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SINGLE-AND MULTI-LEVEL CONTINUOUS SAMPLING PROCEDURES AND TABLES FOR INSPECTION BY ATTRIBUTES

FUNCTIONAL CURVES OF THE CONTINUOUS SAMPLING PLANS

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DEPARTMENT OF DEFENSE
Washington, DC 20360

Single and Multi-Level Continuous Sampling Procedures and Tables for Inspection by Attributes

MIL-STD-1235C

1. This Military Standard is approved for use by all Departments and Agencies of the Department of Defense.

2. Recommended corrections, additions or deletions should be addressed to: Commander, U.S. Army Armament Research, Development and Engineering Center, ATTN: SMCAR-ESC-S, Picatinny Arsenal, NJ 07806-5000.

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FOREWORD

This Standard provides the tables and procedures for applying five different types of continuous sampling plans for inspection by attributes:

a. CSP-1, a single-level continuous sampling procedure which provides for alternating between sequences of 100% inspection and sampling inspection.

b. CSP-F, a variation of the CSP-1 plans in that CSP-F plans are applied to a relatively short run of product, thereby permitting smaller clearance numbers to be used.

c. CSP-2, a modification of CSP-1 in that 100% inspection resumes only after a prescribed number of defect-free units separate any two defective sample units.

d. CSP-T, a multi-level continuous sampling procedure which provides for reducing the sampling frequency upon demonstration of superior product quality.

e. CSP-V, a single-level continuous sampling procedure which is an alternative to CSP-T in that these plans provide for reducing the clearance number in good quality situations where reduction of sampling frequency has no economic merit.

All of these plans are described in Section 100 of this Standard (see Sampling Plan 101, 102, 103, 104 and 105).

Appendix A, B, C and D contain functional curves for the CSP-1, 2, V and T procedures.

Curves for the CSP-F procedures are not provided, since exact methods for their determination have not been developed.

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1. SCOPE

1.1 Purpose This Standard establishes continuous sampling plans and procedures for inspection by attributes. When this Standard is referenced in a contract, specification, inspection standard or similar document, the provisions of this Standard shall govern the application of all attributes type continuous sampling plans and procedures. Unless otherwise noted herein, the provisions of this Standard shall be carried out by the supplier.

In addition this Standard provides functional curves of the continuous sampling plans (with the exception of the CSP-F plans) as well as a description of their use and guidelines for interpretation.

1.1.1 Applicability The conditions that must exist before the sampling plans may be used are:

(a) Moving product (see 3.23)

(b) Ample space, equipment and manpower at or near the site of inspection to permit rapid 100% inspection when required.

(c) Relatively easy and quick inspection.

(d) A process which is producing, or is capable of producing, material whose quality is stable (see 101.2.2(a), 102.2.2(a), 103.2.2(a), 104.2.2(a), and 105.2.2(a)).

(e) The inspection is non-destructive.

The sampling plans designated herein are applicable, but not limited, to inspection of various entities, viz., end items, components, raw materials, data or records, and any other entities, provided that the foregoing conditions are satisfied.

Use of the curves in accordance with the guidelines presented herein may assist the user in determining the procedure most suitable for his/her application. Approval of the use of any procedure is reserved to the consumer.

2. REFERENCED DOCUMENTS

Not Applicable

3. DEFINITIONS

3.1 Acceptable Quality Level (AQL) For continuous sampling plans, the AQL is an index to the plans and has no other meaning.

3.2 AFI The Average Fraction Inspected (AFI) is the fraction of product that will be inspected over the long run if the process average is a particular value.

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3.3 AOQ The Average Outgoing Quality (AOQ) for a particular process average is the long run expected percentage of defective material in the accepted material, if the associated sampling plan is followed faithfully (see 102-1 for clarified meaning for CSP-F).

3.4 AOQL The Average Outgoing Quality Limit (AOQL) is the maximum of all of the possible values of AOQ if the associated sampling plan is followed faithfully (see 102.1 for clarified meaning for CSP-F).

3.5 Checking Inspection Checking inspection is sampling inspection performed by the supplier on units of product which have already been 100% inspected in order to determine the effectiveness of the screening crew. This inspection is performed at the sampling rate f or more often.

3.6 Clearance Number The clearance number, i, is the number of consecutive conforming (i.e., defect-free) units required to adjust inspection actions.

3.7 Conforming Unit A conforming unit is one which meets the acceptance criteria established for the characteristic being considered.

3.8 Continuous Sampling Inspection Continuous sampling inspection is the examination or testing of units of product as they move past an inspection station. Only those units of product found by the inspector or screening crew to be nonconforming are rejected. The rest of the production, uninspected units as well as units found to be conforming, is allowed to continue down the production line as conforming material.

3.9 Critical Defect A critical defect is a defect that judgment and experience indicate is likely to result in hazardous or unsafe conditions for individuals using, maintaining, or depending upon the product; or a defect that judgment and experience indicate is likely to prevent performance of the tactical function of a major end item such as a ship, aircraft, tank, missile, or space vehicle. NOTE: For a special provision relating to critical defects, see 4.5.2.

3.10 Critical Defective A critical defective contains one or more critical defects and may also contain major and/or minor defects. NOTE: For a special provision relating to critical defectives, see 4.5.2.

3.11 Defect A defect is any nonconformance of the unit of product with specified requirements.

3.12 Defects Concerned The defects being inspected for while using the sampling plan.

3.13 Defective A defective is any unit of product which contains one or more defects.

3.14 Functional Curve A functional curve describes the relationship between some property of a sampling plan and the percent defective of submitted product. The types of functional curves presented herein are the AFI curves, the AOQ curves, and the O.C. curves.

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3.15 Inspection Inspection is the process of measuring, examining, testing, or otherwise comparing the unit of product with the requirements.

3.16 Inspection by Attributes Inspection by attributes is inspection whereby certain characteristics of units of products are inspected and classified simply as conforming or not conforming to the specified requirements.

3.17 Inspection by Defect Class When one sampling plan is associated with inspection for several kinds of defects collectively and each unit of product inspected is inspected for each of the defects in the class.

3.18 Inspection by Individual Defect When one sampling plan is associated with inspection for a single defect, or when a sampling plan is applied to each of several defects independently.

3.19 Major Defect A major defect is a defect other than critical, that is likely to result in failure or materially reduce the usability of the unit of product for its intended purpose.

3.20 Major Defective A major defective contains one or more major defects, and may also contain minor defects, but contains no critical defects.

3.21 Minor Defect A minor defect is a defect that is not likely to reduce materially the usability of the unit of product for its intended purpose, or is a departure from established standards having little bearing on the effective use or operation of the unit.

3.22 Minor Defective A minor defective contains one or more minor defects but contains no critical or major defects.

3.23 Moving Product The term "moving product" refers to product which is flowing past the inspection station. In the typical case the product moves on a conveyor belt or line; however, it may be moved in tote boxes, buggies or other conveyances which are operated manually or by mobile materials-handling equipment.

3.24 Multi-level A multi-level plan consists of periods of 100% inspection and of sampling inspection at various rates which reflect past inspection results.

3.25 N The specified number of units to which CSP-F is to be applied.

3.26 O.C. The operating characteristics (O.C.) of a continuous sampling plan describe the percent of product accepted during the sampling phases of the plan over the long run if the process average is a particular value.

3.27 One Hundred Percent Inspection One hundred percent inspection means the inspection of every unit of product for the defects concerned listed for an inspection station. The two terms, screening and 100% inspection, are used interchangeably in this standard.

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3.28 Process Average The process average (PA) is defined as the percent defective of product submitted by the supplier for original inspection. Original inspection is the first inspection of a particular quantity of product as distinguished from the inspection of product which has been resubmitted. The phrases "Process Average" and "Percent Defective of Submitted Product" are used interchangeably.

3.29 Production Interval A production interval is normally a shift; it can be a day if it is reasonably certain that shift changes do not affect quality of product, but shall not be longer than a day.

3.30 Sampling Frequency (f) The sampling frequency, f, is the desired ratio between the number of units of product randomly selected and inspected at an inspection station and the number of units passing the inspection station during periods of sampling inspection. In this Standard, each f is expressed as a fraction of the form, 1/7, 1/25, 1/50, etc. The procedure used in selecting the sample units should give each unit of product presented during periods of sampling inspection an equal chance of being selected and inspected.

3.31 Sampling Inspection Sampling inspection in this Standard means the inspection for the defects concerned where the units selected for inspection are selected by sampling.

3.32 Sampling Plan As used herein, the phrase "sampling plan" denotes a particular procedure and the size(s) of the clearance number(s) and sampling frequency(ies) associated with it.

3.33 Screening Screening is 100% inspection where all defective units are removed from the production flow. The two terms, screening and 100% inspection, are used interchangeably in this Standard.

3.34 Single-level A single-level plan consists of alternating periods of 100% inspection and sampling inspection wherein the sampling rate is constant.

3.35 Taraget AOQL The target AOQL is the value of AOQL which was used to determine plan parameters. The actual AOQL may differ slightly from the target AOQL in some cases since an appropriate set of plan parameters to yield the target AOQL exactly does not exist in all cases.

3.36 Unit of Product The unit of product is the thing being inspected in order to determine its classification as defective or nondefective or to count the number of defects. It may be a single article, a pair, a set, a length, an area, an operation, a volume, a component of an end product, or the end product itself. The unit of product may or may not be the same as the unit of purchase, supply, production, or shipment.

4. GENERAL REQUIREMENTS

4.1 CLASSIFICATION OF DEFECTS AND DEFECTIVES

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4.1.1 Method of Classifying Defects A classification of defects is the enumeration of possible defects of the unit of product classified according to their seriousness. Defects will normally be grouped into one or more of the following classes: Critical Defect, Major Defect and Minor Defect (see 3.9, 3.19 and 3.21). Defects may be grouped into other classes, or into subclasses within these classes.

4.1.2 Method of Classifying Defectives A defective is a unit of product which contains one or more defects. Defectives will usually be classified as follows: Critical Defective, Major Defective and Minor Defective (see 3.10, 3.20 and 3.22).

4.2 ACCEPTABLE QUALITY LEVEL (AQL)

4.2.1 Use The AQL, together with the Sample Size Code Letter, is used for indexing the plans provided herein. The plans are also indexed by the Average Outgoing Quality Limit (AOQL).

4.2.2 Limitation The designation of an AQL shall not imply that the supplier has the right to supply knowingly any defective unit of product.

4.2.3 Specifying AQL's The AQL will be designated in the contract or by the responsible authority. Different AQL's may be designated for groups of defects considered collectively, or for individual defects. An AQL for a group of defects may be designated in addition to AQL's for individual defects, or subgroups, within that group.

4.2.4 Preferred AQL's The values of AQL's given in these tables are known as preferred AQL's. If, for any product, an AQL be designated other than a preferred AQL, these tables are not applicable.

4.3 AVERAGE OUTGOING QUALITY (AOQ)

4.3.1 Limitation The listing of values of AOQL in this Standard does not imply that the supplier has a right to supply knowingly any defective unit of product.

4.4 SUBMISSION OF PRODUCT

4.4.1 Lot or Batch Although lot or batch size is not used to select a continuous sampling plan, the formation of lots or batches may remain desirable for reasons of homogeneity, shipping convenience, and facilitation of payment.

4.4.2 Order of Production. All inspection should be performed in the order in which the units of product are produced, in order that the source of quality problems can be more easily spotted and corrective action taken. In those situations where maintaining the order of production is not possible for example, when product from two or more identical production lines is merged prior to inspection, the plans herein may still be used provided that the mixing of product from the lines is thorough, thereby assuring a random spacing of any defective units in the flow of product.

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4.4.3 Units of Product Submitted All units for which disposition is sought must pass each inspection station. This does not prevent process inspection by the supplier prior to arrival of the product at the inspection station, nor does this prohibit the supplier from removing or correcting units containing defects prior to submittal of the product. However, if, in the opinion of the consumer, the supplier's method of scheduling process inspection results in a flow of product during periods of screening inspection which is not representative of the flow of product which can be expected to be encountered during subsequent sampling inspection, the consumer reserves the right to cause the supplier to modify his method of scheduling process inspection.

4.5 ACCEPTANCE AND REJECTION

4.5.1 Responsibility Although both the consumer and supplier may reject nonconforming material of the supplier, only the consumer possesses the authority to accept (purchase) the supplier's material. However, since the supplier is responsible for providing material which satisfies contractual requirements, he will inspect the product through use of a sampling plan indexed by the designated AQL to determine whether or not to submit the product to the consumer.

4.5.2 Special Reservation for Critical Defects The supplier may be required at the discretion of the responsible authority to inspect every unit for critical defects or to follow some other procedure with regard to the inspection of critical defects. If a critical defect is found on any unit of product, even if that unit has not been selected for inspection for critical defects, the supplier shall carry out the procedure specified by the consumer for critical defects.

4.5.3 Disposition of Rejected Product Units found to be defective by either the supplier or consumer shall be removed and kept apart from the flow of product. The supplier may correct these units, in which case they will be screened and resubmitted to the consumer apart from the regular flow of product. If they are accepted by the consumer, they will be returned to the production line right after the inspection station for the defects concerned.

4.6 DRAWING OF SAMPLES

4.6.1 Sample Under continuous sampling a sample consists of one unit of product drawn from the production line as it passes a given station.

4.6.2 Frequency of Sampling Certain values of sampling frequency, f, are provided for each of the plans.

4.6.3 Sample Selection The sample units shall be selected at the chosen sampling frequency (f) so as to give each unit of product an equal chance of being inspected. The inspector should allow the interval between sample units to vary somewhat rather than draw sample units according to a rigid pattern.

4.7 SAMPLING PLANS

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4.7.1 Code Letters Sampling plans are designated by code letters. Table 1 provides permissible code letters based on the number of units in the production interval. A code letter and its associated sampling frequency should be selected after considering such influencing factors as inspection time per unit of product, production rate, and proximity to other inspection stations. When idle inspector time is a significant consideration, a plan with a higher sampling frequency and lower clearance number is usually preferred.

4.7.2 Obtaining Sampling Plans The AQL and an appropriate code letter shall be used to obtain the sampling plan from Table II-A, III-A, IV-A, V-A or VI-A. For CSP-F, it is also necessary to determine N (see 102.2.1).

4.7.3 Types of Sampling Plans Five types of sampling plans: CSP-1, CSP-F, CSP-2, CSP-T and CSP-V are provided in Tables II-A, III-A, IV-A, V-A and VI-A respectively. A selection of the appropriate plan can be made by a consideration of their individual features. CSP-1 is the simplest. CSP-F is a CSP-1 plan with clearance number adjusted to handle a shorter run of product. CSP-2 provides advance warning when a screening crew may have to be assembled. CSP-T provides for a reduction in sampling frequency in good quality situations. CSP-V provides for a reduction in clearance number in good quality situations, and is an alternative to CSP-T in those situations where a reduction in sampling frequency has no economic merit.

4.8 DISCONTINUATION OF INSPECTION

4.8.1 Long Periods of Screening When the use of 101.2.6, 102.2.6, 103.2.6, 104.2.6 and 105.2.6 give indication that an excessively long period of screening has been in progress, corrective action shall be taken to improve the production process and the consumer reserves the right to suspend product acceptance. The provisions of 101.2.6, 102.2.6, 103.2.6, 104.2.6 and 105.2.6 do not prevent the supplier from taking corrective action to improve the production process prior to reaching the limits described in the aforementioned paragraphs.

4.8.2 Ineffective Screening If, during a period of 100% inspection, a checking inspector finds a defect, the consumer shall be notified, and corrective action shall be taken to improve the effectiveness of the screening crew. If a second defect is found by the checking inspector during this period of 100% inspection, the same action shall be taken by the supplier, and the consumer will reserve the right to suspend product acceptance. In the case of critical defects, the consumer reserves the right to suspend acceptance upon the finding of the first critical defect by the checking inspector during a period of 100% inspection.

4.9 ESTIMATION OF THE PROCESS AVERAGE

4.9.1 Computation A reasonably good estimate of the process average can be made from the inspection results. If the inspection results used are for a set period of time or a pre-set number of units, the process average can be estimated as follows:

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$$PA_{est} = \frac{100\ (\text{number of defectives observed})}{\text{number of units inspected}}$$

4.9.2 Use The estimate of the process average, besides giving an indication of what percentage of manufactured product is defective, can also be used to consult the curves provided herein.

TABLE I

SAMPLING FREQUENCY CODE LETTERS

Number of Units in Production Interval	Permissible Code Letters
2-8	A,B
9-25	A through C
26-90	A through D
91-500	A through E
501-1200	A through F
1201-3200	A through G
3201-10,000	A through H
10,001-35,000	A through I
35,001-150,000	A through J
150,001-up	A through K

4.10 ARRANGEMENT OF CURVES

The curves are arranged in such fashion that when this publication is opened to a page of curves, the AOQ curves for a set of plans would appear on the left page, along with the legend. The AFI curves for the same set of plans would appear at the top of the right page, and the O.C. curves at the bottom of the right page.

The curves are ordered by AQL and Target AOQL. In this case, AQL is provided only as an index for simplicity when it is listed in the specification, and has no meaning with relation to continuous sampling plans.

4.11 AOQ CURVES

AOQ curves are provided for each of the CSP-1, CSP-2, CSP-T and CSP-V plans contained in Section 100. The curves indicate what percent of material accepted over the long run is defective for a particular value of process average. It should be noted that for values of the process average indicating poor quality, the corresponding values of AOQ are not of great interest, since corrective action should be taken to improve the process

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under such circumstances. The vertical axis on each of these curves is labelled "Average Outgoing Quality". The horizontal axis is labelled "Percent Defective of Submitted Product". These curves can be used to obtain an idea of the outgoing quality properties of the plan in use and may be of special interest when the process average is computed as described in 4.9. Each of the curves is indexed by AQL, Target AOQL and sampling frequency code letter. AOQ curves for CSP-1, CSP-2, CSP-T and CSP-V are contained in Appendix A, B, C and D respectively.

4.12 AFI CURVES

AFI curves are provided for each of the CSP-1, CSP-2, CSP-T and CSP-V plans contained in Section 100. The curves indicate what fraction of submitted material will be inspected over the long run for a particular value of process average. It should be noted that for values of the process average indicating poor quality the corresponding values of AFI are not of interest since corrective action should be taken to improve the process under such circumstances. The vertical axis is labelled "Average Fraction Inspected". The horizontal axis is labelled "Percent Defective of Submitted Product". These curves can be used to obtain an idea of the amount of inspection required over the long run for the plan in use and may be of special interest when the process average is computed as described in 4.9. Each of the curves is indexed by AQL, Target AOQL and sampling frequency code letter. AFI curves for CSP-1, CSP-2, CSP-T and CSP-V are contained in Appendix A, B, C and D respectively.

4.13 O.C. CURVES

Operating Characteristic (O.C.) curves are provided for each of the CSP-1, CSP-2, CSP-T and CSP-V plans contained in Section 100. The curves indicate what percent of material over the long run will be accepted during the sampling phases of the plans for a particular value of process average. It should be noted that for values of the process average indicating poor quality the corresponding percent of material accepted during the sampling phases is not of great interest, since corrective action should be taken to improve the process under such circumstances. The vertical axis on each of these curves is labelled "Percent of Product Accepted Under Sampling", and the horizontal axis is labelled "Percent Defective of Submitted Product". These curves can be used to obtain an idea of the operating characteristics of the plan in use, and may be of special interest when the process average is computed as in 4.9. Each of the curves is indexed by AQL, Target AOQL and sampling frequency code letter. O.C. curves for CSP-1, CSP-2, CSP-T and CSP-V are contained in Appendix A, B, C and D respectively.

5. DETAIL REQUIREMENTS

5.1 Continuous Sampling Plans for Inspection by Attributes are divided into five different types: Sampling Plan 101 for CSP-1, Sampling Plan 102 for CSP-F, Sampling Plan 103 for CSP-2, Sampling Plan 104 for CSP-T and Sampling Plan 105 for CSP-V.

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6. NOTES

6.1 Intended Use The Single- and Multi-level Continuous Sampling Procedures and Tables for Inspection by Attributes Including the Functional Curves of the Continuous Sampling Plans described by this Standard are intended to be used in the acquisition of defense materiel.

6.2 Subject Term (Keyword) Listing

Acceptable Quality Level (AQL)
Average Fraction Inspected (AFI) Curve
Average Outgoing Quality (AOQ) Curve
Average Outgoing Quality Limit (AOQL)
Functional Curve
Inspection by Attributes
Operating Characteristics (OC) Curve
Process Average (PA)
Sampling Plan
Screening
Target AOQL

6.3 International Standardization Agreement Certain provisions of this Military Standard (Single and Multi-level Continuous Sampling Procedures and Tables for inspection by attributes) are the subject of International Standardization Agreement, QSTAG 340. When amendment, revision, or cancellation of this standard is proposed, which will modify the international agreement concerned, the preparing activity will take appropriate action through international standardization channels, including departmental standardization offices, to change the agreement or make other appropriate accomodations.

6.4 Changes from Previous Issue Vertical lines or asterisks are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

Custodian:
Army - AR
Navy - OS
Air Force - 23

Review Activities:
Army - MI, EA
Navy - AS, MC, OM, SH, YD
DSC - ES
DLA - GS

User Activities:
Army - ME

Preparing Activity:
Army - AR

(Project QCIC-0095)

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SECTION 100

SAMPLING PLANS

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SAMPLING PLAN 101

CSP-1

101.1 PURPOSE OF CSP-1

CSP-1 is a single-level continuous sampling procedure which provides for alternating sequences of 100% inspection and sampling inspection with no limit as to the number of such sequences. CSP-1 requires a return to 100% inspection whenever a nonconforming unit is discovered during sampling inspection. See Figure 2-A for a summary of the operation of CSP-1. Tables II-A and II-B list parameters associated with the procedure.

101.2 DESCRIPTION OF PROCEDURE

101.2.1 Initiation of Production At the start of production, each unit of product shall be inspected by the screening crew. Checking inspection shall be performed concurrently at a frequency f or more often on the units passed by the screening crew (see 101.2.5).

101.2.2 Sampling Inspection Sampling inspection normally is initiated when the following requirements are satisfied:

(a) All units of product are made according to the same drawing and specifications under stable conditions of production. This requirement, which is termed homogeneity, is usually satisfied when the production process is not altered by innovation, significant changes in materials, strikes, retooling (other than that due to routine changes to compensate for tool wear) or interruptions other than those due to the end of the shift, day, or week.

(b) At least i consecutive units inspected by the screening crew during 100% inspection are found free of the defects concerned.

(c) None of the i consecutive units found defect-free by the screening crew are found defective by the checking inspector(s). When sampling inspection is begun, screening is terminated and samples are taken at the frequency, f.

101.2.3 Return to 100% Inspection Sampling inspection shall be terminated and 100% inspection shall be resumed if either or both of the conditions described below occur. For critical defects, screening shall begin with the unit of product just after the last defect-free sample unit. (See 4.5.2 for further provisions for critical defects.)

(a) The production process is interrupted for more than three operating days, or the requirement of 101.2.2(a) is otherwise not satisfied.

(b) A unit having any of the defects concerned is found by the sampling inspector. When 100% inspection is required, the flow of product is cur-tailed until the screening crew can begin 100% inspection. 100% inspection shall be continued until the requirements of 101.2.2 are met.

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101.2.4 Change in Code Letter If it is necessary or desirable to change Sampling Frequency Code Letters, the following applies:

(a) If the change results in an increase in the sampling frequency, f (and, of course, a decrease in the clearance number, i), the change may be made at the next shift from a screening sequence to a sampling sequence or during a sampling sequence, whichever is the earlier.

(b) If the change results in a decrease in the sampling frequency, f (and, of course, an increase in the clearance number, i) the change may be made at the next shift from a sampling sequence to a screening sequence or during a screening sequence, whichever is the earlier. (At any time the change may be made by initiating a screening sequence whose clearance number, i, will be that associated with the new code letter.)

101.2.5 Ineffective Screening Whenever the checking inspector finds a defect in the product found conforming by the screening crew, the screening crew shall start a new count of consecutive defect-free units, and the actions described in 4.8.2 shall be carried out.

101.2.6 Long Period of Screening If, during a period of 100% inspection, a defect is found before finding i consecutive conforming units and the number of units screened is equal to or greater than the appropriate value of S in Table II-B, the supplier shall notify the consumer of this occurrence, and corrective action shall be taken to improve the production process. The consumer may, at its option, suspend acceptance immediately or at any time thereafter during the period of 100% inspection until the supplier corrects the cause(s) of the high rate of defectiveness. After effective corrective action has been taken, 100% inspection shall be reinitiated.

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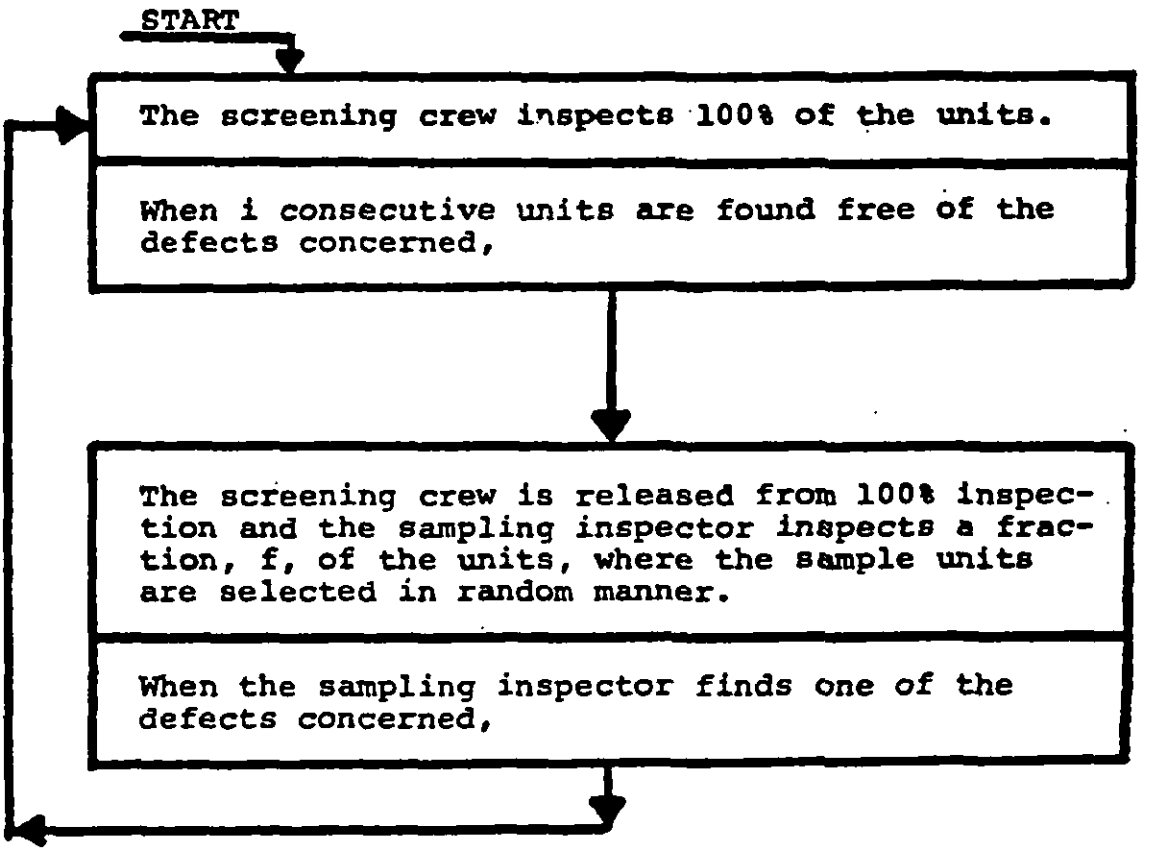

FIGURE 2-A. PROCEDURE FOR CSP-1 PLANS

TABLE II-A

Values of i for CSP-1 Plans

Samp Freq Code Ltr	f	AQL* in %															
		.010	.015	.025	.040	.065	0.10	0.15	0.25	0.40	0.65	1.0	1.5	2.5	4.0	6.5	10.0
A	1/2	1540	840	600	375	245	194	140	84	53	36	23	15	10	6	5	3
B	1/3	2550	1390	1000	620	405	321	232	140	87	59	38	25	16	10	7	5
C	1/4	3340	1820	1310	810	530	420	303	182	113	76	49	32	21	13	9	6
D	1/5	3960	2160	1550	965	630	498	360	217	135	91	58	38	25	15	11	7
E	1/7	4950	2700	1940	1205	790	623	450	270	168	113	73	47	31	18	13	8
F	1/10	6050	3300	2370	1470	965	762	550	335	207	138	89	57	38	22	16	10
G	1/15	7390	4030	2890	1800	1180	930	672	410	255	170	108	70	46	27	19	12
H	1/25	9110	4970	3570	2215	1450	1147	828	500	315	210	134	86	57	33	23	14
I	1/50	11730	6400	4590	2855	1870	1477	1067	640	400	270	175	110	72	42	29	18
J	1/100	14320	7810	5600	3485	2305	1820	1302	790	500	330	215	135	89	52	36	22
K	1/200	17420	9500	6810	4235	2760	2178	1583	950	590	400	255	165	106	62	43	26
		.018	.033	.046	.074	.113	.143	.198	0.33	0.53	0.79	1.22	1.90	2.90	4.94	7.12	11.46
		AOQL in %															

*AQL's are provided as indices to simplify use of this table, but have no other meaning relative to the plans.

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TABLE II-B

Values of S for CSP-1 Plans

Samp Freq Code Ltr	f	AQL* in %															
		.010	.015	.025	.040	.065	0.10	0.15	0.25	0.40	0.65	1.0	1.5	2.5	4.0	6.5	10.0
A	1/2	1850	925	721	451	295	273	197	119	75	55	36	22	17	11	10	6
B	1/3	4080	1950	1600	993	649	579	442	268	166	120	78	52	36	24	19	16
C	1/4	6010	2915	2360	1460	1010	926	699	421	262	177	115	79	57	36	28	20
D	1/5	8320	3890	3100	1930	1390	1150	975	589	367	258	165	109	76	45	40	27
E	1/7	11400	5670	4660	2895	1980	1750	1355	813	507	376	244	154	109	63	54	34
F	1/10	16900	7590	6640	4120	2800	2595	1985	1245	624	543	352	221	164	90	82	51
G	1/15	24400	11300	9250	5760	4020	3820	2960	1810	922	856	524	327	241	141	138	75
H	1/25	35500	16900	13900	8640	5950	5740	4560	2760	1390	1350	839	524	390	212	189	105
I	1/50	59800	26900	23000	14300	10300	10100	8440	5070	3170	2445	1590	913	733	368	334	212
J	1/100	96000	39800	36400	23300	16900	16500	14300	8710	6020	3980	2600	1640	1360	642	601	352
K	1/200	148100	63700	58000	36000	29000	28500	25400	15200	9470	8030	4365	2835	2150	1080	1025	636
		.018	.033	.046	.074	.113	.143	.198	0.33	0.53	0.79	1.22	1.90	2.90	4.94	7.12	11.46
		AOQL in %															

*AQL's are provided as indices to simplify use of this table, but have no other meaning relative to the plans.

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SAMPLING PLAN 102

CSP-F

102.1 PURPOSE OF CSP-F

CSP-F is a single-level continuous sampling procedure which provides for alternating sequences of 100% inspection and sampling inspection. CSP-F is equivalent to the application of a CSP-1 plan to a specified number of units at a time, thereby permitting a smaller clearance number to be used. The plan may be applied in situations involving short production runs, or it may be applied to one or more production intervals at a time in situations involving time consuming inspection operations (for example, inspection with X-ray equipment) where a larger clearance number could cause a production bottleneck. See Figure 3-A for a summary of the operations of CSP-F. Table III-A lists parameters associated with the procedure. AOQ and AOQL for CSP-F relate to the long run average and limit, respectively, over many periods of application of the plan, which in fact are the same as the expected values, respectively, for a single application of the plan.

102.2 DESCRIPTION OF PROCEDURE

102.2.1 Initiation of Period The period, in terms of number of units, N, for which the plan is to be applied, must first be determined, and plan parameters determined from Table III-A. (If N is smaller than the value of i from Table III-A, inspect all units.) At the start of production or of the period for which the plan is to be applied, each unit of product shall be inspected by the screening crew. Checking inspection shall be performed concurrently at a frequency f or more often on the units passed by the screening crew (see 102.2.5).

102.2.2 Sampling Inspection Sampling inspection normally is initiated when the following requirements are satisfied:

(a) All units of product are made according to the same drawings and specifications under stable conditions of production. This requirement, which is termed homogeneity, is usually satisfied when the production process is not altered by innovation, significant changes in materials, strikes, retooling (other than that due to routine changes to compensate for tool wear) or interruptions other than those due to the end of the shift, day, or week.

(b) At least i consecutive units inspected by the screening crew during 100% inspection are found free of the defects concerned.

(c) None of the i consecutive units found defect-free by the screening crew are found defective by the checking inspector(s). When sampling inspection is begun, screening is terminated and samples are taken at the frequency, f.

102.2.3 Return to 100% Inspection Sampling inspection shall be terminated and 100% inspection shall be resumed if any of the conditions described below

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occur. For critical defects, screening shall begin with the unit of product just after the last defect-free sample unit. (See 4.5.2 for further provisions for critical defects.)

(a) The production process is interrupted for more than three operating days, or the requirement of 102.2.2(a) is otherwise not satisfied.

(b) A unit having any of the defects concerned is found by the sampling inspector.

(c) The units to which the plan was intended to be applied have reached the point of inspection.

The remaining units to be produced will be broken down into one or more groups, and the i value for each group will be determined from Table III-A. For example, suppose that initially the size of a production run is to be 3,000 units, and subsequently it is determined that the run is to be 4,000 units. After 3,000 units have passed the point of inspection, 100% inspection will be initiated, with an i value associated with N = 1,000.

When 100% inspection is required, the flow of product is curtailed until the screening crew can begin 100% inspection. 100% inspection shall be continued until the requirements of 102.2.2 are met.

102.2.4 Change in Code Letter If it is necessary or desirable to change Sampling Frequency Code Letters, the following applies:

(a) If the change results in an increase in the sampling frequency, f (and, of course, a decrease in the clearance number, i) the change may be made at the next shift from a screening sequence to a sampling sequence or during a sampling sequence, whichever is the earlier.

(b) If the change results in a decrease in the sampling frequency, f (and, of course, an increase in the clearance number, i) the change may be made at the next shift from a sampling sequence to a screening sequence or during a screening sequence, whichever is the earlier. (At any time the change may be made by initiating a screening sequence whose clearance number, i, will be that associated with the new code letter.)

102.2.5 Ineffective Screening Whenever the checking inspector finds a defect in the product found conforming by the screening crew, the screening crew shall start a new count of consecutive defect-free units, and the actions described in 4.8.2 shall be carried out.

102.2.6 Long Periods of Screening If, during a period of 100% inspection, a defect is found before finding i consecutive conforming units and the number of units screened is equal to or greater than the the appropriate value of S in Table II-B (before N units have reached the point of inspection), the supplier shall notify the consumer of this occurrence, and corrective action shall be taken to improve the production process. The consumer may, at its option, suspend acceptance immediately or at any time thereafter during the period of 100% inspection until the supplier corrects the cause(s) of the high rate of defectiveness. After effective corrective action has been taken, 100% inspection shall be reinitiated. (Note: If

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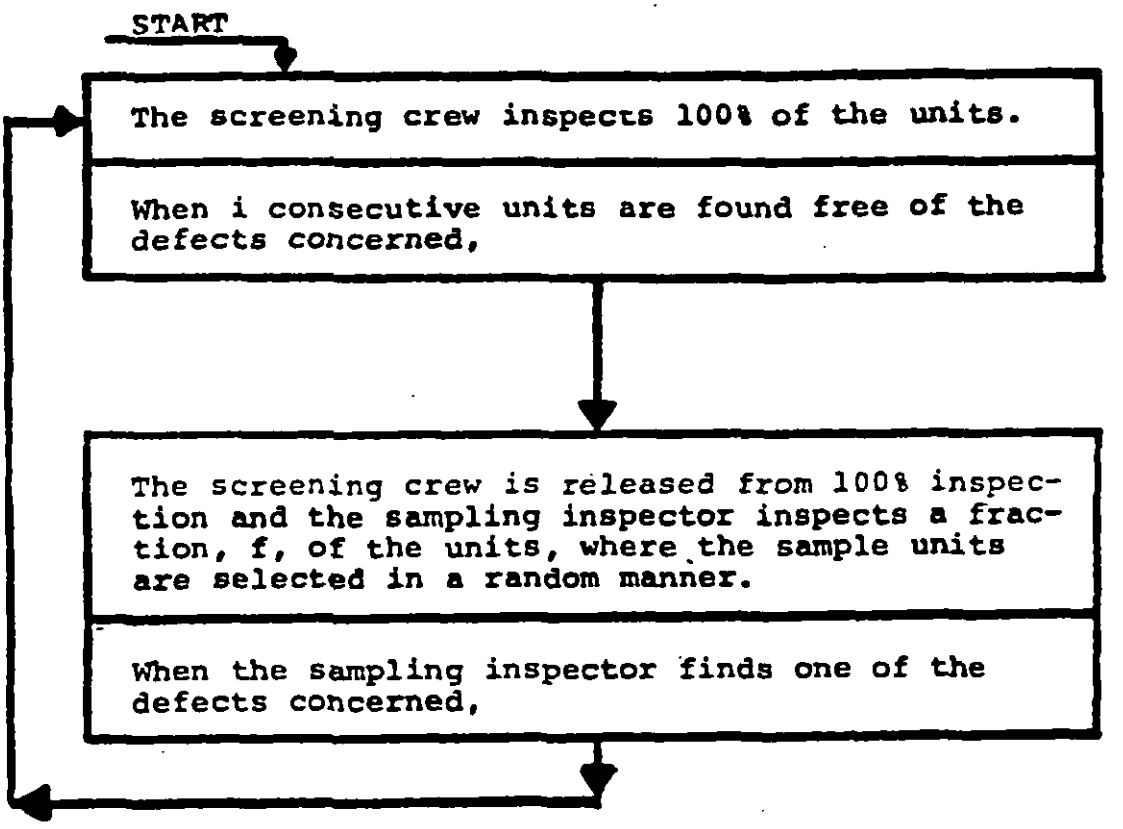
several consecutive periods of some length N each have passed without going to sampling, and without reaching the S value because N is smaller than S, the consumer reserves the right to cause the supplier to use another sampling plan.)



NOTE: This plan is applied to a specified number of units, N, to be produced in the period considered.

FIGURE 3-A. PROCEDURE FOR CSP-F PLANS

TABLE III-A-1

Values of i for CSP-F Plans

AQL* - .010%
AOQL - .018%

Samp Freq Code Ltr	A	B	C	D	E	F	G	H
f	1/2	1/3	1/4	1/5	1/7	1/10	1/15	1/25
N								
1-500	347	376	387	392	398	402	405	407
501-600	400	432	449	458	461	464	470	472
601-700	441	485	502	517	519	523	529	533
701-800	482	530	577	585	589	591	594	596
801-1,000	545	618	647	662	678	689	697	703
1,001-1,500	679	799	843	870	900	903	920	935
1,501-2,000	784	942	1008	1044	1082	1108	1128	1143
2,001-3,000	929	1163	1264	1320	1380	1423	1455	1479
3,001-4,000	1029	1328	1462	1538	1620	1679	1723	1757
4,001-5,000	1101	1458	1624	1718	1822	1896	1952	1996
5,001-6,000	1156	1564	1759	1871	1996	2086	2154	2208
6,001-7,000	1199	1651	1874	2004	2149	2255	2335	2398
7,001-8,000	1234	1725	1974	2125	2285	2407	2499	2572
8,001-9,000	1262	1789	2061	2224	2408	2545	2649	2732
9,001-10,000	1286	1844	2138	2317	2520	2671	2788	2880
10,001-11,000	1306	1891	2207	2400	2622	2788	2917	3018
11,001-12,000	1323	1933	2269	2496	2716	2897	3037	3148
12,001-15,000	1363	2034	2420	2666	2957	3181	3356	3497
15,001-20,000	1405	2146	2598	2898	3265	3554	3787	3975
20,001-30,000	1449	2271	2808	3183	3670	4076	4414	4698

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Samp Freq Code Ltr	A	B	C	D	E	F	G	H
f	1/2	1/3	1/4	1/5	1/7	1/10	1/15	1/25
N								
30,001-40,000	1473	2340	2926	3352	3924	4424	4858	5232
40,001-50,000	1487	2383	3003	3462	4097	4674	5191	5651
50,001-60,000	1497	2413	3056	3539	4223	4861	5451	5990
60,001-70,000	1504	2435	3095	3597	4317	5005	5659	6271
70,001-80,000	1509	2451	3125	3642	4391	5120	5828	6508
80,001-90,000	1514	2464	3149	3677	4451	5213	5969	6712
90,001-100,000	1517	2475	3168	3706	4500	5291	6088	6888
100,001-150,000	1527	2507	3228	3796	4652	5539	6481	7501
150,001-200,000	1532	2523	3258	3842	4733	5673	6700	7865
200,001-250,000	1535	2533	3277	3870	4783	5756	6840	8105
250,001-300,000	1537	2540	3290	3890	4816	5813	6936	8274
300,001 and over	1540	2550	3340	3960	4950	6050	7390	9110

*AQL's are provided as indices to simplify use of this table, but have no other meaning relative to the plans.

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TABLE III-A-2

Values of i for CSP-F Plans

AQL* - .015%
AOQL - .033%

Samp Freq Code Ltr	A	B	C	D	E	F	G	H
f	1/2	1/3	1/4	1/5	1/7	1/10	1/15	1/25
N								
1-500	282	318	332	340	347	353	357	359
501-700	340	400	421	437	442	455	460	465
701-1,000	411	490	522	540	559	572	581	589
1,001-2,000	545	697	764	802	843	872	894	911
2,001-3,000	617	826	924	981	1043	1088	1122	1148
3,001-4,000	661	915	1041	1115	1198	1259	1305	1341
4,001-5,000	691	981	1132	1222	1324	1400	1458	1504
5,001-6,000	713	1032	1204	1309	1431	1521	1591	1647
6,001-7,000	729	1072	1263	1382	1521	1626	1708	1773
7,001-8,000	742	1104	1321	1442	1600	1719	1813	1888
8,001-9,000	752	1131	1354	1498	1669	1802	1907	1992
9,001-10,000	760	1153	1389	1544	1731	1877	1994	2088
10,001-11,000	767	1172	1420	1584	1786	1945	2073	2176
11,001-12,000	773	1189	1447	1620	1835	2007	2145	2259
12,001-15,000	786	1229	1509	1706	1958	2163	2334	2476
15,001-20,000	800	1266	1578	1803	2101	2358	2578	2765
20,001-30,000	815	1309	1654	1911	2272	2604	2907	3179
30,001-40,000	822	1332	1695	1971	2370	2753	3120	3466
40,001-50,000	826	1345	1720	2009	2433	2852	3268	3678
50,001-60,000	829	1355	1737	2035	2477	2922	3377	3841

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Samp Freq Code Ltr	A	B	C	D	E	F	G	H
f	1/2	1/3	1/4	1/5	1/7	1/10	1/15	1/25
N								
60,001-70,000	831	1362	1750	2054	2509	2974	3460	3970
70,001-80,000	833	1367	1759	2068	2534	3015	3525	4075
80,001-90,000	834	1371	1767	2080	2554	3048	3578	4161
90,001-100,000	835	1374	1773	2089	2570	3074	3621	4234
100,001-150,000	838	1384	1792	2117	2619	3157	3759	4471
150,001 and over	840	1390	1820	2160	2700	3300	4030	4970

*AQL's are provided as indices to simplify use of this table, but have no other meaning relative to the plans.

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TABLE III-A-3

Values of i for CSP-F Plans

AQL* - .025%
AOQL - .046%

Samp Freq Code Ltr	A	B	C	D	E	F	G	H
f	1/2	1/3	1/4	1/5	1/7	1/10	1/15	1/25
N								
1-500	245	284	299	307	316	322	326	329
501-700	293	351	377	385	400	407	417	420
701-1,000	342	420	454	472	492	506	516	524
1,001-2,000	434	576	642	680	721	751	774	791
2,001-3,000	479	666	760	816	877	923	957	985
3,001-4,000	506	726	843	914	996	1056	1103	1140
4,001-5,000	523	768	905	990	1090	1165	1223	1270
5,001-6,000	535	800	953	1051	1167	1256	1326	1382
6,001-7,000	544	824	991	1100	1232	1334	1416	1482
7,001-8,000	551	843	1022	1141	1287	1402	1495	1571
8,001-9,000	557	859	1047	1175	1334	1462	1566	1651
9,001-10,000	561	871	1069	1204	1376	1515	1630	1725
10,001-11,000	565	882	1089	1230	1412	1563	1688	1792
11,001-12,000	568	892	1103	1251	1444	1606	1741	1854
12,001-15,000	576	912	1139	1303	1522	1712	1876	2016
15,001-20,000	583	935	1178	1359	1610	1838	2044	2227
20,001-30,000	591	958	1220	1420	1710	1990	2260	2518
30,001-40,000	594	970	1242	1453	1765	2077	2392	2709
40,001-50,000	597	977	1255	1473	1800	2133	2480	2846
50,001-60,000	598	982	1265	1487	1824	2172	2544	2947

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Samp Freq Code Ltr	A	B	C	D	E	F	G	H
f	1/2	1/3	1/4	1/5	1/7	1/10	1/15	1/25
N								
60,001-70,000	599	985	1271	1497	1841	2201	2591	3025
70,001-80,000	600	988	1276	1505	1855	2224	2628	3088
80,001-90,000	600	990	1280	1511	1865	2241	2657	3138
90,001-100,000	600	994	1283	1516	1874	2256	2681	3180
100,001 and over	600	1000	1310	1550	1940	2370	2890	3570

*AQL's are provided as indices to simplify use of this table, but have no other meaning relative to the plans.

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TABLE III-A-4

Values of i for CSP-F Plans

AQL* - .040%
AOQL - .074%

Samp Freq Code Ltr	A	B	C	D	E	F	G	H
f	1/2	1/3	1/4	1/5	1/7	1/10	1/15	1/25
N								
1-500	195	233	250	259	268	275	280	284
501-1,000	253	327	361	380	400	415	426	435
1,001-2,000	302	424	485	522	563	593	617	635
2,001-3,000	324	474	557	608	668	713	748	776
3,001-4,000	336	504	604	667	744	803	850	887
4,001-5,000	343	525	636	710	801	874	932	979
5,001-6,000	348	539	660	743	847	931	1000	1057
6,001-7,000	352	550	679	768	884	979	1058	1124
7,001-8,000	355	559	693	789	914	1020	1109	1184
8,001-9,000	357	566	705	805	939	1054	1153	1237
9,001-10,000	359	571	715	819	960	1084	1192	1285
10,001-11,000	361	576	723	831	979	1111	1227	1329
11,001-12,000	362	580	730	841	995	1134	1258	1369
12,001-15,000	365	588	746	864	1032	1189	1335	1469
15,001-20,000	368	598	762	888	1072	1251	1426	1595
20,001-30,000	371	607	779	914	1116	1321	1534	1756
30,001-40,000	373	612	788	928	1139	1359	1595	1855
40,001-50,000	373	615	794	936	1153	1383	1635	1921
50,001-60,000	374	617	797	942	1163	1399	1662	1968
60,001-70,000	375	618	800	946	1170	1411	1682	2004
70,001 and over	375	620	810	965	1205	1470	1800	2215

*AQL's are provided as indices to simplify use of this table, but have no other meaning relative to the plans.

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TABLE III-A-5

Values of i for CSP-F Plans

AQL* - .065%
AOQL - .113%

Samp Freq Code Ltr	A	B	C	D	E	F	G	H
f	1/2	1/3	1/4	1/5	1/7	1/10	1/15	1/25
N								
1-500	155	190	207	216	226	233	239	243
501-1,000	187	254	286	305	325	340	352	361
1,001-2,000	213	312	367	401	441	471	494	513
2,001-3,000	223	339	409	455	510	554	589	617
3,001-4,000	229	354	434	489	558	614	659	697
4,001-5,000	232	364	451	512	592	659	715	762
5,001-6,000	235	371	463	529	618	694	760	816
6,001-7,000	236	376	472	542	638	722	797	862
7,001-8,000	238	380	479	552	654	746	828	902
8,001-9,000	239	384	485	560	667	765	855	937
9,001-10,000	240	386	489	567	678	782	879	968
10,001-11,000	240	388	493	573	687	796	899	995
11,001-12,000	241	390	496	578	695	808	917	1020
12,001-15,000	242	394	504	588	713	836	959	1082
15,001-20,000	243	398	511	600	732	867	1007	1154
20,001-30,000	245	402	519	611	752	900	1061	1242
30,001-40,000	245	404	523	617	762	918	1090	1292
40,001 and over	245	405	530	630	790	965	1180	1450

*AQL's are provided as indices to simplify use of this table, but have no other meaning relative to the plans.

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TABLE III-A-6

Values of i for CSP-F Plans

AQL* - 0.10%
AOQL - .143%

Samp Freq Code Ltr	A	B	C	D	E	F	G	H
f	1/2	1/3	1/4	1/5	1/7	1/10	1/15	1/25
N								
1-500	130	167	184	193	204	211	216	221
501-1,000	156	217	248	267	287	302	314	323
1,001-2,000	173	260	310	342	377	410	433	452
2,001-3,000	180	278	340	382	434	477	511	539
3,001-4,000	184	288	357	406	469	522	567	605
4,001-5,000	186	295	369	422	494	556	611	657
5,001-6,000	188	300	377	434	512	582	645	700
6,001-7,000	189	303	383	442	526	603	673	737
7,001-8,000	190	305	387	449	537	619	696	768
8,001-9,000	190	307	391	454	545	633	716	794
9,001-10,000	191	309	394	459	553	644	733	818
10,001-11,000	191	310	396	462	559	654	747	839
11,001-12,000	192	312	398	465	564	662	760	857
12,001-15,000	192	314	403	472	576	681	790	902
15,001-20,000	193	317	408	480	588	701	822	954
20,001-30,000	194	319	413	487	601	723	858	1014
30,001-40,000	194	321	415	491	608	734	877	1048
40,001 and over	194	321	417	493	612	741	889	1069

*AQL's are provided as indices to simplify use of this table, but have no other meaning relative to the plans.

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TABLE III-A-7

Values of i for CSP-F Plans

AQL* - 0.15%
AOQL - .198%

Samp Freq Code Ltr	A	B	C	D	E	F	G	H
f	1/2	1/3	1/4	1/5	1/7	1/10	1/15	1/25
N								
1-500	103	138	155	164	174	182	187	192
501-1,000	119	173	201	219	239	254	266	275
1,001-2,000	130	199	242	271	306	335	358	377
2,001-3,000	133	209	260	295	342	382	415	443
3,001-4,000	135	215	270	310	364	413	455	492
4,001-5,000	136	219	276	319	379	434	485	530
5,001-6,000	137	221	281	326	390	451	508	561
6,001-7,000	138	223	284	331	398	463	526	586
7,001-8,000	138	224	287	334	404	473	541	607
8,001-9,000	139	226	289	337	409	481	553	625
9,001-10,000	139	226	290	340	413	487	563	640
10,001-11,000	139	227	291	342	417	493	572	654
11,001-12,000	139	228	293	343	420	498	579	666
12,001-15,000	140	229	295	347	426	508	597	694
15,001-20,000	140	230	298	351	433	520	615	725
20,001-30,000	140	232	300	355	440	531	635	760
30,001 and over	140	232	303	360	450	550	672	828

*AQL's are provided as indices to simplify use of this table, but have no other meaning relative to the plans.

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TABLE III-A-8

Values of i for CSP-F Plans

AQL* - 0.25%
AOQL - 0.33%

Samp Freq Code Ltr	A	B	C	D	E	F	G	H
f	1/2	1/3	1/4	1/5	1/7	1/10	1/15	1/25
N								
1-500	70	99	114	123	133	140	146	151
501-1,000	77	116	140	155	174	188	200	209
1,001-2,000	81	127	158	181	211	236	258	277
2,001-3,000	82	132	166	192	228	261	291	318
3,001-4,000	83	134	170	198	237	276	312	347
4,001-5,000	83	135	173	201	244	286	327	368
5,001-6,000	84	136	174	204	248	293	338	384
6,001-7,000	84	137	176	206	251	298	346	397
7,001-8,000	84	137	177	207	254	302	353	408
8,001-9,000	84	138	177	209	256	305	358	416
9,001-10,000	84	138	178	209	257	308	362	424
10,001-11,000	84	138	178	210	259	310	366	430
11,001-12,000	84	139	179	211	260	312	369	435
12,001-15,000	84	139	180	212	262	316	376	447
15,001-20,000	84	140	181	214	265	320	384	460
20,001 and over	84	140	182	217	270	335	410	500

*AQL's are provided as indices to simplify use of this table, but have no other meaning relative to the plans.

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TABLE III-A-9

Values of i for CSP-F Plans

AQL* - 0.40%
AOQL - 0.53%

Samp Freq Code Ltr	A	B	C	D	E	F	G	H
f	1/2	1/3	1/4	1/5	1/7	1/10	1/15	1/25
N								
1-500	47	69	82	91	100	108	113	118
501-1,000	50	78	96	108	125	138	149	159
1,001-2,000	52	83	104	121	144	165	185	203
2,001-3,000	52	84	108	125	151	177	202	227
3,001-4,000	53	85	109	128	156	184	213	243
4,001-5,000	53	86	110	129	158	188	220	254
5,001-6,000	53	86	111	130	160	191	225	262
6,001-7,000	53	86	111	131	162	194	229	269
7,001-8,000	53	87	112	132	163	195	231	273
8,001-9,000	53	87	112	132	163	197	234	277
9,001-10,000	53	87	112	133	164	198	236	281
10,001-11,000	53	87	113	133	165	199	237	283
11,001-15,000	53	87	113	134	166	201	241	291
15,001 and over	53	87	113	135	168	207	255	315

*AQL's are provided as indices to simplify use of this table, but have no other meaning relative to the plans.

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TABLE III-A-10

Values of i for CSP-F Plans

AQL* - 0.65%
AOQL - 0.79%

Samp Freq Code Ltr	A	B	C	D	E	F	G	H
f	1/2	1/3	1/4	1/5	1/7	1/10	1/15	1/25
N								
1-500	33	50	61	68	77	84	90	95
501-1,000	35	54	68	78	92	104	114	123
1,001-2,000	35	57	72	84	102	120	136	152
2,001-3,000	36	58	74	87	106	125	145	167
3,001-4,000	36	58	75	88	108	128	151	176
4,001-5,000	36	58	75	88	109	131	154	182
5,001-10,000	36	59	76	90	112	135	162	195
10,001 and over	36	59	76	91	113	138	170	210

TABLE III-A-11

AQL* - 1.0%
AOQL - 1.22%

1-500	22	35	43	49	56	63	68	73
501-1,000	23	37	46	54	64	74	83	92
1,001-2,000	23	38	48	56	69	81	95	109
2,001-3,000	23	38	49	57	70	84	99	117
3,001-4,000	23	38	49	58	71	86	102	121
4,001-5,000	23	38	49	58	72	87	104	124
5,001-10,000	23	38	49	58	73	89	107	130
10,001 and over	23	38	49	58	73	89	108	134

*AQL's are provided as indices to simplify use of this table, but have no other meaning relative to the plans.

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TABLE III-A-12

Values of i for CSP-F Plans

AQL* - 1.5%
AOQL - 1.90%

Samp Freq Code Ltr	A	B	C	D	E	F	G	H
f	1/2	1/3	1/4	1/5	1/7	1/10	1/15	1/25
N								
1-500	15	23	29	34	40	45	50	55
501-1,000	15	24	31	36	43	51	59	66
1,001-2,000	15	25	32	37	46	54	64	75
2,001-3,000	15	25	32	38	46	56	66	79
3,001-4,000	15	25	32	38	47	56	67	81
4,001-5,000	15	25	32	38	47	57	68	82
5,001-6,000	15	25	32	38	47	57	69	83
6,001-7,000	15	25	32	38	47	57	69	84
7,001-8,000	15	25	32	38	47	57	69	84
8,001-9,000	15	25	32	38	47	57	69	85
9,001-10,000	15	25	32	38	47	57	70	85
10,001 and over	15	25	32	38	47	57	70	85

*AQL's are provided as indices to simplify use of this table, but have no other meaning relative to the plans.

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SAMPLING PLAN 103

CSP-2

103.1 PURPOSE OF CSP-2

CSP-2 is a type of single-level continuous sampling procedure which provides for alternating sequences of 100% inspection and sampling inspection with no limits asto the number of such sequences. CSP-2 requires a return to 100% inspection whenever two defective units are found separated by fewer than i consecutive sampled units but does not require return to 100% inspection if i or more consecutive defect-free sample units separate two defective units. CSP-2 shall not be used for inspection for critical defects (see also 4.5.2). See Figure 4-A for a summary of the operation of CSP-2. Tables IV-A and IV-B list parameters associated with the procedure.

103.2 DESCRIPTION OF PROCEDURE

103.2.1 Initiation of Production At the start of production, each unit of product shall be inspected by the screening crew. Checking inspection shall be performed concurrently at a frequency f or more often on the units passed by the screening crew (see 103.2.5).

103.2.2 Sampling Inspection Sampling inspection normally is initiated when the following requirements are satisfied:

(a) All units of product are made according to the same drawings and specifications under stable conditions of production. This requirement, which is termed homogeneity, is usually satisfied when the production process is not altered by innovation, significant changes in materials, strikes, retooling (other than that due to routine changes to compensate for tool wear) or interruptions other than those due to the end of the shift, day, or week.

(b) At least i consecutive units inspected by the screening crew during 100% inspection are found free of the defects concerned.

(c) None of the i consecutive units found defect-free by the screening crew are found defective by the checking inspector(s). When sampling inspection is begun, screening is terminated and samples are taken at the frequency, f.

103.2.3 Return to 100% Inspection Sampling inspection shall be terminated and 100% inspection shall be resumed upon the occurrence of one or both of the conditions described below:

(a) The production process is interrupted for more than three operating days, or the requirement of 103.2.2(a) is otherwise not satisfied.

(b) Fewer than i consecutive defect-free sample units separate two defective sample units.

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When 100% inspection is required, the flow of product is curtailed until the screening crew can begin 100% inspection. 100% inspection shall be continued until the requirements of 103.2.2 are met.

103.2.4 Change in Code Letter If it is necessary or desirable to change Sampling Frequency Code Letters, the following applies:

(a) If the change results in an increase in the sampling frequency, f (and, of course, a decrease in the clearance number, i), the change may be made at the next shift from a screening sequence to a sampling sequence or during a sampling sequence, whichever is the earlier.

(b) If the change results in a decrease in the sampling frequency, f (and, of course, an increase in the clearance number, i), the change may be made at the next shift from a sampling sequence to a screening sequence or during a screening sequence, whichever is the earlier. (At any time the change may be made by initiating a screening sequence whose clearance number, i, will be that associated with the new code letter.)

103.2.5 Ineffective Screening Whenever the checking inspector finds a defect in the product found conforming by the screening crew, the screening crew shall start a new count of consecutive defect-free units, and the action described in 4.8.2 shall be carried out.

103.2.6 Long Periods of Screening If, during a period of 100% inspection, a defect is found before finding i consecutive conforming units and the number of units screened is equal to or greater than the appropriate value of S in Table IV-B, the supplier will notify the consumer of this occurrence, and corrective action shall be taken to improve the production process. The consumer may, at its option, suspend acceptance immediately or at any time thereafter during the period of 100% acceptance until the supplier corrects the cause(s) of the high rate of defectives. After effective corrective action has been taken, 100% inspection shall be reinitiated.

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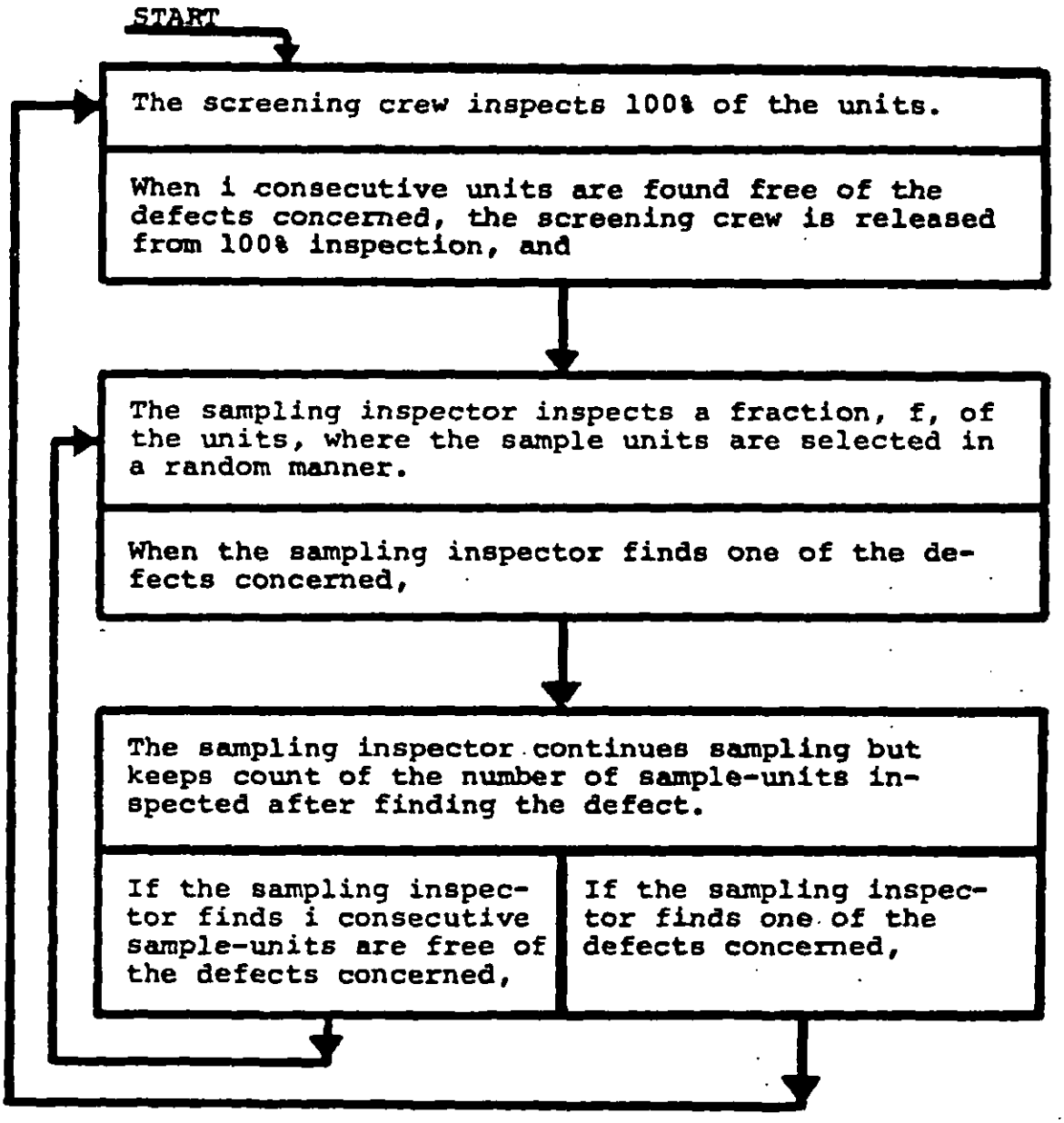

FIGURE 4-A. PROCEDURE FOR CSP-2 PLANS

TABLE IV-A

Values of i for CSP-2 Plans

Samp Freq Code Ltr	f	AQL* in %							
		0.40	0.65	1.0	1.5	2.5	4.0	6.5	10.0
A	1/2	80	54	35	23	15	9	7	4
B	1/3	128	86	55	36	24	14	10	7
C	1/4	162	109	70	45	30	18	12	8
D	1/5	190	127	81	52	35	20	14	9
E	1/7	230	155	99	64	42	25	17	11
F	1/10	275	185	118	76	50	29	20	13
G	1/15	330	220	140	90	59	35	24	15
H	1/25	395	265	170	109	71	42	29	18
I,J,K	1/50	490	330	210	134	88	52	36	22
		0.53	0.79	1.22	1.90	2.90	4.94	7.12	11.46
		AOQL in %							

*AQL's are provided as indices to simplify use of this table, but have no other meaning relative to the plans.

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TABLE IV-B

Values of S for CSP-2 Plans

Samp Freq Code Ltr	f	AQL* in %							
		0.40	0.65	1.0	1.5	2.5	4.0	6.5	10.0
A	1/2	145	105	68	45	32	20	19	11
B	1/3	322	235	151	100	70	42	33	27
C	1/4	473	352	288	138	106	63	46	34
D	1/5	746	461	296	181	141	76	62	42
E	1/7	902	687	431	274	199	115	91	62
F	1/10	1380	987	608	386	292	154	132	91
G	1/15	1990	1480	946	566	440	243	200	127
H	1/25	3090	2265	1455	905	652	368	334	212
I,J,K	1/50	5400	3980	2540	1625	1165	642	601	352
		0.53	0.79	1.22	1.90	2.90	4.94	7.12	11.46
		AOQL in %							

*AQL's are provided as indices to simplify use of this table, but have no other meaning relative to the plans.

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SAMPLING PLAN 104

CSP-T

104.1 PURPOSE OF CSP-T

CSP-T is a multi-level continuous sampling procedure which provides for alternating sequences of 100% inspection and sampling inspection. CSP-T requires a return to 100% inspection whenever a nonconforming unit is discovered during sampling inspection, but provides for a reduced sampling frequency upon demonstration of superior product quality. CSP-T shall not be used for inspection for critical defects (see also 4.5.2). See Figures 5-A for a summary of the operation of CSP-T. Tables V-A and V-B list parameters associated with the procedure.

104.2 DESCRIPTION OF PROCEDURE

104.2.1 Initiation of Production At the start of production, each unit of product shall be inspected by the screening crew. Checking inspection shall be performed concurrently at frequency f or more often on the units passed by the screening crew (see 104.2.5).

104.2.2 Sampling Inspection Sampling inspection normally is initiated when the following requirements are satisfied:

(a) All units of product are made according to the same drawings and specifications under stable conditions of production. This requirement, which is termed homogeneity, is usually satisfied when the production process is not altered by innovation, significant changes in materials, strikes, retooling (other than that due to routine changes to compensate for tool wear) or interruptions other than those due to the end of the shift, day, or week.

(b) At least i consecutive units inspected by the screening crew during 100% inspection are found free of the defects concerned.

(c) None of the i consecutive units found defect-free by the screening crew are found defective by the checking inspector(s). When sampling inspection is begun, screening is terminated and samples are taken at the frequency f. The sampling frequency may be reduced subject to the conditions shown on Figure 5-A.

104.2.3 Return to 100% Inspection Sampling inspection shall be terminated and 100% inspection shall be resumed if either or both of the conditions described below occur.

(a) The production process is interrupted for more than three operating days, or the requirement of 104.2.2(a) is otherwise not satisfied.

(b) A unit having any of the defects concerned is found by the sampling inspector.

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When 100% inspection is required, the flow of product is curtailed until the screening crew can begin 100% inspection. 100% inspection shall be continued until the requirements of 104.2.2 are met.

104.2.4 Change in Code Letter If it is necessary or desirable to change Sampling Frequency Code Letters, the following applies:

(a) If the change results in an increase in the sampling frequency, f (and, of course, a decrease in the clearance number, i), the change may be made at the next shift from a screening sequence to a sampling sequence or during a sampling sequence, whichever is the earlier.

(b) If the change results in a decrease in the sampling frequency, f (and, of course, an increase in the clearance number, i), the change may be made at the next shift from a sampling sequence to a screening sequence or during a screening sequence, whichever is the earlier. (At any time the change may be made by initiating a screening sequence whose clearance number, i, will be that associated with the new code letter.)

104.2.5 Ineffective Screening Whenever the checking inspector finds a defect in the product found conforming by the screening crew, the screening crew shall start a new count of consecutive defect-free units, and the actions described in 4.8.2 shall be carried out.

104.2.6 Long Periods of Screening If, during a period of 100% inspection, a defect is found before finding i consecutive conforming units and the number of units screened is equal to or greater than the appropriate value of S in Table V-B, the supplier shall notify the consumer of this occurrence, and corrective action shall be taken to improve the production process. The consumer may, at its option, suspend acceptance immediately or at any time thereafter during the period of 100% inspection until the supplier corrects the cause(s) of the high rate of defectives. After effective corrective action has been taken, 100% inspection shall be reinitiated.

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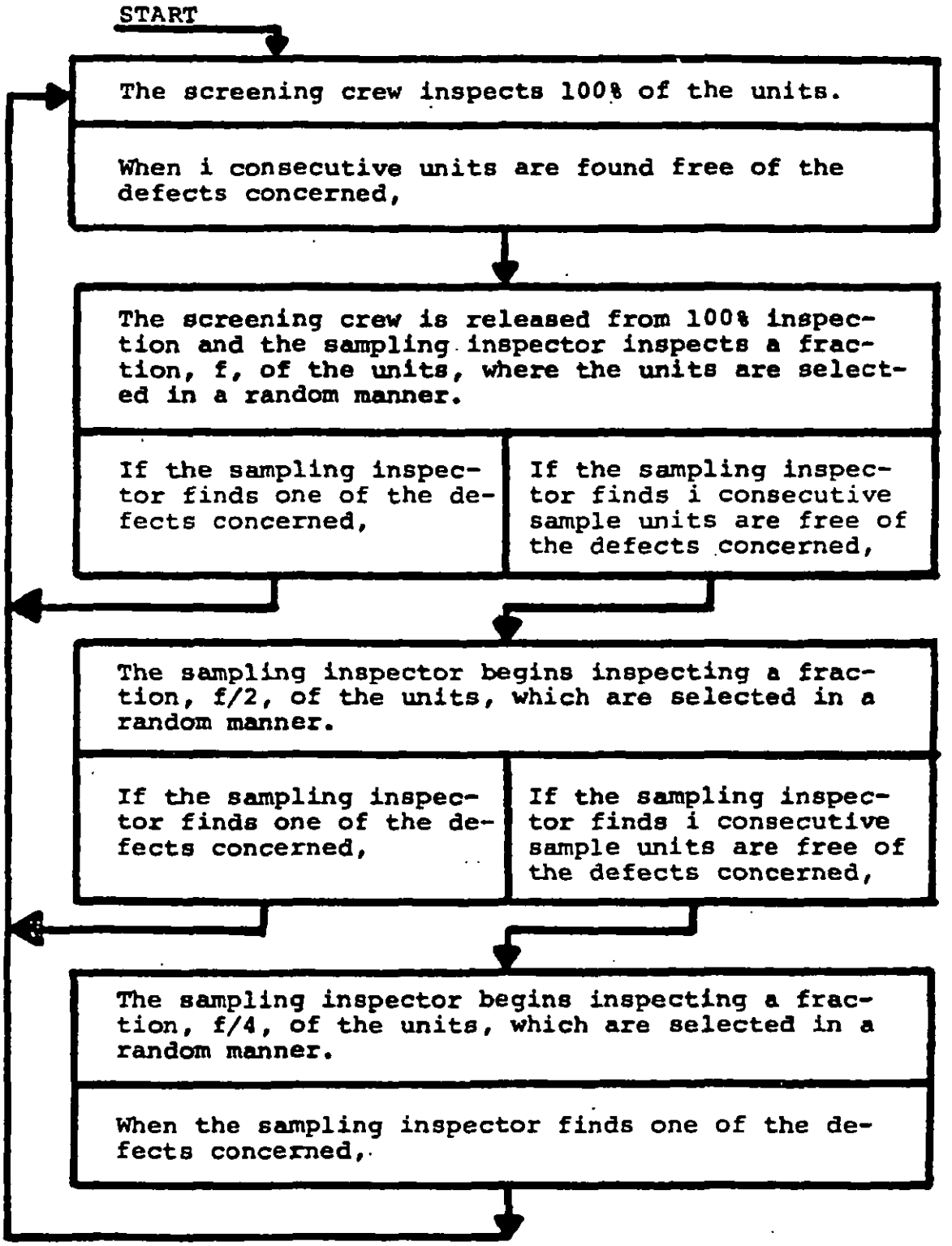

FIGURE 5-A. PROCEDURE FOR CSP-T PLANS

TABLE V-A

Values of i for CSP-T Plans

Samp Freq Code Ltr	f	AQL* in %							
		0.40	0.65	1.0	1.5	2.5	4.0	6.5	10.0
A	1/2	87	58	38	25	16	10	7	5
B	1/3	116	78	51	33	22	13	9	6
C	1/4	139	93	61	39	26	15	11	7
D	1/5	158	106	69	44	29	17	12	8
E	1/7	189	127	82	53	35	21	14	9
F	1/10	224	150	97	63	41	24	17	11
G	1/15	266	179	116	74	49	29	20	13
H	1/25	324	217	141	90	59	35	24	15
I	1/50	409	274	177	114	75	44	30	19
J,K	1/100	499	335	217	139	91	53	37	23
		0.53	0.79	1.22	1.90	2.90	4.94	7.12	11.46
		AOQL in %							

*AQL's are provided as indices to simplify use of this table, but have no other meaning relative to the plans.

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TABLE V-B

Values of S for CSP-T Plans

Samp Freq Code Ltr	f	AQL* in %							
		0.40	0.65	1.0	1.5	2.5	4.0	6.5	10.0
A	1/2	159	117	77	52	34	22	13	12
B	1/3	256	197	128	80	59	35	25	18
C	1/4	379	253	167	103	78	43	38	24
D	1/5	444	320	210	130	93	54	43	30
E	1/7	725	460	289	188	137	81	59	34
F	1/10	857	619	398	261	189	104	88	58
G	1/15	1254	900	584	368	376	152	126	84
H	1/25	1885	1396	923	545	421	235	198	122
I	1/50	3283	2477	1604	1013	764	408	374	223
J,K	1/100	5753	4541	2948	1754	1341	708	653	391
		0.53	0.79	1.22	1.90	2.90	4.94	7.12	11.46
		AOQL in %							

*AQL's are provided as indices to simplify use of this table, but have no other meaning relative to the plans.

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SAMPLING PLAN 105

CSP-V

105.1 PURPOSE OF CSP-V

CSP-V is a single-level continuous sampling procedure which provides for alternating sequences of 100% inspection and sampling inspection. CSP-V requires a return to 100% inspection whenever a nonconforming unit is discovered during sampling inspection, but provides for a reduced clearance number upon demonstration of superior product quality. It can be beneficially applied in those situations where there is no advantage to reducing sampling frequencies in the good quality situation; for example, when the inspector would merely have more idle time if the sampling frequency were reduced. CSP-V shall not be used for inspection for critical defects (see also 4.5.2). See Figure 6-A for a summary of the operation of CSP-V. Tables VI-A and VI-B list parameters associated with the procedure.

105.2 DESCRIPTION OF PROCEDURE

105.2.1 Initiation of Production At the start of production, each unit of product shall be inspected by the screening crew. Checking inspection shall be performed concurrently at a frequency f or more often on the units passed by the screening crew (see 105.2.5).

105.2.2 Sampling Inspection Sampling inspection normally is initiated when the following requirements are satisfied:

(a) All units of product are made according to the same drawings and specifications under stable conditions of production. This requirement, which is termed homogeneity, is usually satisfied when the production process is not altered by innovation, significant changes in materials, strikes, retooling (other than that due to routine changes to compensate for tool wear) or interruptions other than those due to the end of the shift, day, or week.

(b) At least i (or x if appropriate) consecutive units inspected by the screening crew during 100% inspection are found free of the defects concerned.

(c) None of the i (or x if appropriate) consecutive units found defect-free by the screening crew are found defective by the checking inspector(s). When sampling inspection is begun, screening is terminated and samples are taken at the frequency, f.

105.2.3 Return to 100% Inspection Sampling inspection shall be terminated and 100% inspection shall be resumed if either or both of the conditions described below occur. The appropriate clearance number will be determined according to the procedural rules shown in Figure 6-A.

(a) The production process is interrupted for more than three operating days, or the requirement of 105.2.2(a) is otherwise not satisfied.

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(b) A unit having any of the defects concerned is found by the sampling inspector.

When 100% inspection is required, the flow of product is curtailed u;ntil the screening crew can begin 100% inspection. 100% inspection shall be continued until the requirements of 105.2.2 are met.

105.2.4 Change in Code Letter If it is necessary or desirable to change Sampling Frequency Code Letters, the following applies:

(a) If the change results in an increase in the sampling frequency, f (and, of course, a decrease in the clearance number, i), the change may be made at the next shift from a screening sequence to a sampling sequence or during a sampling sequence, whichever is the earlier.

(b) If the change results in a decrease in the sampling frequency, f (and, of course, an increase in the clearance number, i), the change may be made at the next shift from a sampling sequence to a screening sequence or during a screening sequence, whichever is the earlier. (At any time the change may be made by initiating a screening sequence whose clearance number, i, will be that associated with the new code letter.)

105.2.5 Ineffective Screening Whenever the checking inspector finds a defect in the product found conforming by the screening crew, the screening crew shall start a new count of consecutive defect-free units, and the actions described in 4.8.2 shall be carried out.

105.2.6 Long Periods of Screening If, during a period of 100% inspection, a defect is found before finding i consecutive conforming units and the number of units screened is equal to or grater than the appropriate value of S in Table VI-B, the supplier shall notify the consumer of this occurrence, and corrective action shall be taken to improve the production process. The consumer may, at its option. suspend acceptance immediately or at any time thereafter during the period of 100% inspection until the supplier corrects the cause(s) of the high rate of defectives. After effective corrective action has been taken, 100% inspection shall be reinitiated.

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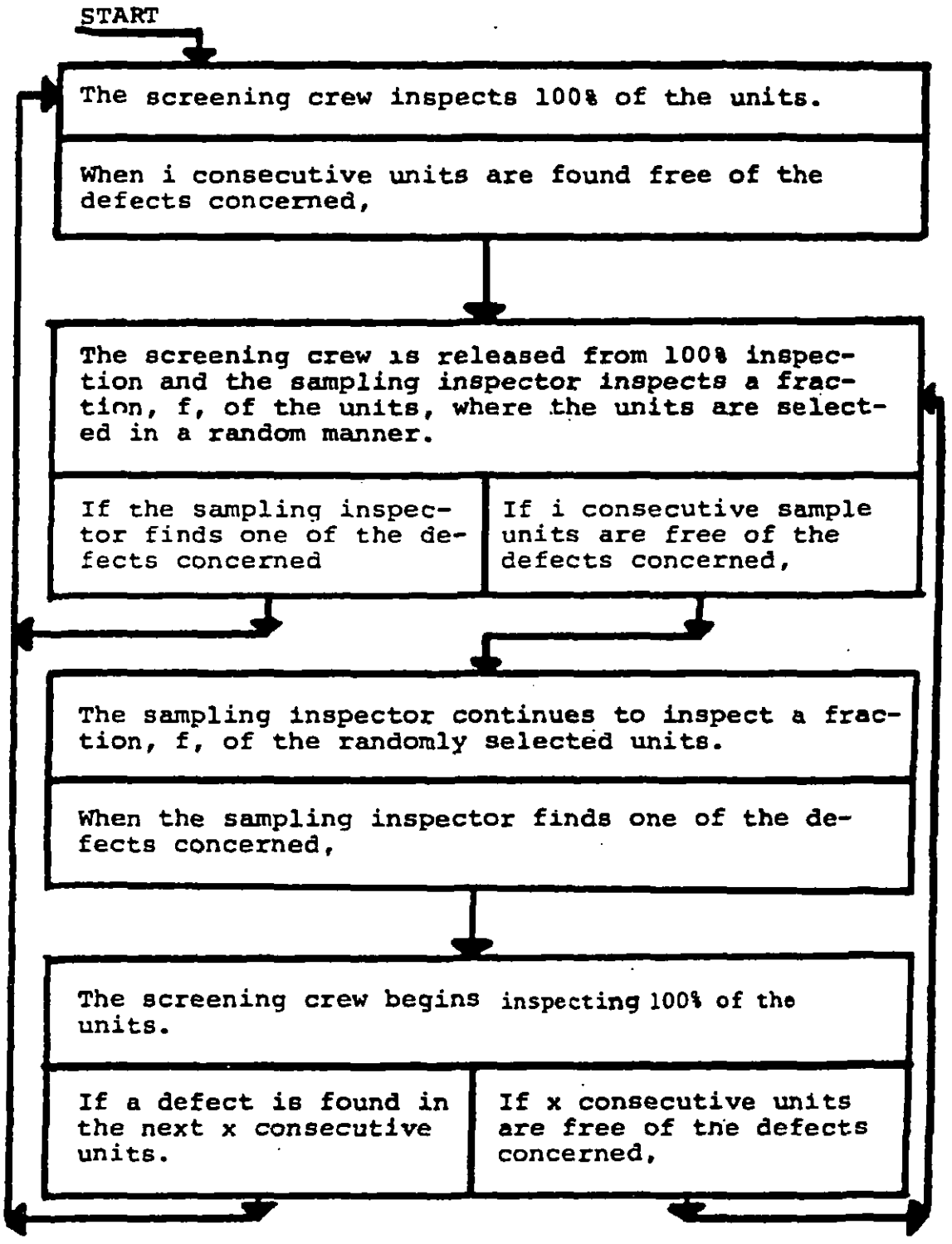

FIGURE 6-A. PROCEDURE FOR CSP-V PLANS

TABLE VI-A

Values of i and x for CSP-V Plans

Samp Freq Code Ltr	f	AQL* in %								
		0.40	0.65	1.0	1.5	2.5	4.0	6.5	10.0	
A	1/2	60	39	27	18	12	9	6	3	i
		20	13	9	6	4	3	2	1	x
B	1/3	96	63	42	27	18	12	9	6	i
		32	21	14	9	6	4	3	2	x
C	1/4	120	81	54	36	24	15	12	6	i
		40	27	18	12	8	5	4	2	x
D	1/5	144	96	63	42	27	18	12	9	i
		48	32	21	14	9	6	4	3	x
E	1/7	177	120	78	51	33	21	15	9	i
		59	40	26	17	11	7	5	3	x
F	1/10	213	144	93	60	39	24	18	12	i
		71	48	31	20	13	8	6	4	x
G	1/15	258	174	114	72	48	30	21	12	i
		86	58	38	24	16	10	7	4	x
H	1/25	318	213	138	90	60	36	24	15	i
		106	71	46	30	20	12	8	5	x
I	1/50	405	273	177	114	75	45	30	21	i
		135	91	59	38	25	15	10	7	x
J	1/100	498	333	216	138	90	54	39	24	i
		166	111	72	46	30	18	13	8	x
K	1/200	594	399	258	165	108	63	45	27	i
		198	133	86	55	36	21	15	9	x
		0.53	0.79	1.22	1.90	2.90	4.94	7.12	11.46	
		AOQL in %								

*AQL's are provided as indices to simplify use of this table, but have no other meaning relative to the plans.

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TABLE VI-B

Values of S for CSP-V Plans

Samp Freq Code Ltr	f	AQL* in %							
		0.40	0.65	1.0	1.5	2.5	4.0	6.5	10.0
A	1/2	98	65	46	28	22	18	13	5
B	1/3	192	127	85	55	38	28	25	19
C	1/4	267	214	141	98	66	53	44	19
D	1/5	390	261	172	119	80	58	44	39
E	1/7	533	409	260	176	121	82	65	39
F	1/10	772	579	377	237	167	102	97	71
G	1/15	1165	857	563	357	249	158	139	71
H	1/25	1754	1327	848	537	427	254	198	120
I	1/50	3251	2467	1604	944	762	415	373	301
J	1/100	5491	4508	2826	1741	1279	746	731	433
K	1/200	8931	7208	4670	2828	2516	1210	1192	659
		0.53	0.79	1.22	1.90	2.90	4.94	7.12	11.46
		AOQL in %							

*AQL's are provided as indices to simplify use of this table, but have no other meaning relative to the plans.

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APPENDIX A

FUNCTIONAL CURVES FOR CSP-1 PLANS

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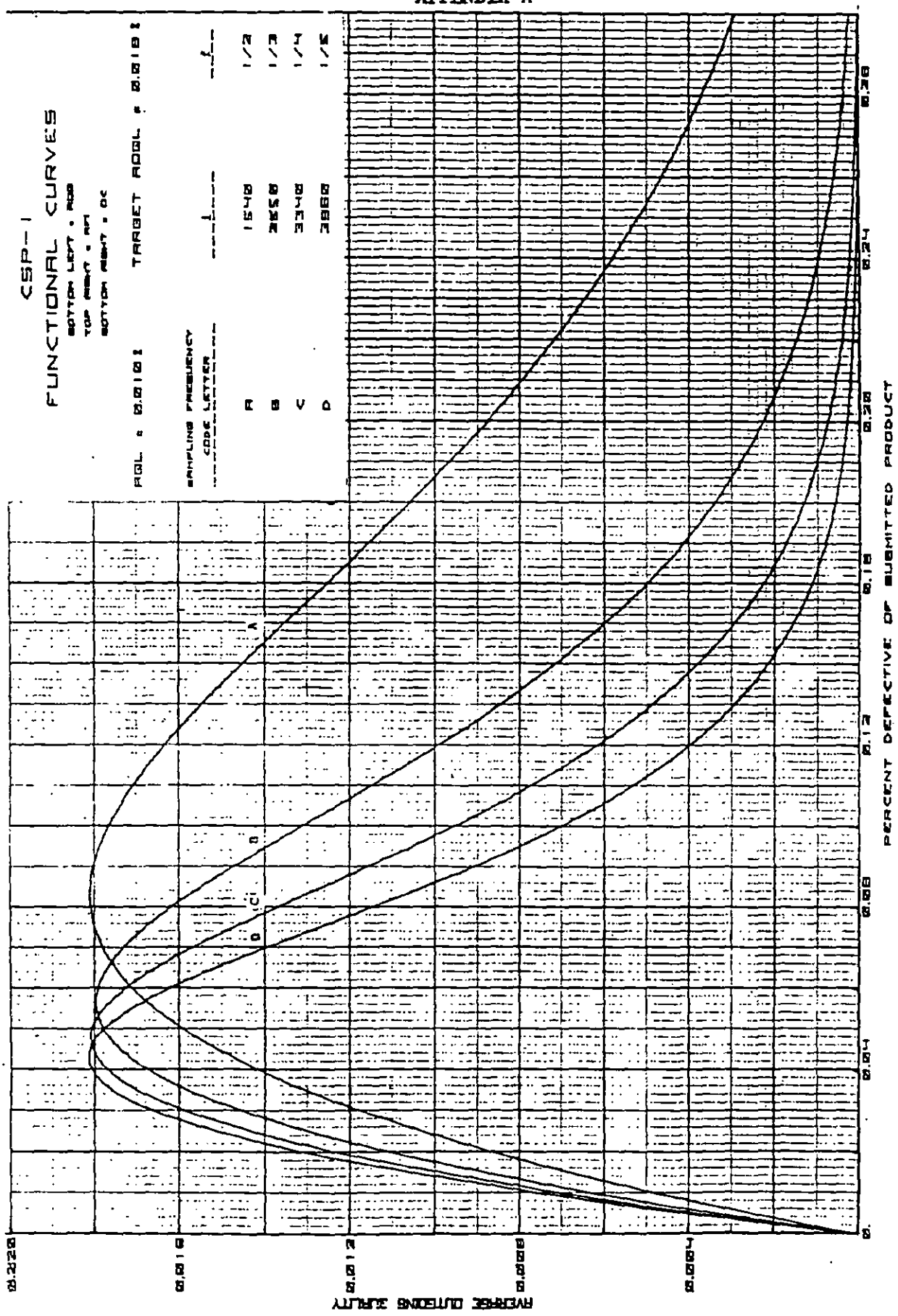

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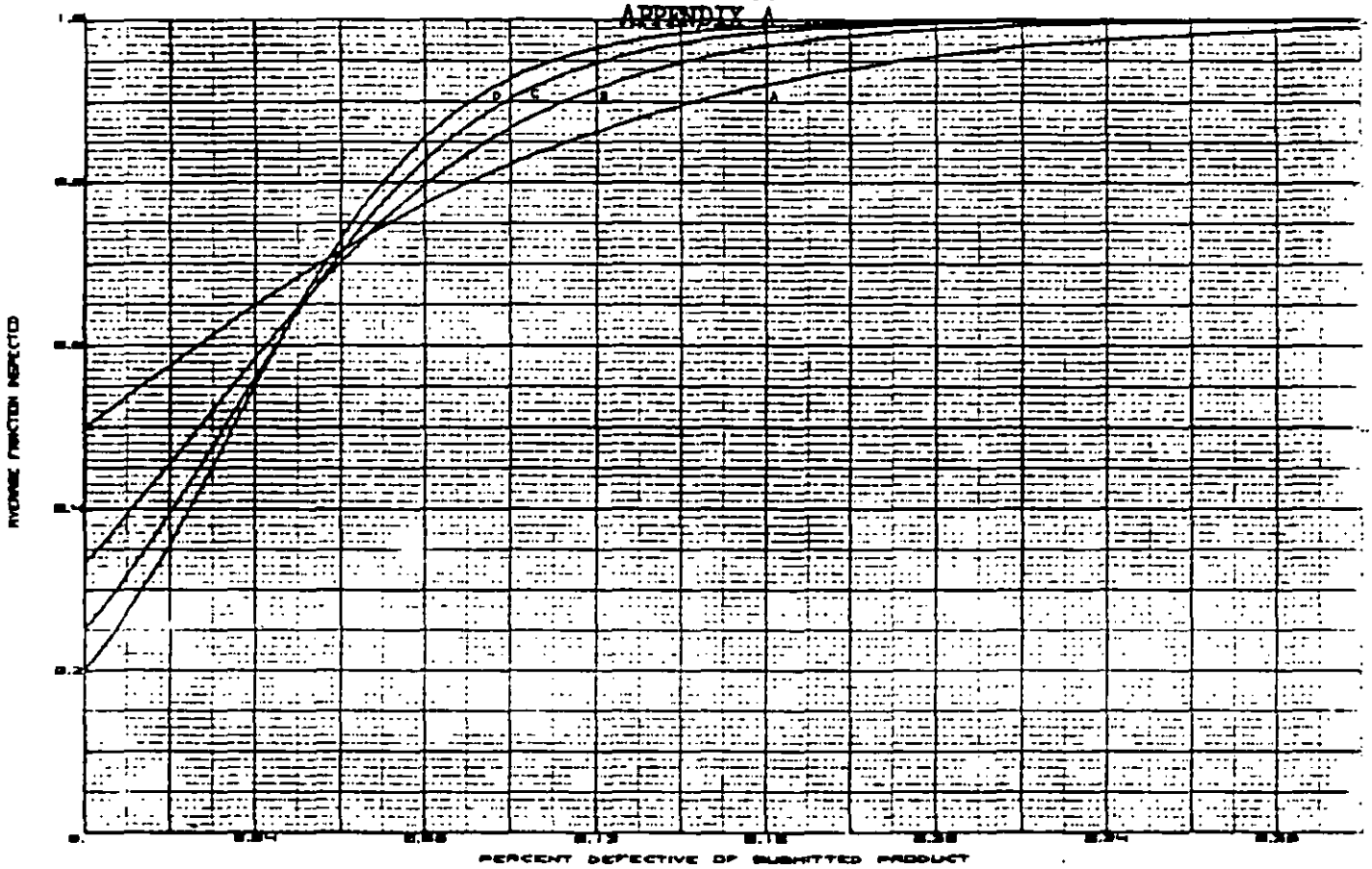

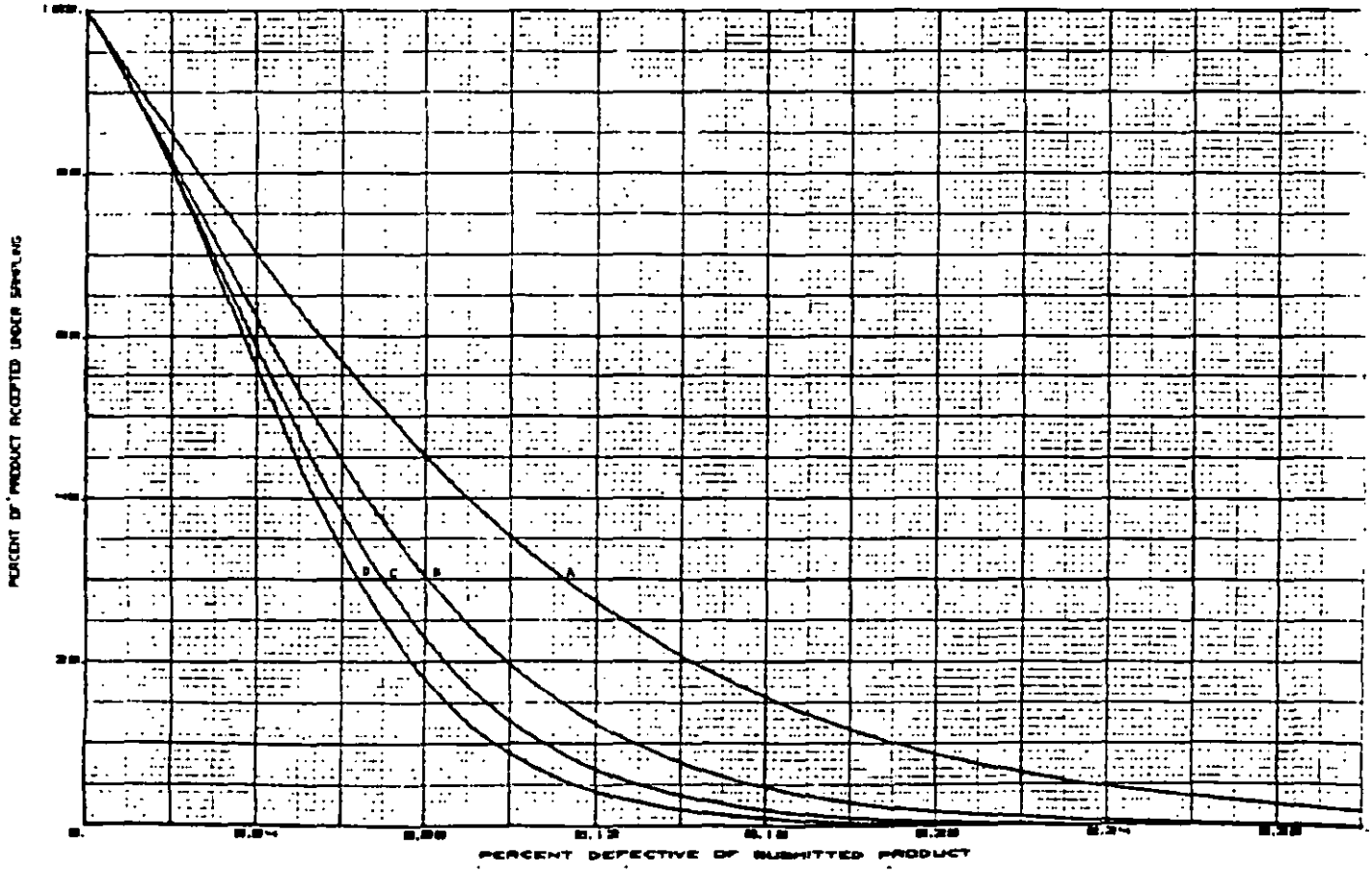

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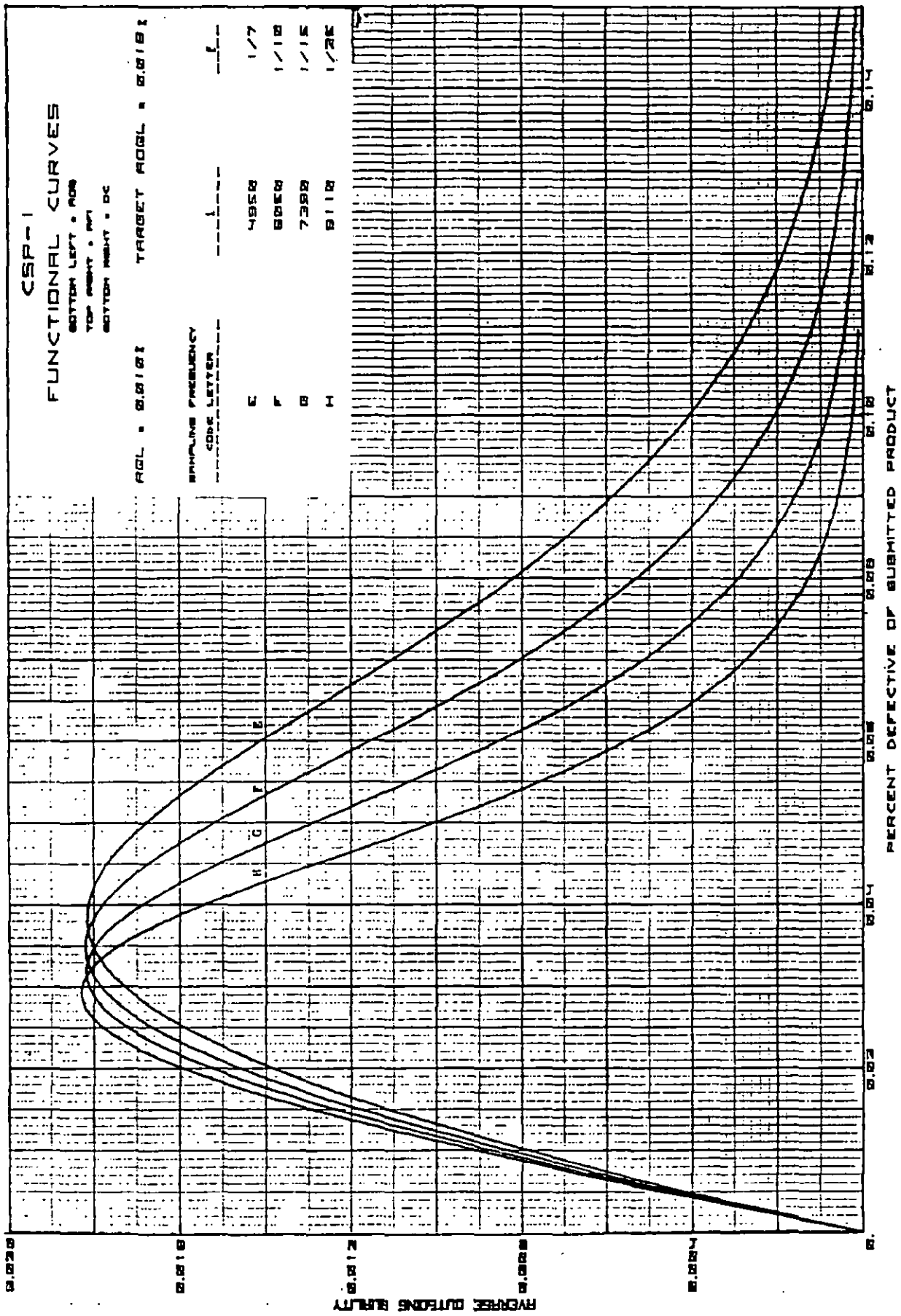

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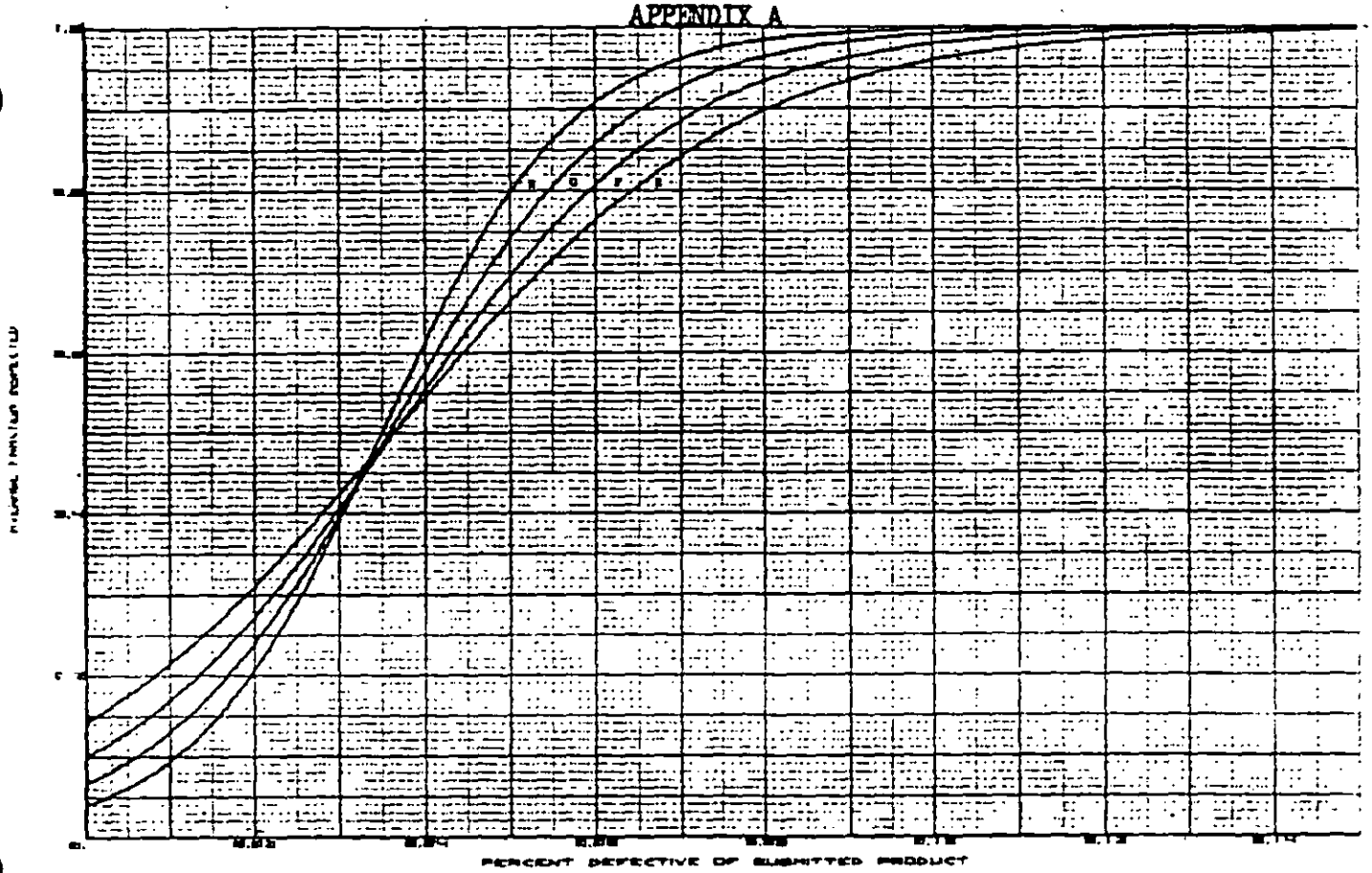

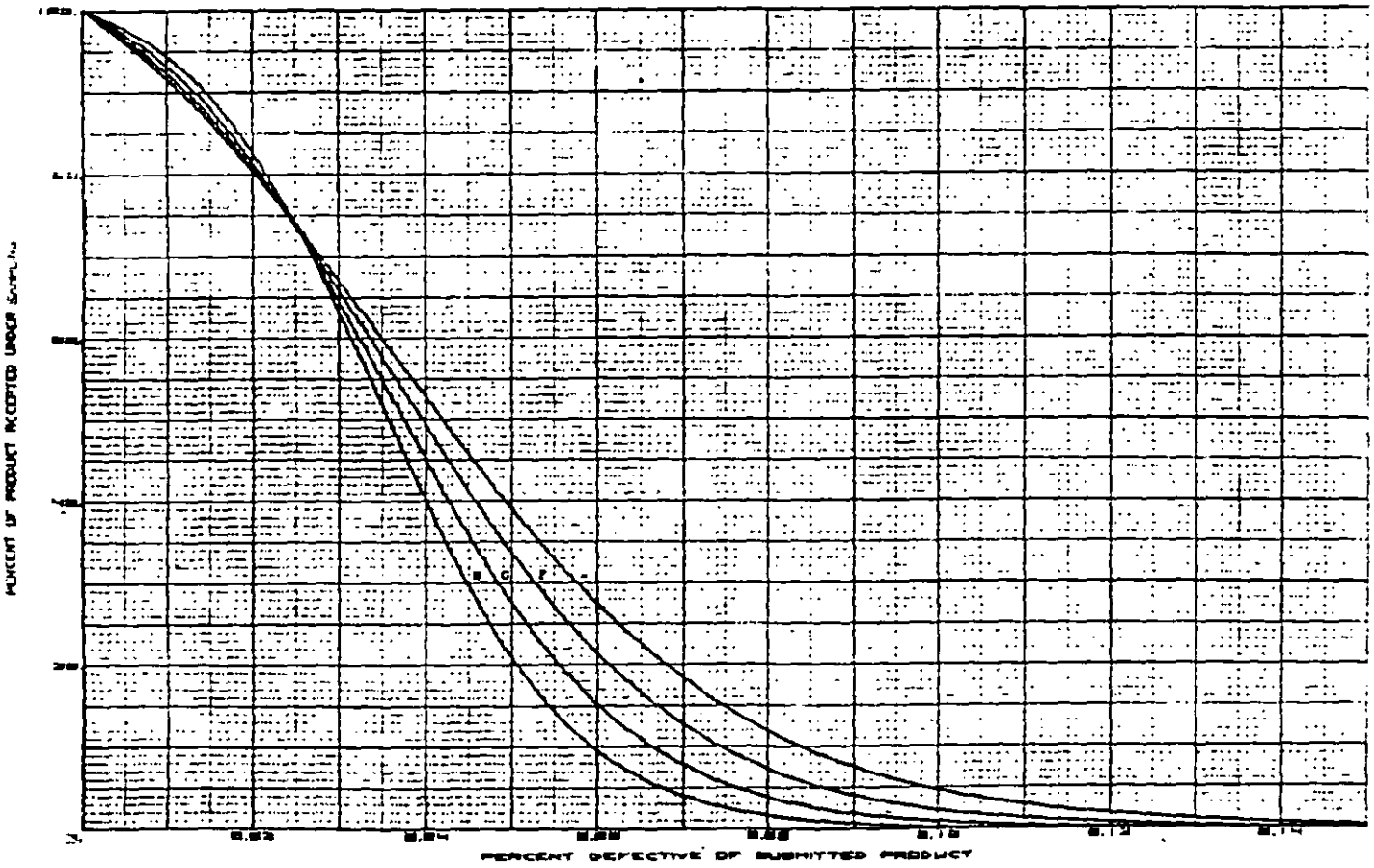

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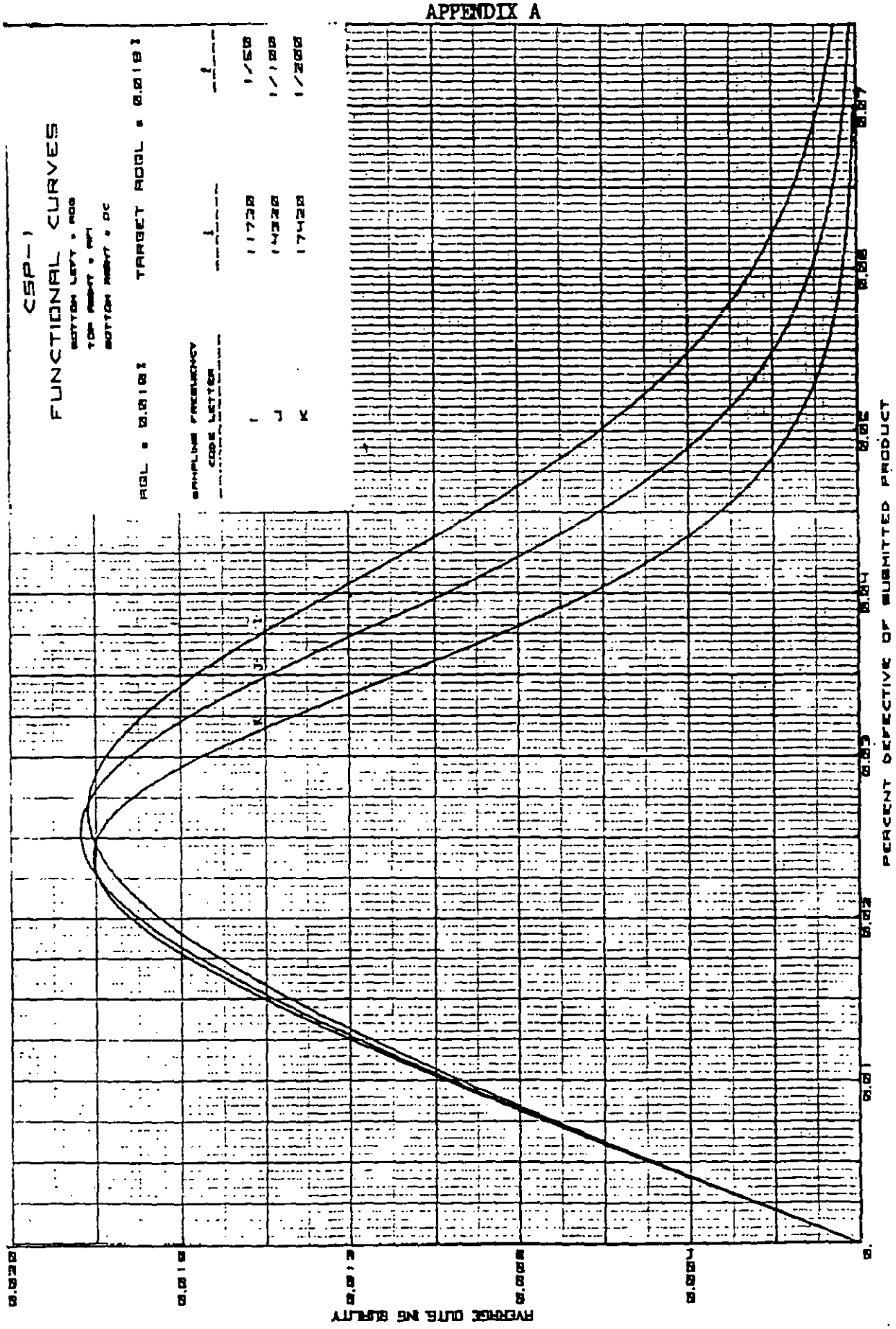

