conditions.

## 8. Sampling

8.1 *General*—A sample shall be selected from the inspection lot. If the test method to be used is nondestructive, the sample size shall be that directed in 8.2. If the test method is destructive, the sample size shall be that directed in 8.3.

8.2 *Nondestructive Tests*—For nondestructive testing, the size of the sample shall be that specified for the sampling plan level that is required by the purchaser. The sampling plans are given for Level I in Table 1, for Level II in Table 2, and for Level III in Table 3. If the purchaser does not specify the level, Level II shall be used.

8.3 *Destructive Tests*—For destructive testing, the size of the sample shall be that specified in Table 4.

NOTE 2—The nature of a destructive test can be such that the tested article can be reclaimed, for example by stripping and reapplying the coating. Other tests can destroy the coating in nonessential locations, in which case the item can still be functional. In these instances the purchaser needs to decide and state whether the tests are to be considered destructive or nondestructive.

NOTE 3—The plan given for destructive tests uses smaller samples than the plans given for nondestructive tests. There may be cases in which destruction of even these smaller quantities is undesirable. For example, the articles may be expensive or the inspection lot may be small. Often in such cases test specimens are coated along with the articles and are used to represent them in the destructive tests. The permission to use test specimens and the requirements covering them and their use should be set forth in the applicable coating specification, purchase order, or other governing document.

8.4 The sample shall be drawn from the inspection lot randomly, that is, in a manner that assures each article an equal chance of being selected regardless of other considerations such as its location in the inspection lot, its appearance, its quality, its location on a fixture during coating, and its

chronological relationship to the other articles. Random sampling procedures are given in the Annex of this test method.

## 9. Inspection and Lot Disposition

9.1 Each article in the sample shall be inspected as directed in the applicable coating standard. If the number of articles that do not conform to a particular requirement is equal to or less than the acceptance number of the sampling plan, the inspection lot is acceptable with respect to that requirement, otherwise the inspection lot is not acceptable (**Note 4**). Inspection lots that are unacceptable with respect to one or more requirements shall be rejected.

**NOTE 4**—The acceptability of an inspection lot is determined with respect to each requirement independently from all other requirements. The acceptance number applies to each requirement in turn; it is not added. For example, if a sample of 50 articles drawn in accordance with

**Table 2** is found to contain two defectives with respect to thickness and a third one with respect to appearance, the inspection lot is acceptable because although three articles were defective no more than two, the acceptance number, were defective with respect to a single requirement.

## 10. Resampling

10.1 When required by the purchaser, inspection lots that are rejected for nonconformance to a requirement where conformance can be determined by a nondestructive test may be 100 % inspected by the seller and resubmitted for acceptance after the seller has removed all nonconforming articles and replaced them with conforming articles. The same sampling plan that was used when the lot was first inspected shall be used for the reinspection of the screened lot. The resubmitted lot shall be inspected only for the characteristics for which it was rejected.

# ANNEX

## (Mandatory Information)

### A1. DRAWING OF SAMPLES

#### A1.1 Random Sampling

A1.1.1 If the articles in a lot are thoroughly mixed, sorted, or arranged without bias as to quality (for example, barrel electroplated articles), a sample drawn anywhere from the lot will meet the requirement of randomness. If the articles are not so mixed, and if it is thought to be impractical to mix them, bias will result if the entire sample is drawn from a single or a few layers. Other bias in sampling, such as taking articles from the same place on a plating rack, taking articles from the output of one electroplating bath and not others, and taking articles that appear to be conforming or to be nonconforming, must be avoided. Bias can be avoided by numbering the articles, randomly selecting a group of numbers equal to the sample size, and inspecting the articles with the selected numbers. A method for doing this is described in the following.

A1.1.2 When random numbers are used to select a sample, each article in the lot is identified by a different number. This may be done by placing the units in racks or trays where the positions in the racks are numbered. If the units have serial numbers, the serial numbers can be used. Random numbers may be obtained from books pertaining to statistics. A table of random numbers (**Table A1.1**) has been included in this Annex. Some pocket calculators are designed to generate random numbers.