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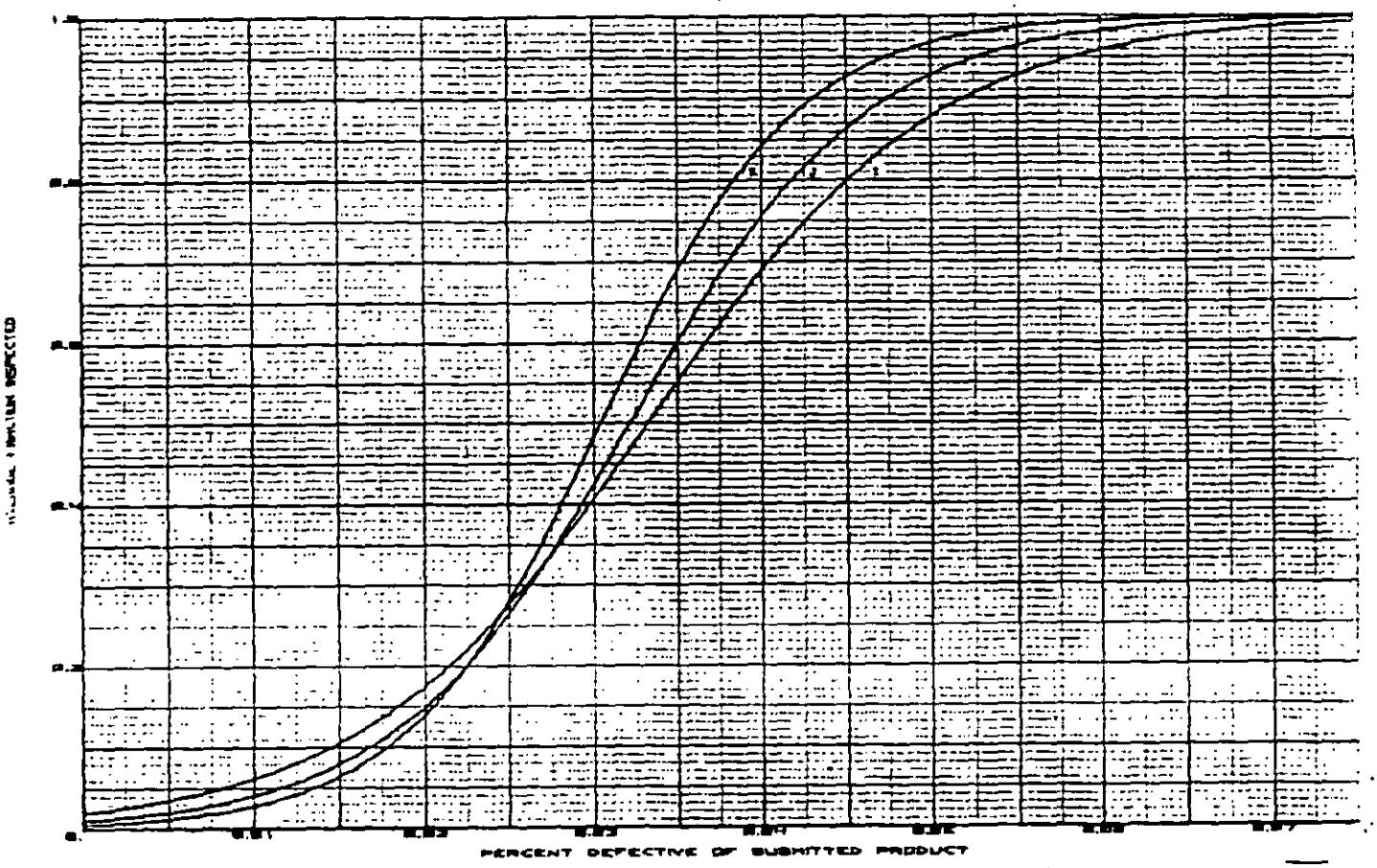

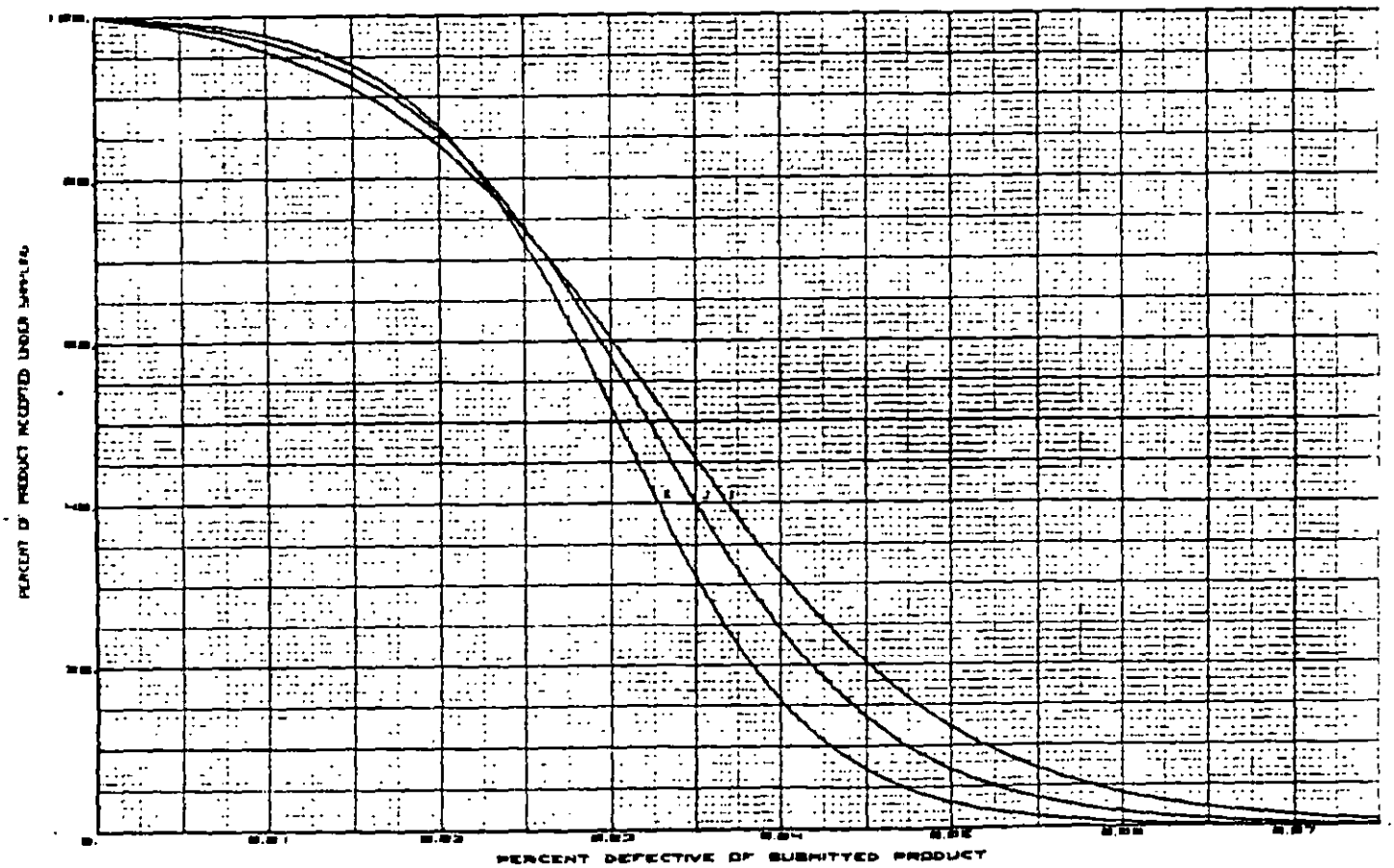

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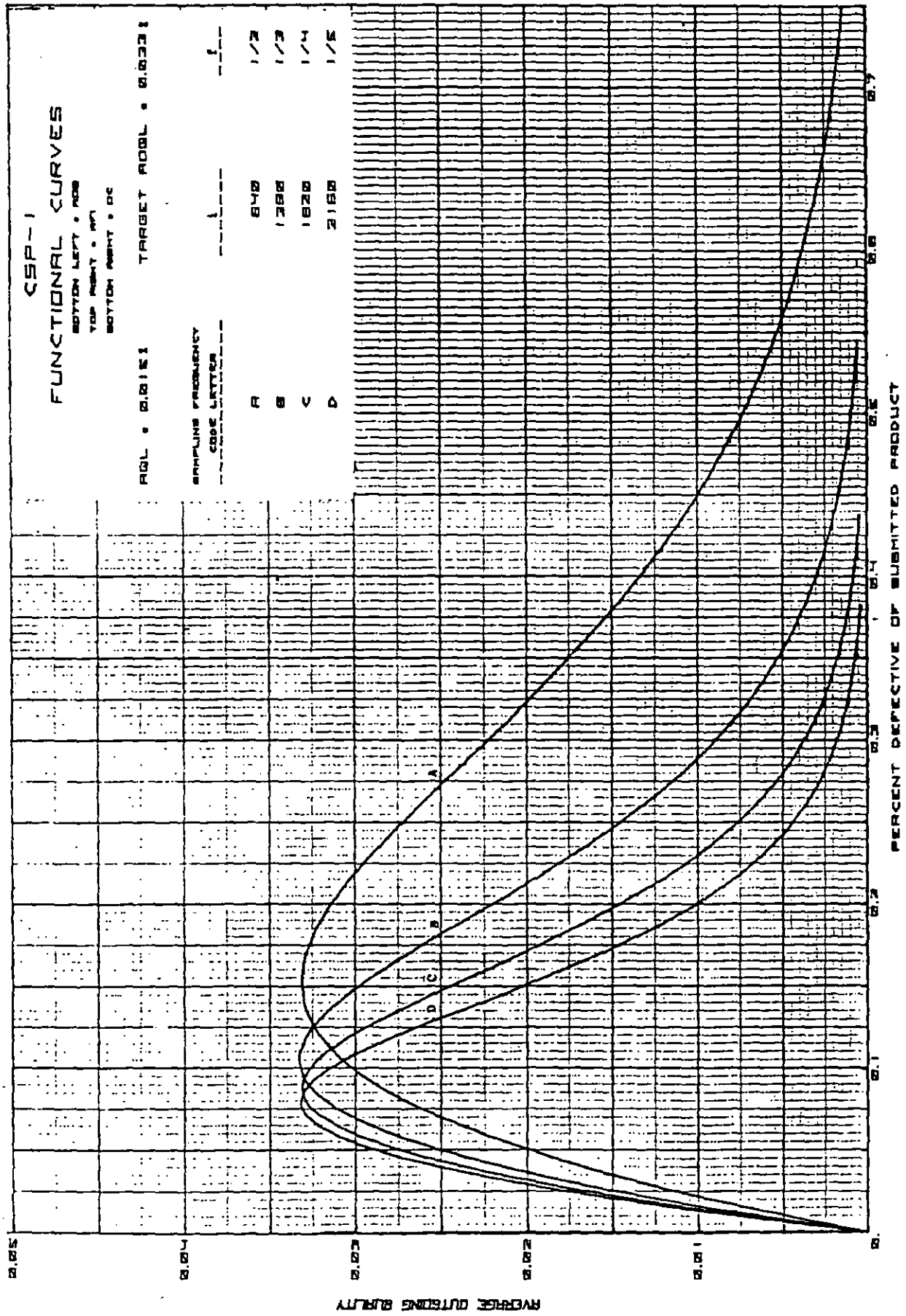

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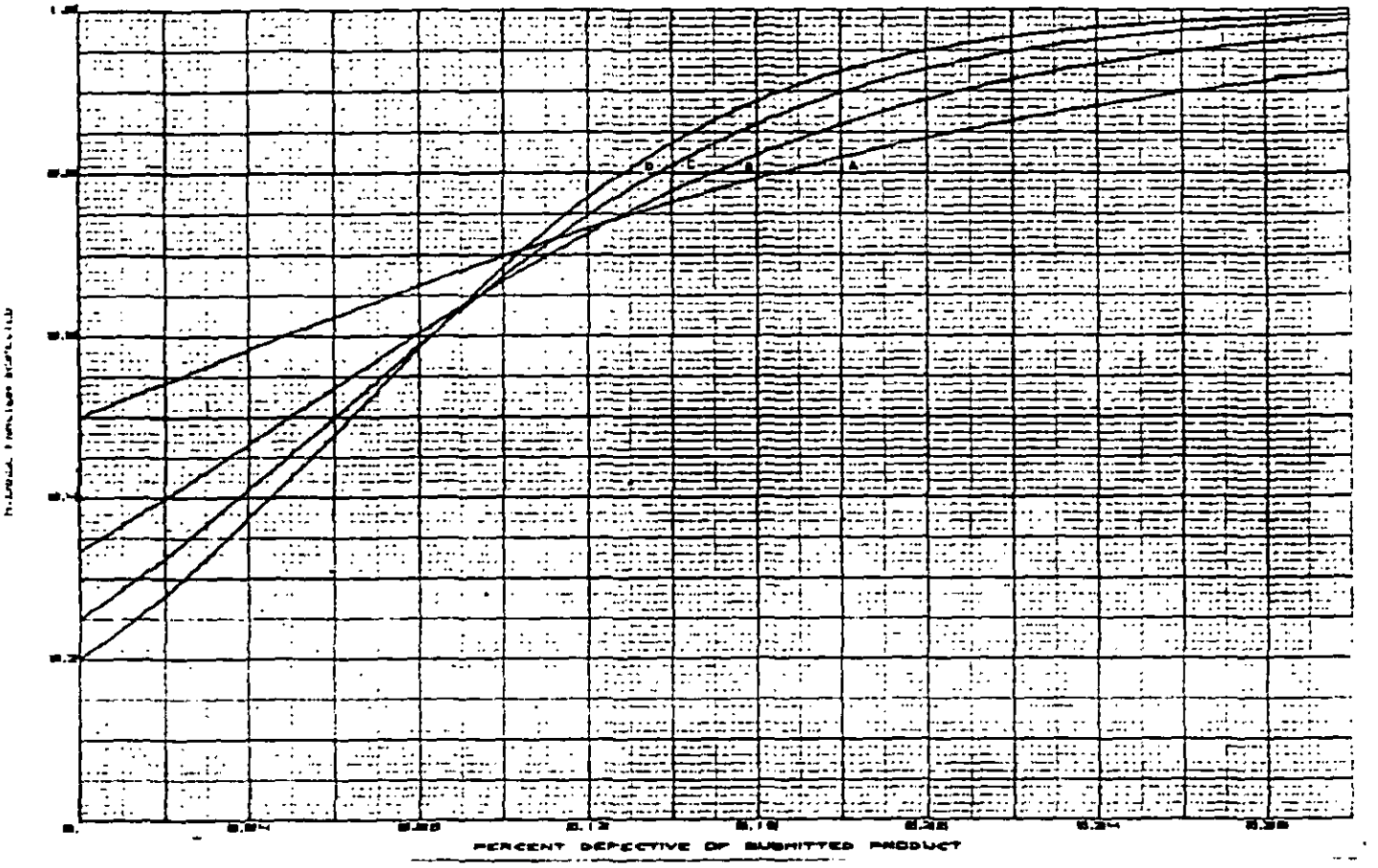

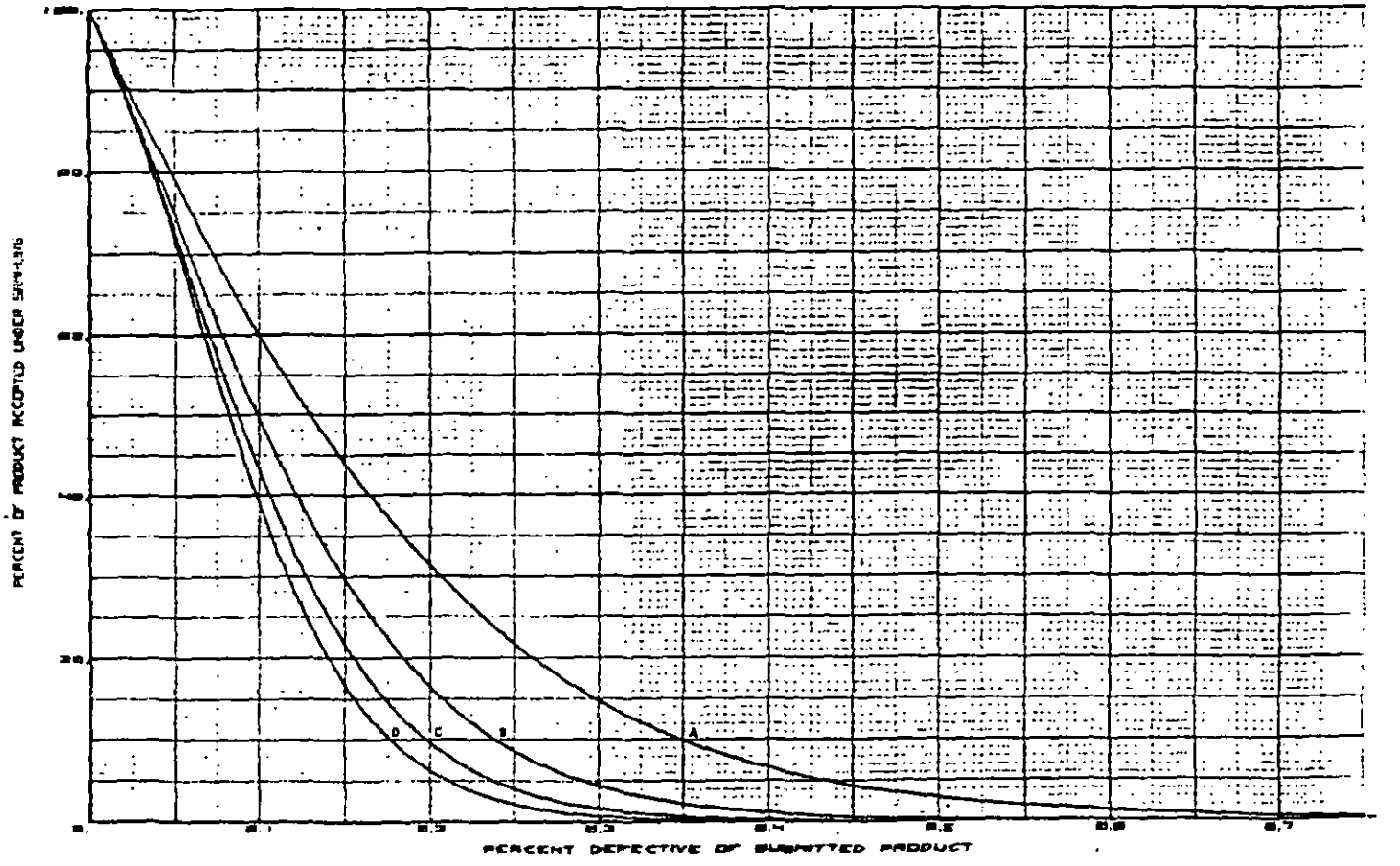

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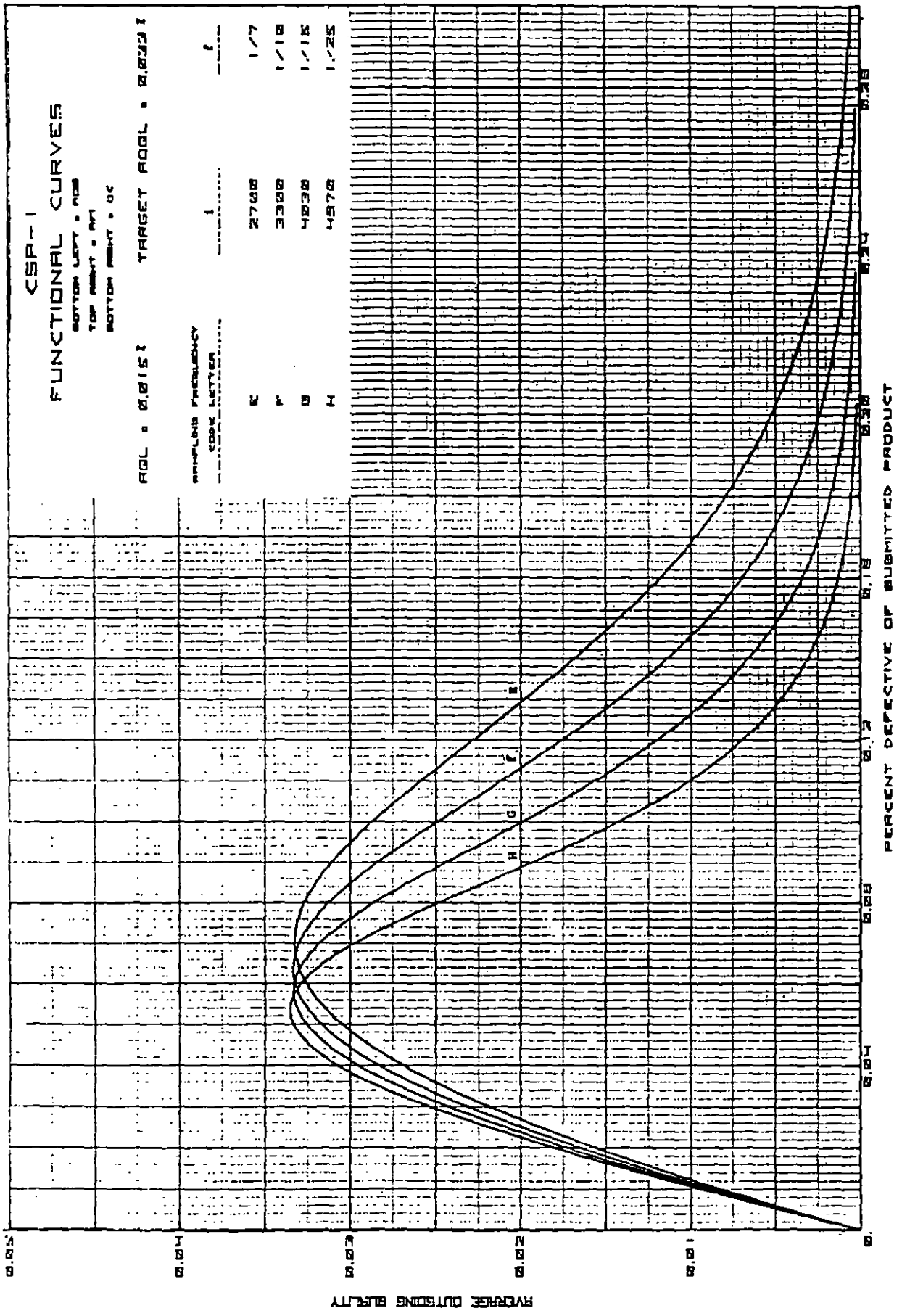

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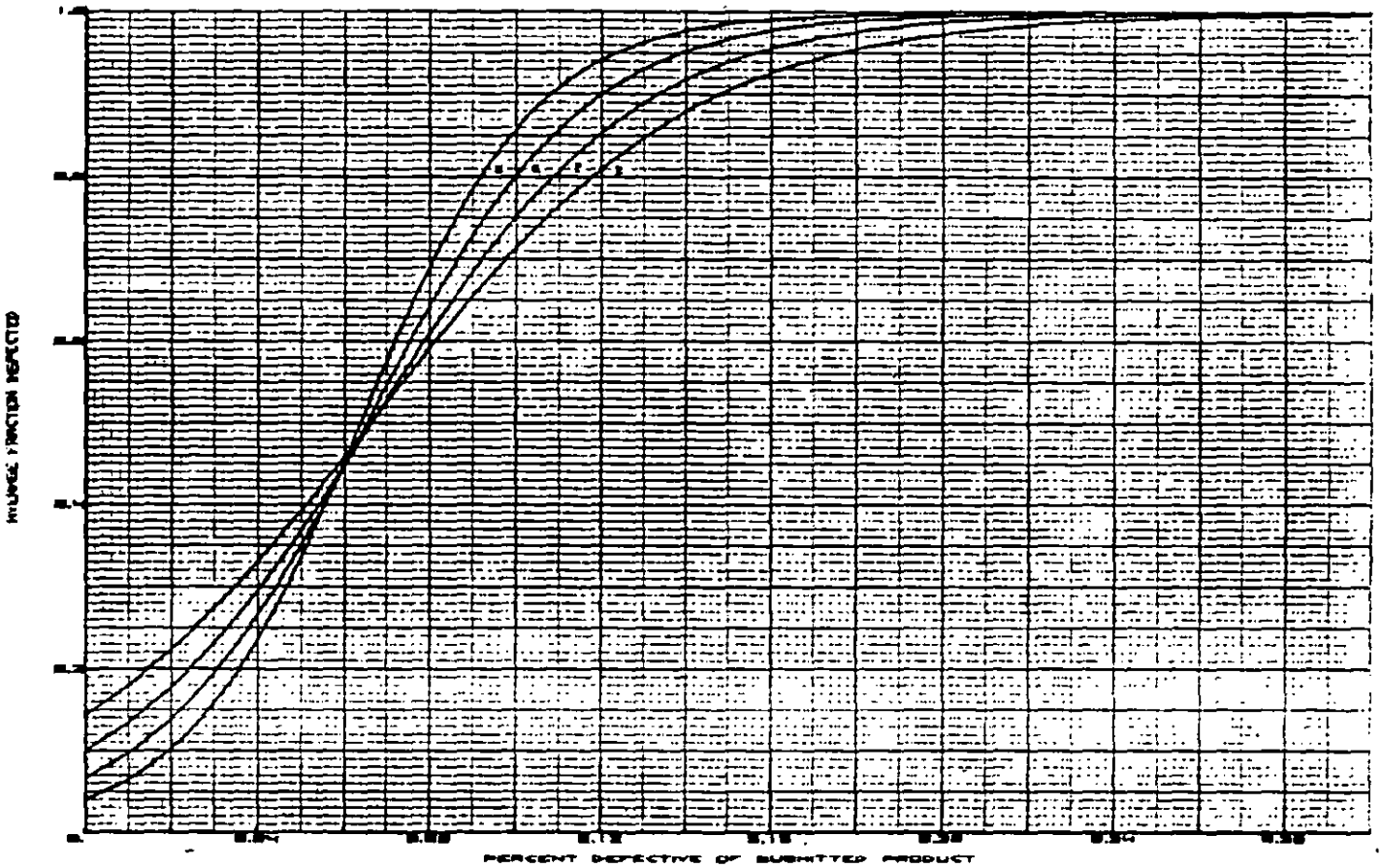

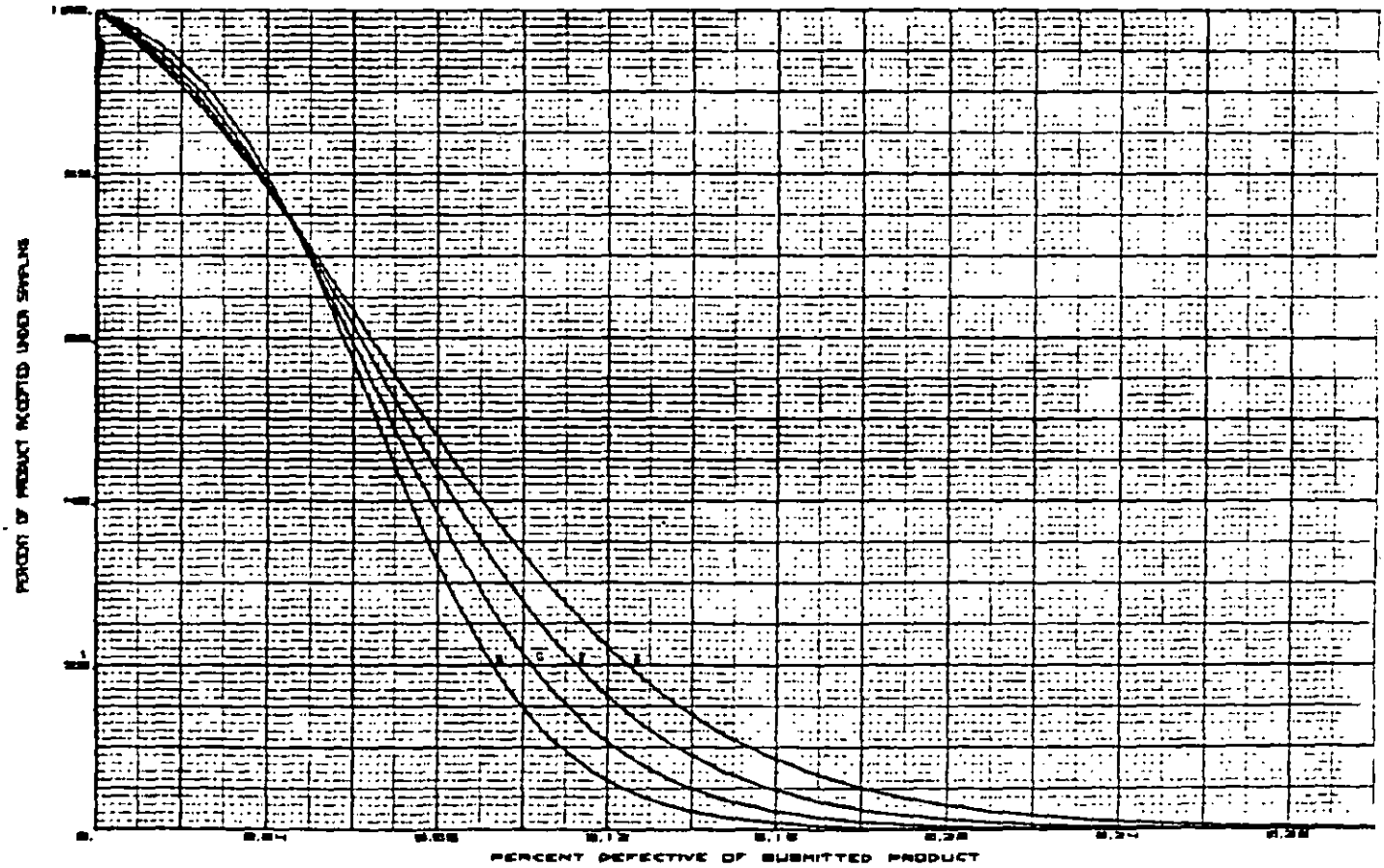

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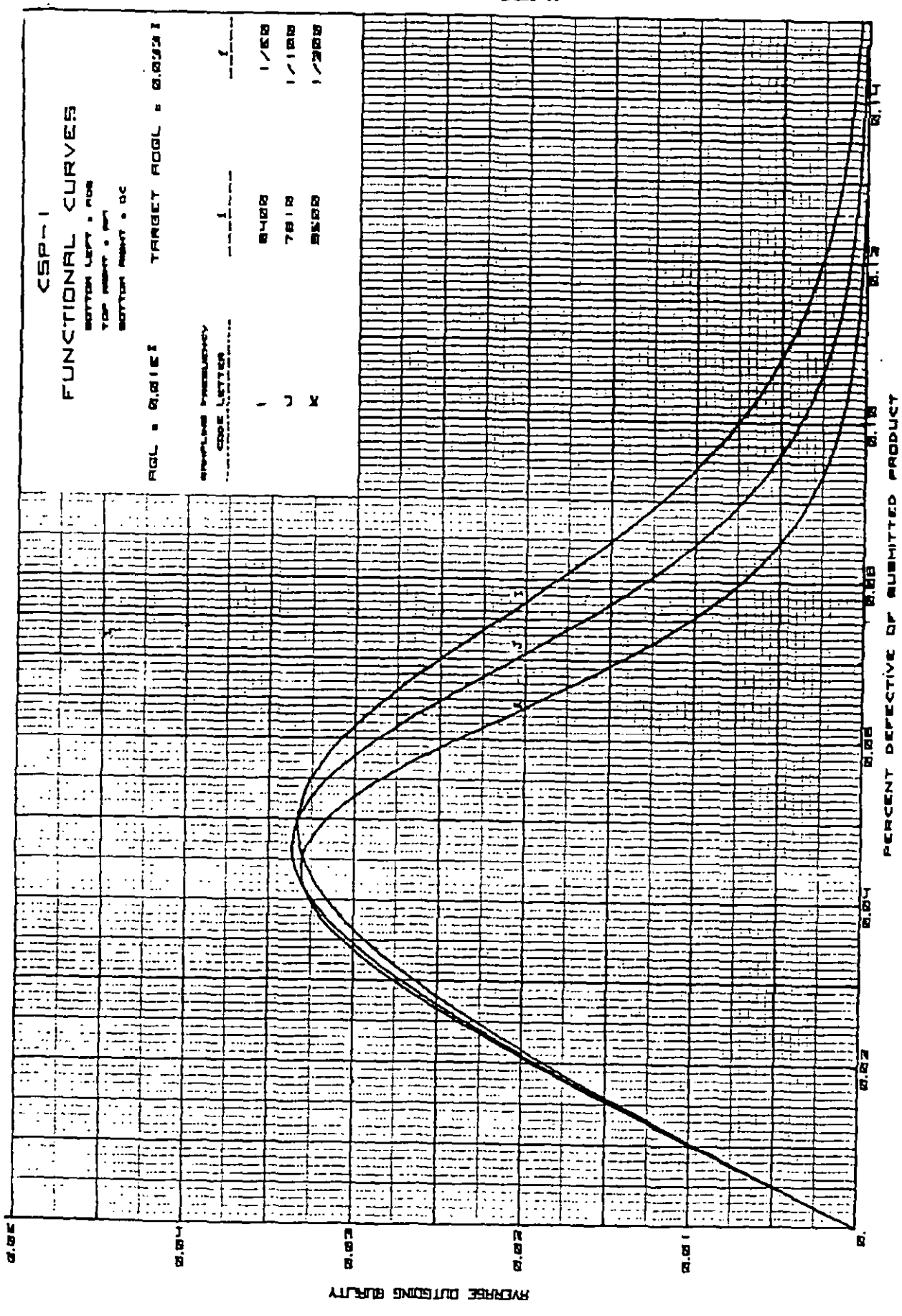

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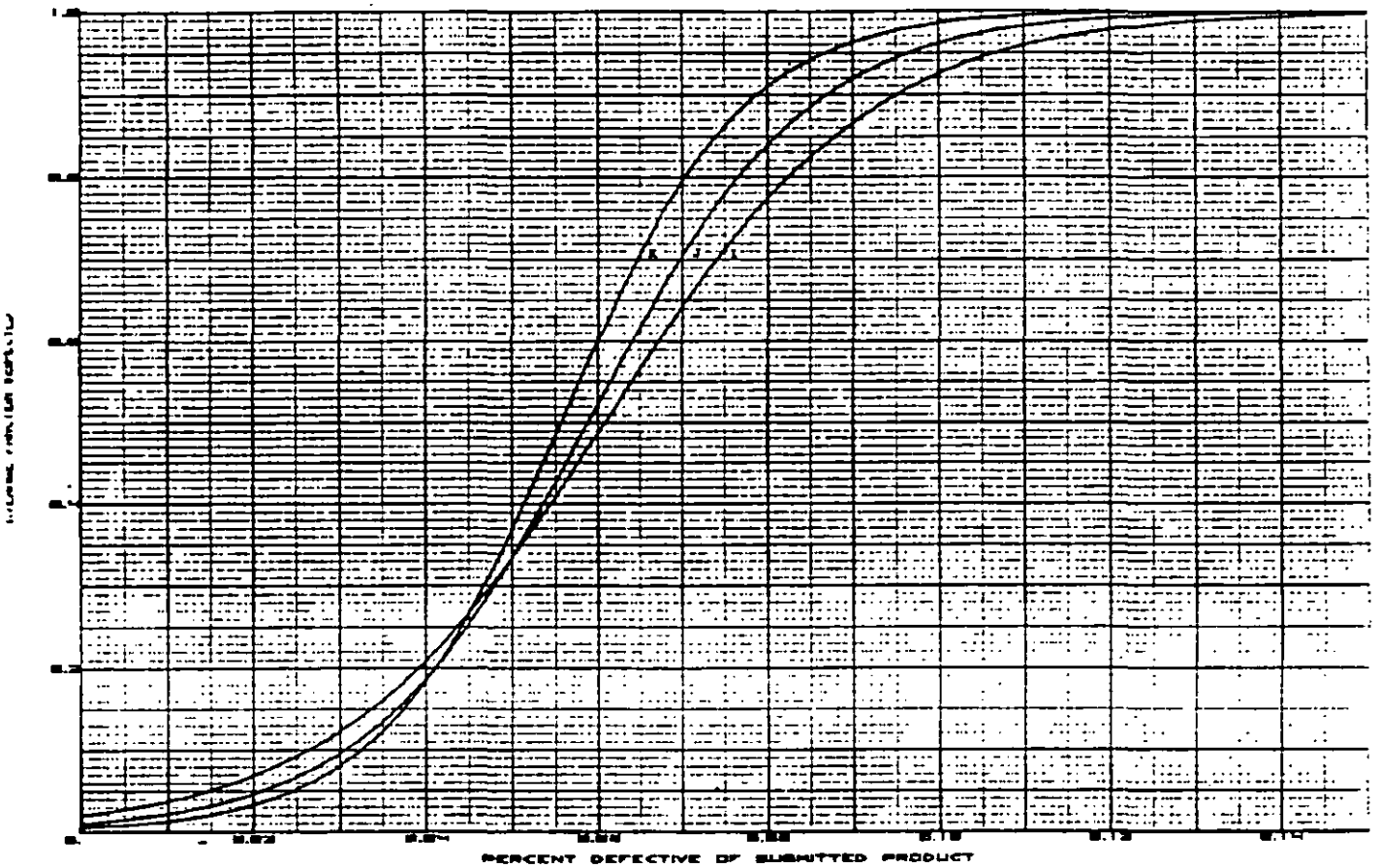

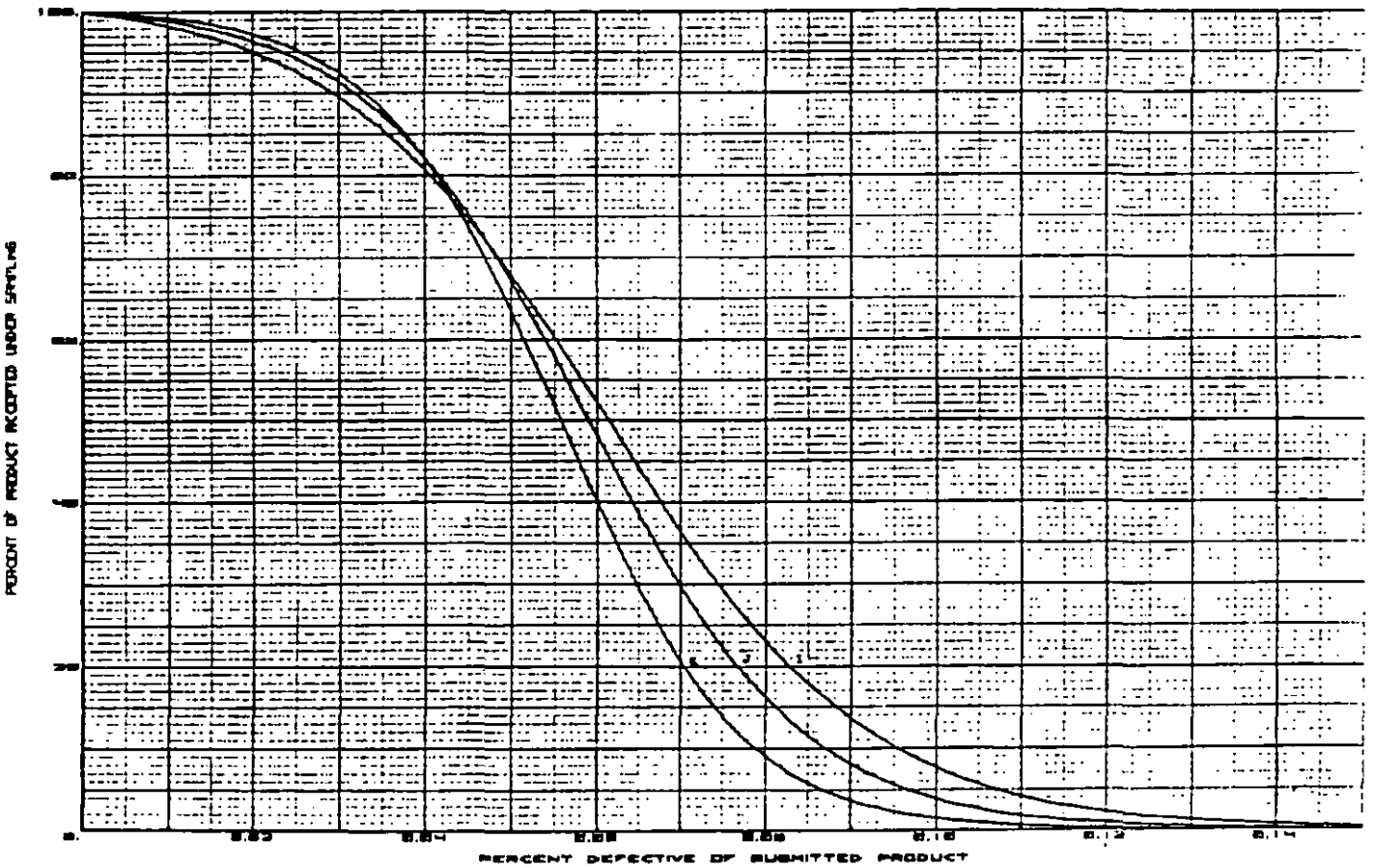

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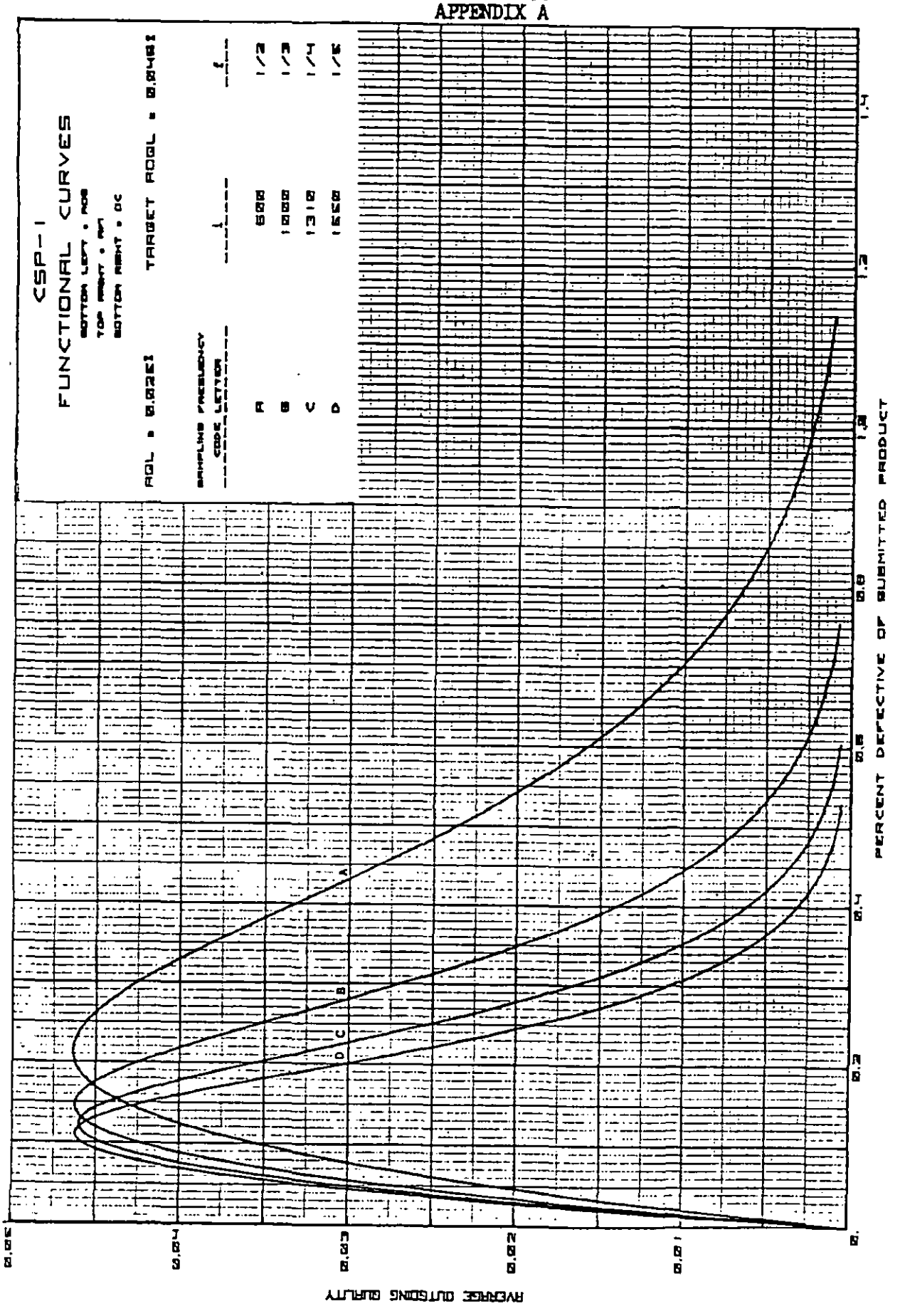

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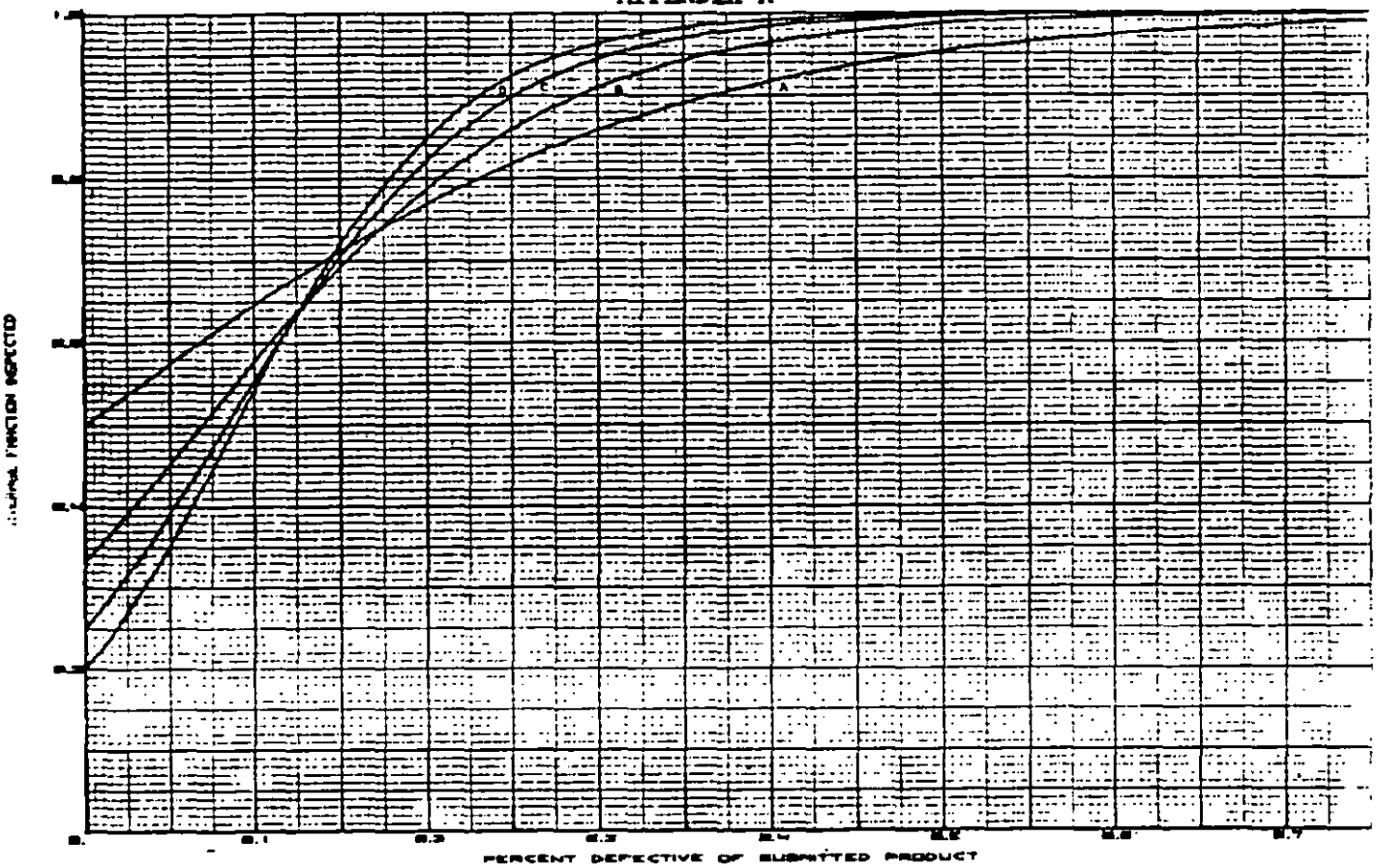

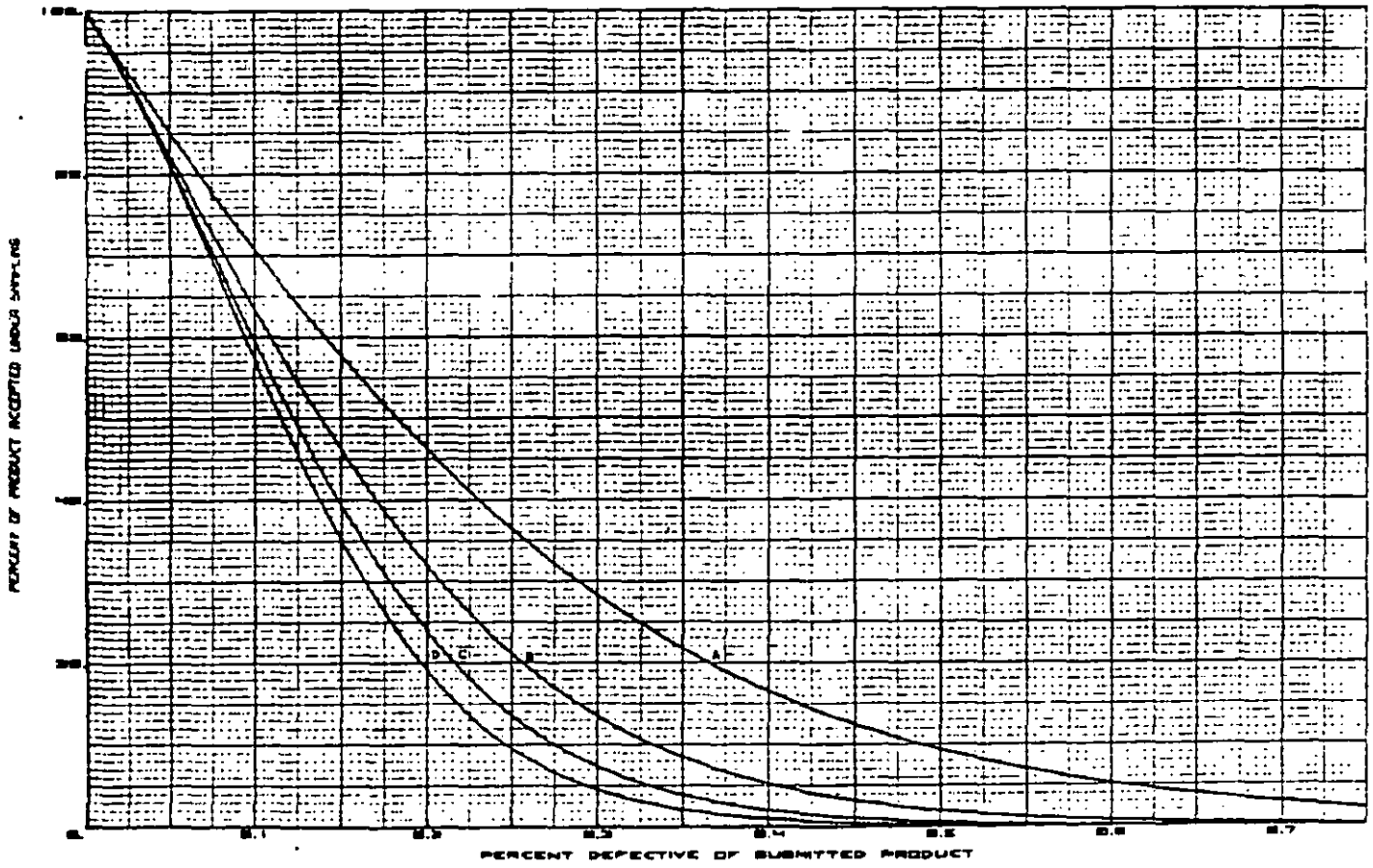

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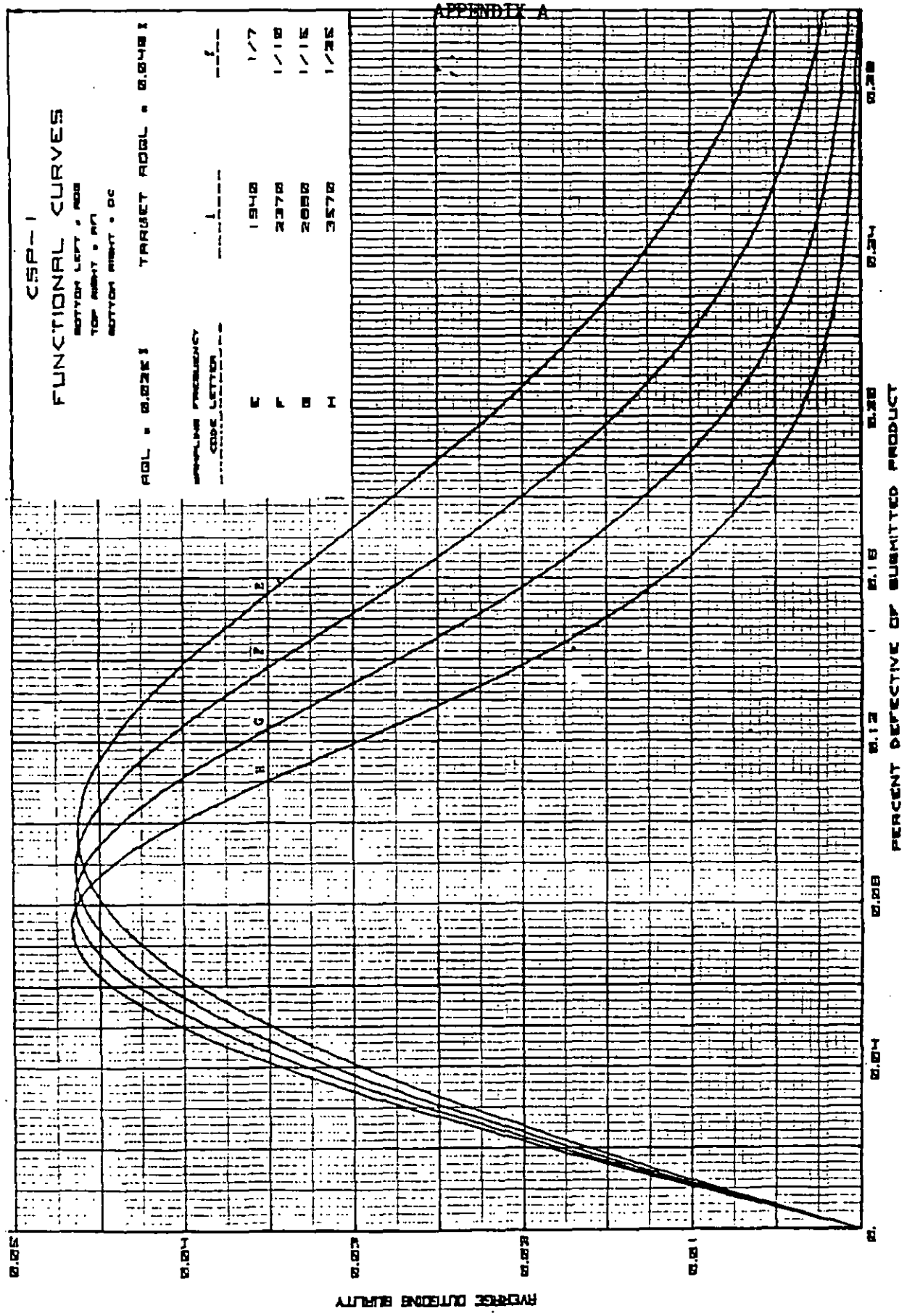

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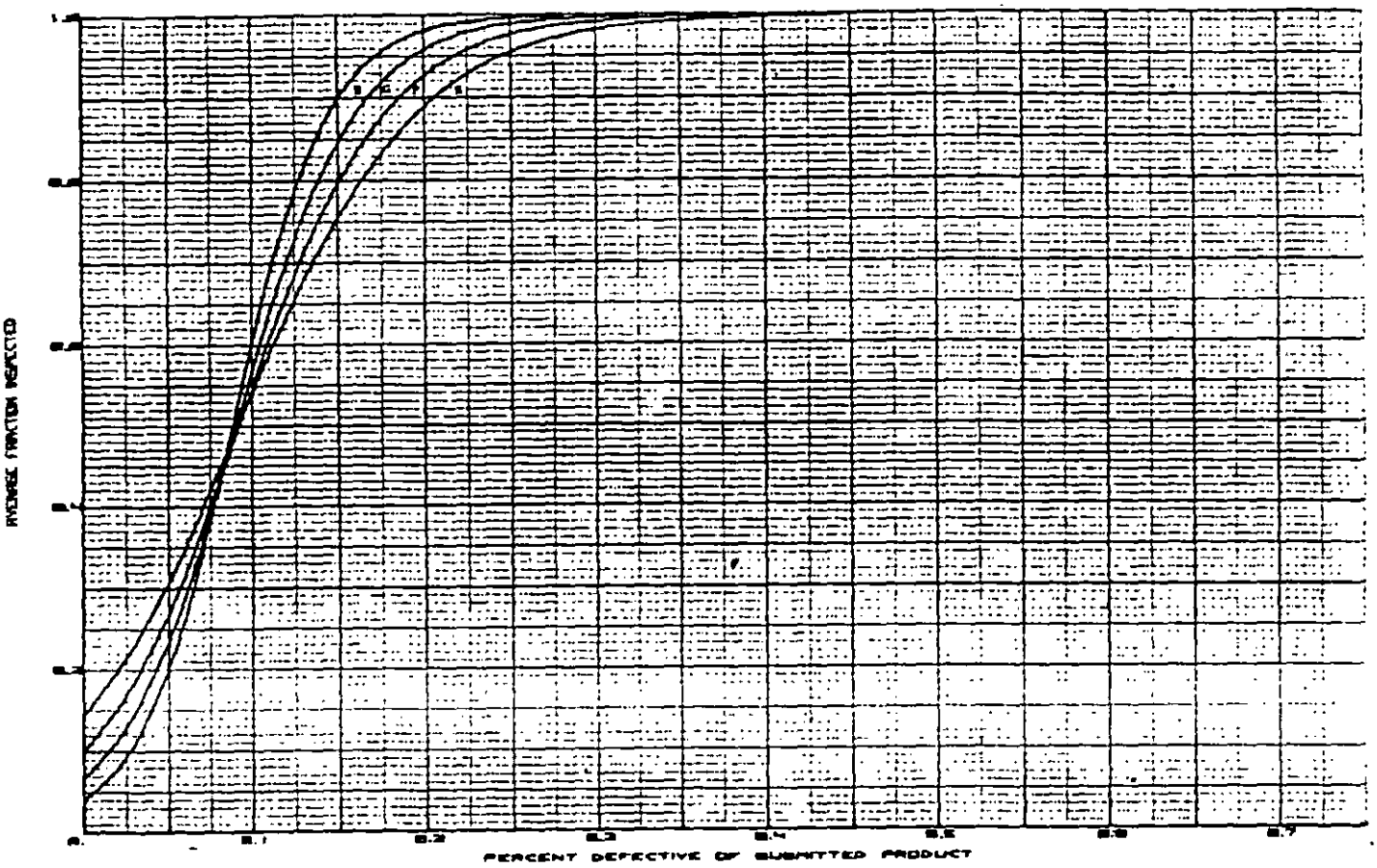

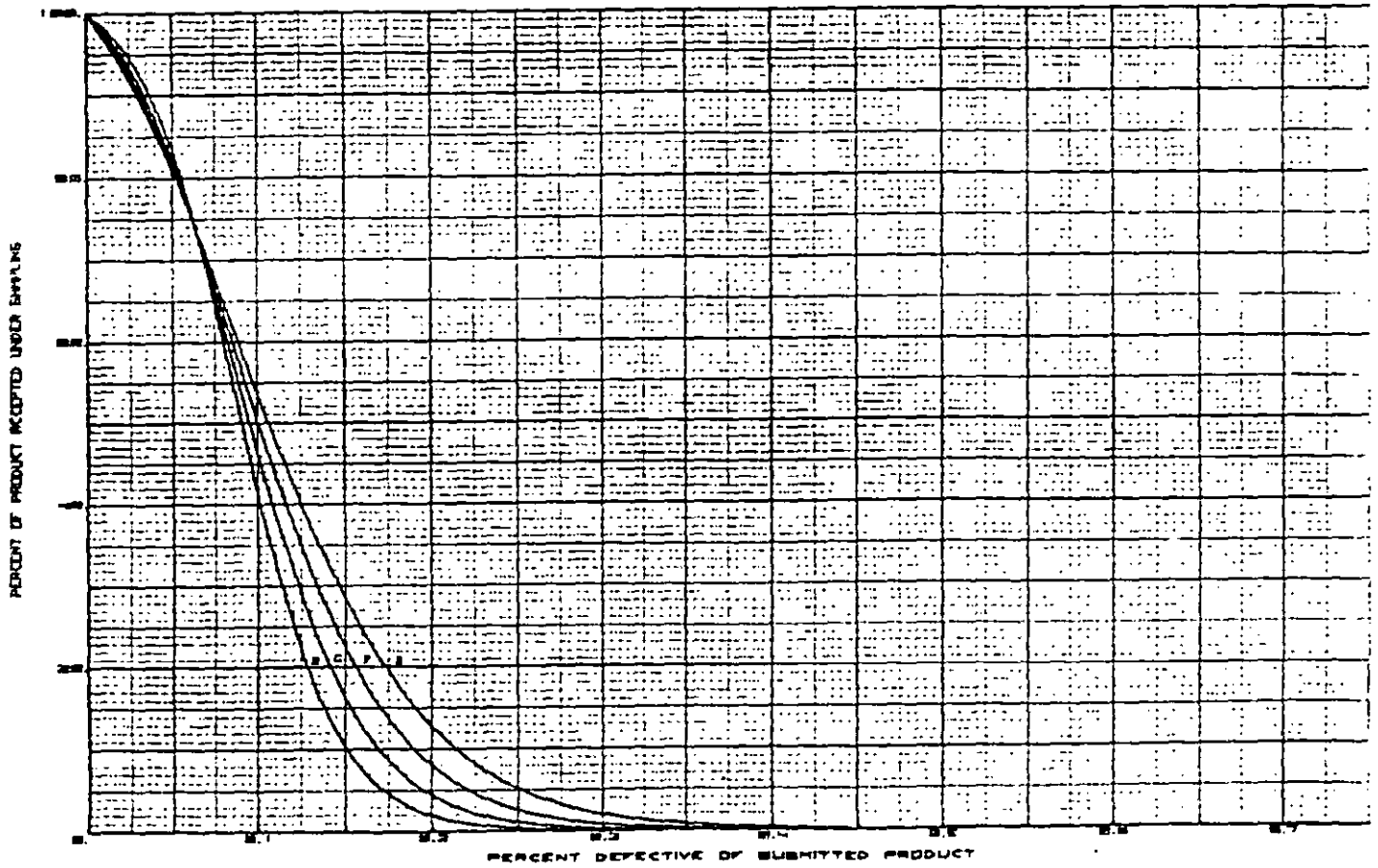

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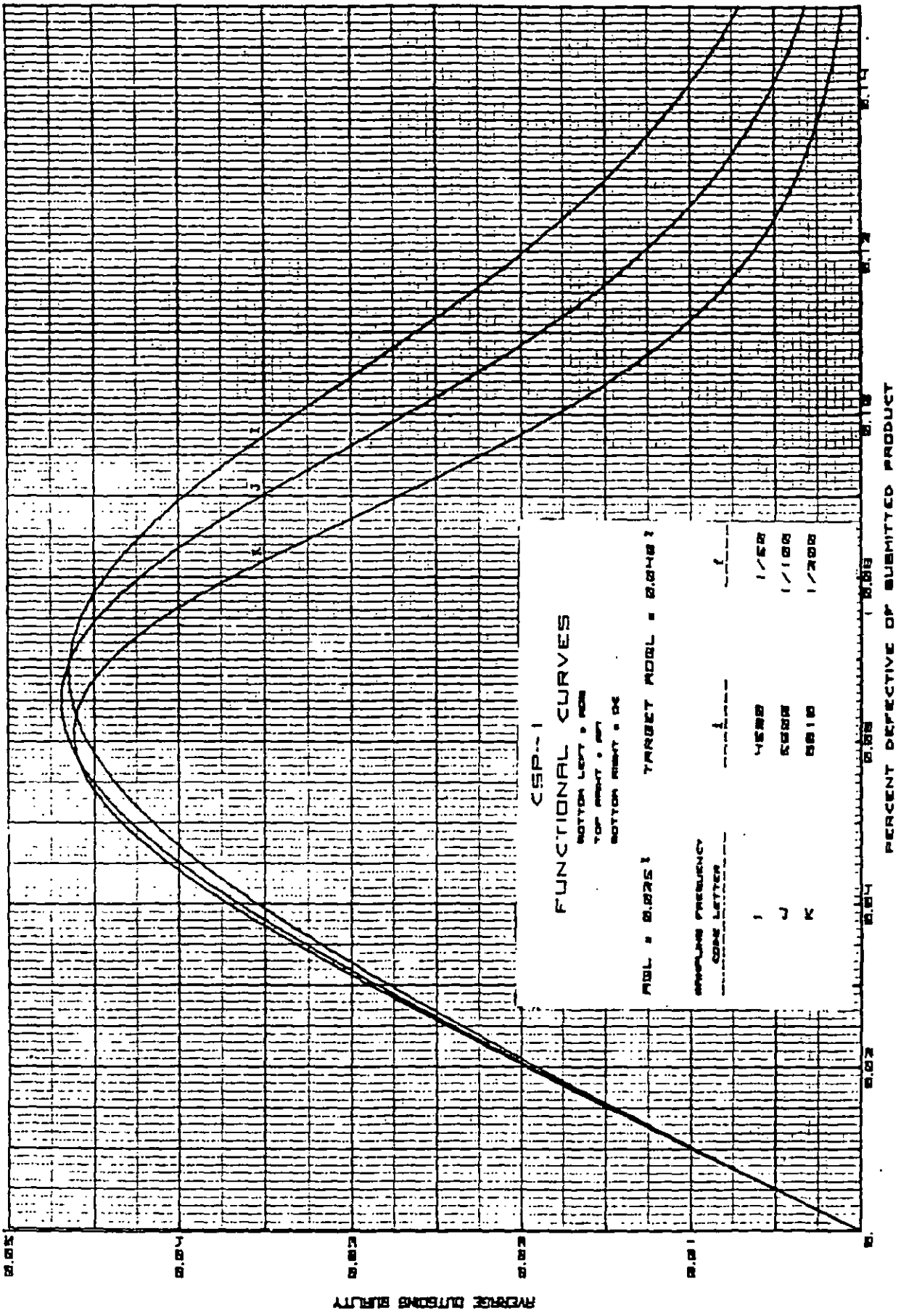

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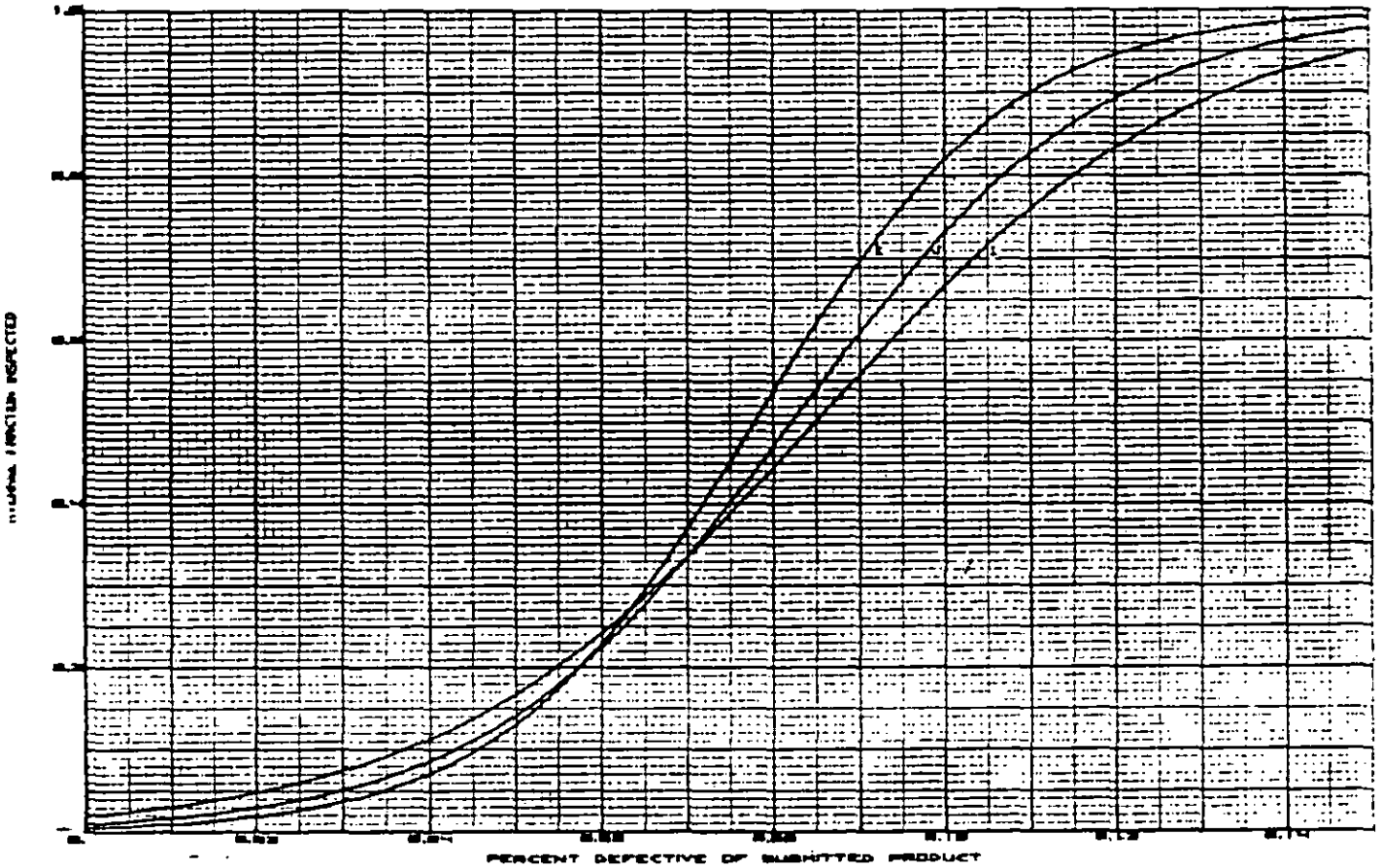

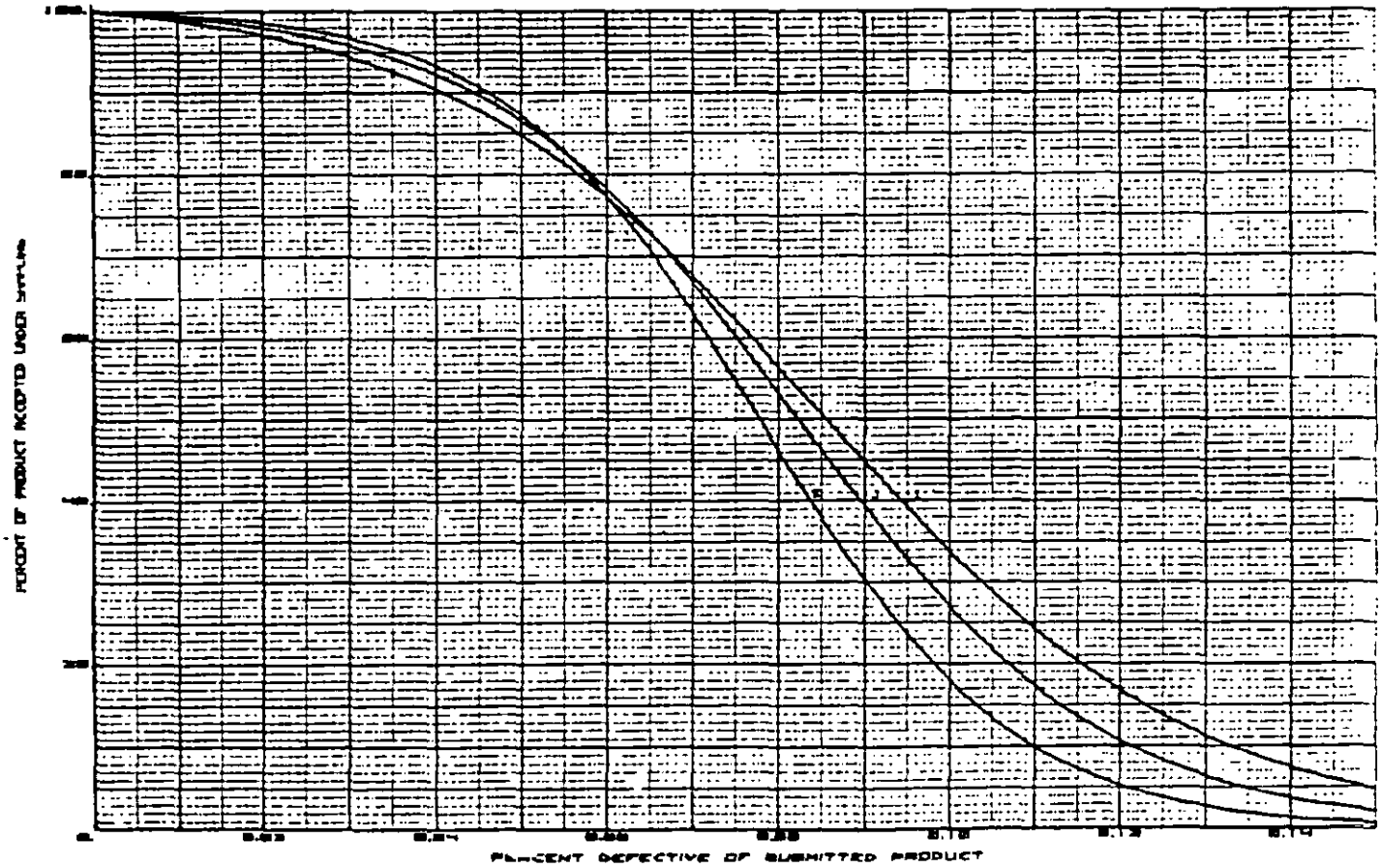

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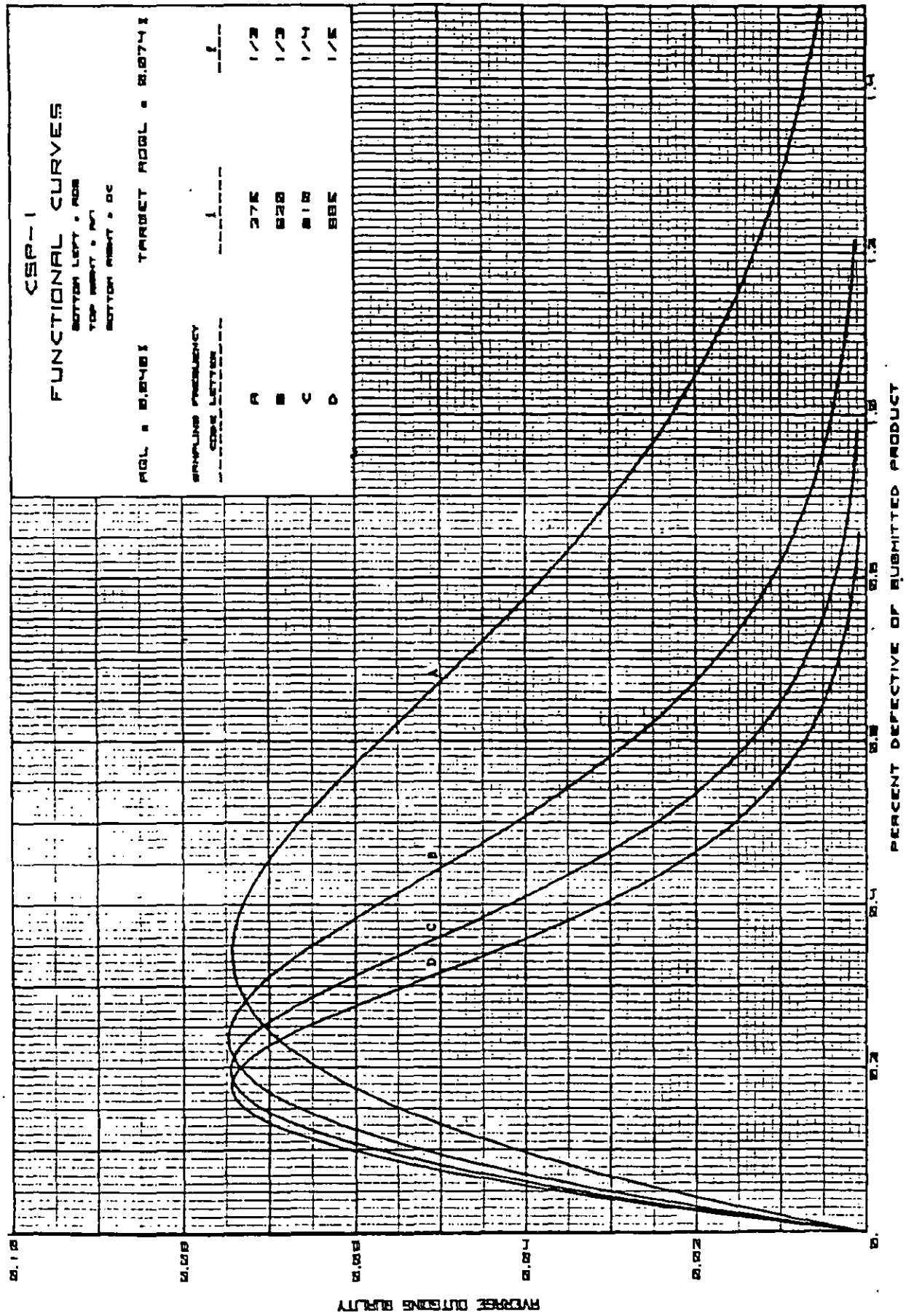

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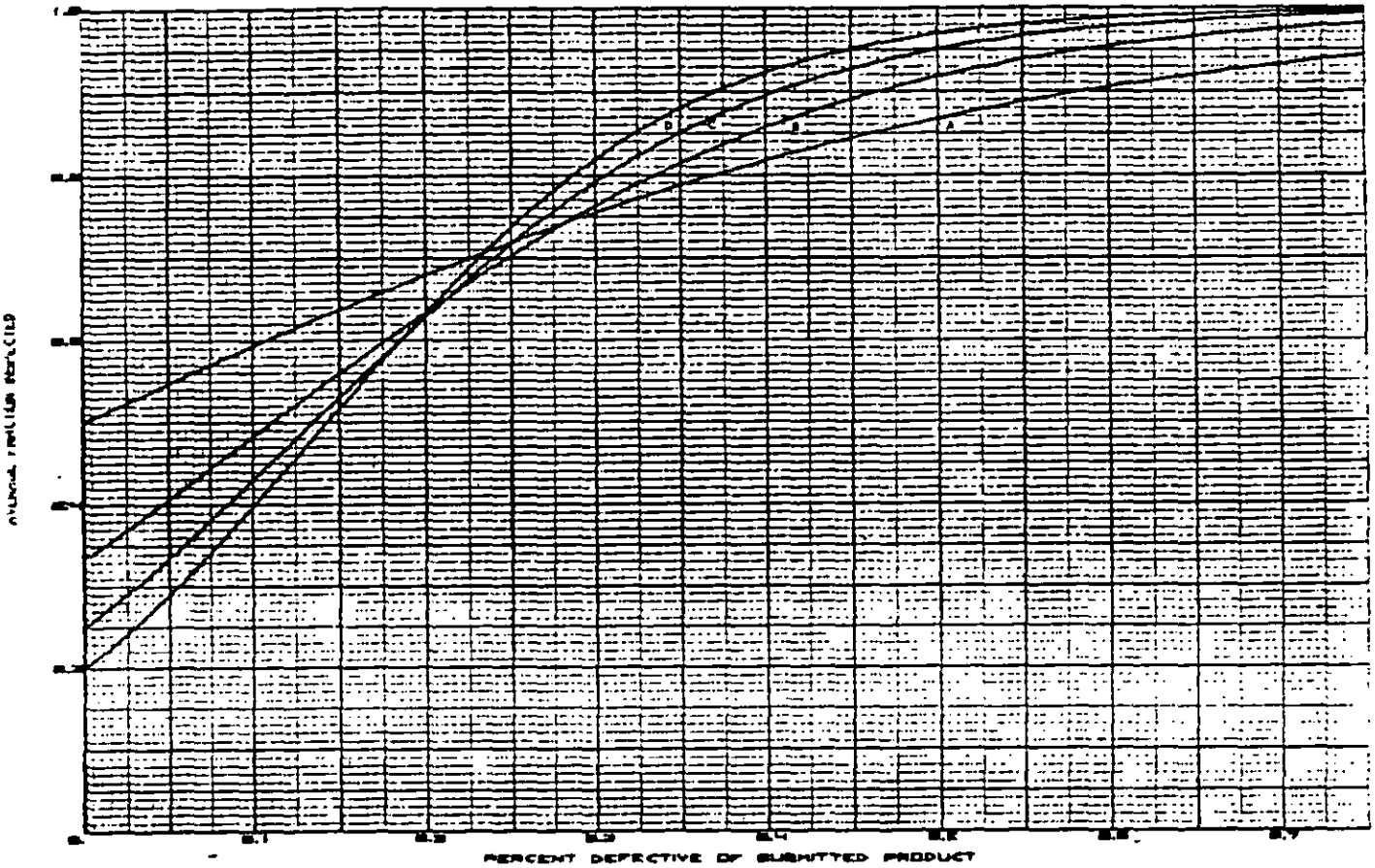

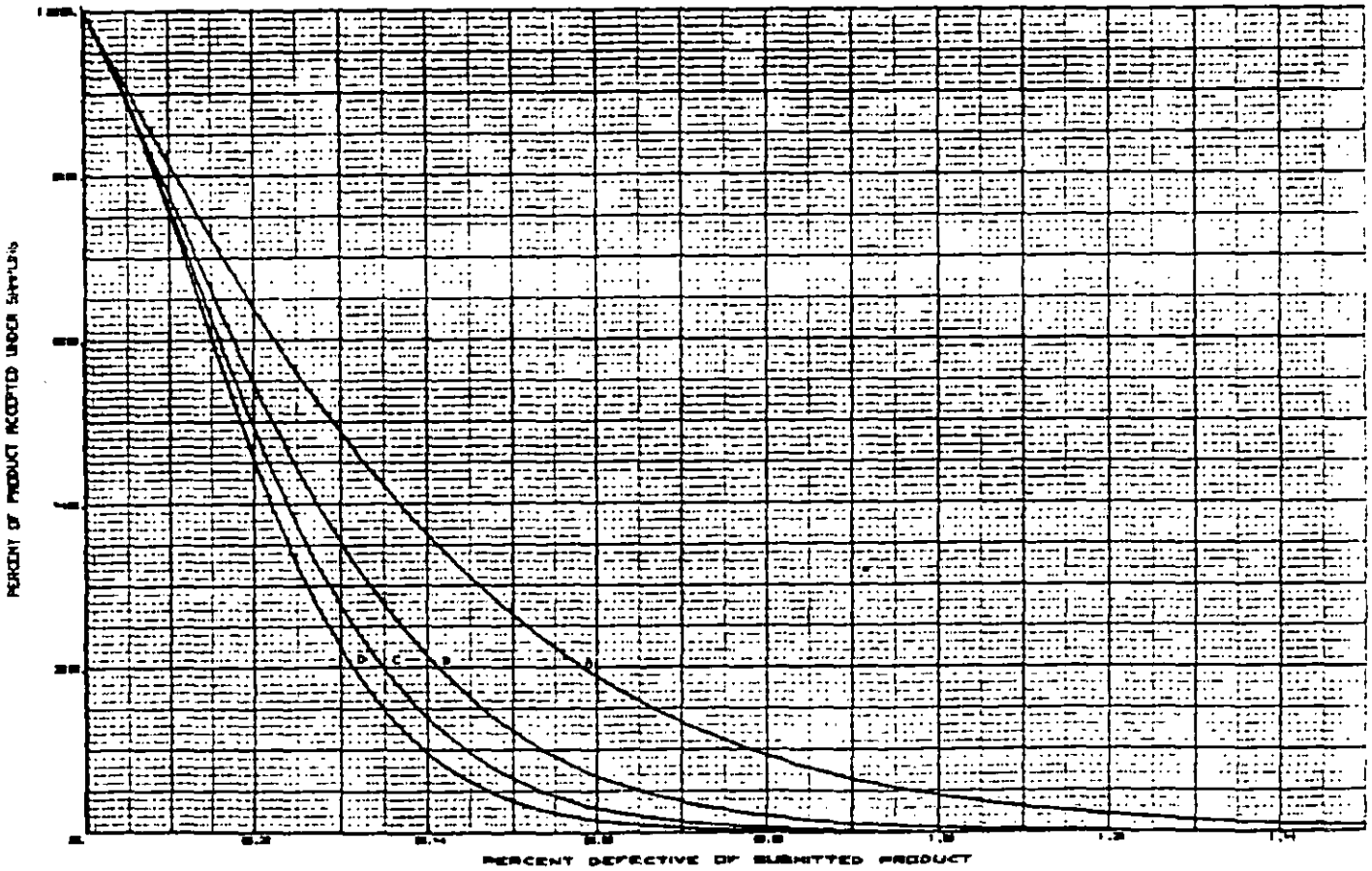

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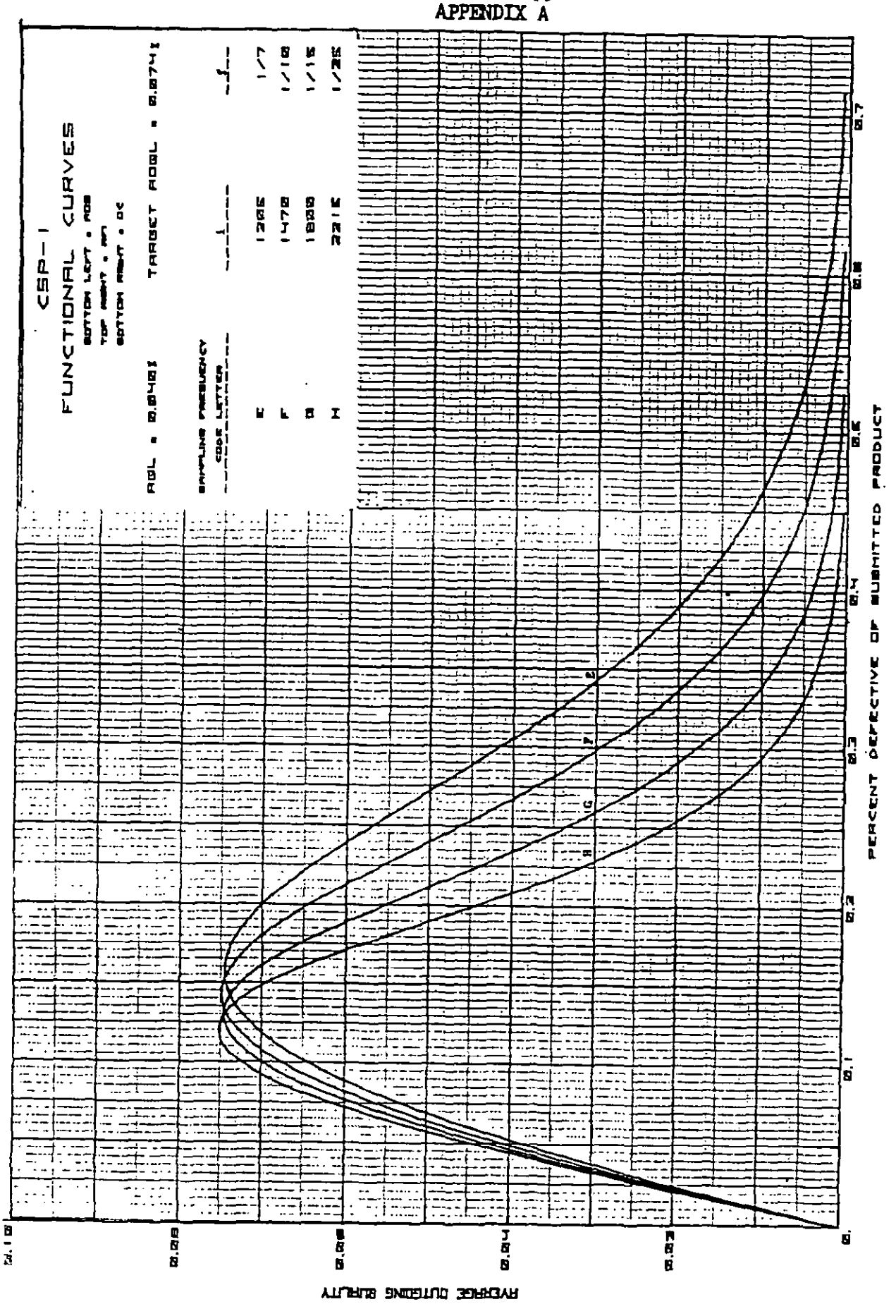

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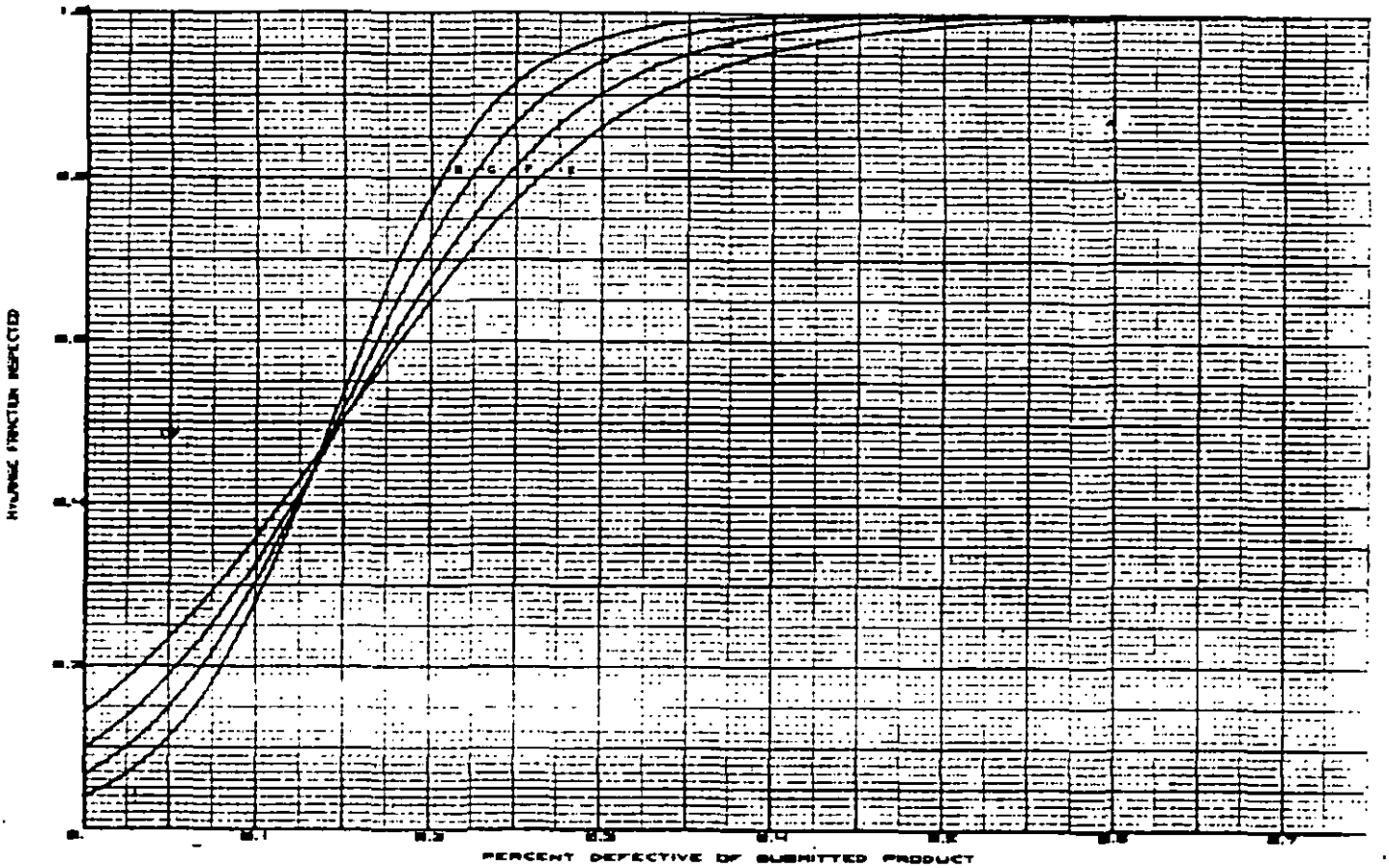

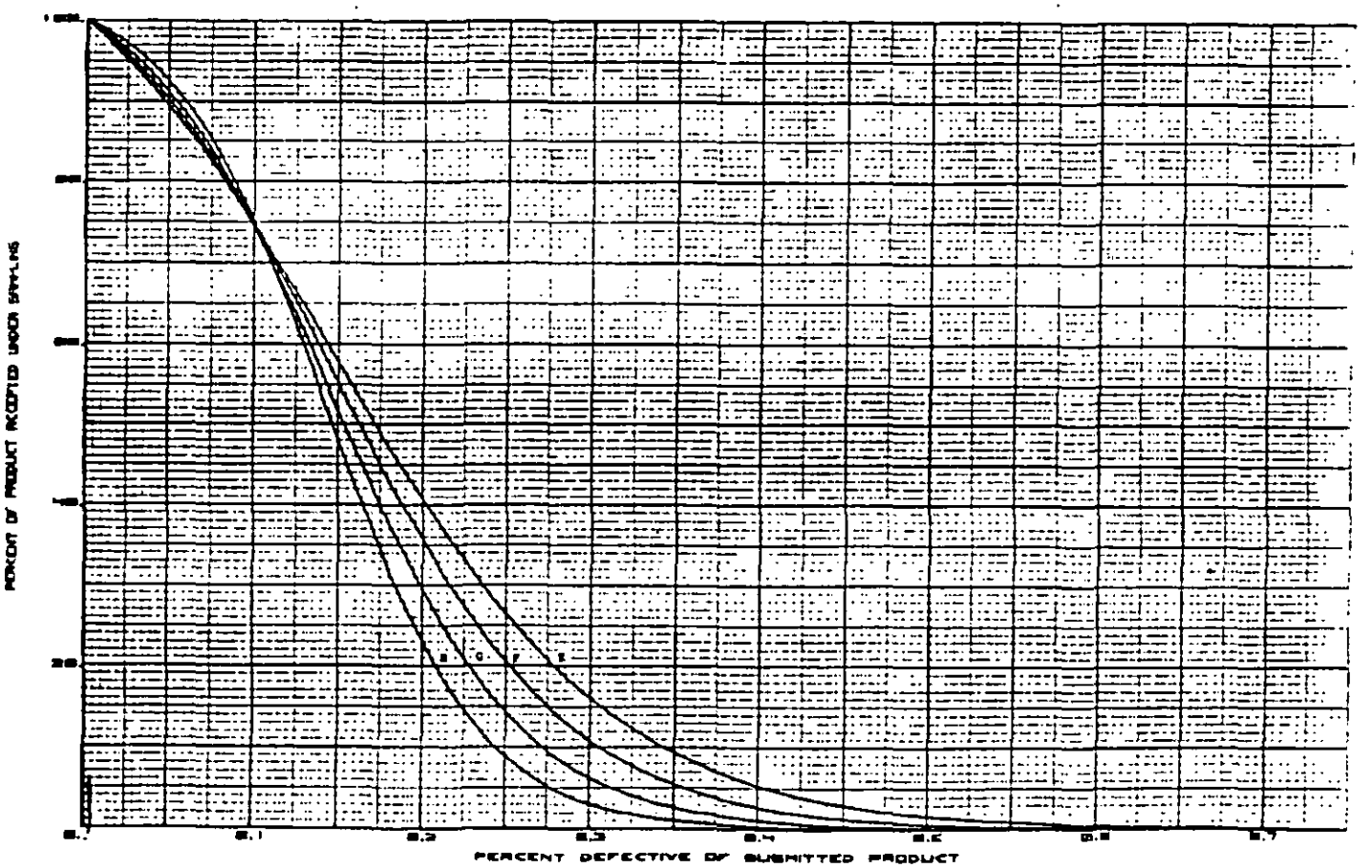

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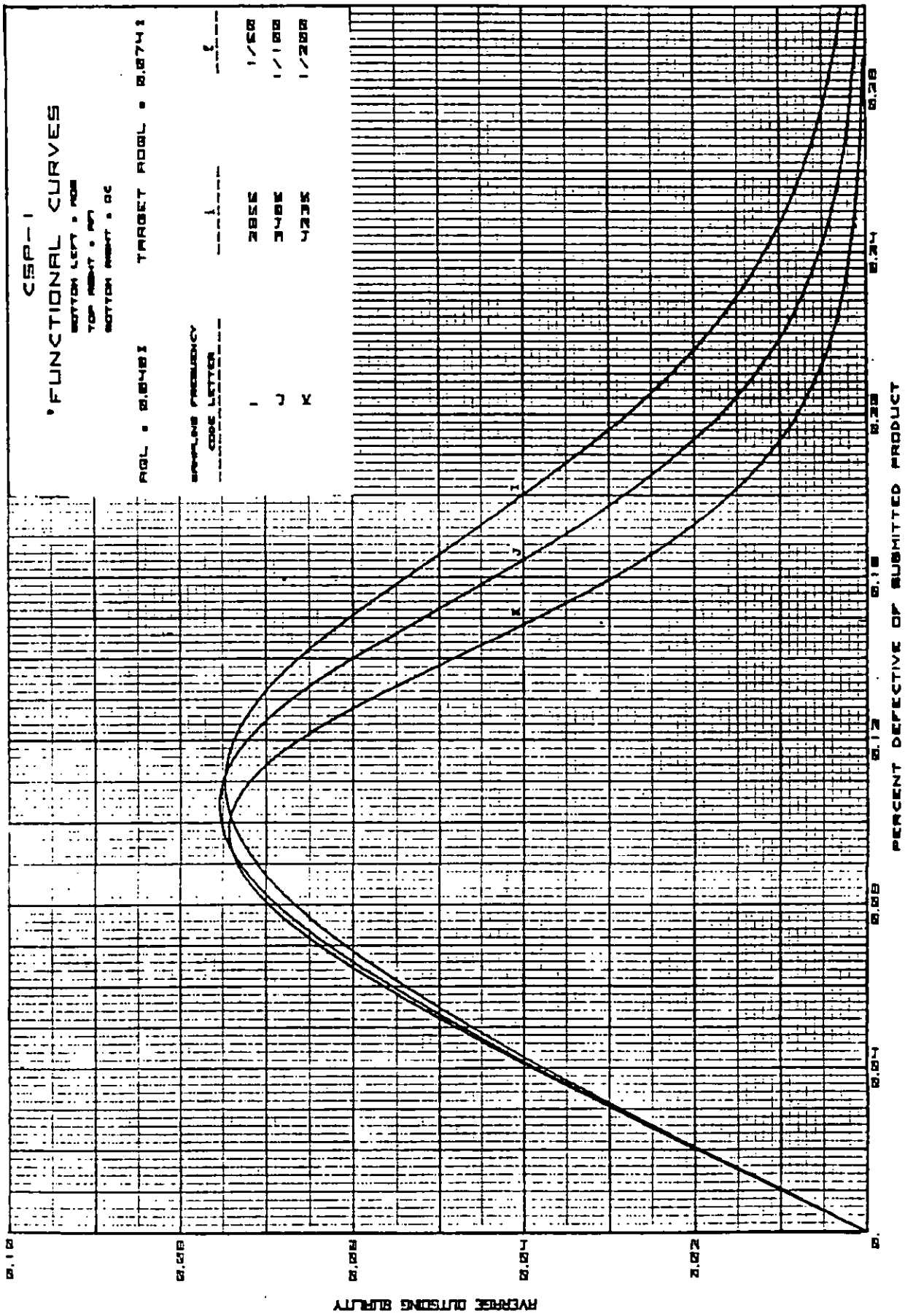

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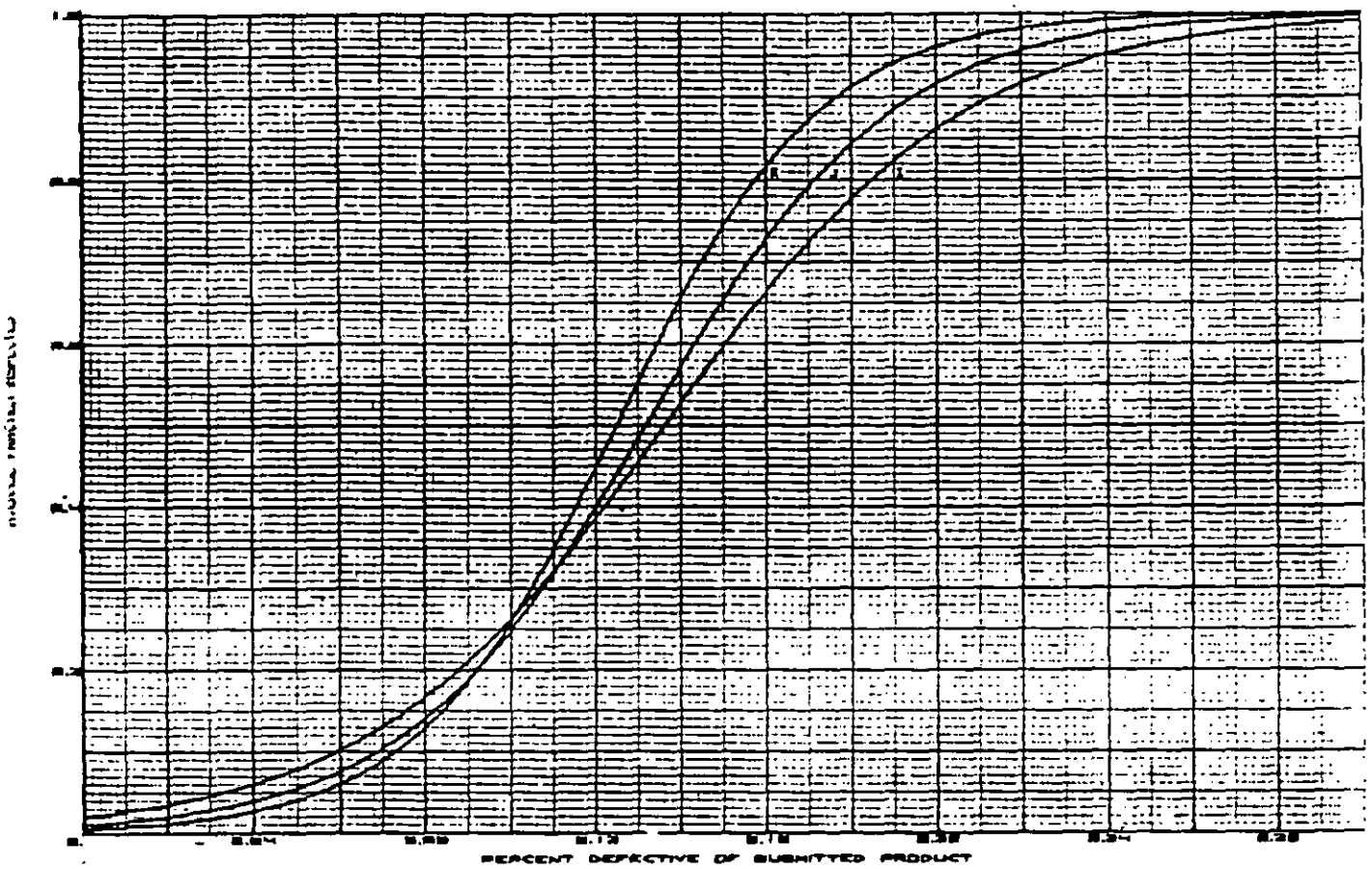

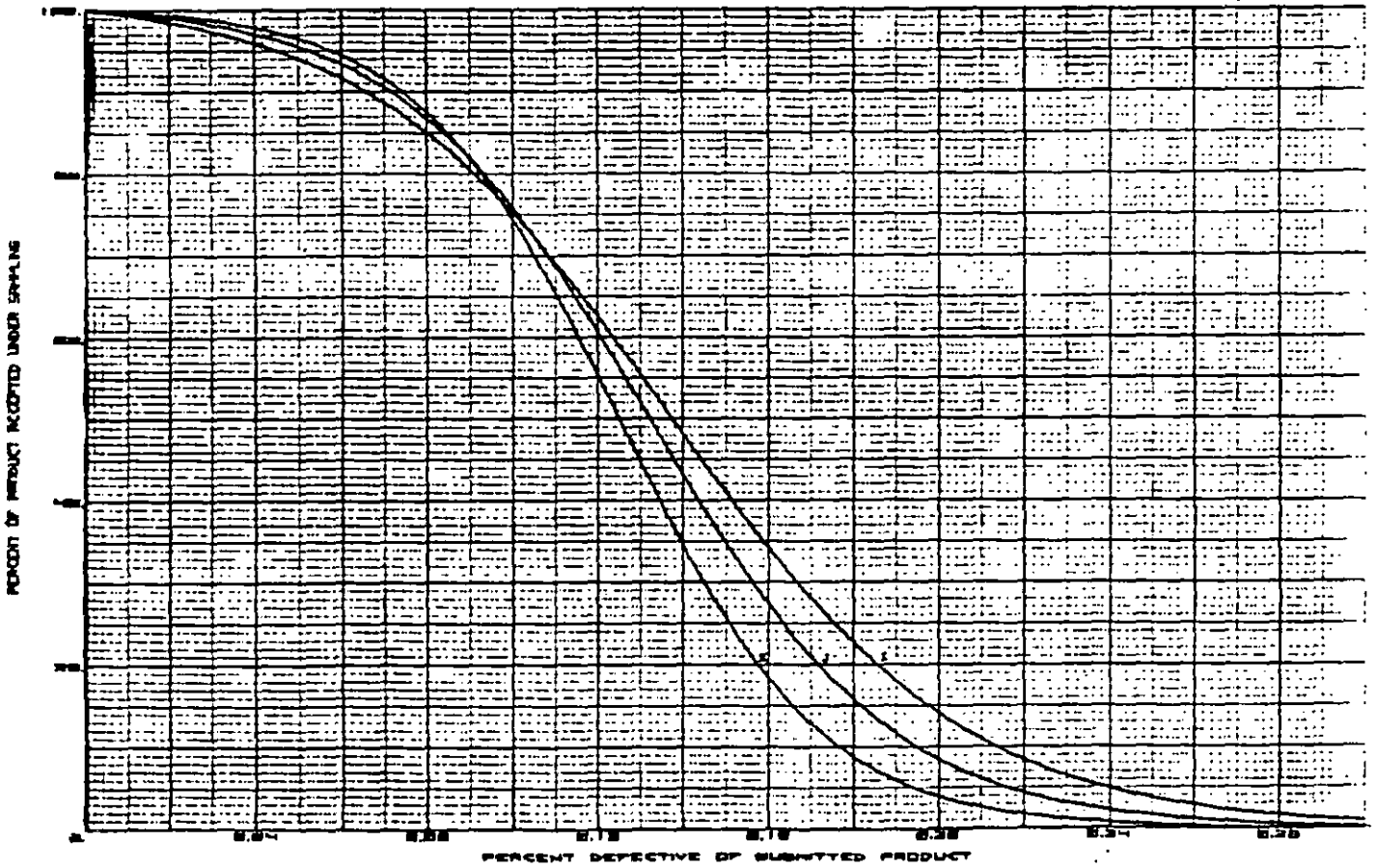

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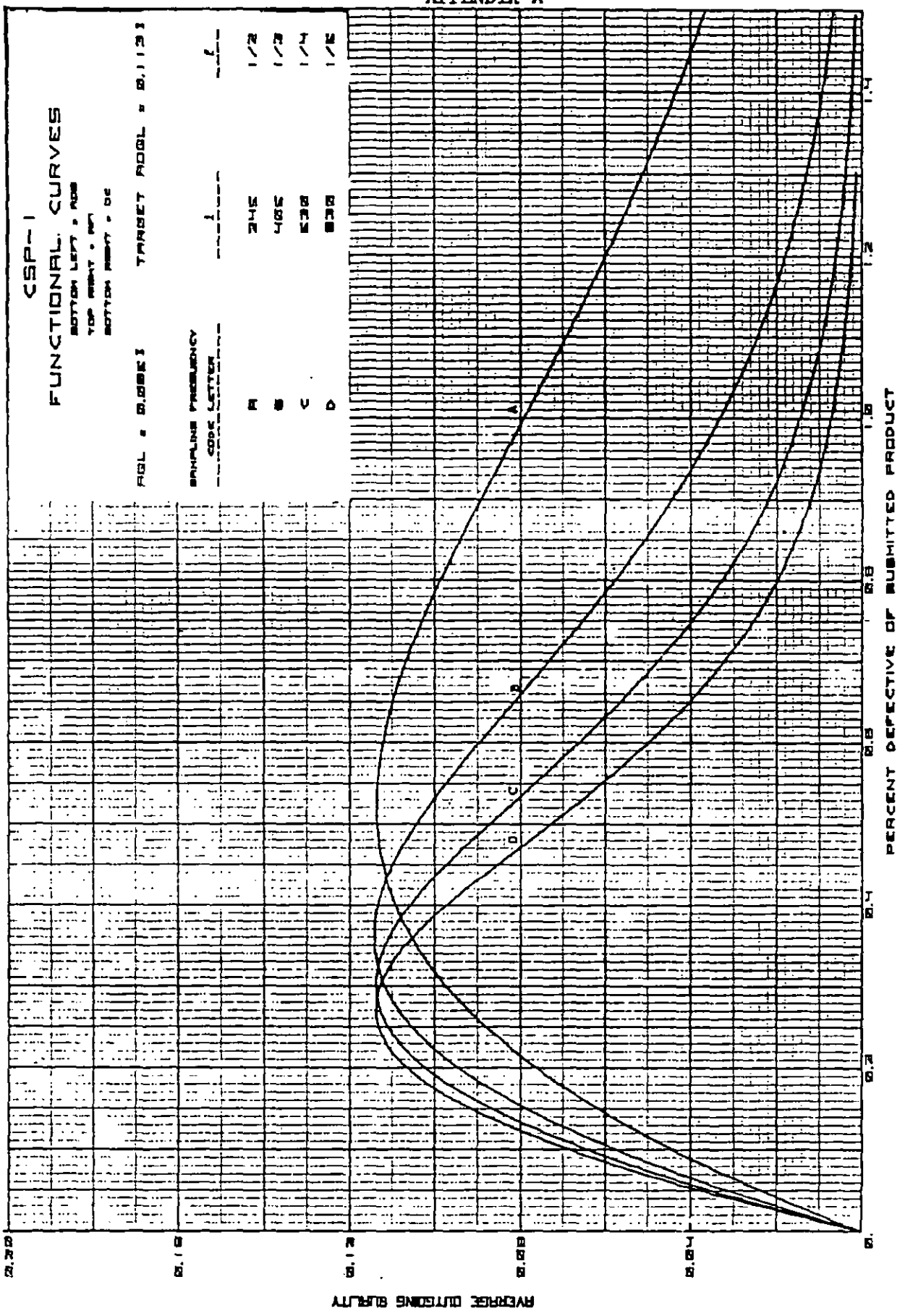

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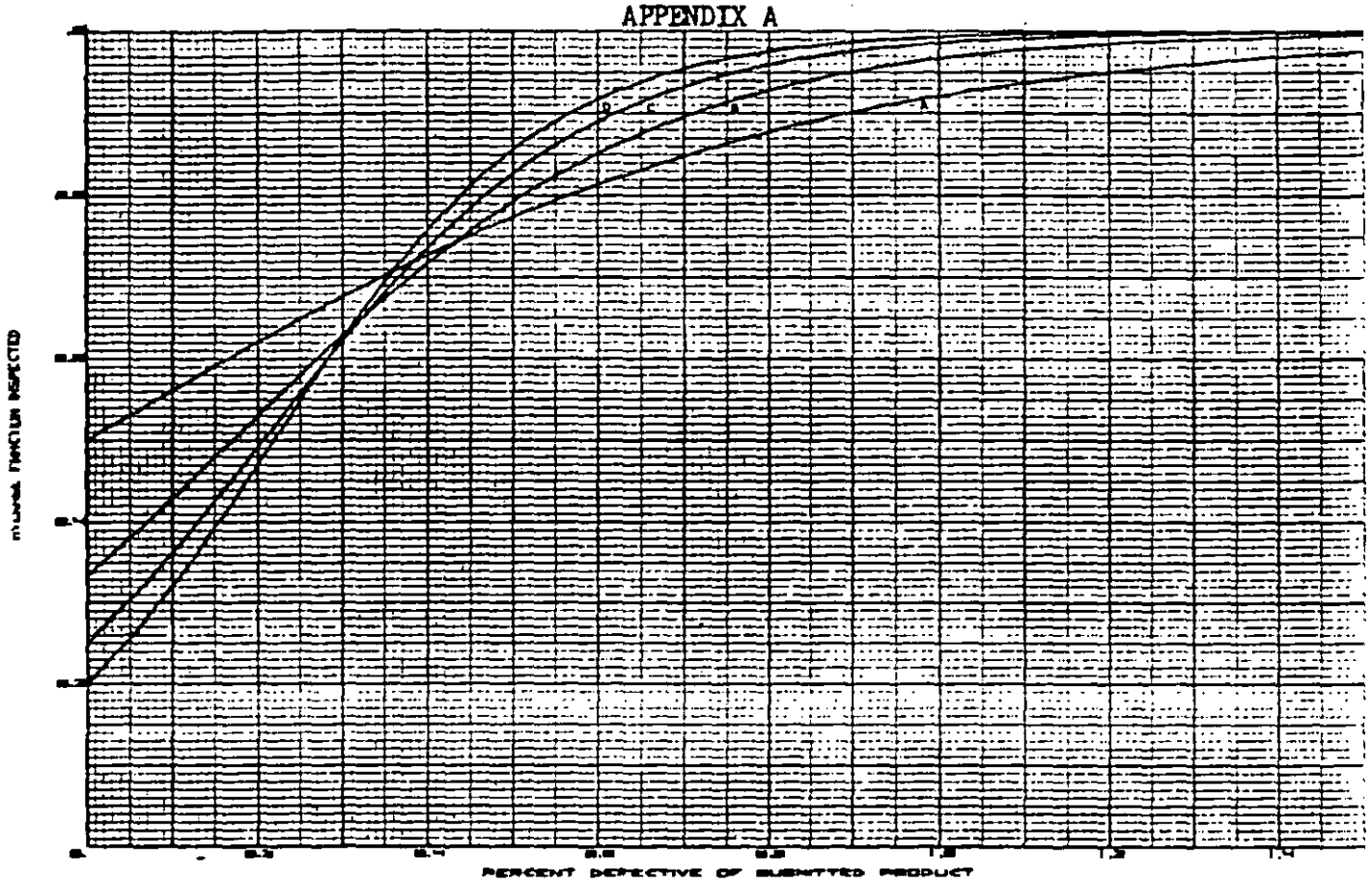

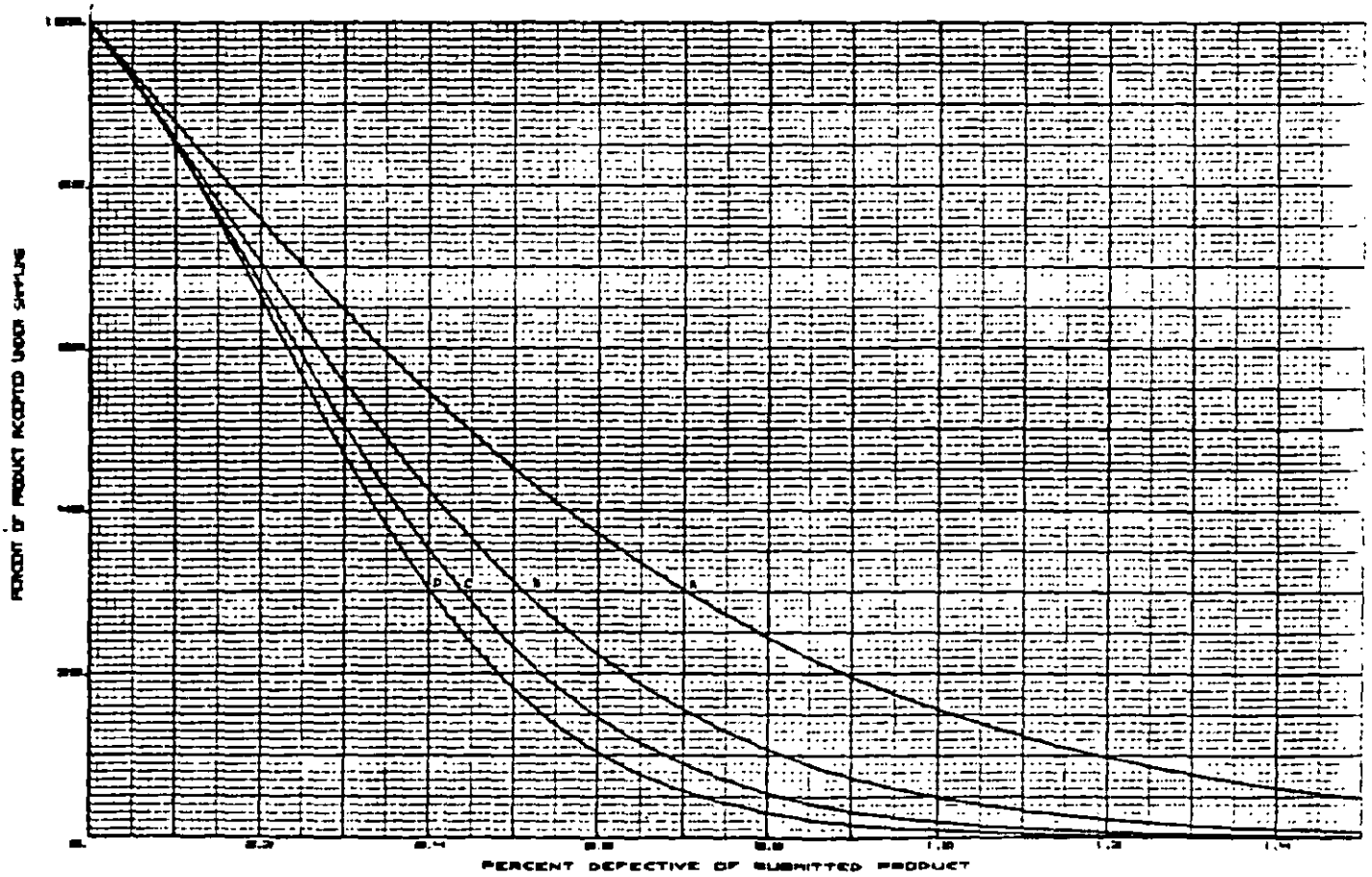

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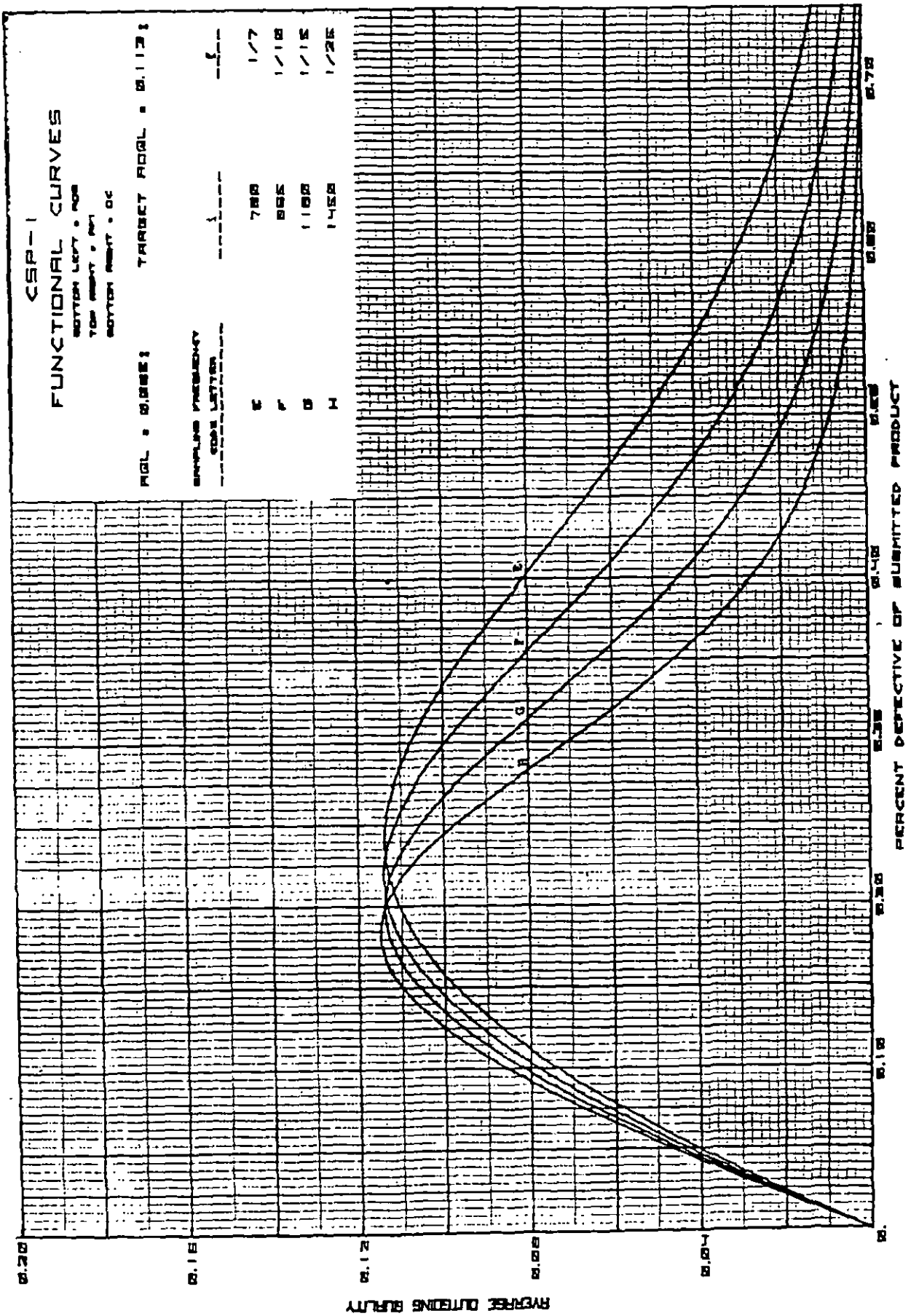

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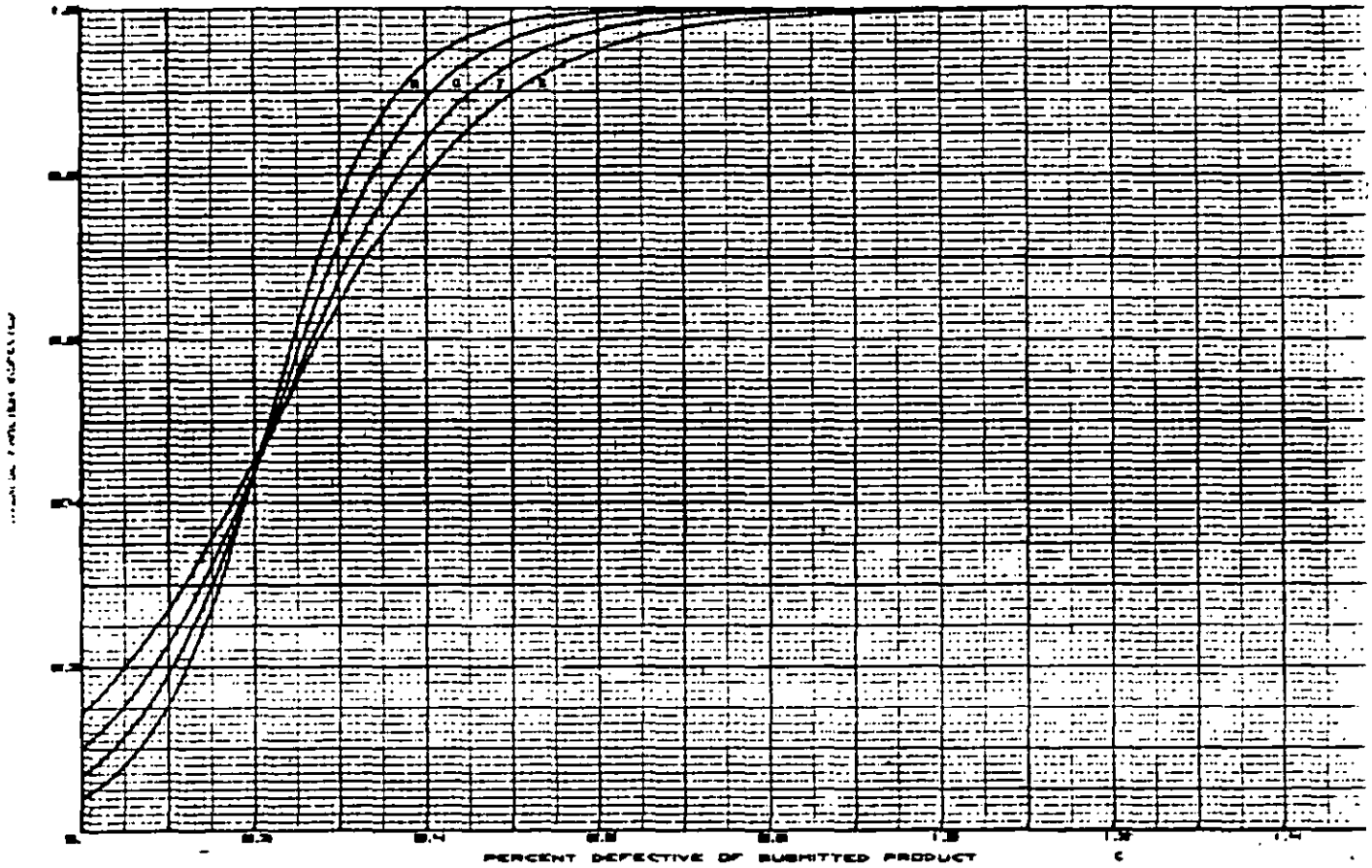

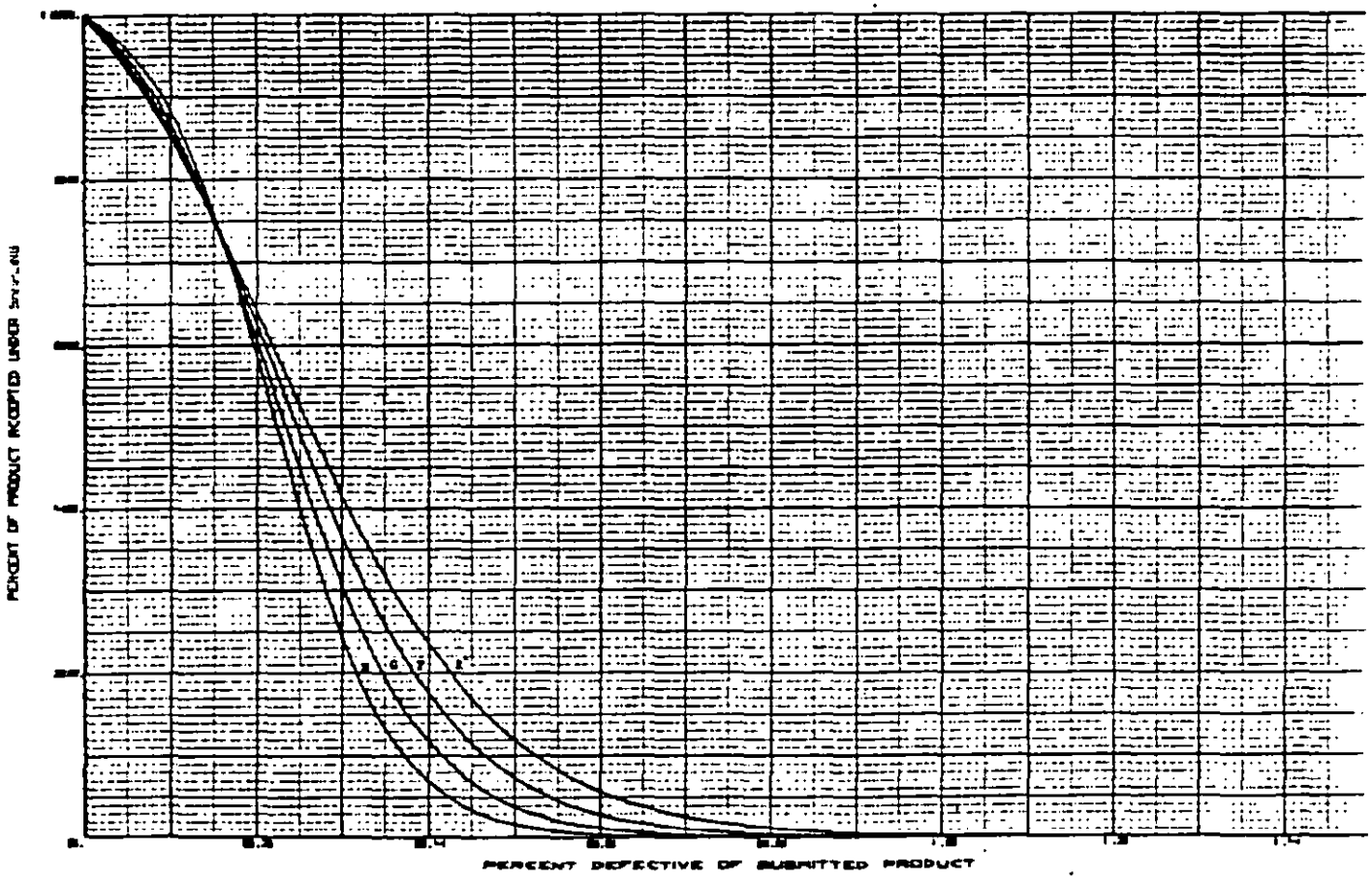

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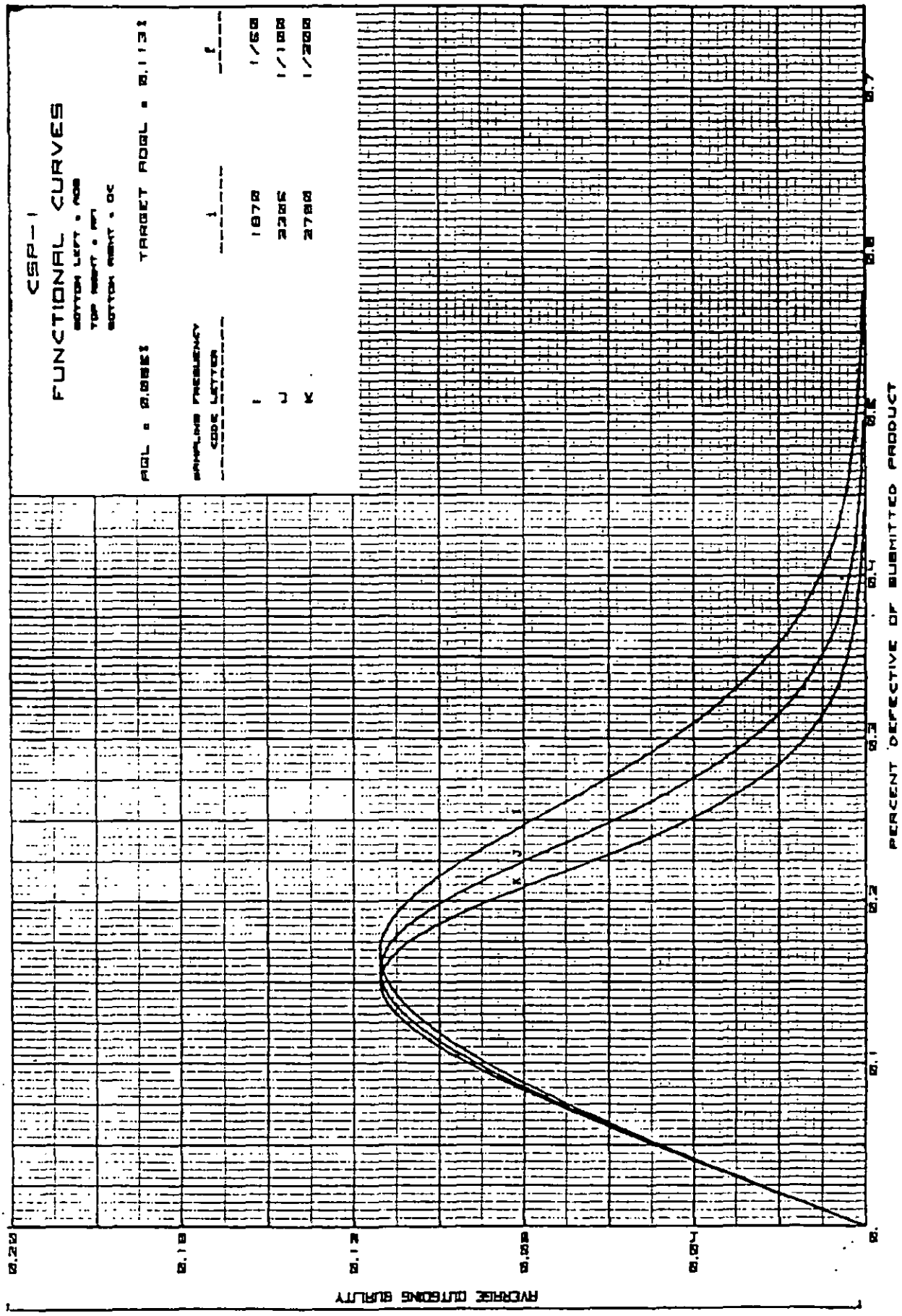

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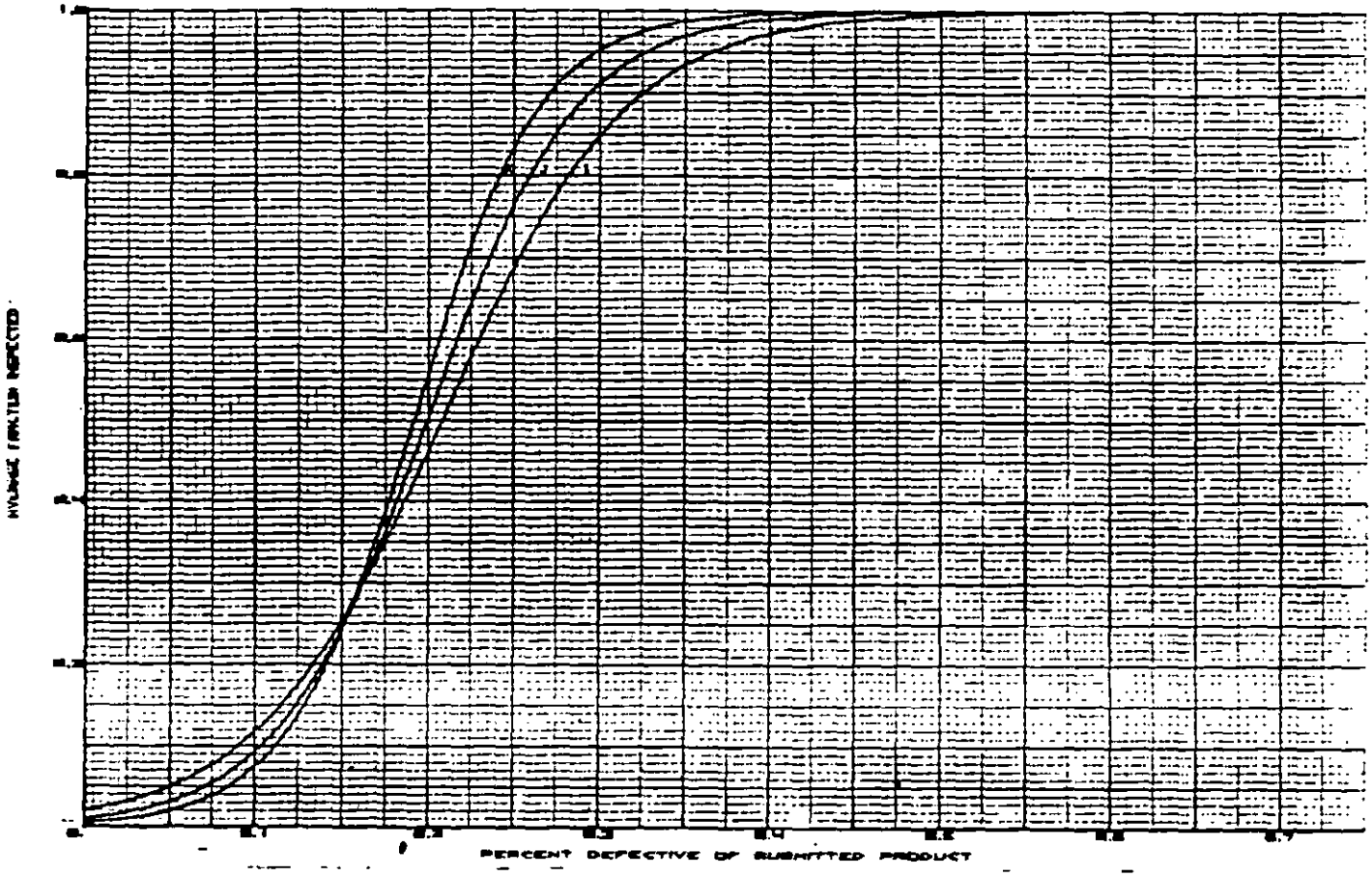

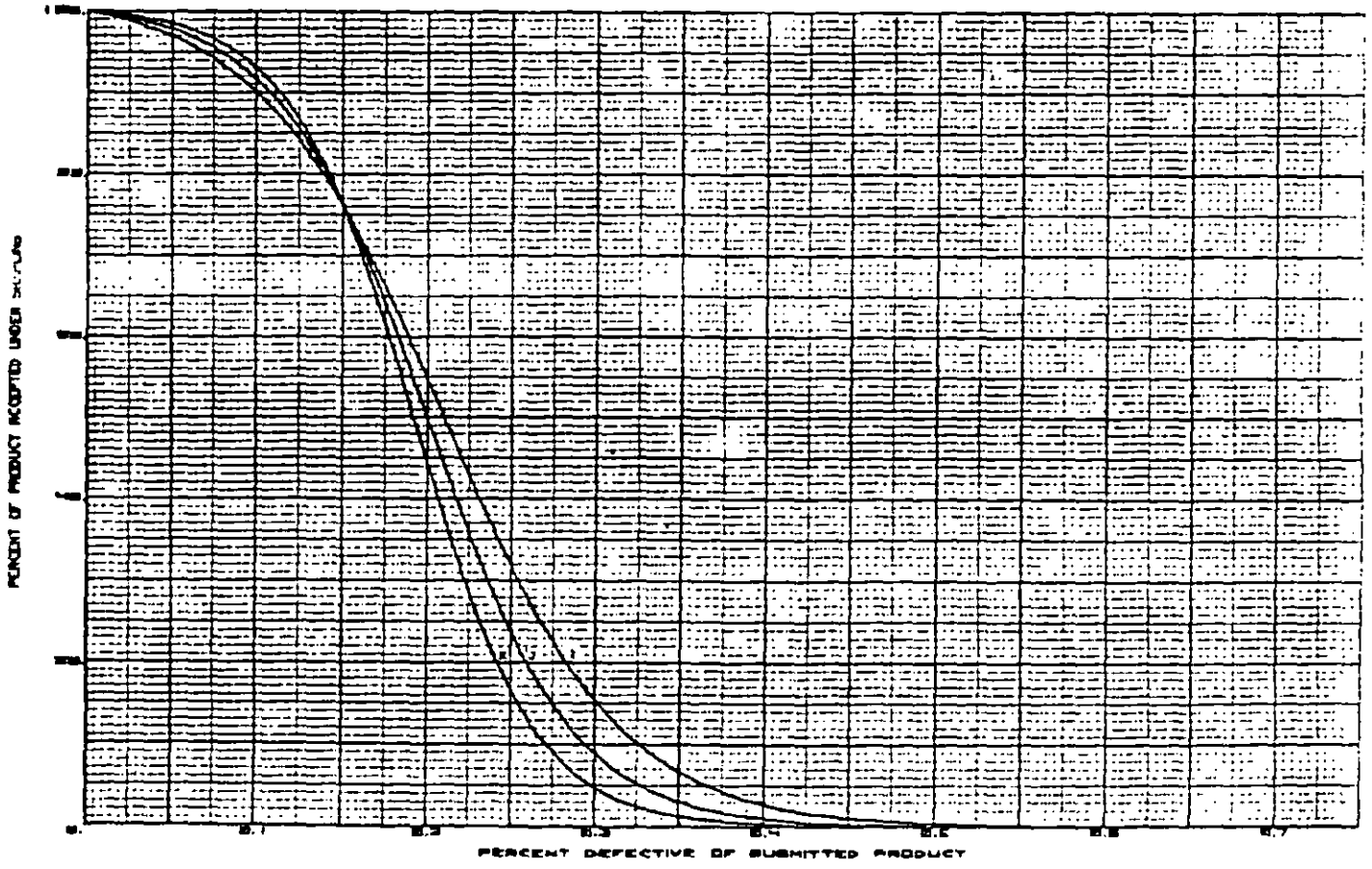

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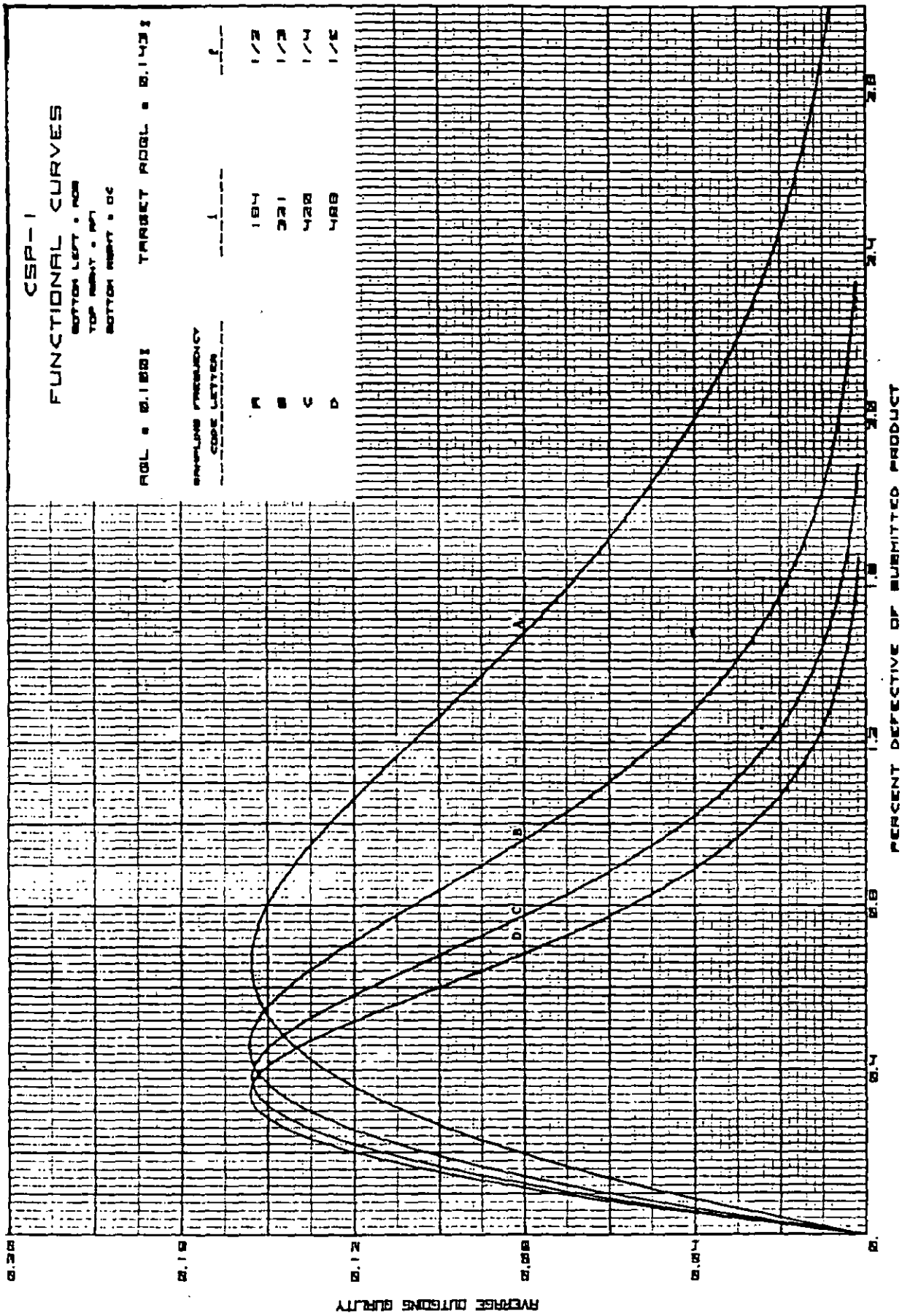

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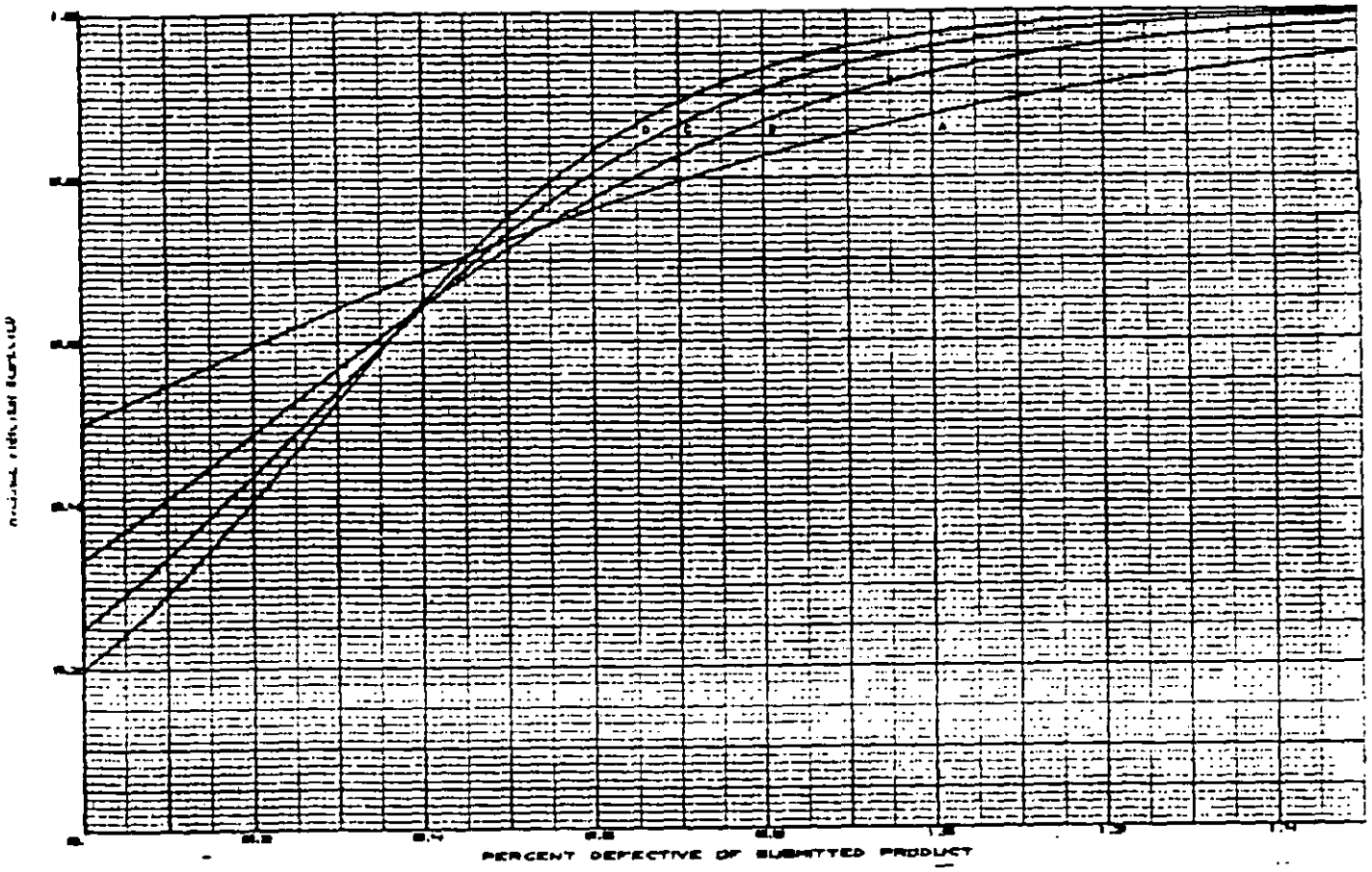

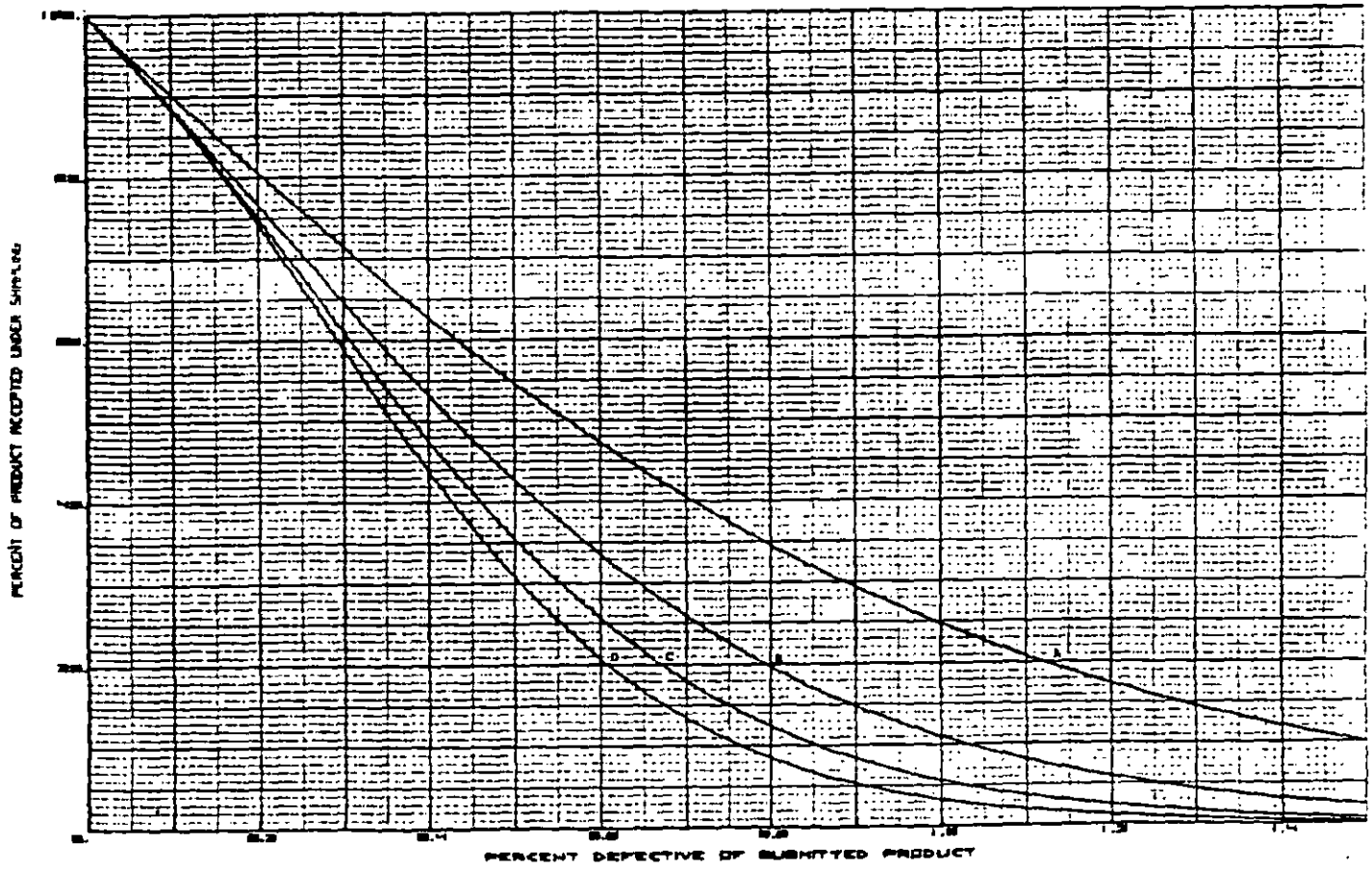

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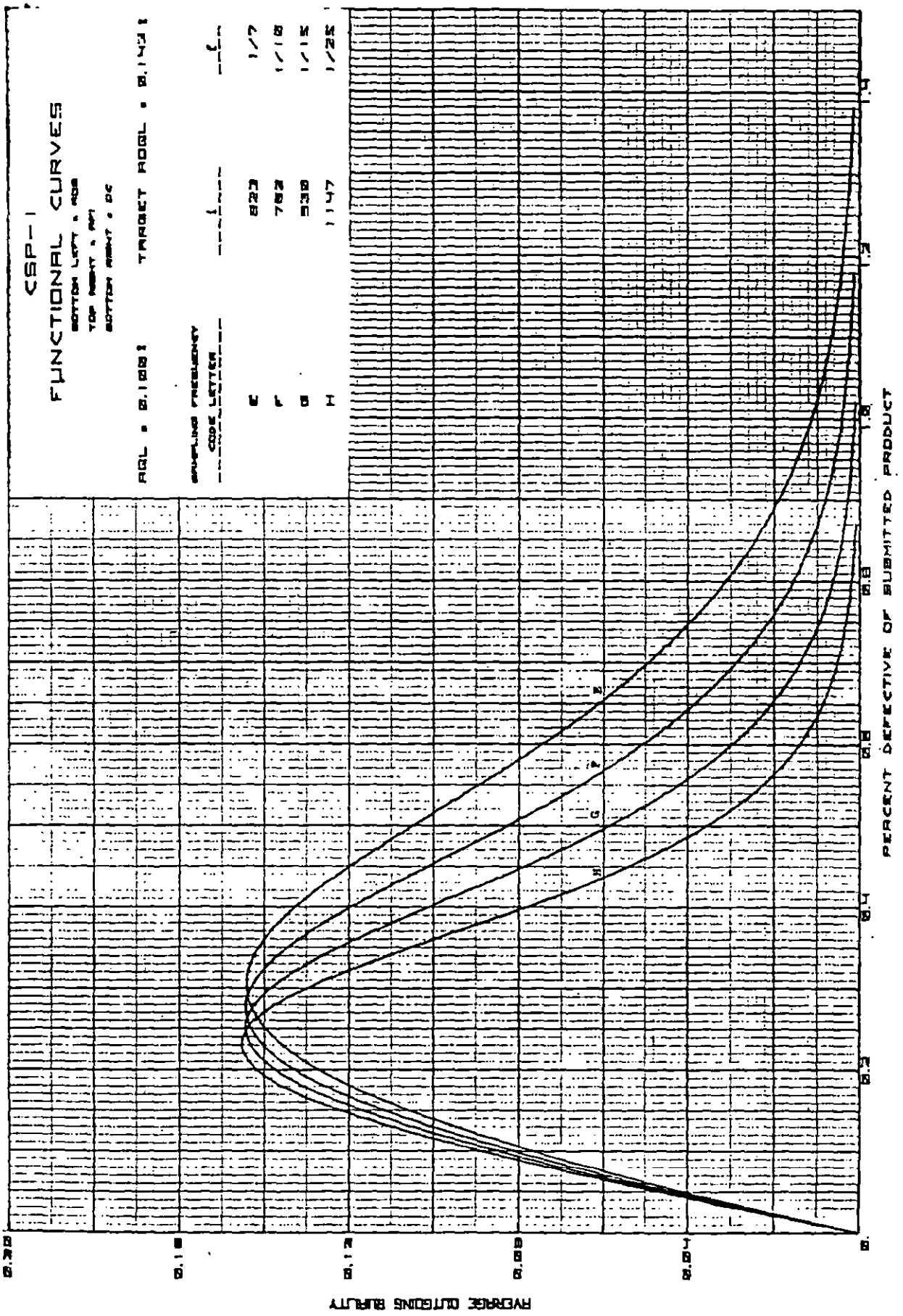

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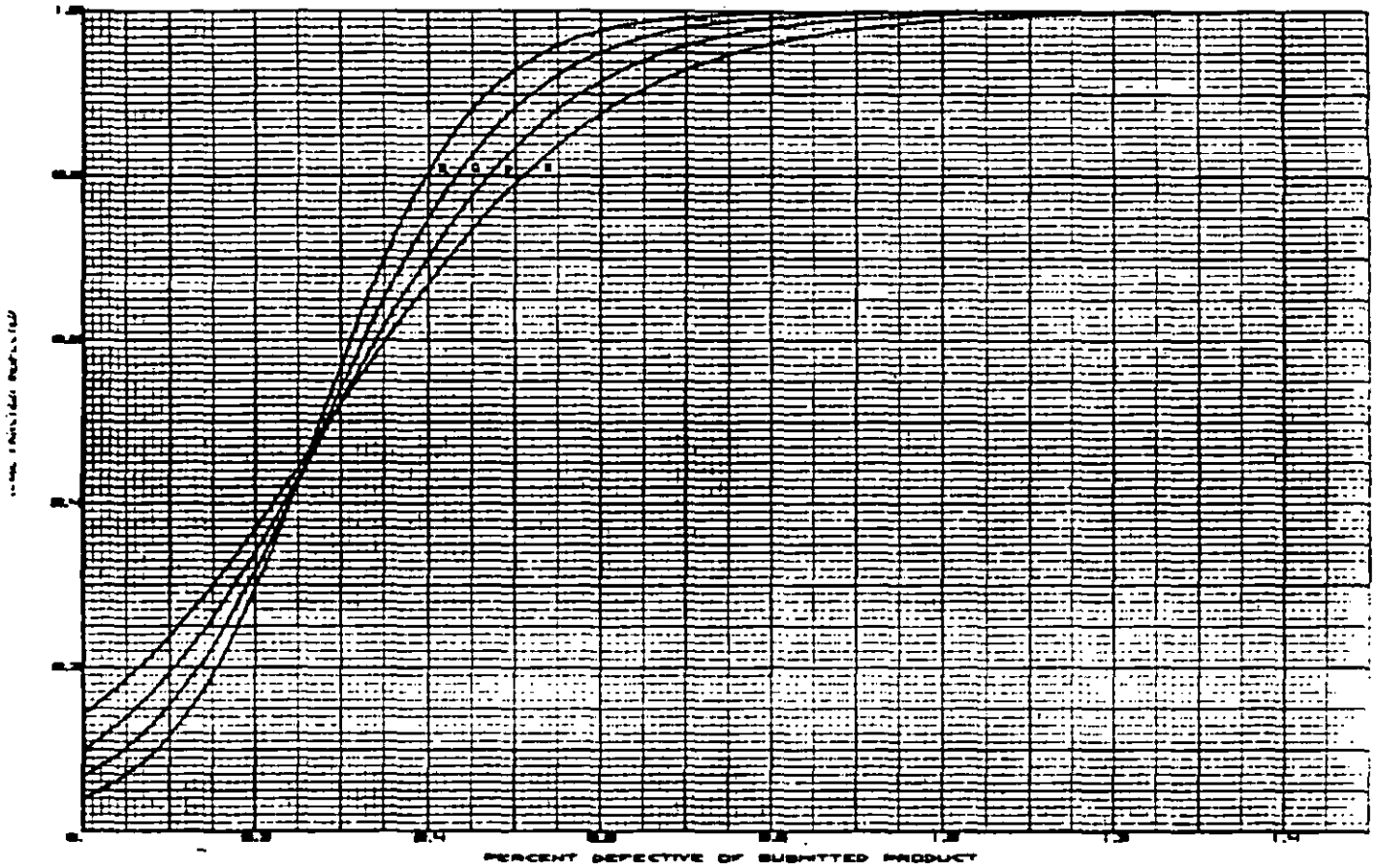

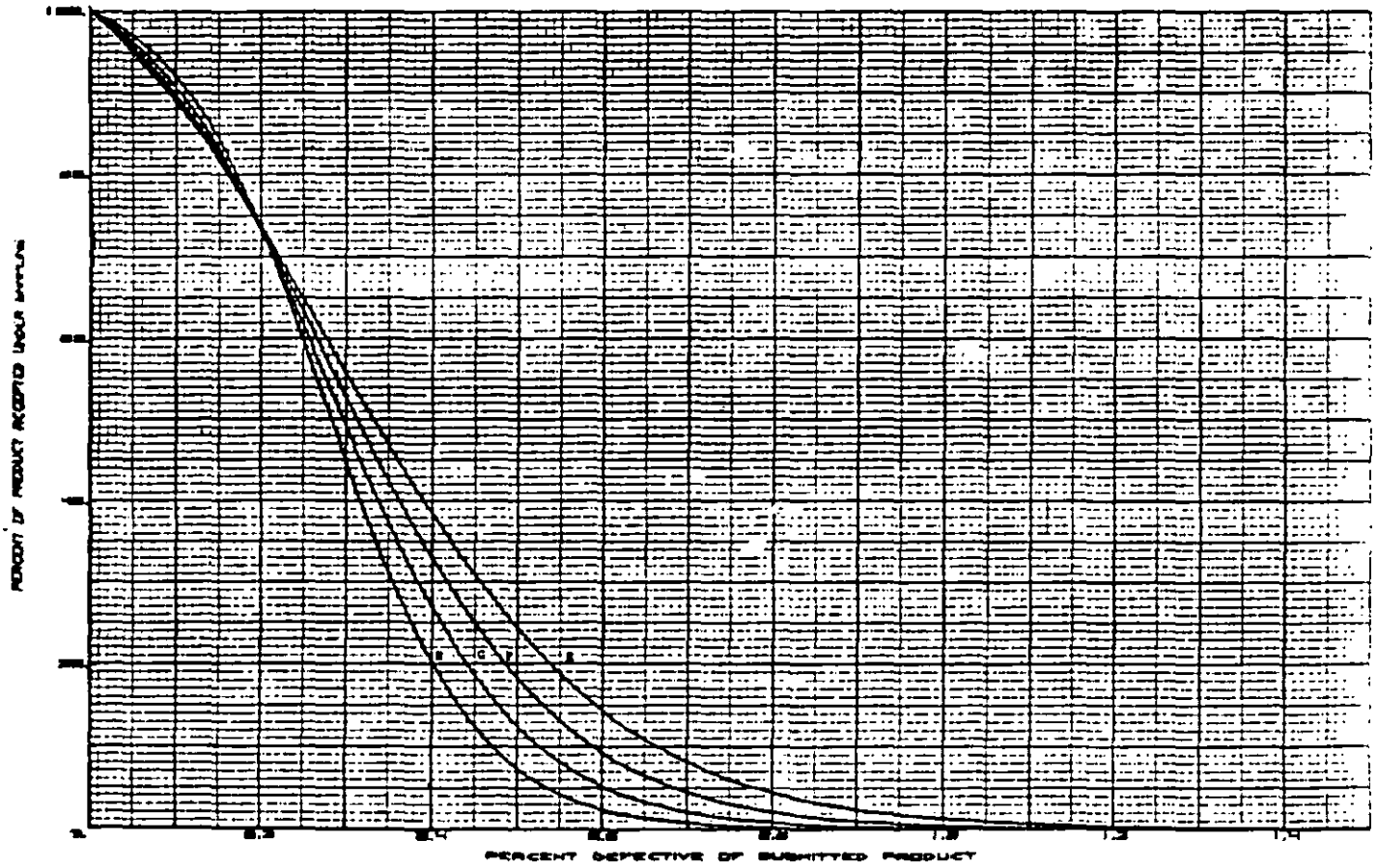

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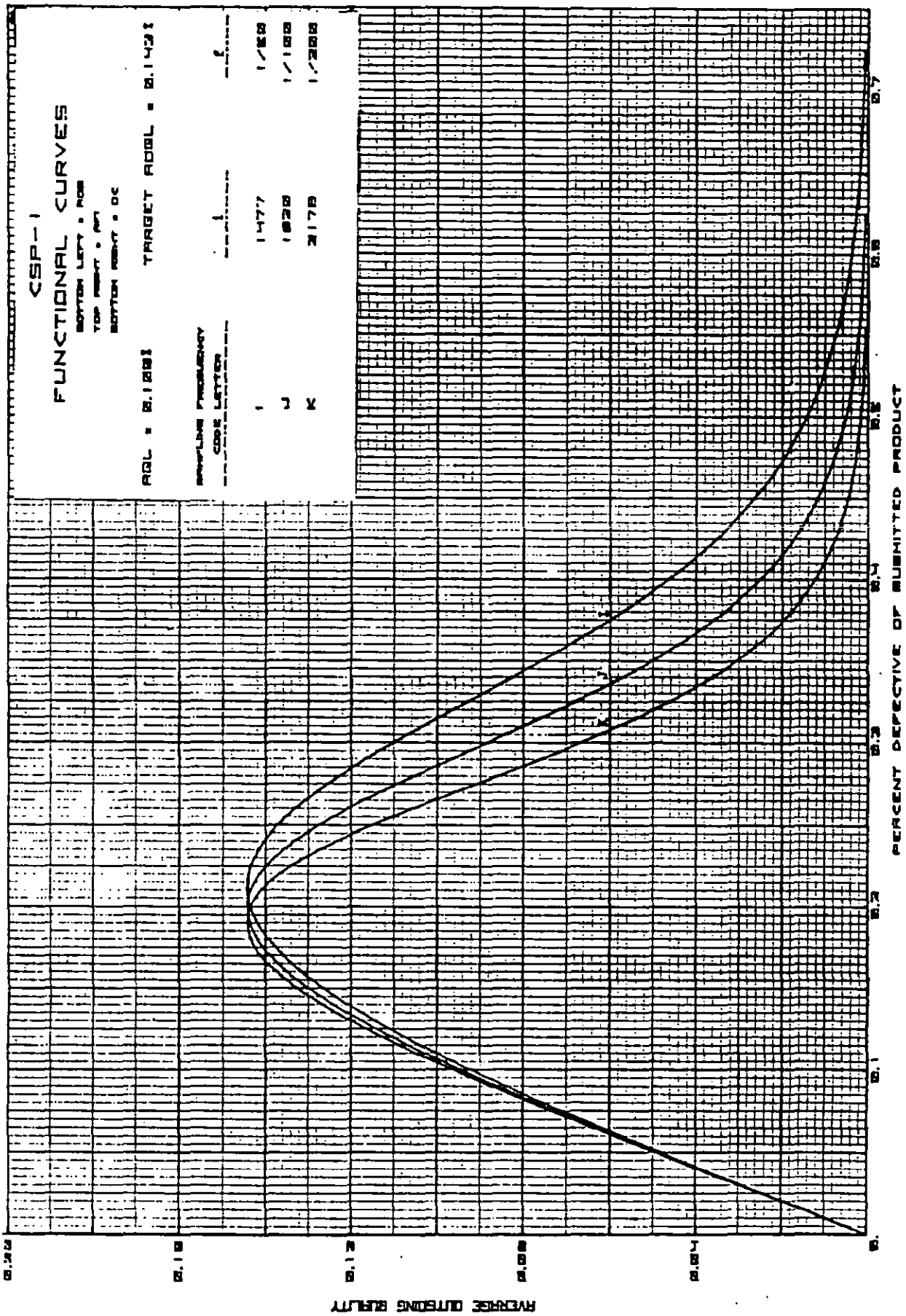

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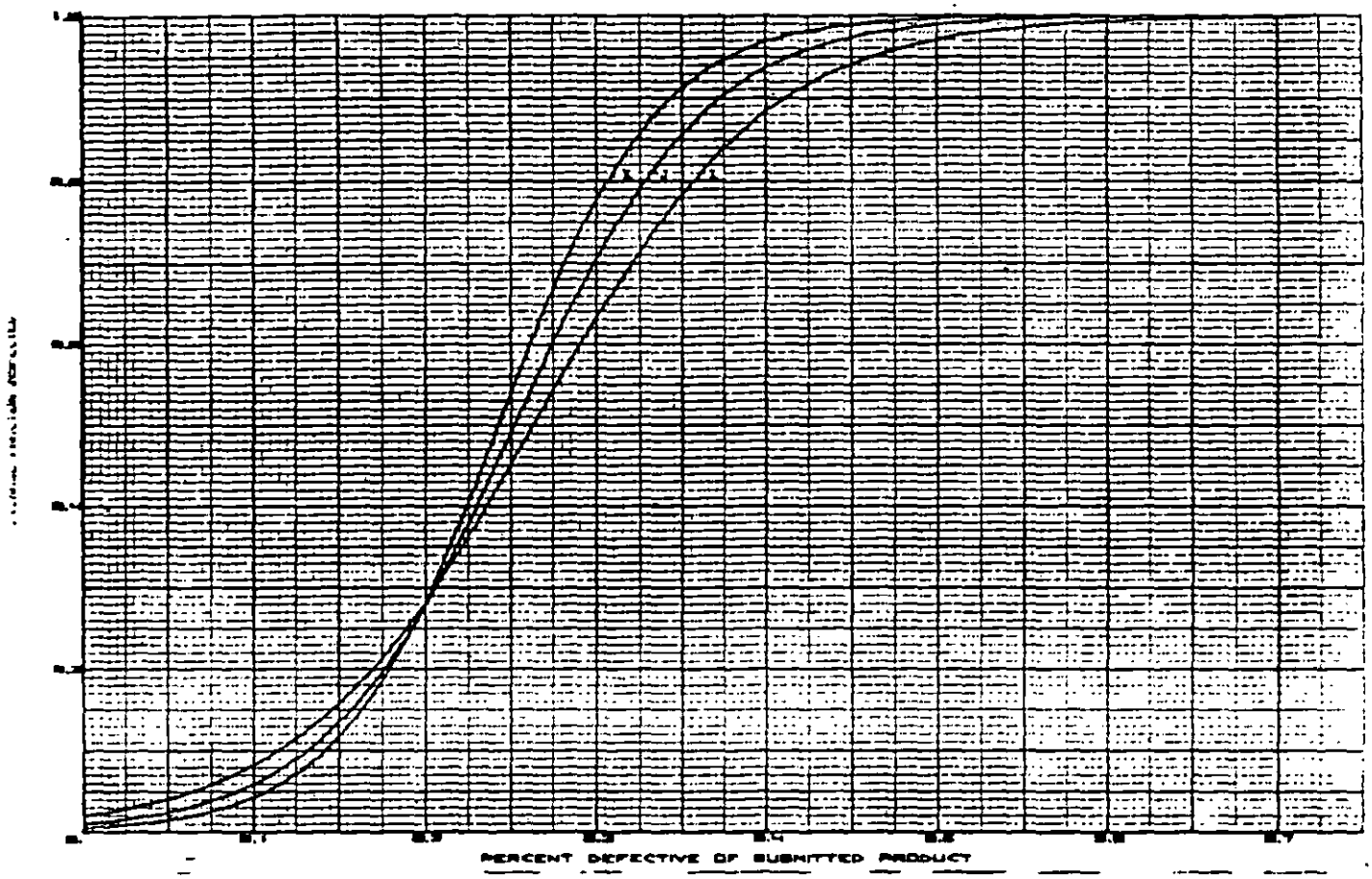

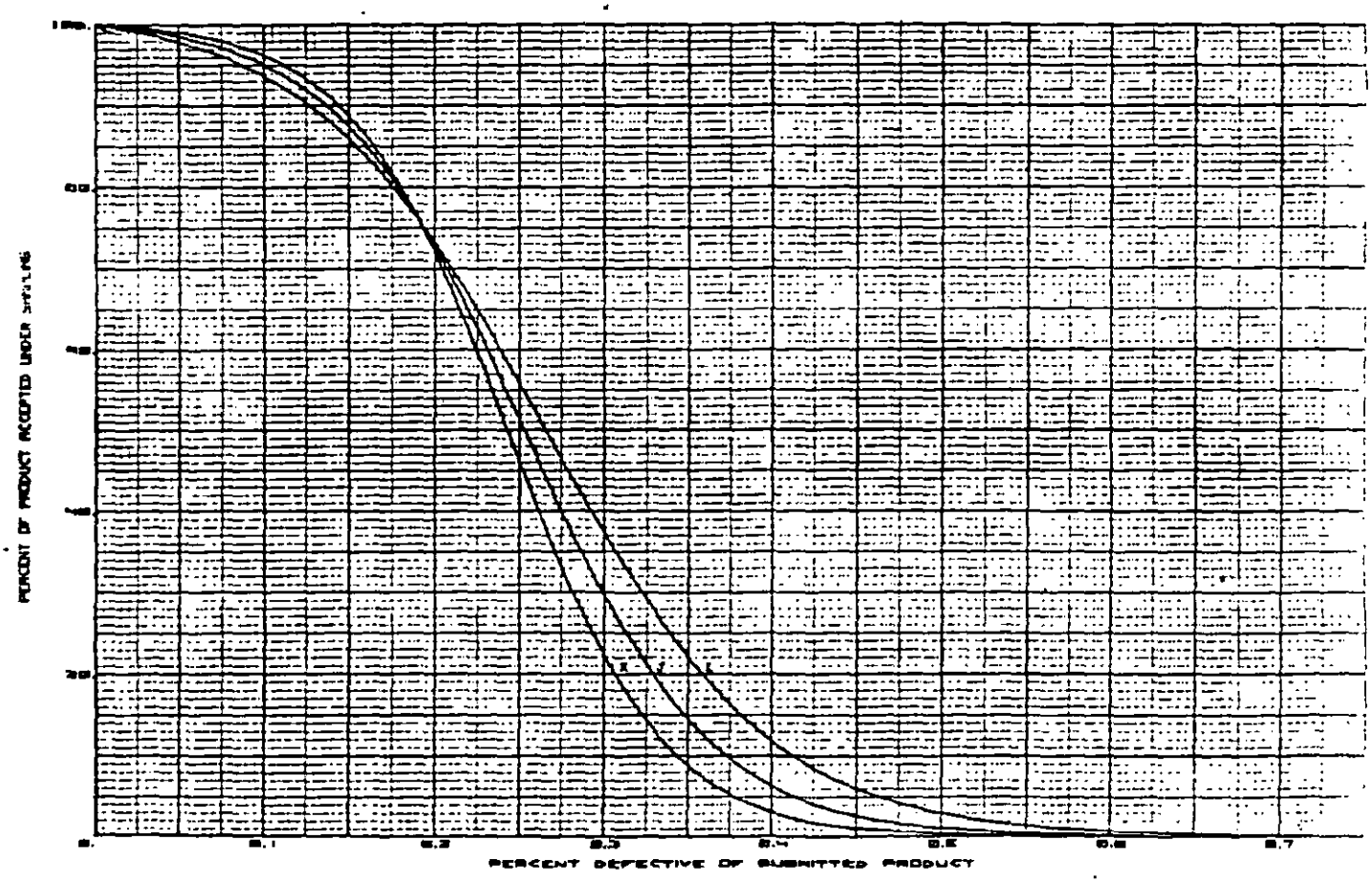

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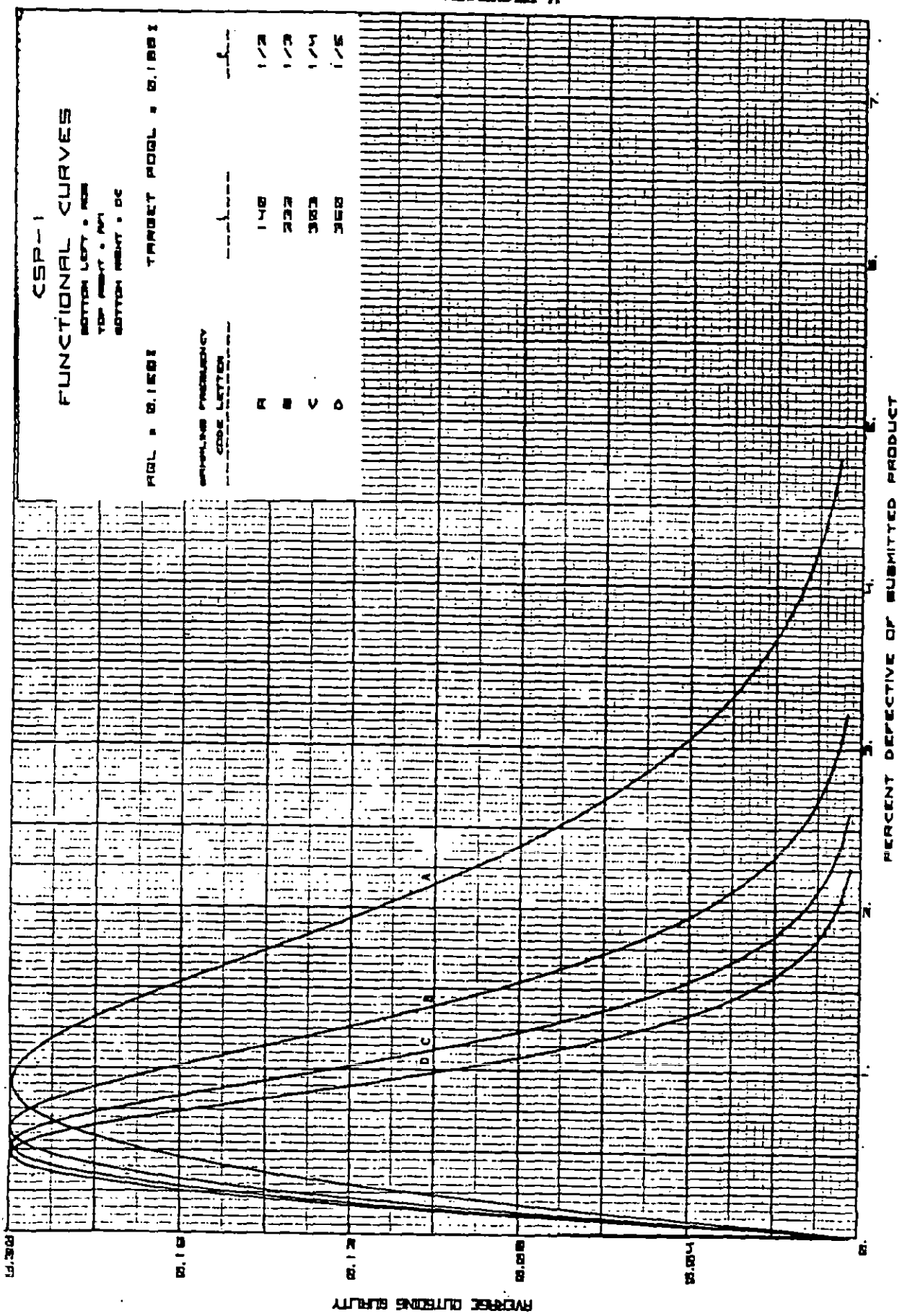

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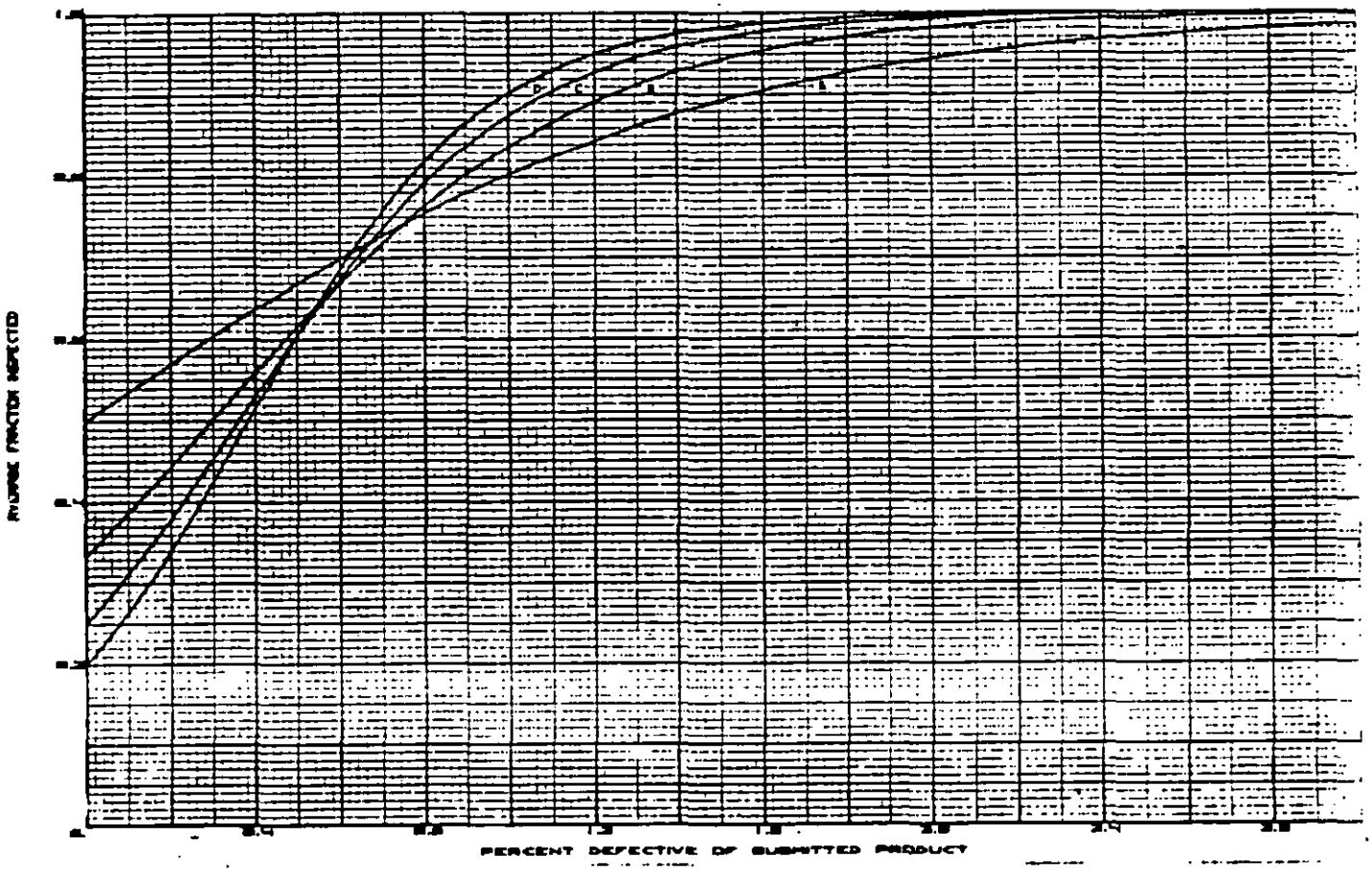

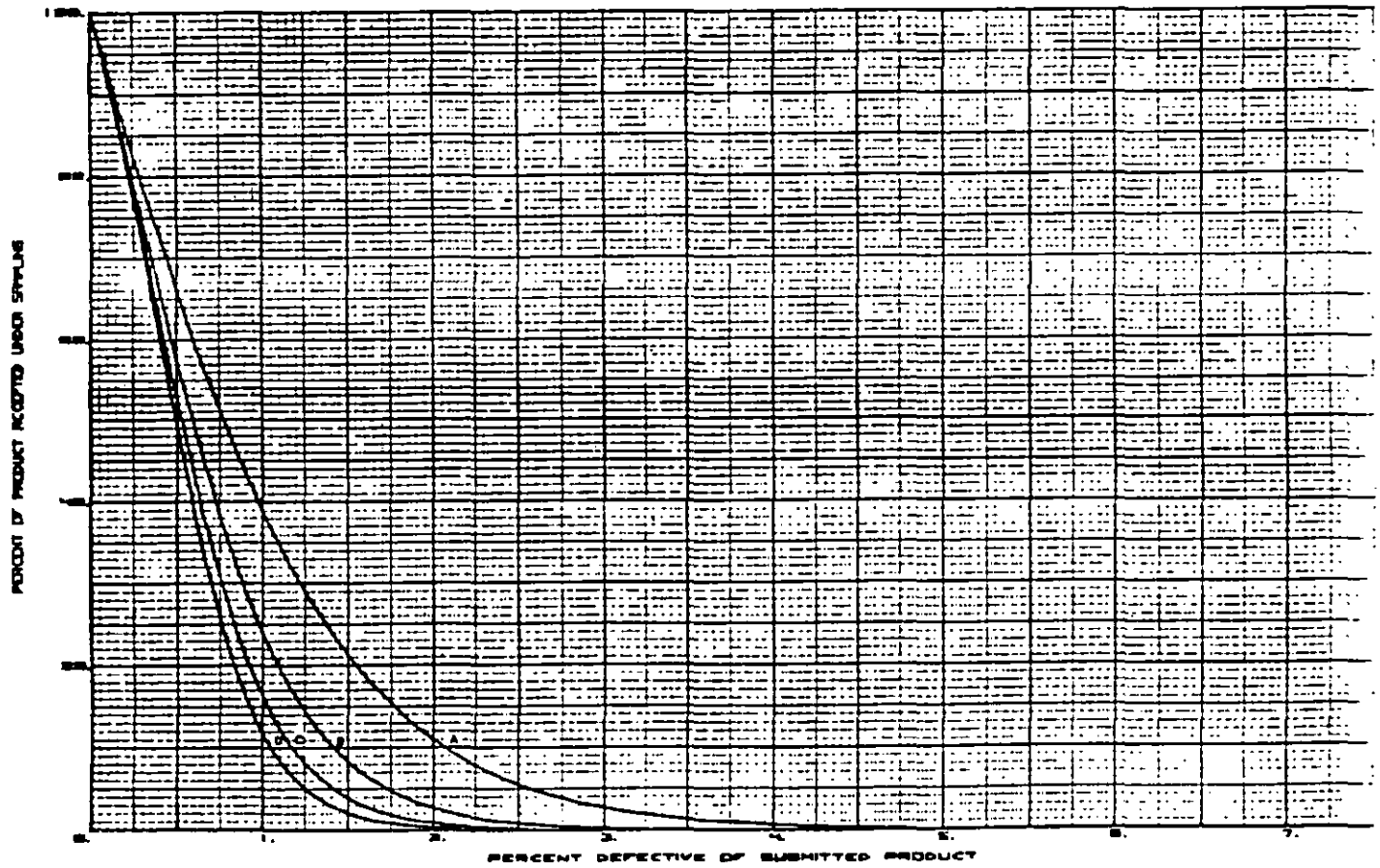

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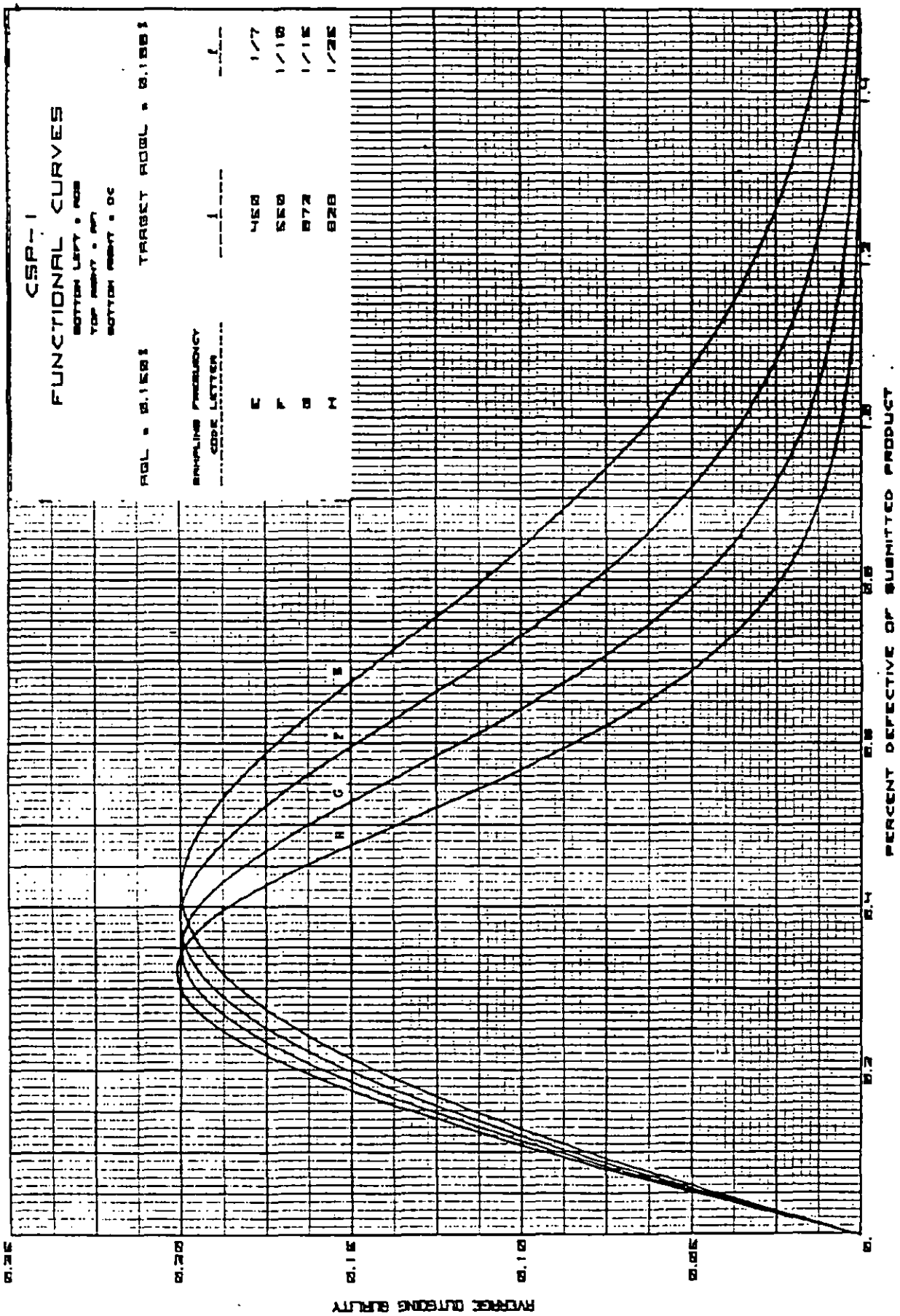

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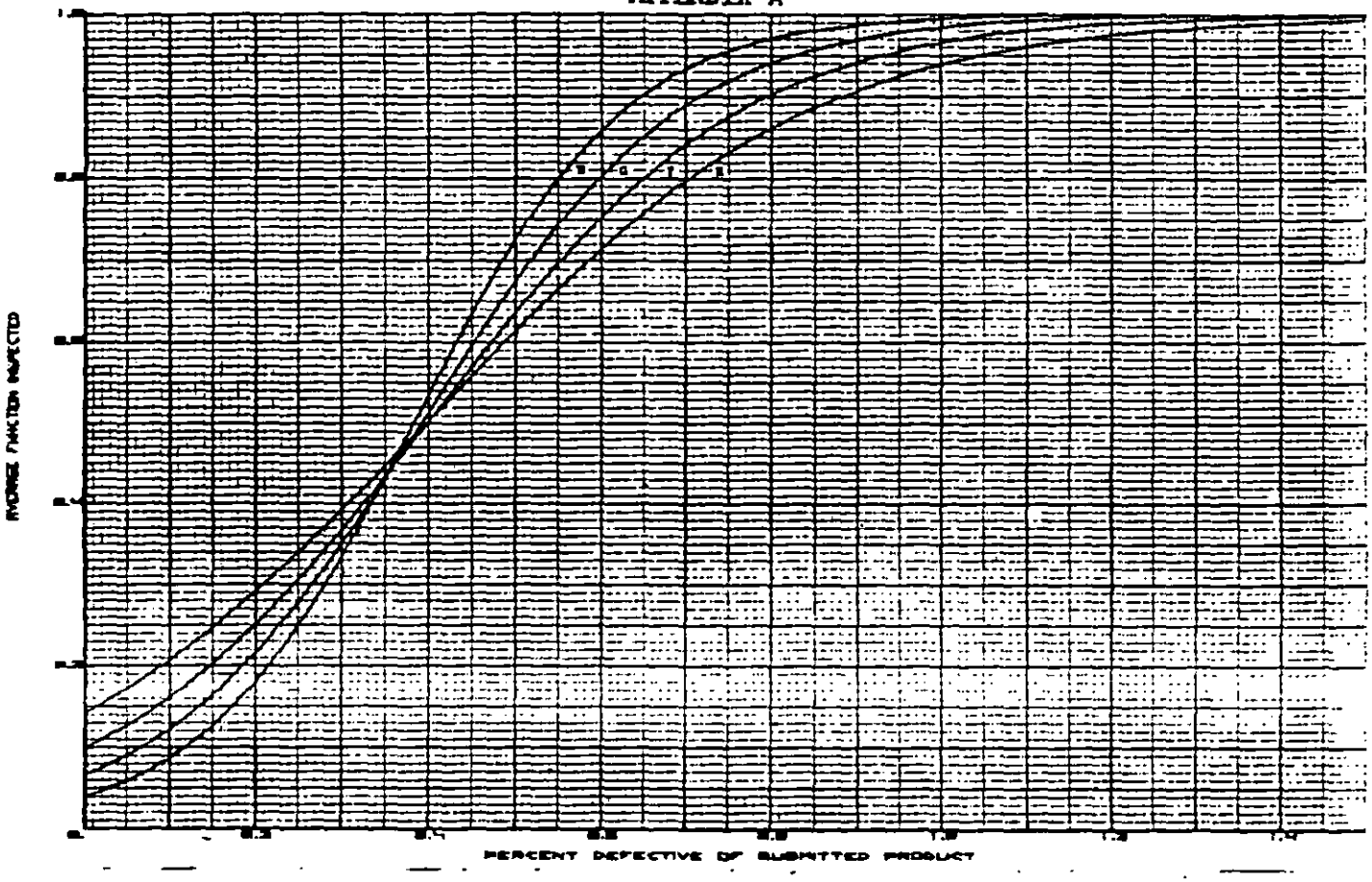

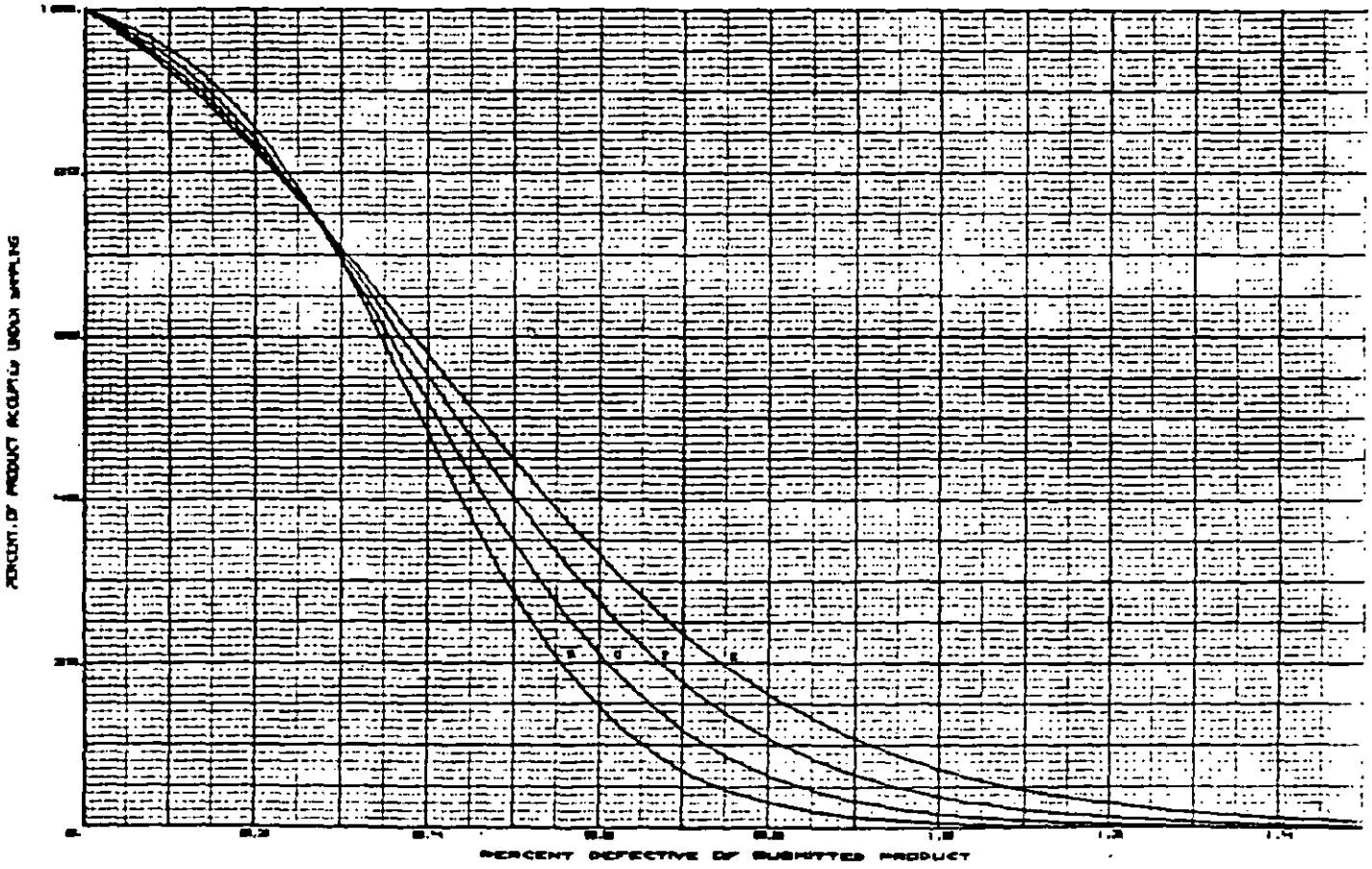

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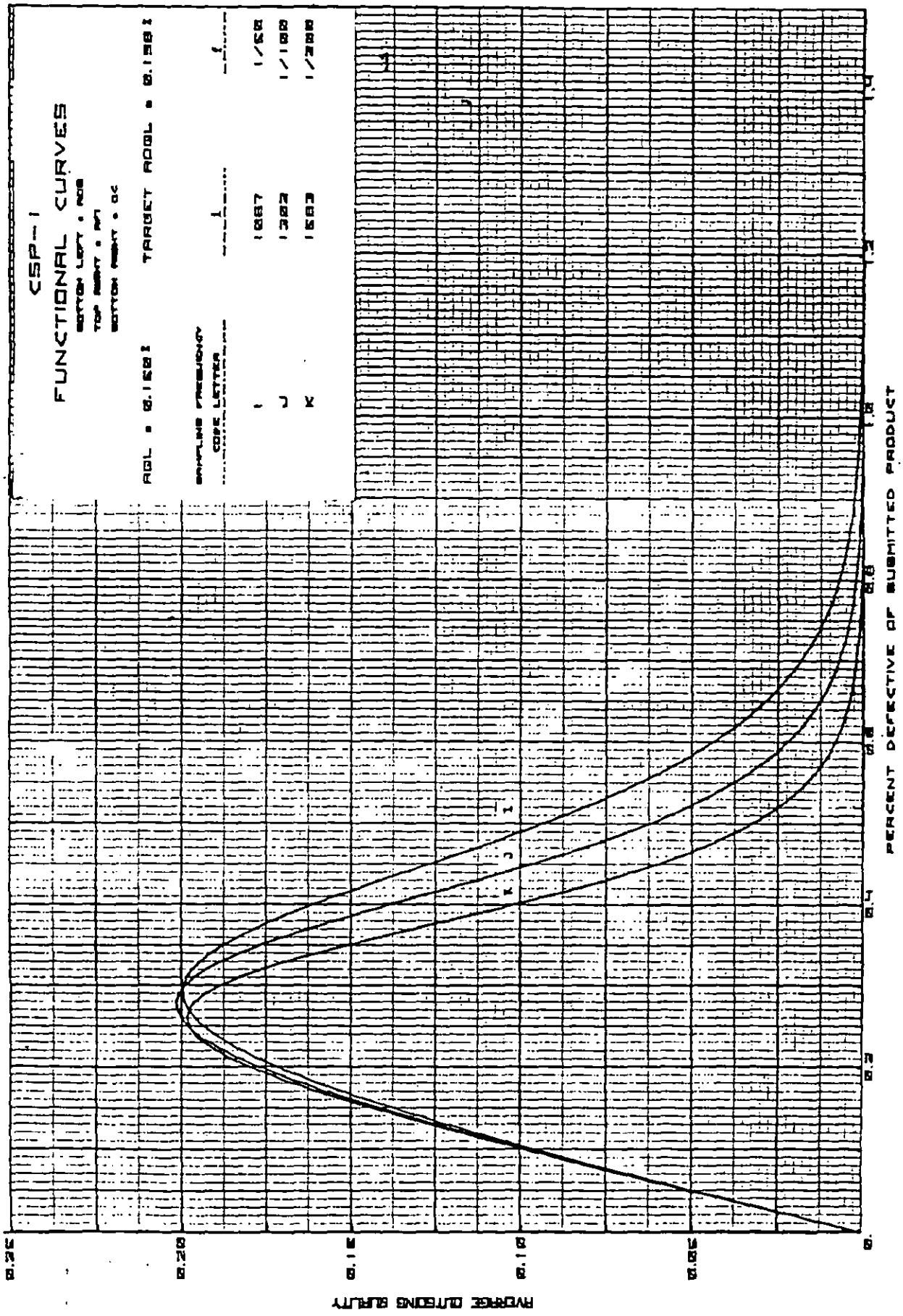

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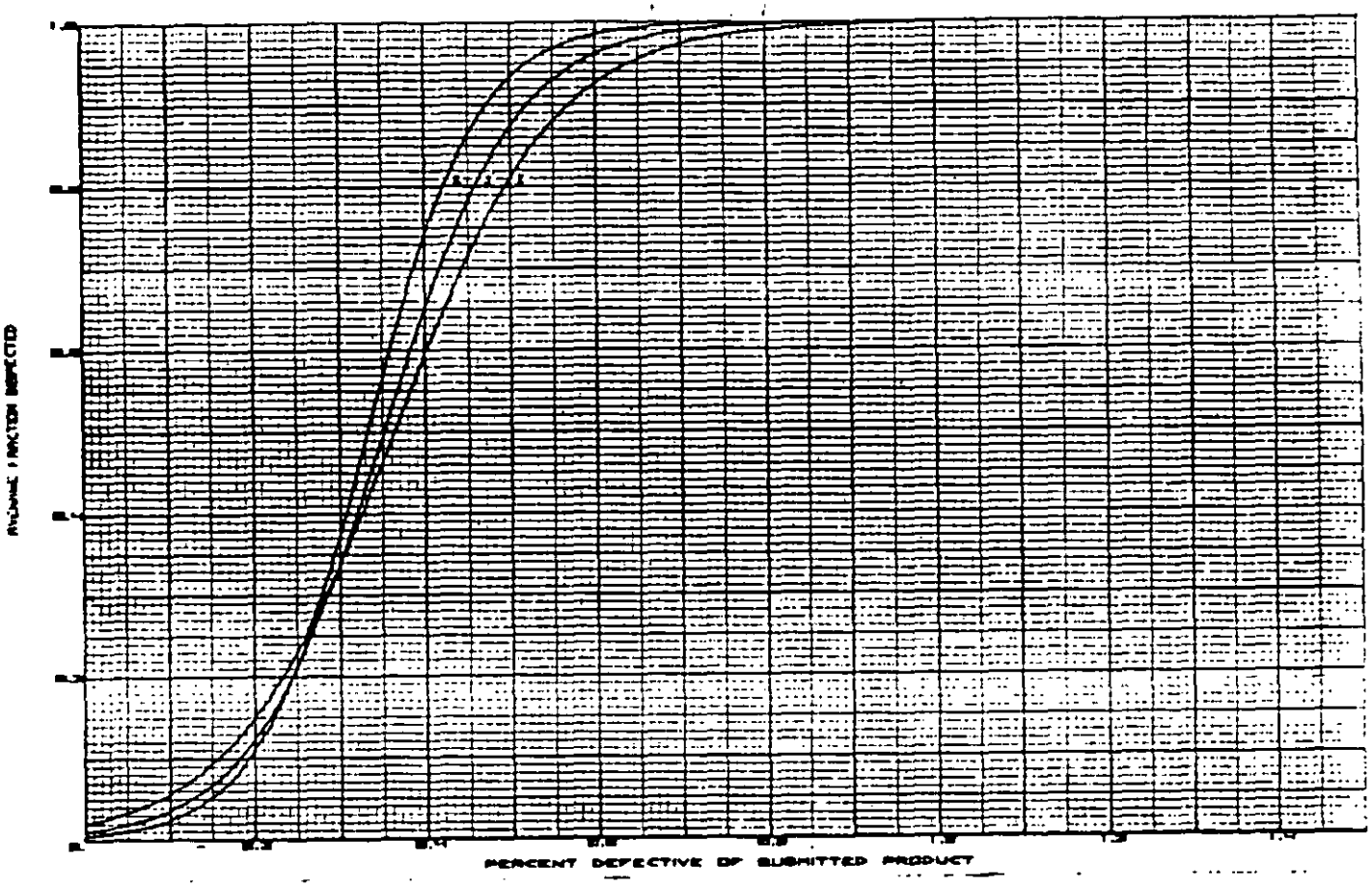

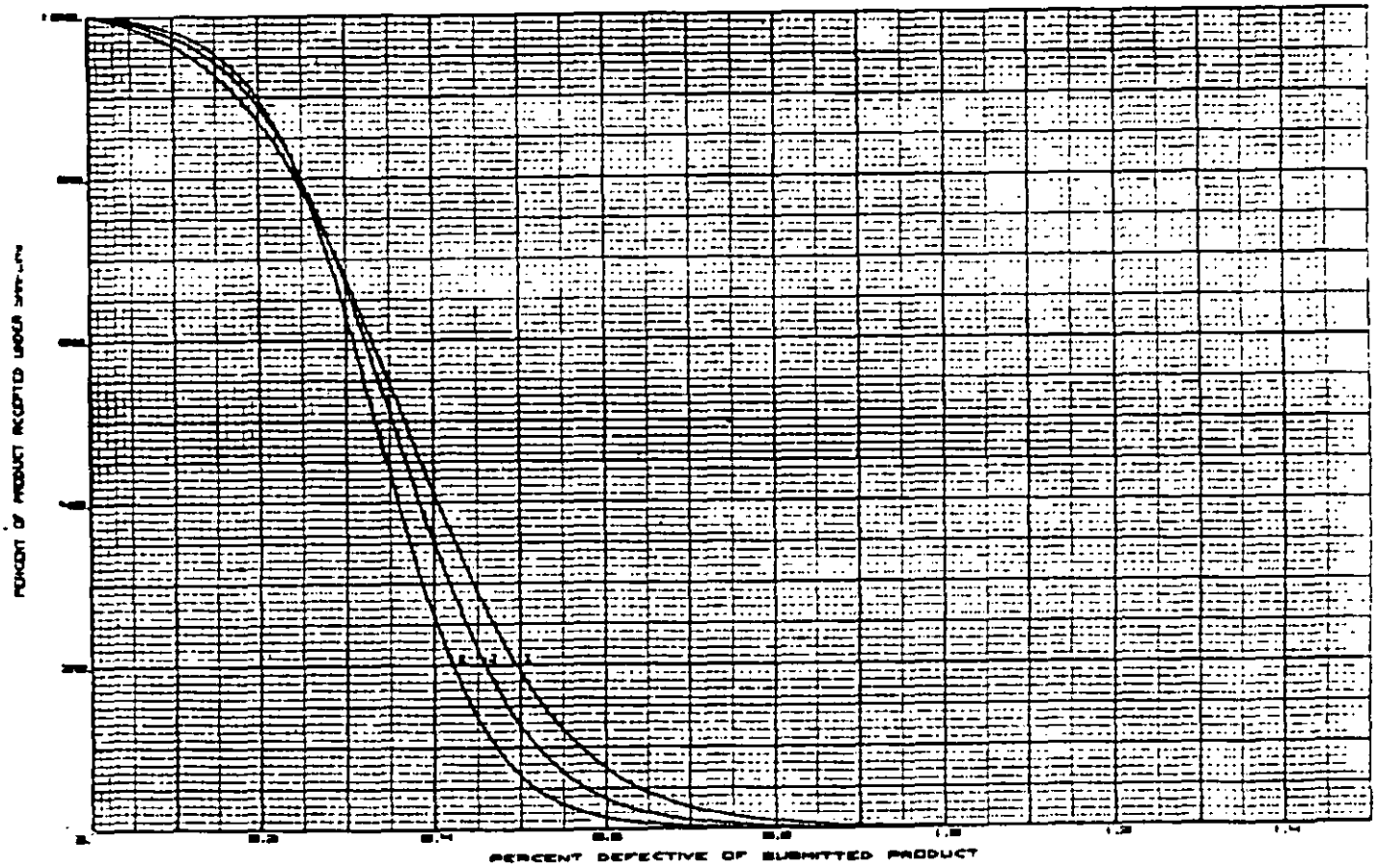

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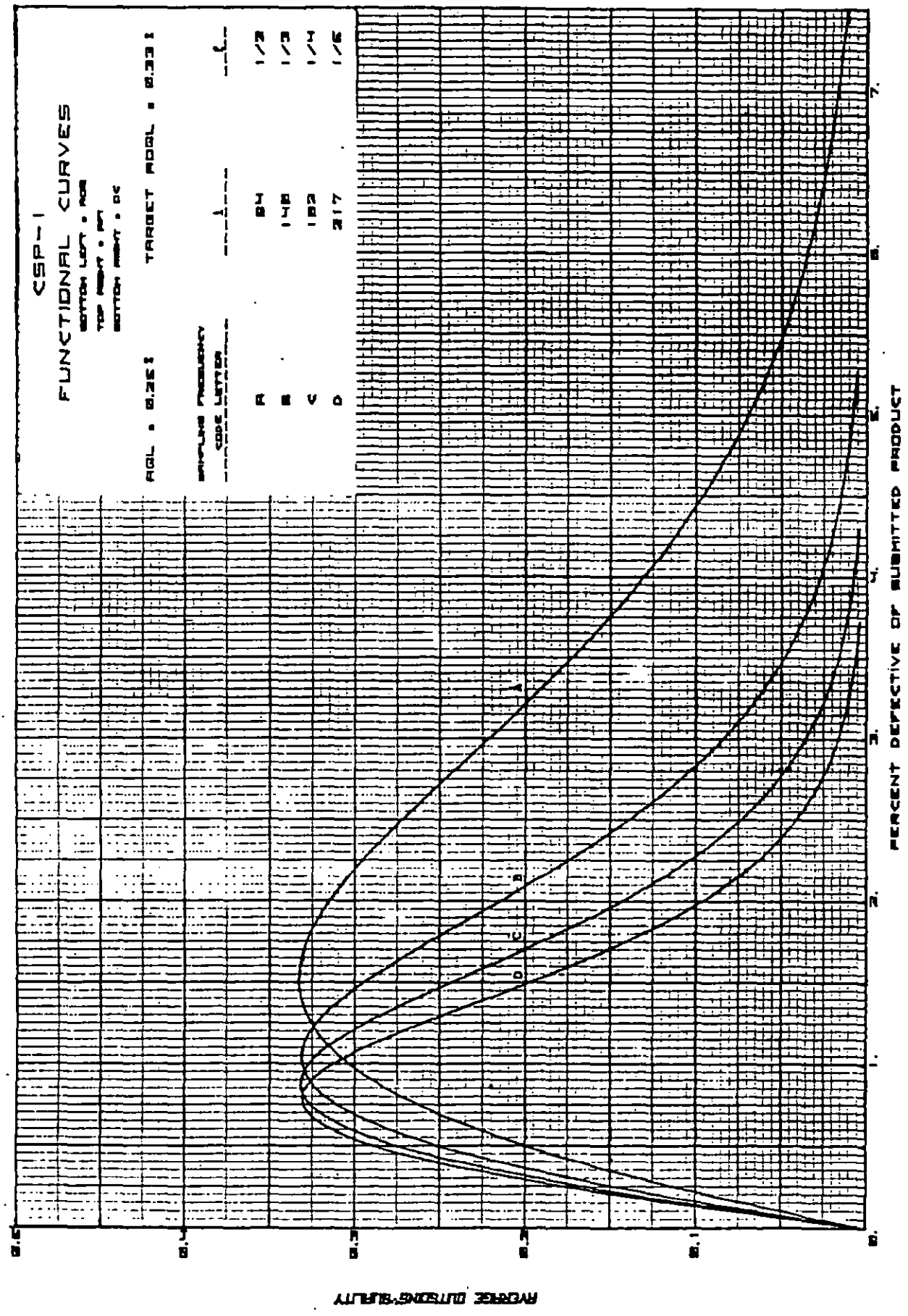

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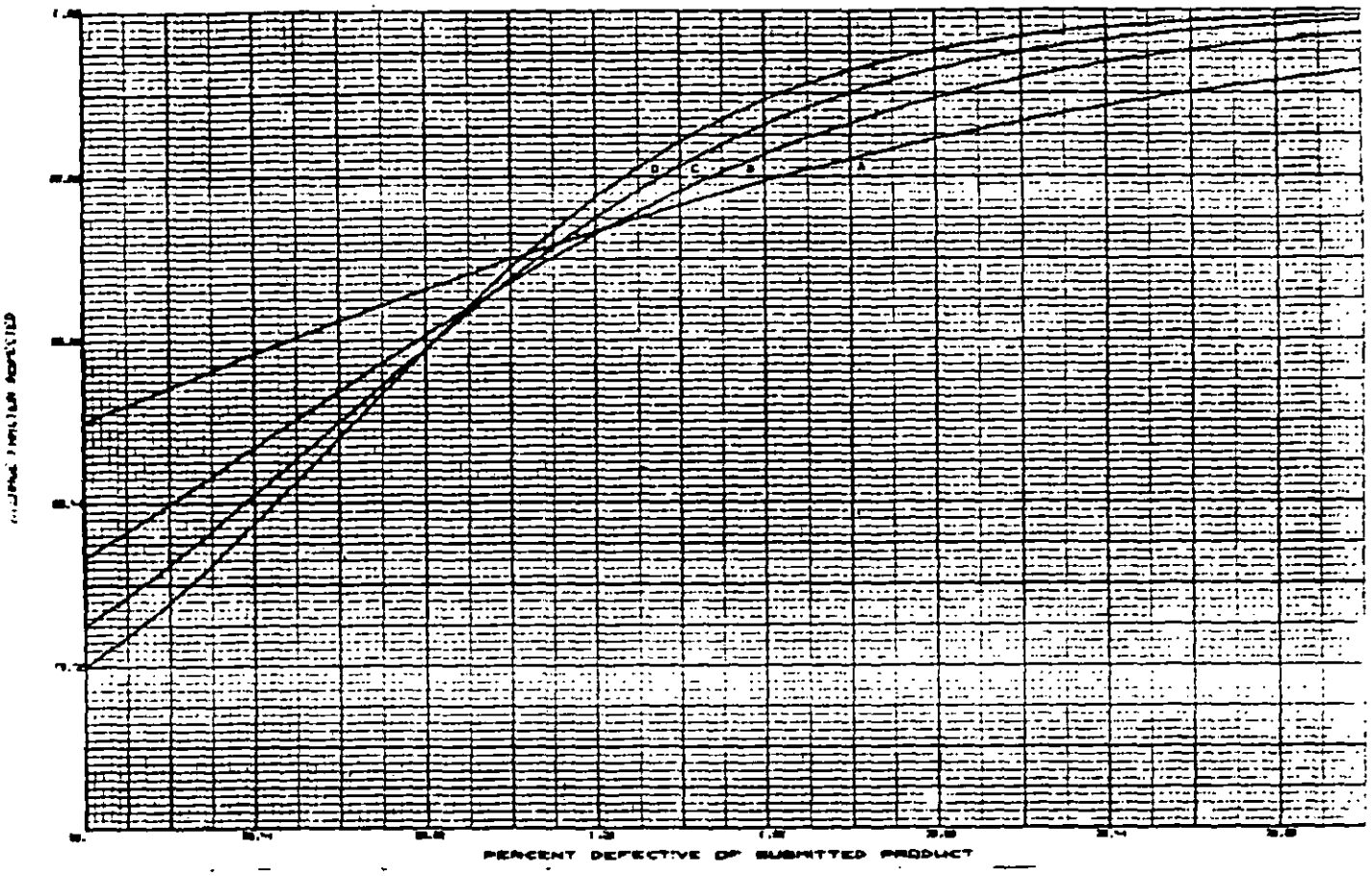