A1.1.3 As an example assume that a sample of 13 articles is to be selected from an inspection lot of 80 articles. The articles are numbered 1 through 80. A pencil is allowed to fall blindly at some number in **Table A1.1**. Starting at this point, a coin is tossed to decide whether to go up or down the column; heads,

up; tails, down. If the pencil falls on column 10, line 11, and the coin is tails, the decision is to read down the column until 13 numbers are chosen. Take the first two digits in each group of five digits. The selection of random numbers is made as follows: the 85s are rejected because they are over 80, and the second 06 is rejected because it has already appeared. The sample then consists of articles numbered 31, 20, 8, 26, 53, 65, 64, 46, 22, 6, 41, 67, and 14.

#### A1.2 Constant-Interval Sampling

A1.2.1 When product items are arranged in an order without regard to quality, such as articles in a tray, a sample can be drawn by using the constant-interval procedure. Here, a constant interval is maintained between the items drawn for the sample. For example, every 9th, 19th, or 24th unit is selected. The first item drawn from the lot can be determined from the table of random numbers. All other items are then drawn at a constant interval following the first item. The constant interval is determined by dividing the lot size by the sample size and by rounding the quotient down to the nearest whole number.

A1.2.2 As an example assume that a lot of 3000 items is to be visually examined for freedom from such defects as blisters, pits, nodules, porosity, and staining. In accordance with **Table 3**, a sample of 135 items is to be drawn. The constant interval is 24 (3000 divided by 125). A random number from 1 to 24 is selected either from a table (see **A1.1.2**) or by another appropriate method. After the first item is taken, the remaining items in the required sample are drawn by selecting every 24th item from the lot until 125 are selected.