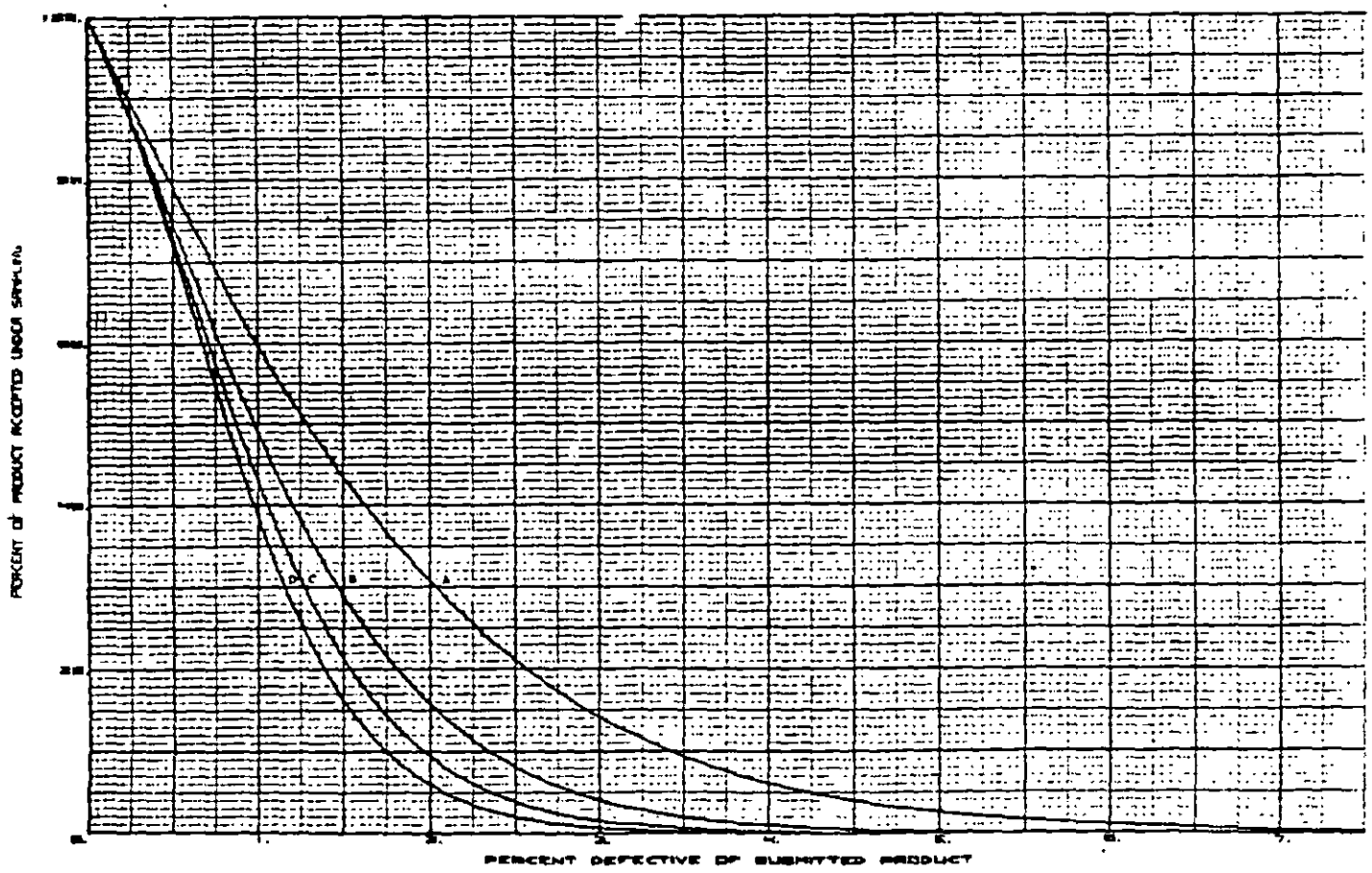

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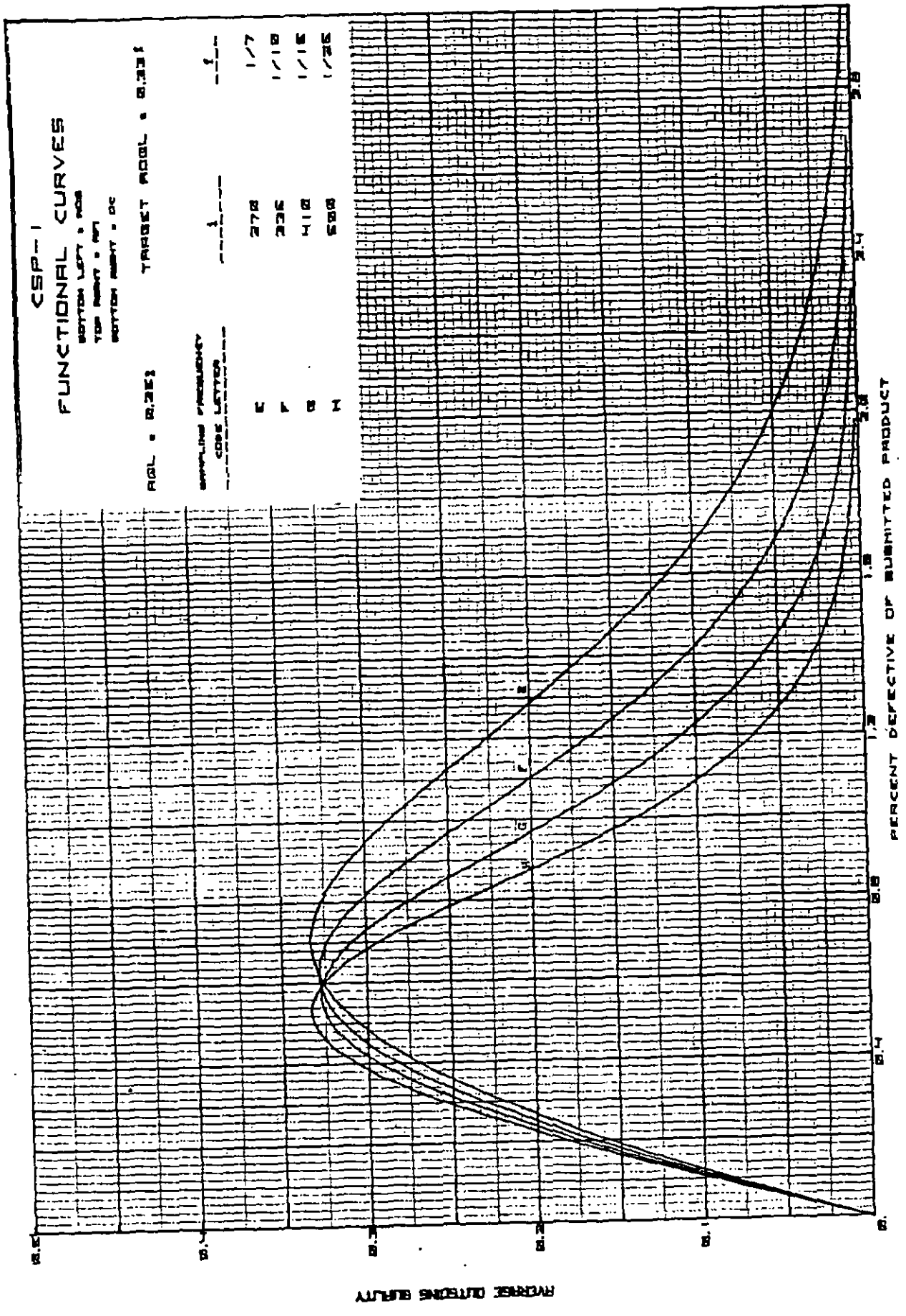

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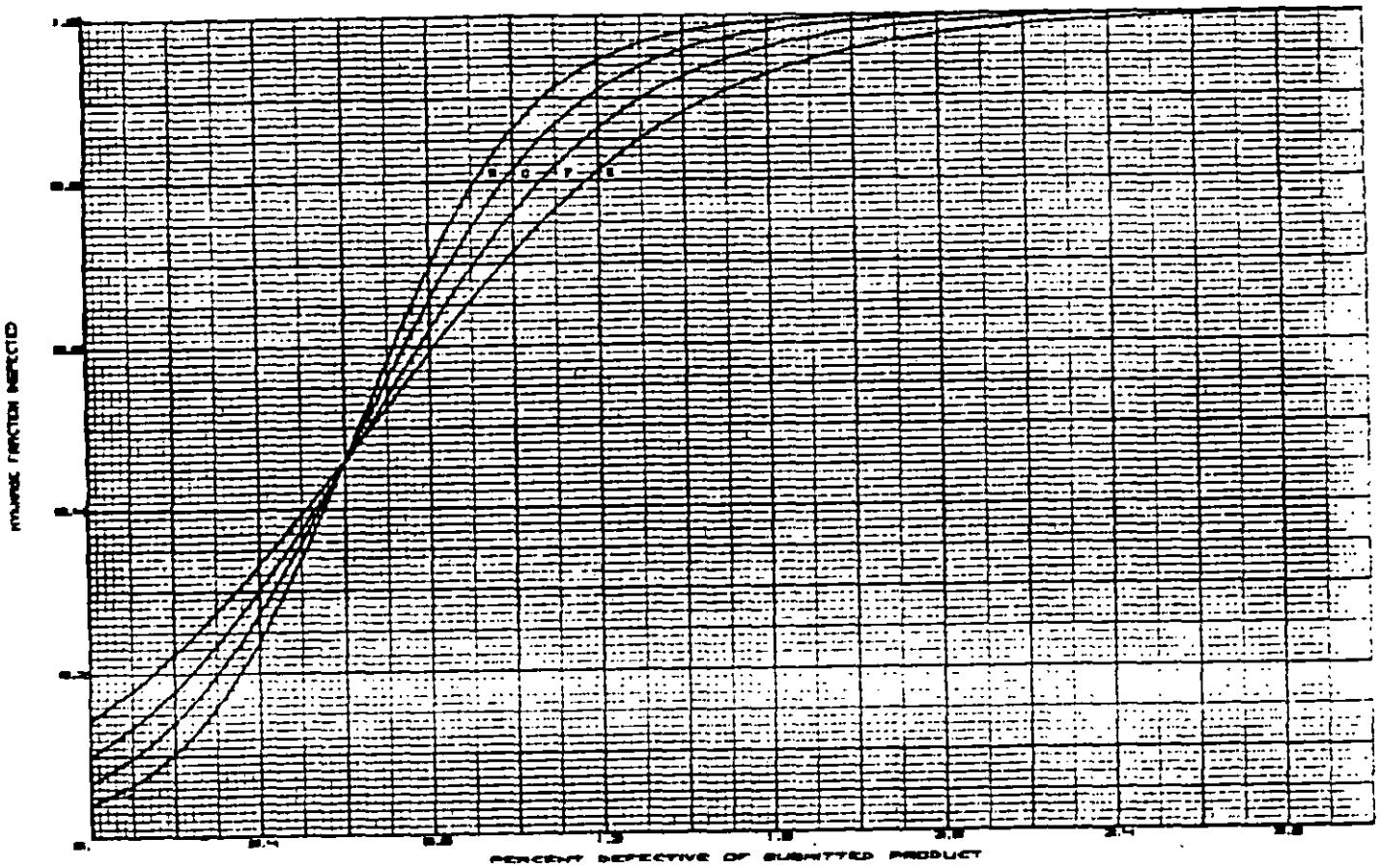

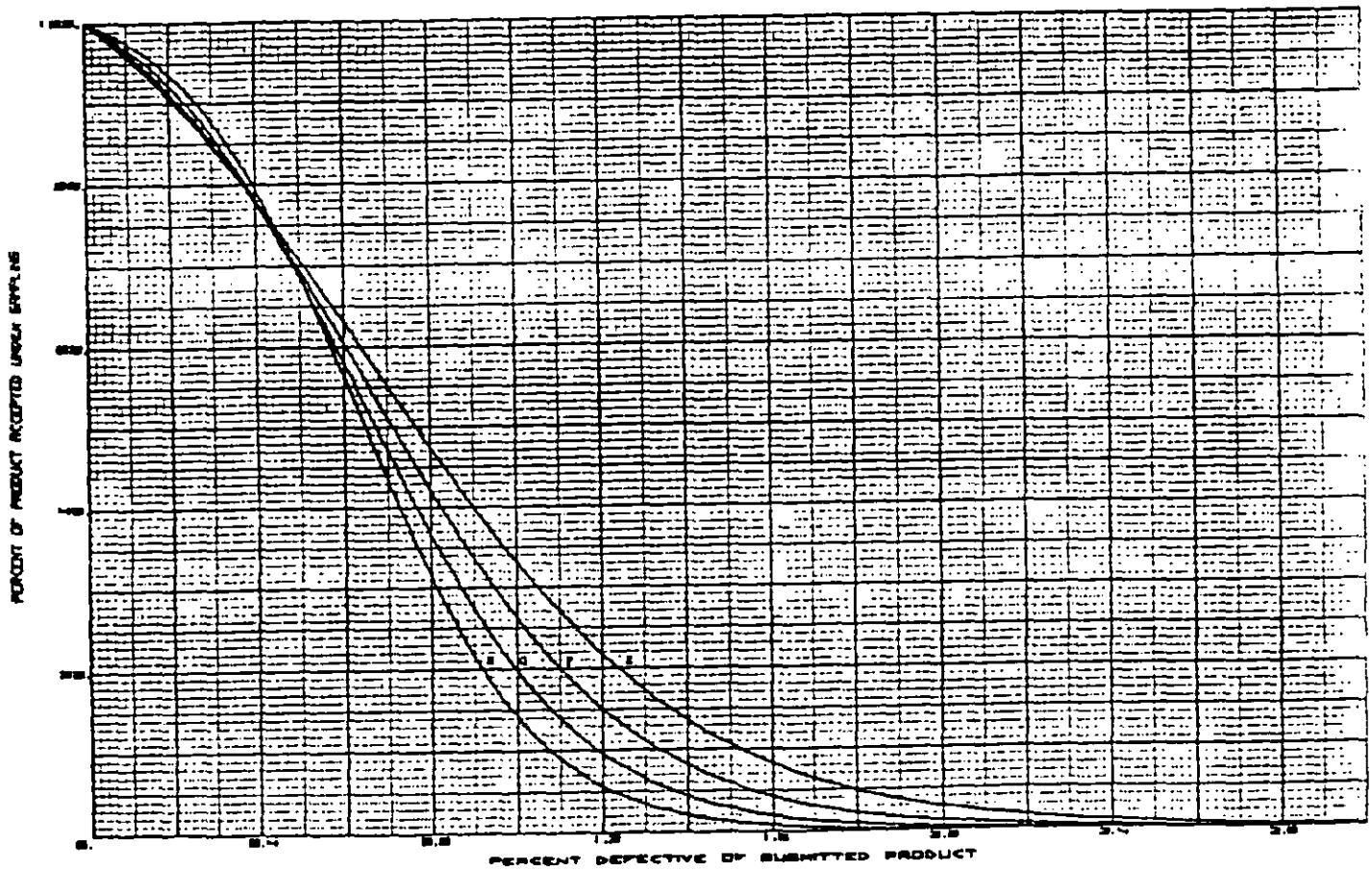

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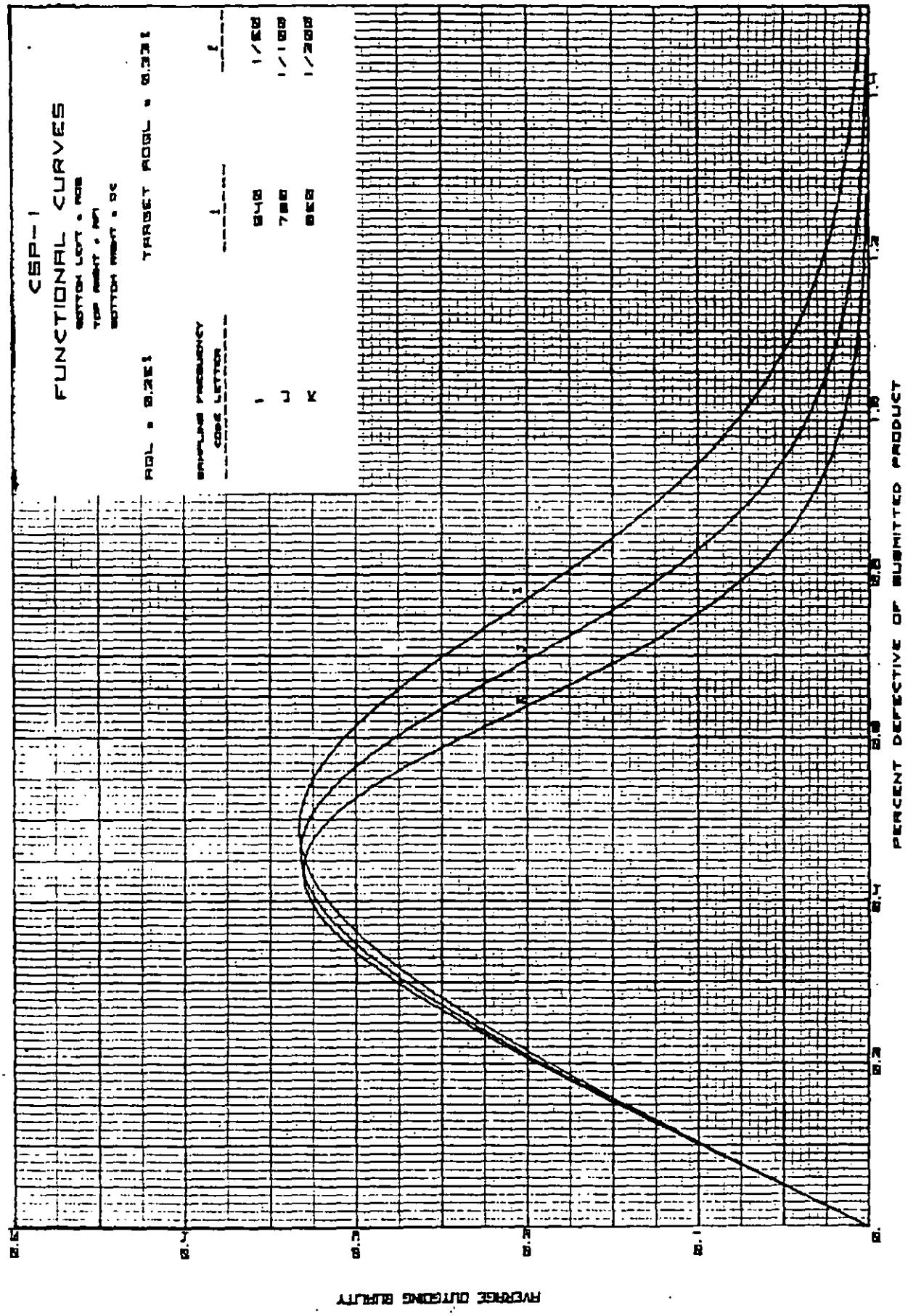

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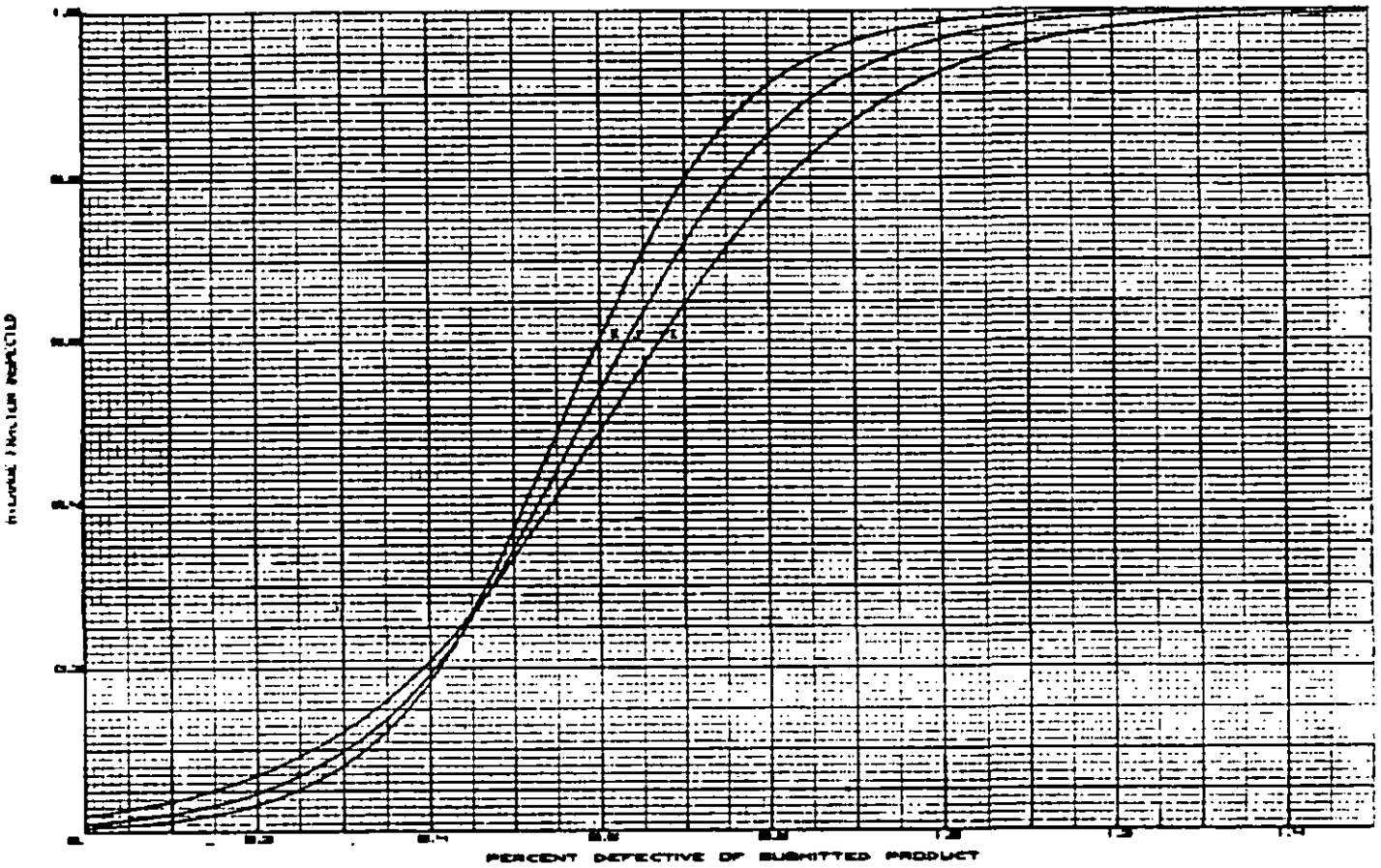

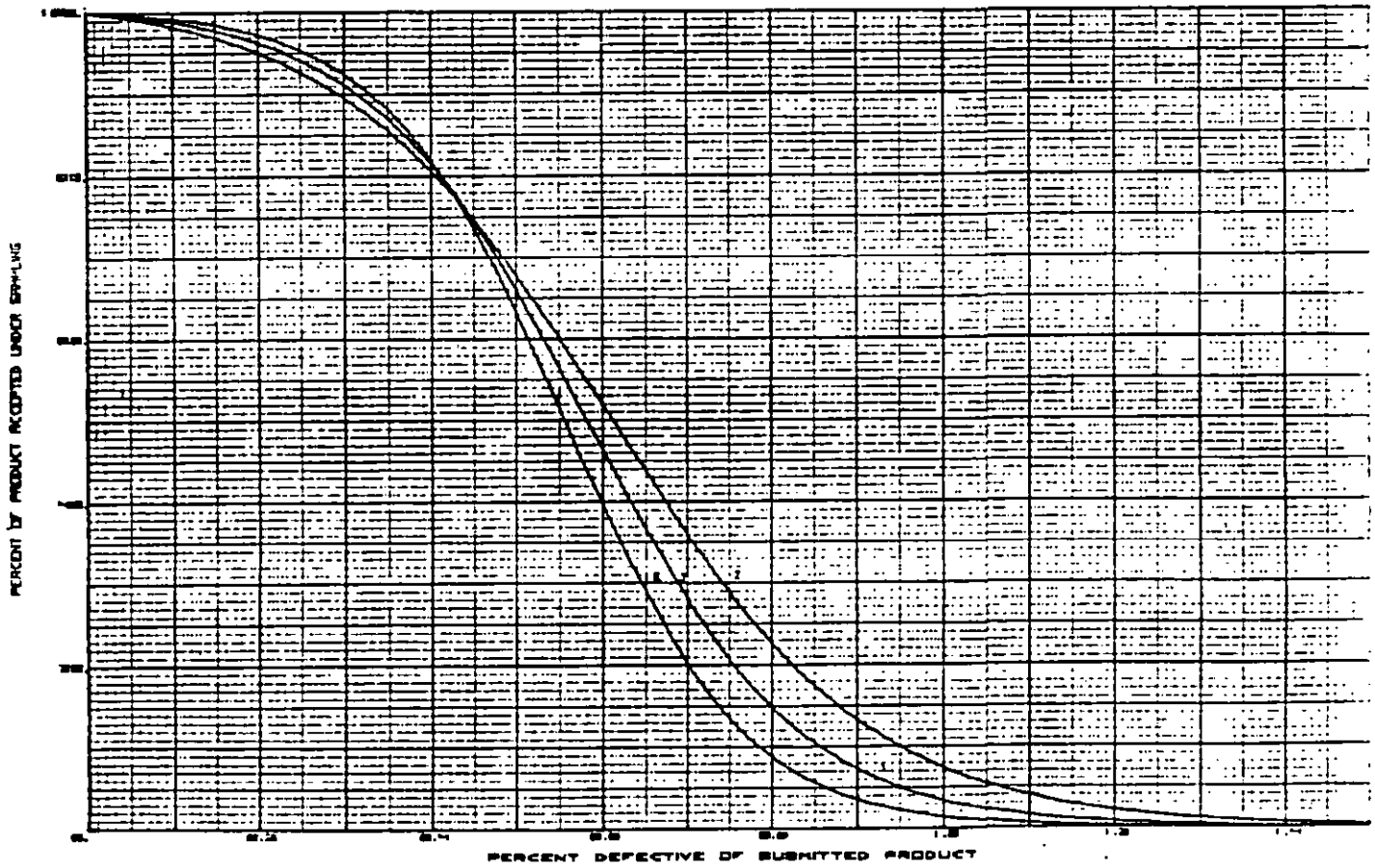

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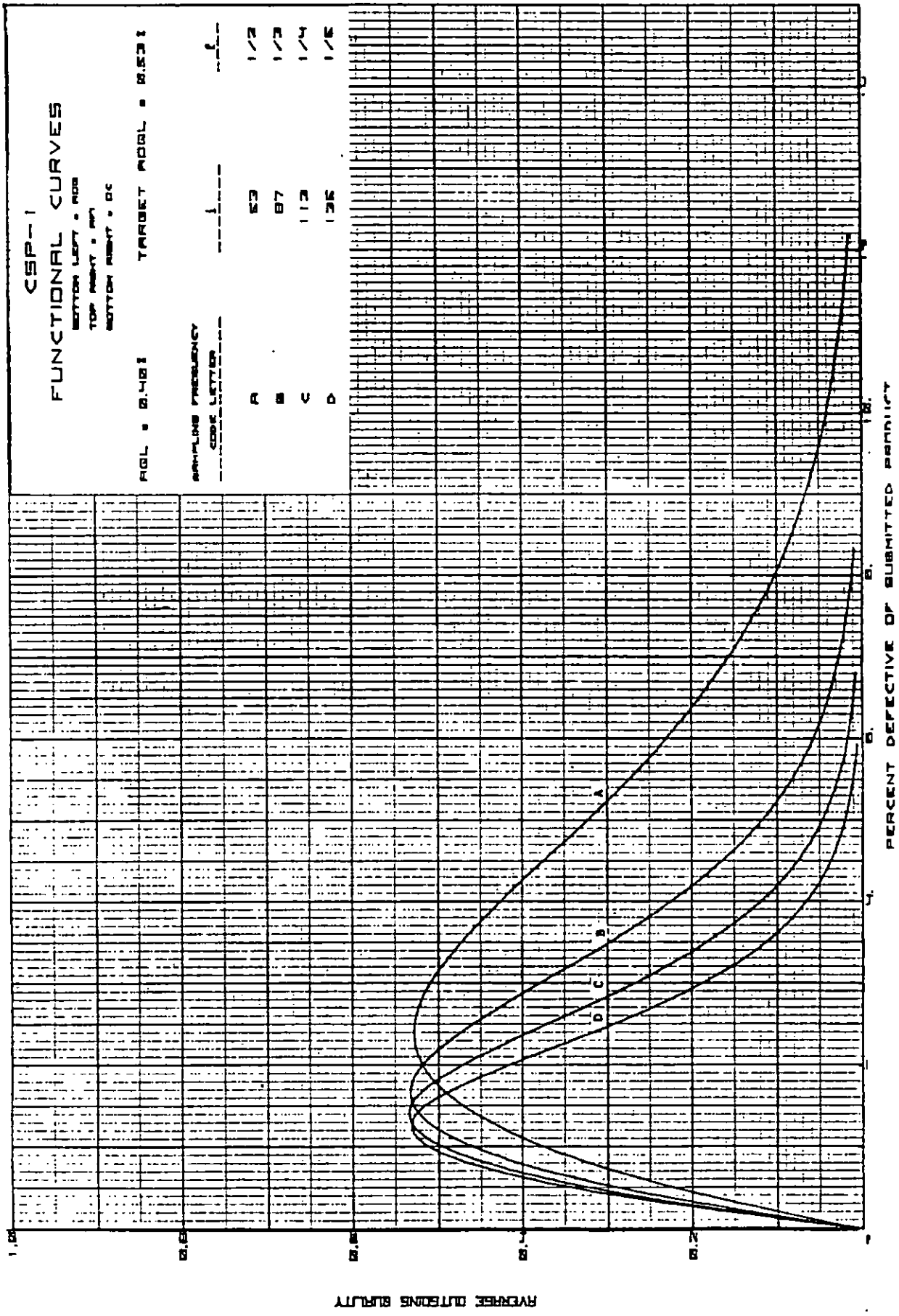

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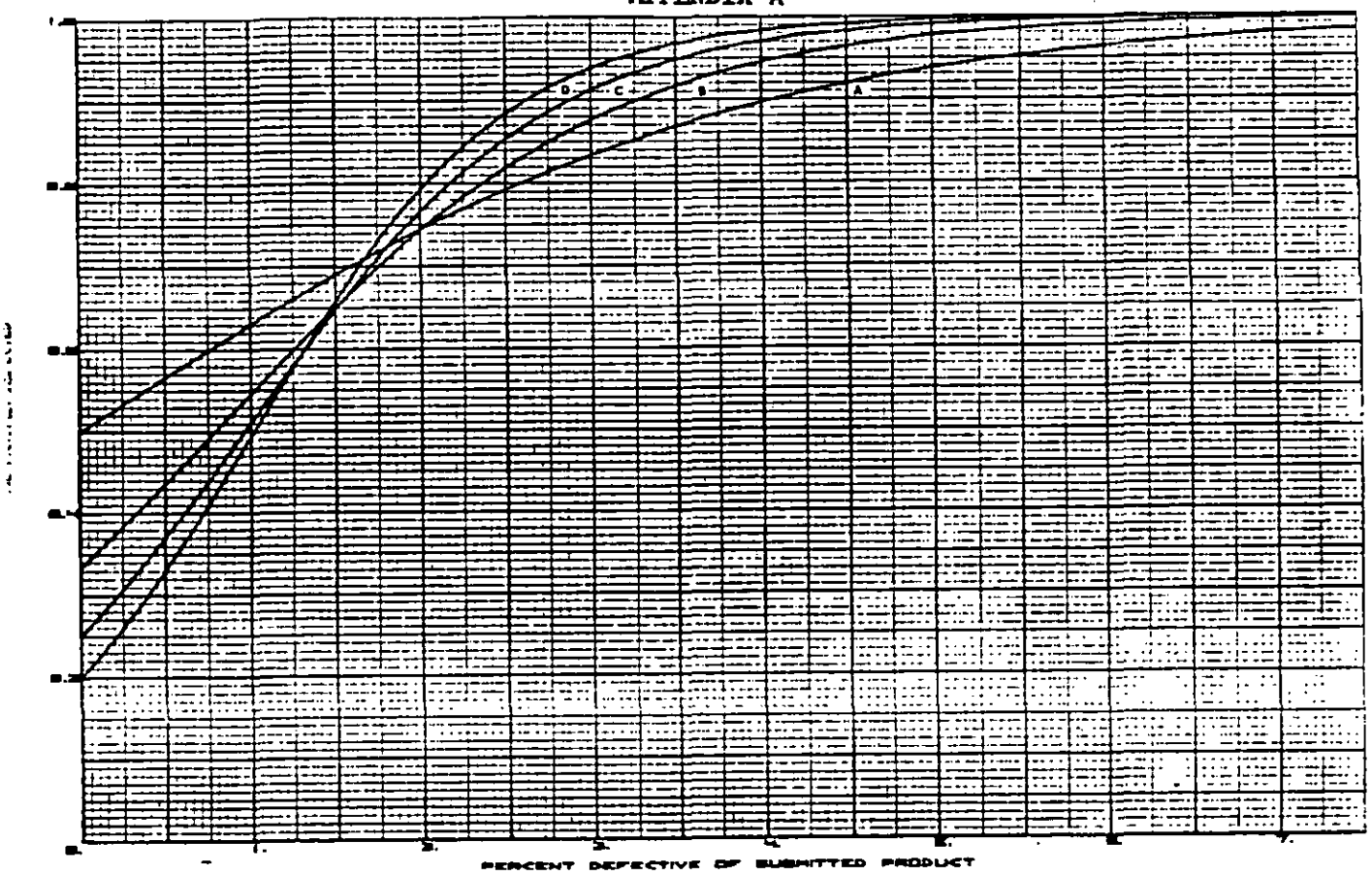

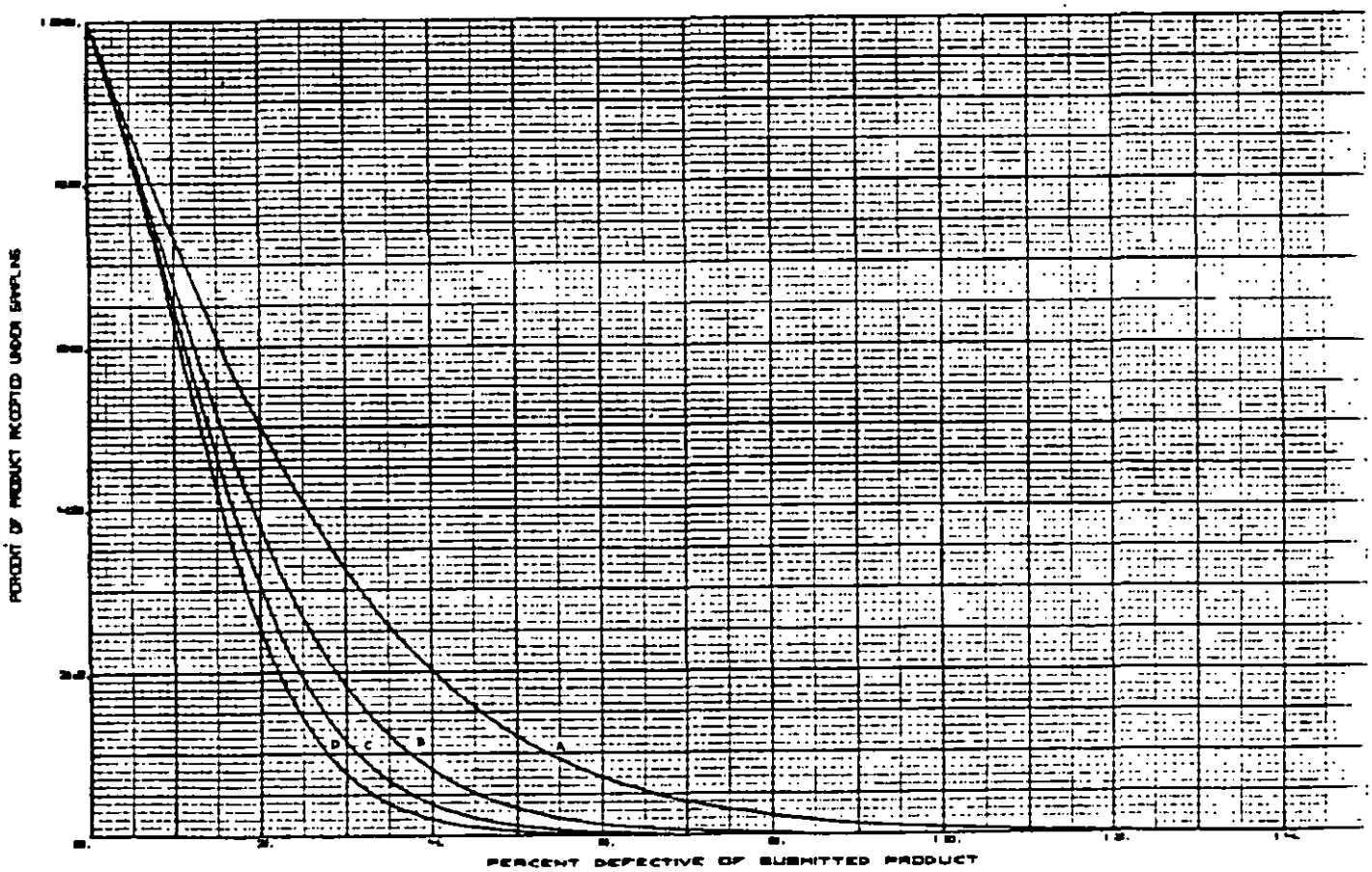

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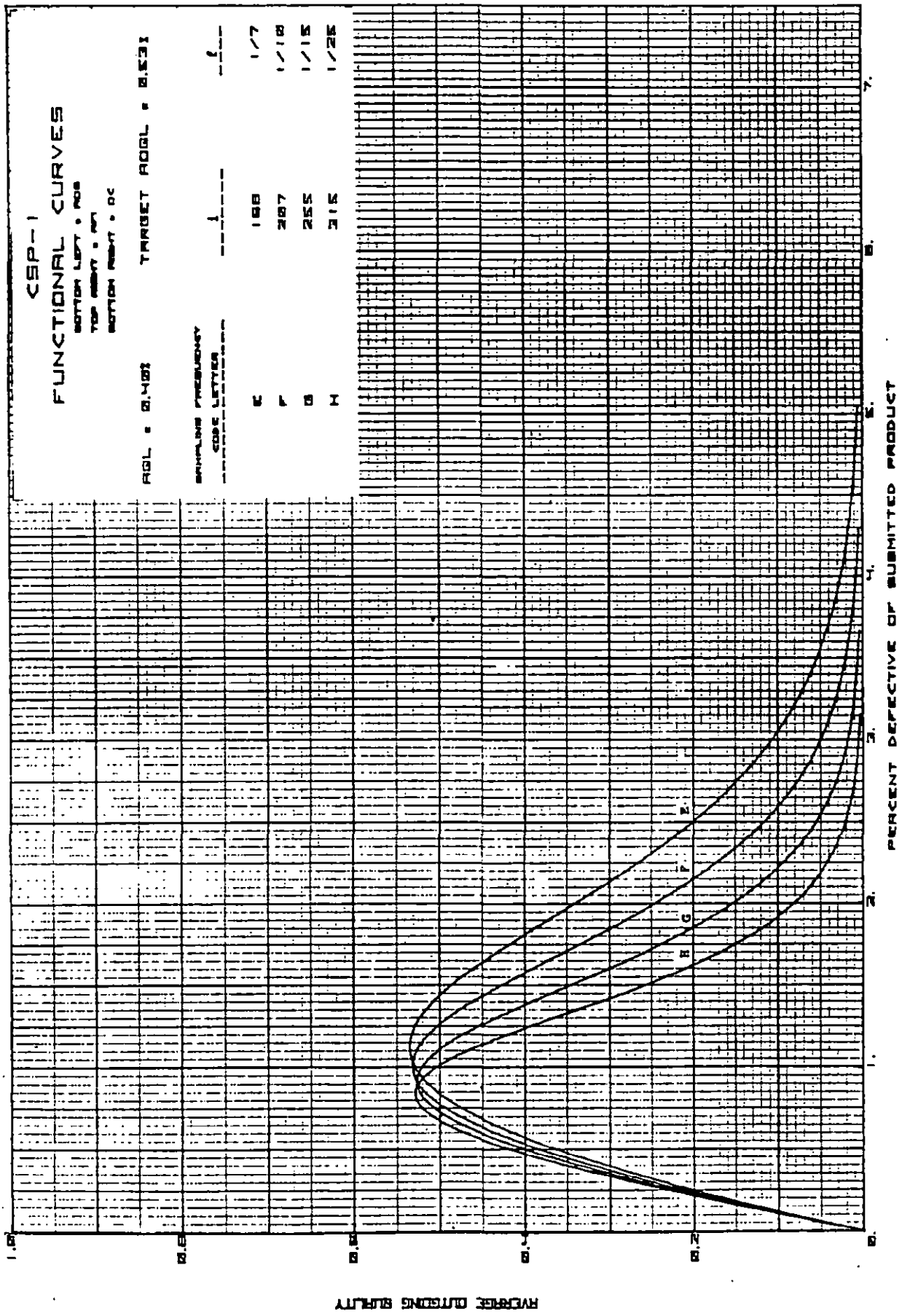

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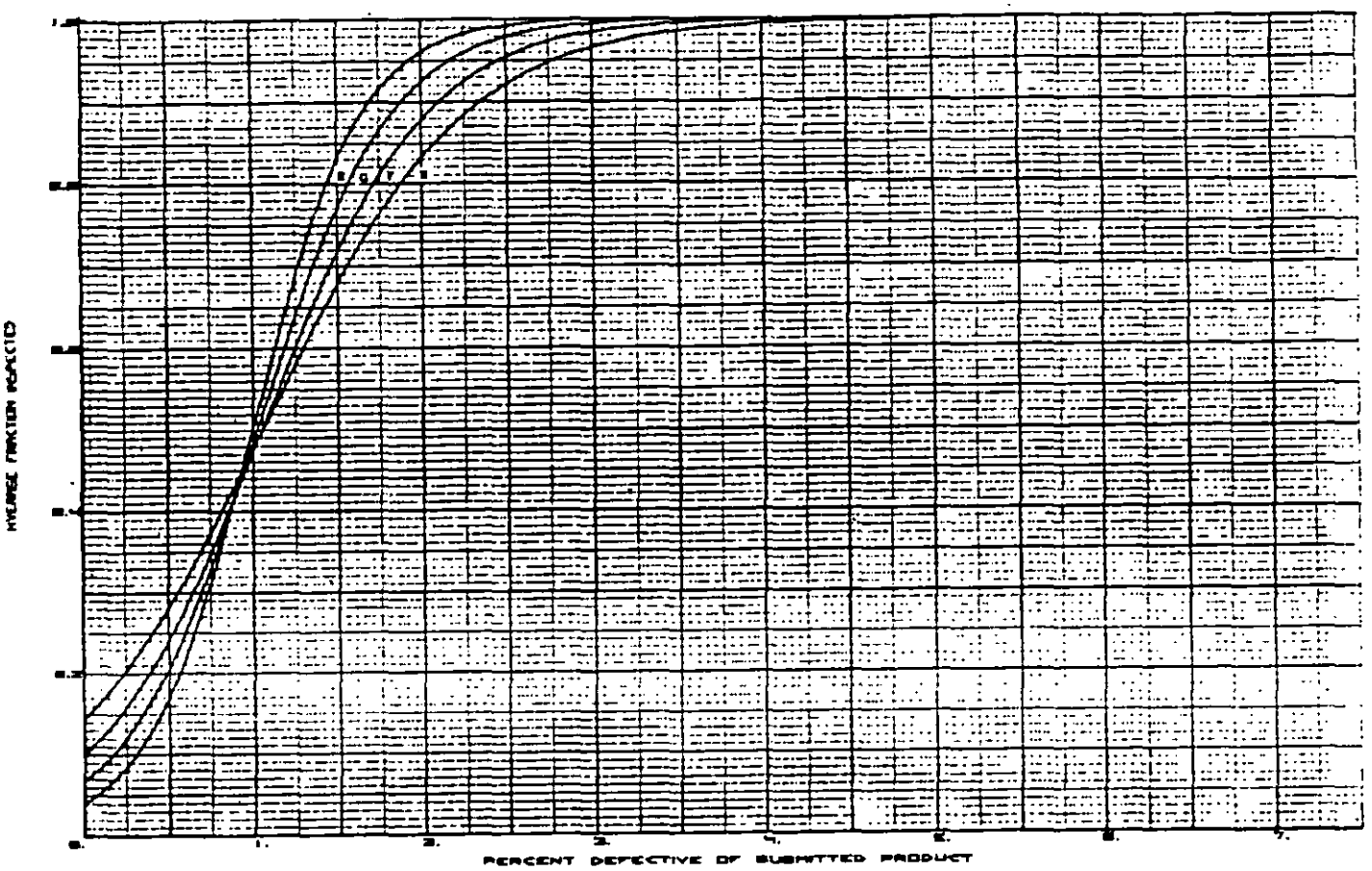

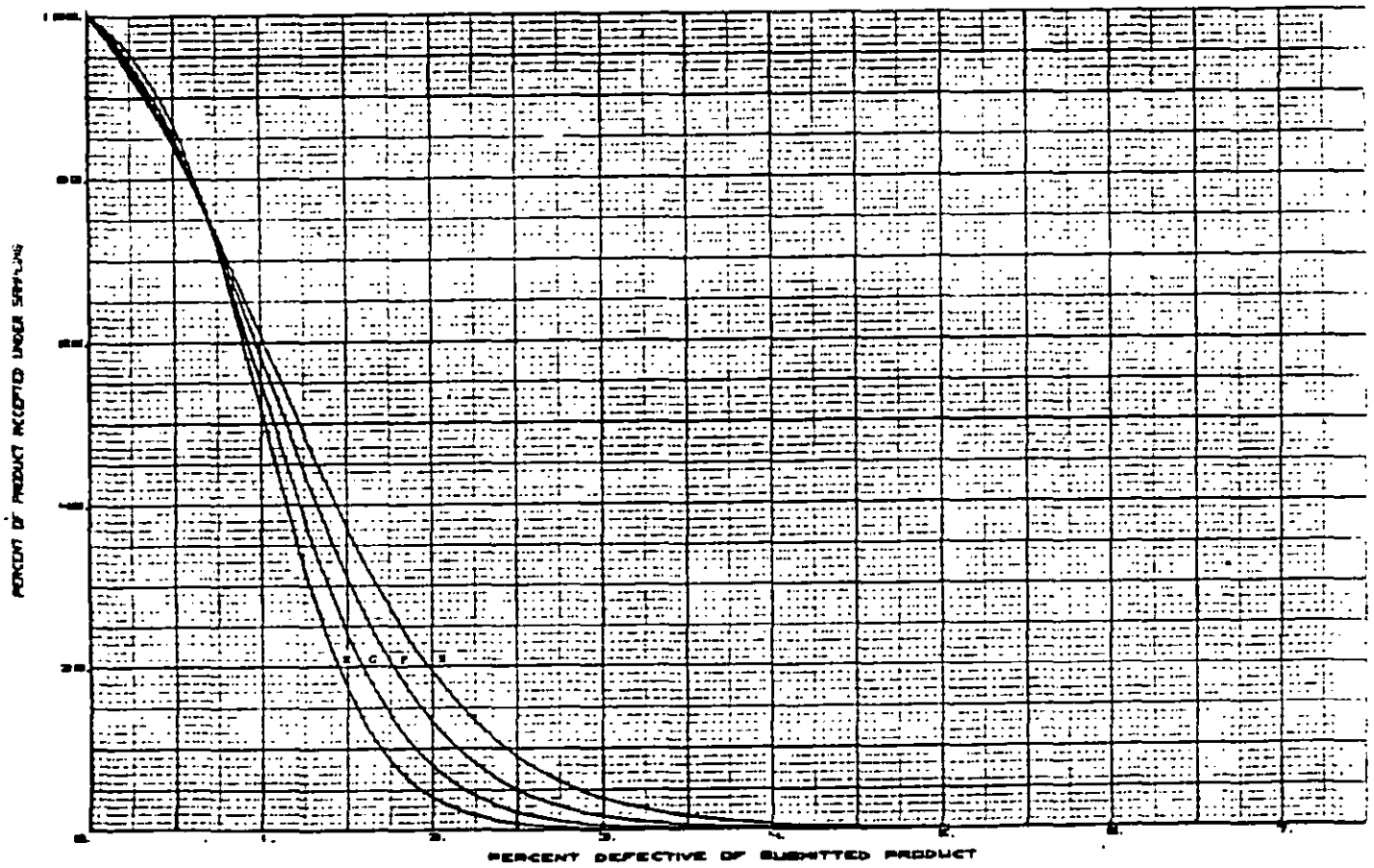

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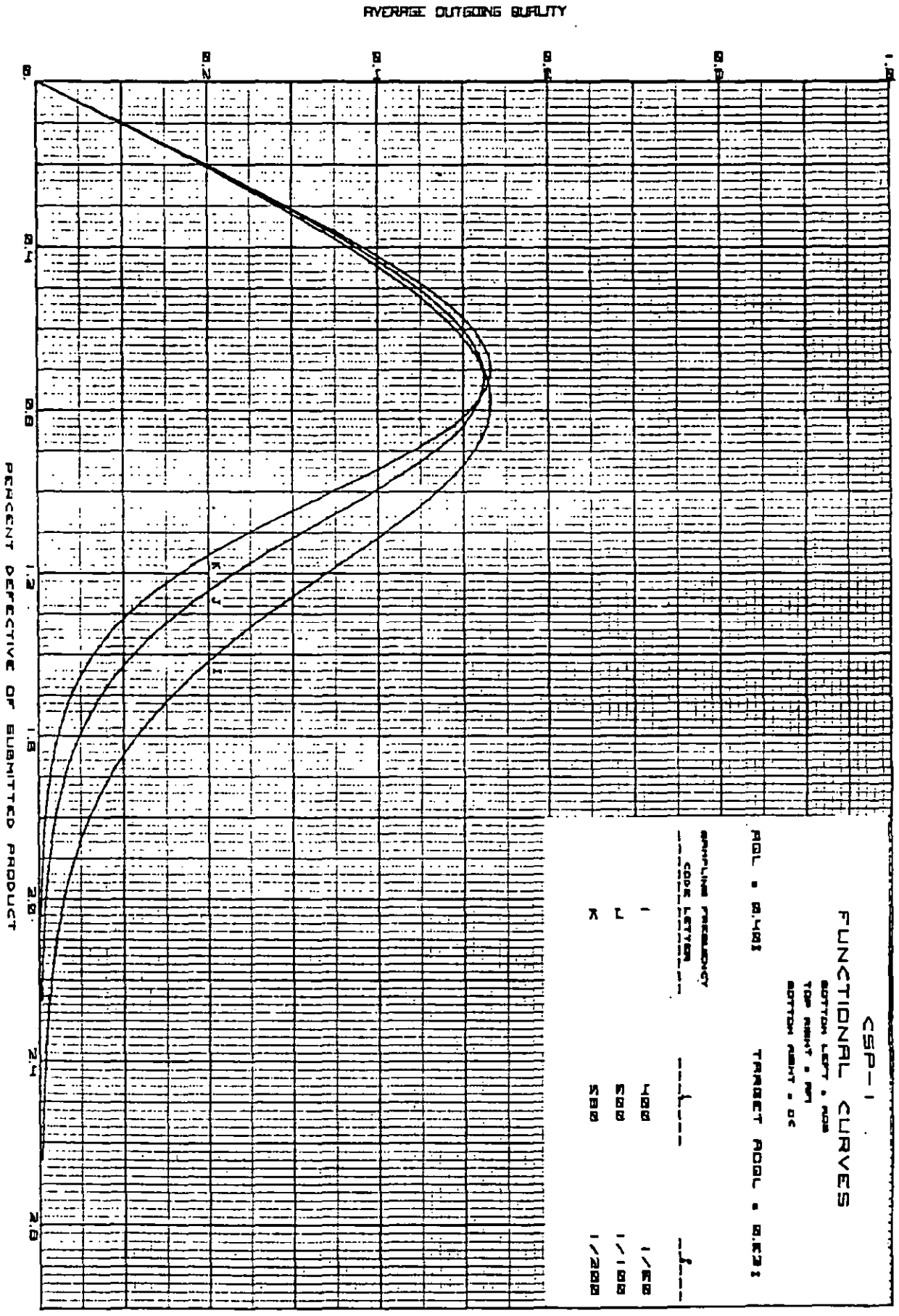

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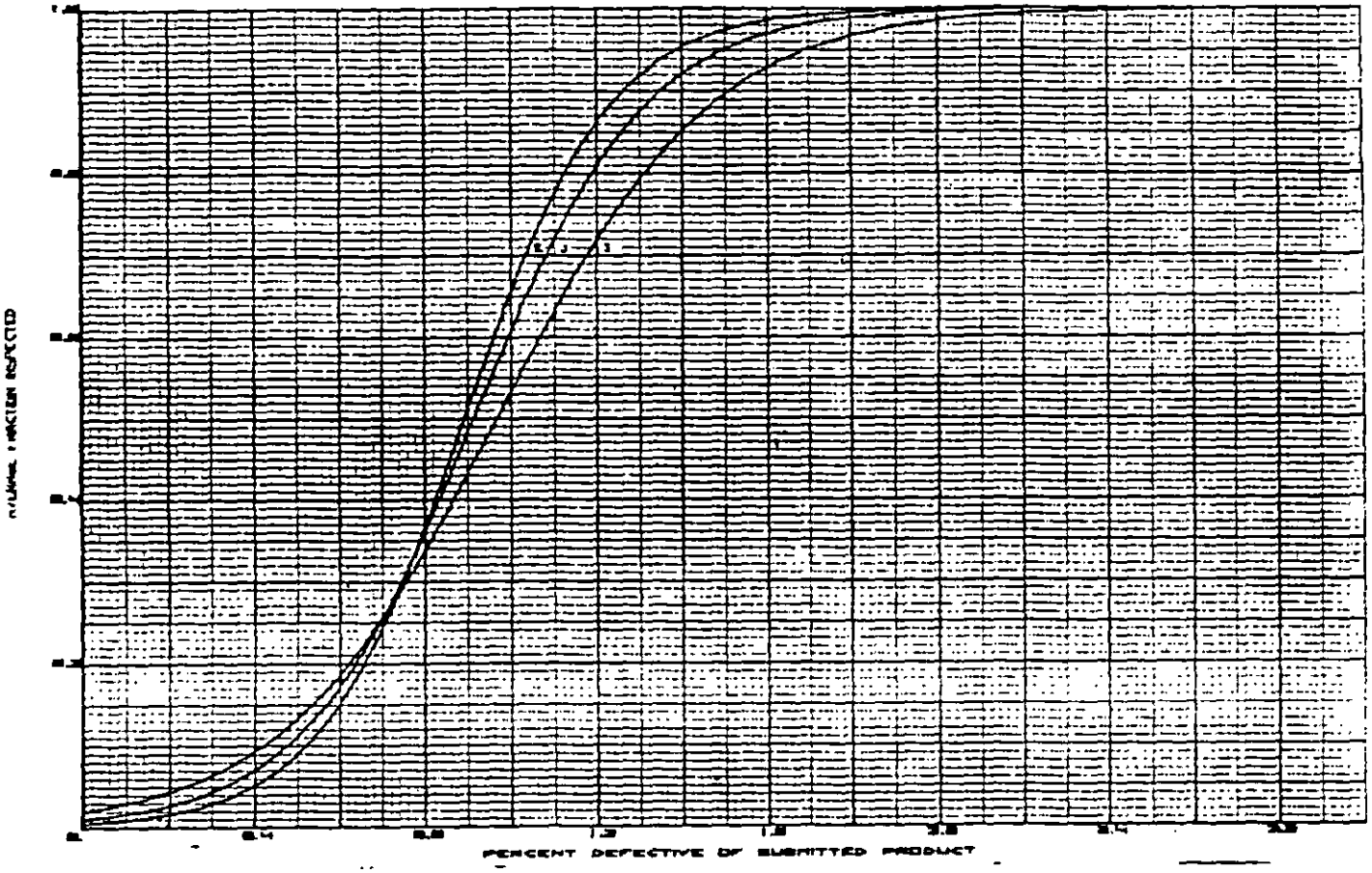

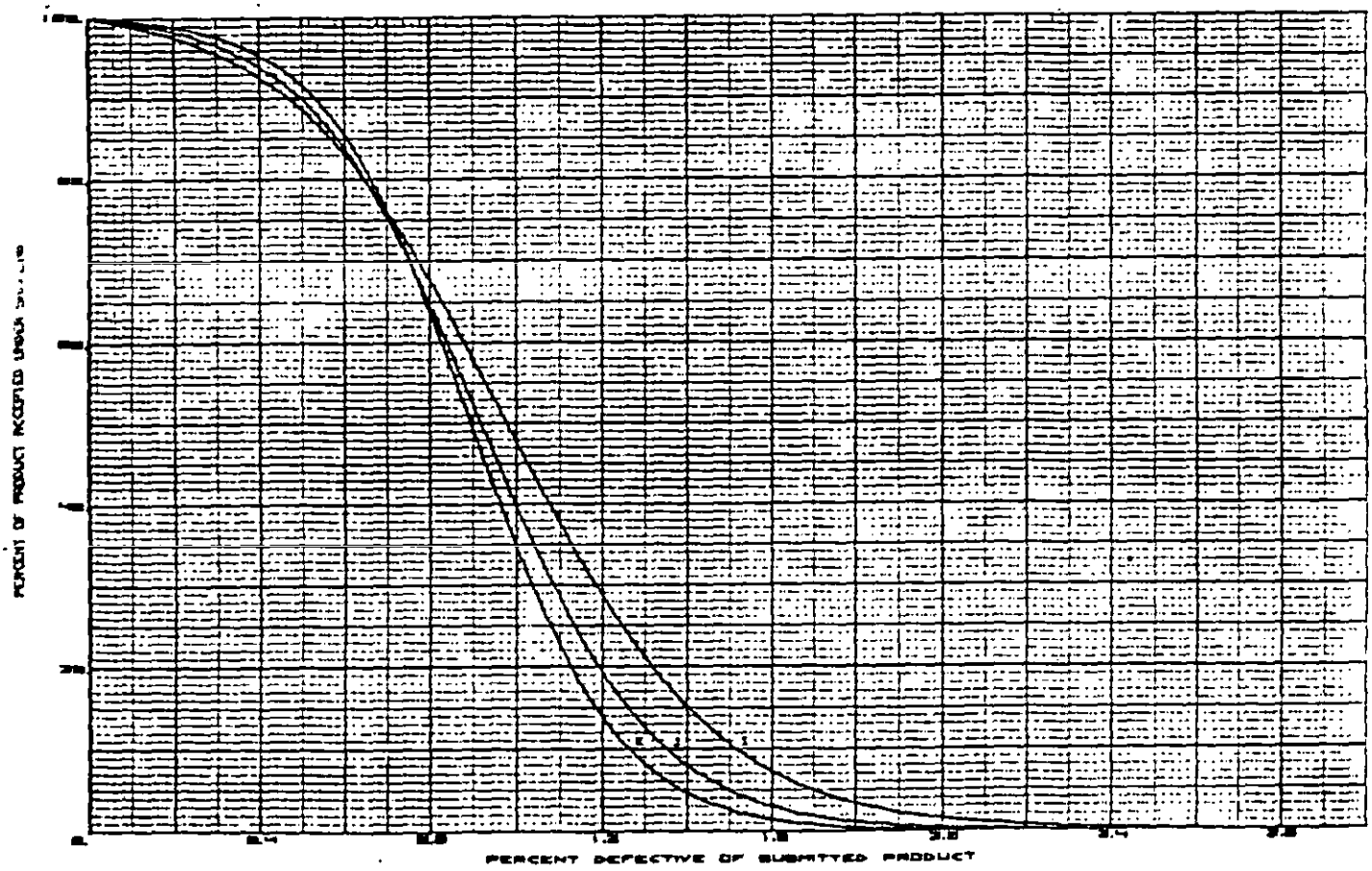

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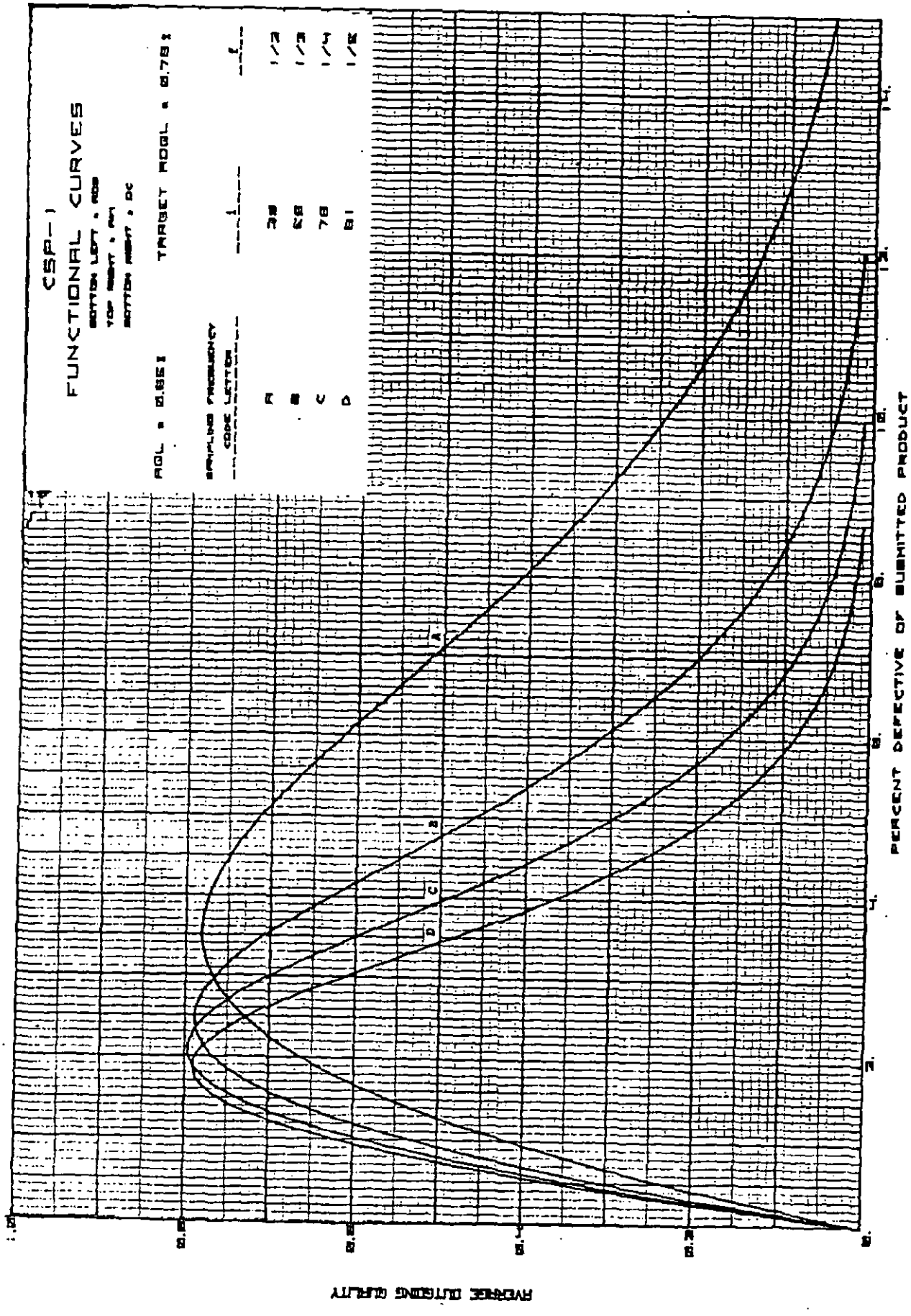

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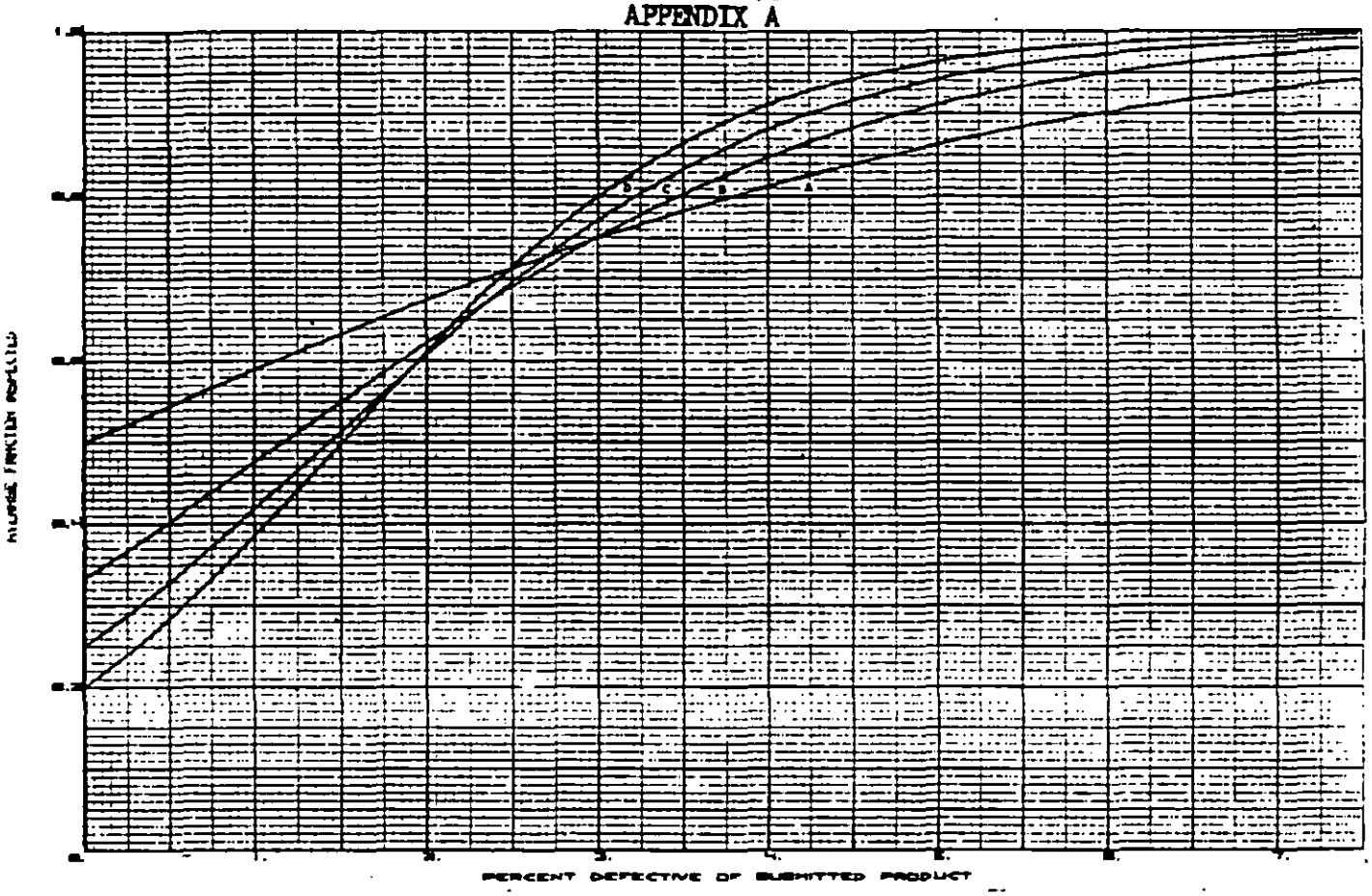

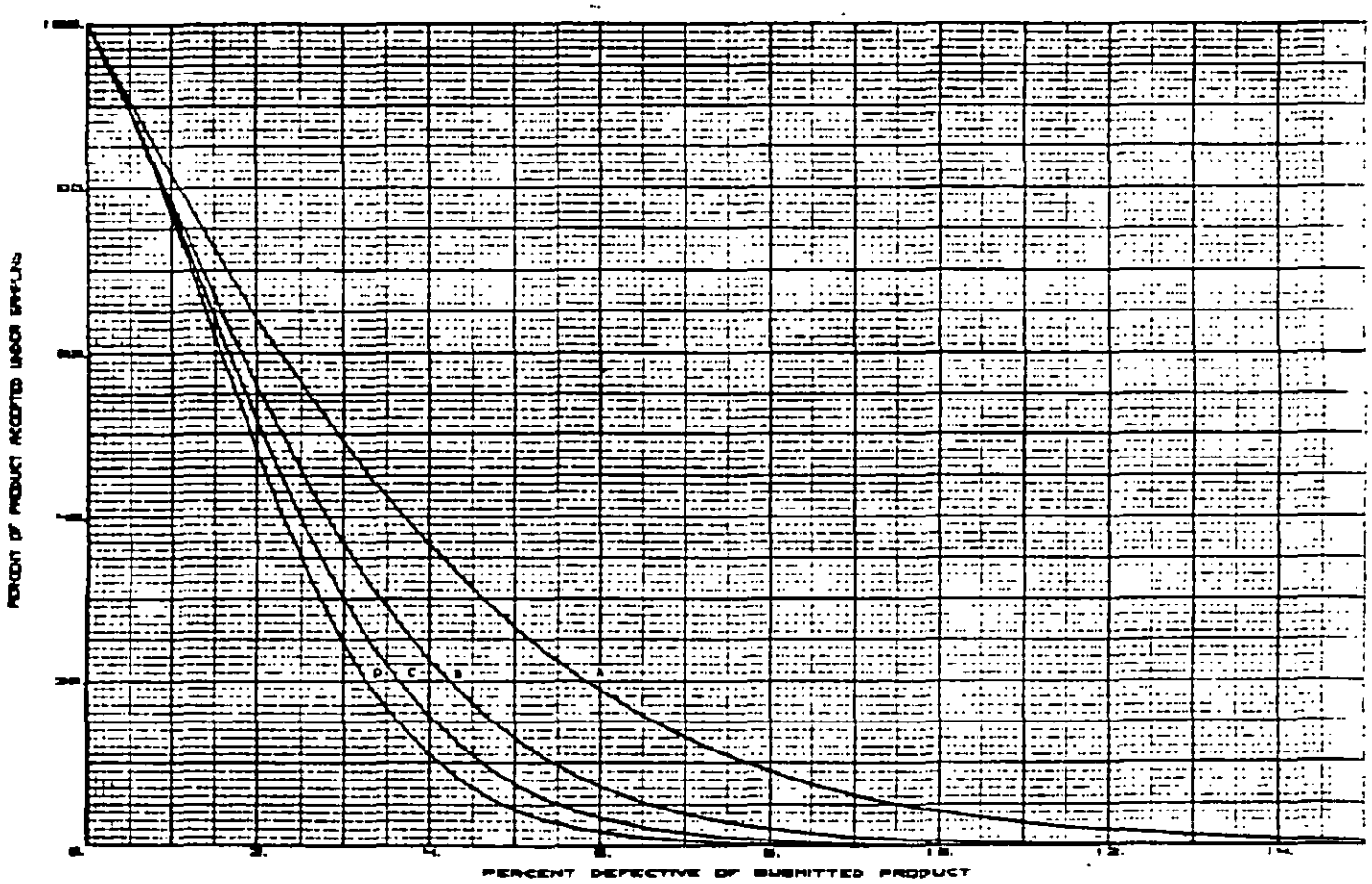

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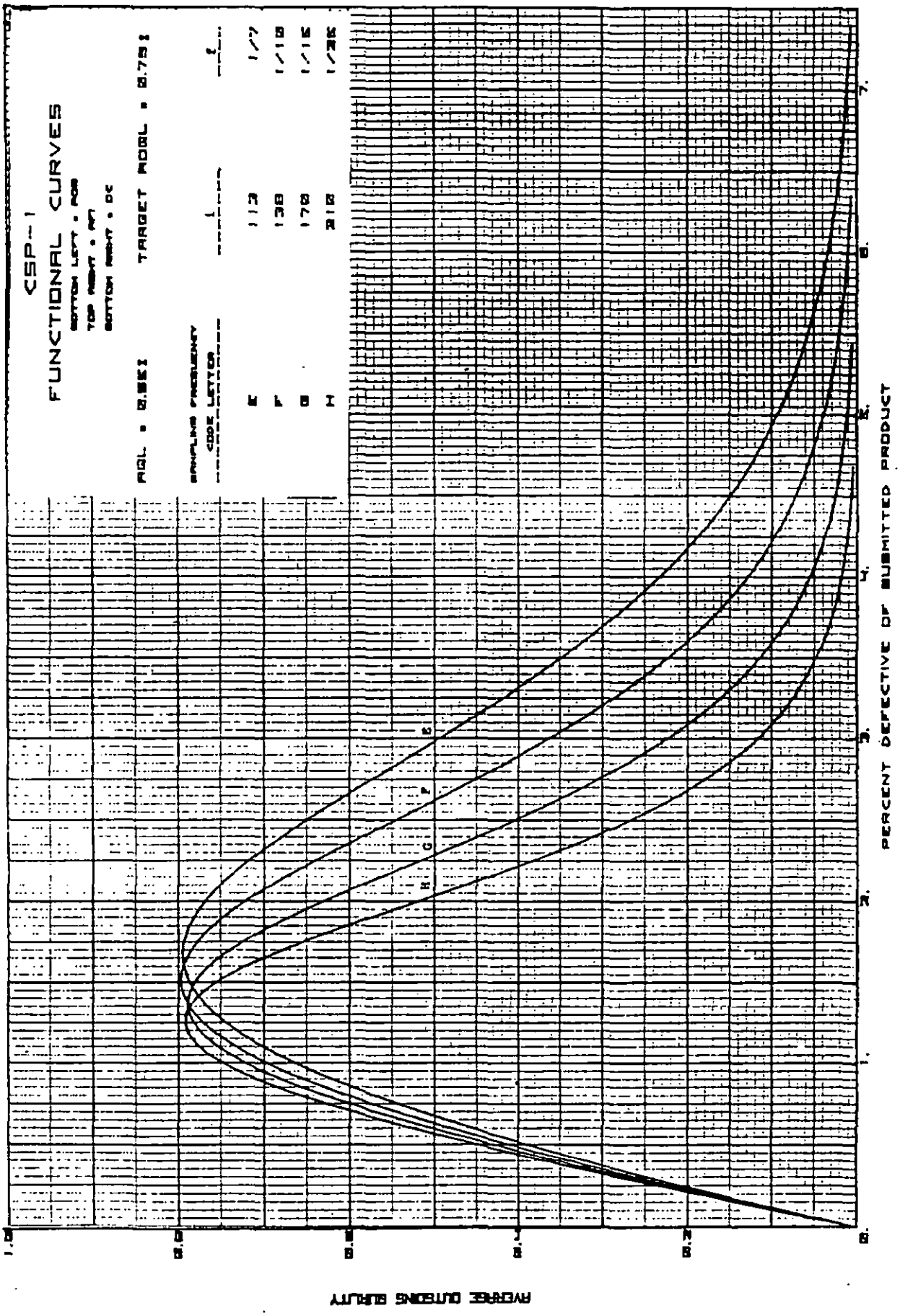

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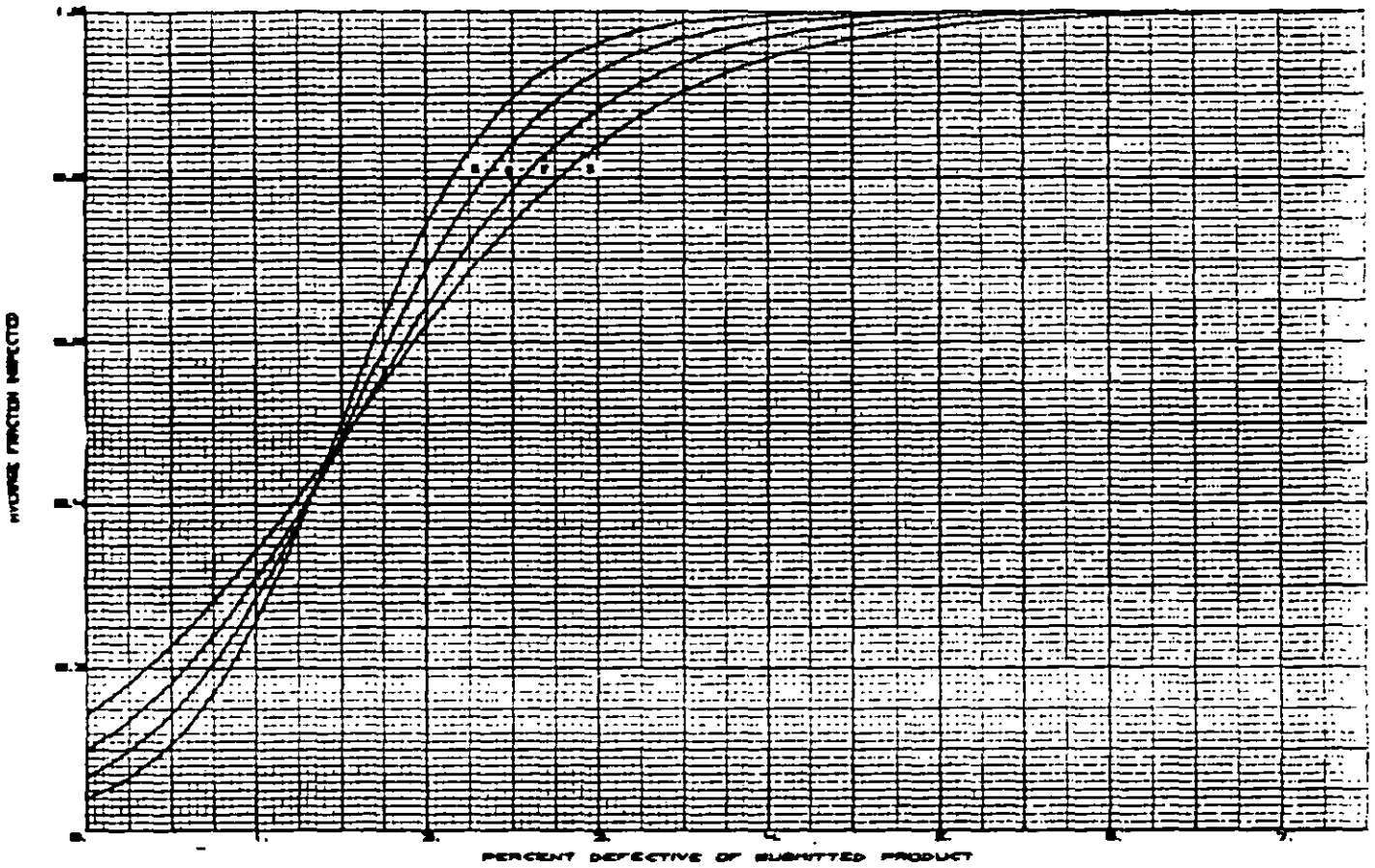

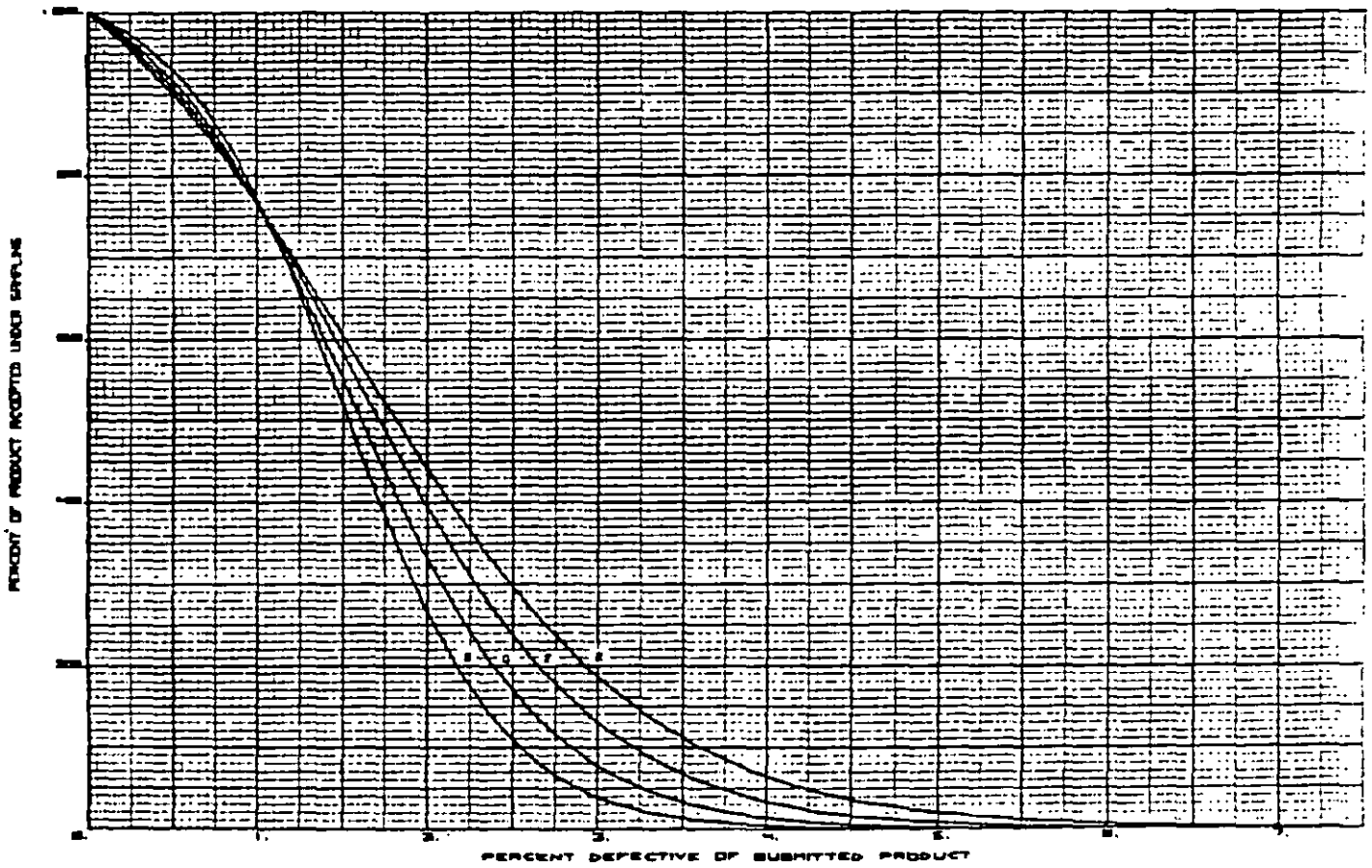

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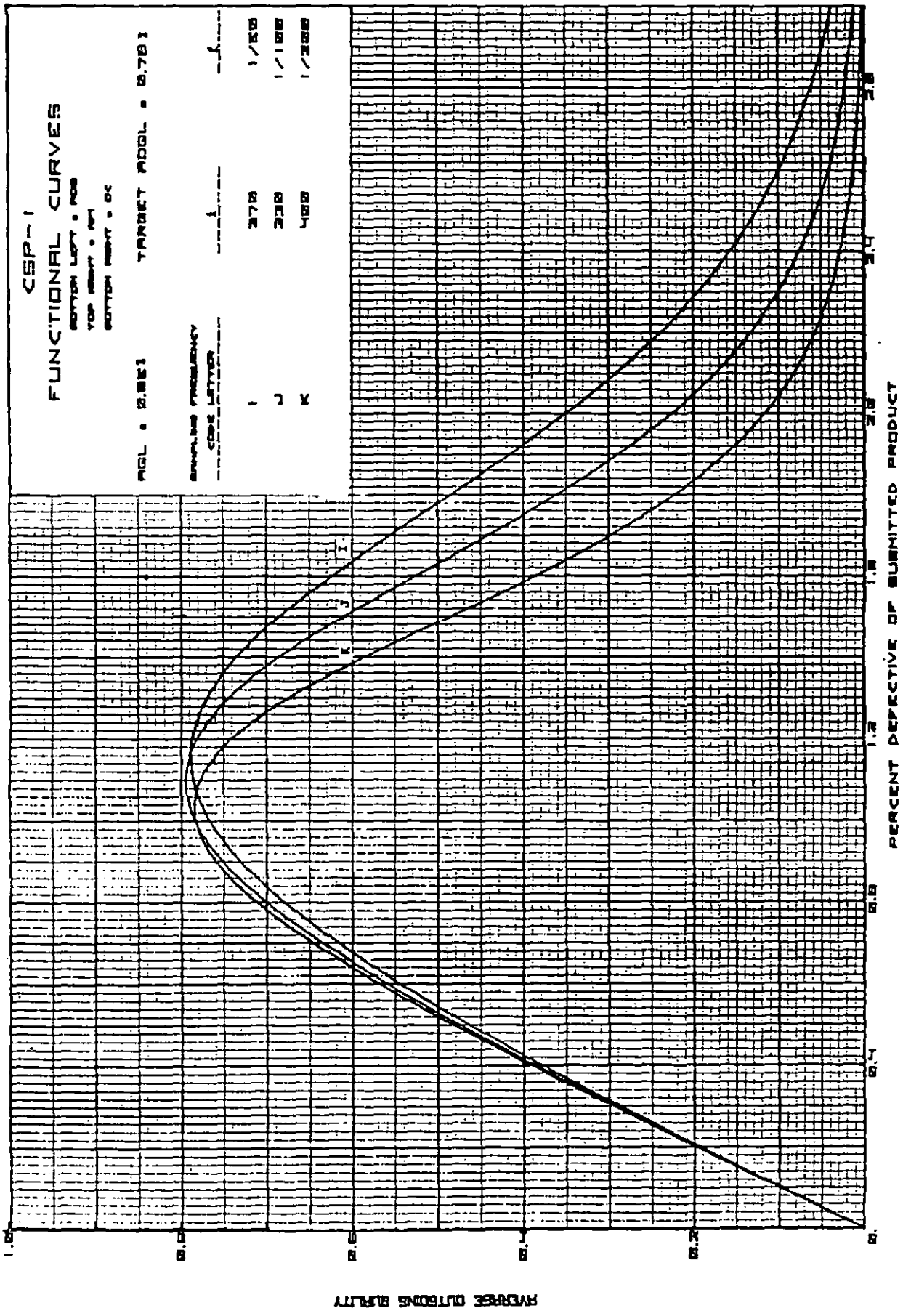

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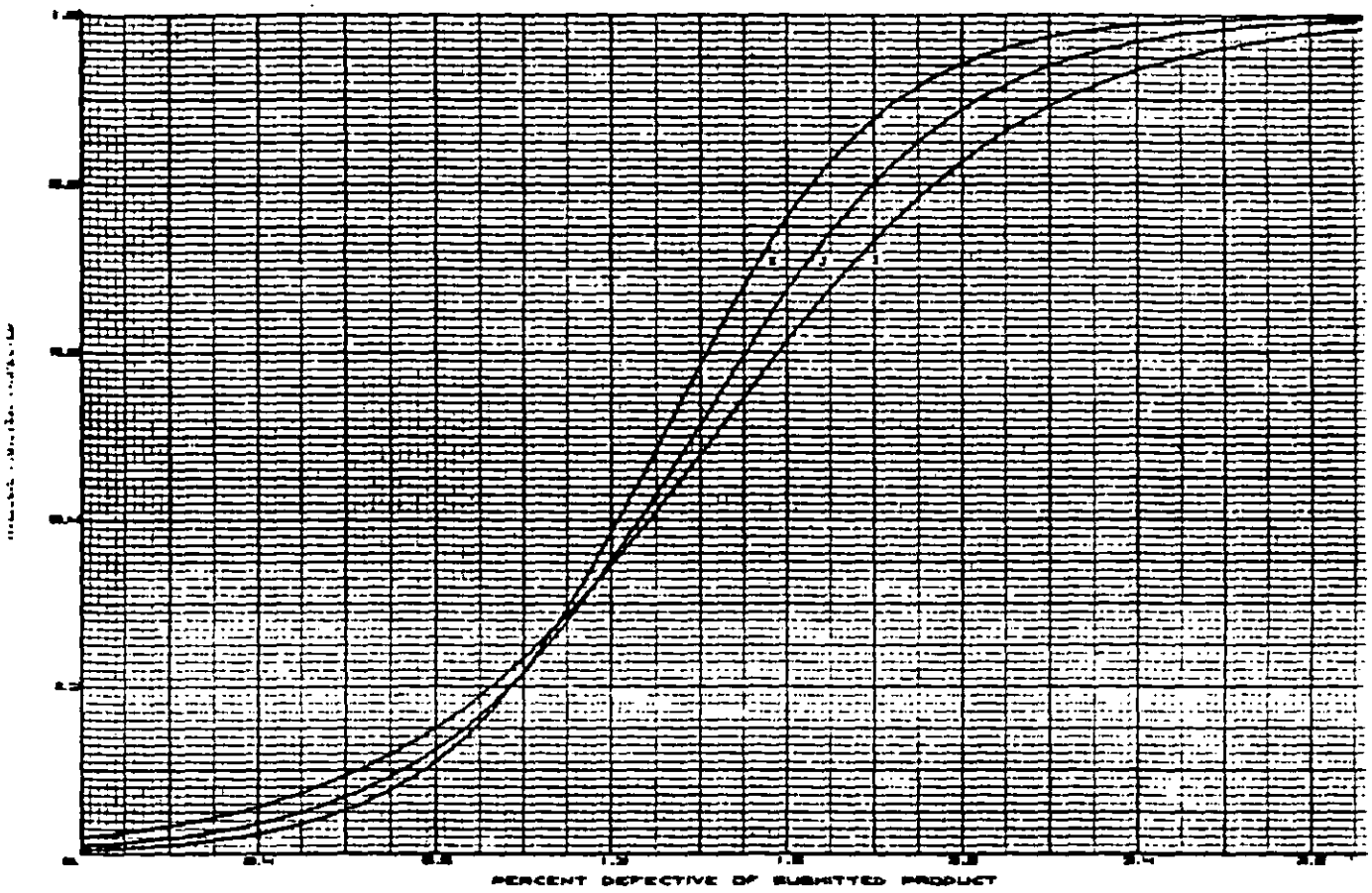

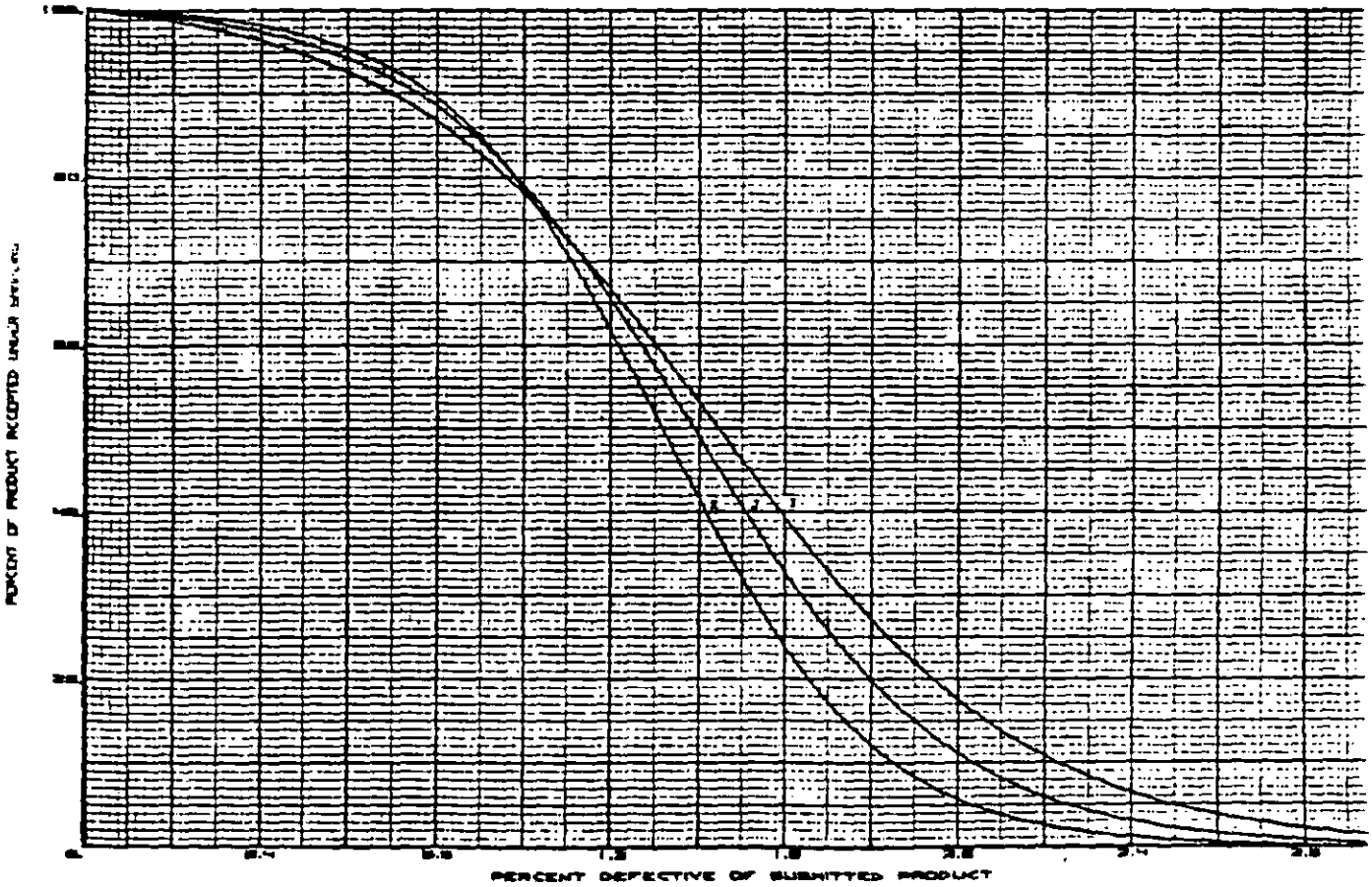

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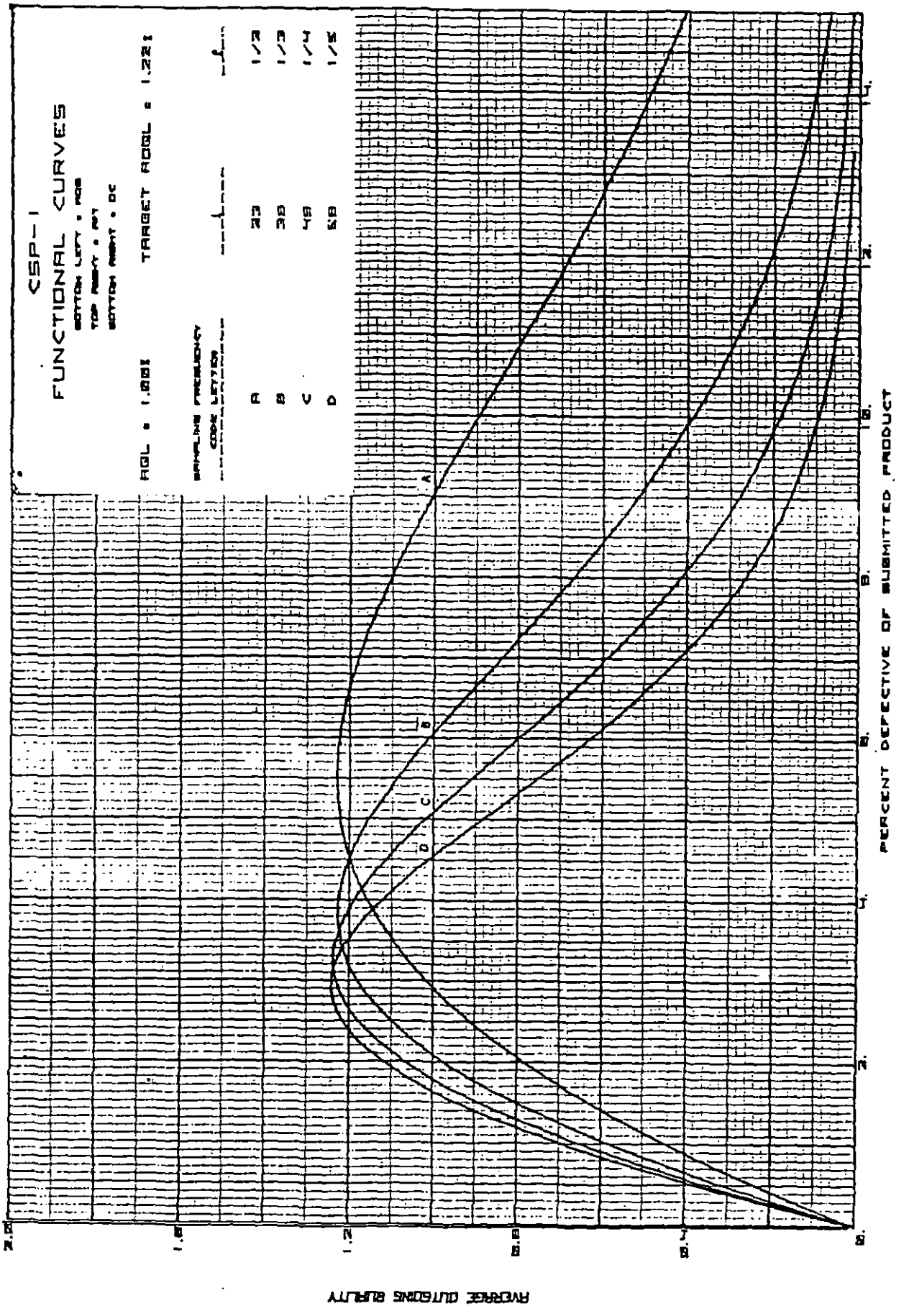

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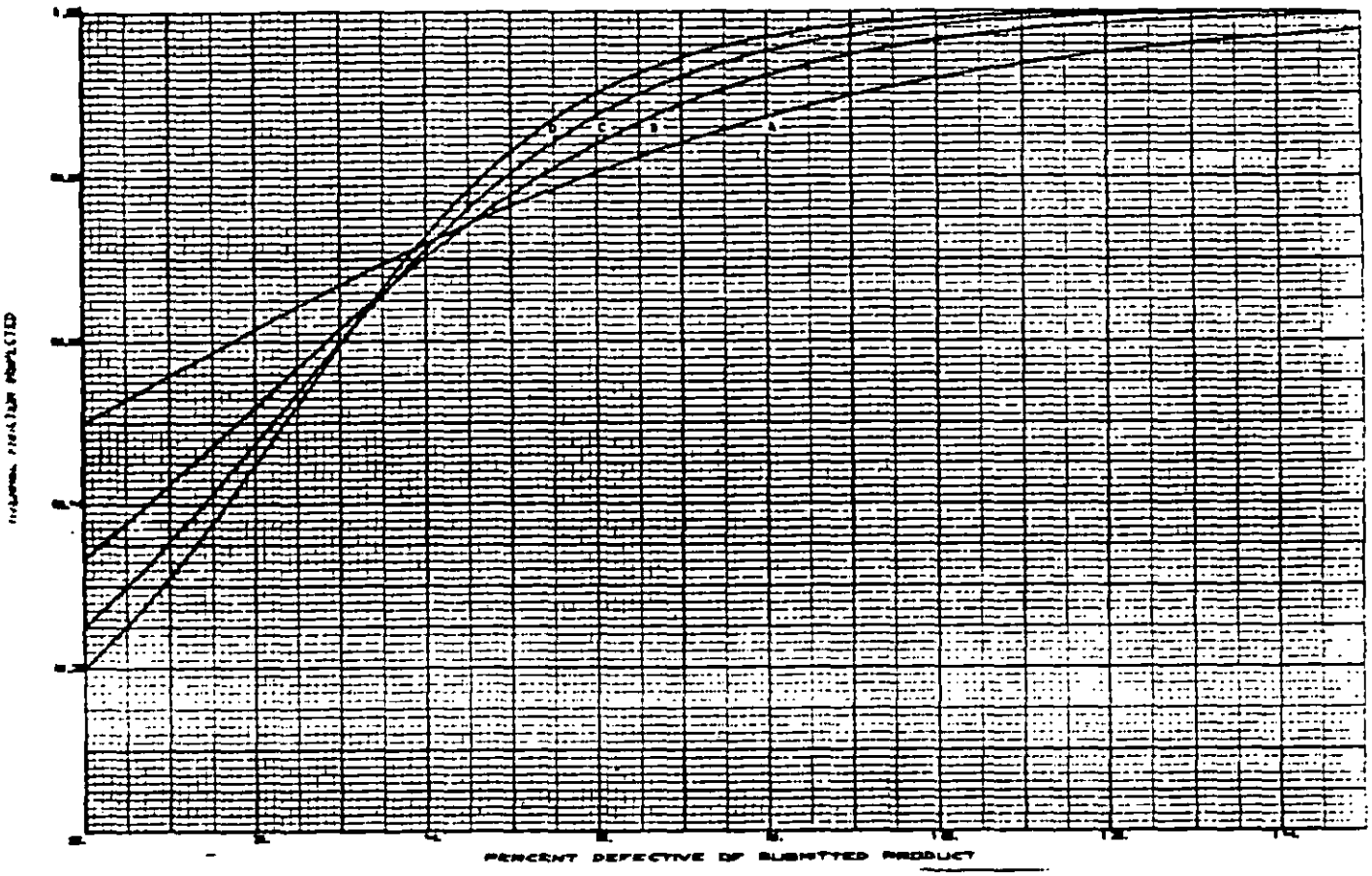

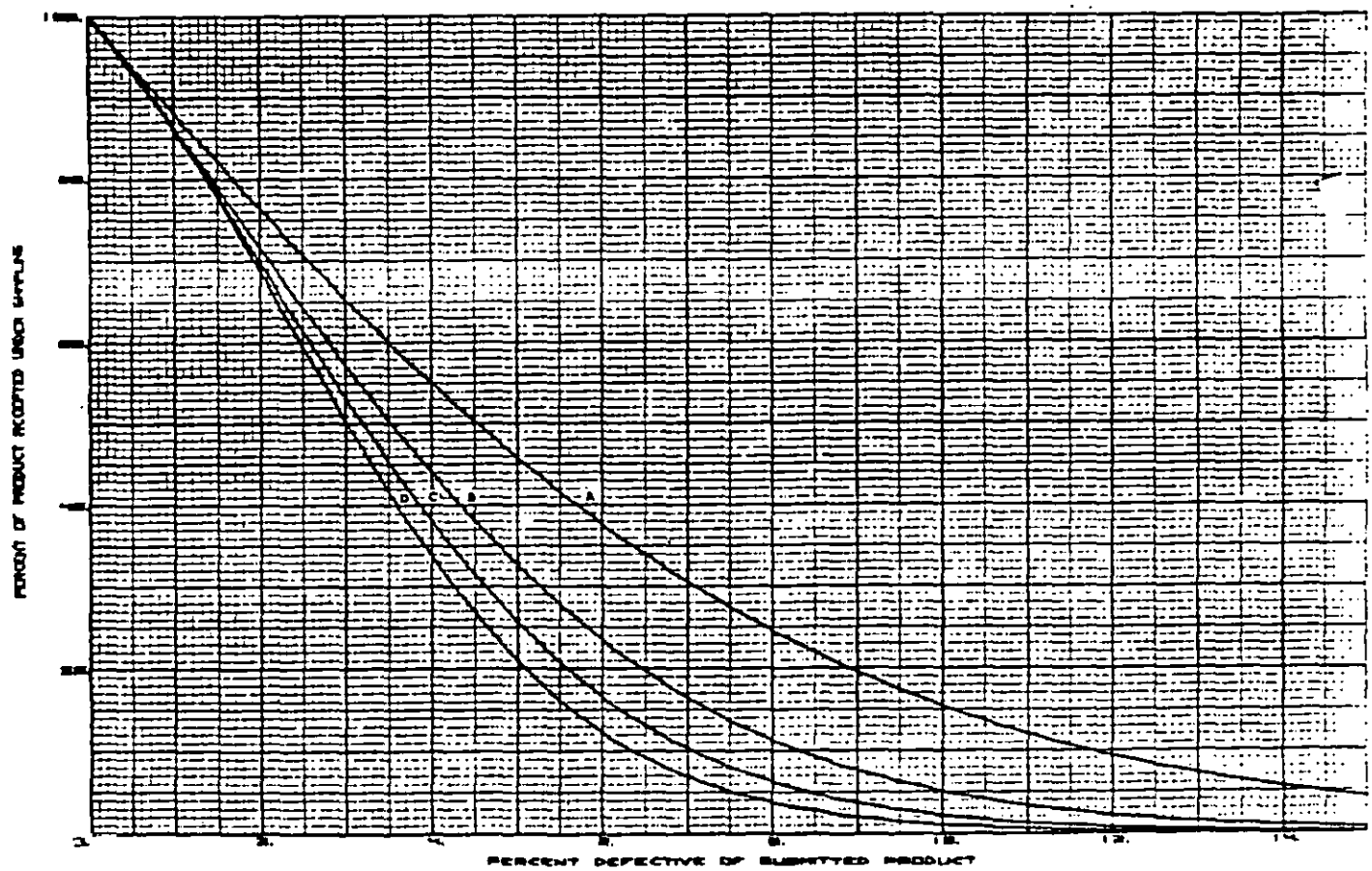

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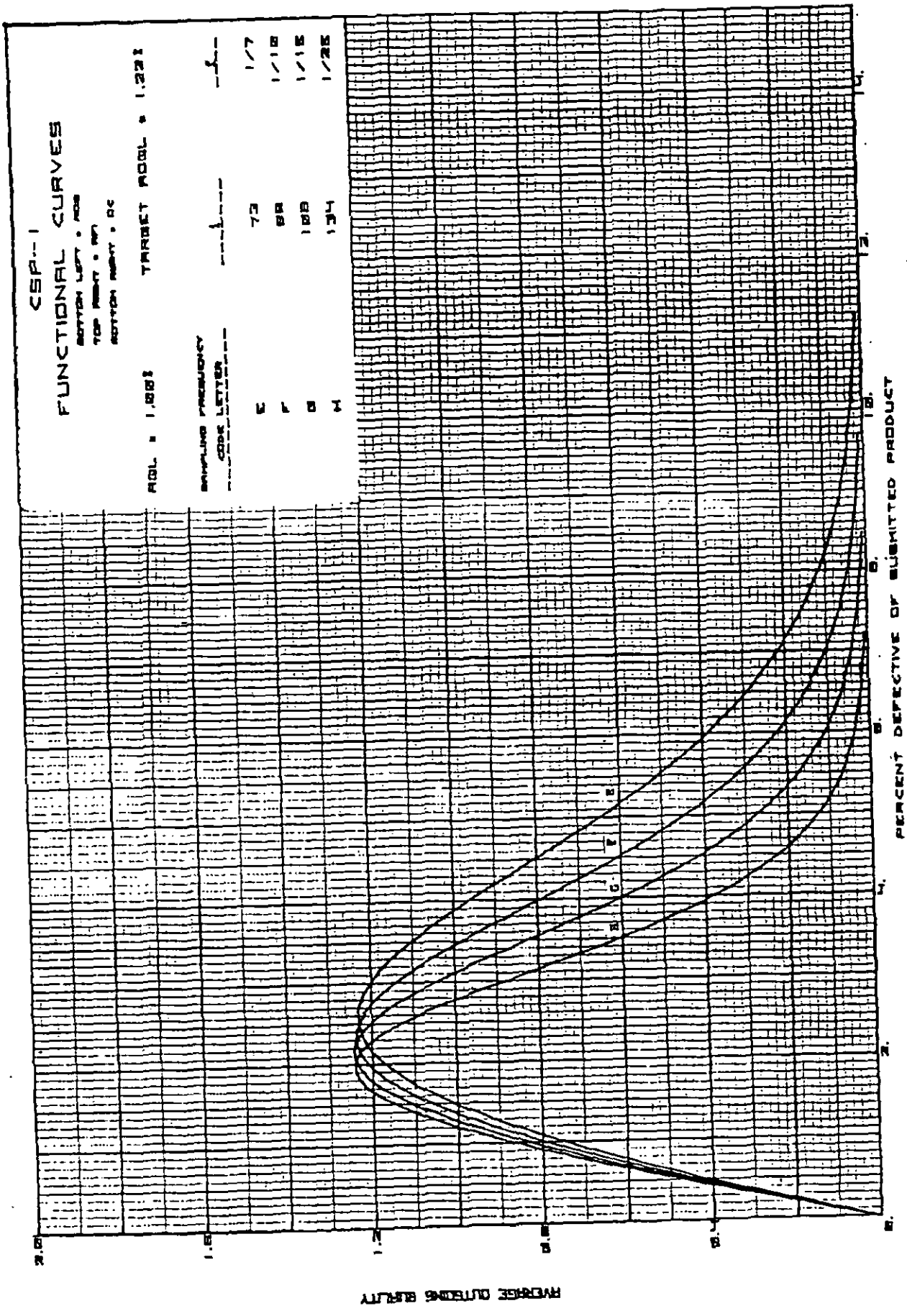

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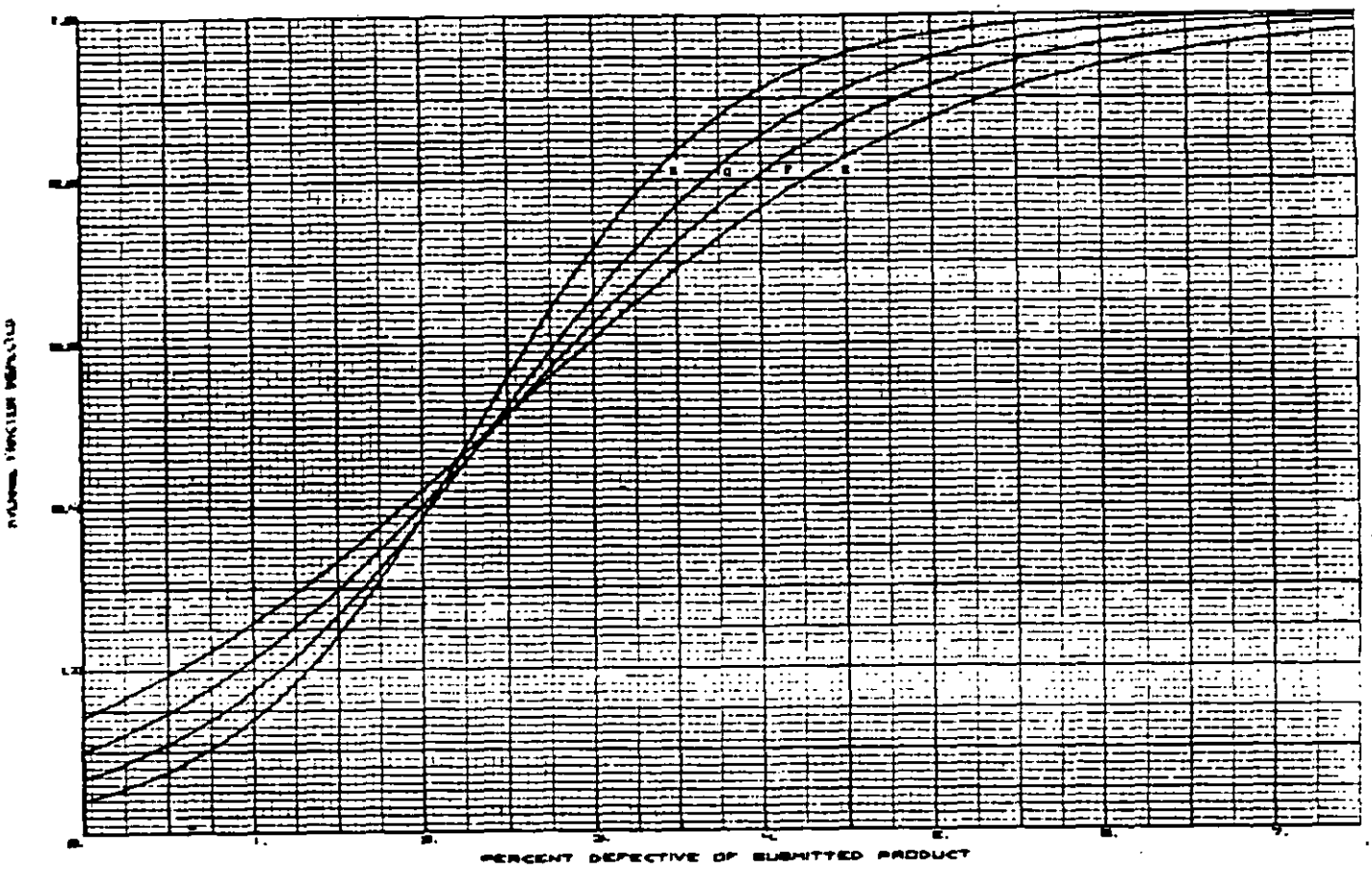