TABLE A1.1 Table of Random Numbers

Line	Column													
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
1	10480	15011	01536	02011	81647	91646	69179	14194	62590	36207	20969	99570	91291	90700
2	22368	46573	25595	85393	30995	89198	27982	53402	93965	34095	52666	19174	39615	99505
3	24130	48360	22527	97265	76393	64809	15179	24830	49340	32081	30680	19655	63348	58629
4	42167	93093	06243	61680	07856	16376	39440	53537	71341	57004	00849	74917	97758	16379
5	37570	39975	81837	16656	06121	91782	60468	81305	49684	60672	14110	06927	01263	54613
6	77921	06907	11008	42751	27756	53498	18602	70659	90655	15053	21916	81825	44394	42880
7	99562	72905	56420	69994	98872	31016	71194	18738	44013	48840	63213	21069	10634	12952
8	96301	91977	05463	07972	18876	20922	94595	56869	69014	60045	18425	84903	42508	32307
9	89579	14342	63661	10281	17453	18103	57740	84378	25331	12566	58678	44947	05585	56941
10	85475	36857	53342	53988	53060	59533	38867	62300	08158	17983	16439	11458	18593	64952
11	28918	69578	88231	33276	70997	79936	56865	05859	90106	31595	01547	85590	91610	78188
12	63553	40961	48235	03427	49626	69445	18663	72695	52180	20847	12234	90511	33703	90322
13	09429	93969	52636	92737	88974	33488	36320	17617	30015	08272	84115	27156	30613	74952
14	10365	61129	87529	85689	48237	52267	67689	93394	01511	26358	85104	20285	29975	89868
15	07119	97336	71048	08178	77233	13916	47564	81056	97735	85977	29372	74461	28551	90707
16	51085	12765	51821	51259	77452	16308	60756	92144	49442	53900	70960	63990	75601	40719
17	02368	21382	52404	60268	89368	19885	55322	44819	01188	65255	64835	44919	05944	55157
18	01011	54092	33362	94904	31273	04146	18594	29852	71585	85030	51132	01915	92747	64951
19	52162	53916	46369	58586	23216	14513	83149	98736	23495	64350	94738	17752	35156	35749
20	07056	97628	33787	09998	42698	06691	76988	13602	51851	46104	88916	19509	25625	58104
21	48663	91245	85828	14346	09172	30168	90229	04734	59193	22178	30421	61666	99904	32812
22	54164	58492	22421	74103	47070	25306	76468	26384	58151	06646	21524	15227	96909	44592
23	32639	32363	05597	24200	13363	38005	94342	28728	35806	06912	17012	64161	18296	22851
24	29334	27001	87637	87308	58731	00256	45834	15398	46557	41135	10367	07684	36188	18510
25	02488	33062	28834	07351	19731	92420	60952	61280	50001	67658	32586	86679	50720	94953
26	81525	72295	04839	96423	24878	82651	66566	14778	76797	14780	13300	87074	79666	95725
27	29676	20591	68086	26432	46901	28049	89768	81536	86645	12659	92259	57102	80428	25280
28	00742	57392	39064	66432	84673	40027	32832	61362	98947	96067	64760	64584	96096	98253
29	05366	04213	25669	26422	44407	44048	37937	63904	45766	66134	75470	66520	34693	90449
30	91921	26418	64117	94305	26766	25940	39972	22209	71500	64568	91402	42416	07844	69618
31	00582	04711	87917	77341	42206	35126	74087	99547	81817	42607	43808	76655	62028	76630
32	00725	69884	62797	56170	86324	88072	76222	36086	84637	93161	76038	65855	77919	88006
33	69011	65795	95876	55293	18988	27354	26575	08625	40801	59920	29841	80150	12777	48501
34	25976	57948	29888	88604	67917	48708	18912	82271	65424	69774	33611	54262	85963	03547
35	09763	83473	73577	12908	30883	18317	28290	35797	05998	41688	34952	37888	38917	88050
36	91567	42595	27958	30134	04024	86385	29880	99730	55536	84855	29080	09250	79656	73211
37	17955	56349	90999	49127	20044	59931	06115	20542	18059	02008	73708	83517	36103	42791
38	46503	18584	18845	49618	02304	51038	20655	58727	28168	15475	56942	53389	20562	87338
39	92157	80634	94824	78171	84610	82834	09922	25417	44137	48413	25555	21246	35509	20468
40	14577	62765	35605	81263	39667	47358	56873	56307	61607	49518	89656	20103	77490	18062
41	98427	07523	33362	64270	01638	92477	66969	98420	04880	45585	46565	04102	46880	45709
42	34914	63976	88720	82765	34476	17032	87589	40836	32427	70002	70663	88863	77775	69348
43	70060	28277	39475	46473	23219	53416	94970	25832	69975	94884	19661	72828	00102	66794
44	53976	54914	06990	67245	68350	82948	11398	42878	80287	88267	47363	46634	06541	97809
45	76072	29515	40980	07391	58745	25774	22987	80059	39911	96189	41151	14222	60697	59583
46	90725	52210	83974	29992	65831	38857	50490	83765	55657	14361	31720	57375	56228	41546
47	64364	67412	33339	31926	14883	24413	59744	92351	97473	89286	35931	04110	23726	51900
48	08962	00358	31662	25388	61642	31072	81249	35648	56891	69352	48373	45578	78547	81788
49	95012	68379	93526	70765	10592	04542	76463	54328	02349	17247	28865	14777	62730	92277
50	15664	10493	20492	38391	91132	21999	59516	81652	27195	48223	46751	22923	32261	85653
51	16408	81899	04153	53381	79401	21438	83035	92350	36693	31238	59649	91754	72772	02338
52	18629	81953	05520	91962	04739	13092	97662	24822	94730	06496	35090	04822	86774	98289
53	73115	35101	47498	87637	99016	71060	88824	71013	18735	20286	23153	72924	35165	43040
54	57491	16703	23167	49323	45021	33132	12544	41035	80780	45393	44812	12515	98931	91202
55	30405	83946	23792	14422	15059	45799	22716	19792	09983	74353	68668	30429	70735	25499
56	16631	35006	85900	98275	32388	52390	16815	69298	82732	38480	73817	32523	41961	44437
57	96773	20206	42559	78985	05300	22164	24369	54224	35083	19687	11052	91491	60383	19746
58	38935	64202	14349	82674	66523	44133	00697	35552	35970	19124	63318	29686	03387	59846
59	31624	76384	17403	53363	44167	64486	64758	75366	76554	31601	12614	33072	60332	92325
60	78919	19474	23632	27889	47914	02584	37680	20801	72152	39339	34806	08930	85001	87820
61	03931	33309	57047	74211	63445	17361	62825	39908	05607	91284	68833	25570	38818	46920
62	74426	33278	43972	10119	89917	15665	52872	73823	73144	88662	88970	74492	51805	99378
63	09066	00903	20795	95452	92648	45454	09552	88815	16553	51125	79375	97596	16296	66092
64	42238	12426	87025	14267	20979	04508	64535	31355	86064	29472	47689	05974	52468	16834
65	16153	08002	26504	41744	81959	65642	74240	56302	00033	67107	77510	70625	28725	34191
66	21457	40742	29820	96783	29400	21840	15035	34537	33310	06116	95240	15957	16572	06004
67	21581	57802	02050	89728	17937	37621	47075	42080	97403	48626	68995	43805	33386	21597
68	55612	78095	83197	33732	05810	24813	86902	60397	16489	03264	88525	42786	05269	92532
69	44657	66999	99324	51281	84463	60563	79312	93454	68876	25471	93911	25650	12682	73572
70	91340	84979	46949	81973	37949	61023	43997	15263	80644	43942	89203	71795	99533	50501
71	91227	21199	31935	27022	84067	05462	35216	14486	29891	68607	41867	14951	91696	85065
72	50001	38140	66321	19924	72163	09538	12151	06878	91903	18749	34405	56087	82790	70925
73	65390	05224	72958	28609	81406	39147	25549	48542	42627	45233	57202	94617	23772	07896
74	27504	96131	83944	41575	10573	08619	64482	73923	36152	05184	94142	25299	84387	34925