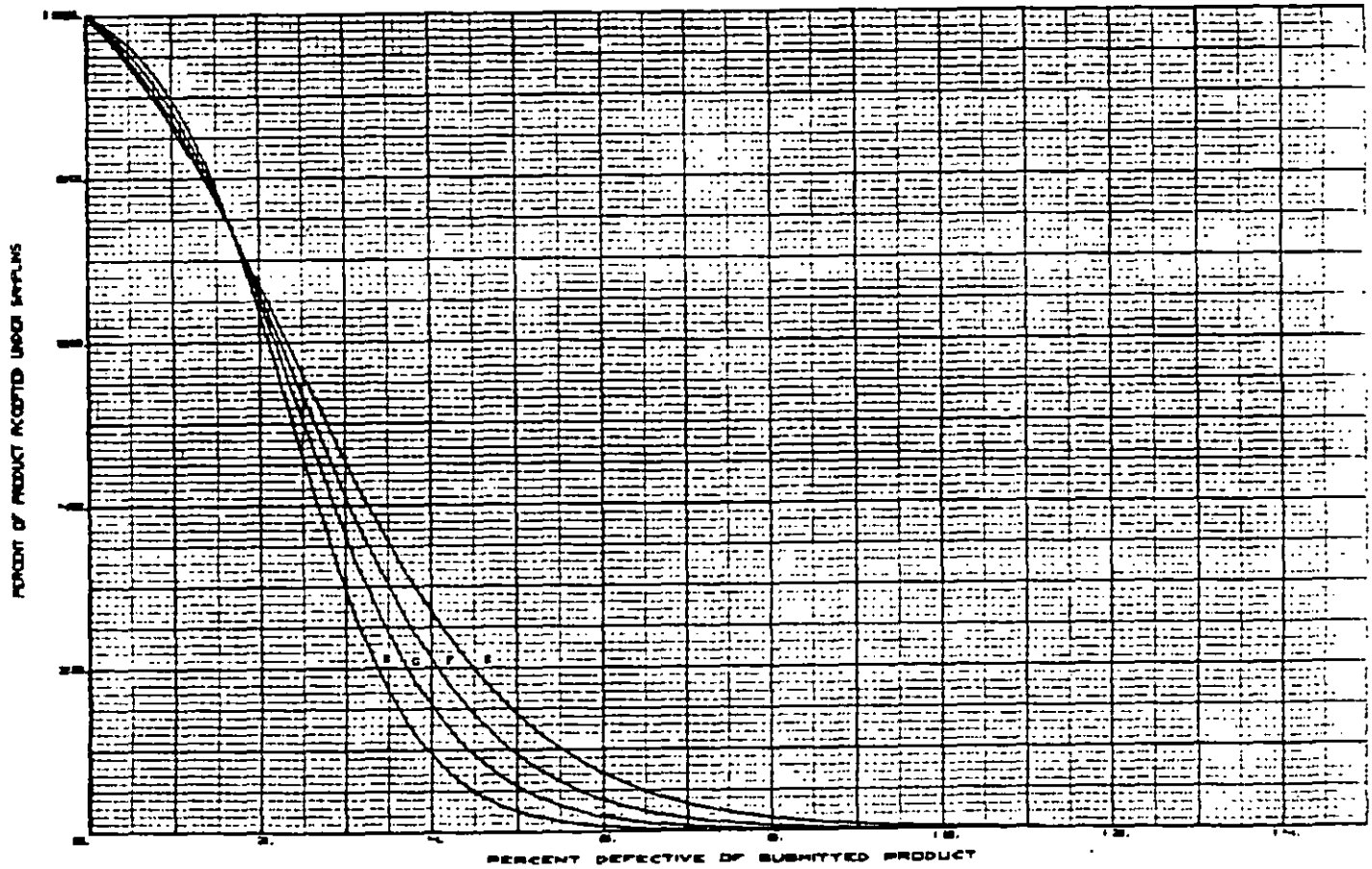

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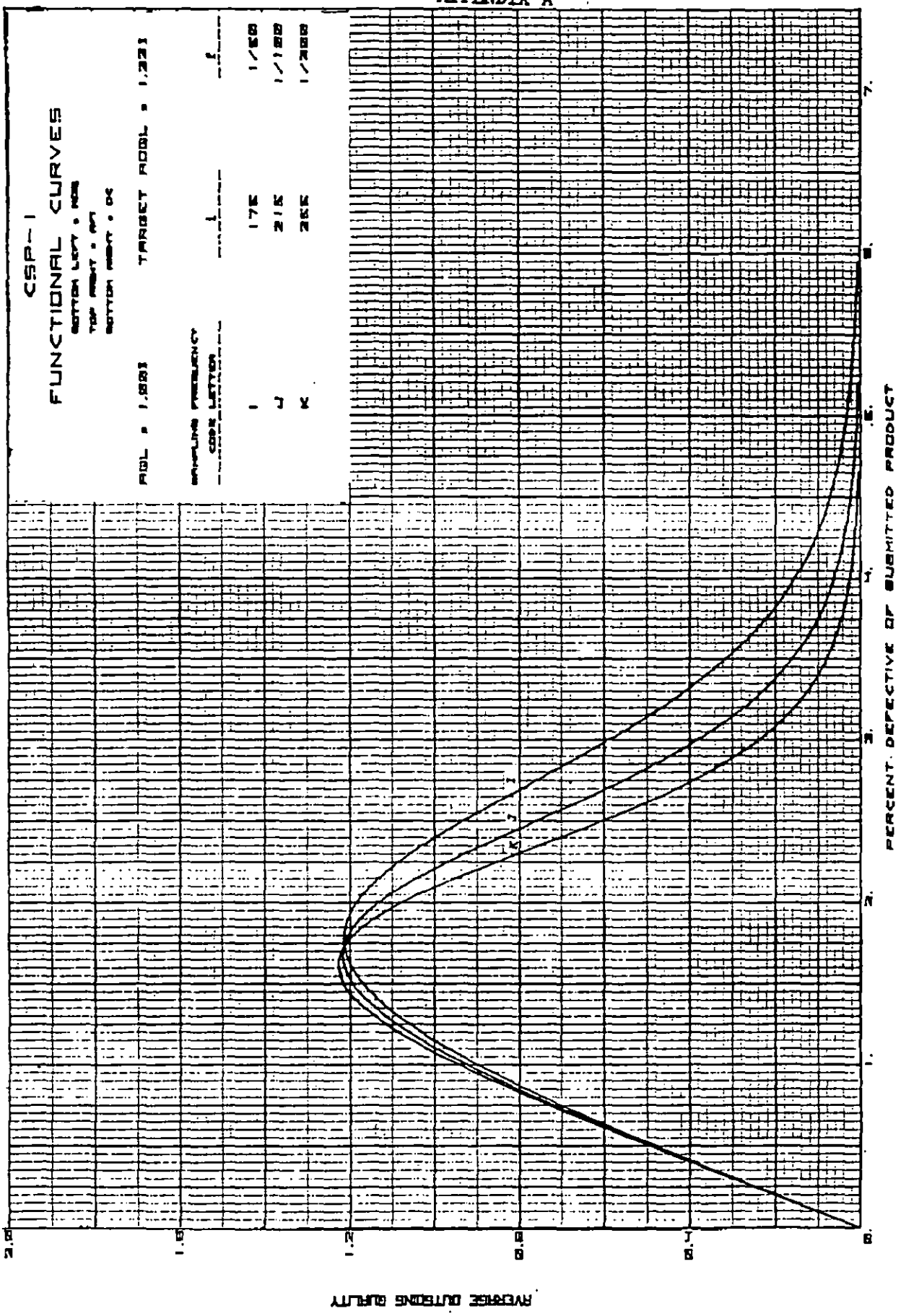

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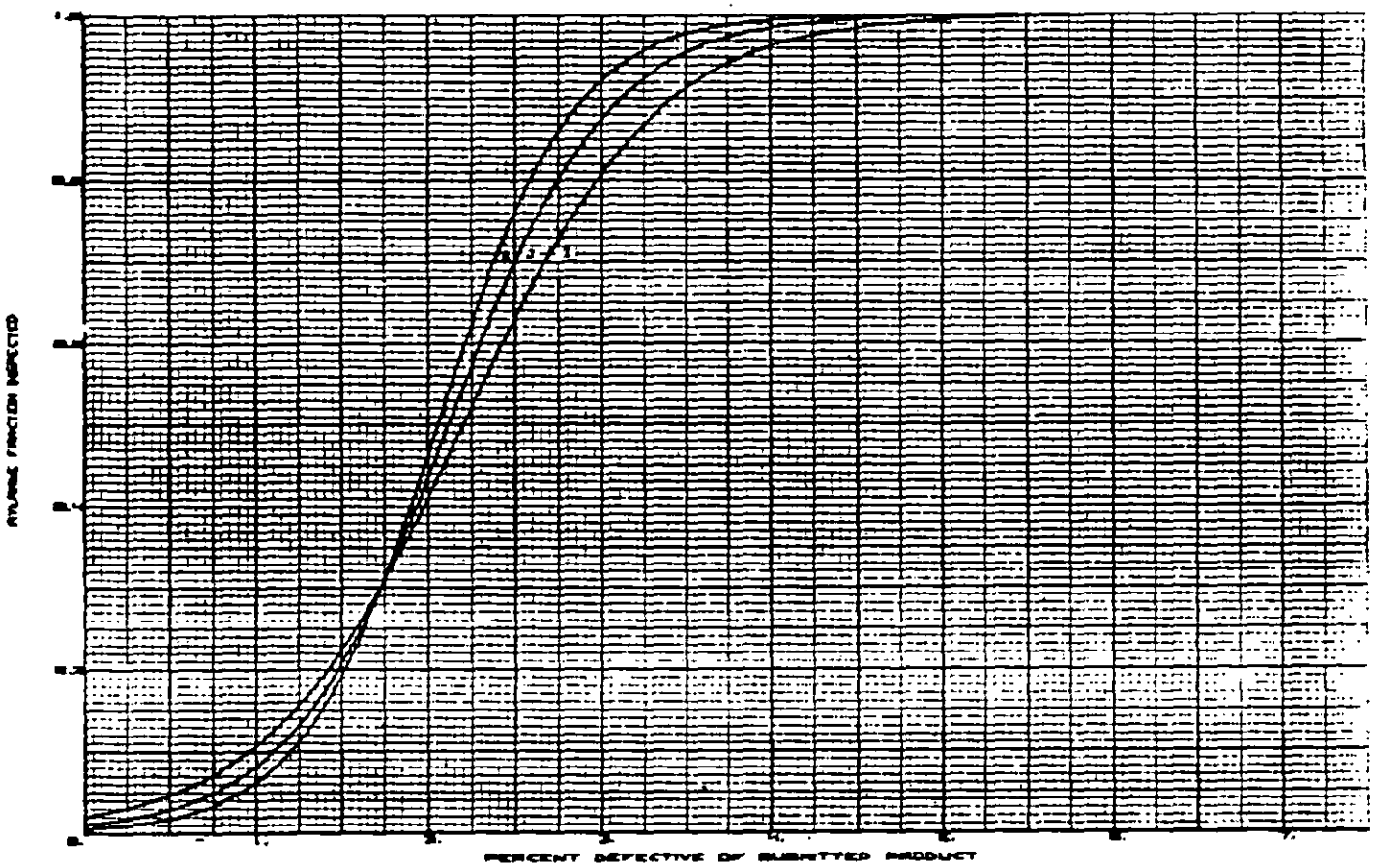

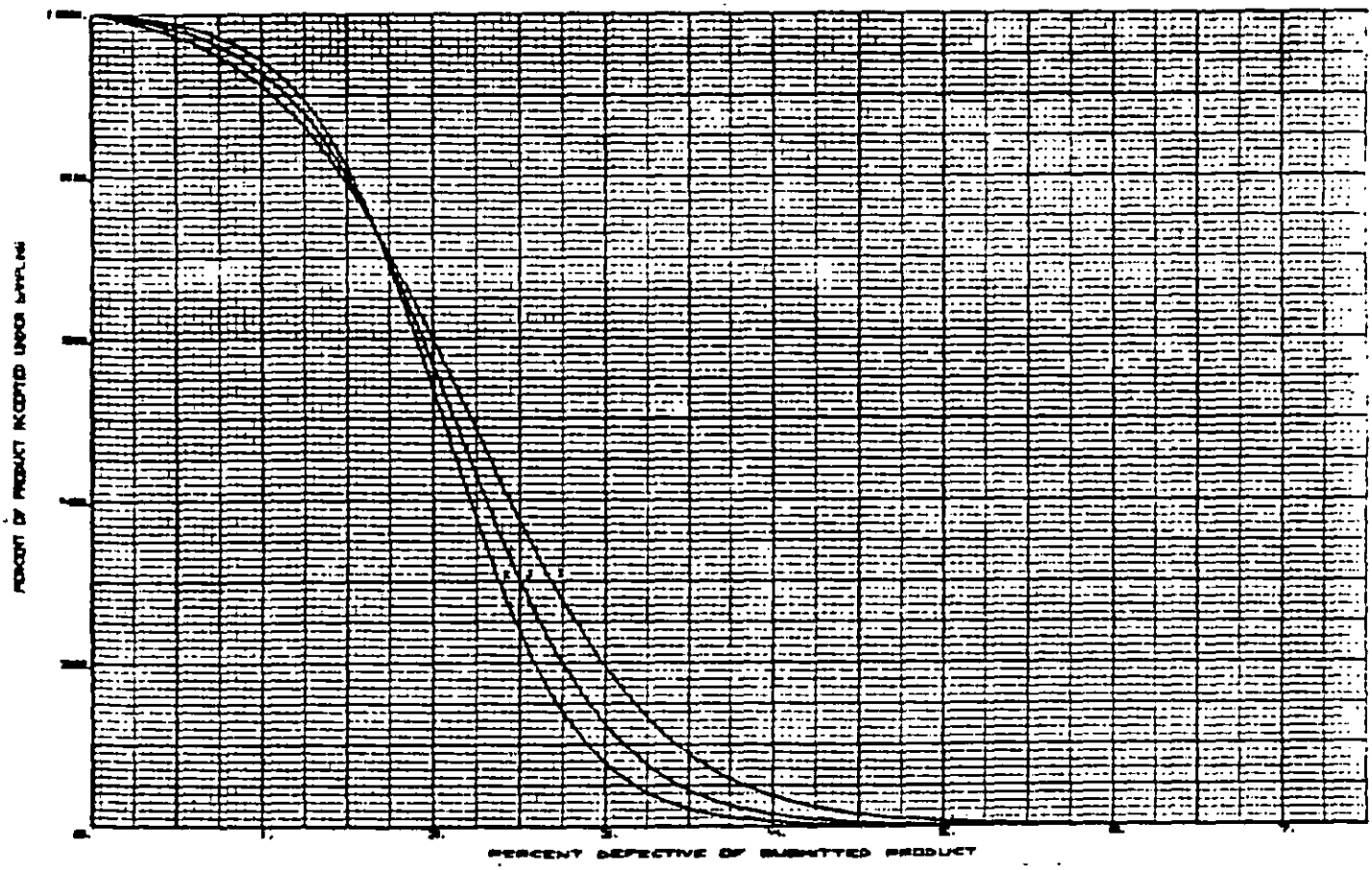

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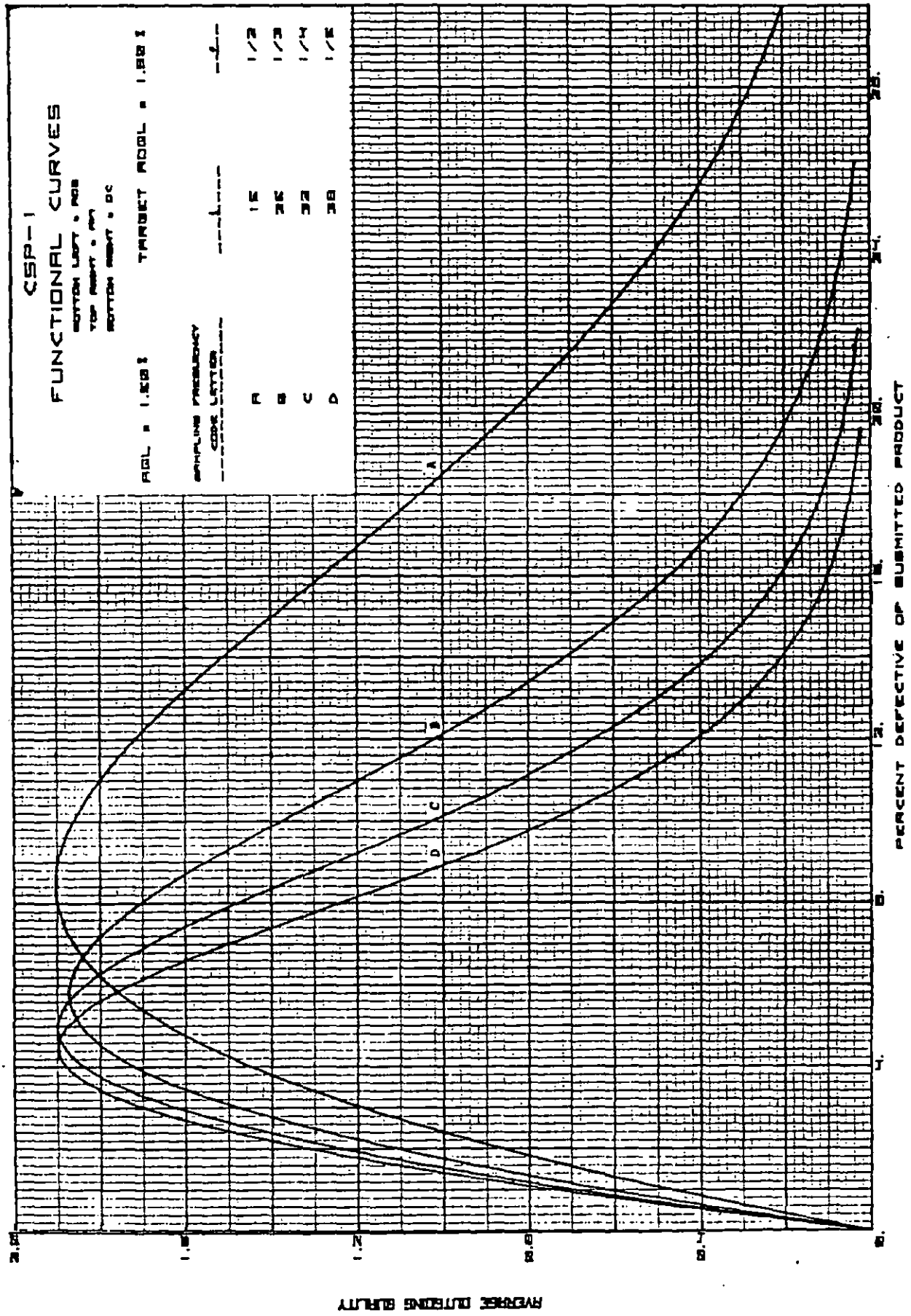

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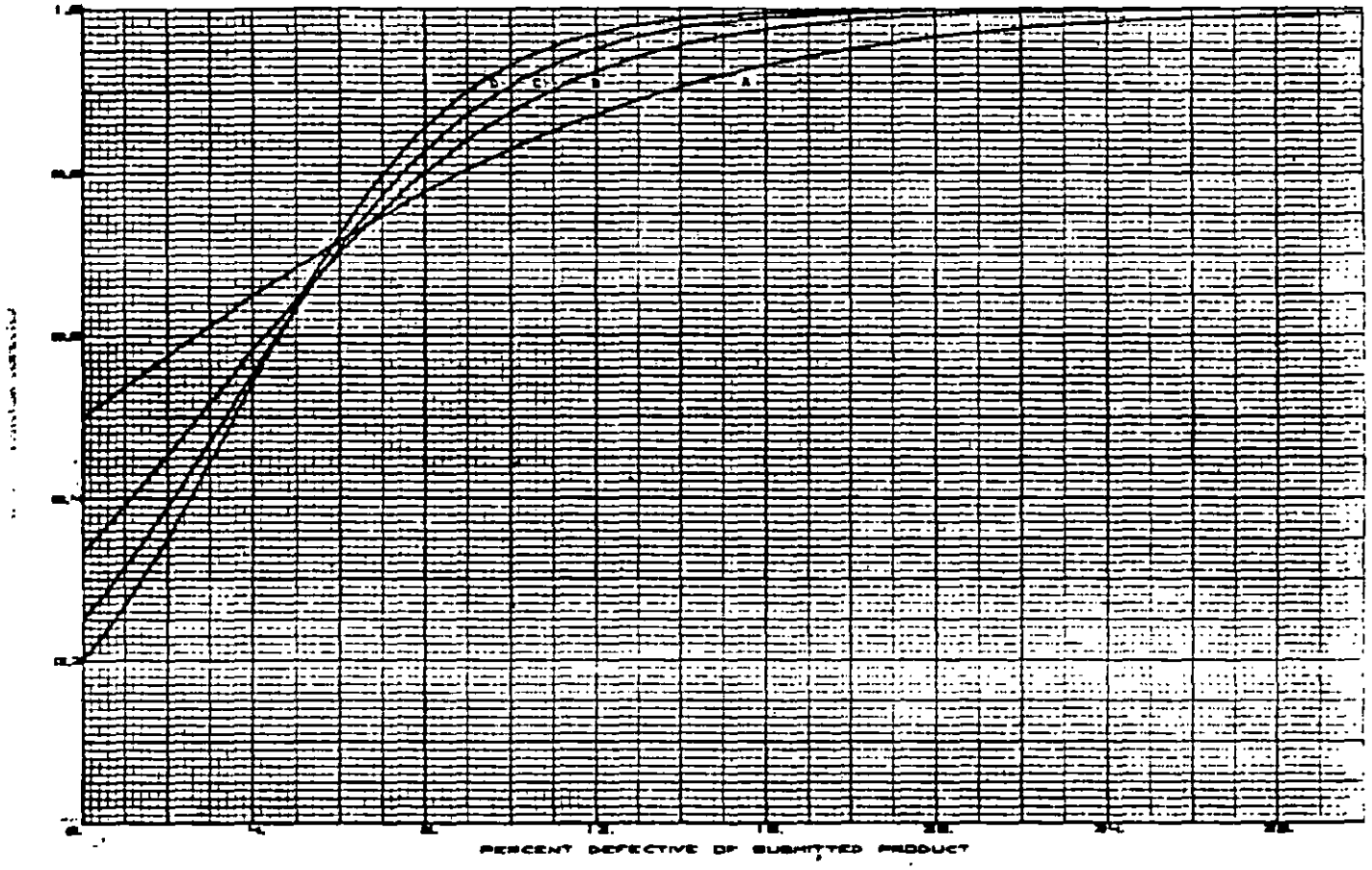

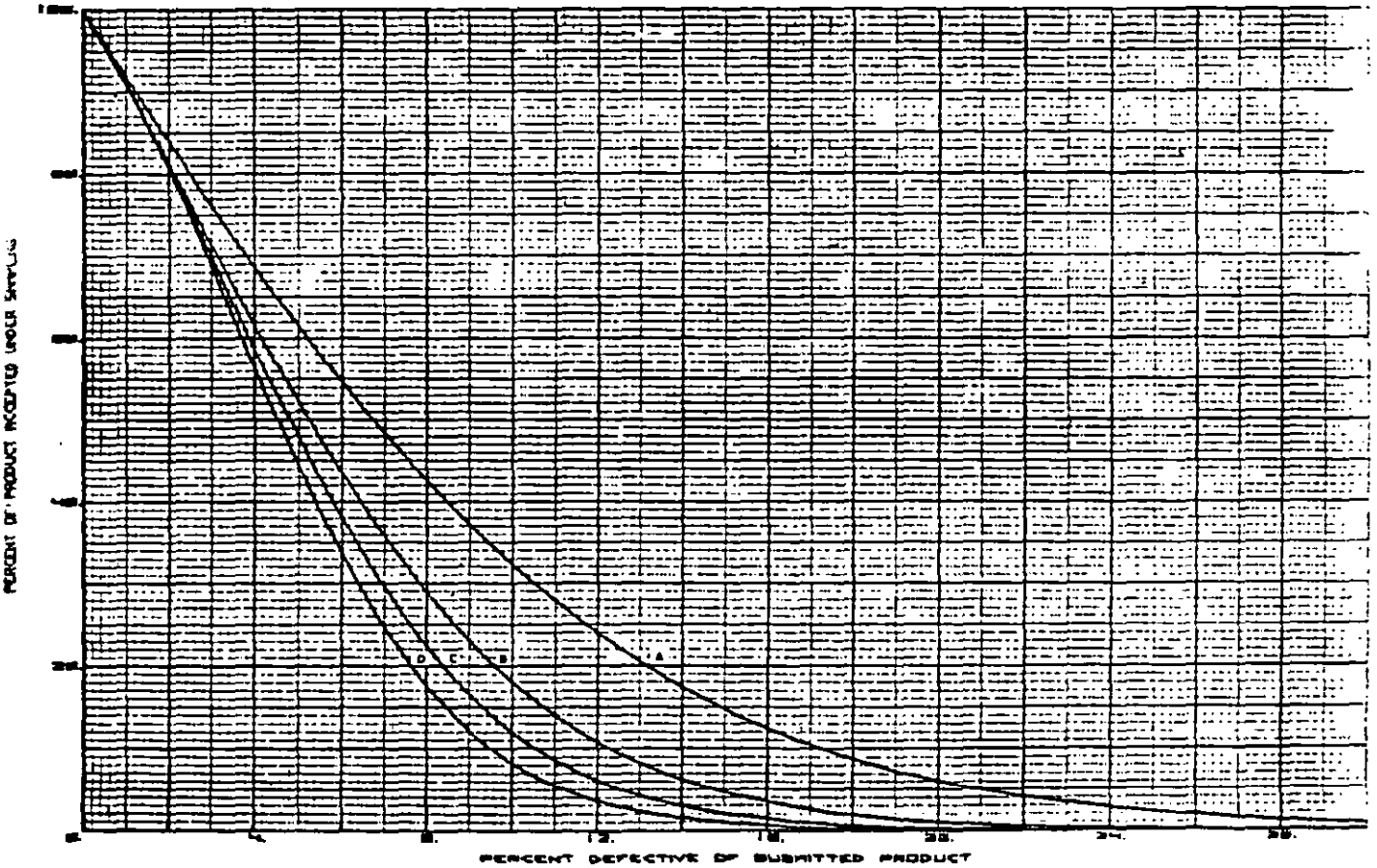

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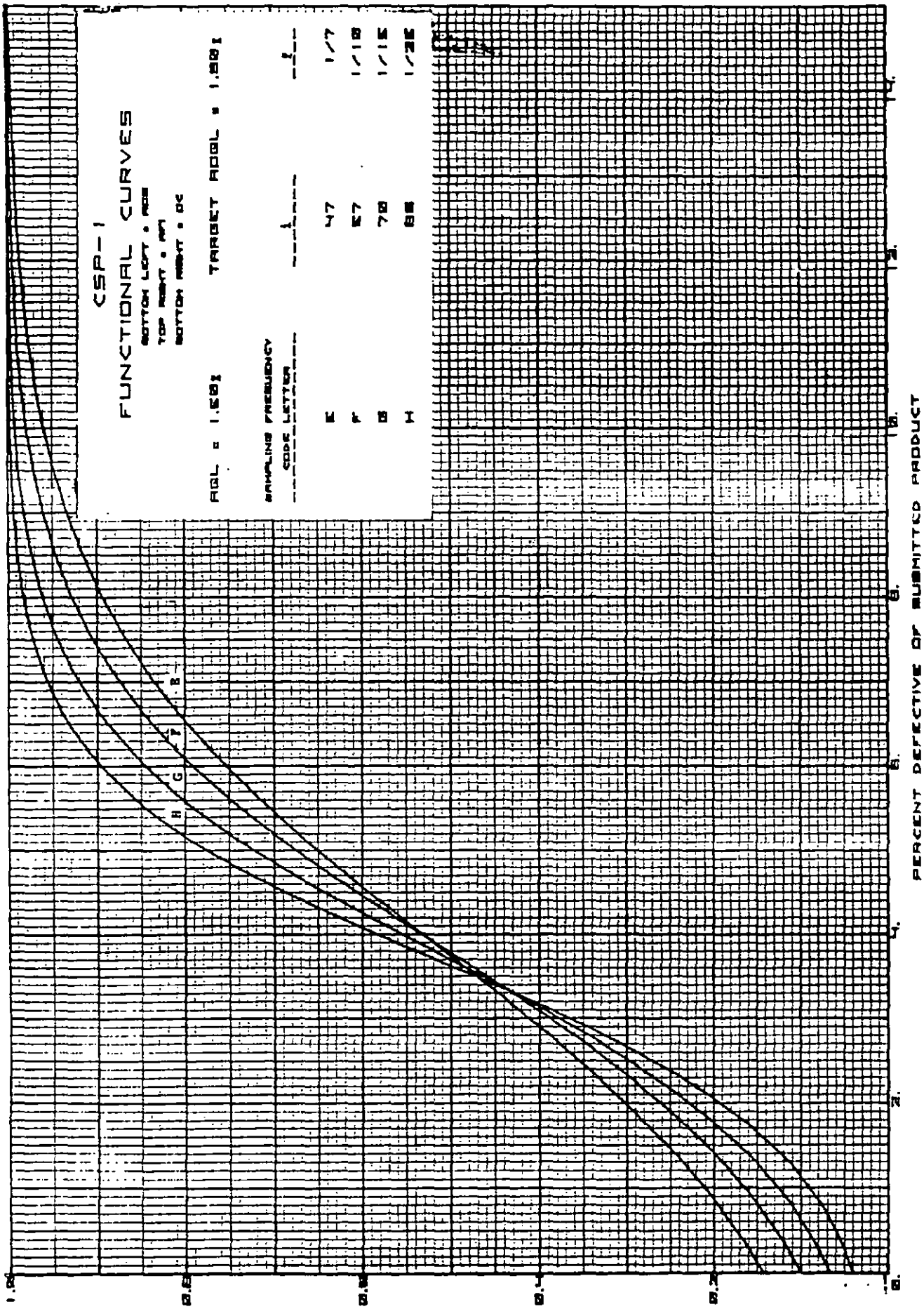

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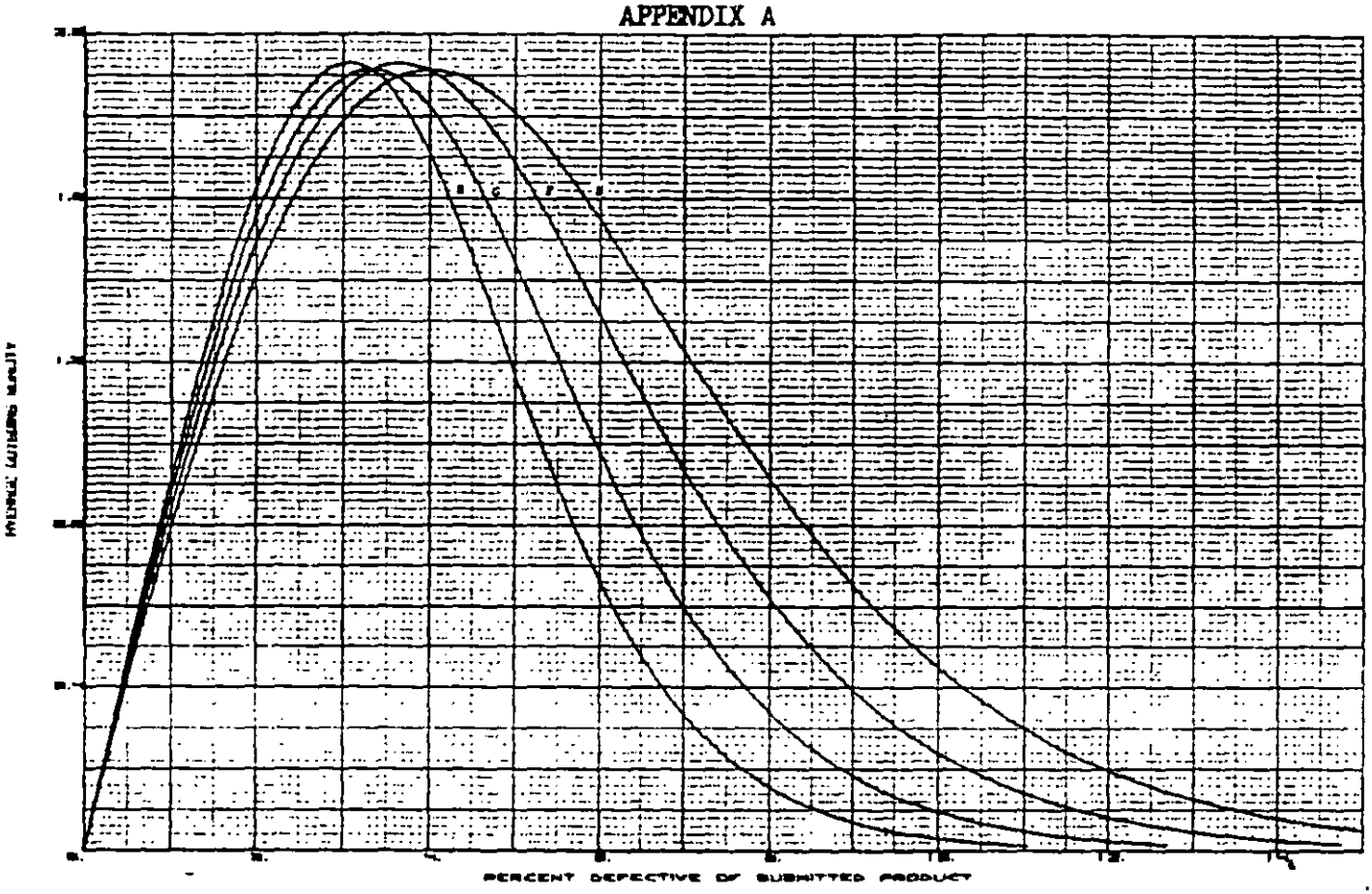

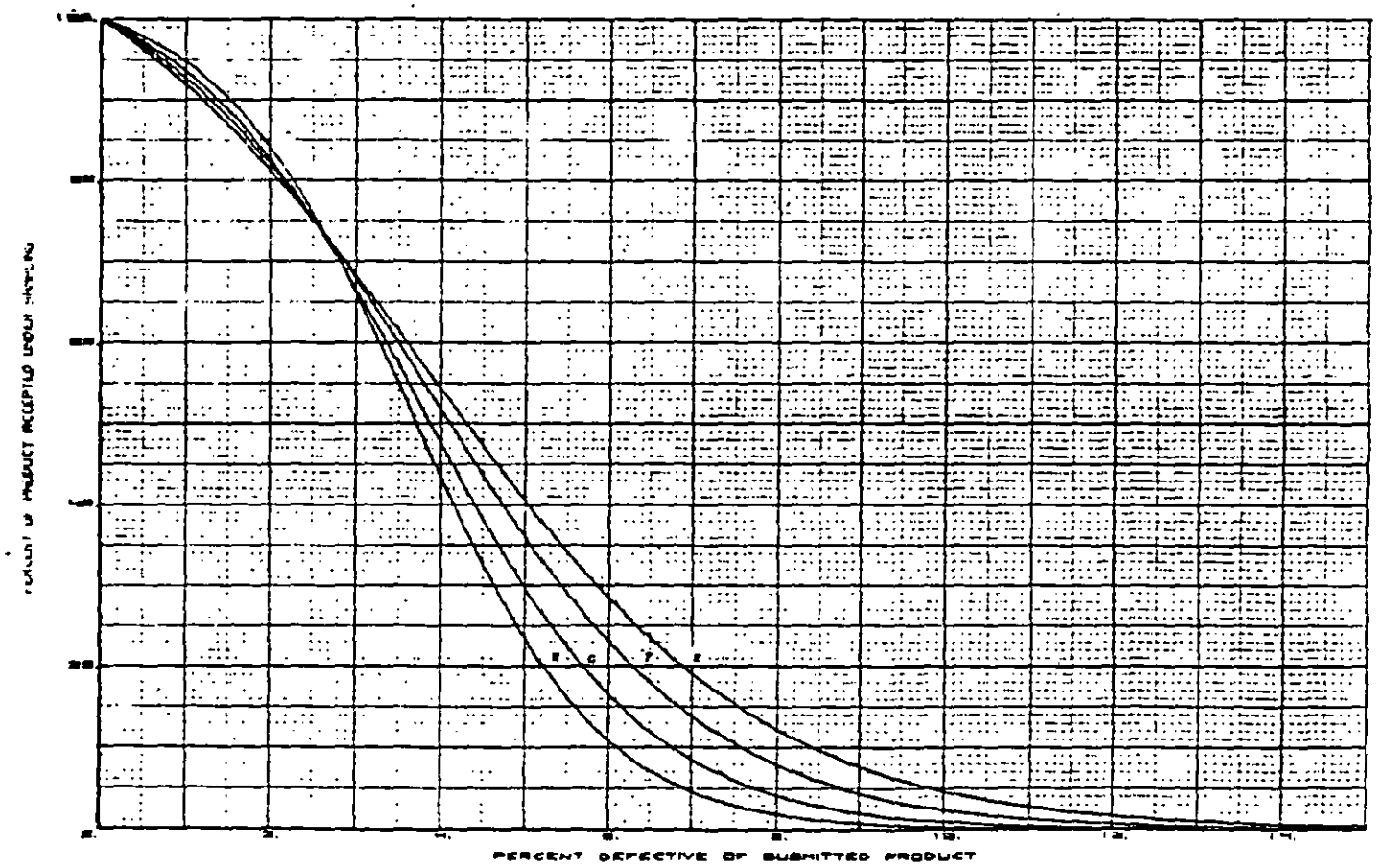

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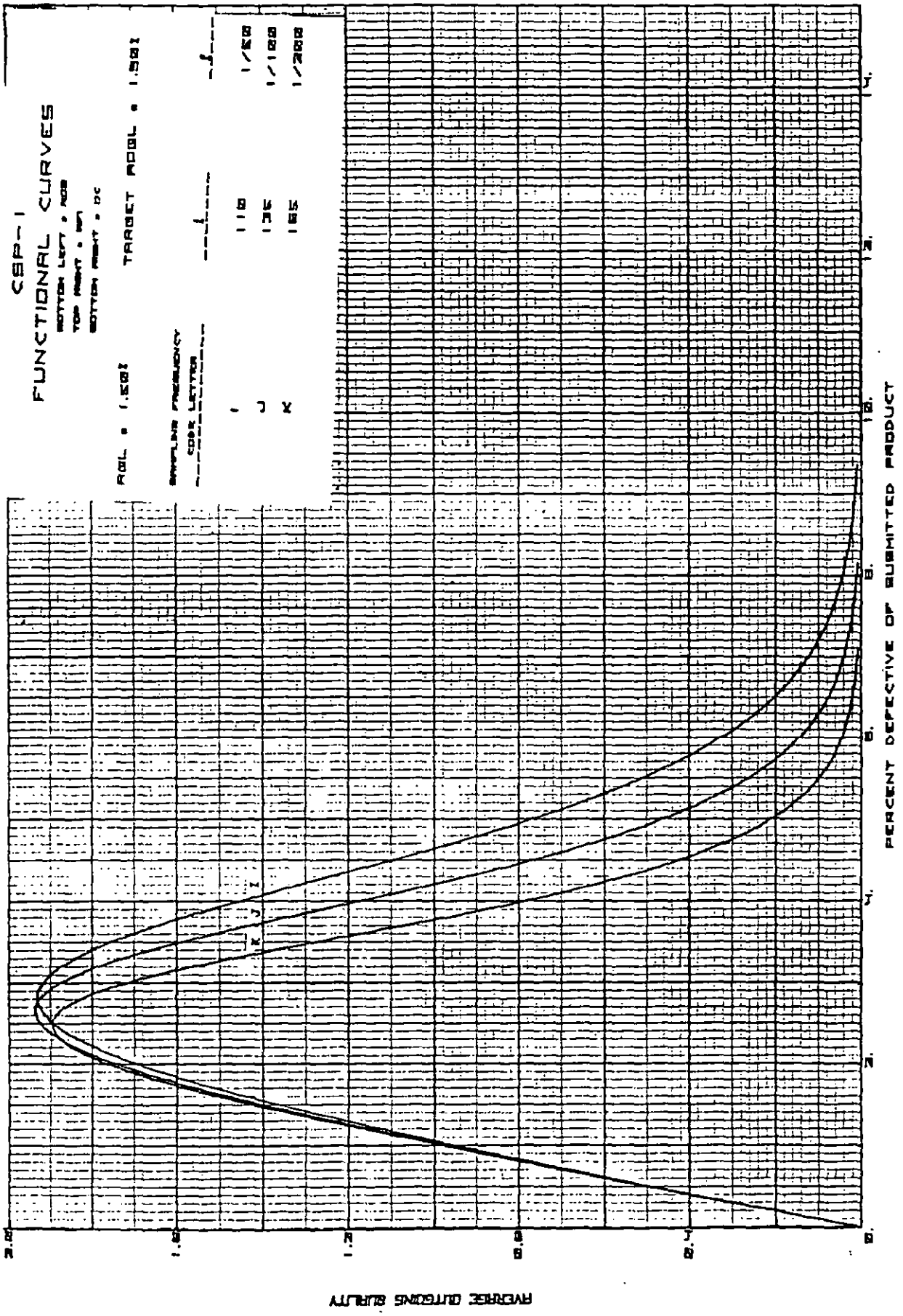

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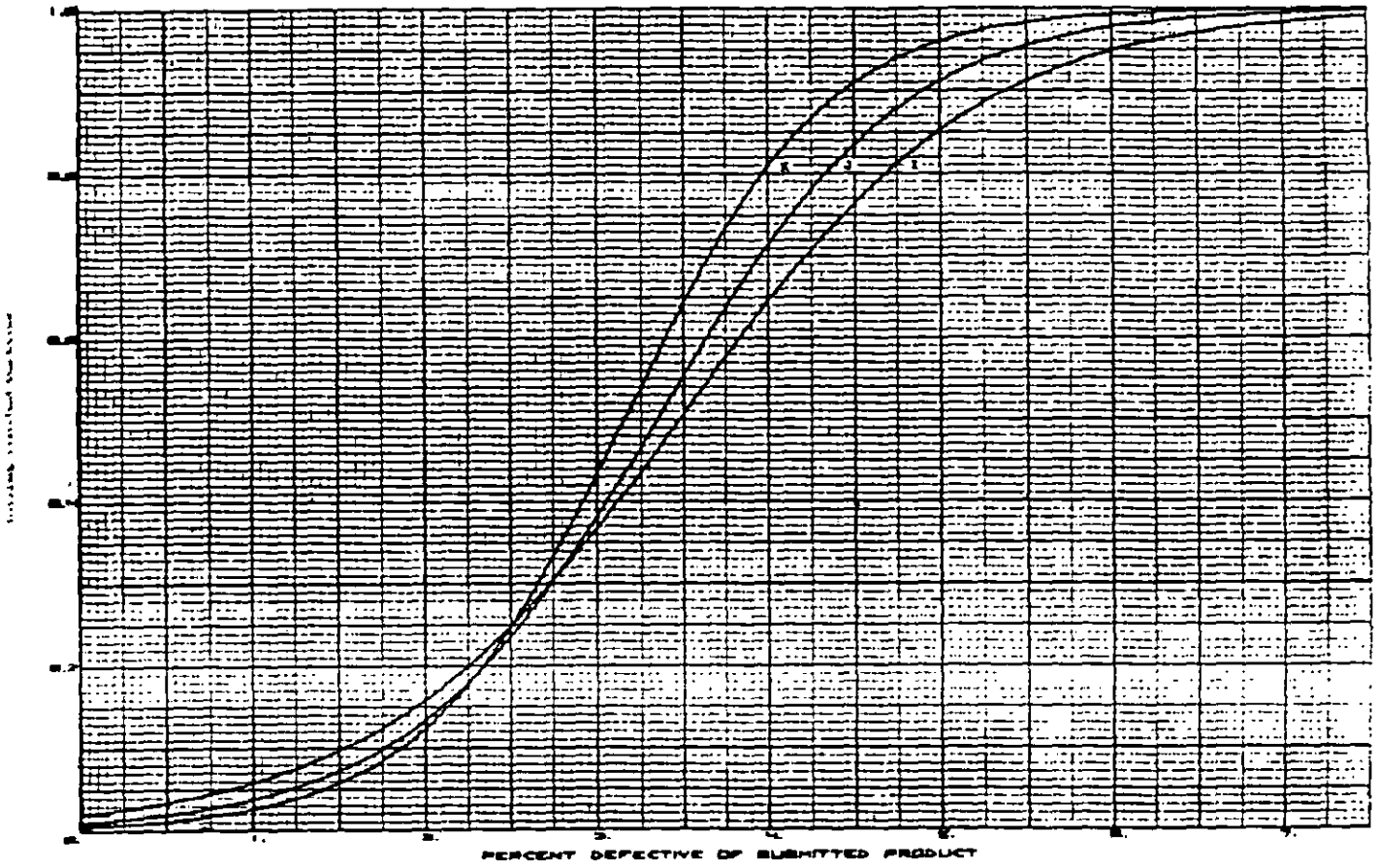

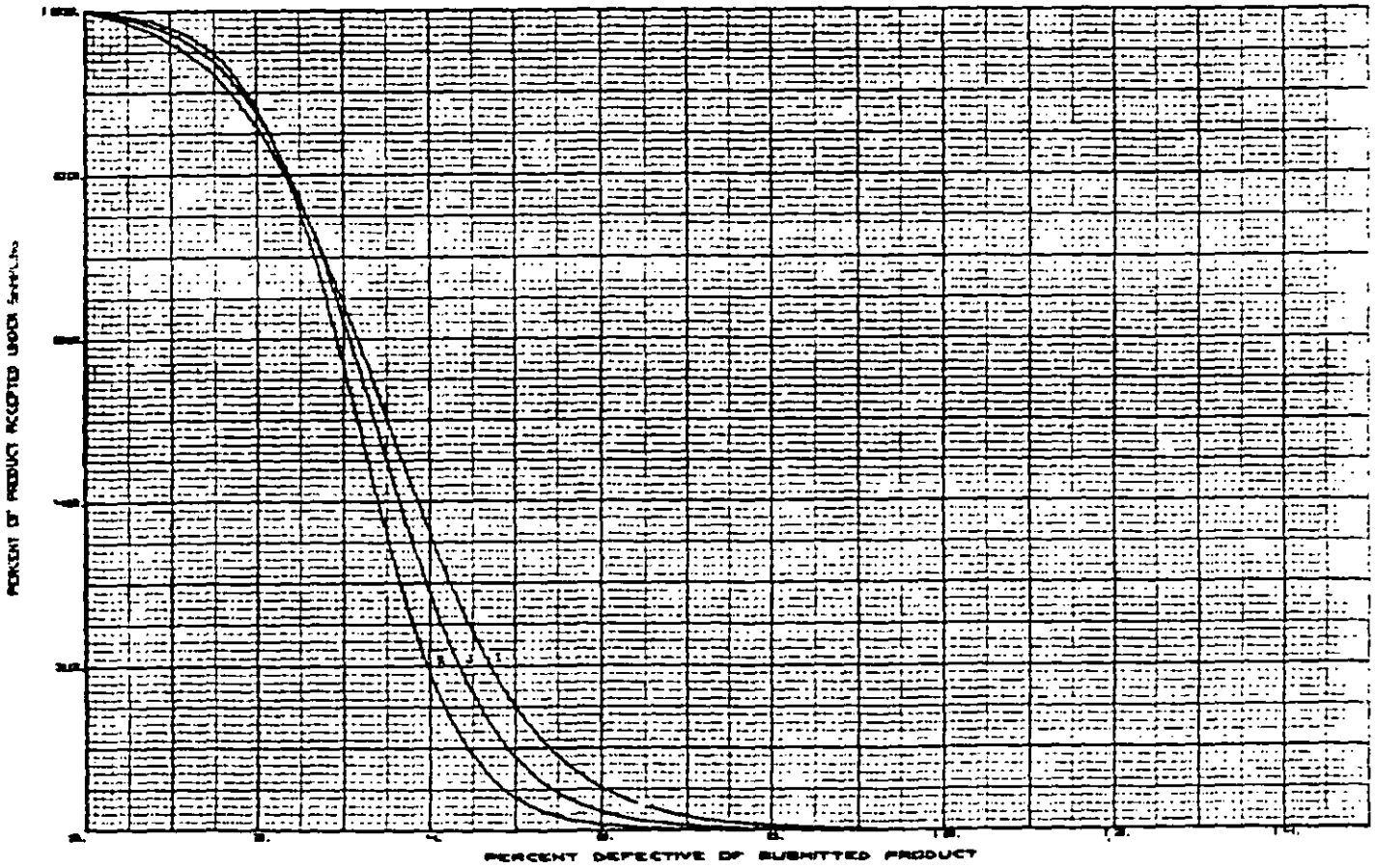

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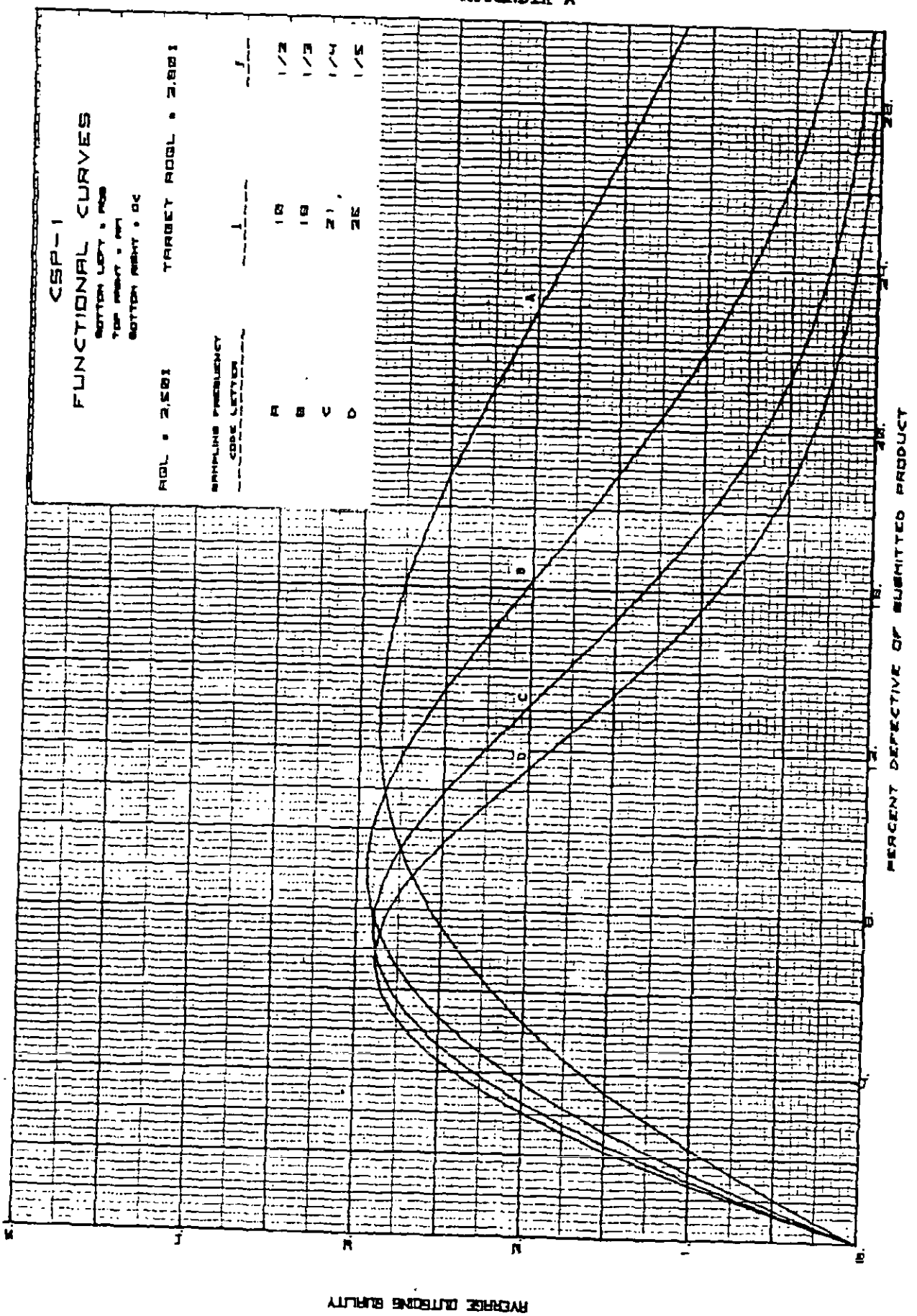

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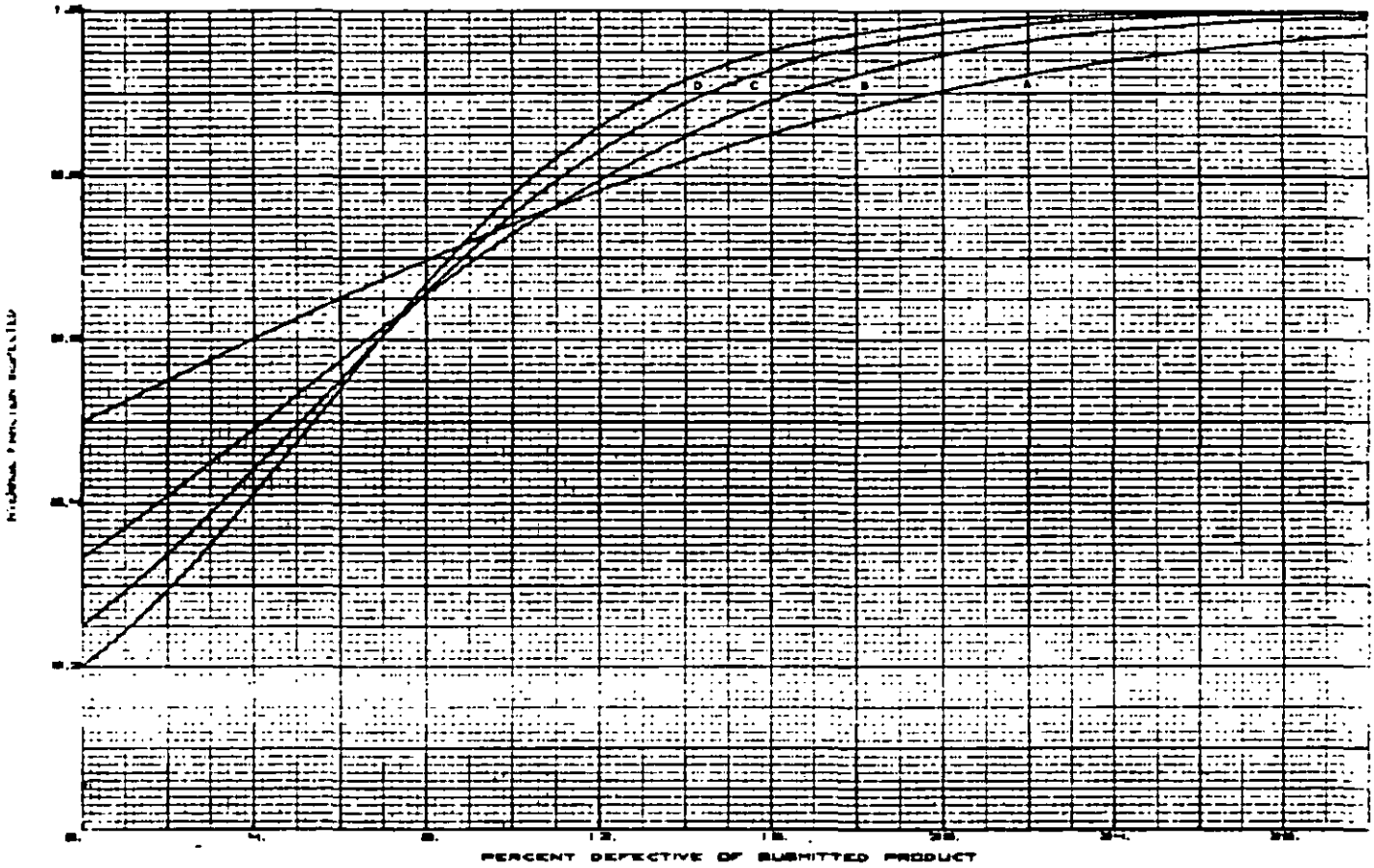

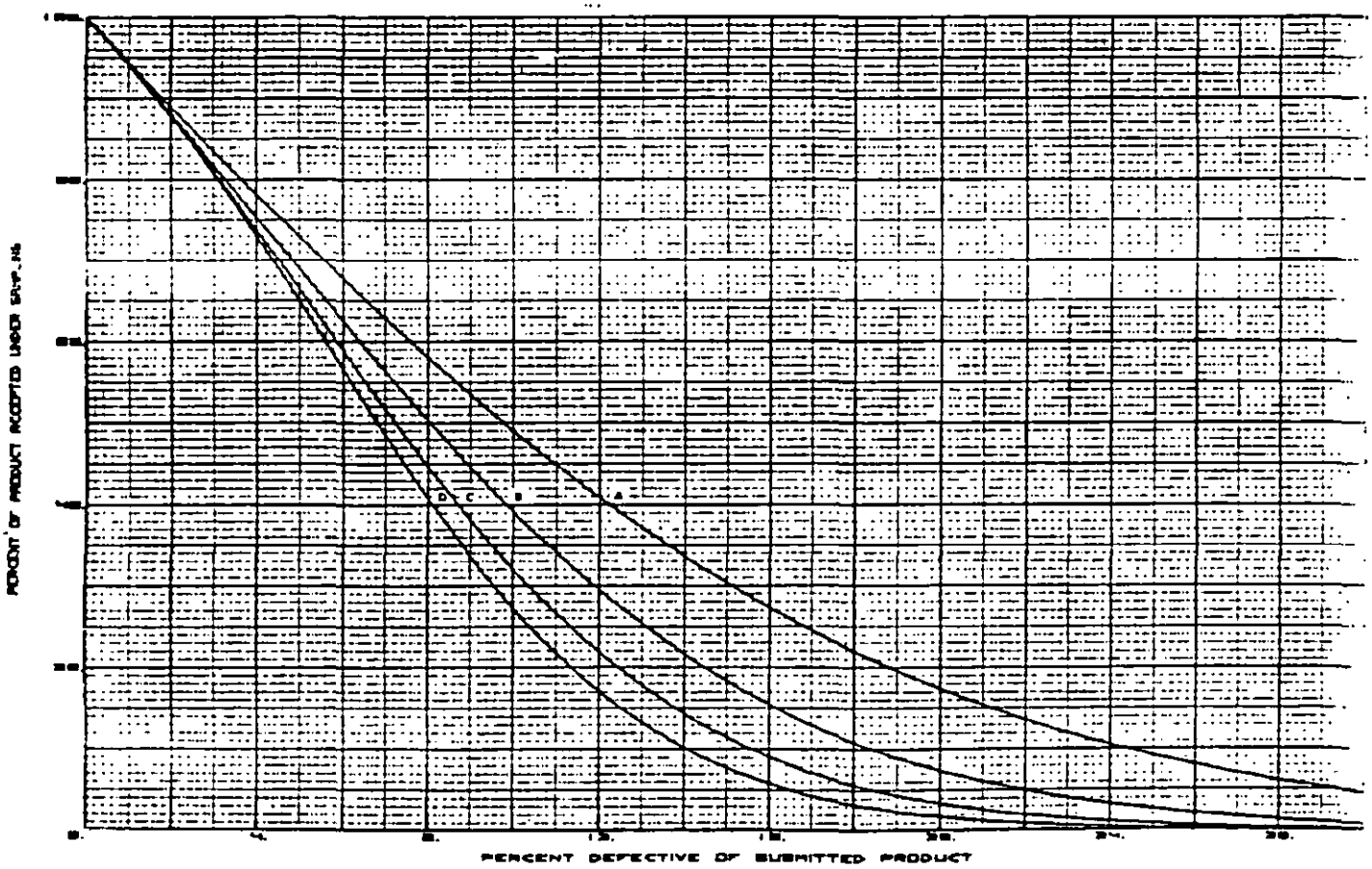

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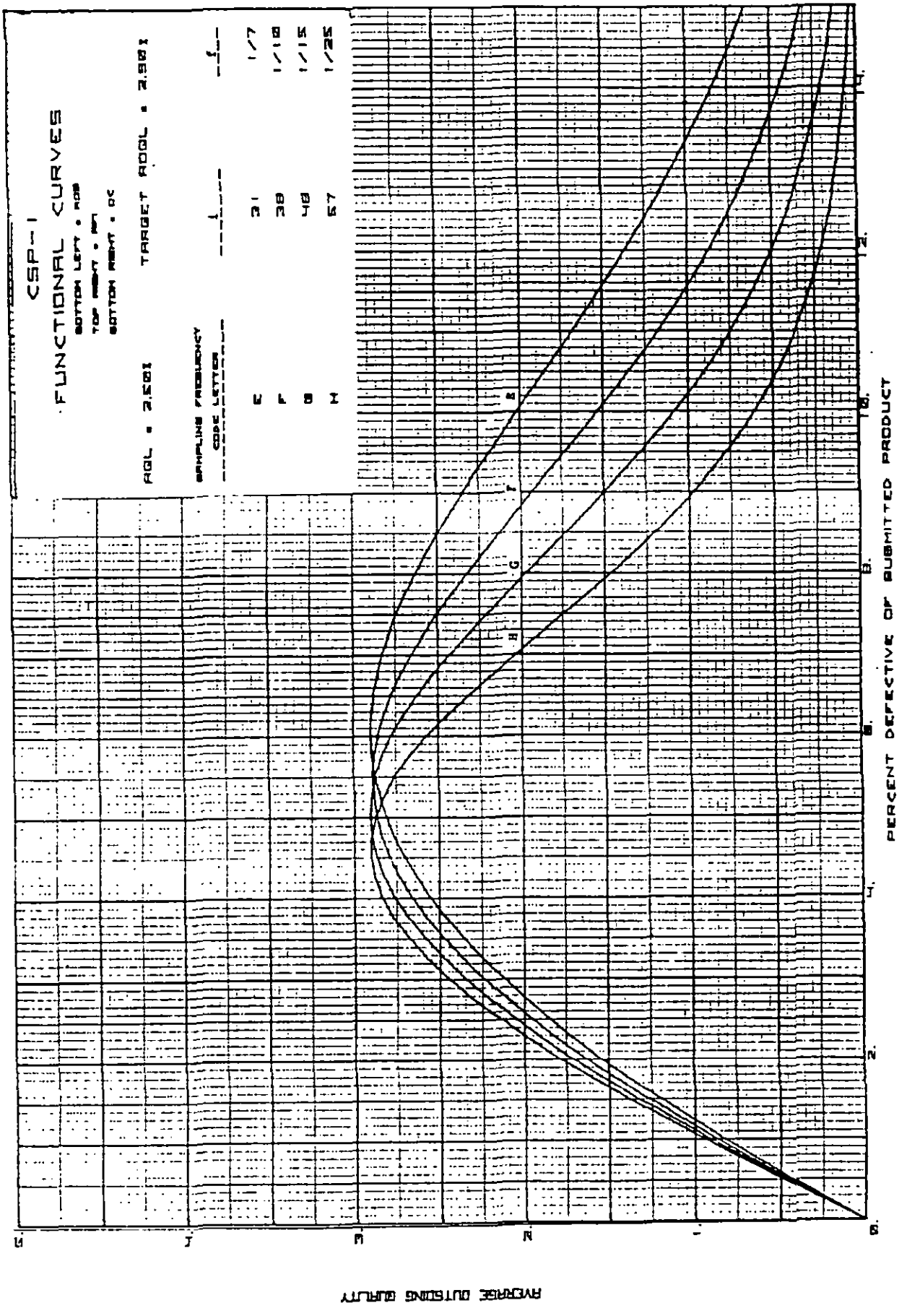

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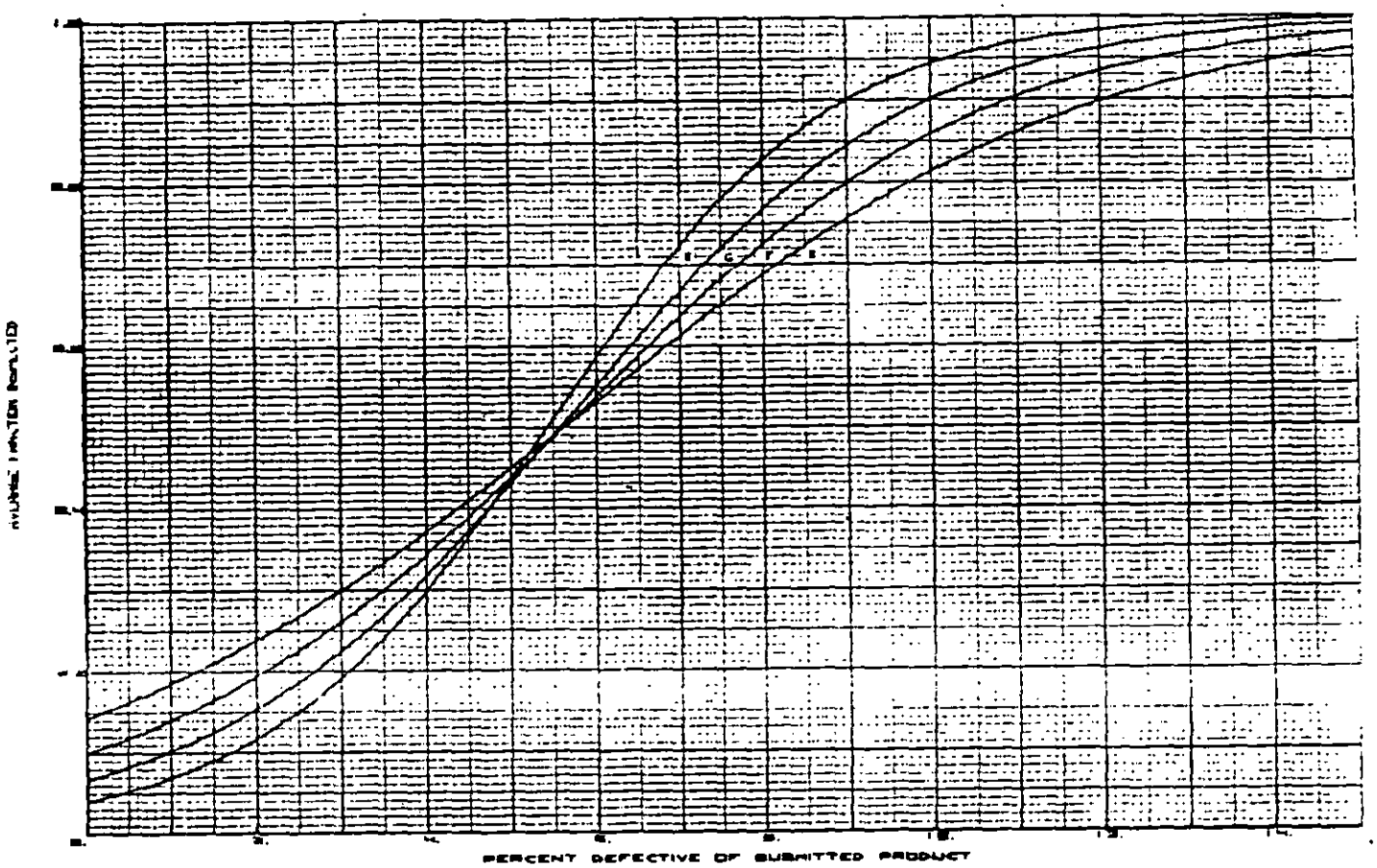

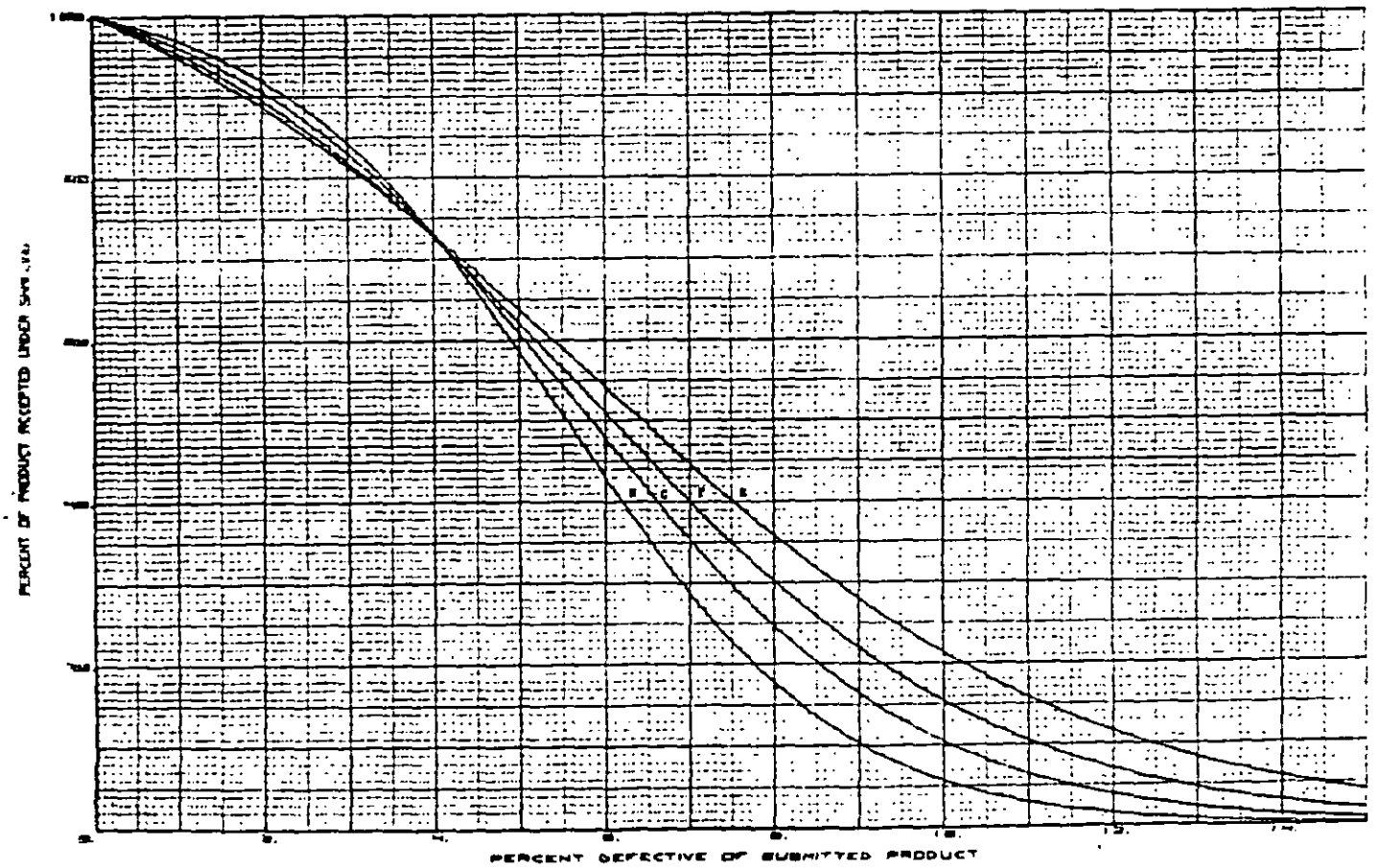

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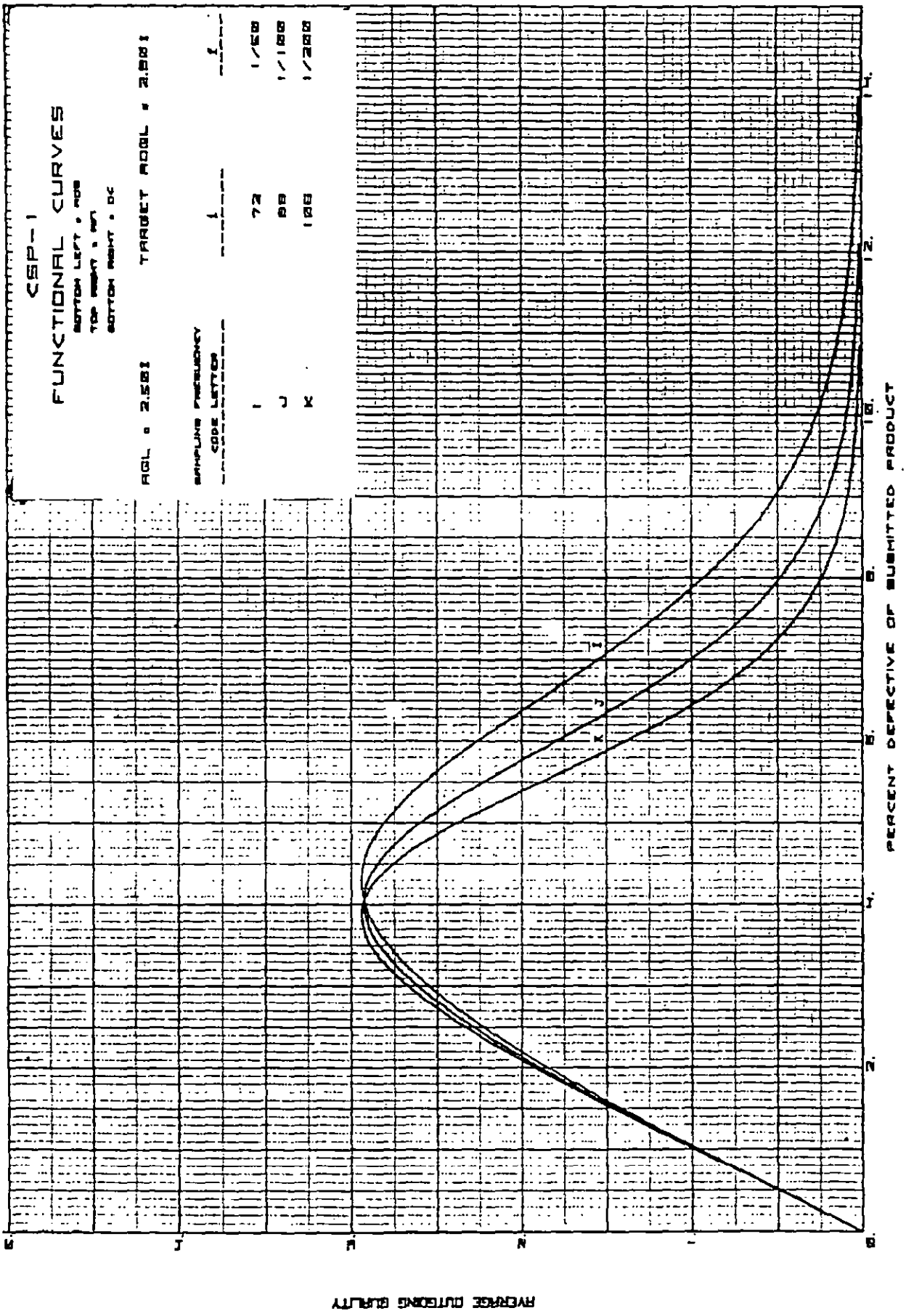

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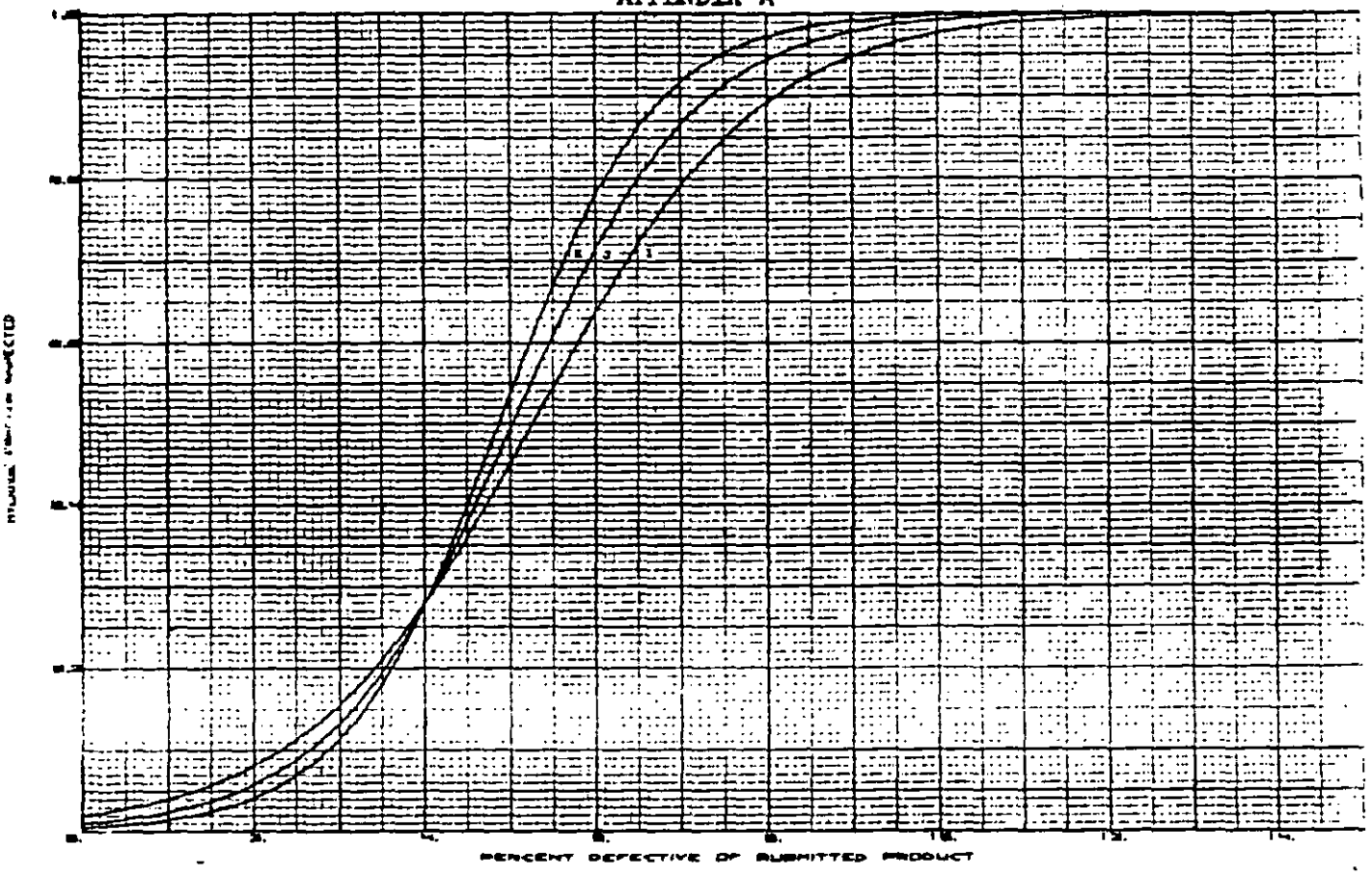

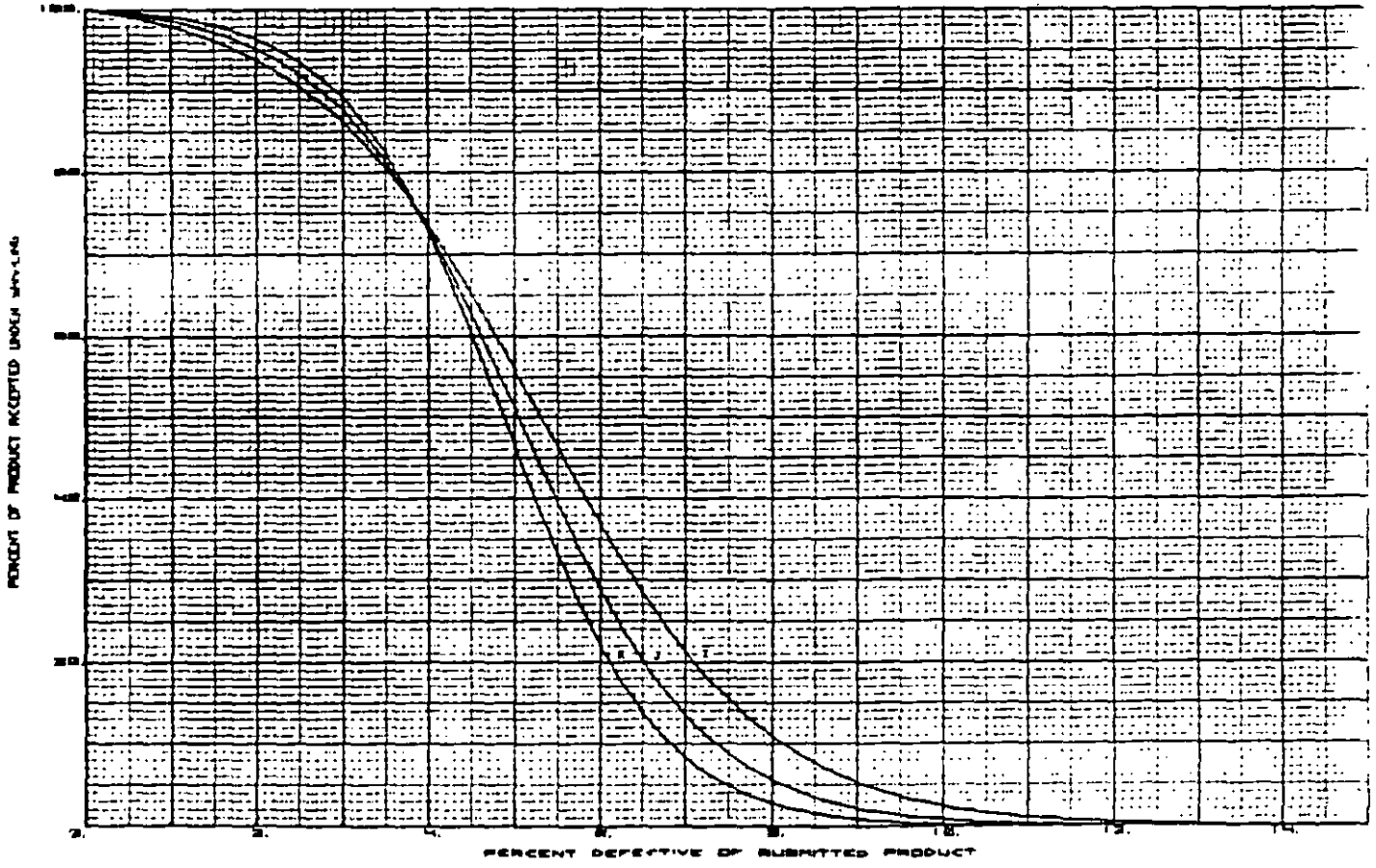

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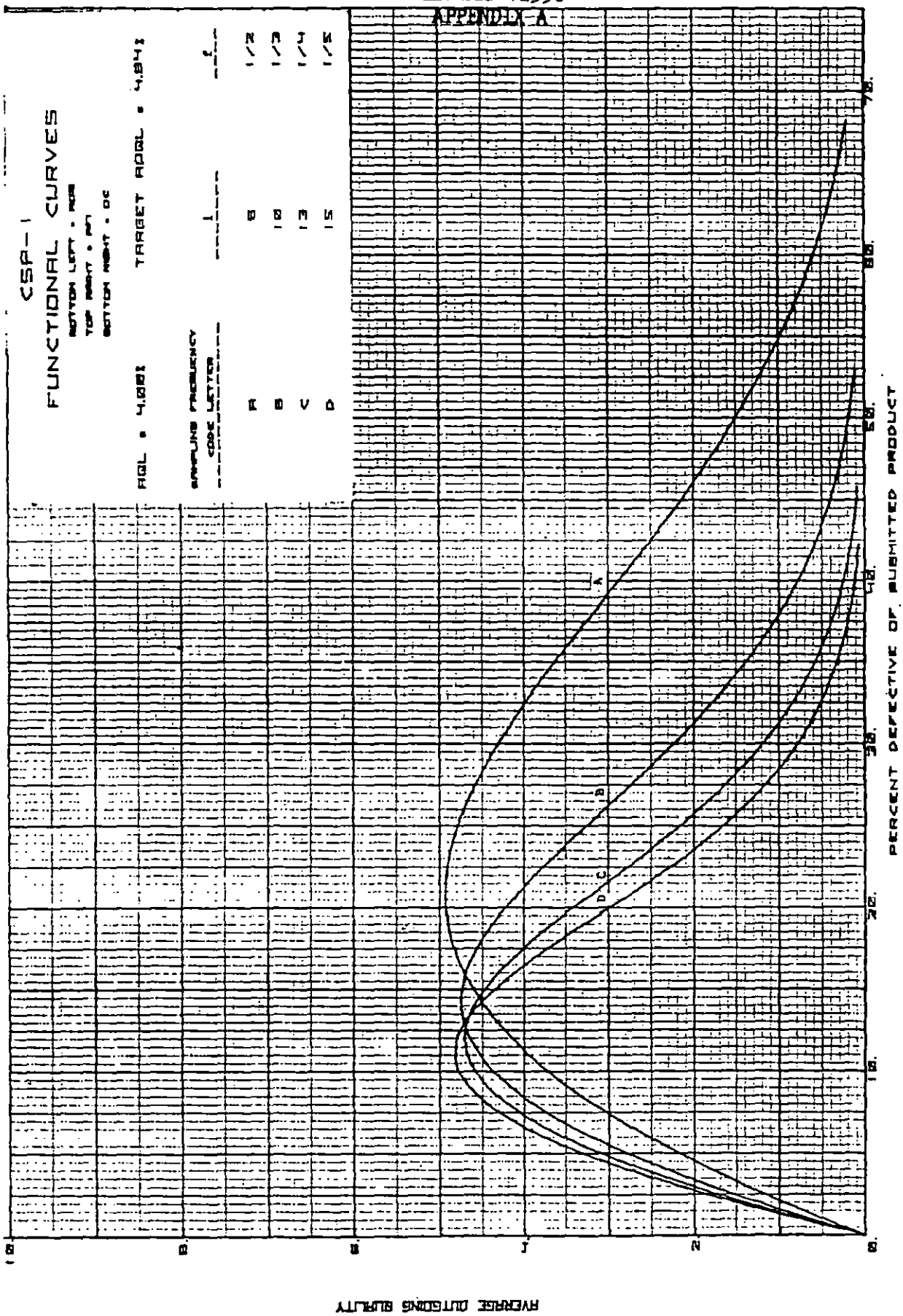

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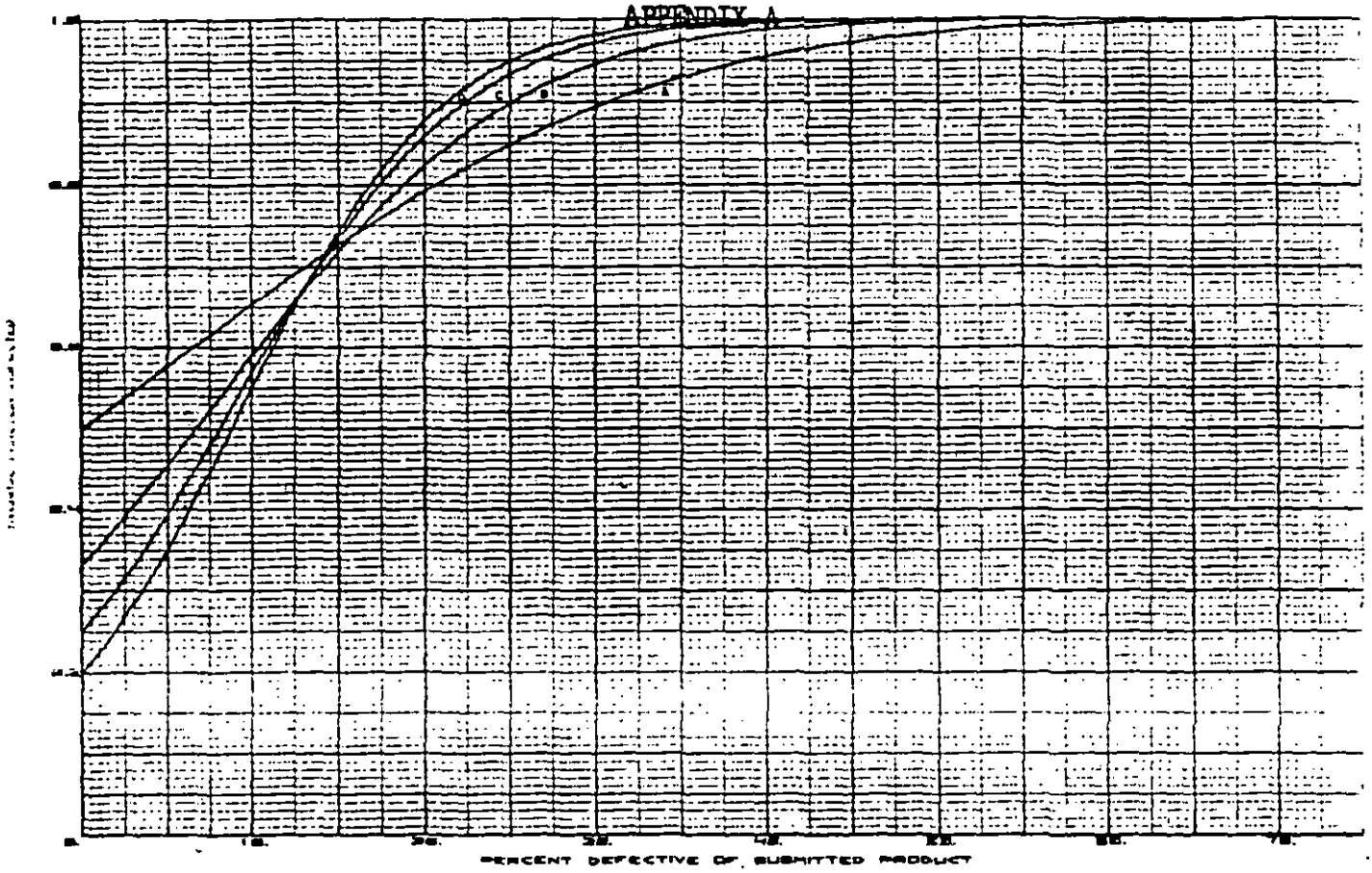

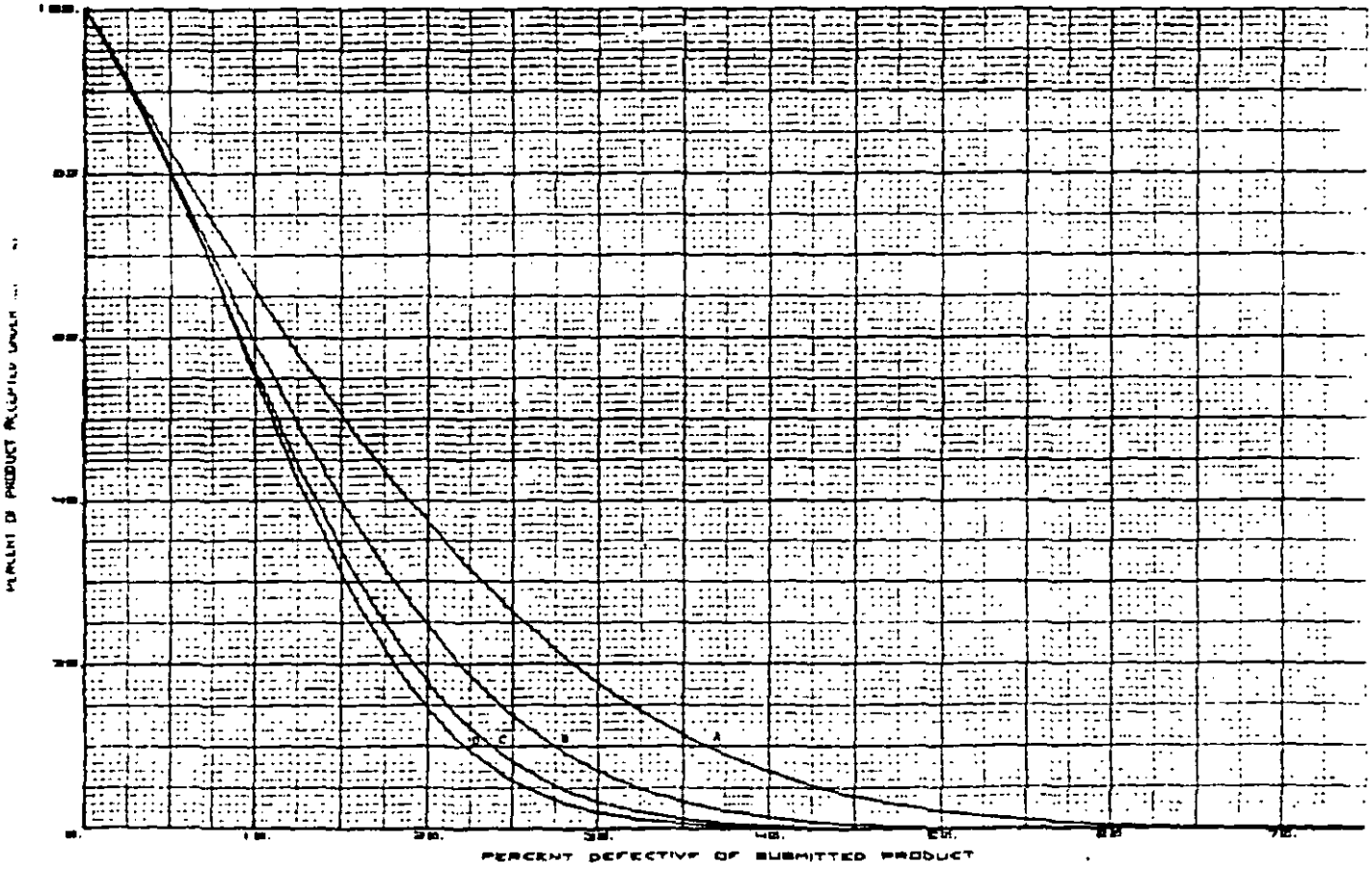

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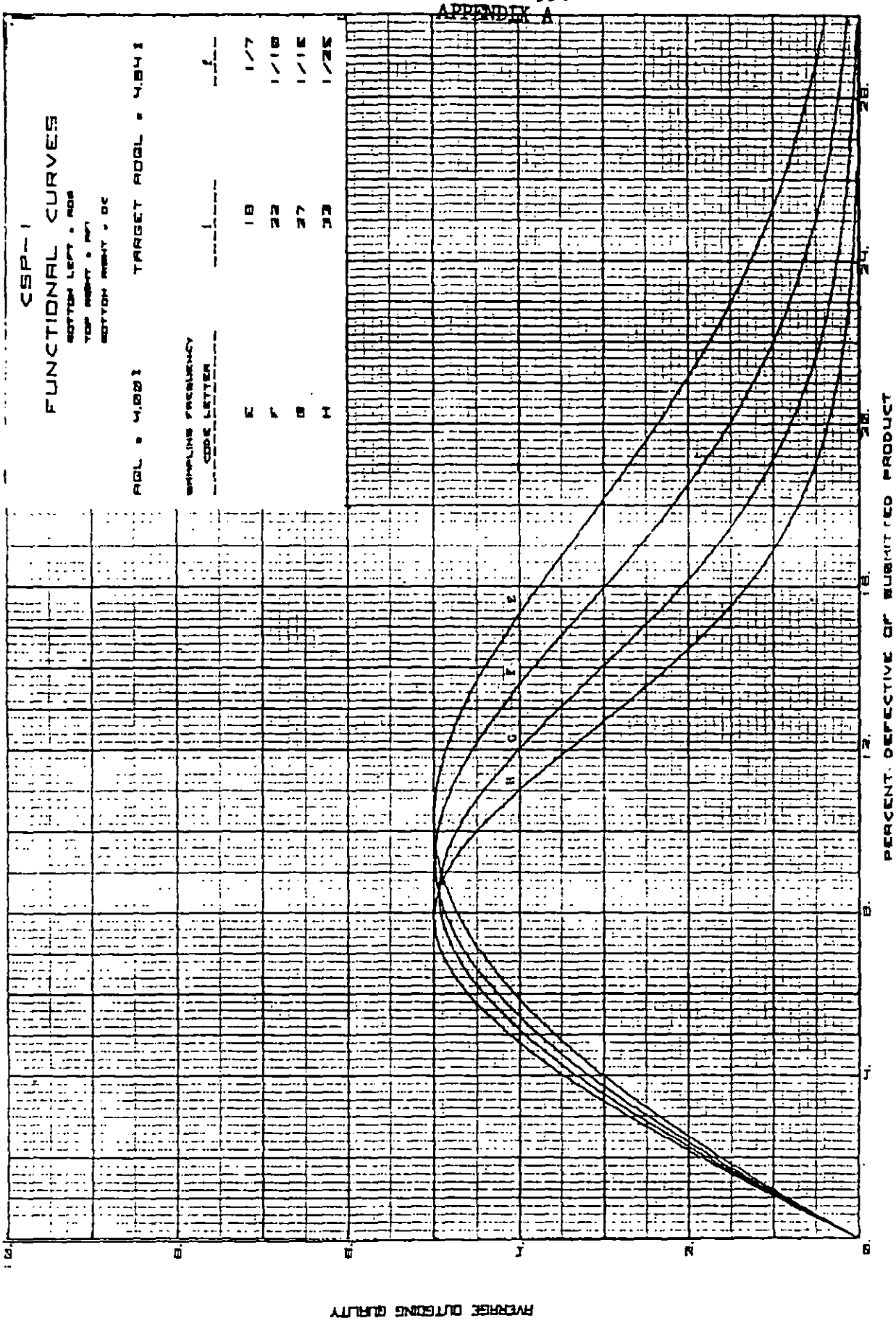

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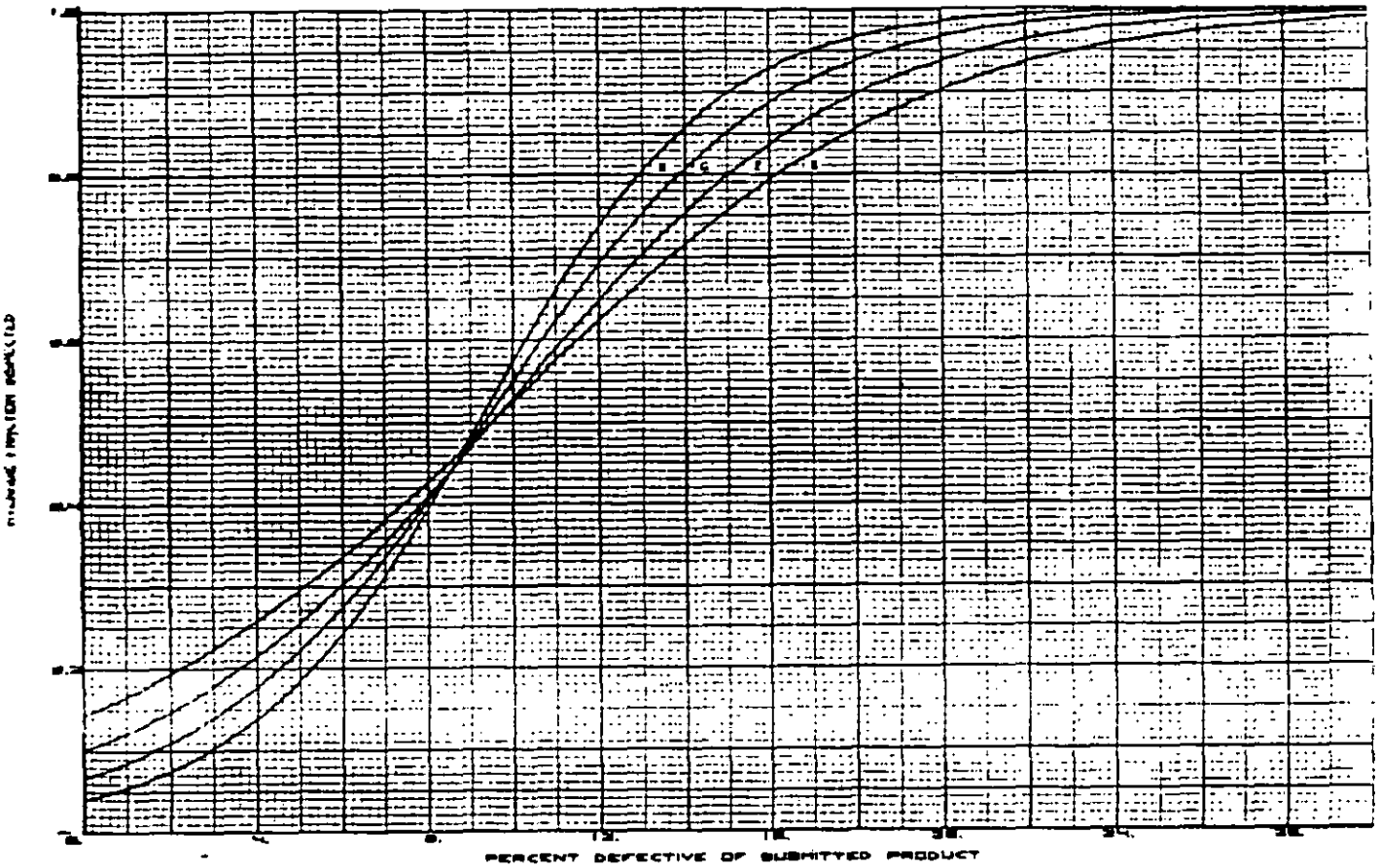

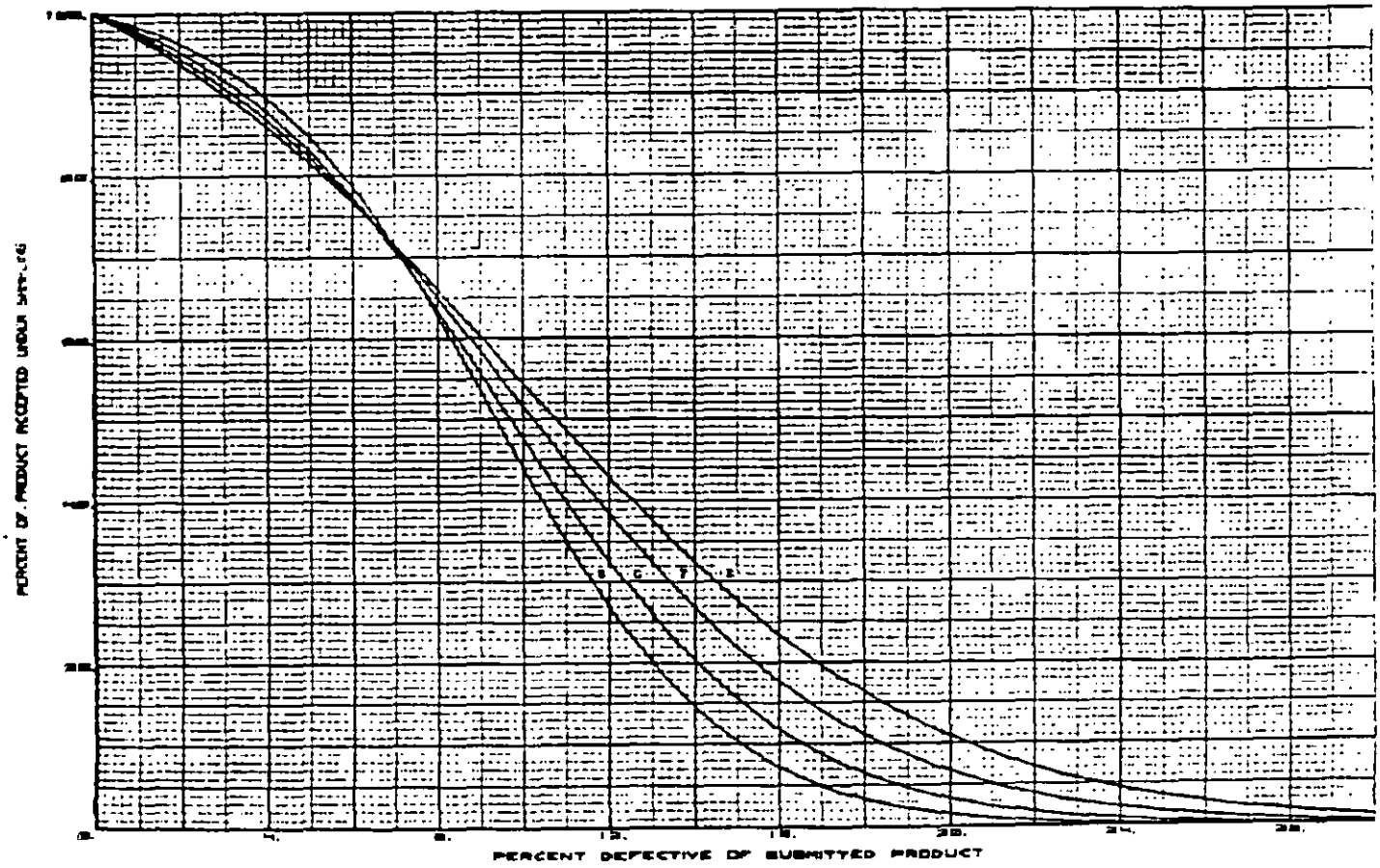

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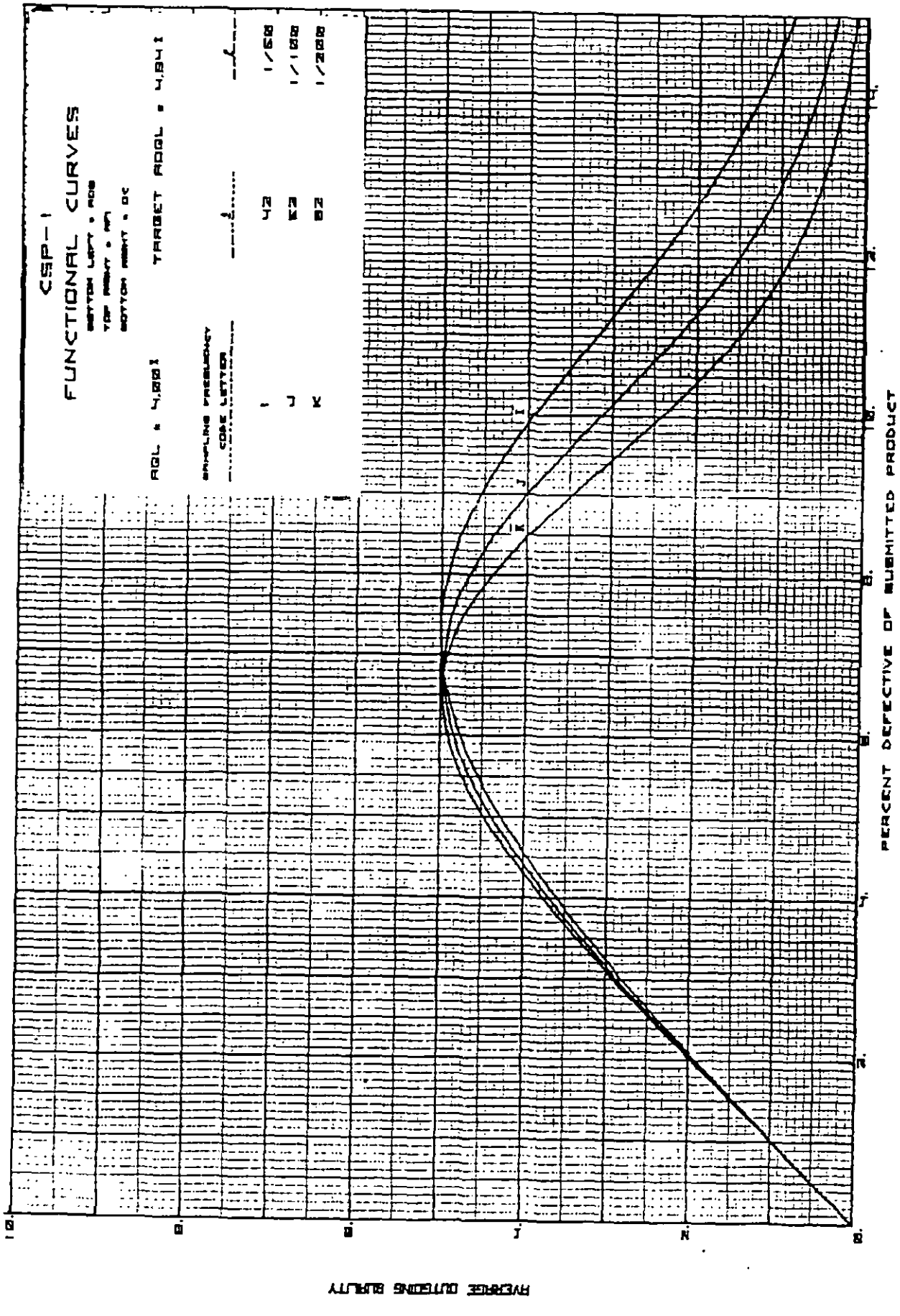

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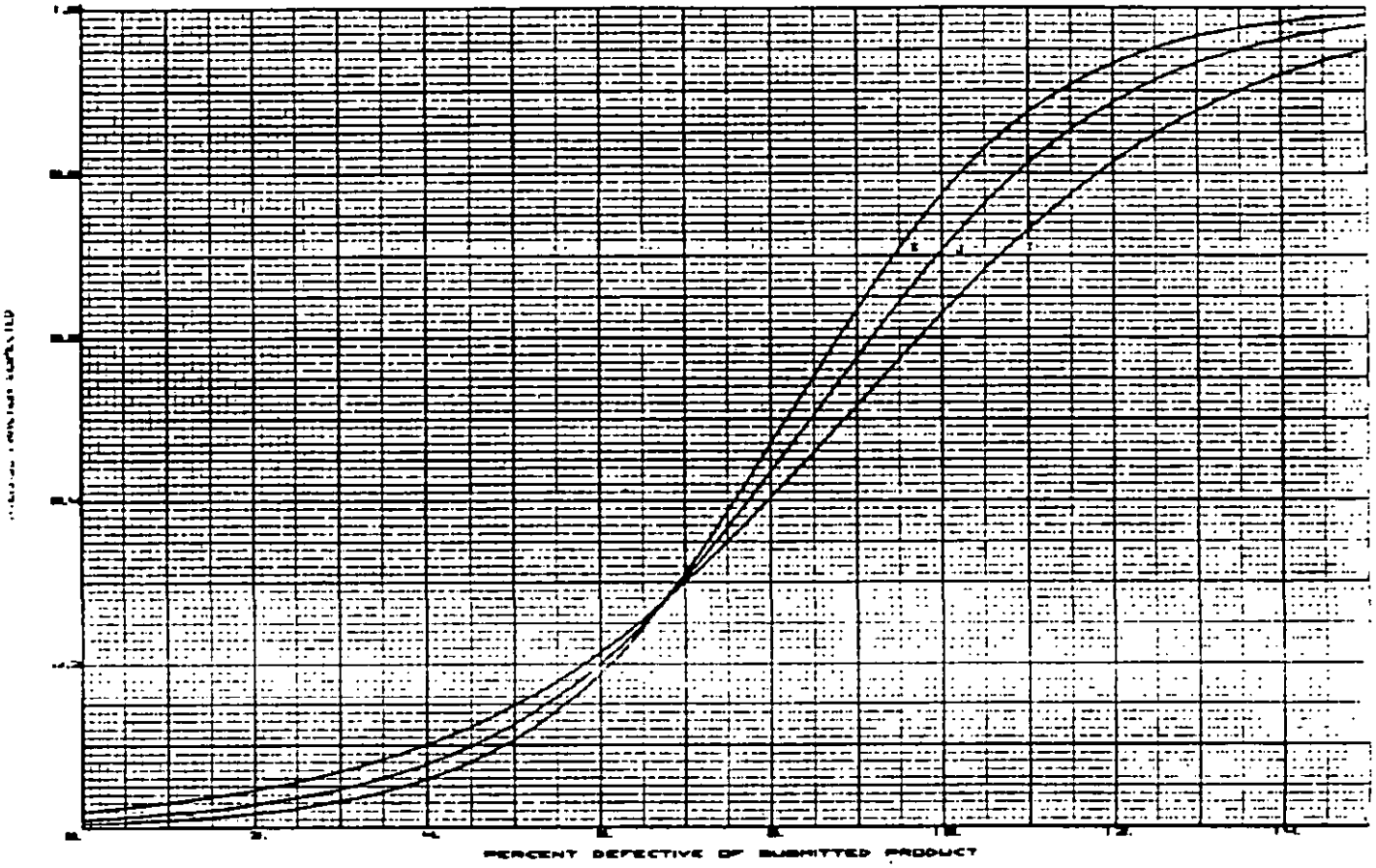

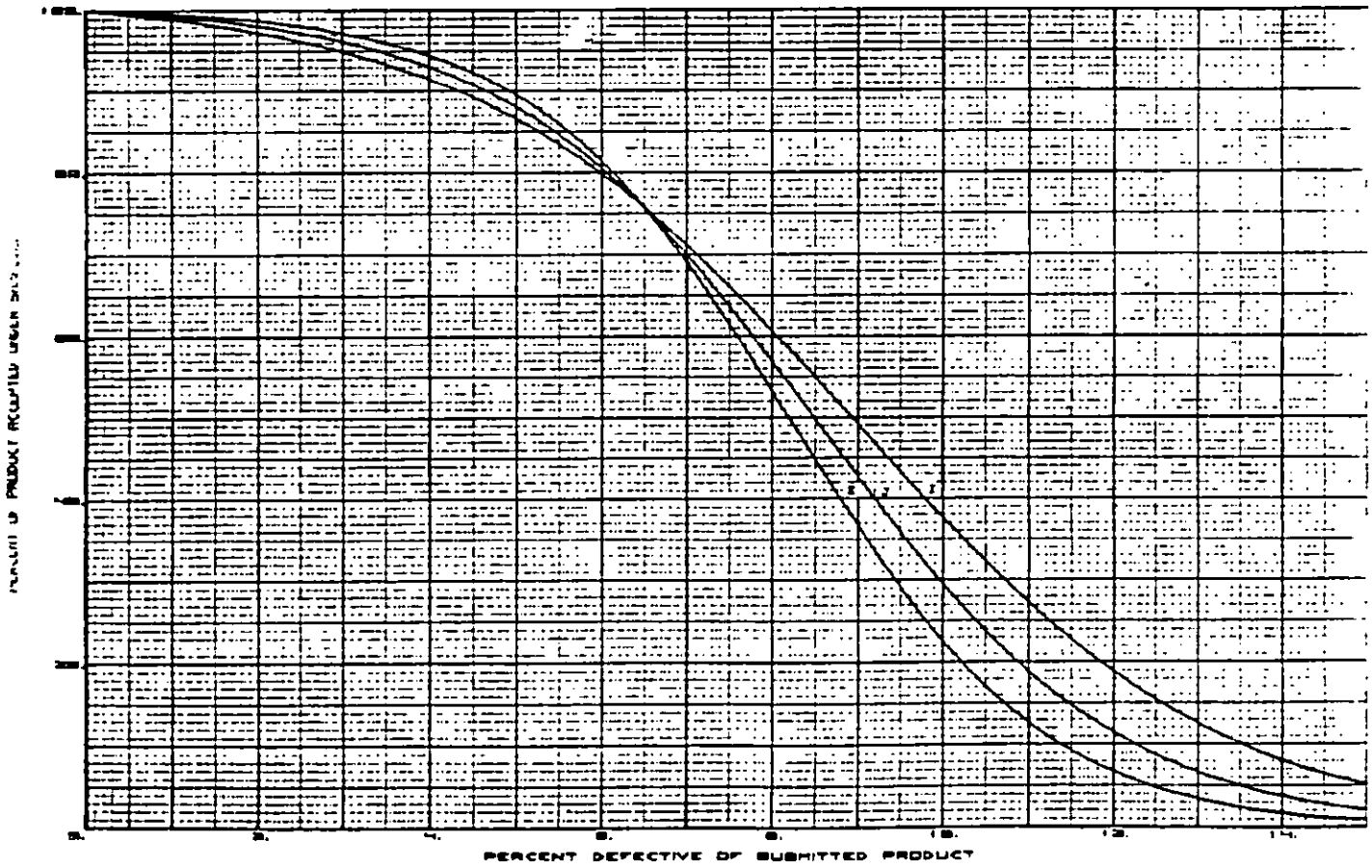

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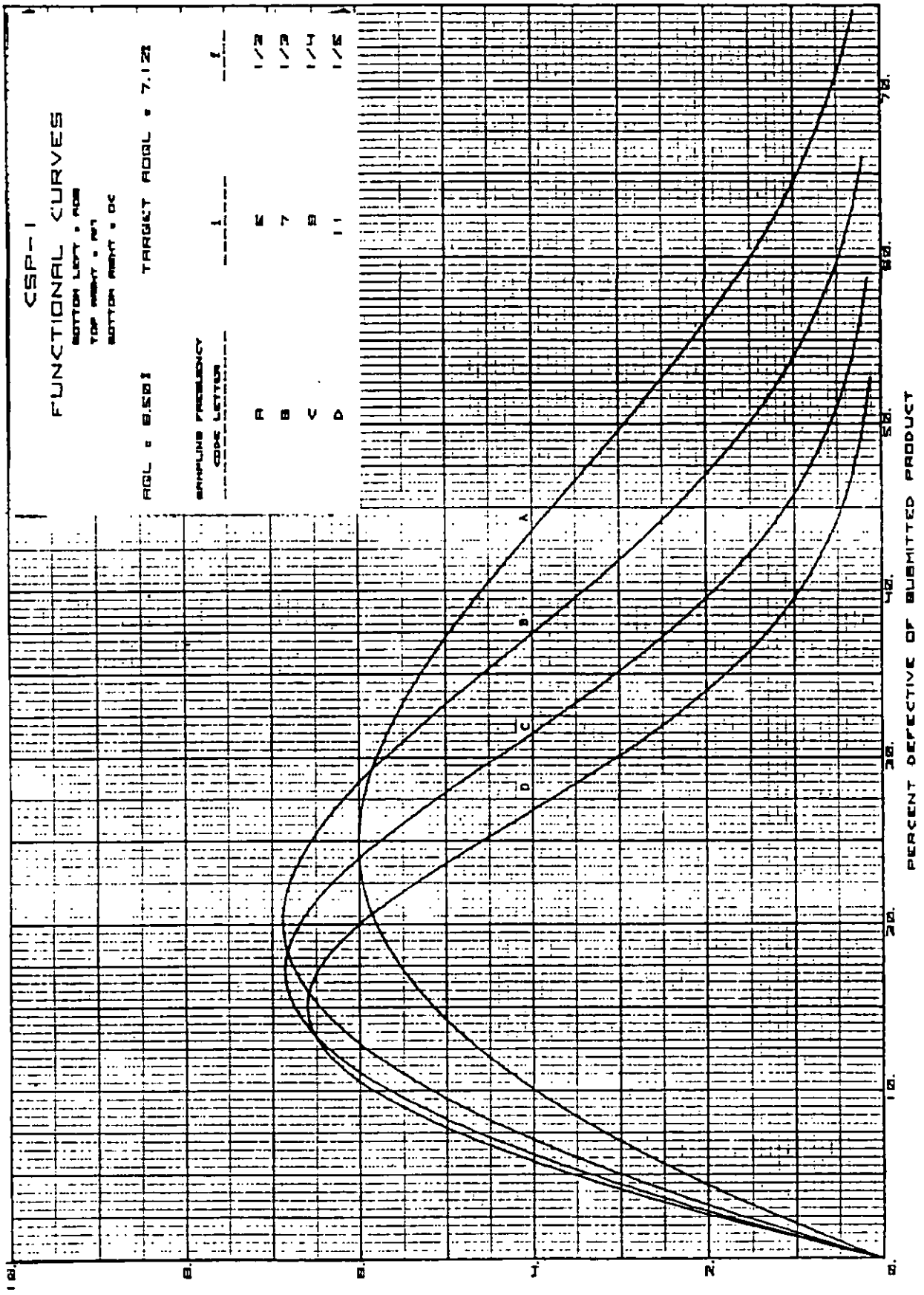

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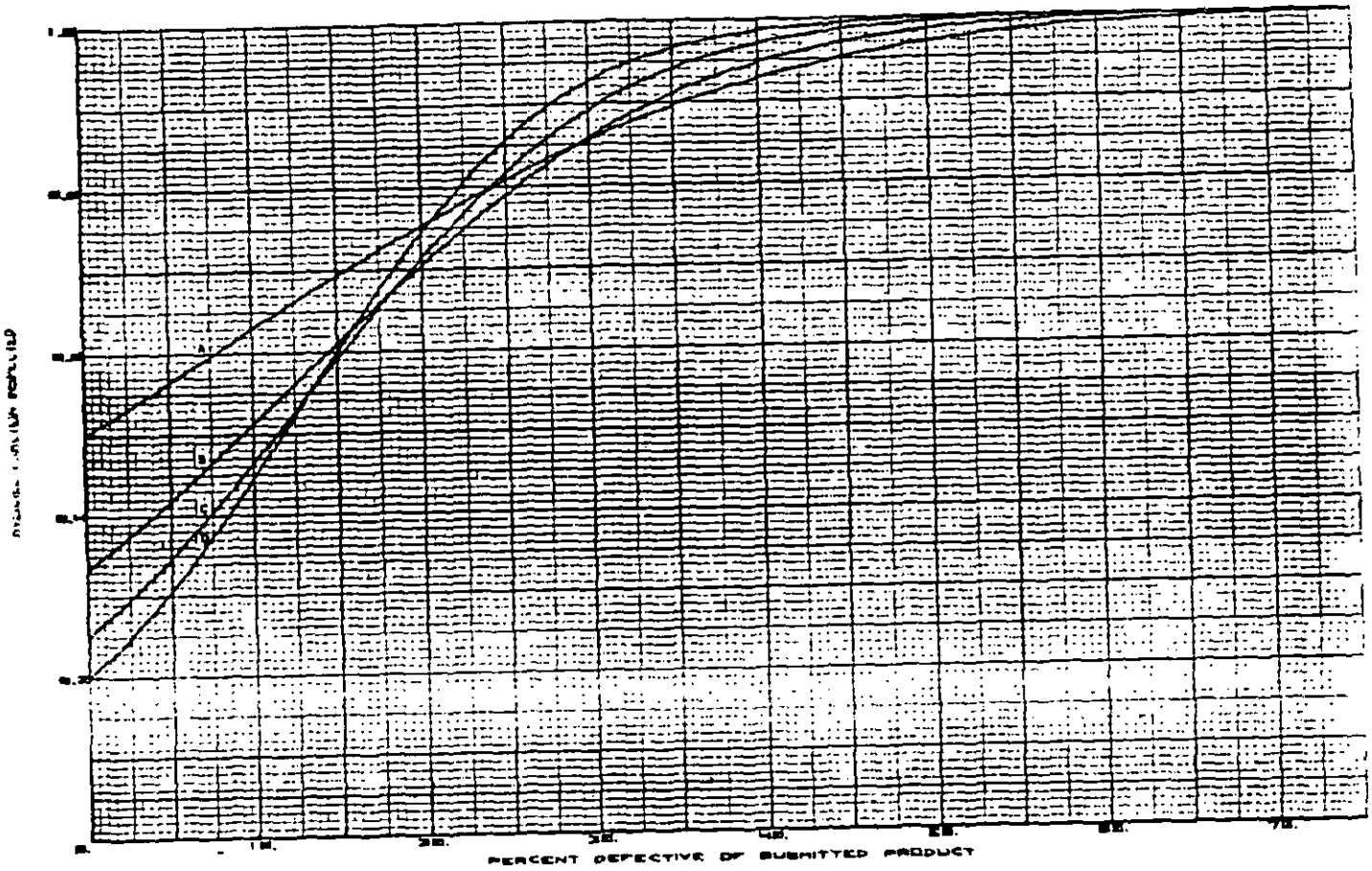

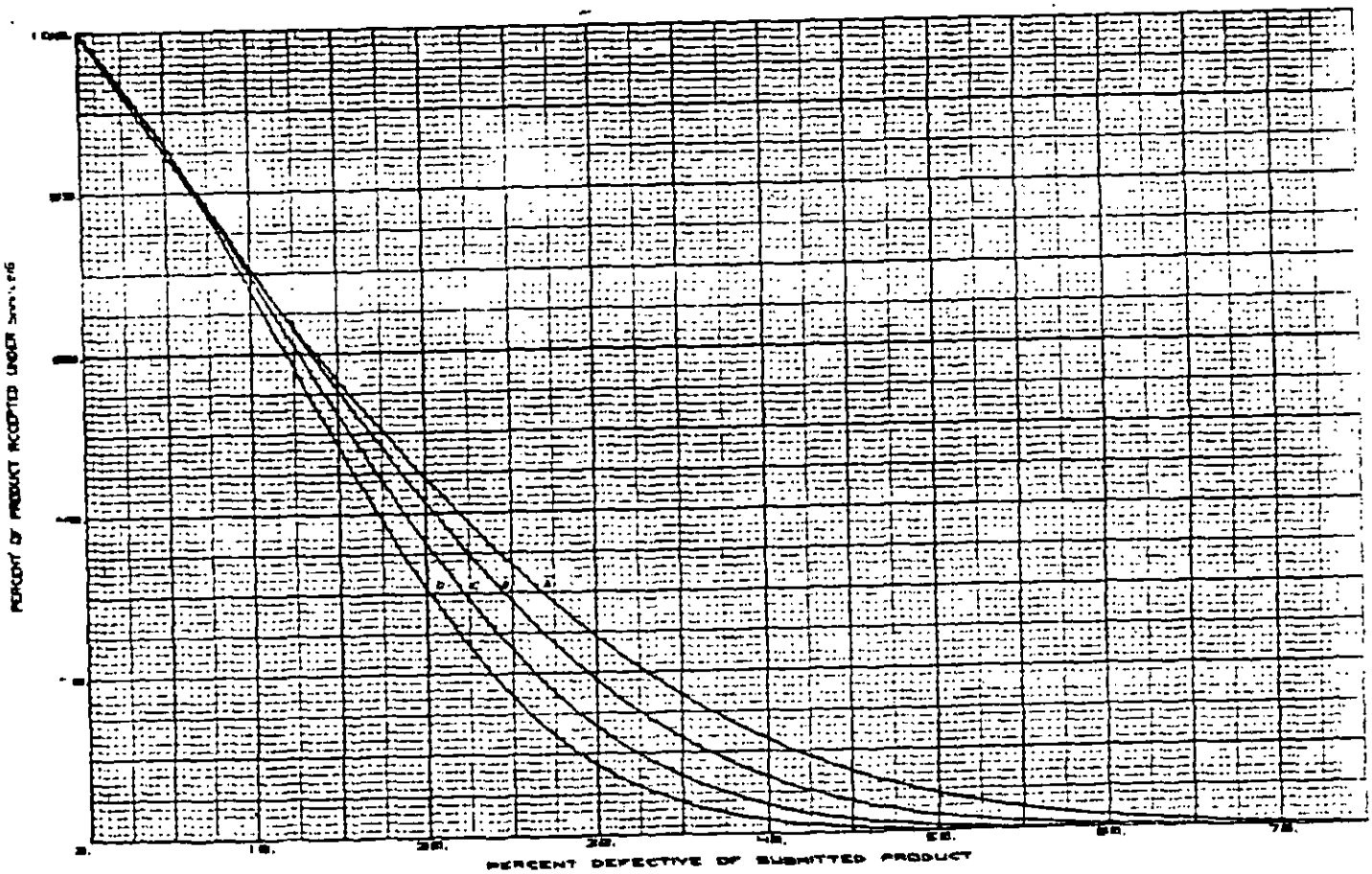

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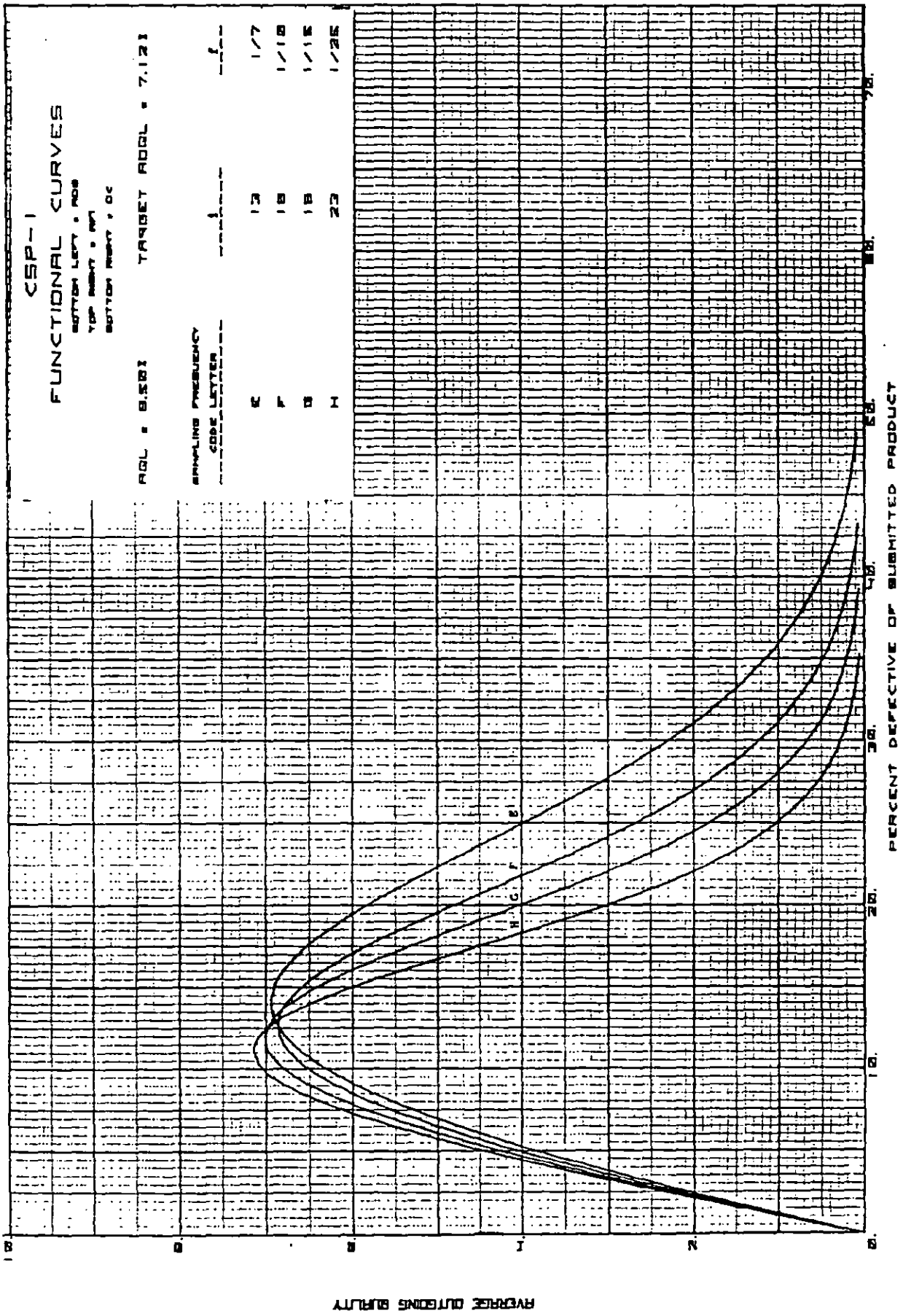

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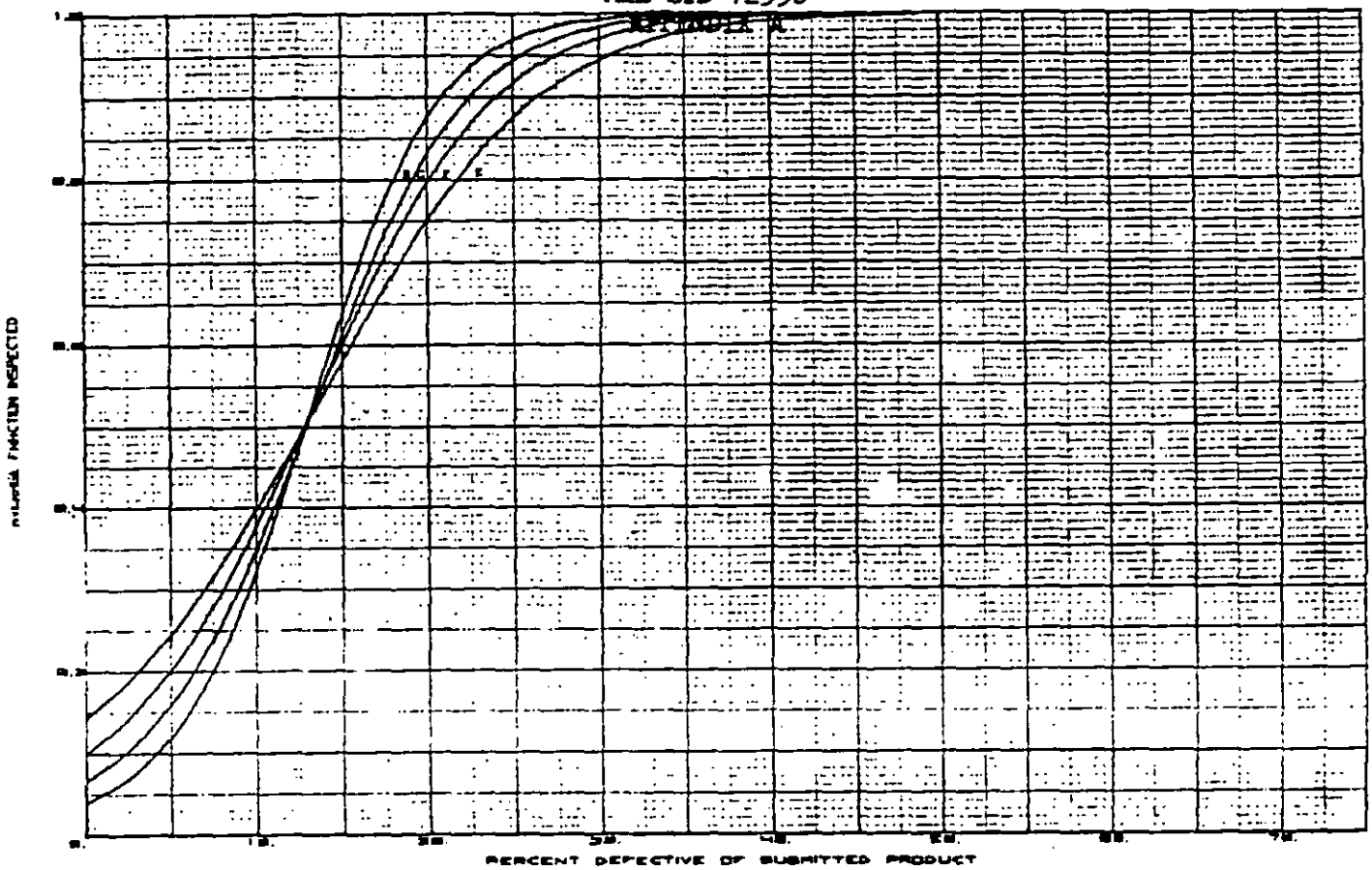

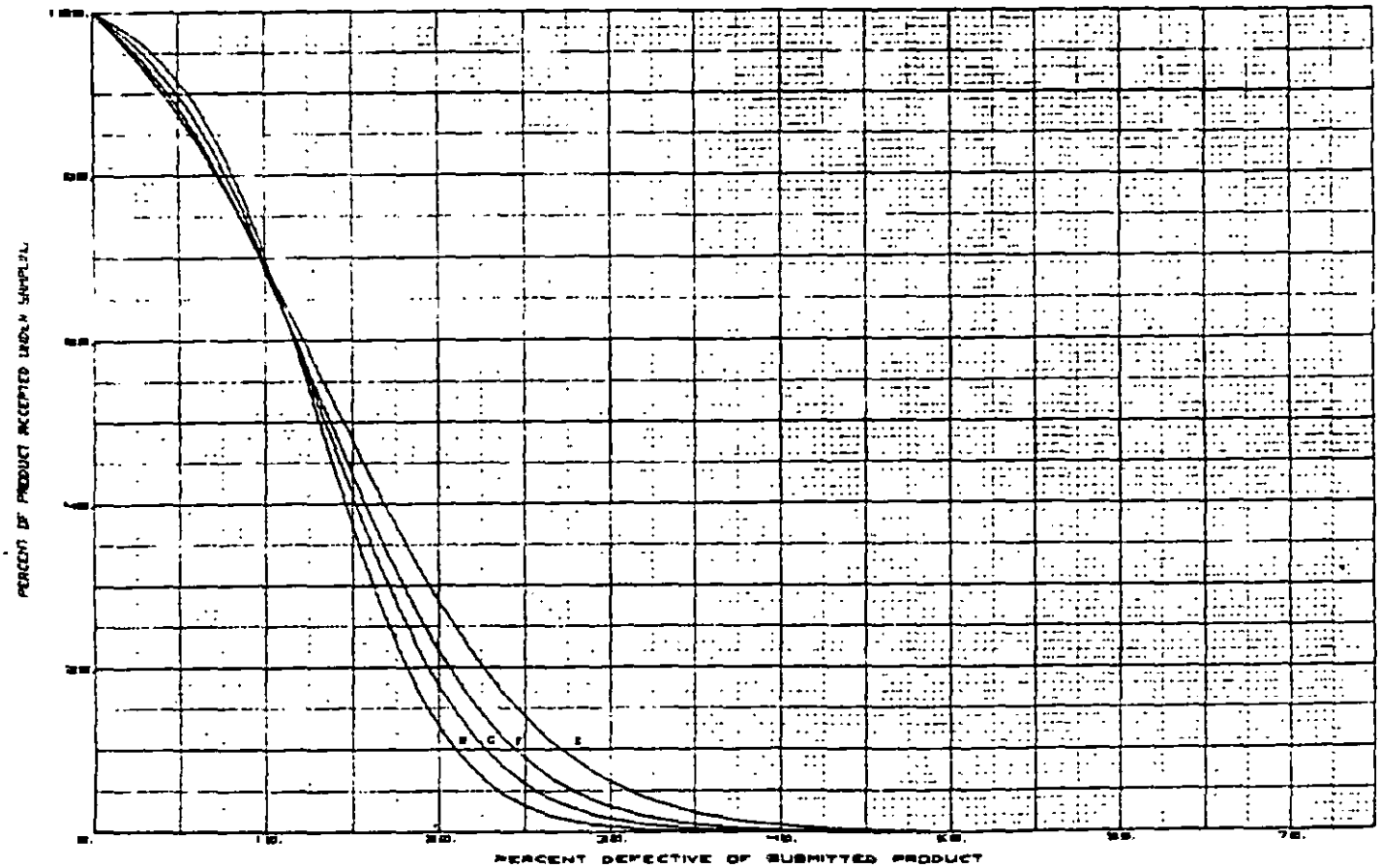

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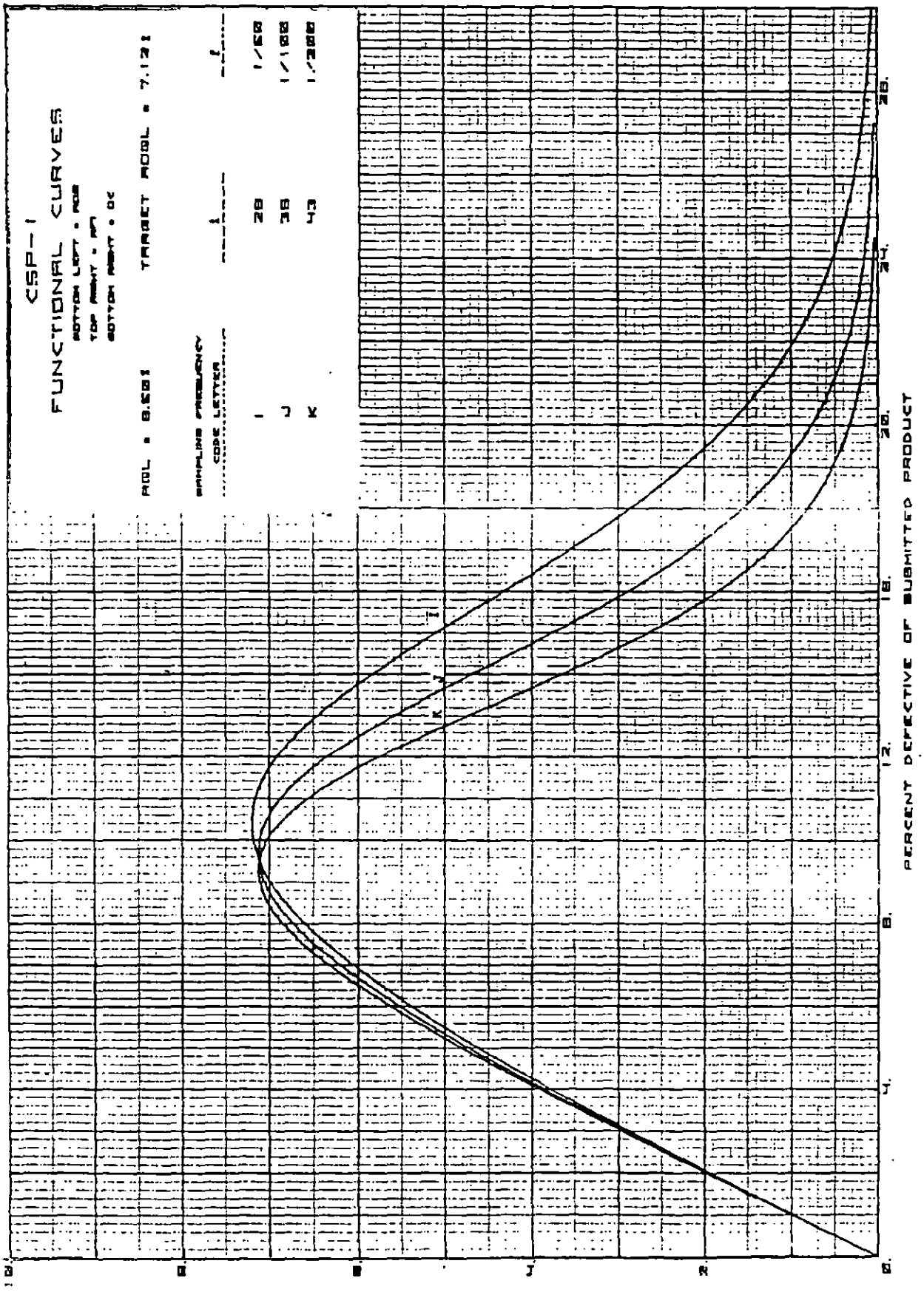

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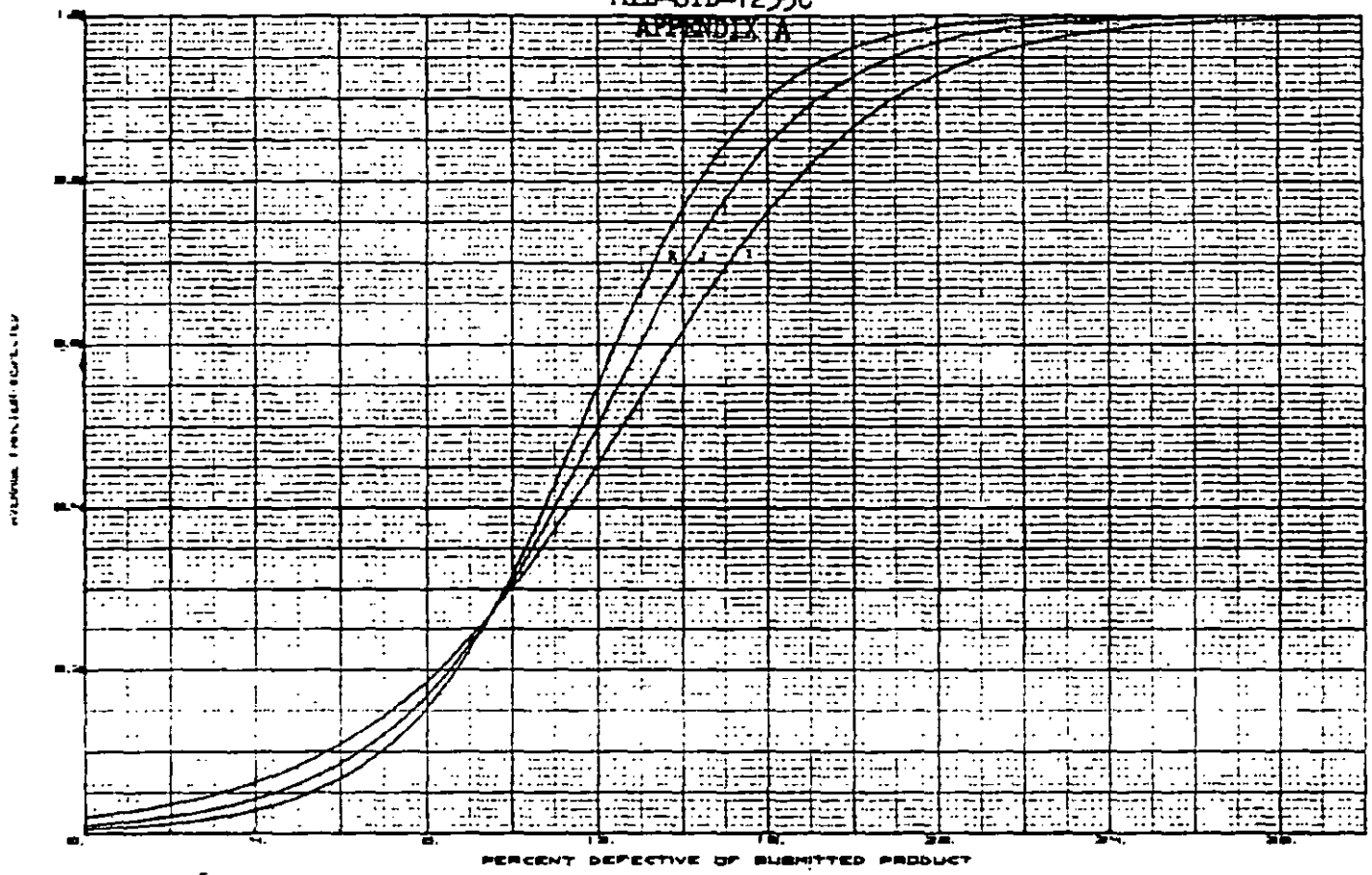

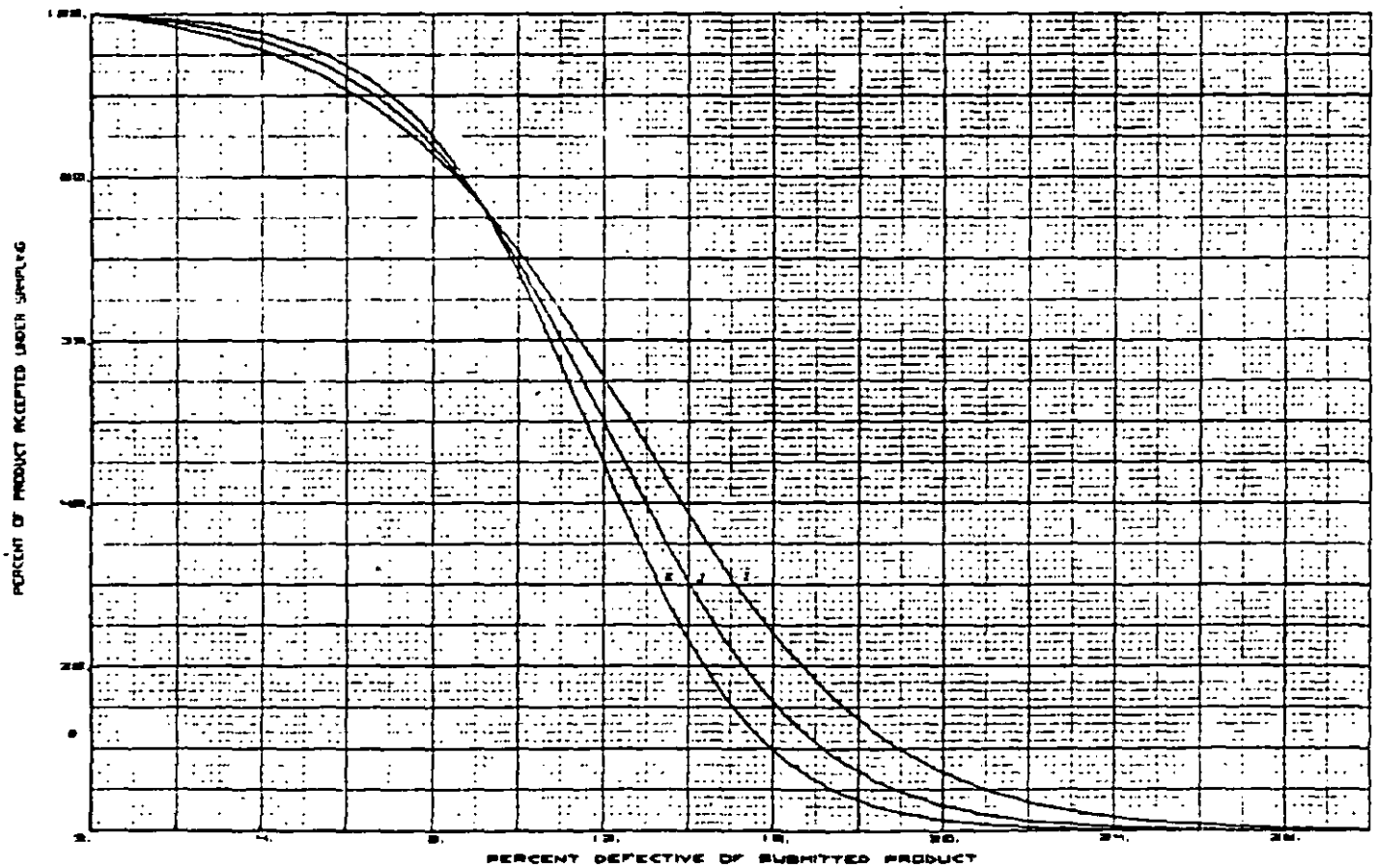

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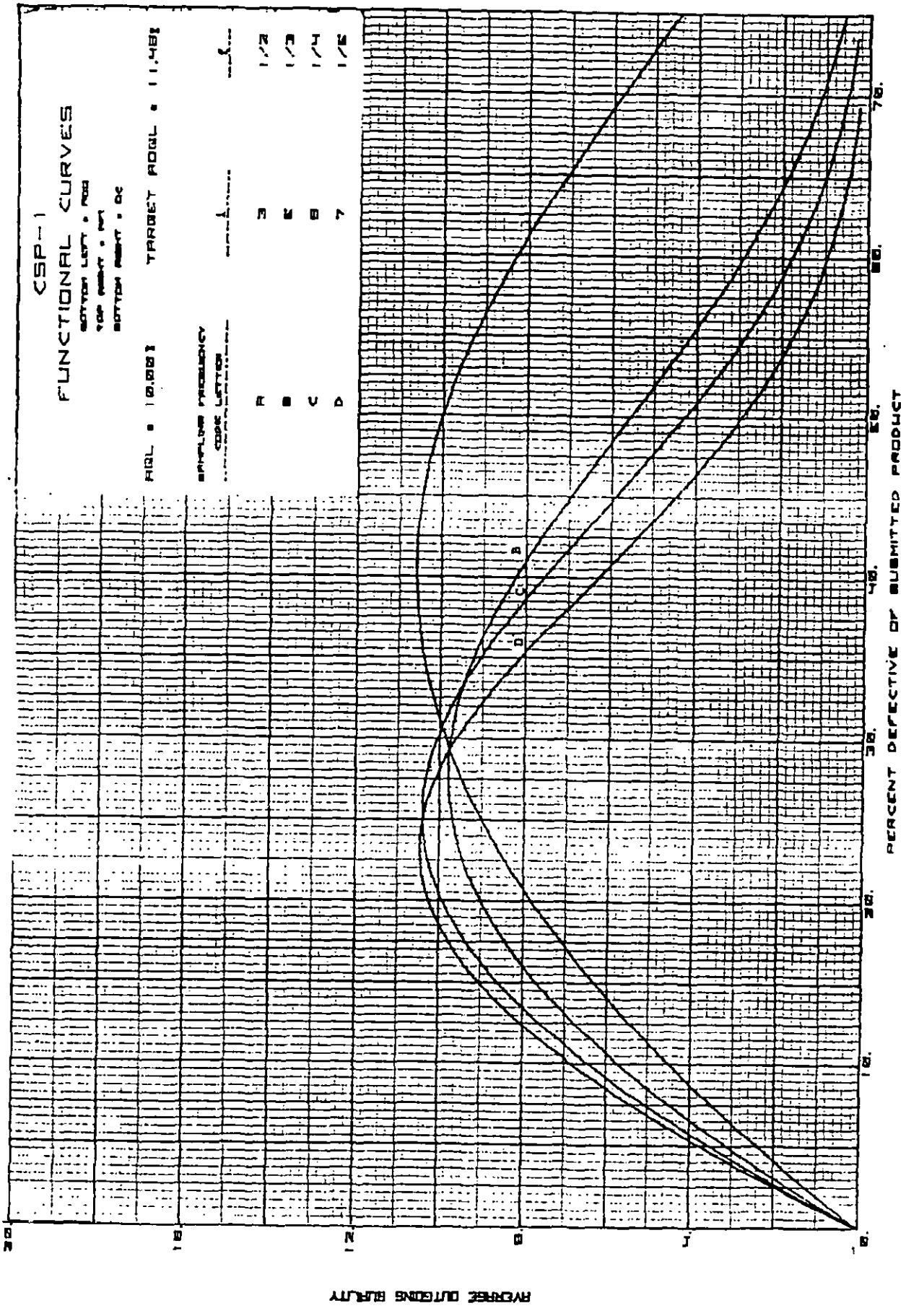

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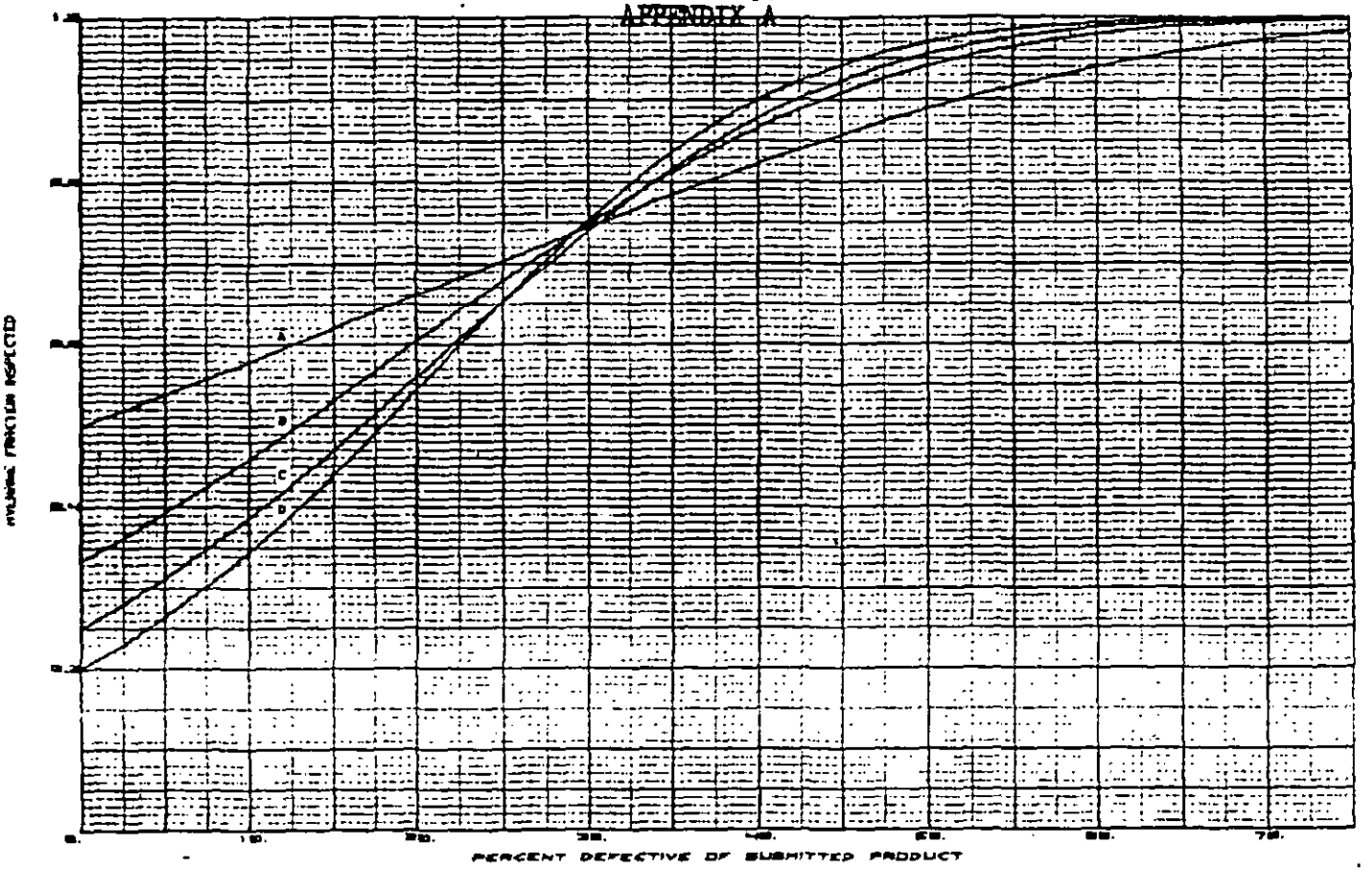

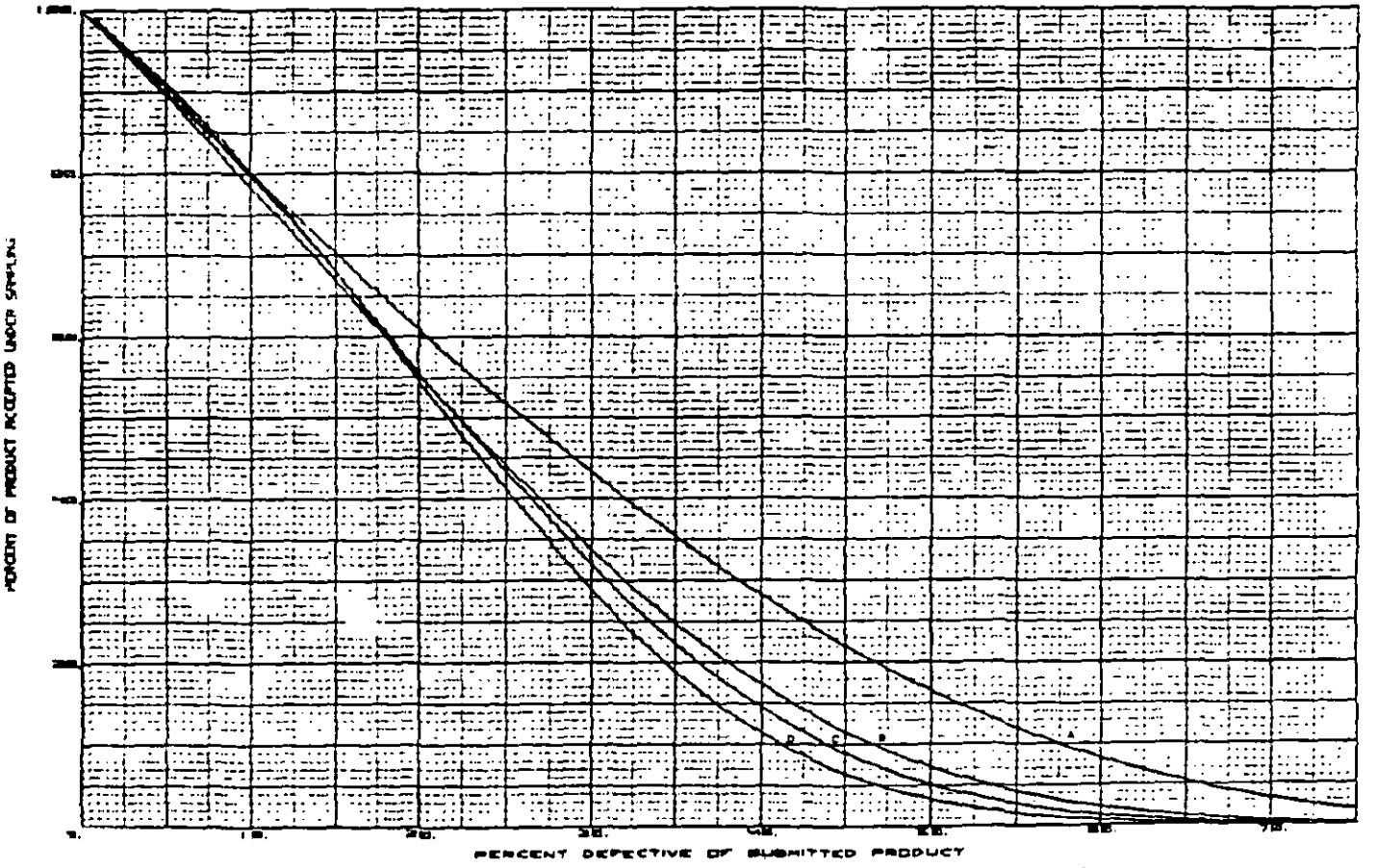

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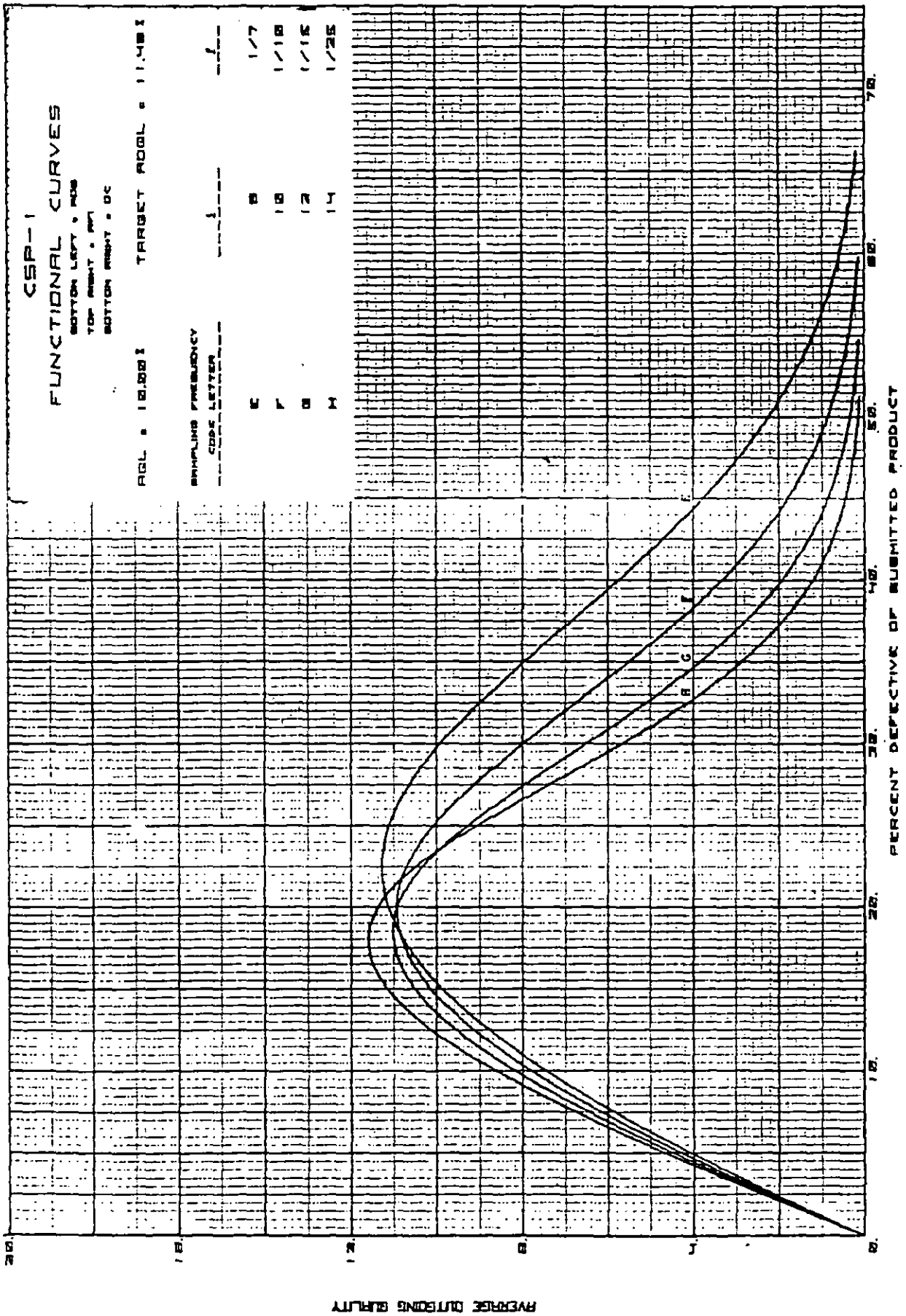

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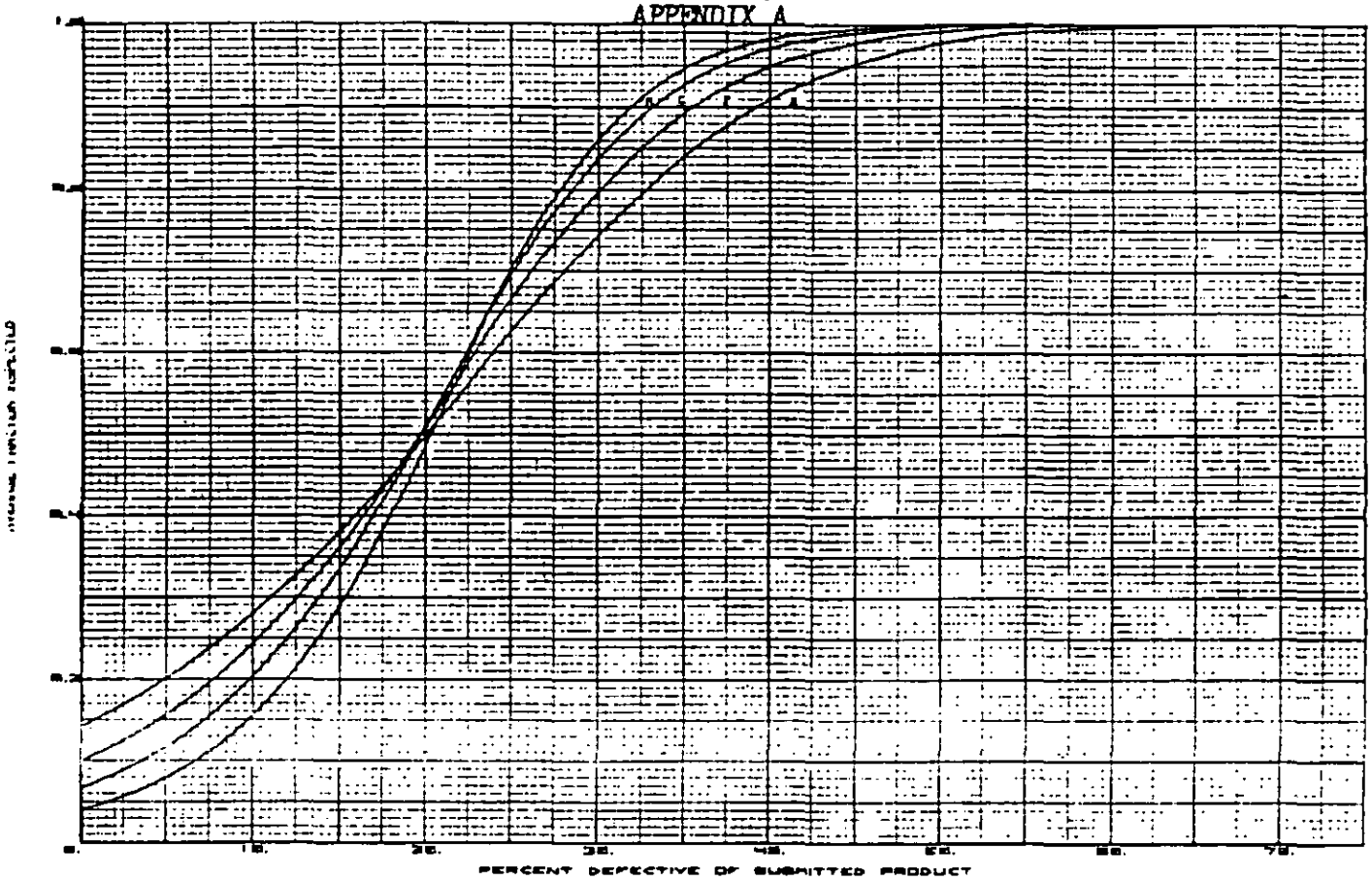

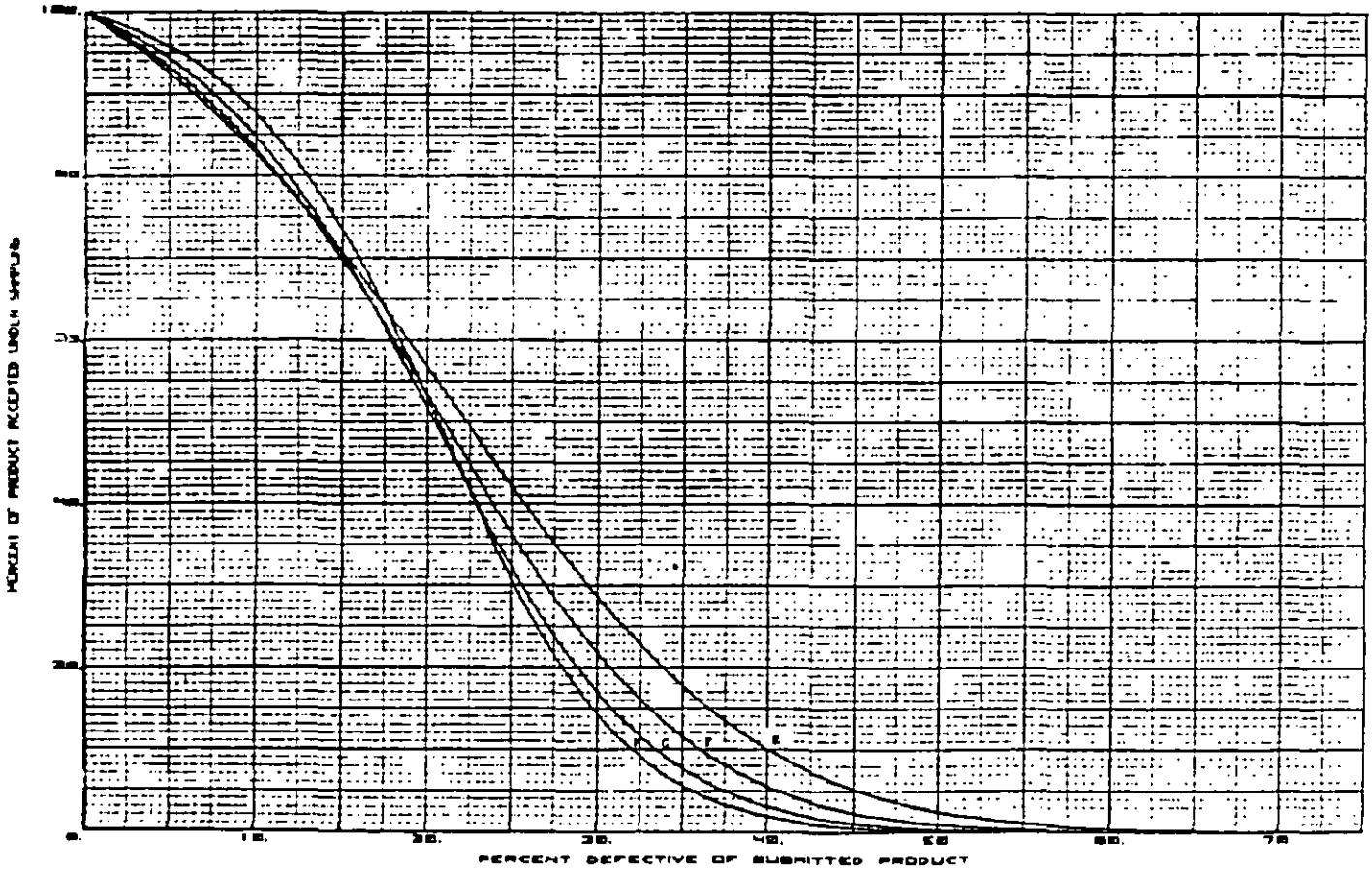

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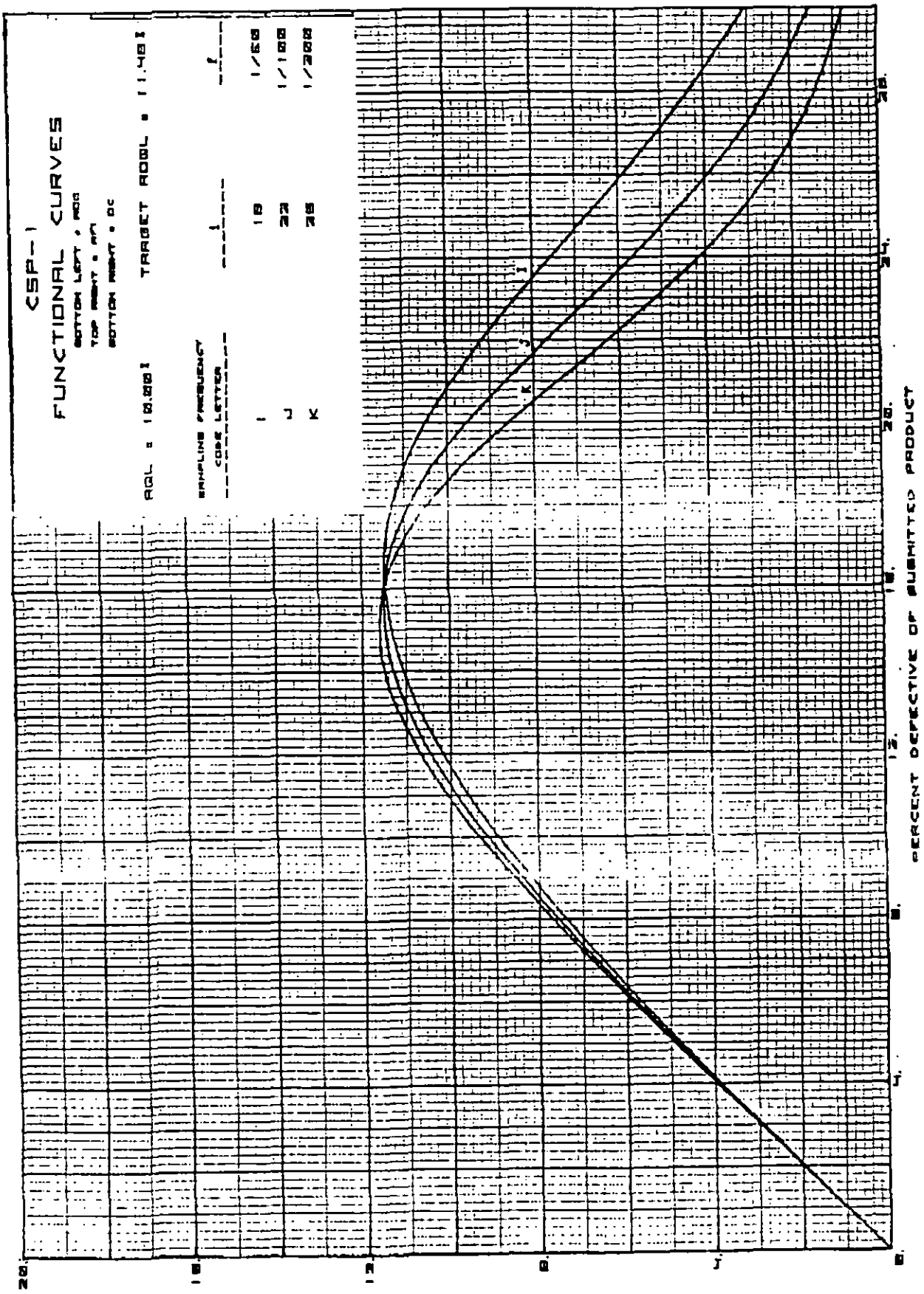

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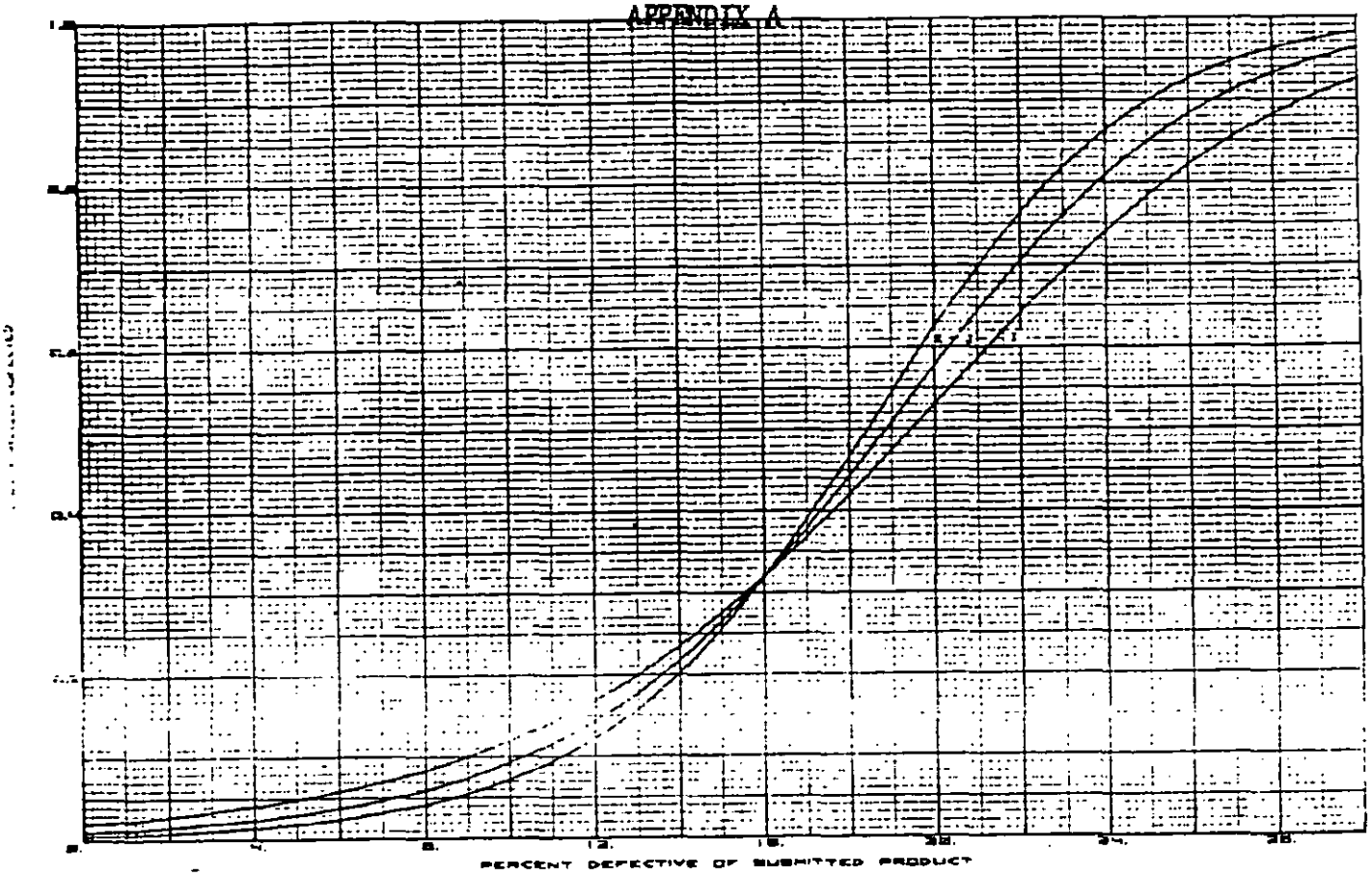

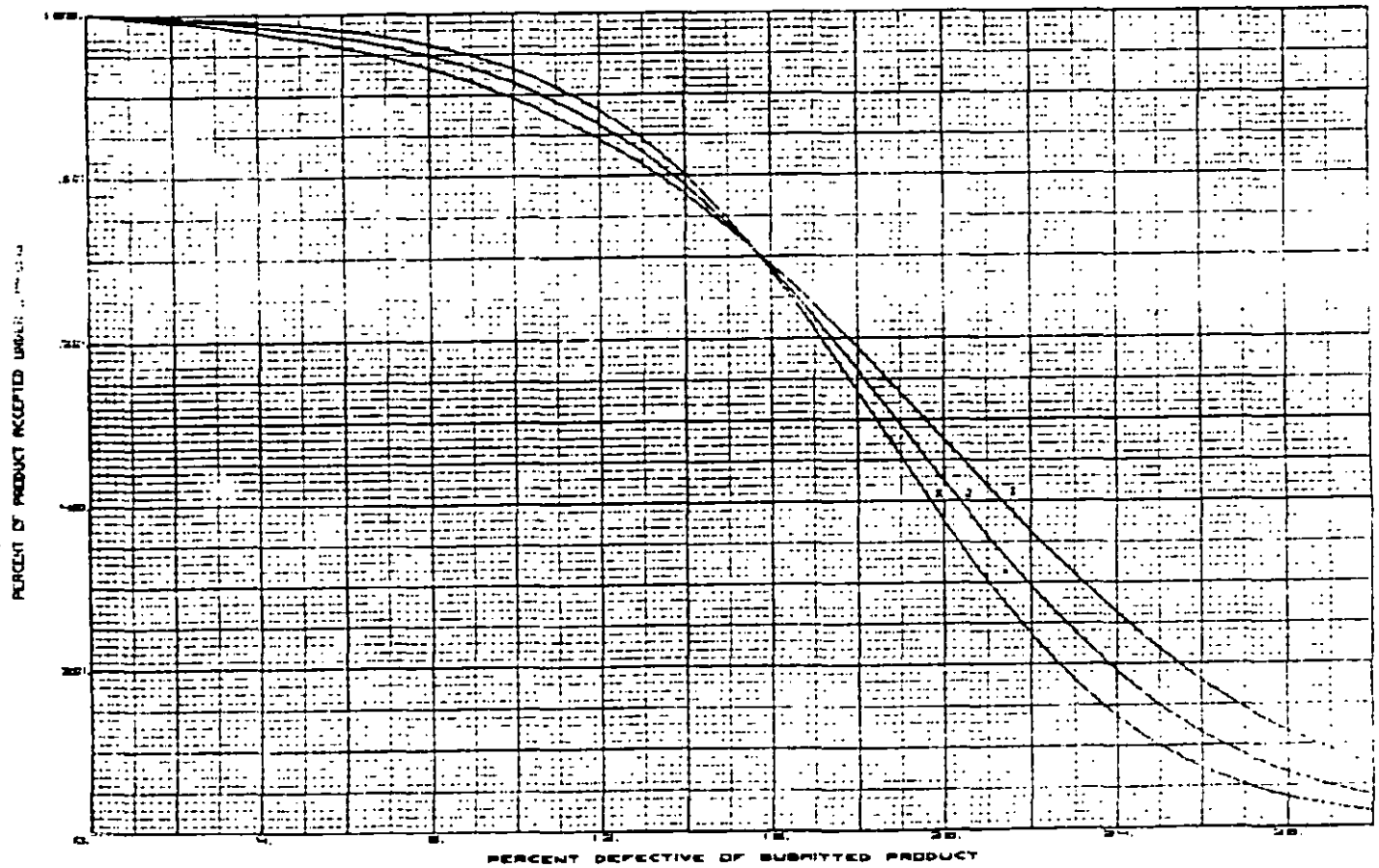

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APPENDIX B

FUNCTIONAL CURVES FOR CSP-2 PLANS

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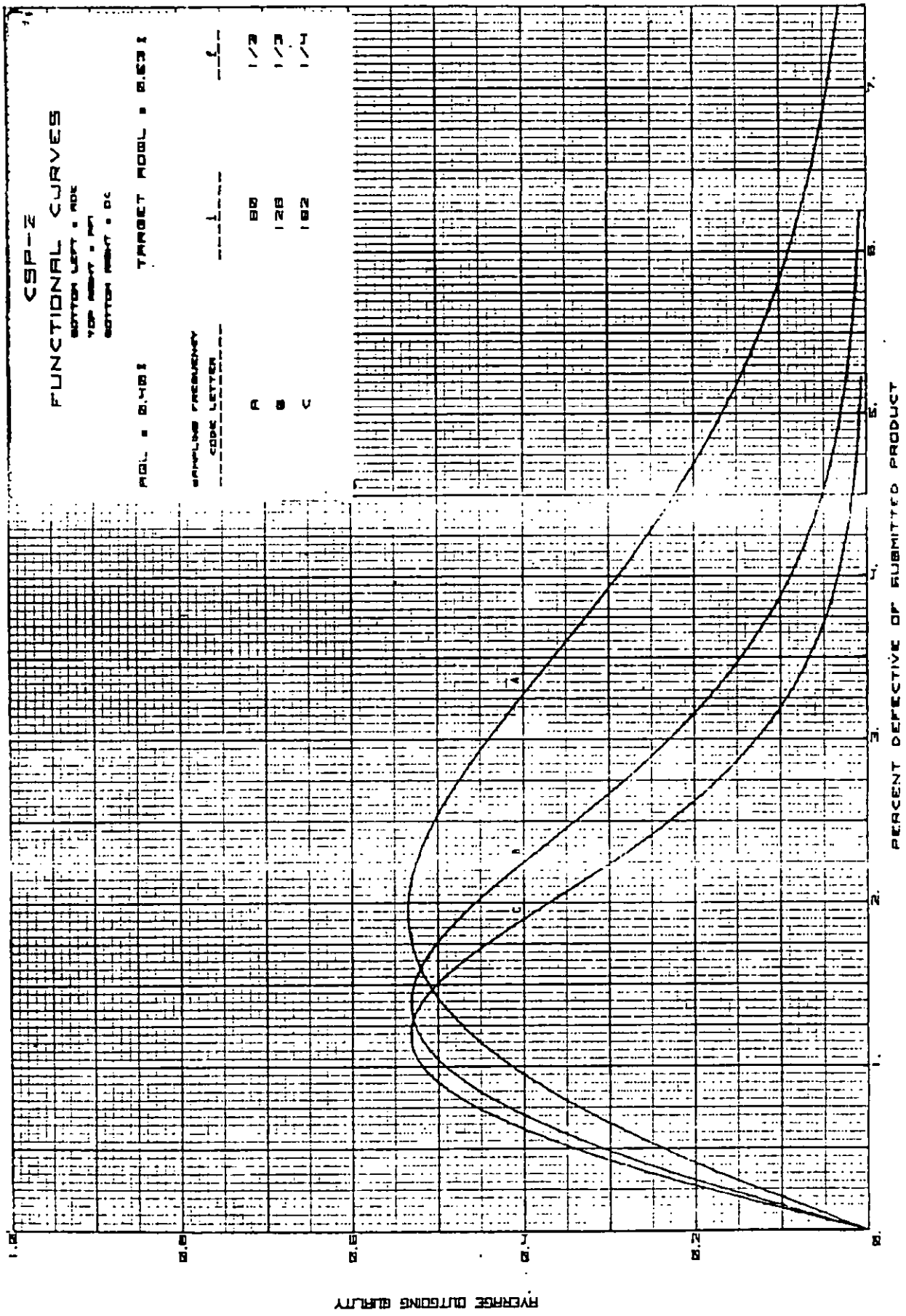

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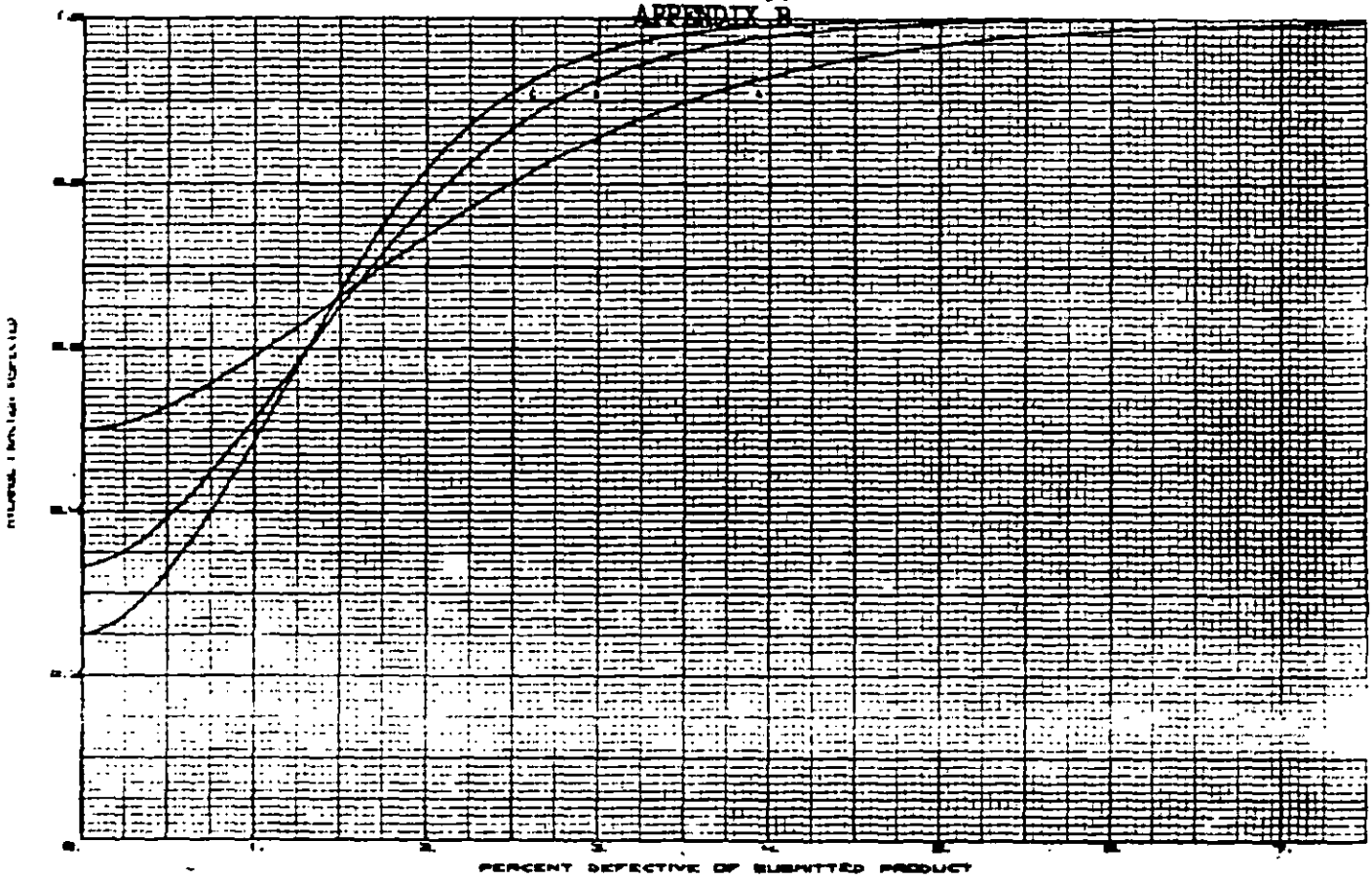

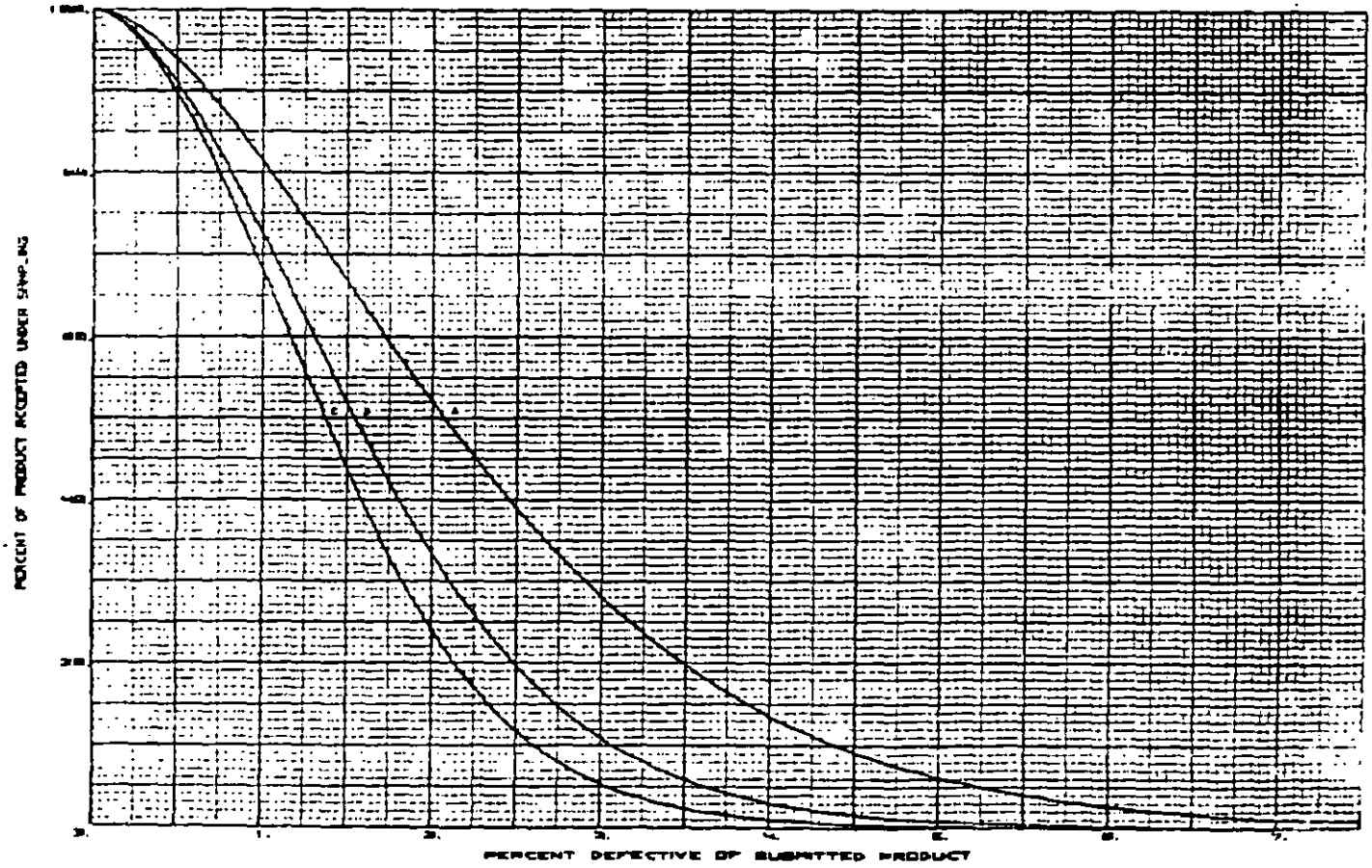

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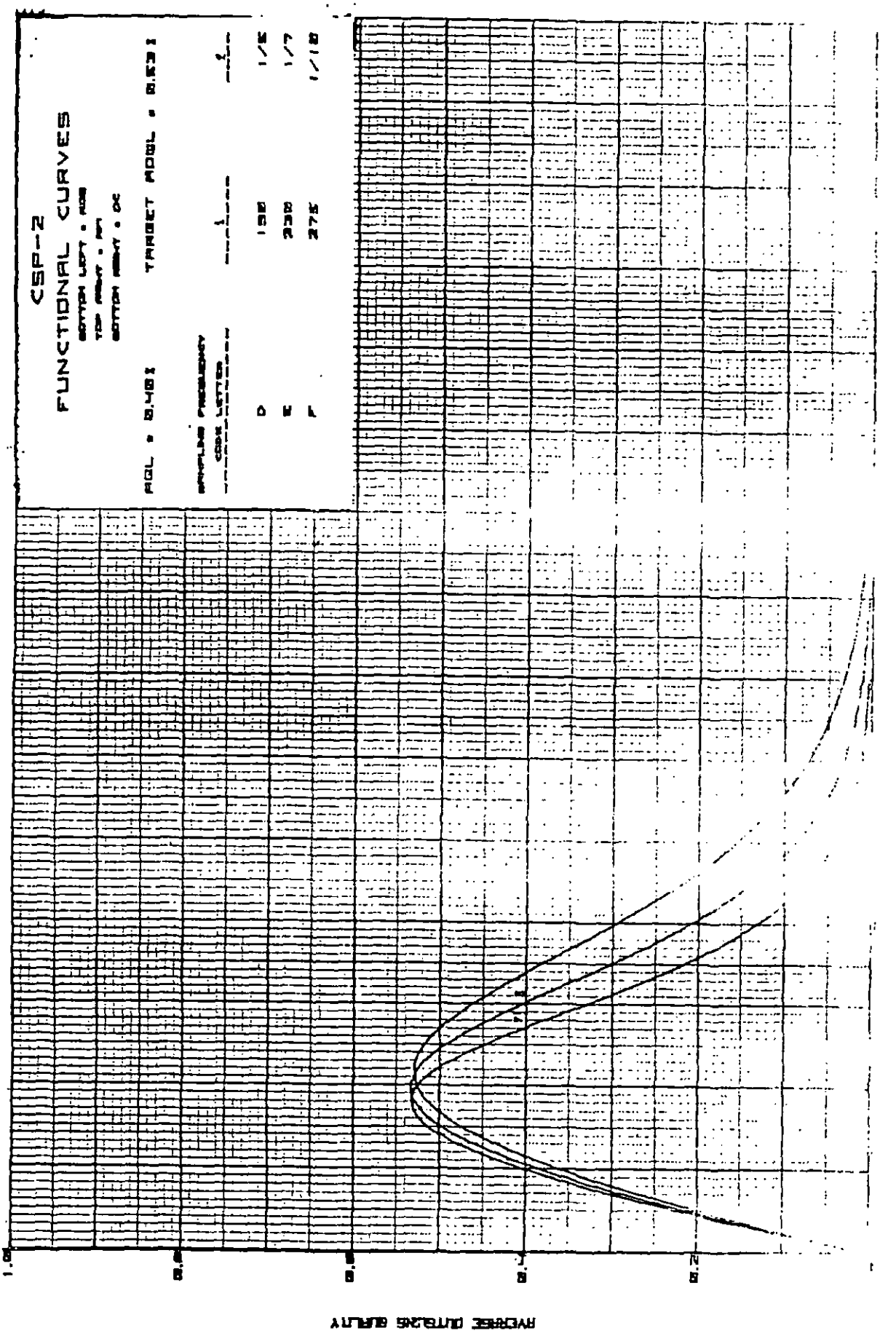

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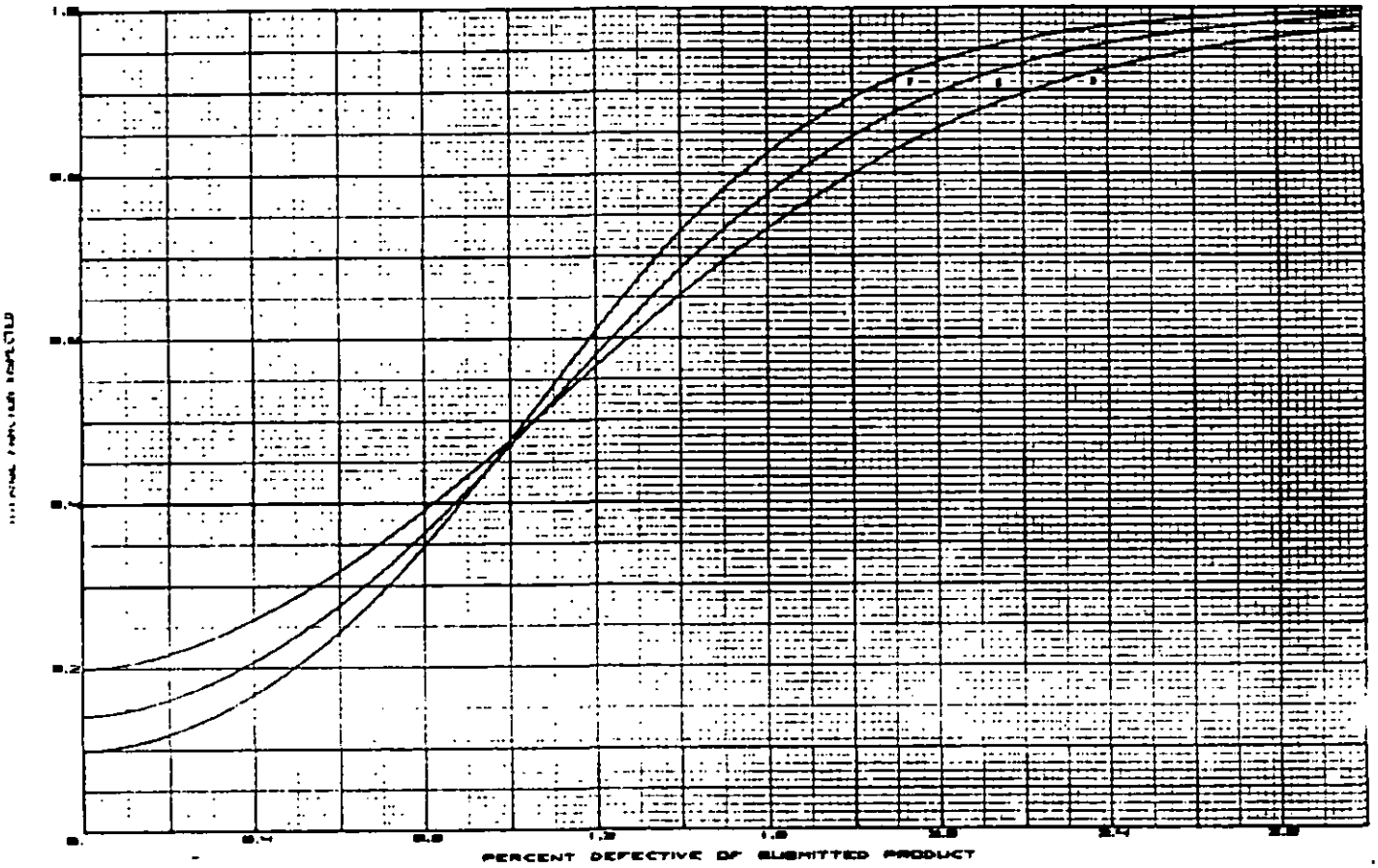

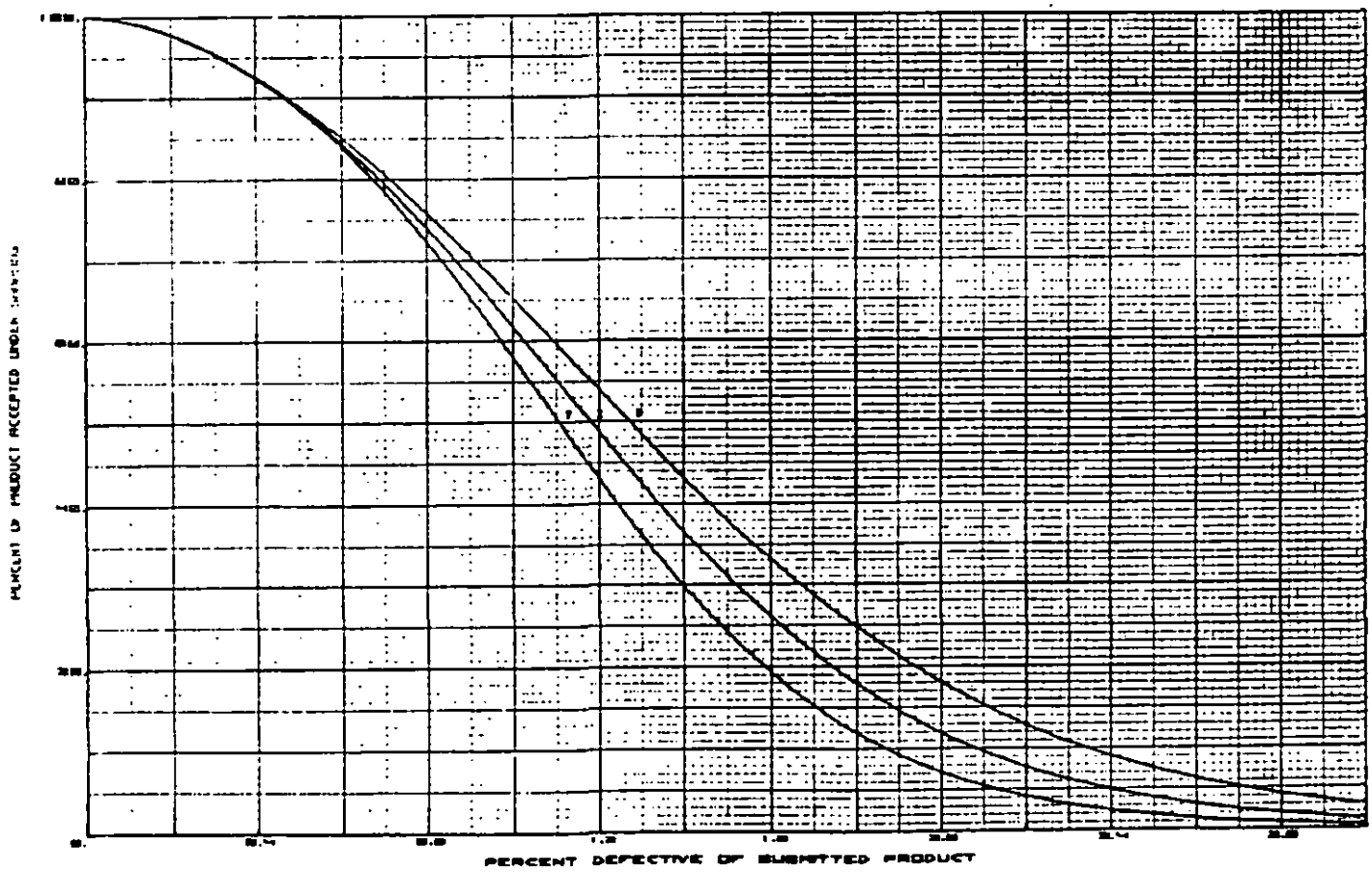

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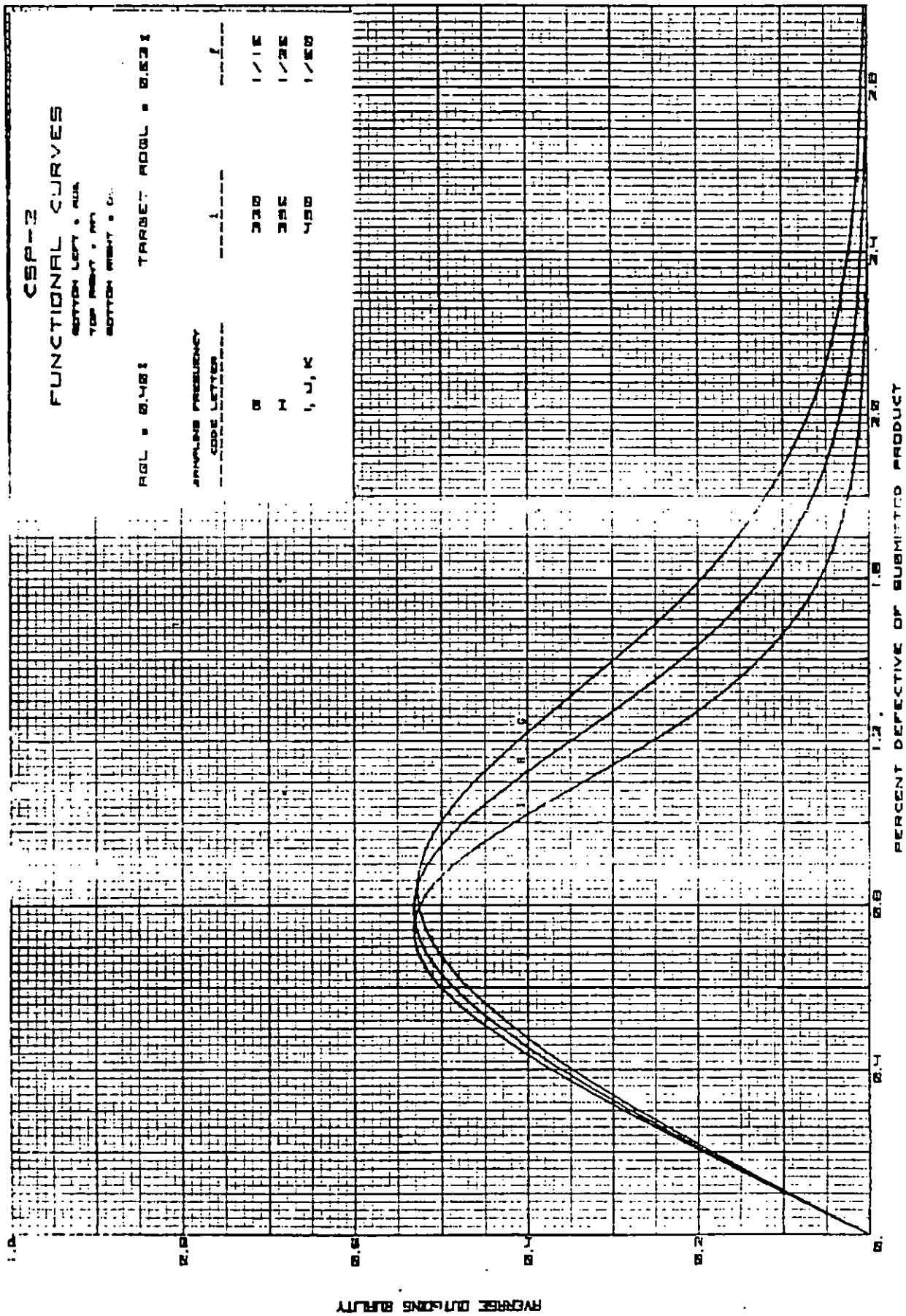

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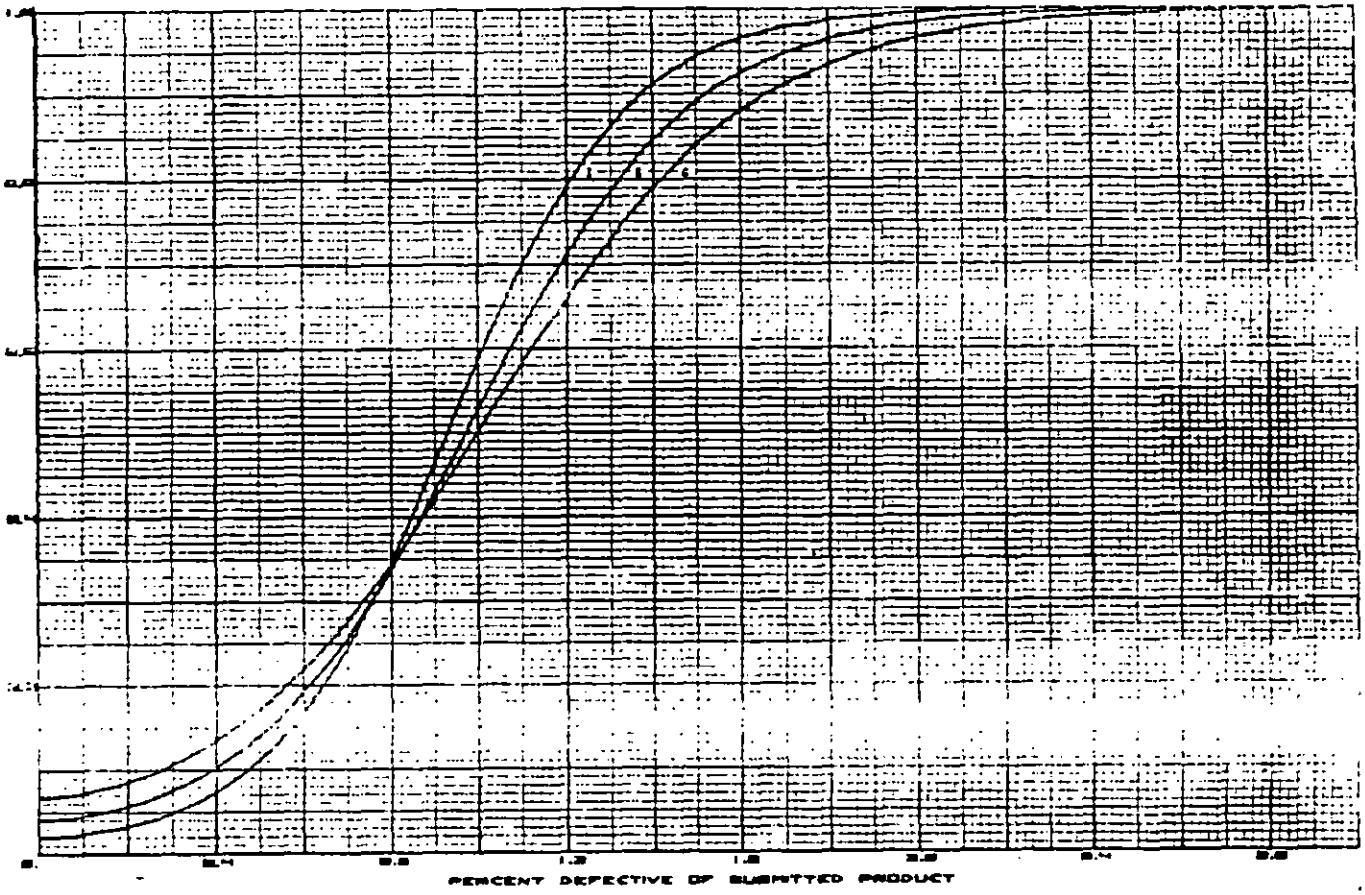

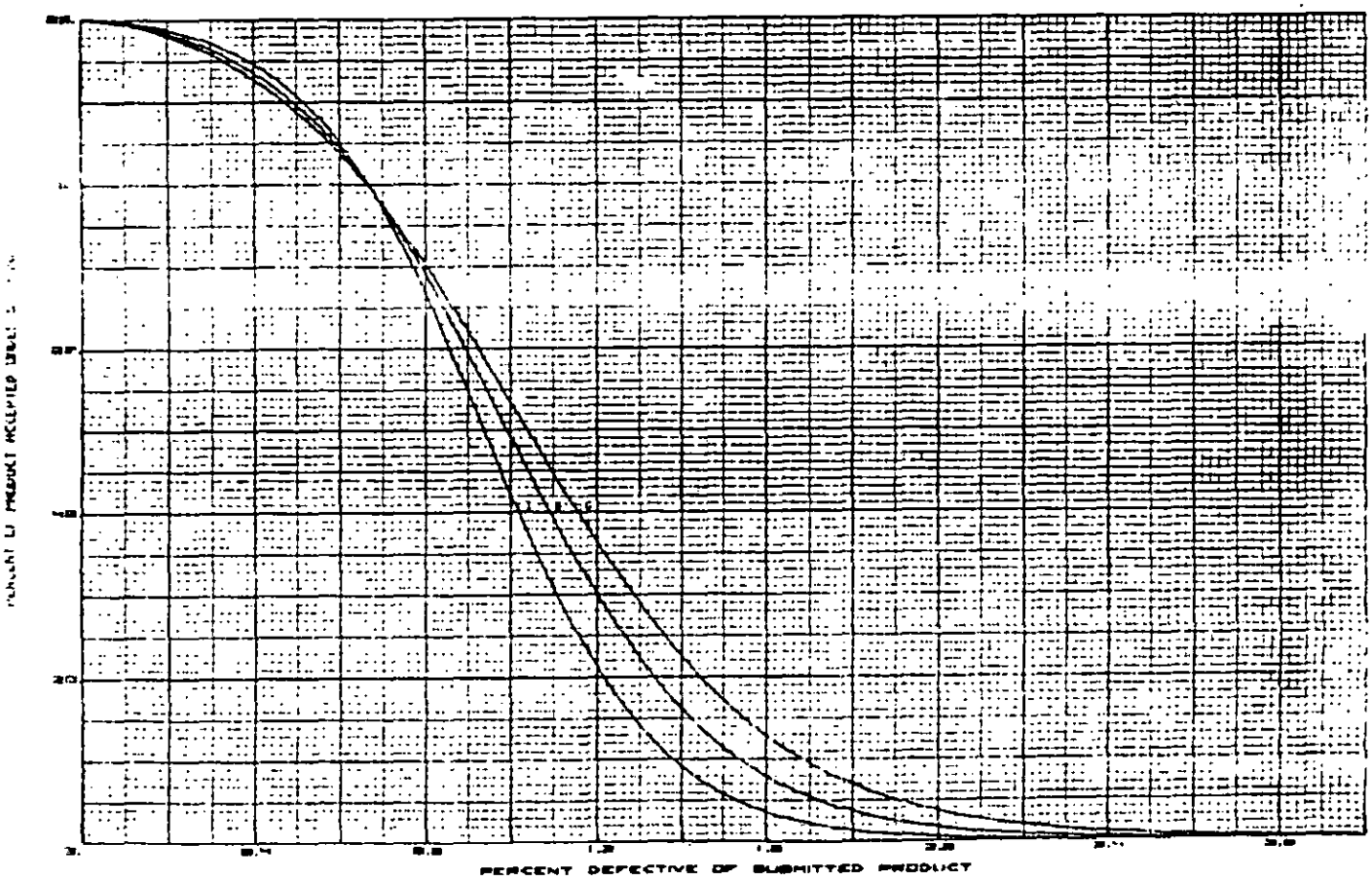

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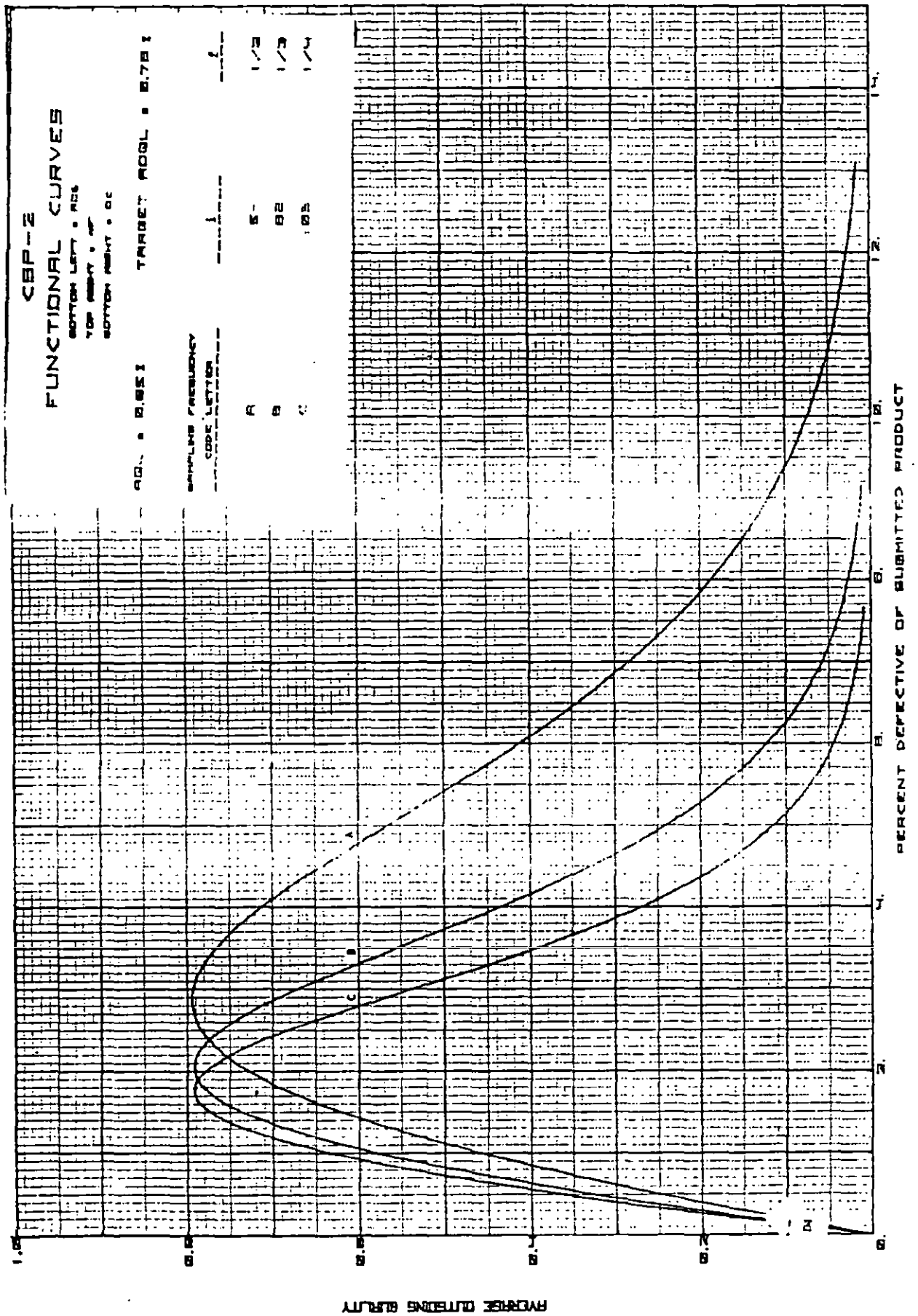