**TABLE A1.1** *Continued*

Line	Column													
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
75	37169	94851	39117	89632	00959	16487	65536	49071	39782	17095	02330	73401	00275	48280
76	11508	70225	51111	38351	19444	66499	71945	05422	13422	78675	84081	66938	93654	59894
77	37449	30362	06694	54690	04052	53115	62757	95348	78662	11163	81651	50245	34971	52924
78	46515	70331	85922	38329	57015	15765	97161	17869	45349	61796	66345	81073	49106	79860
79	30986	81223	42416	58353	21532	30502	32305	86482	05174	07901	54339	58861	74818	46942
80	63798	64995	46583	09785	44160	78128	83991	42865	92520	83531	80377	35909	81250	54238
81	82486	84846	99254	67632	43218	50076	21361	64816	51202	88124	41870	52689	51275	83556
82	21885	32906	92431	09060	64297	51674	64126	62570	26123	05155	59194	52799	28225	85762
83	60336	98782	07408	53458	13564	59089	26445	29789	85205	41001	12535	12133	14645	23541
84	43937	46891	24010	25560	86355	33941	25786	54990	71899	15475	95434	98227	21824	19585
85	97656	63175	89303	16275	07100	92063	21942	18611	47348	20203	18534	03862	78095	50136
86	03299	01221	05418	38982	55758	92237	26759	86367	21216	98442	08303	56613	91511	75928
87	79626	06486	03574	17668	07785	76020	79924	25651	83325	88428	85076	72811	22717	50585
88	85636	68335	47539	03129	65651	11977	02510	26113	99447	68645	34327	15152	55230	93448
89	18039	14367	61337	06177	12143	46609	32989	74014	64708	00533	35398	58408	13261	47908
90	08362	15656	60627	36478	65648	16764	53412	09013	07832	41574	17639	82163	60859	75567
91	79556	29068	04142	16268	15387	12856	66227	38358	22478	73373	88732	09443	82558	05250
92	92608	82674	27072	32534	17075	27698	98204	63863	11951	34648	88022	56148	34925	57031
93	23982	25835	40055	67006	12293	02753	14827	23235	35071	99704	37543	11601	35503	85171
94	09915	96306	05908	97901	28395	14186	00821	80703	70426	75647	76310	88717	37890	40129
95	59037	33300	26695	62247	69927	76123	50842	43834	86654	70959	79725	93872	28117	19233
96	42488	78077	69882	61657	34136	79180	97526	43092	04098	73571	80799	76536	71255	64239
97	46764	86273	63003	93017	31204	36692	40202	35275	57306	55543	53203	18098	47625	88684
98	03237	45430	55417	63282	90816	17349	88298	90183	36600	78406	06216	95787	42579	90730
99	86591	81482	52667	61582	14972	90053	89534	76036	49199	43716	97548	04379	46370	28672
100	38534	01715	94964	87288	65680	43772	39560	12918	86537	62738	19636	51132	25739	56947

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