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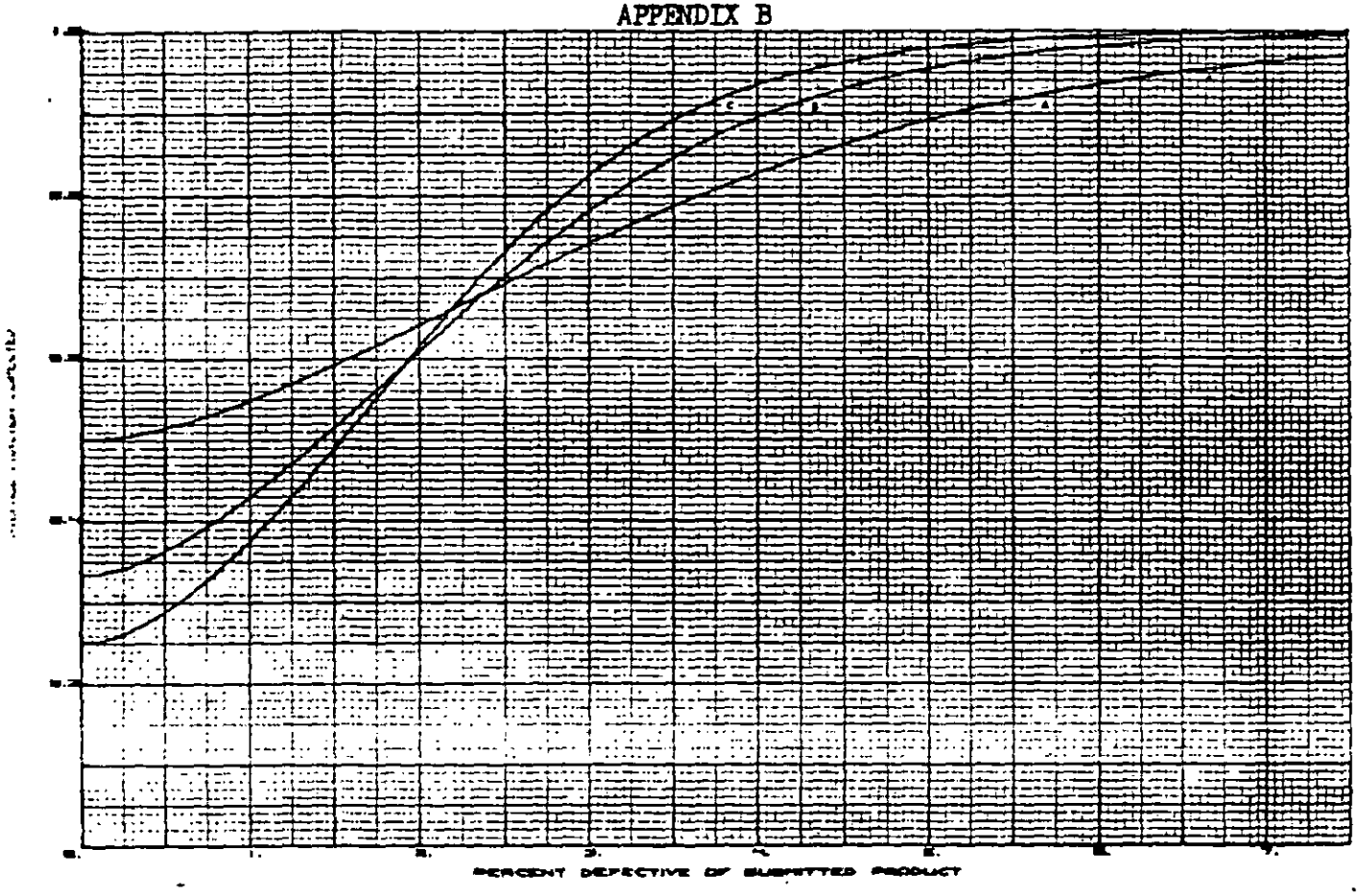

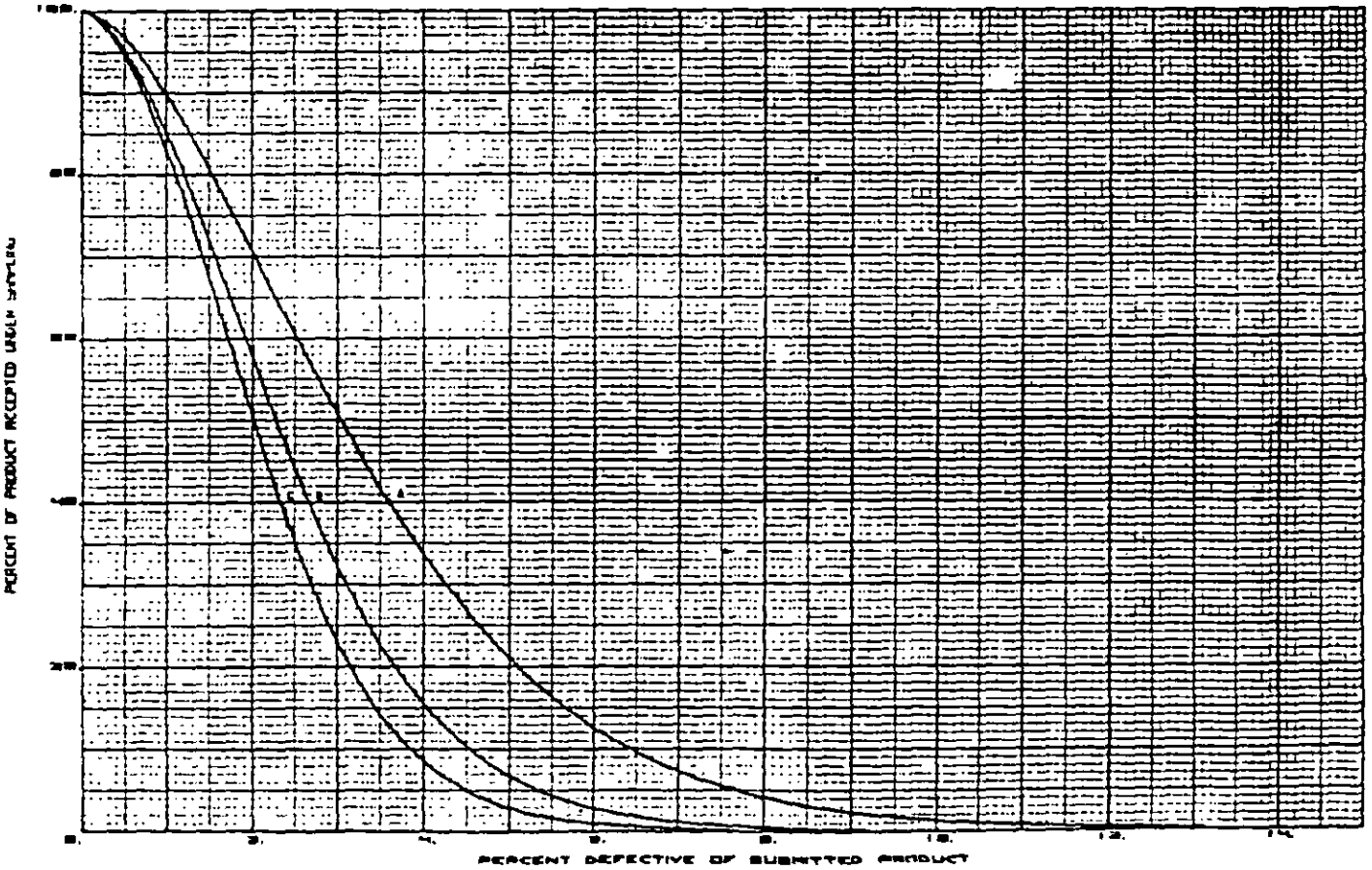

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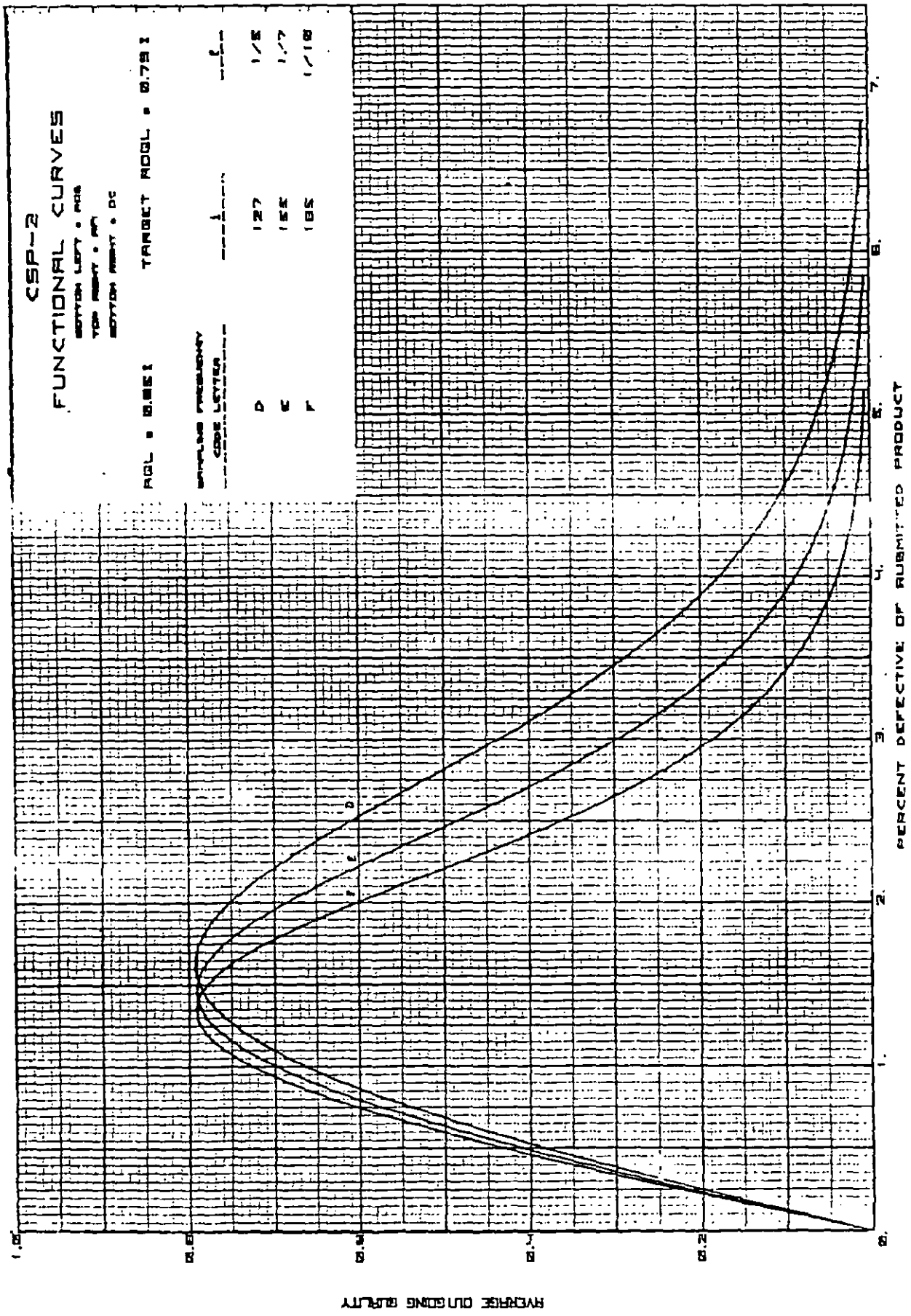

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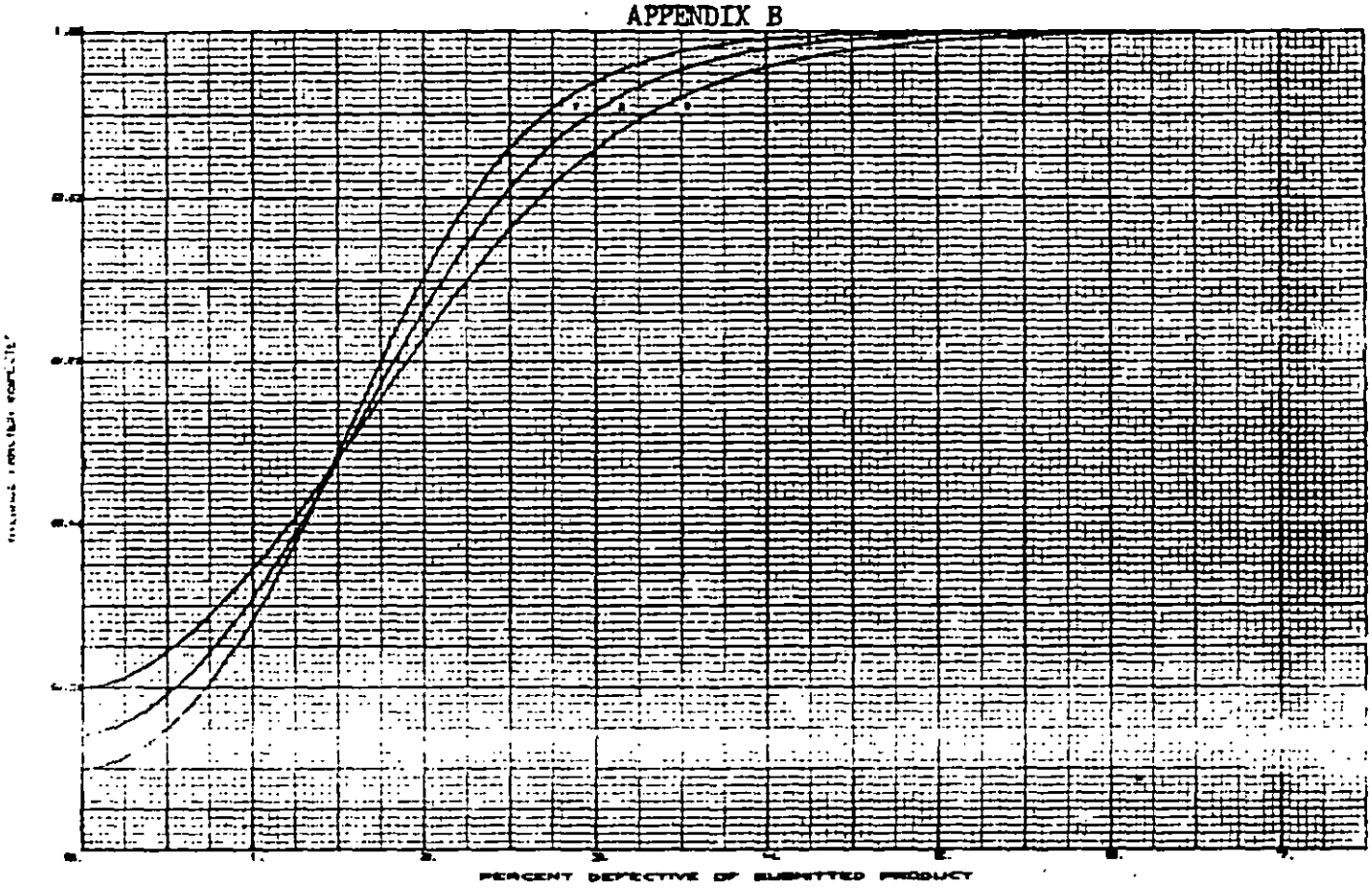

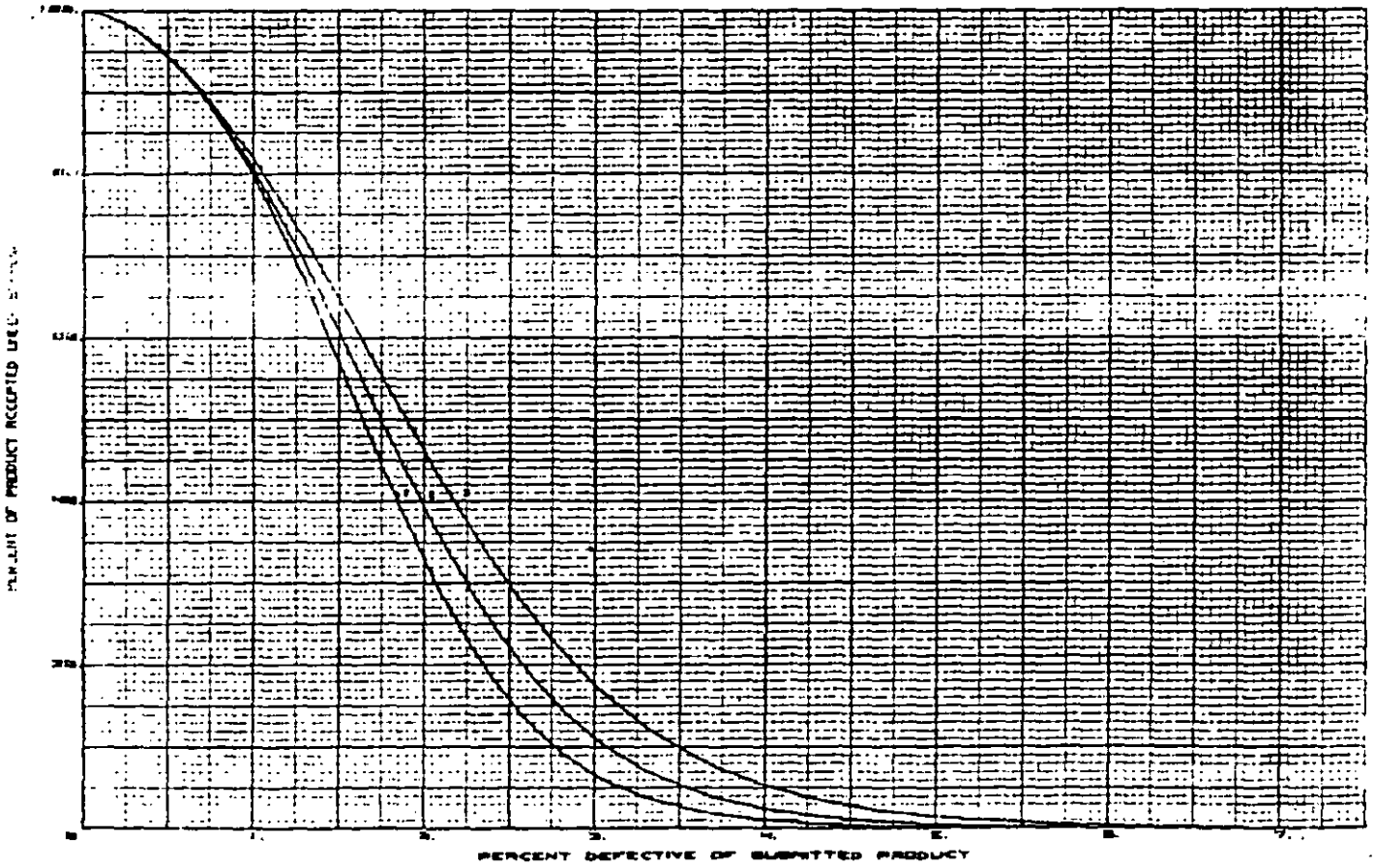

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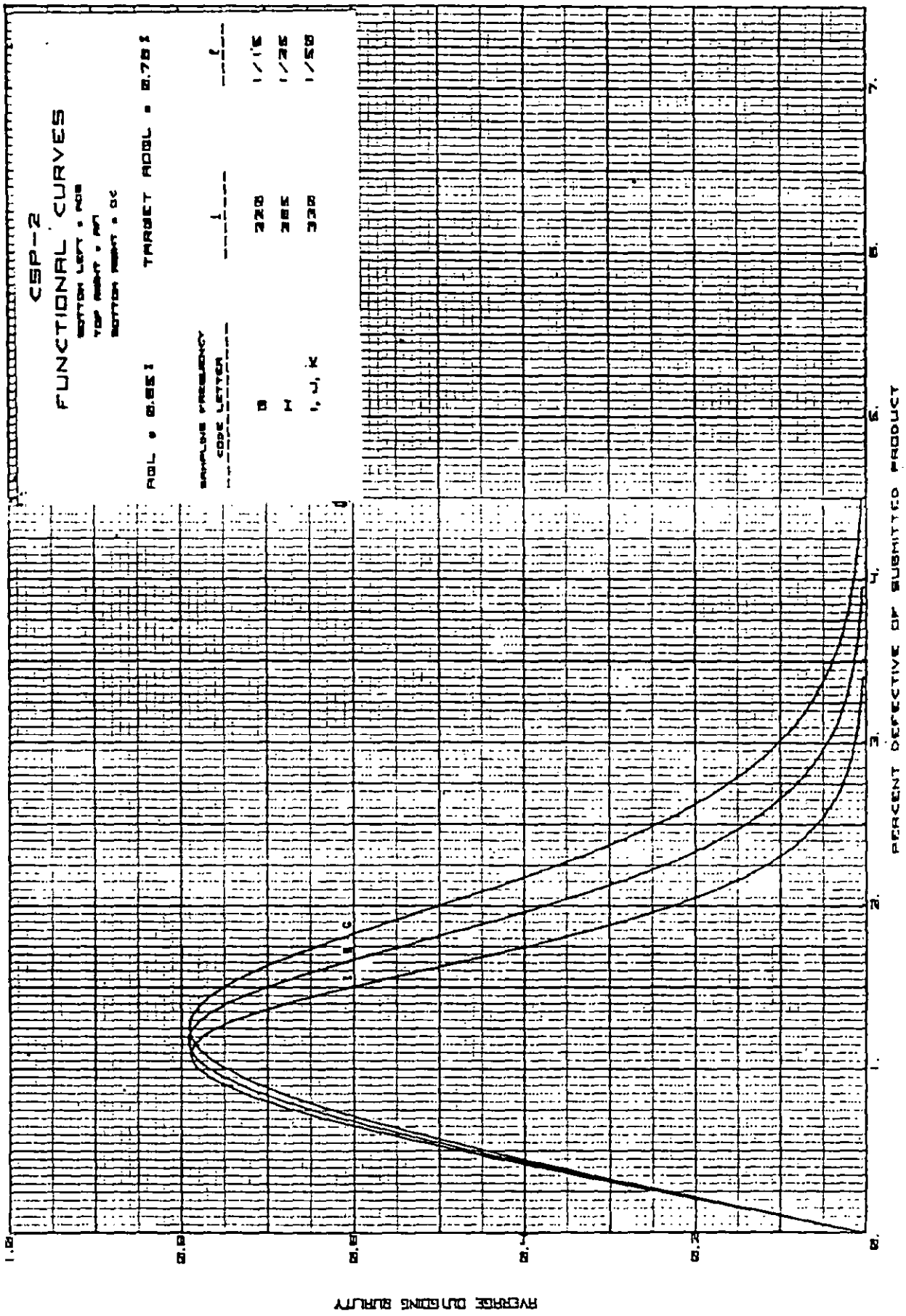

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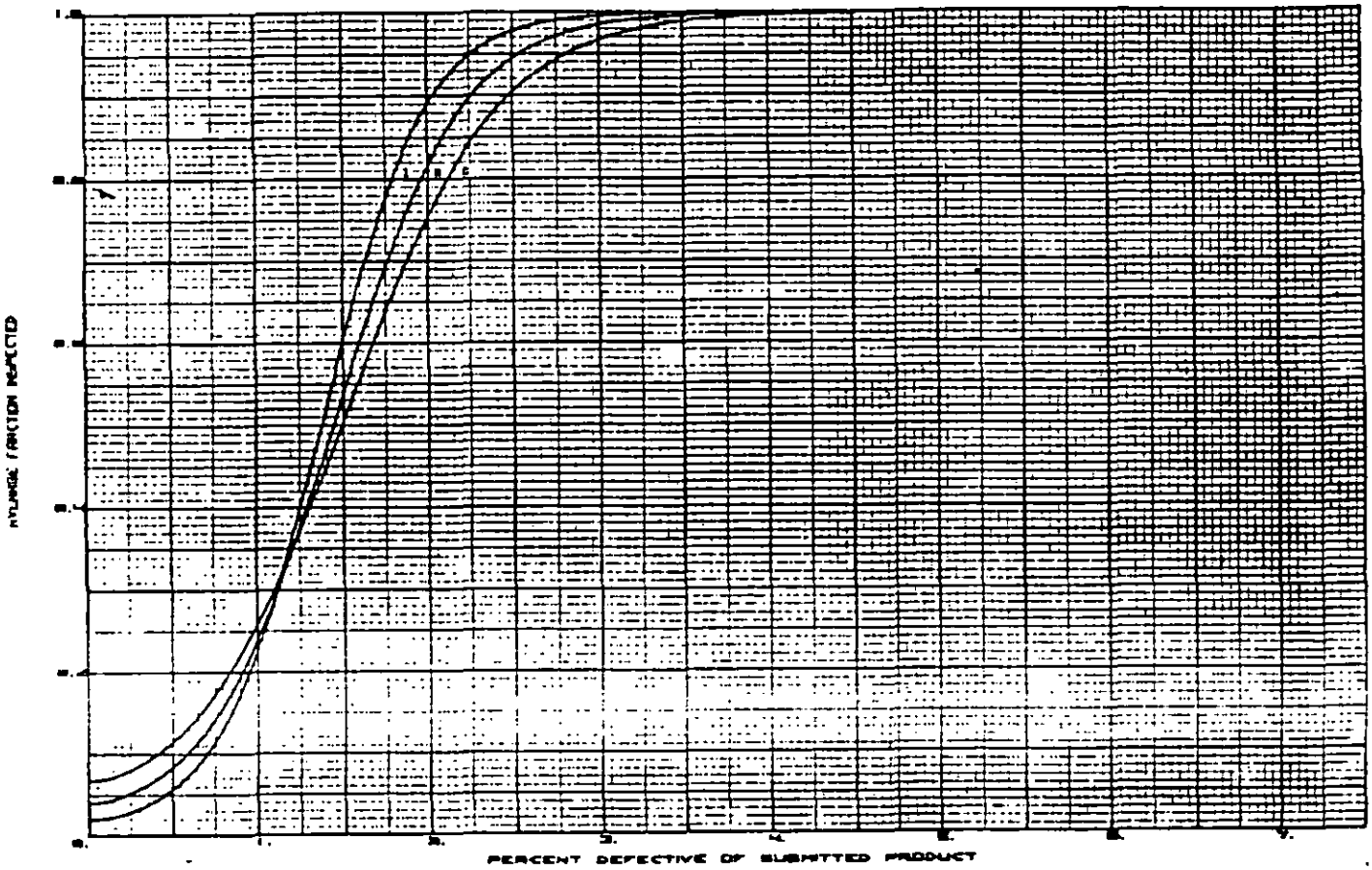

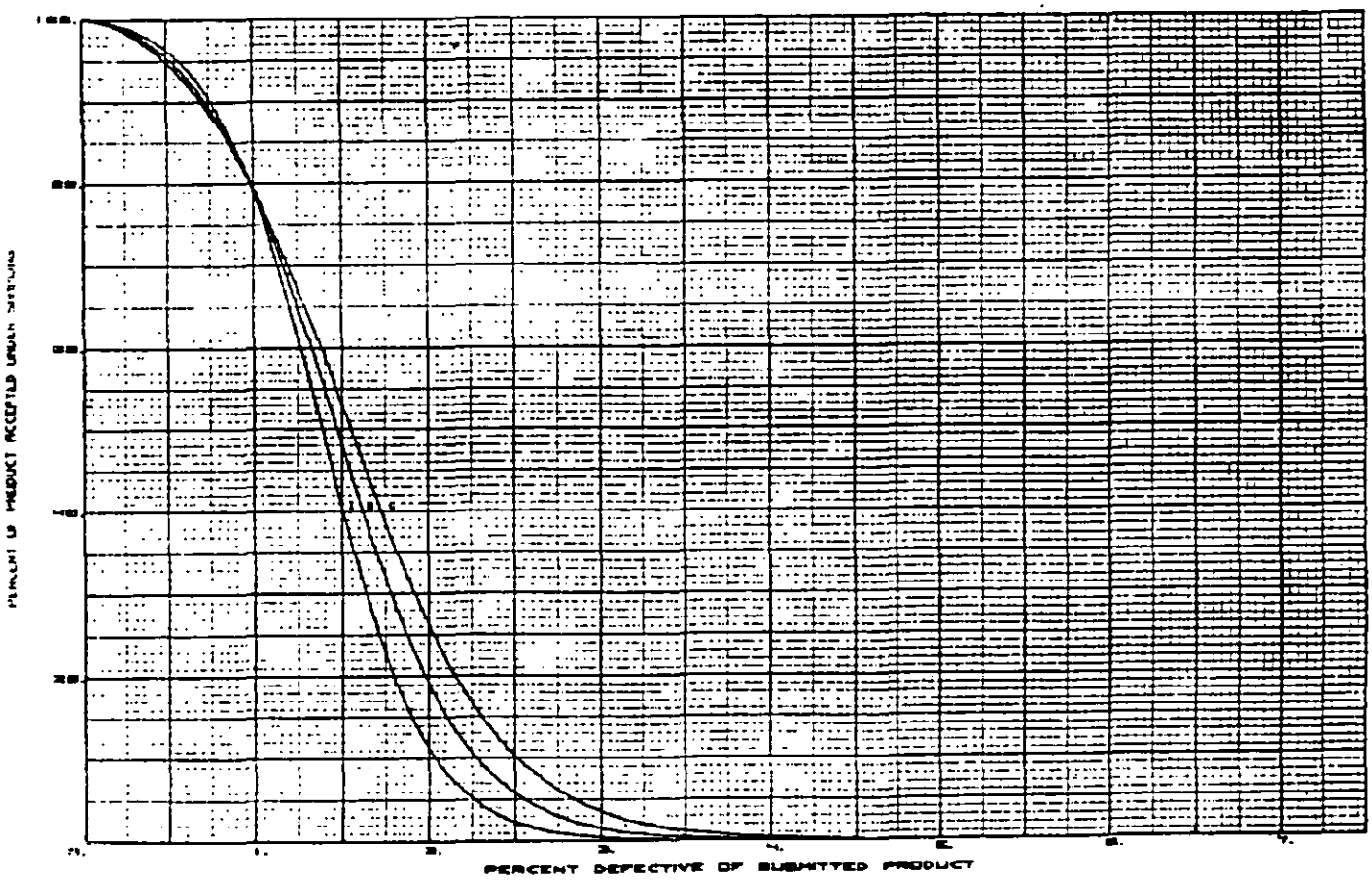

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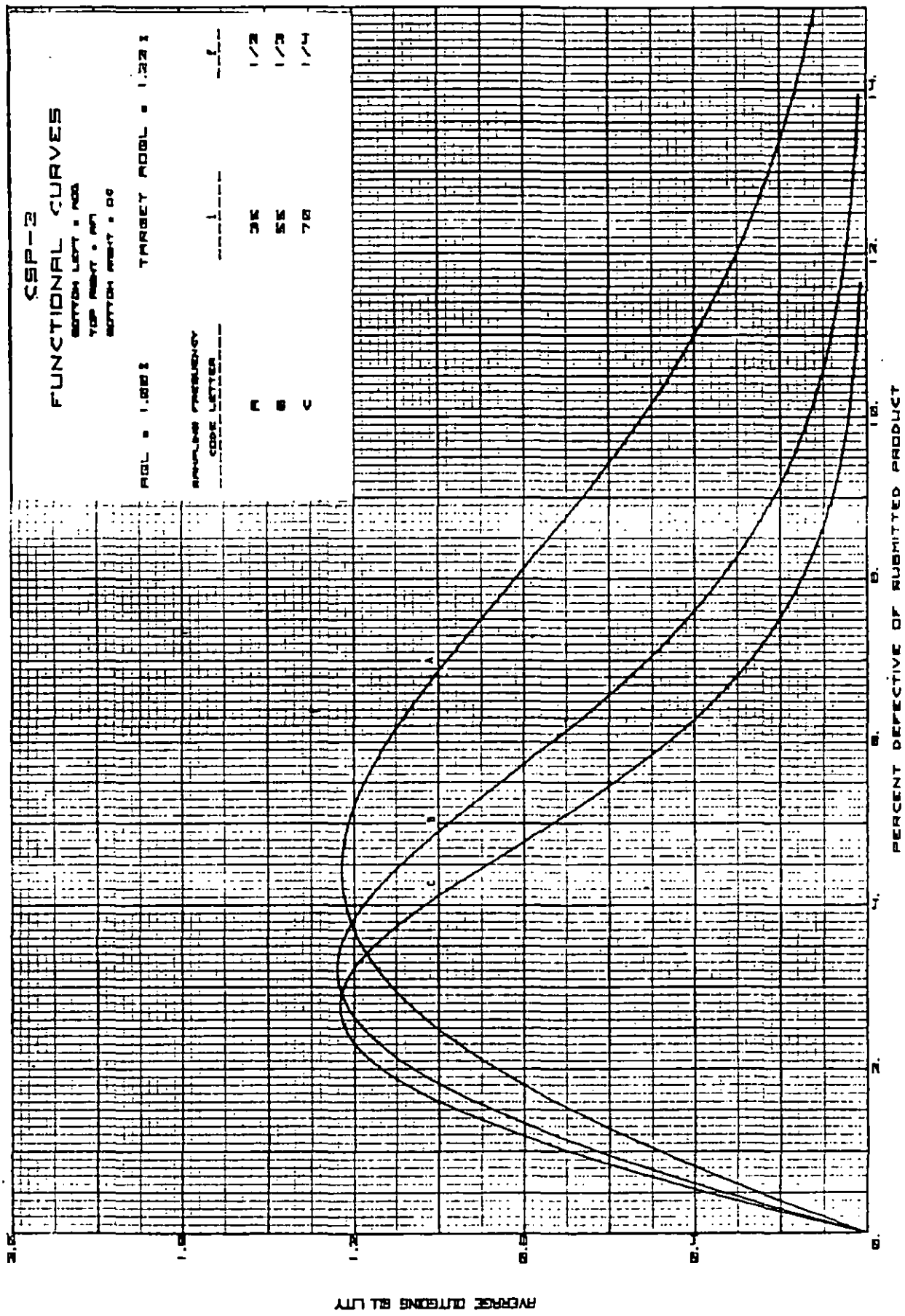

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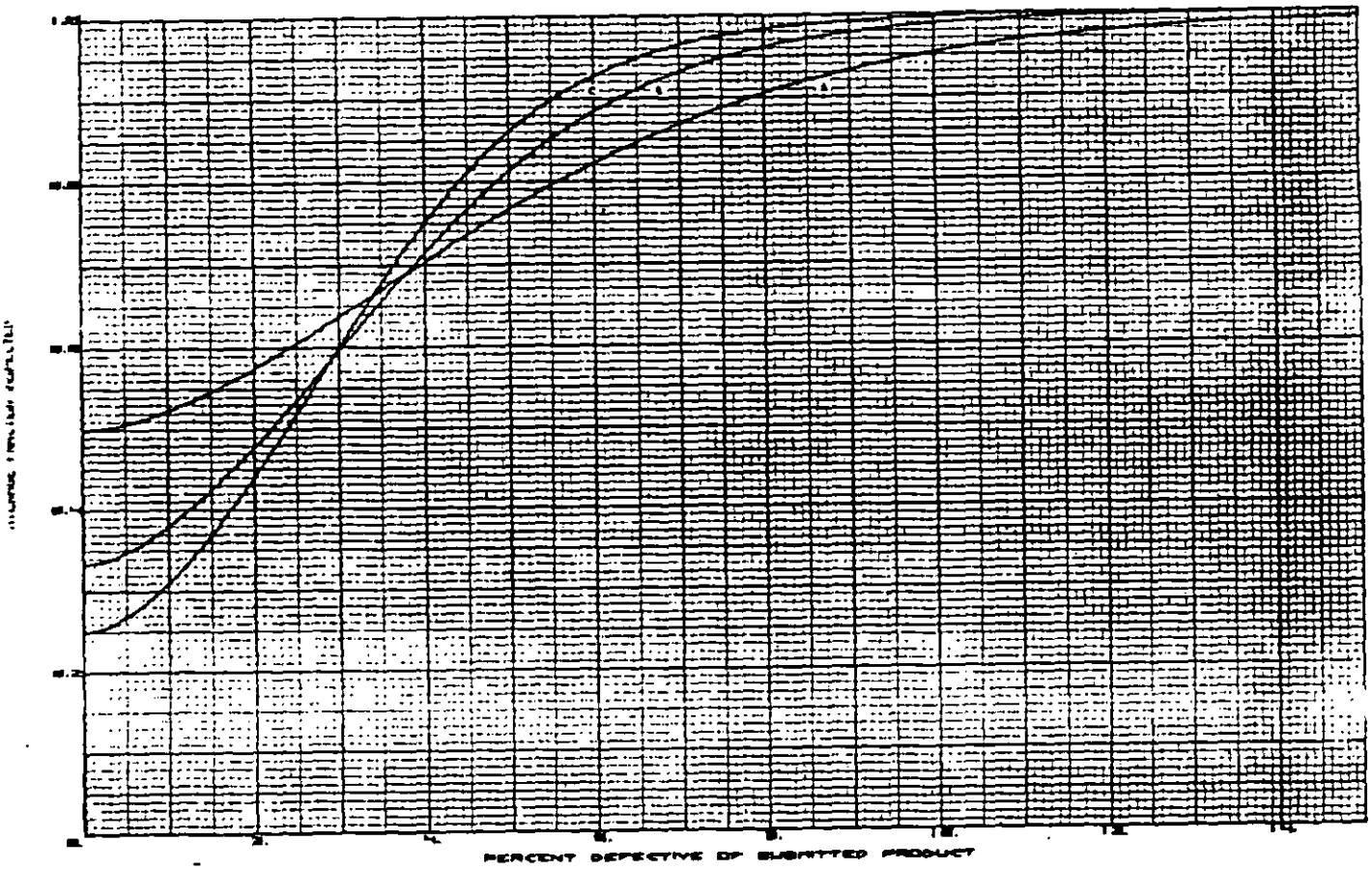

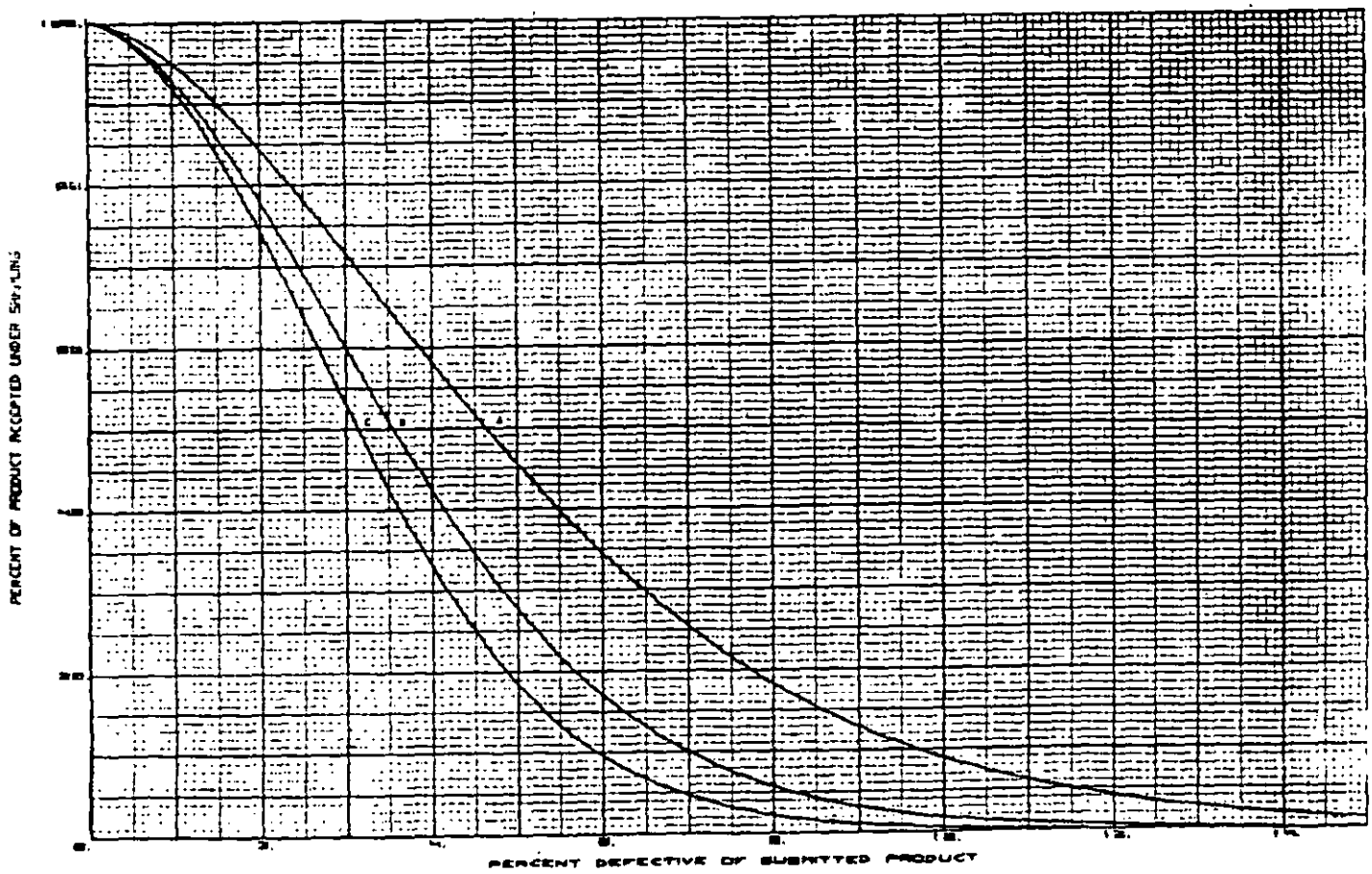

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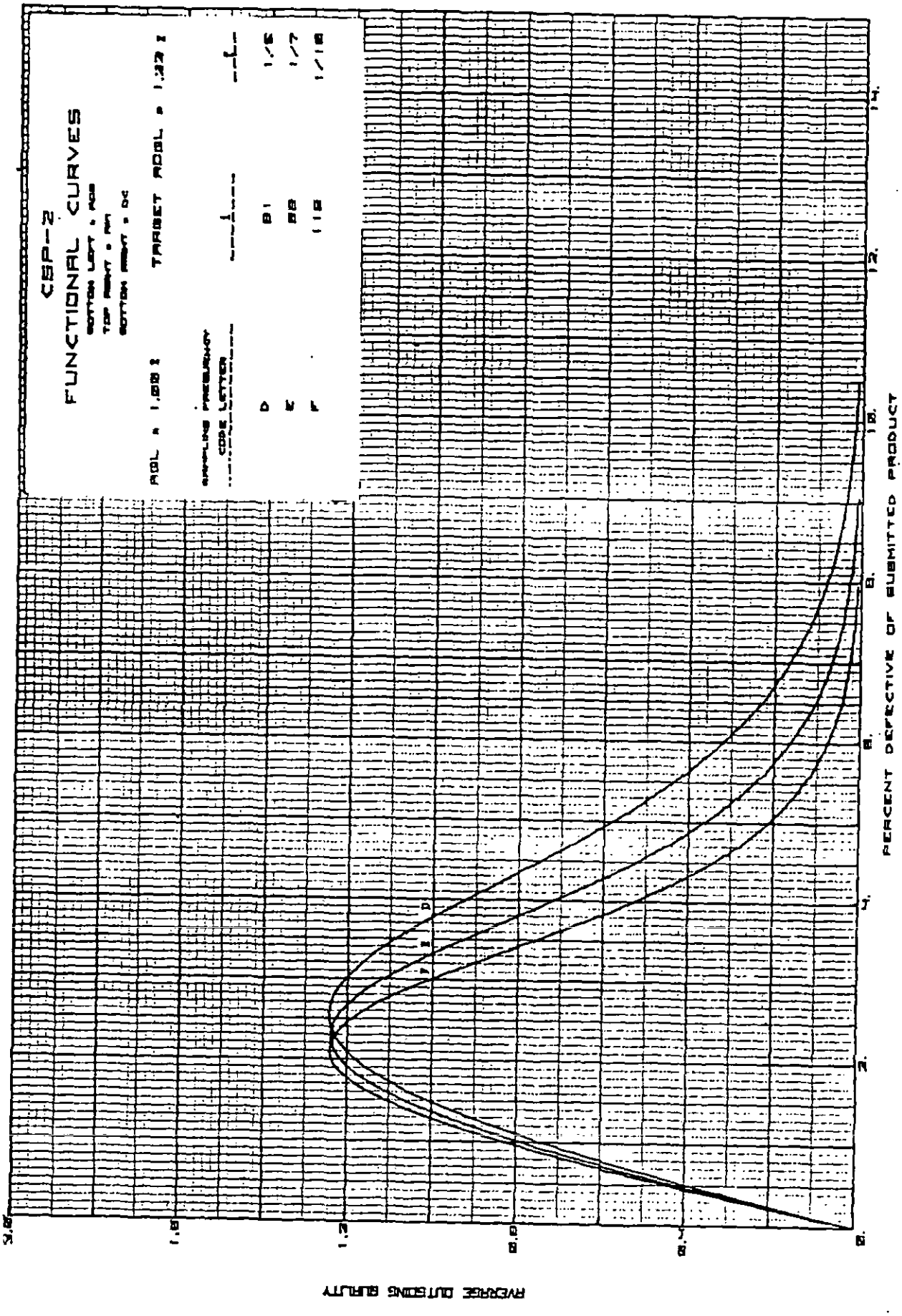

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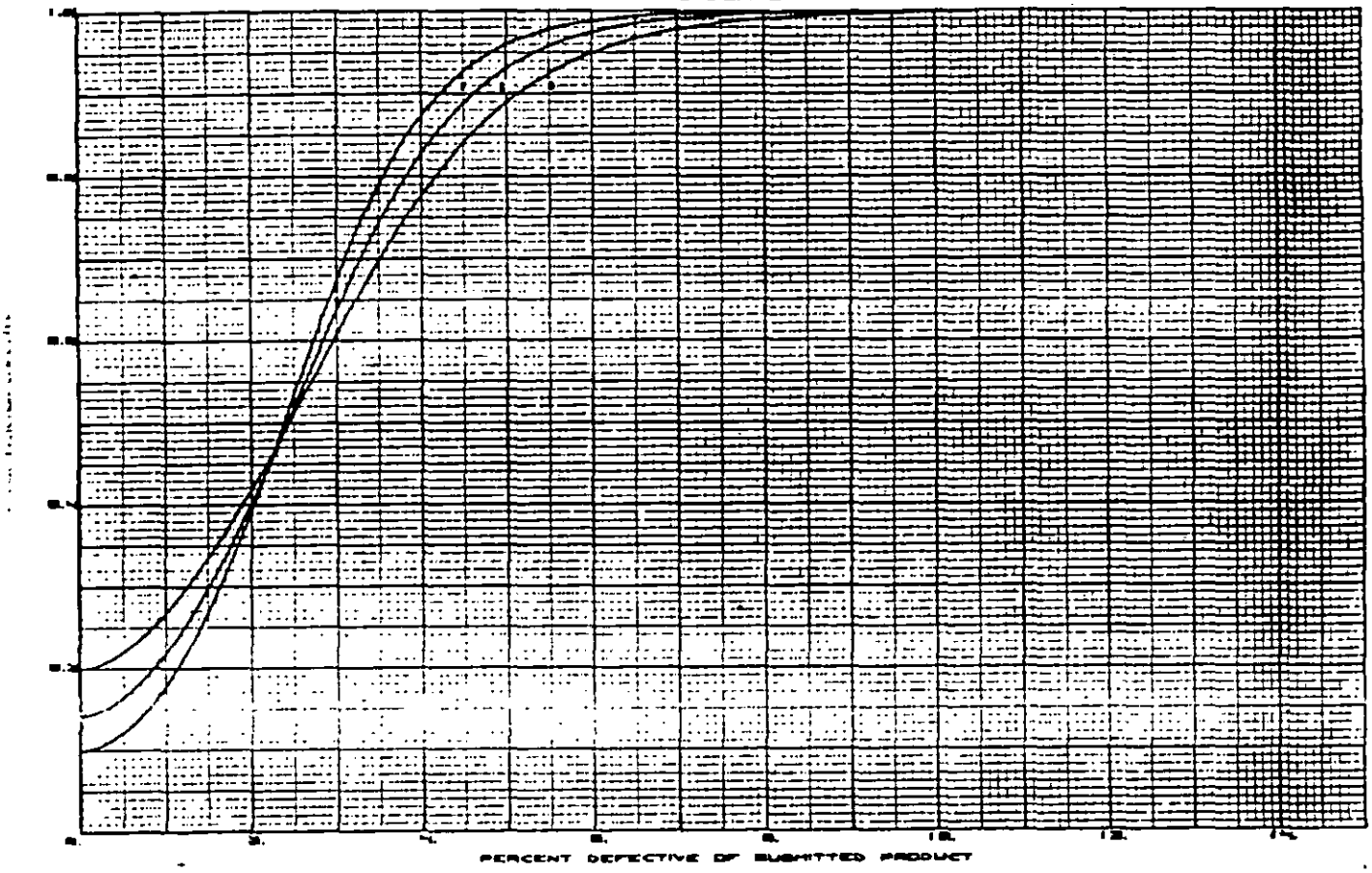

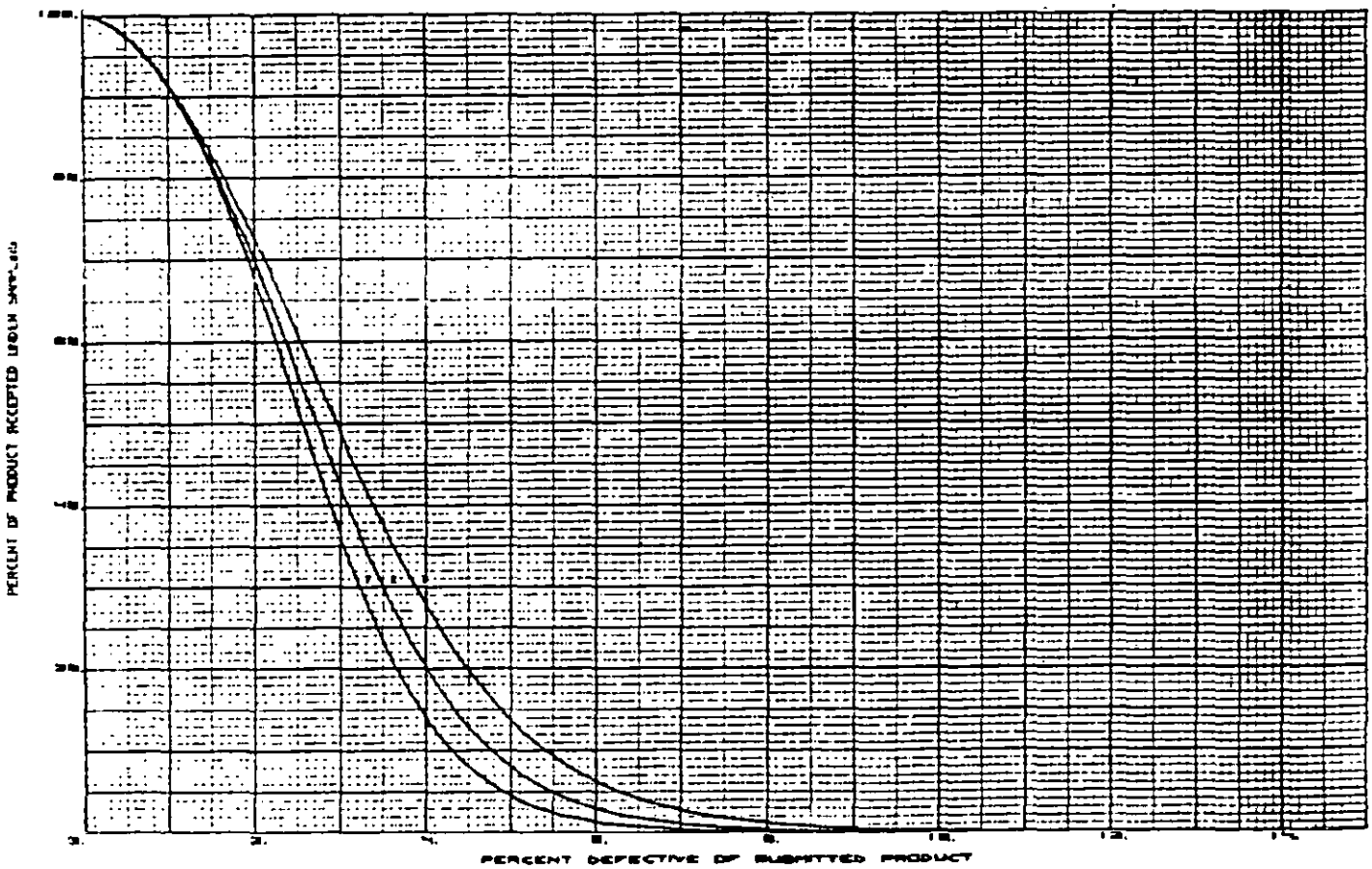

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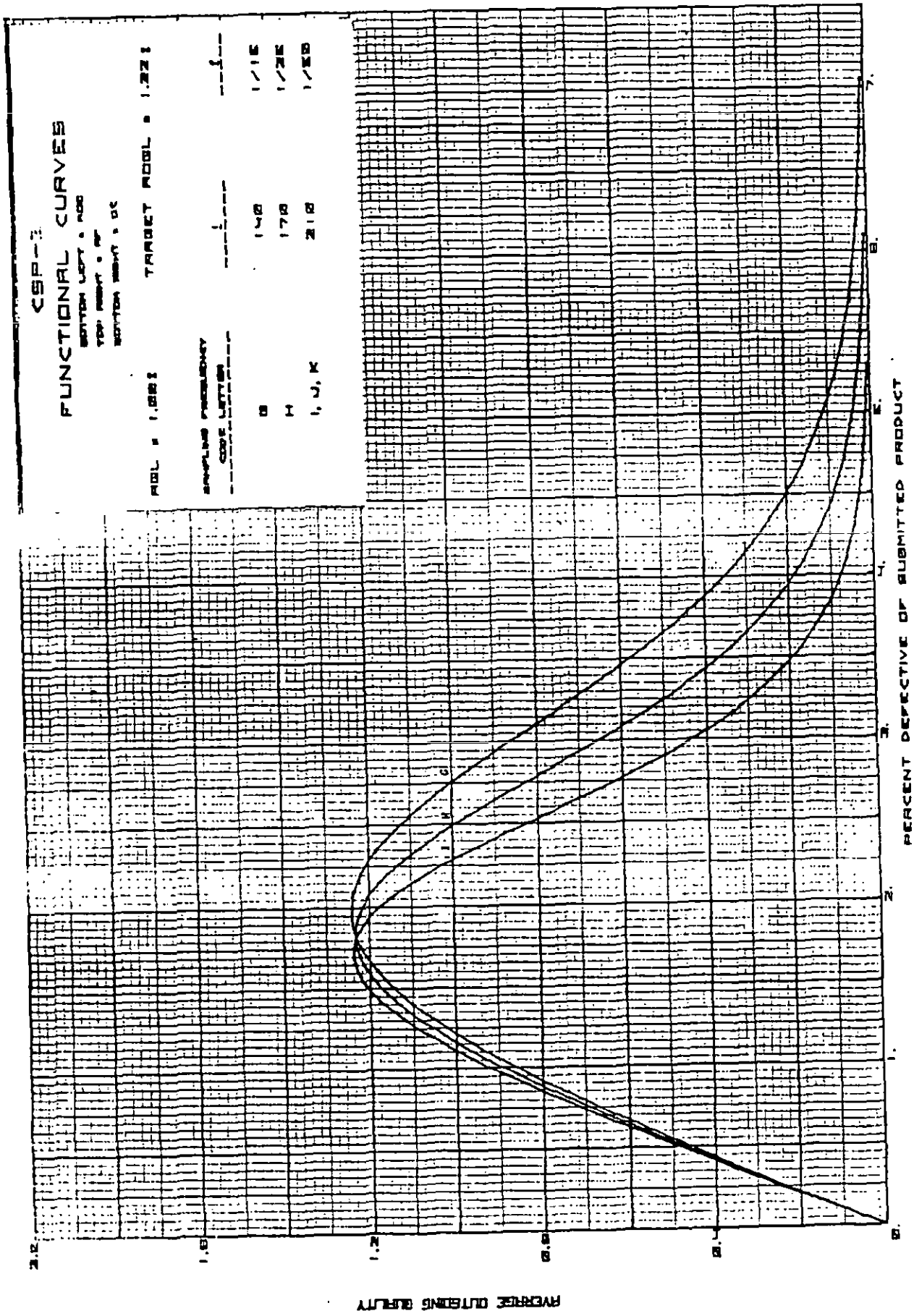

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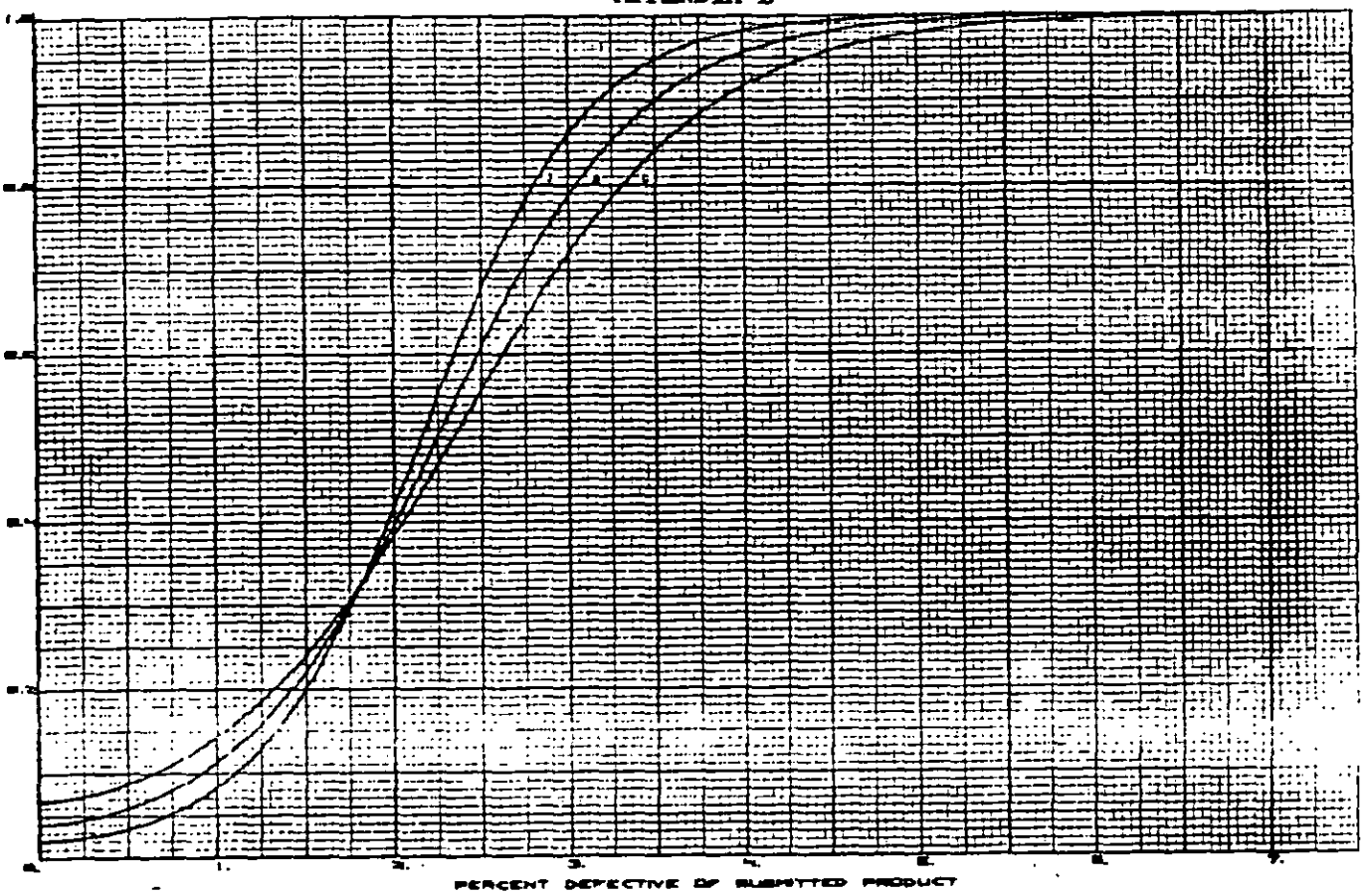

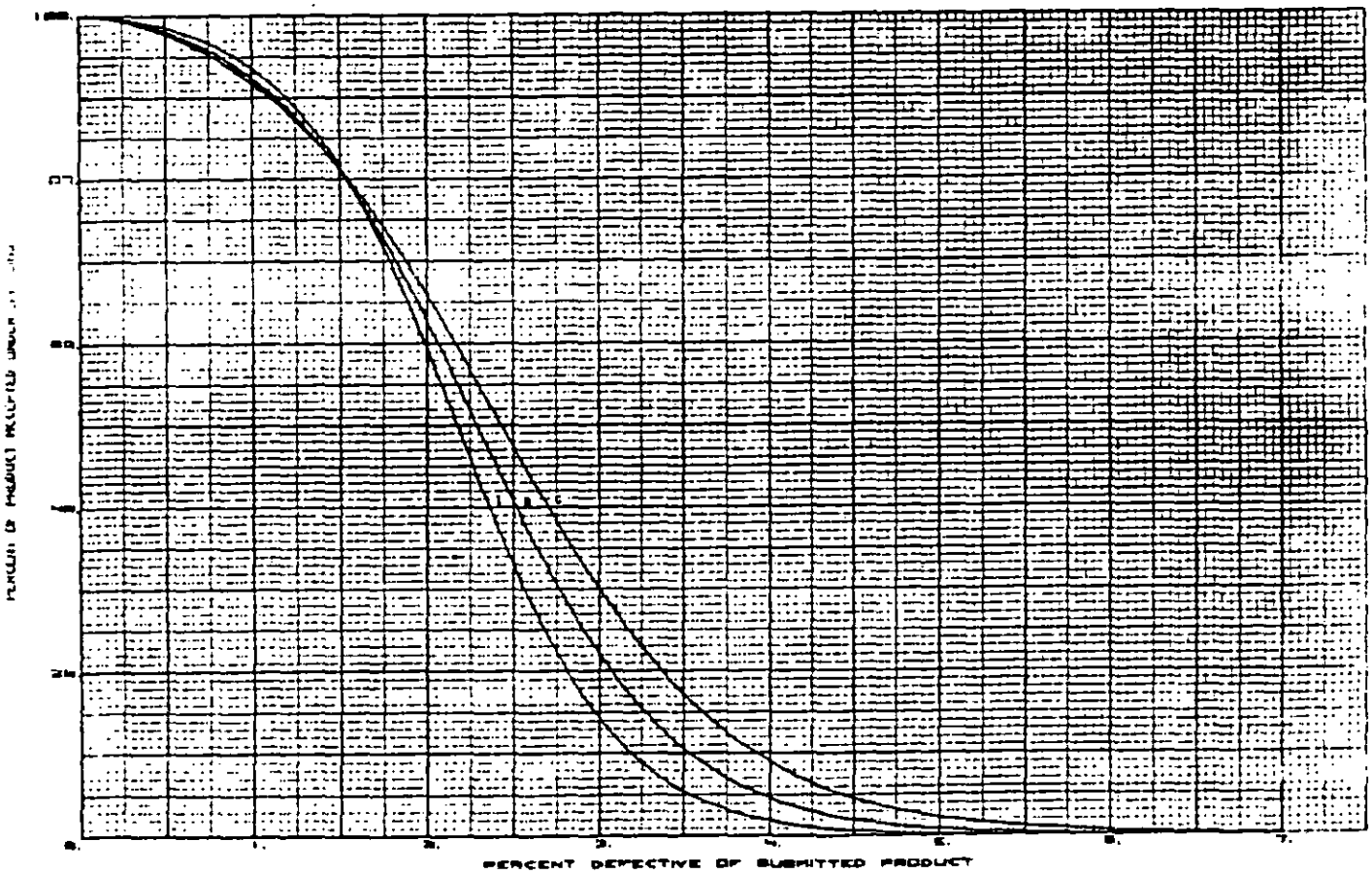

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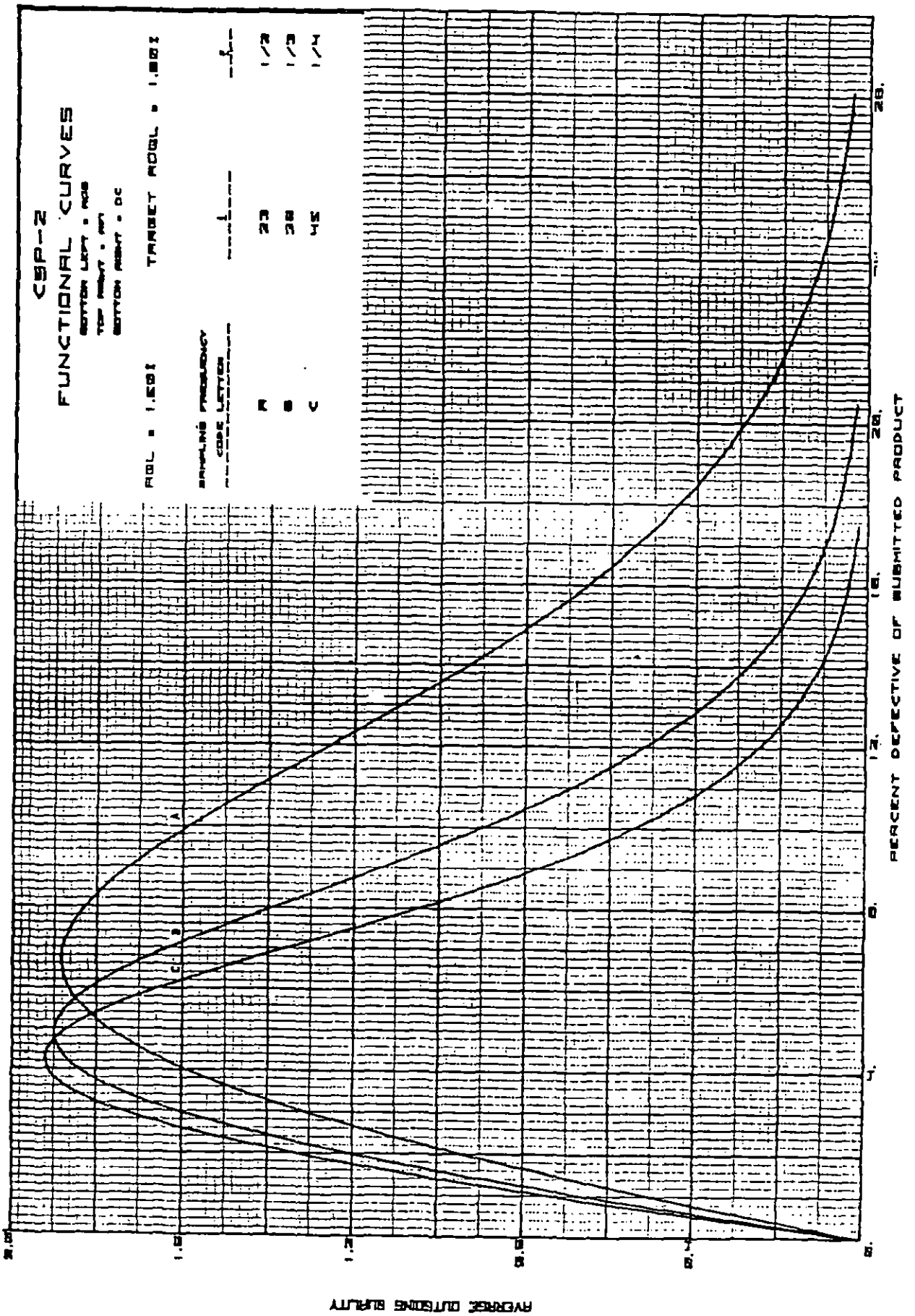

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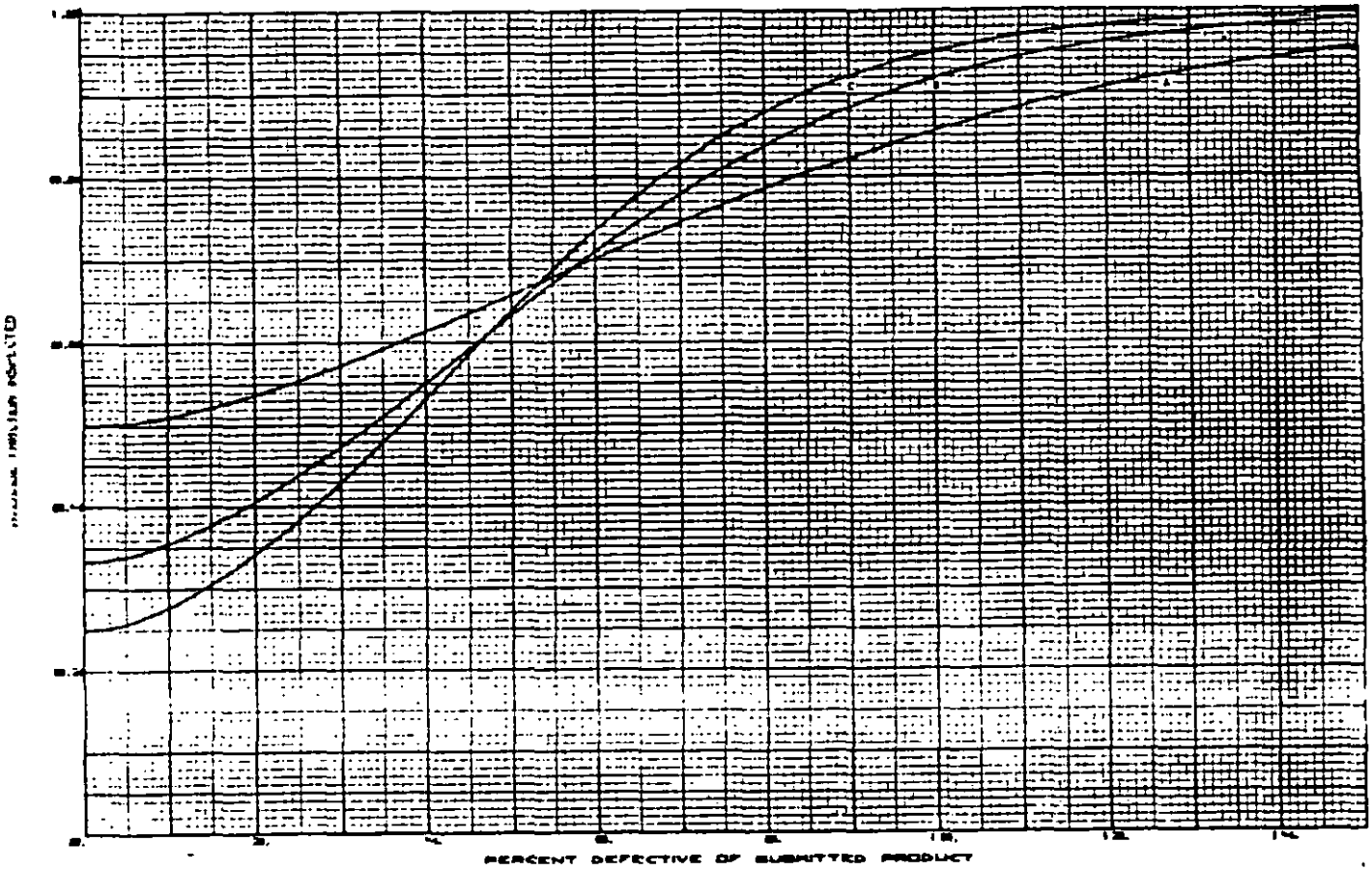

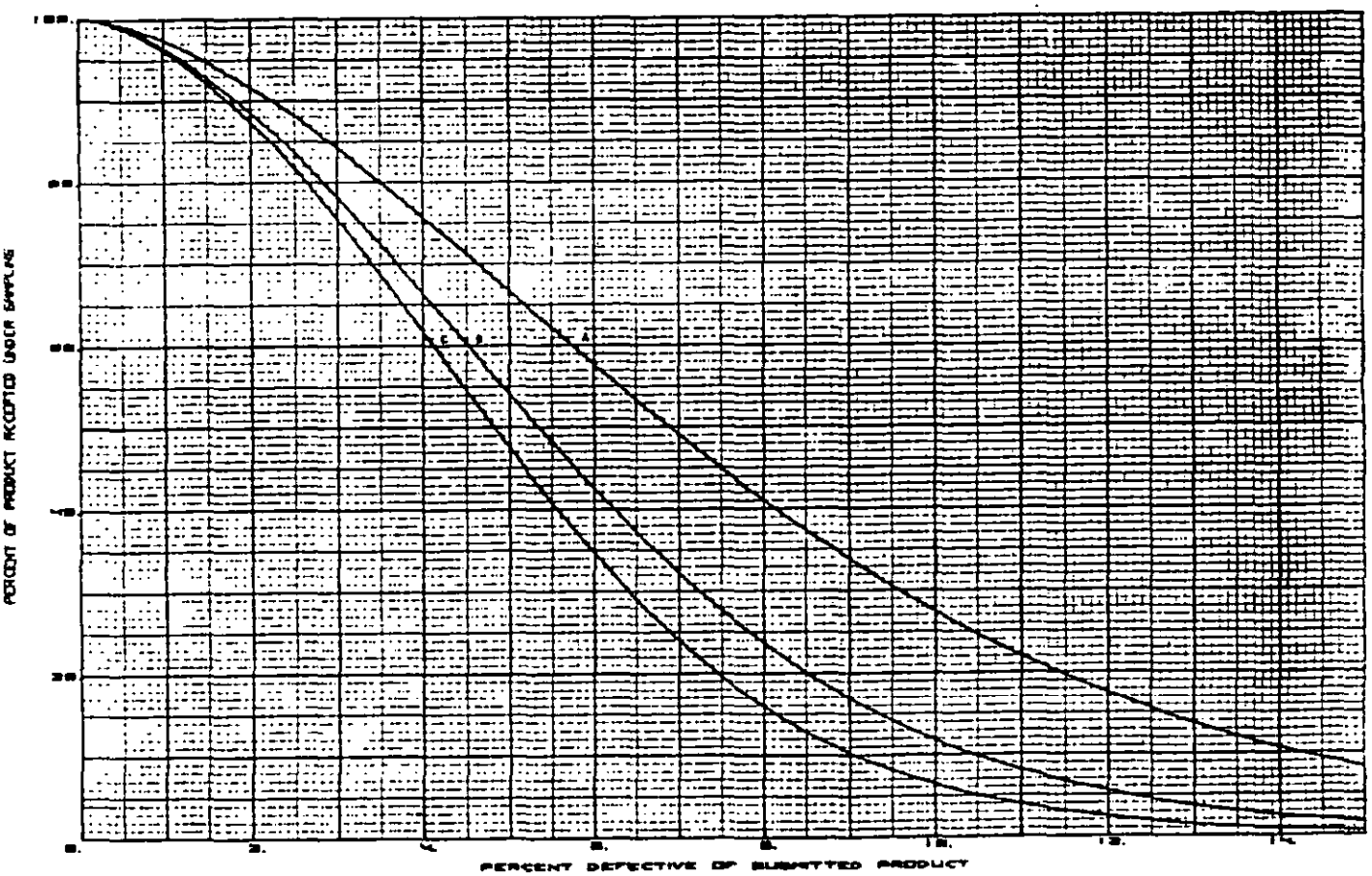

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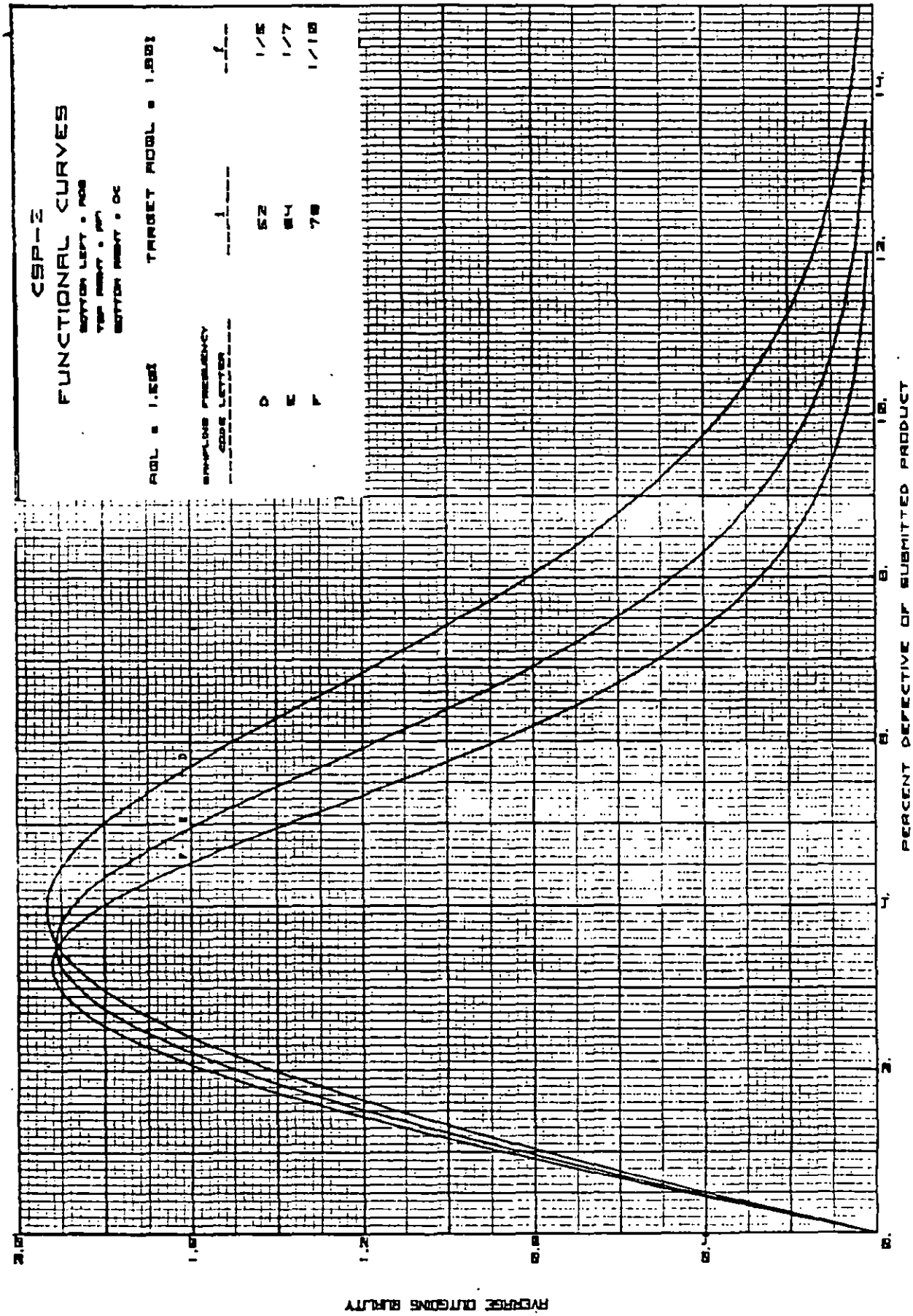

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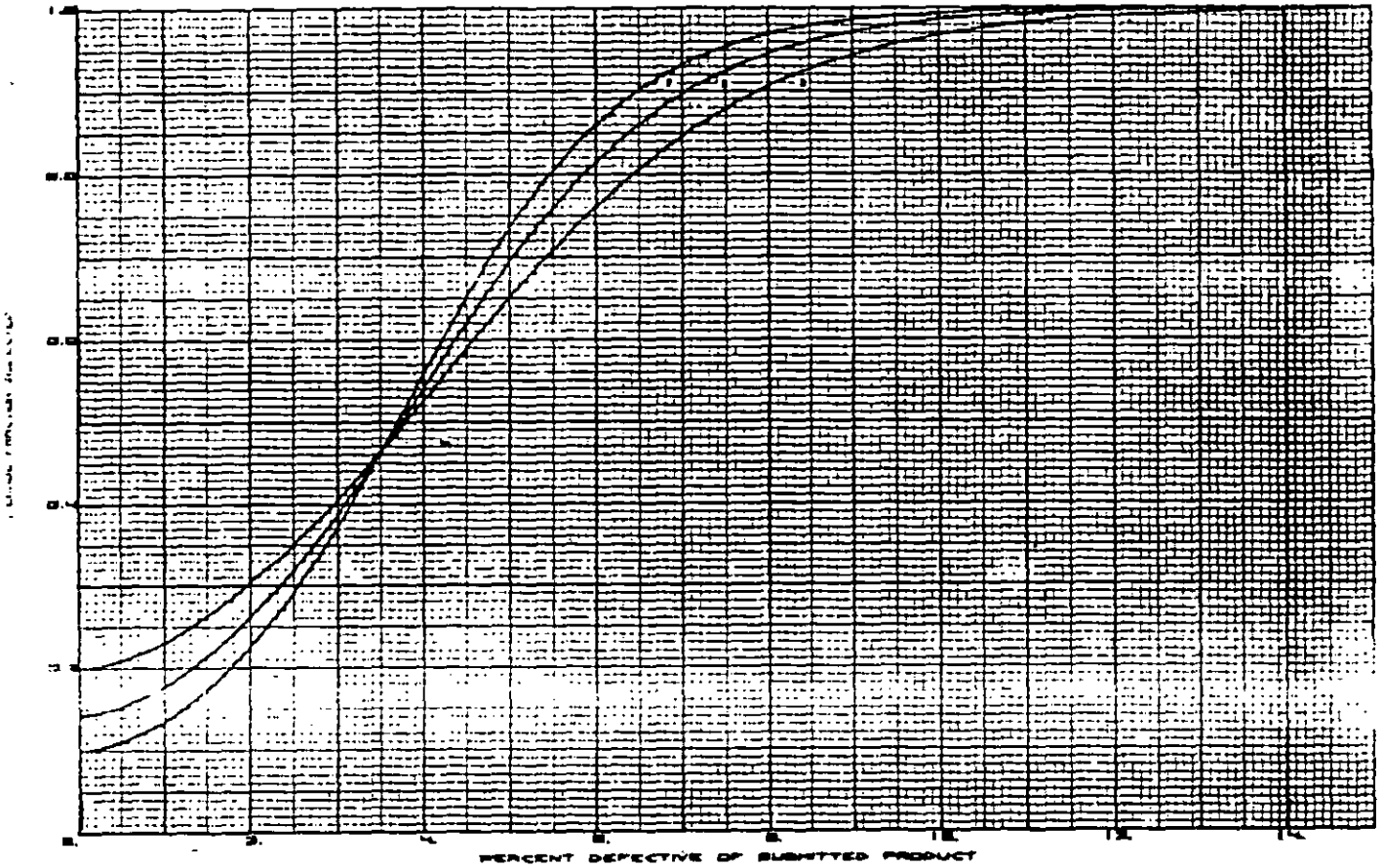

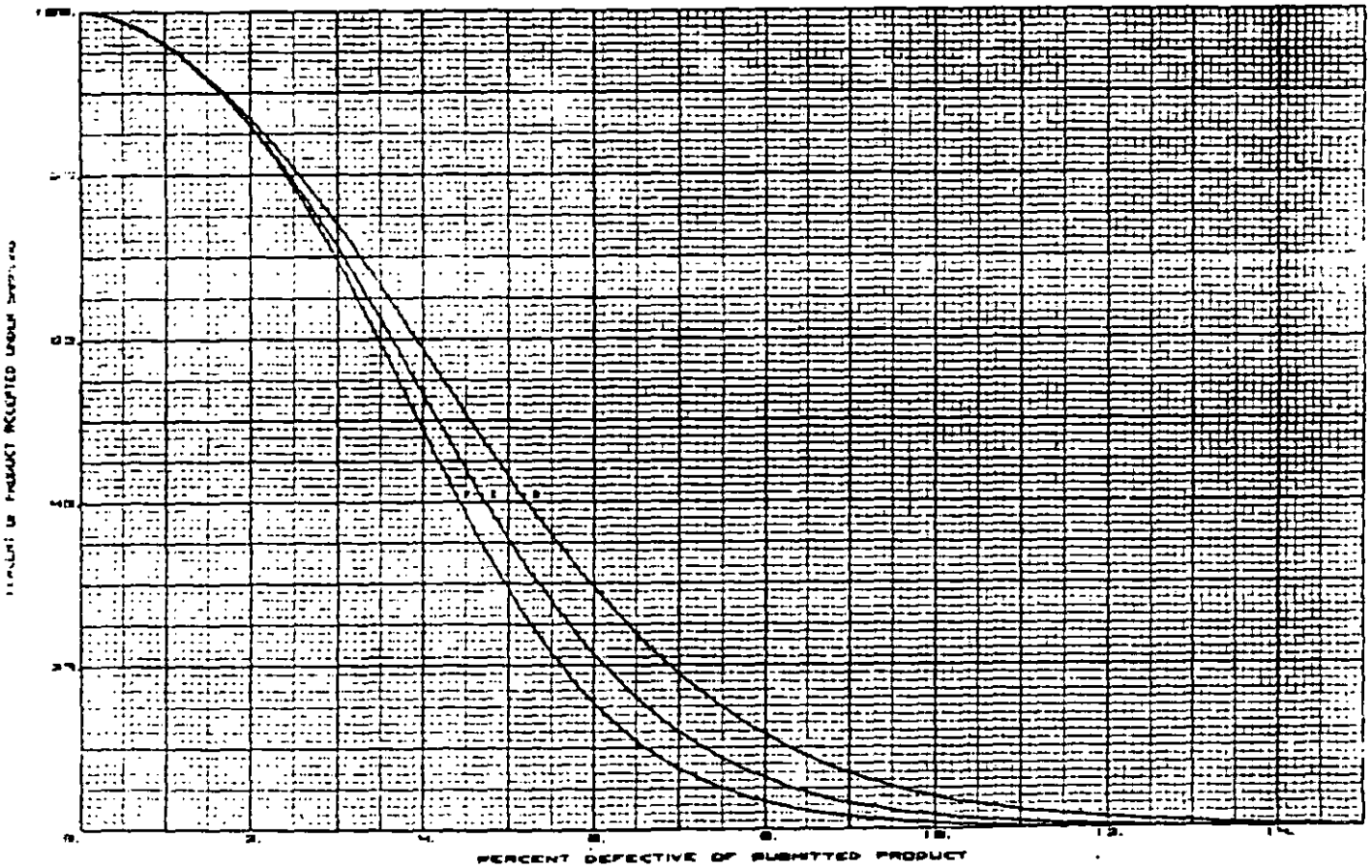

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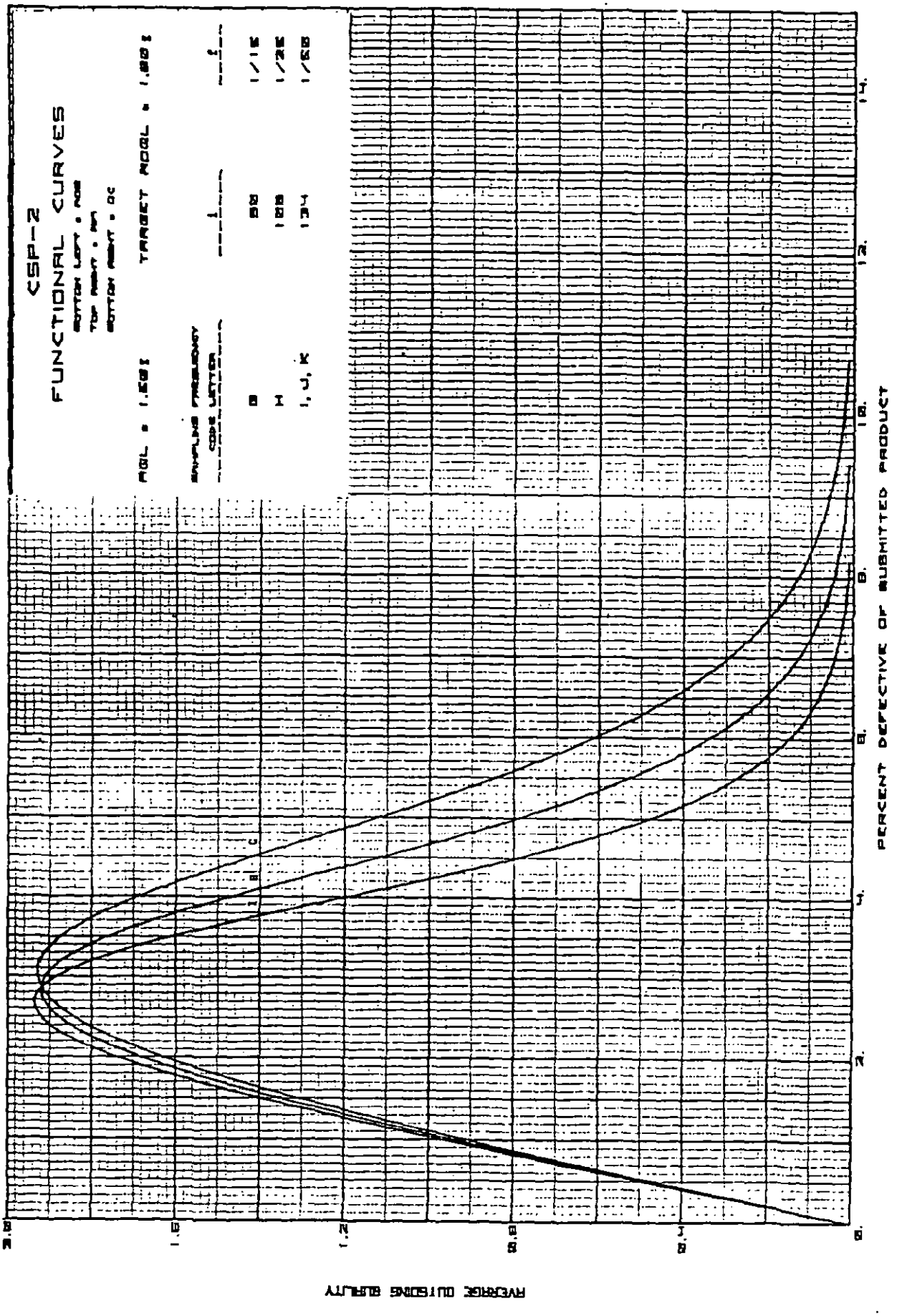

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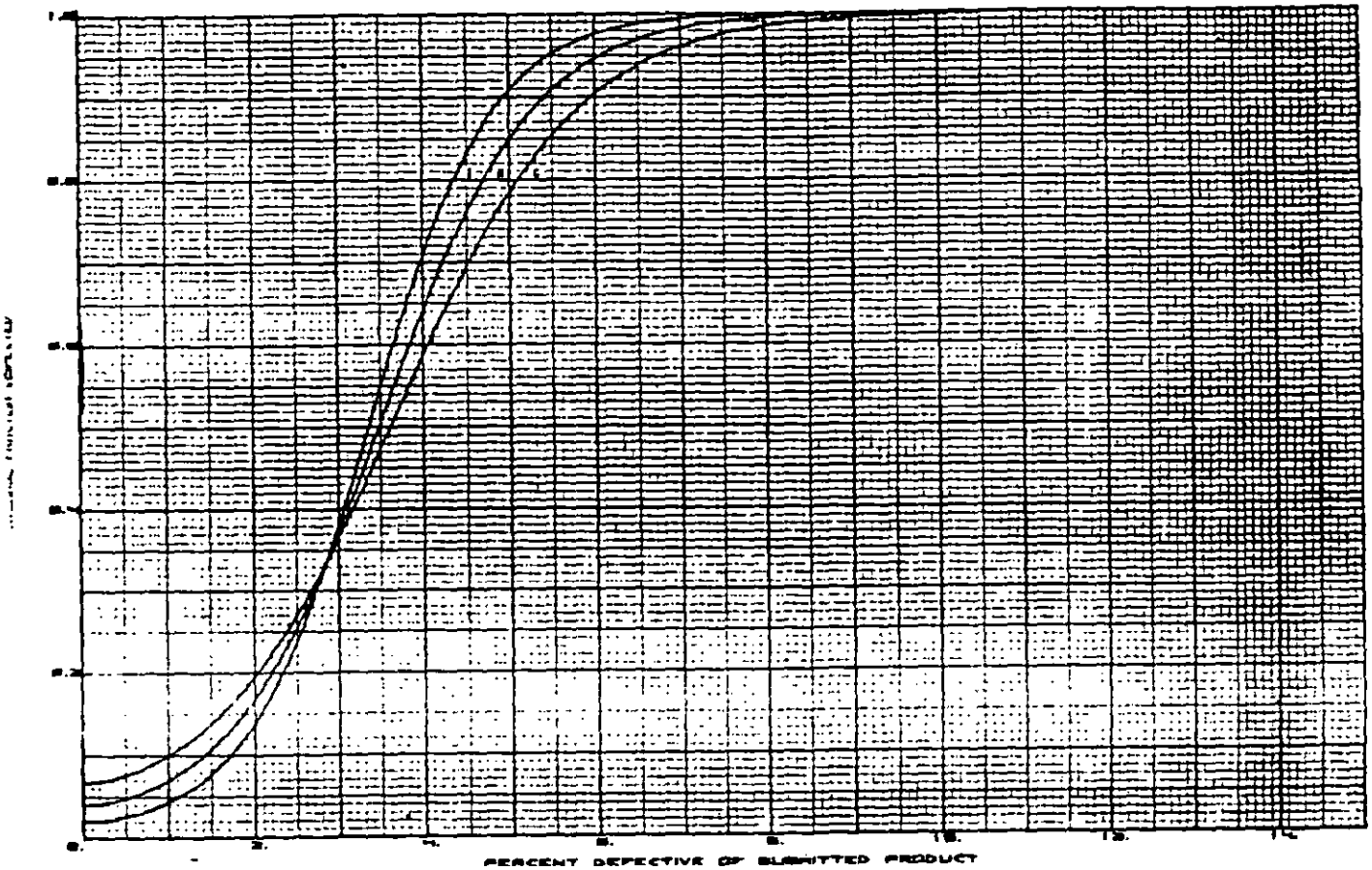

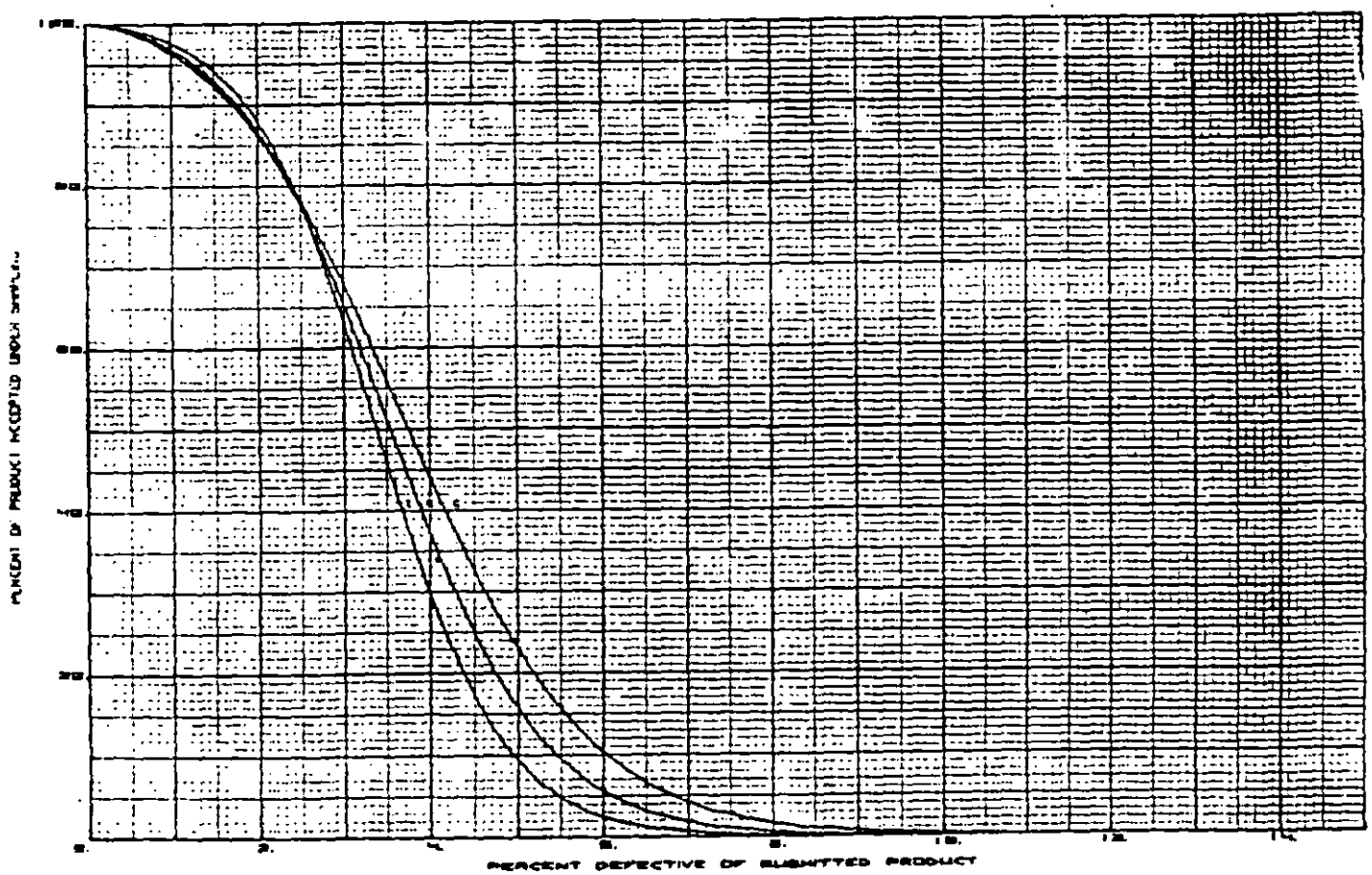

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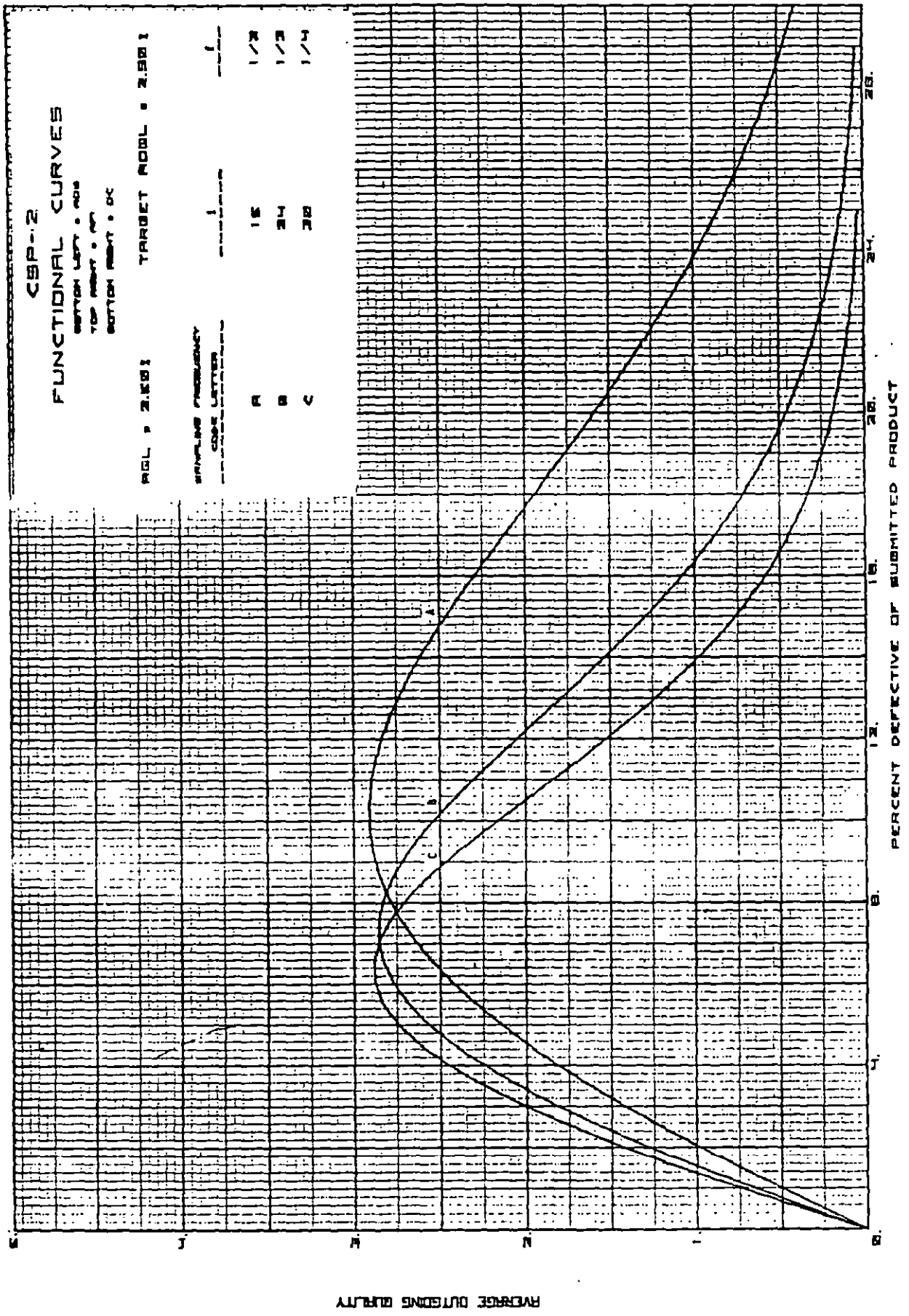

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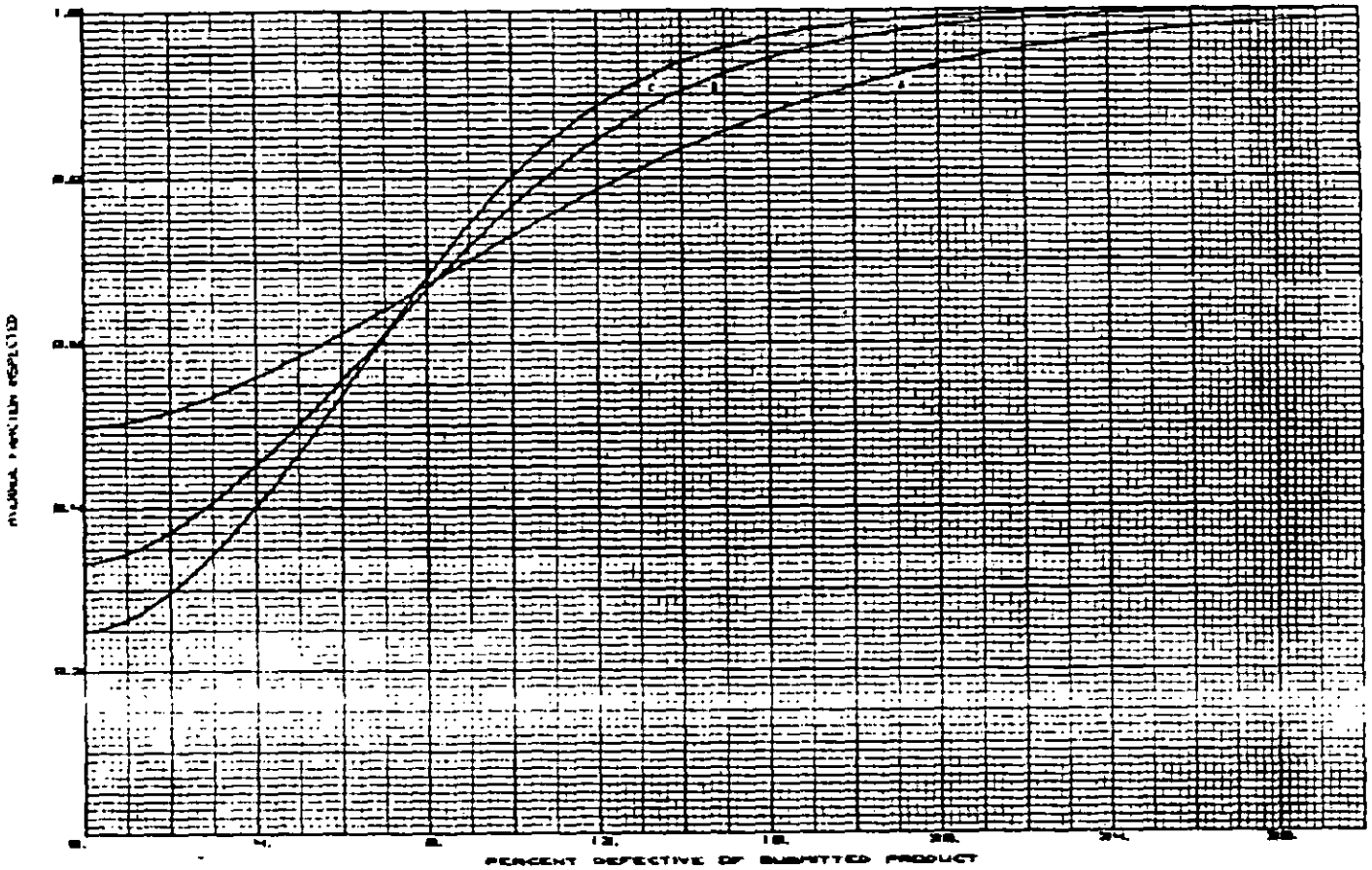

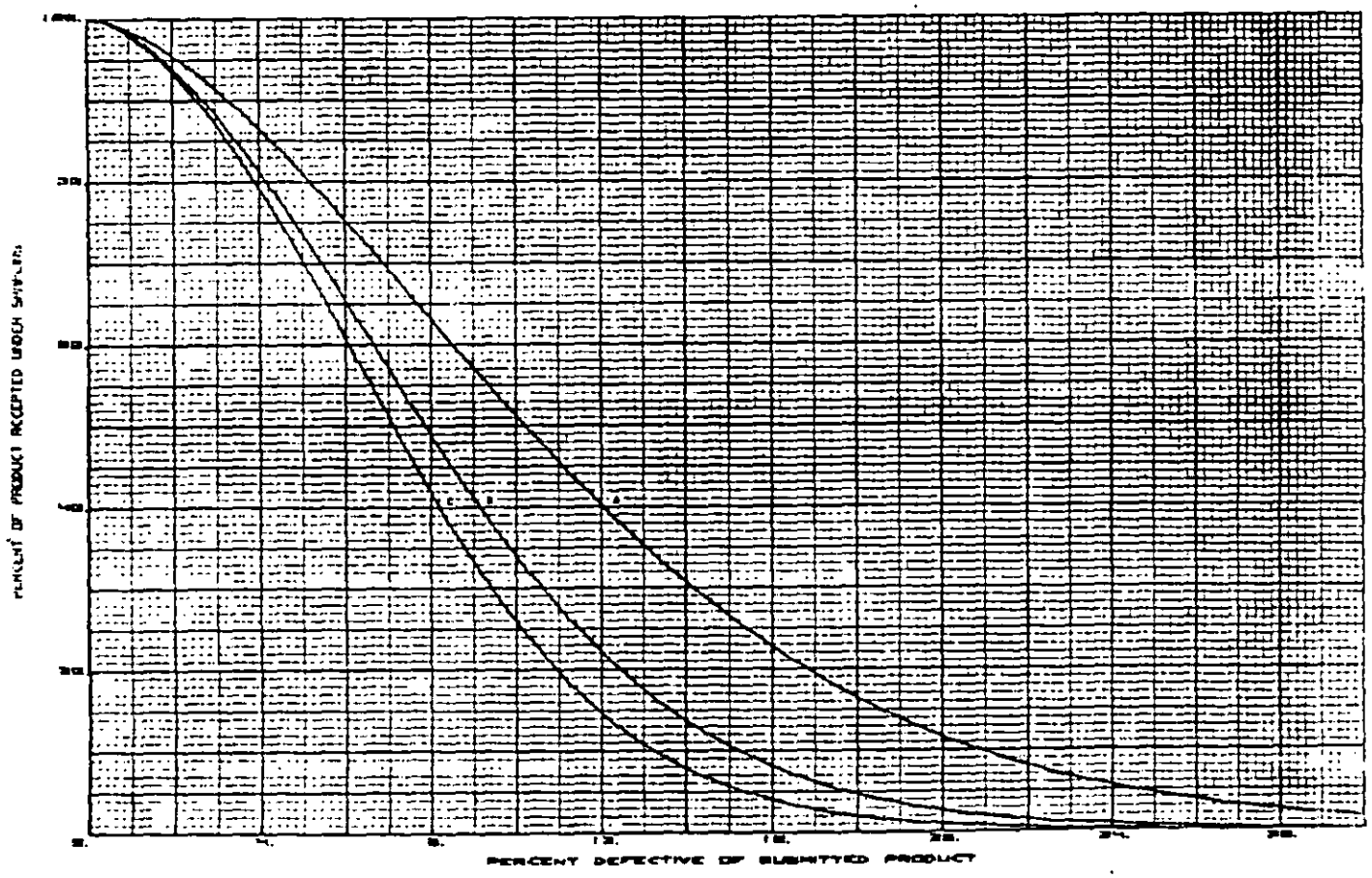

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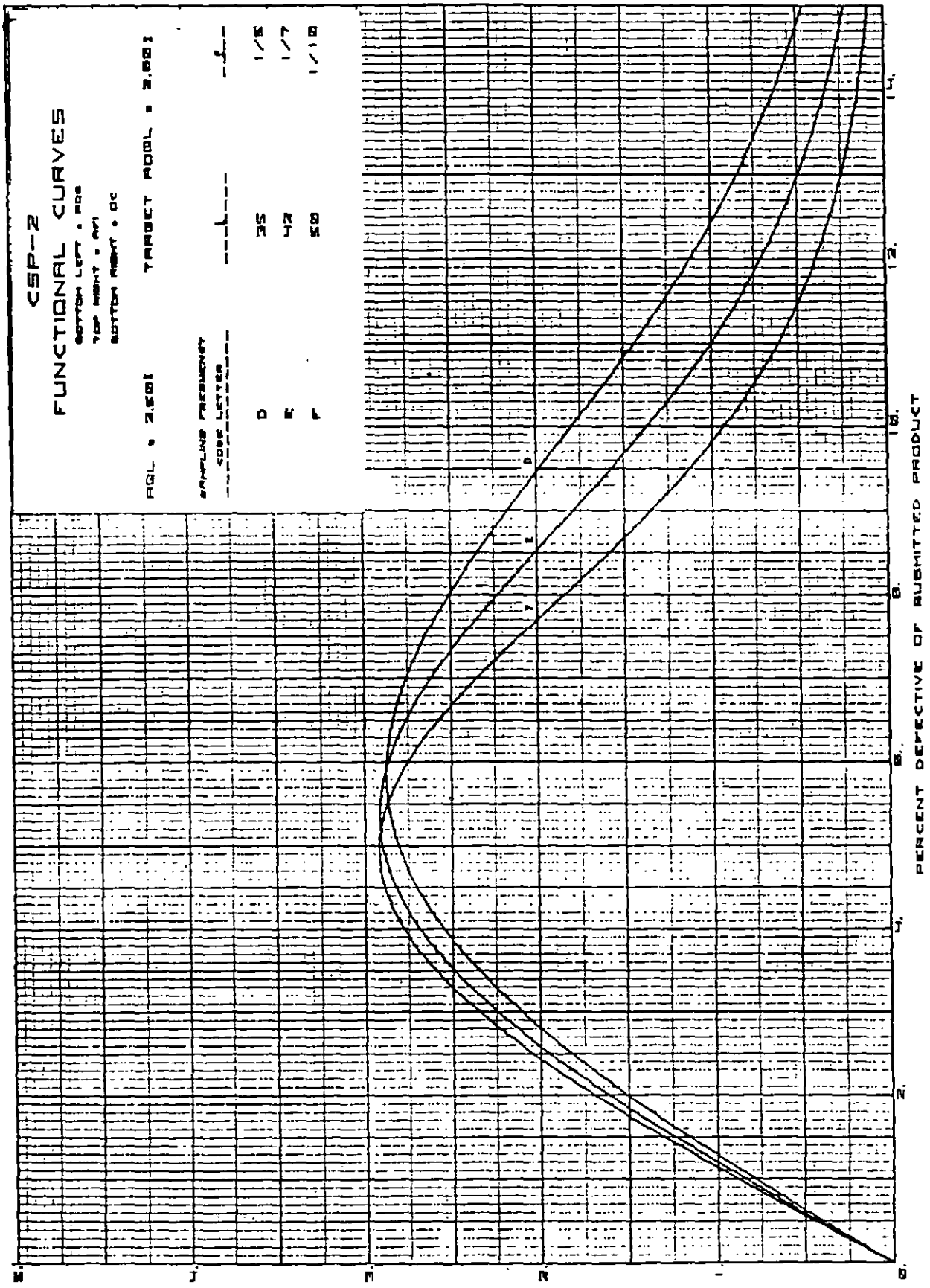

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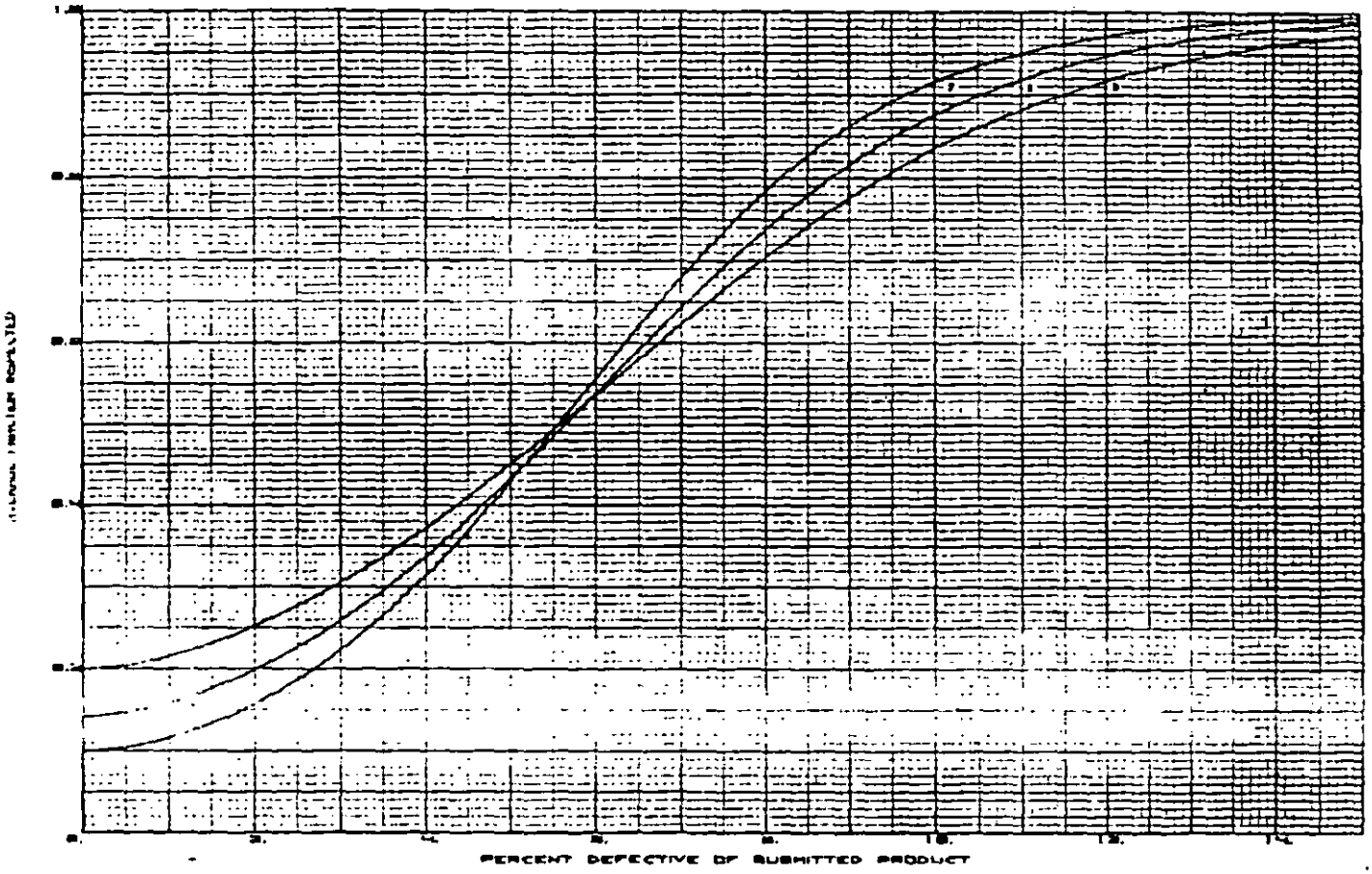

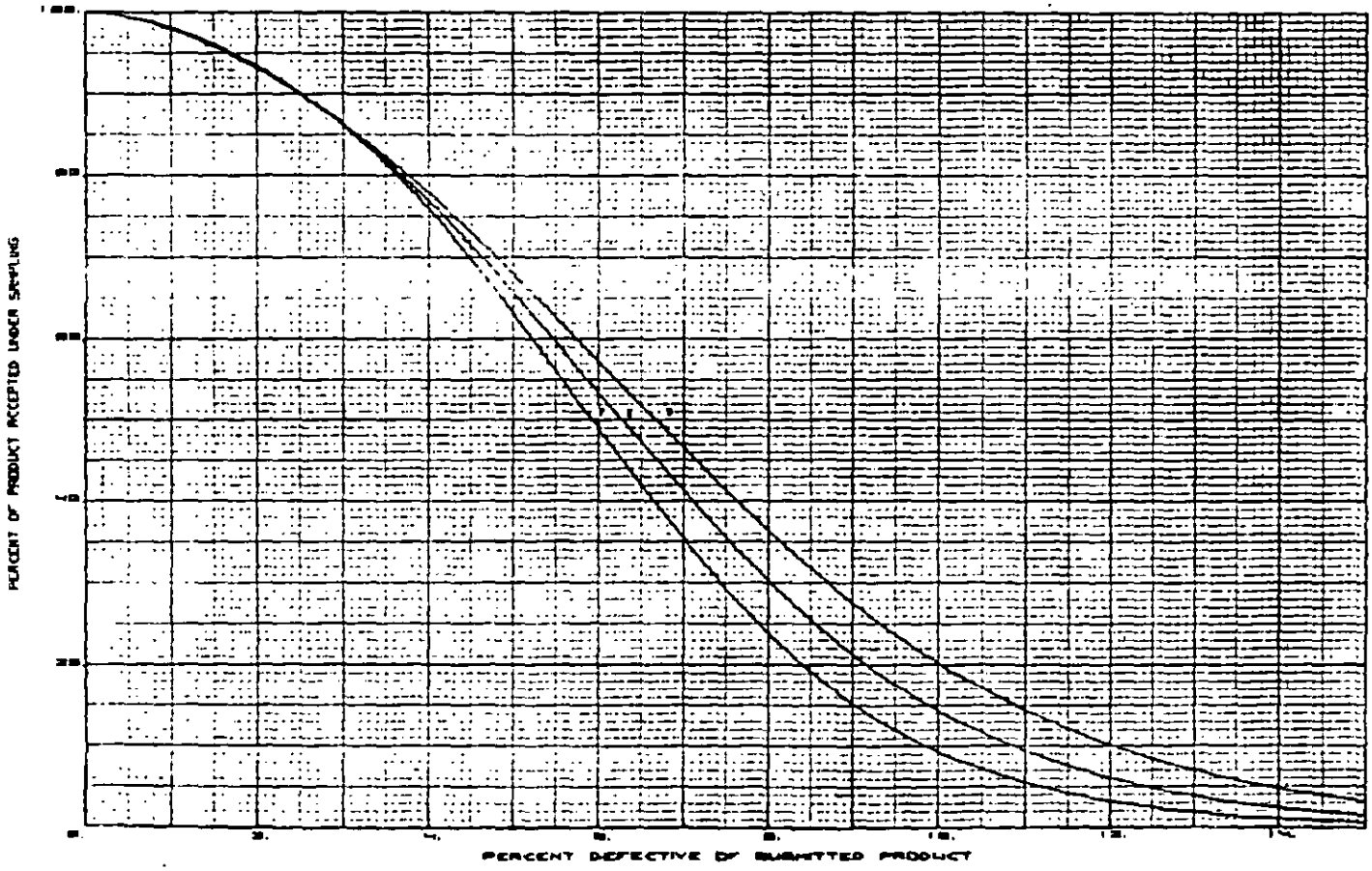

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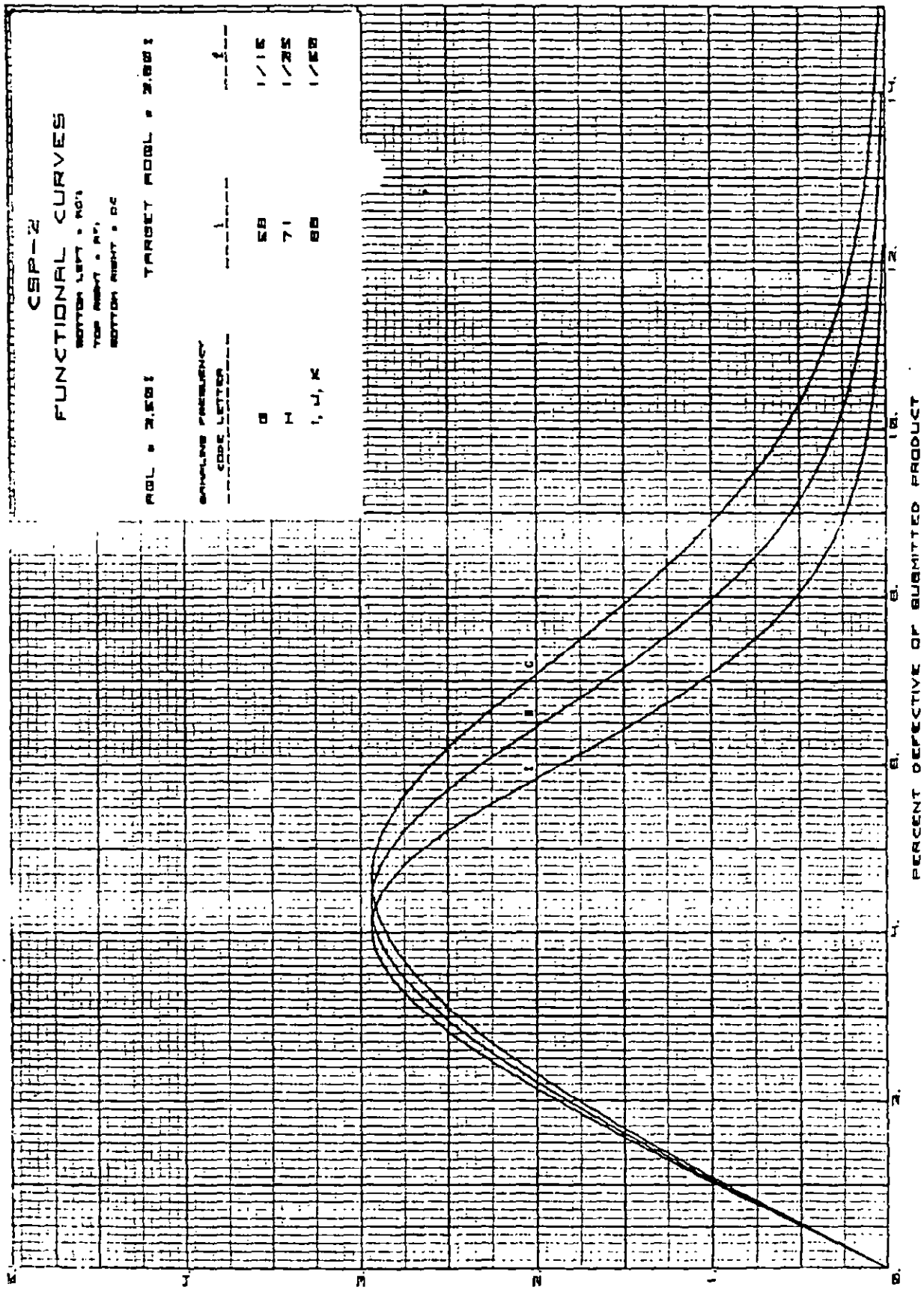

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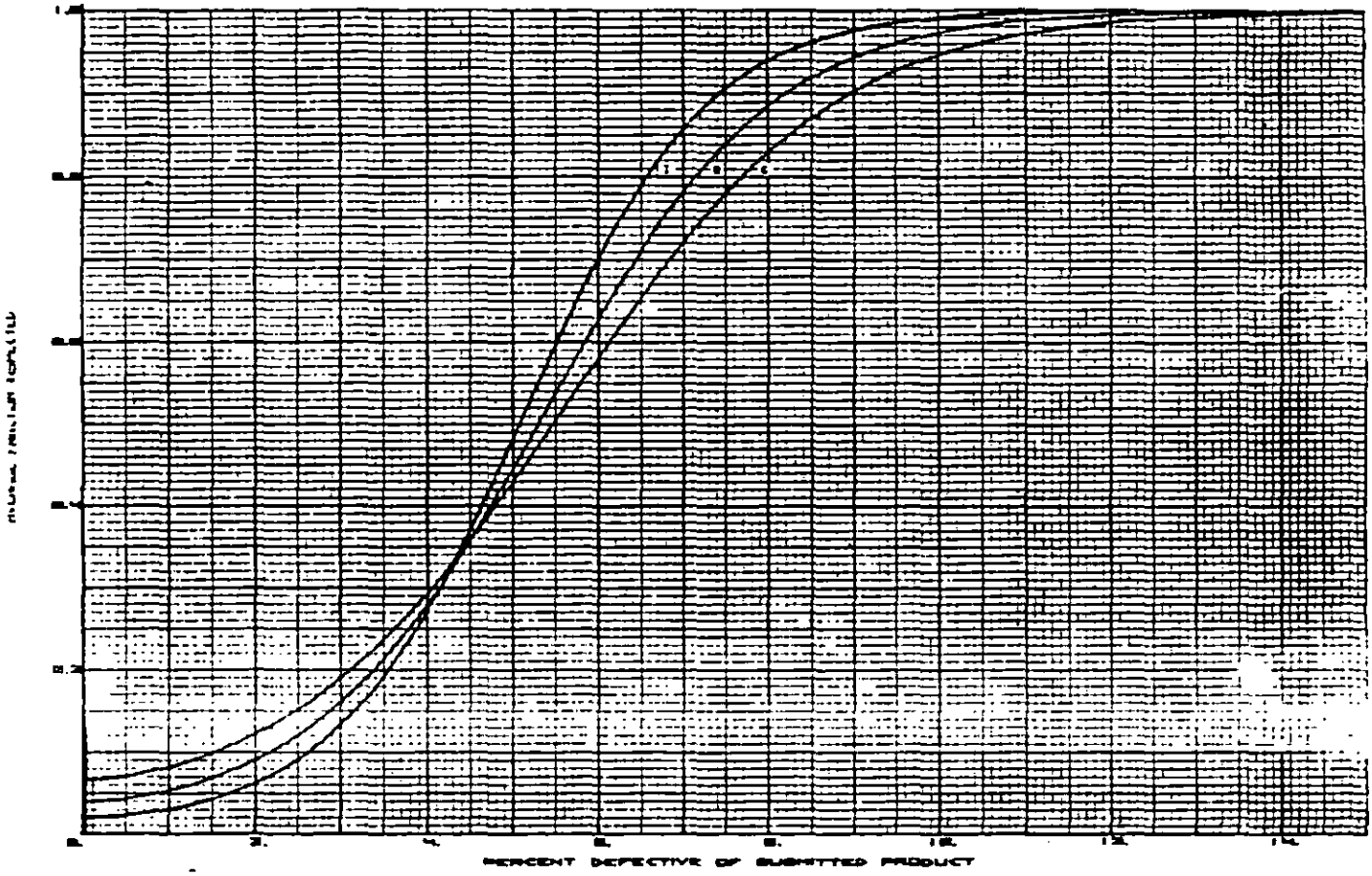

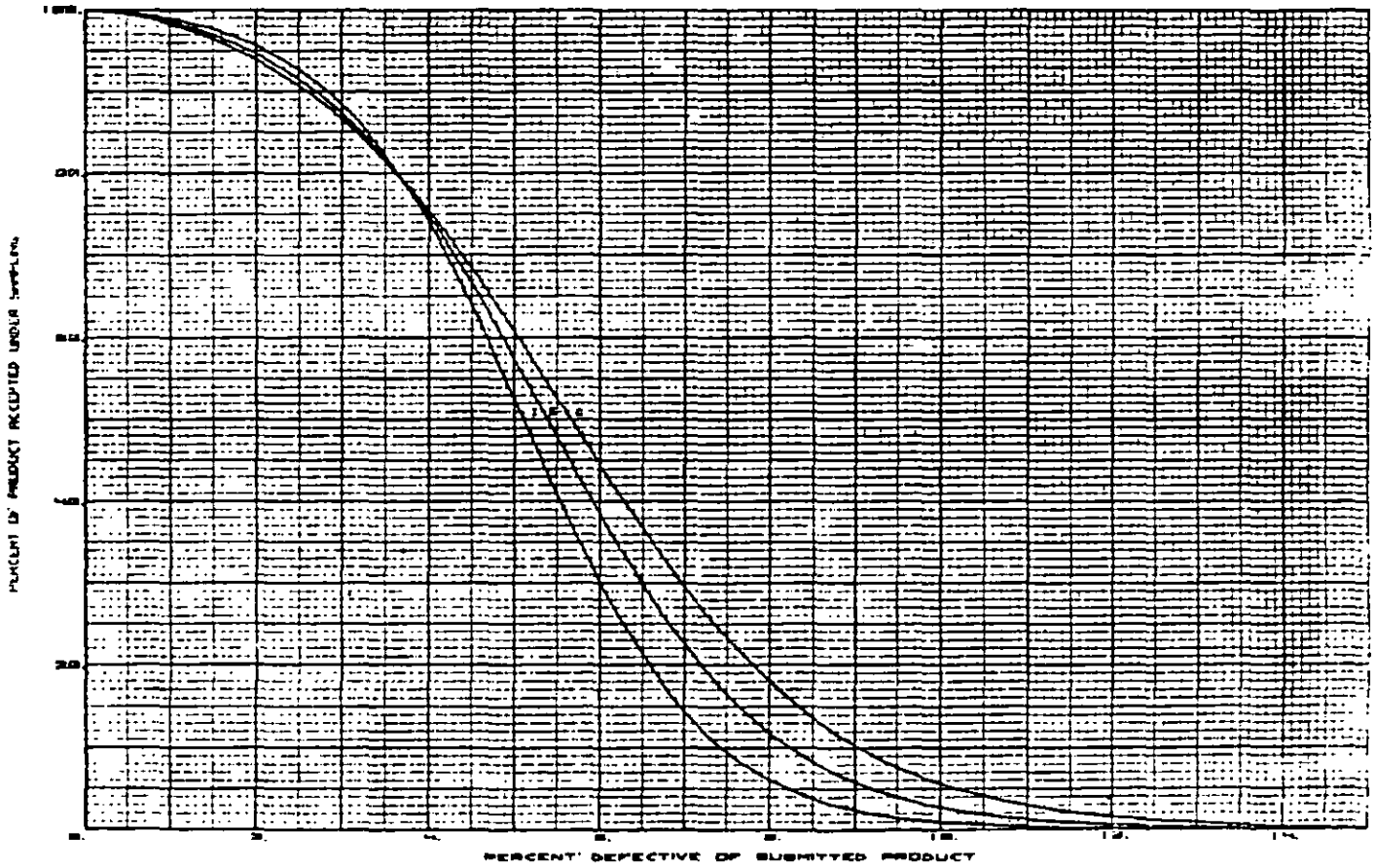

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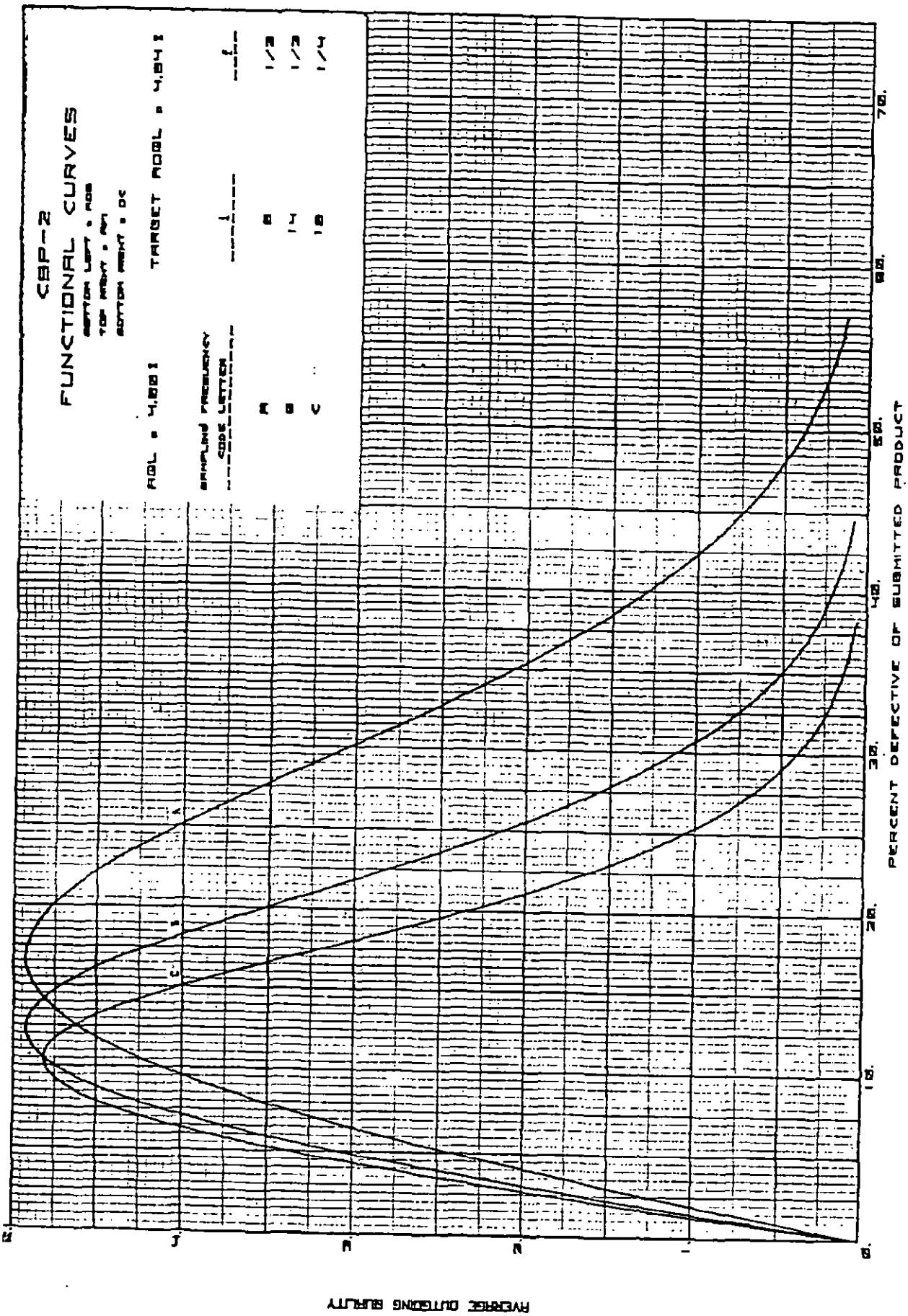

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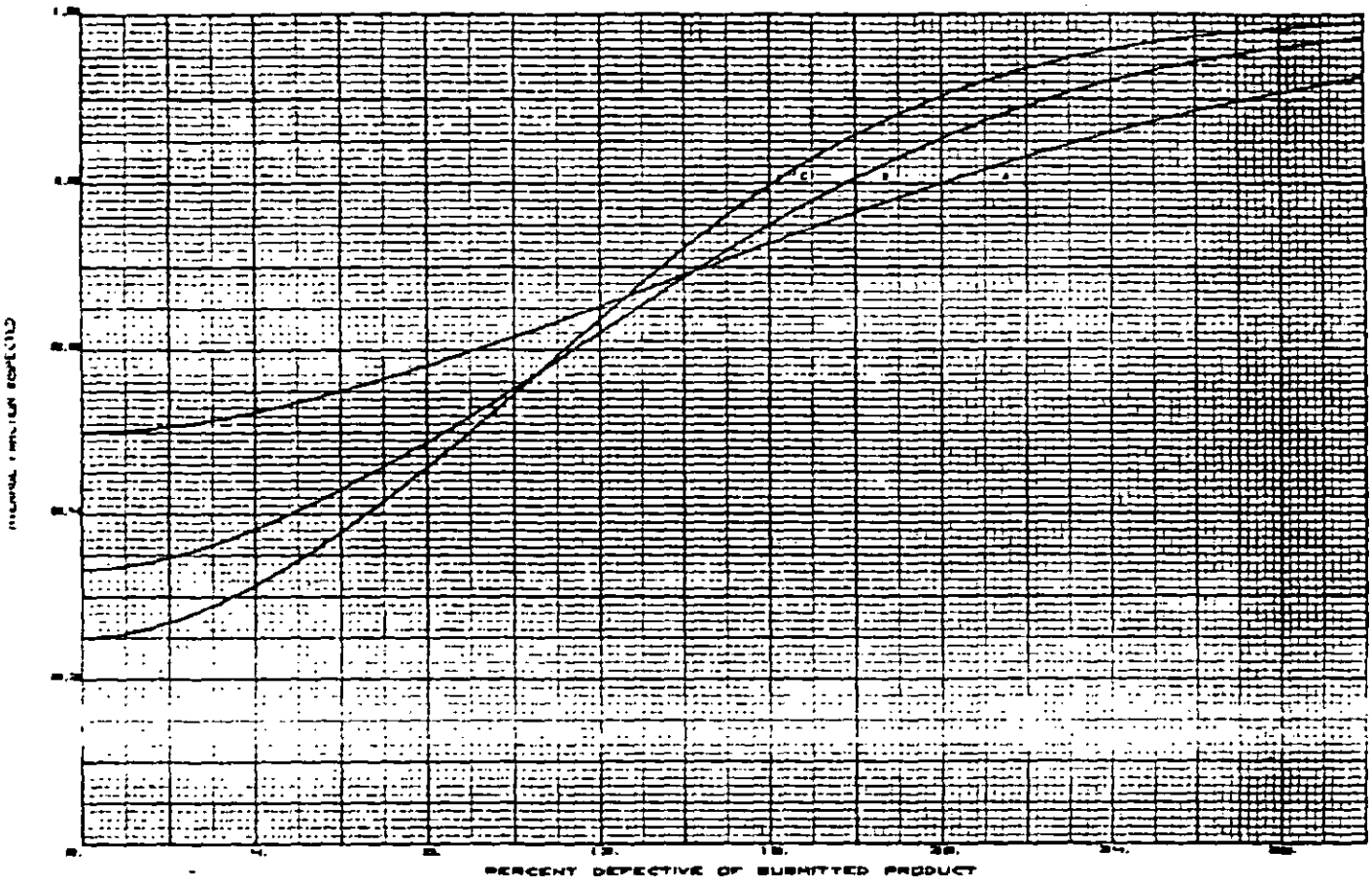

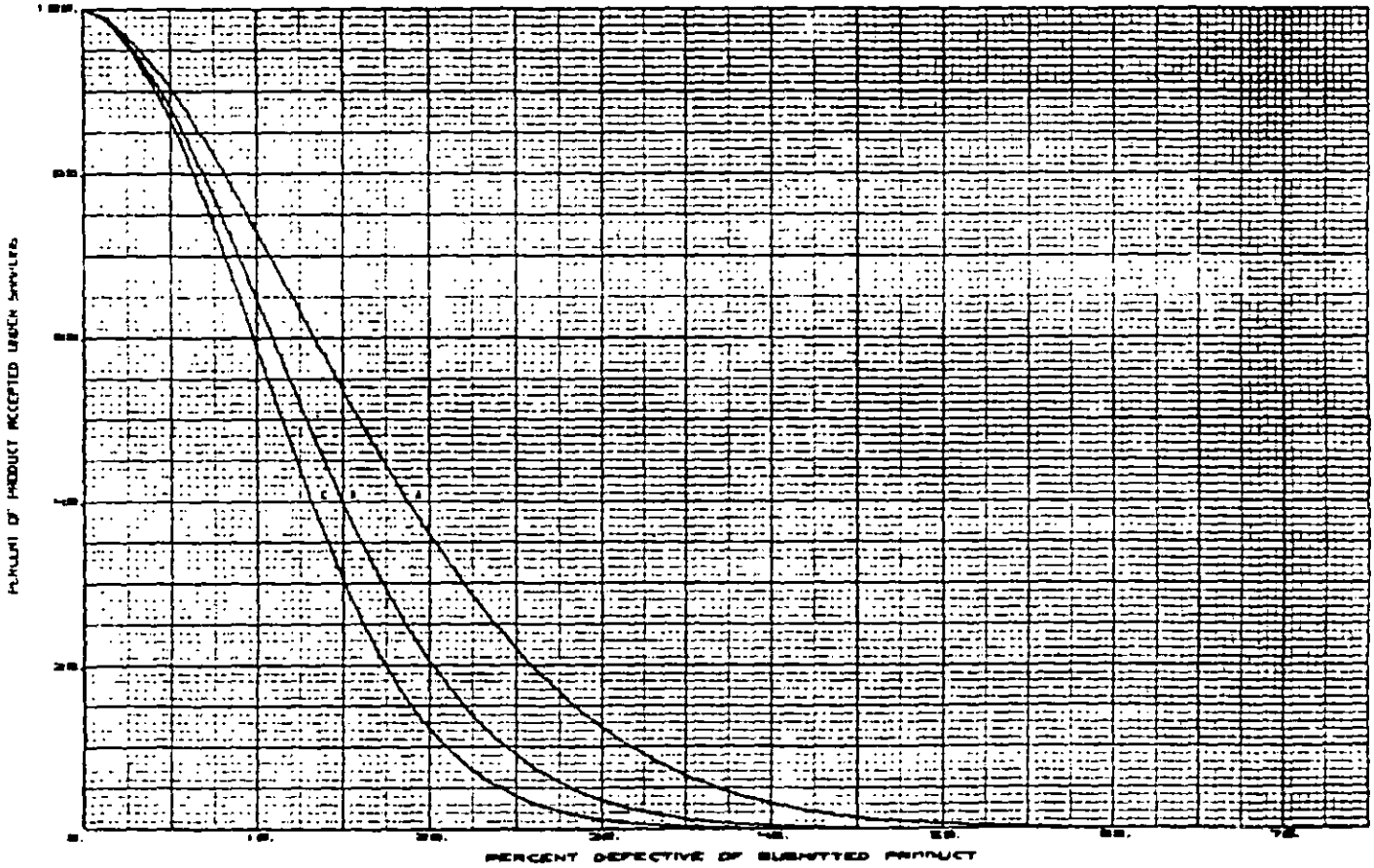

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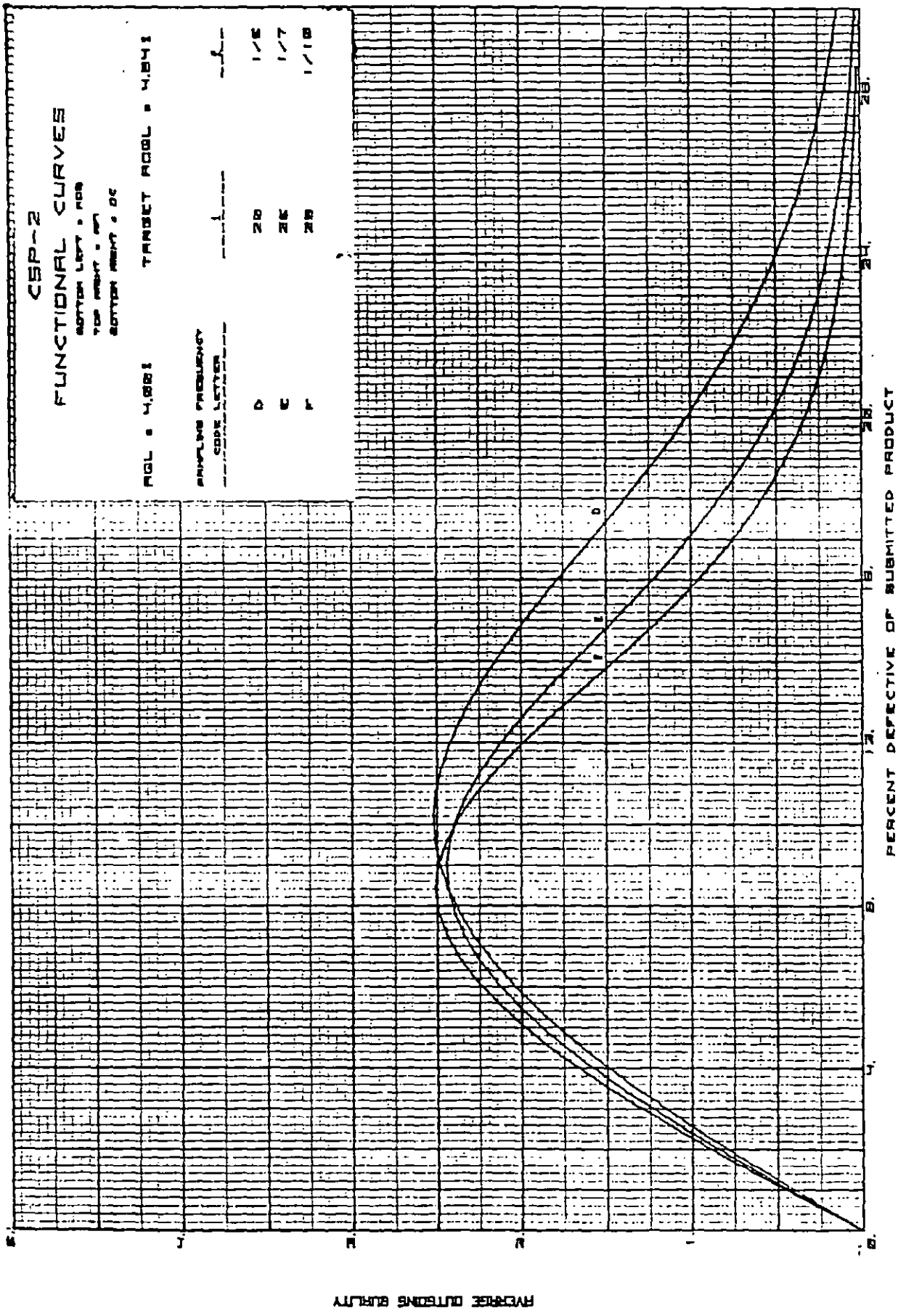

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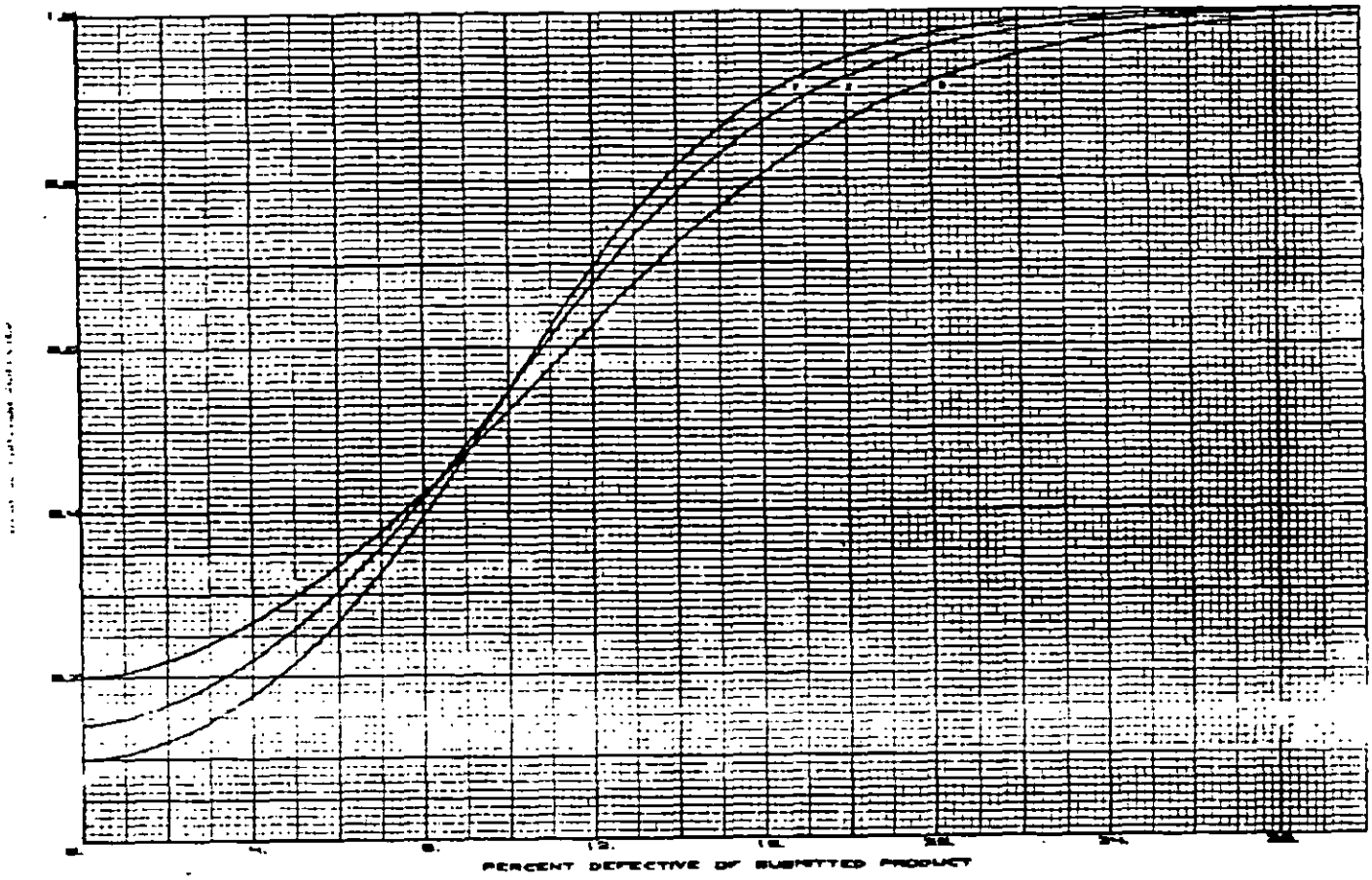

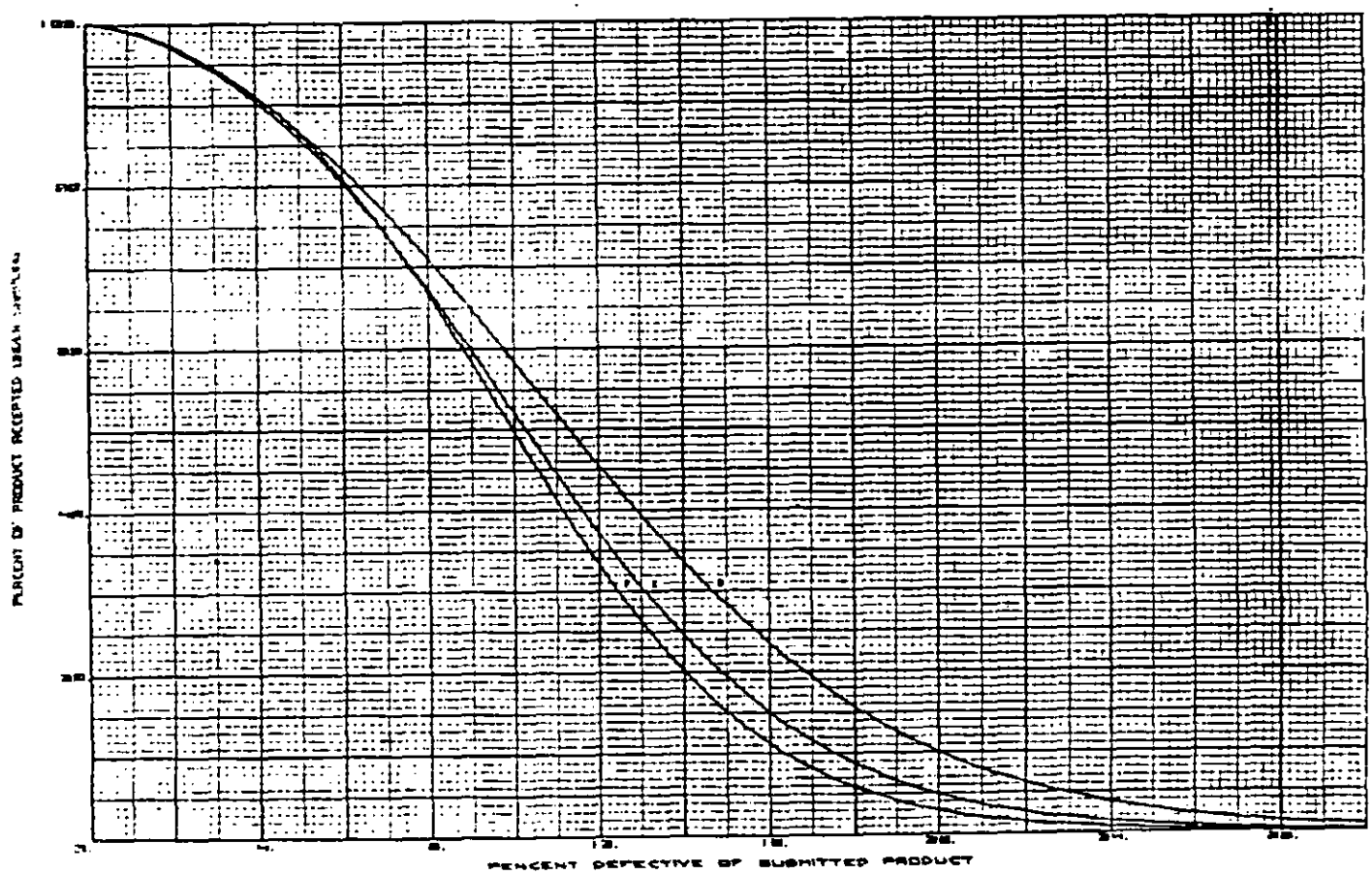

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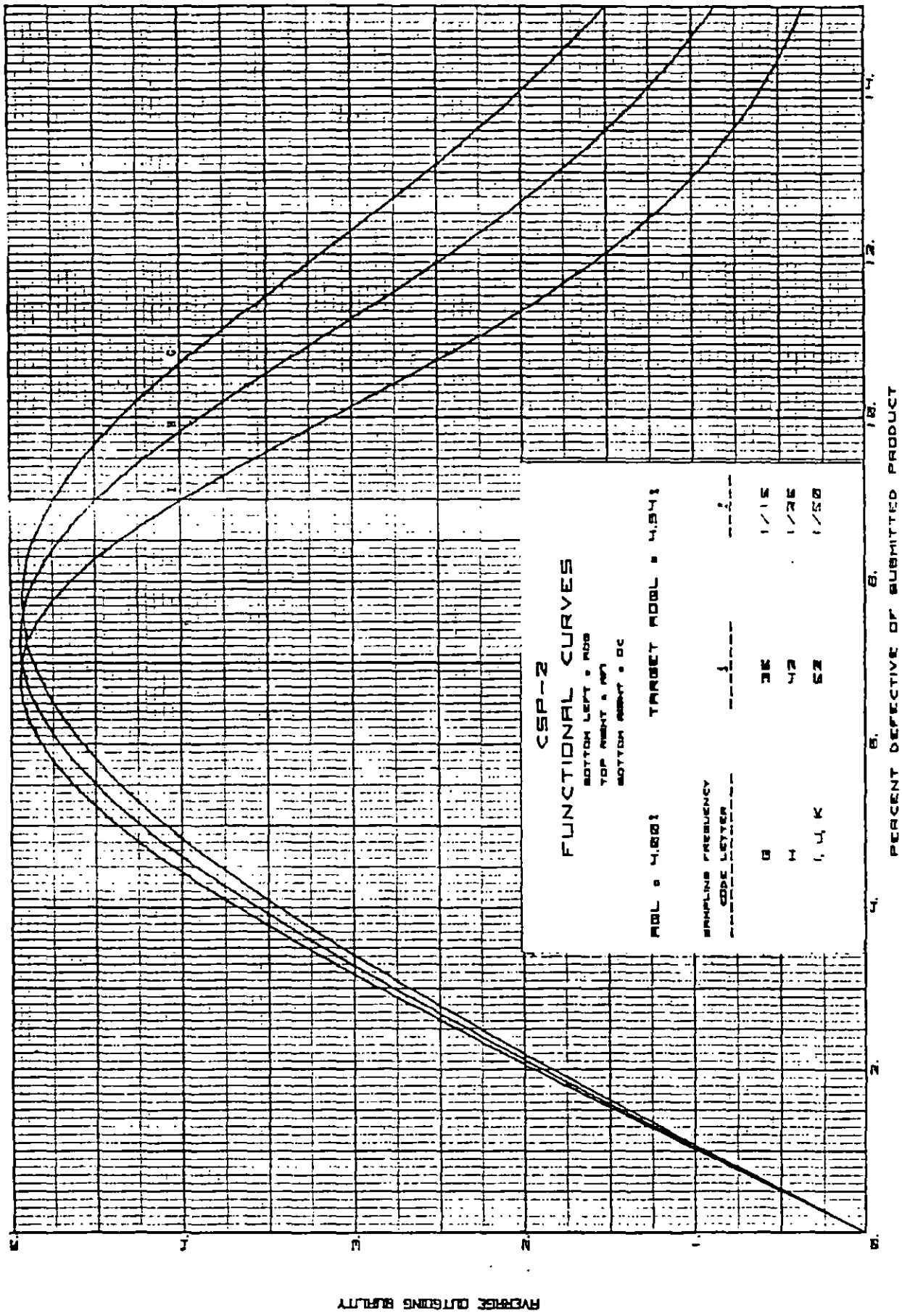

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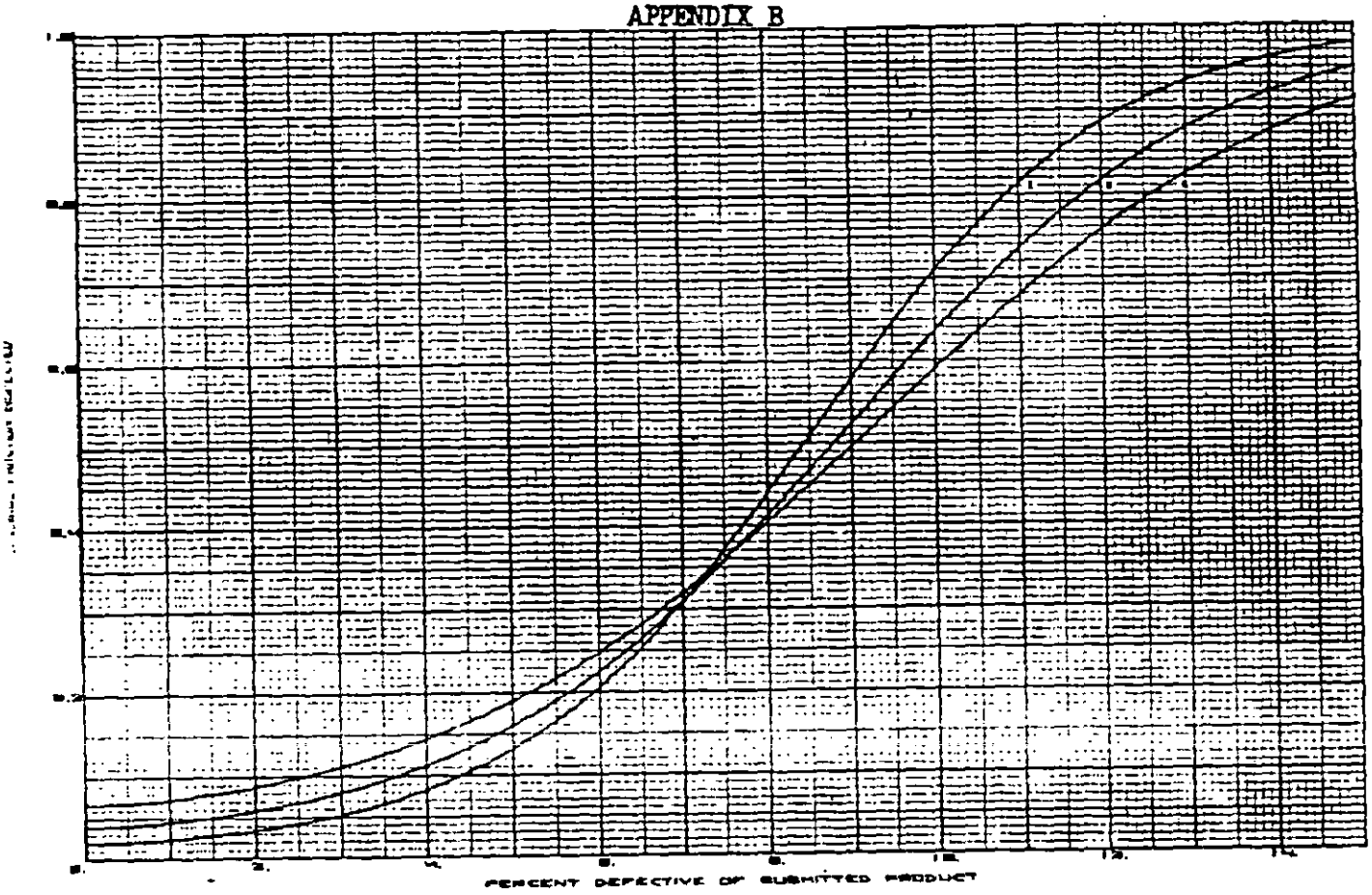

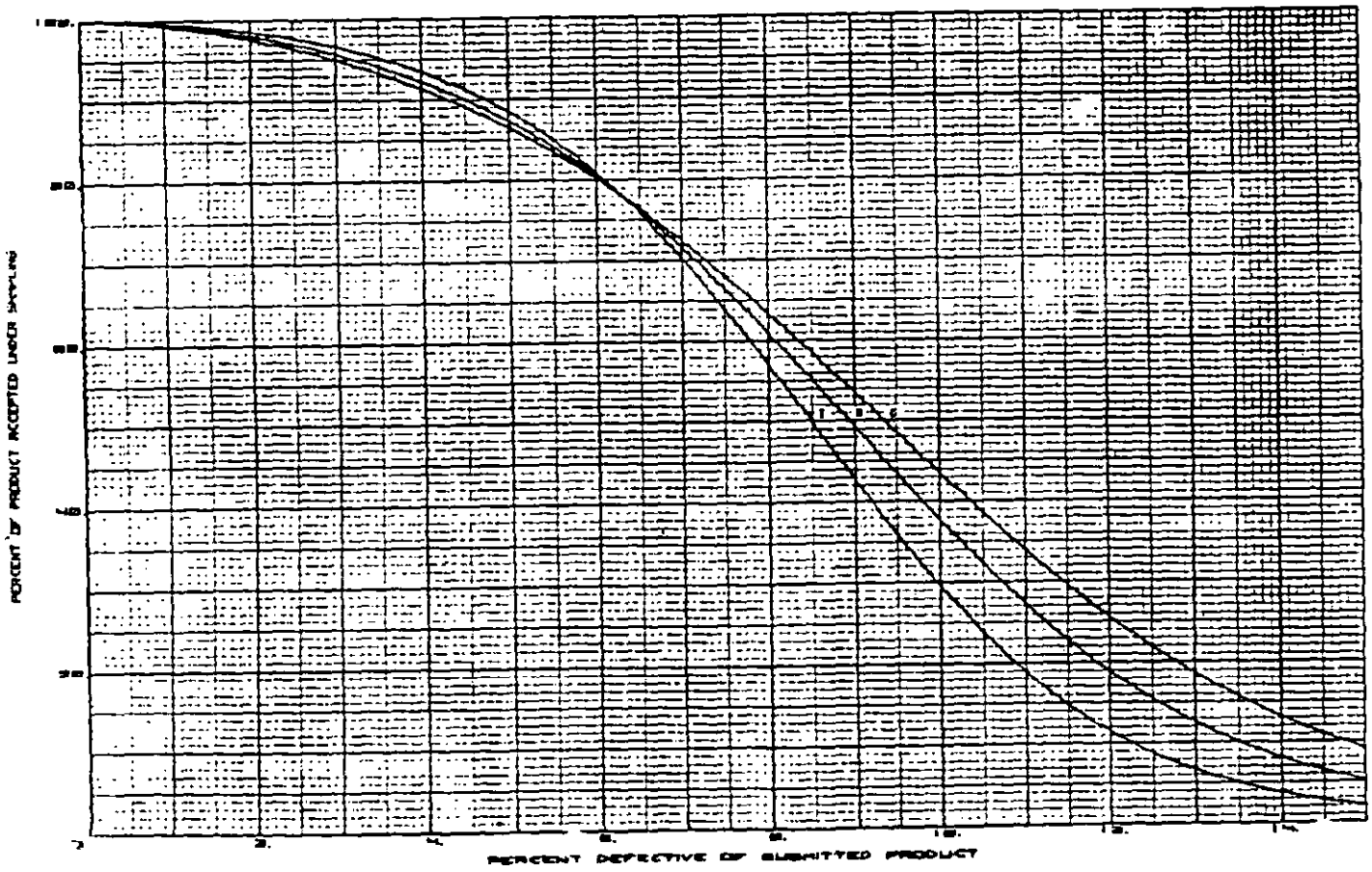

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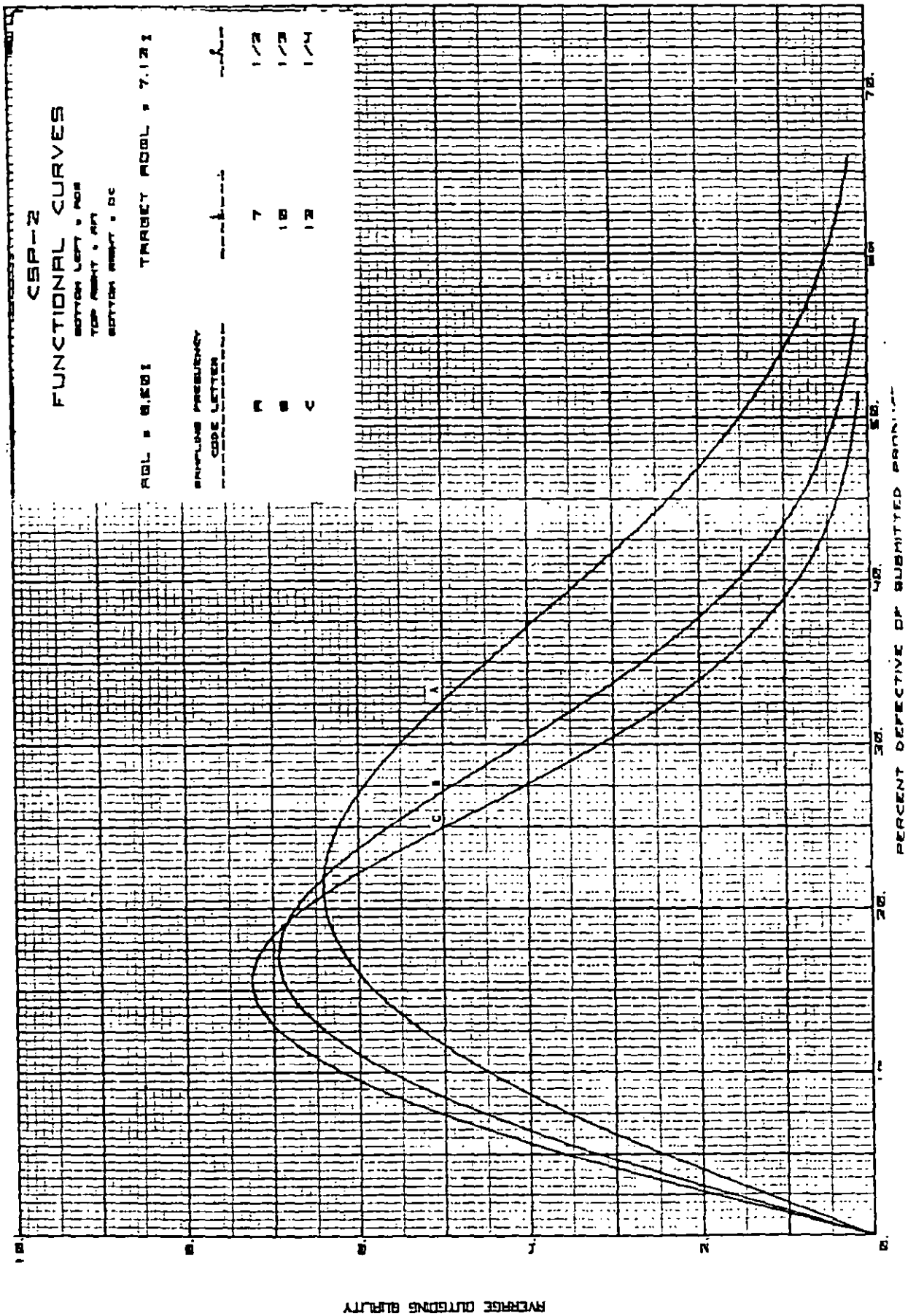

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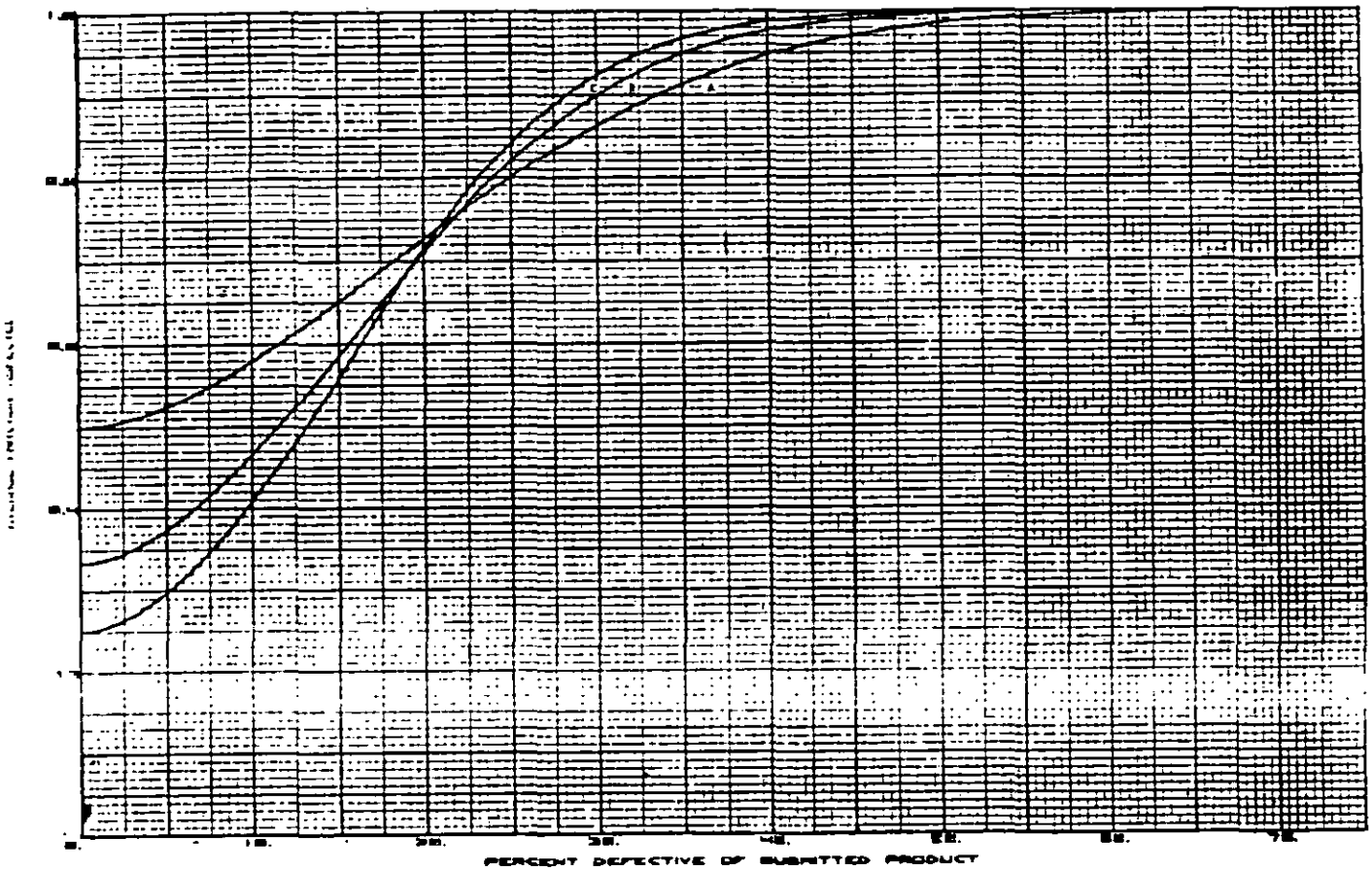

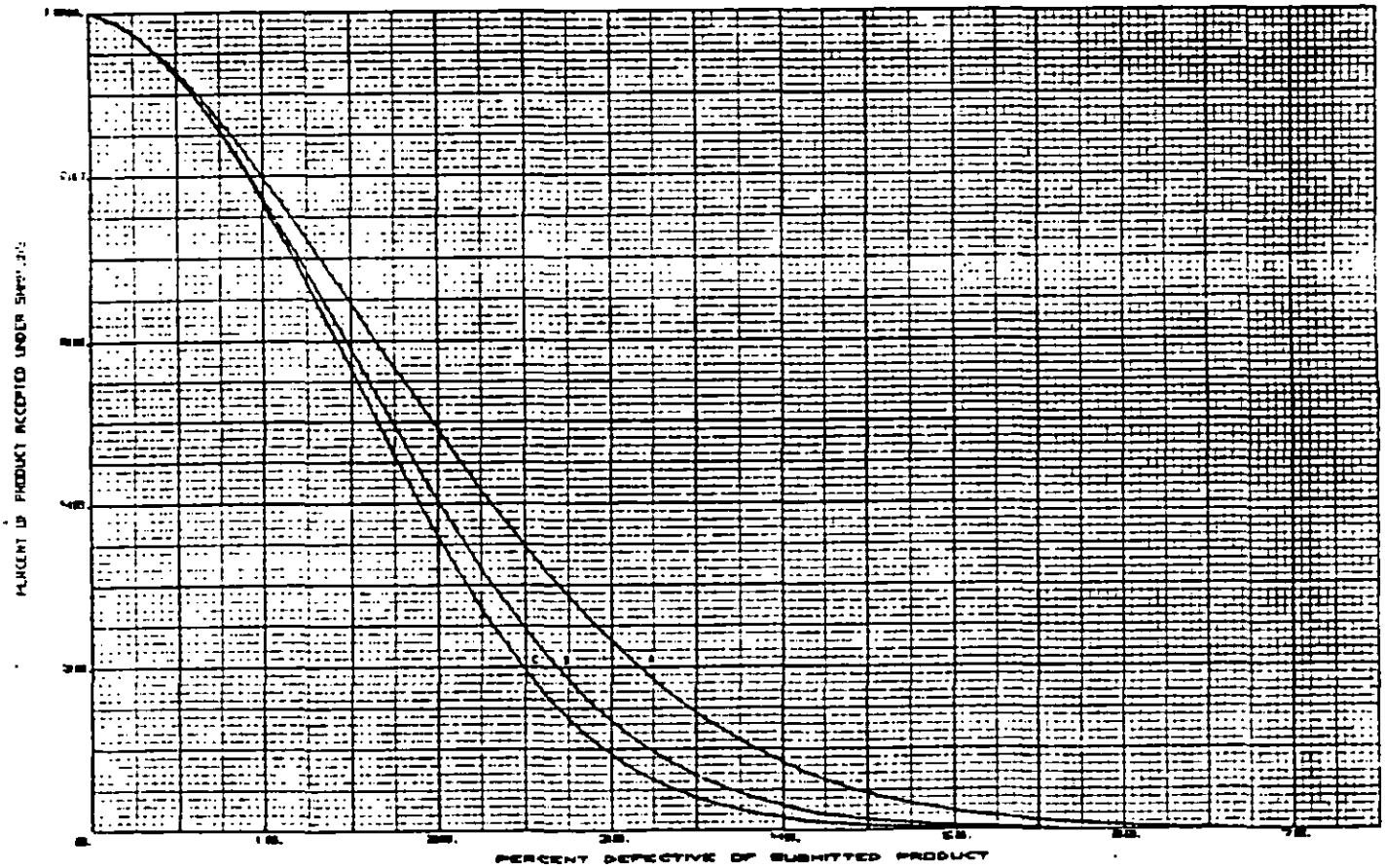

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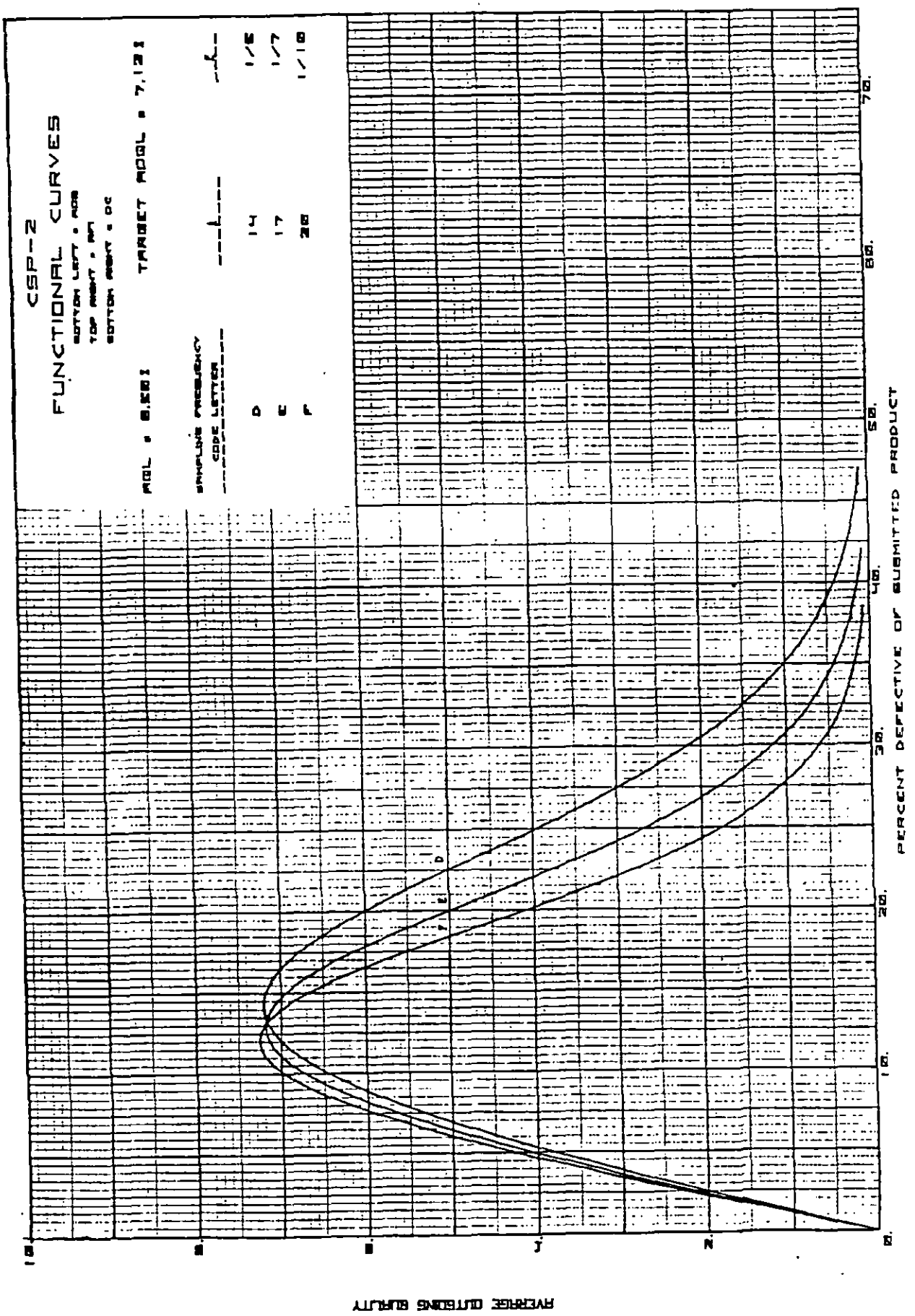

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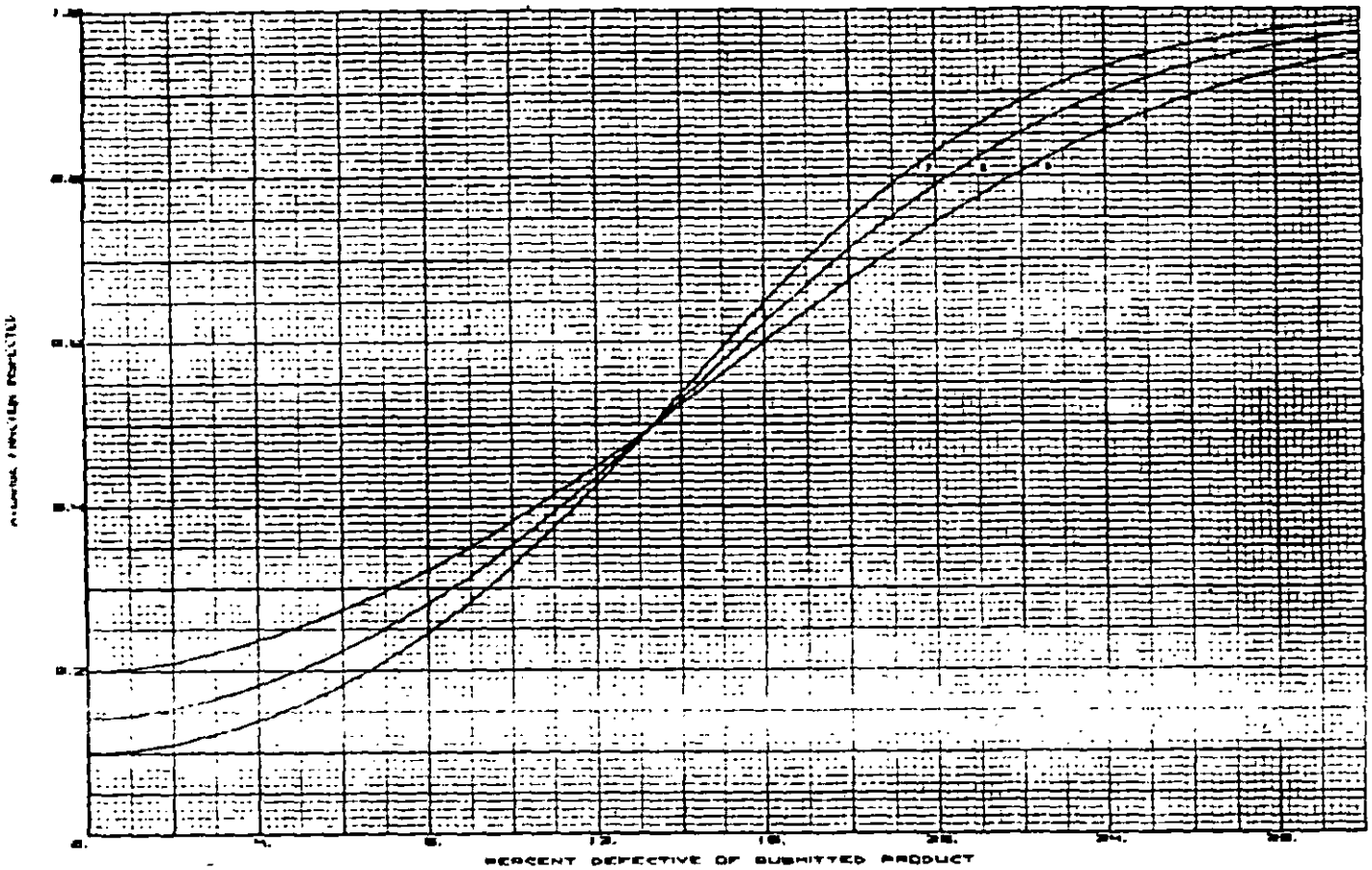

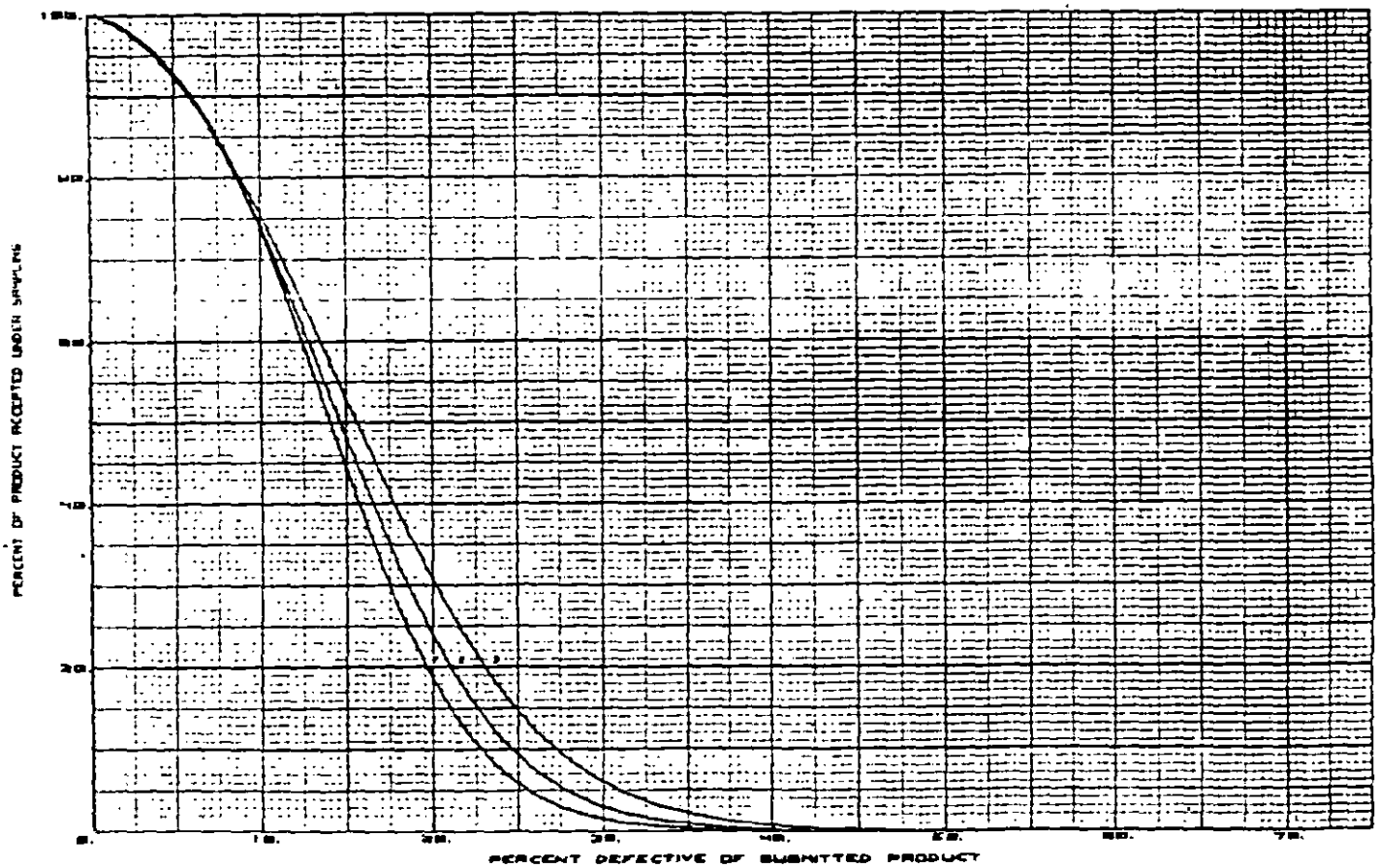

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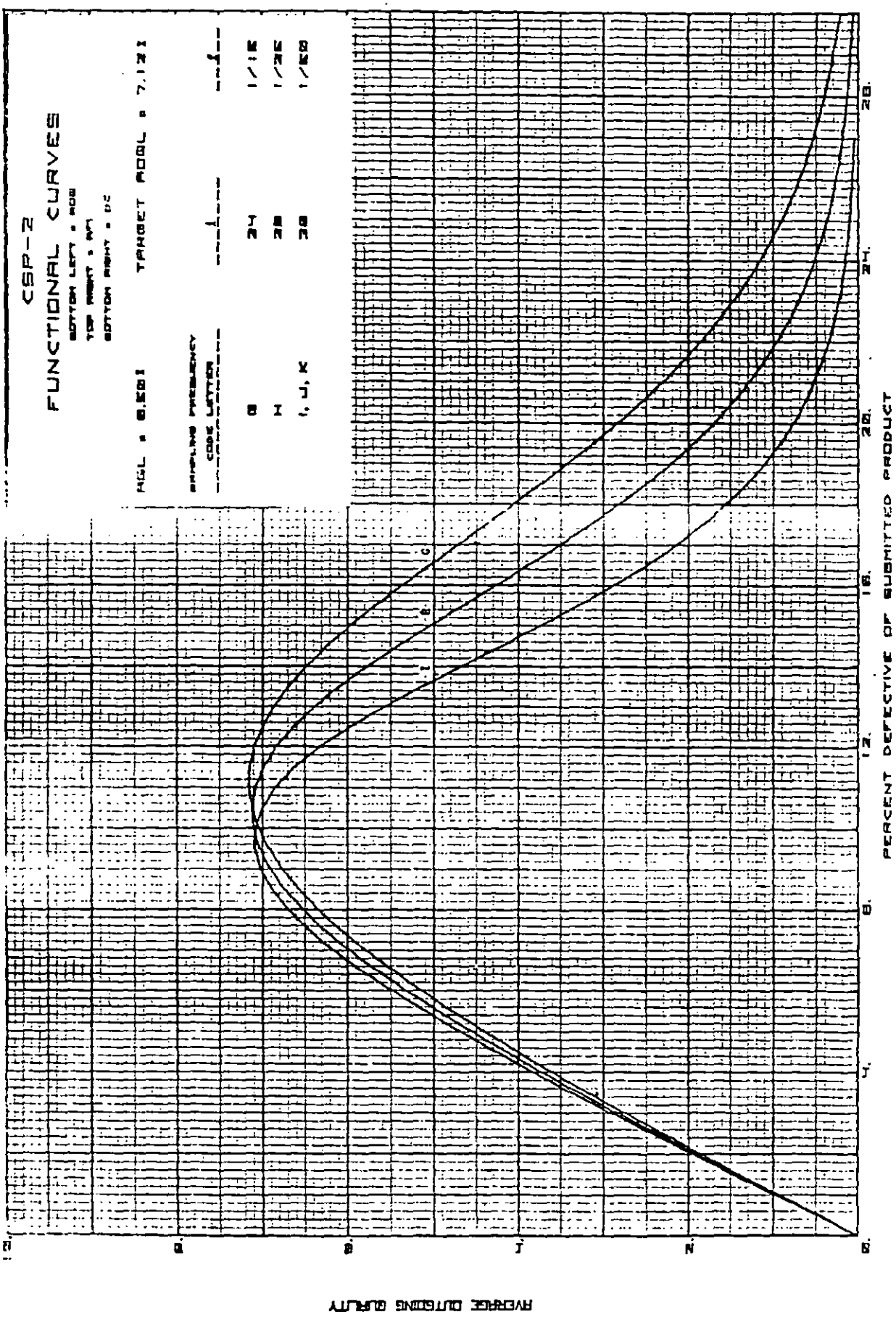

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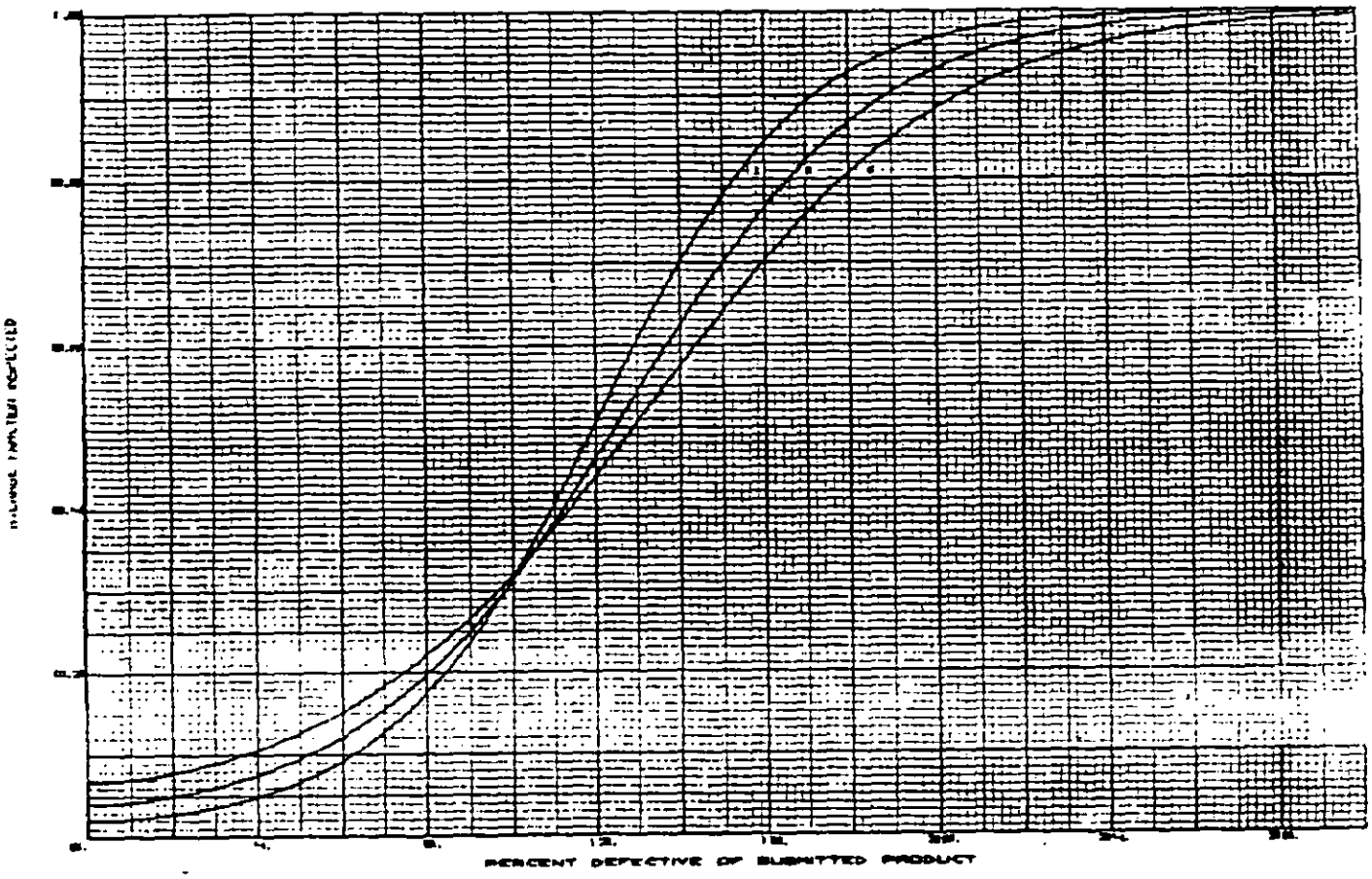

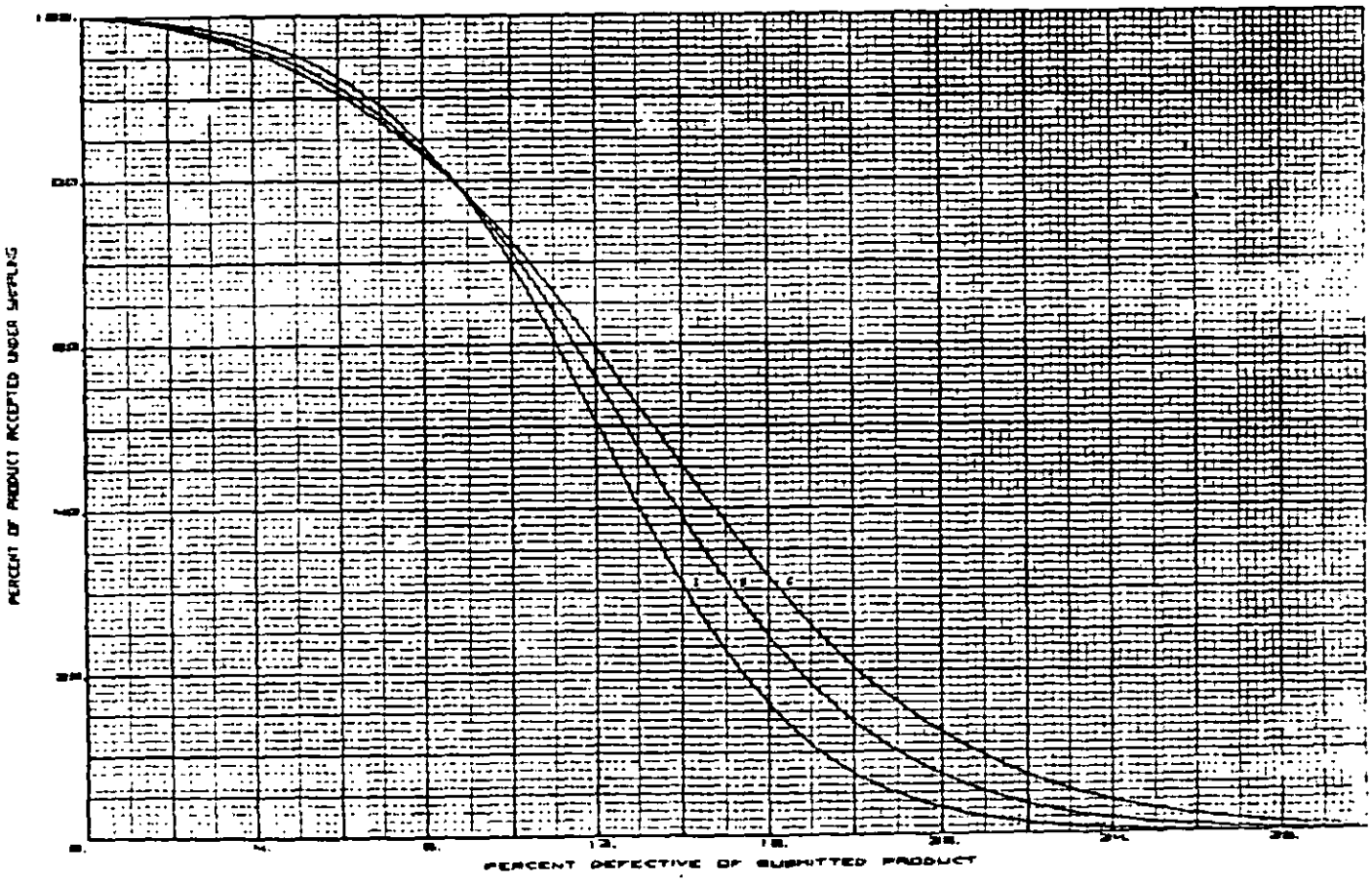

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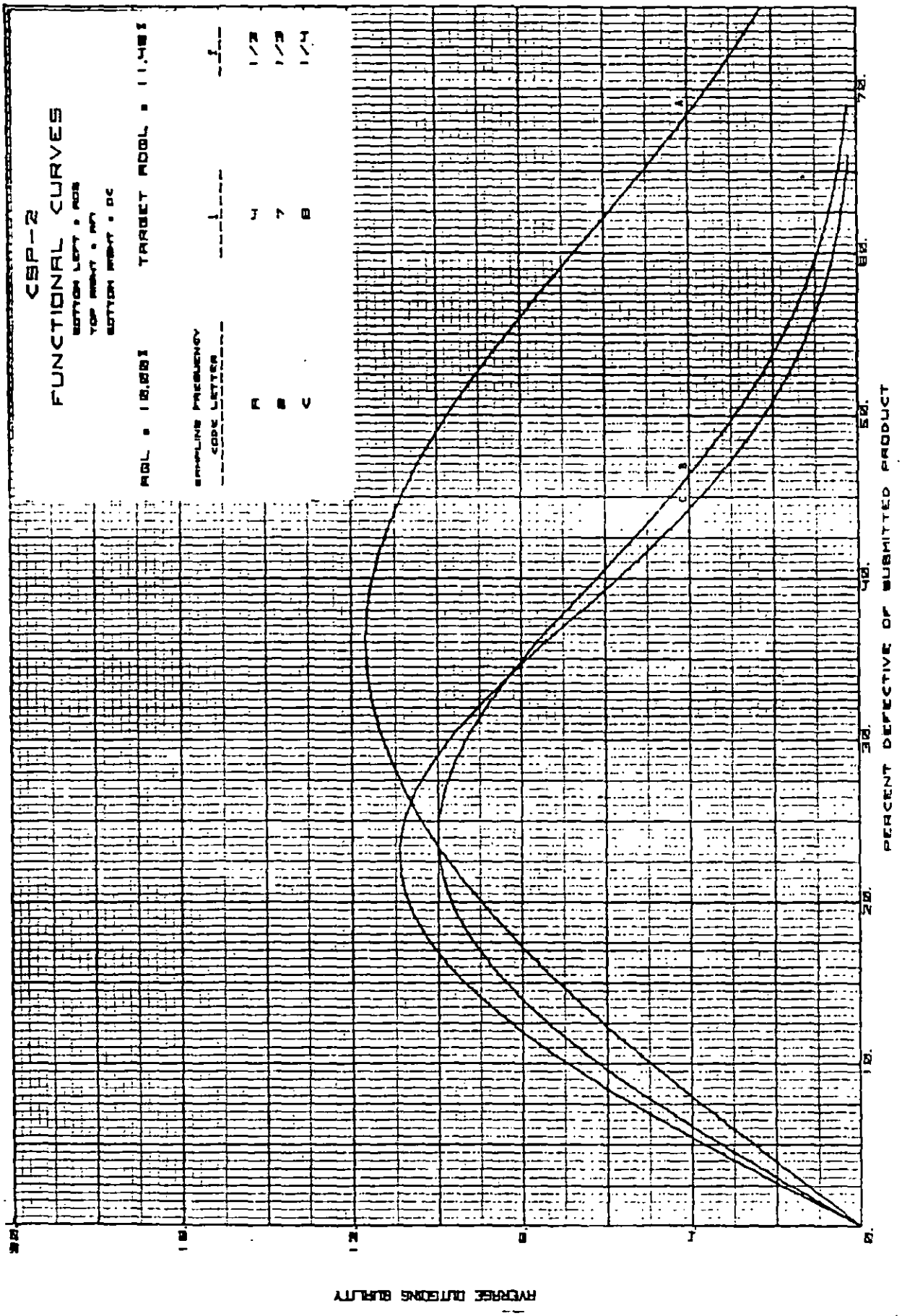

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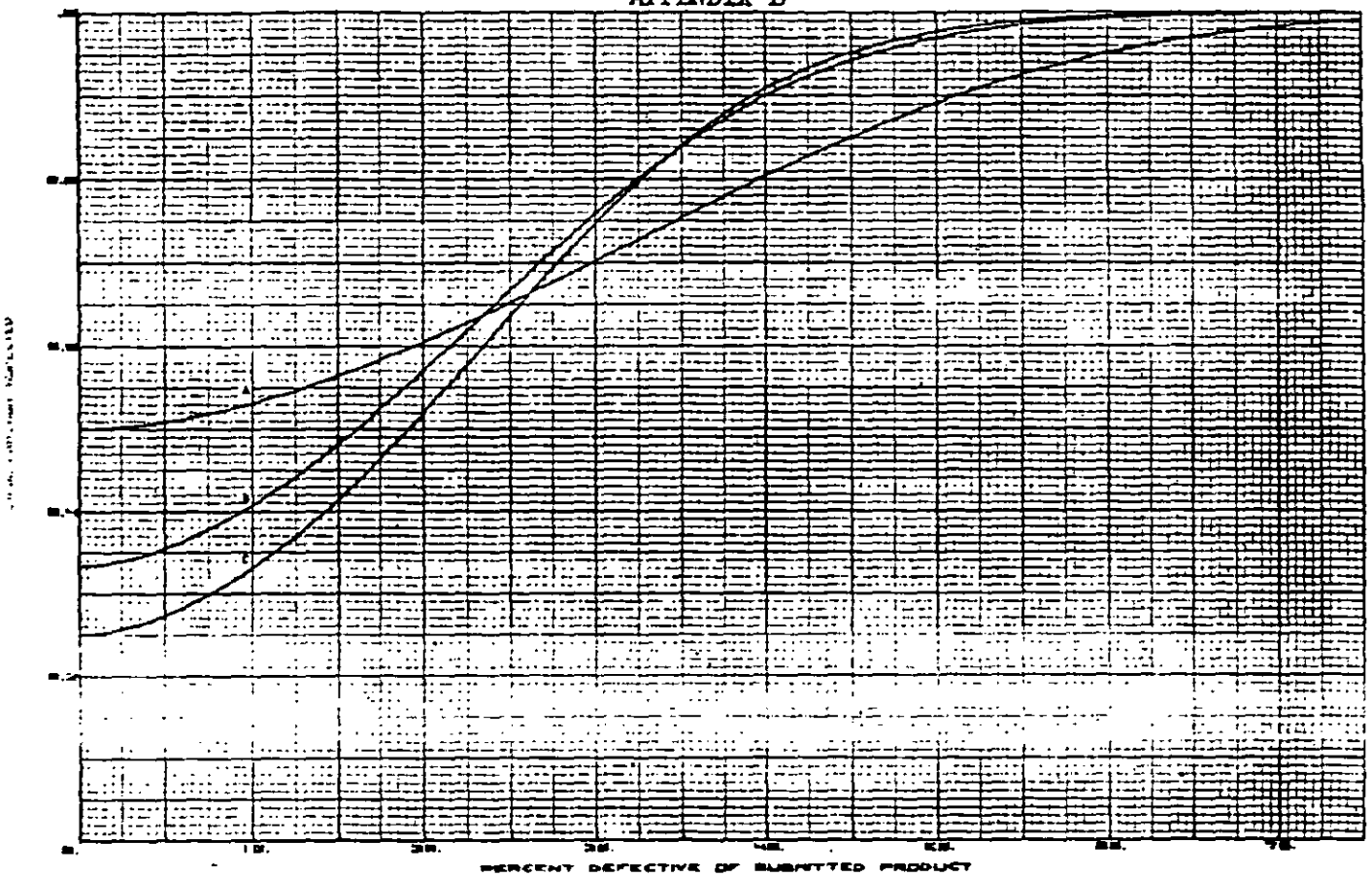

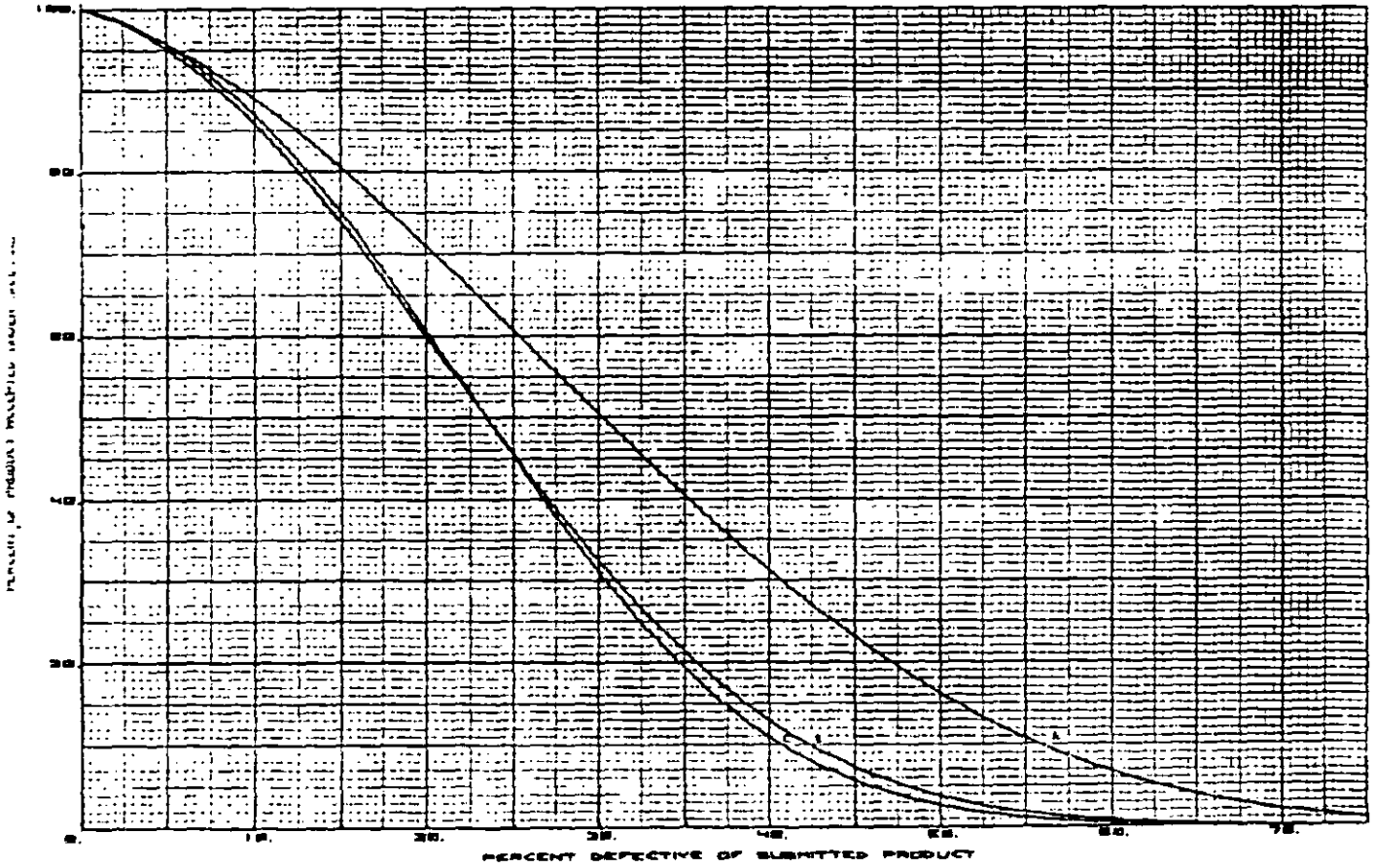

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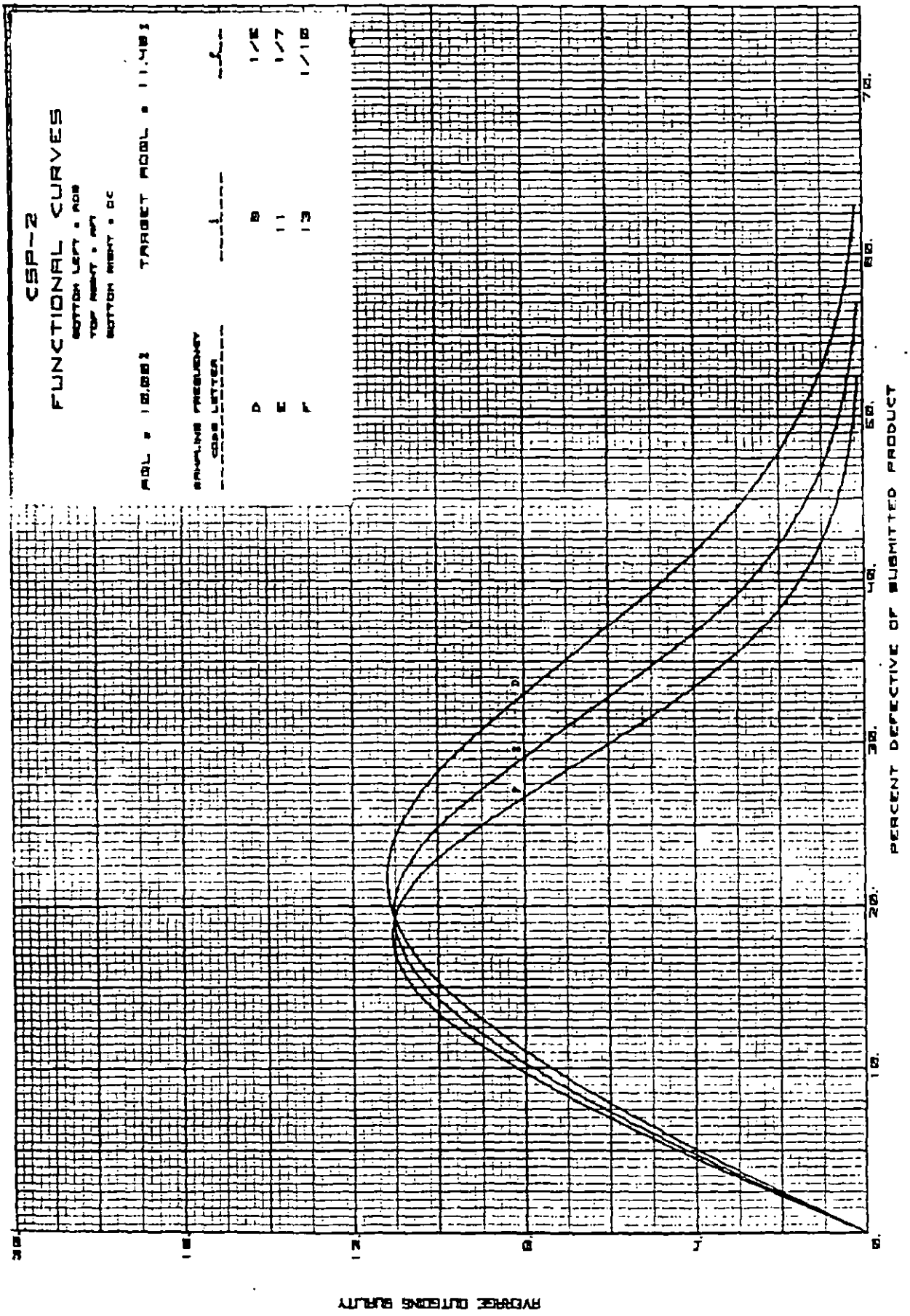

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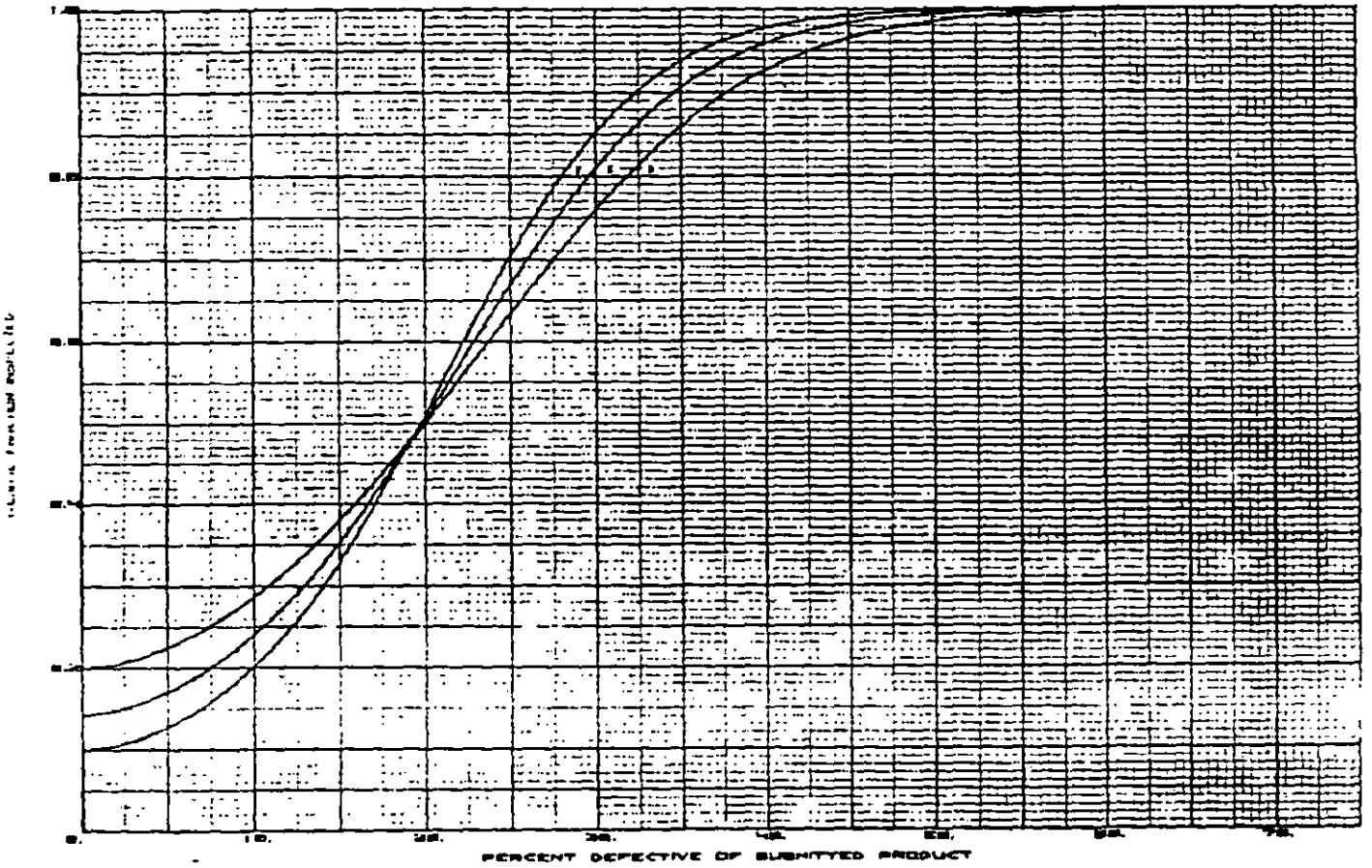

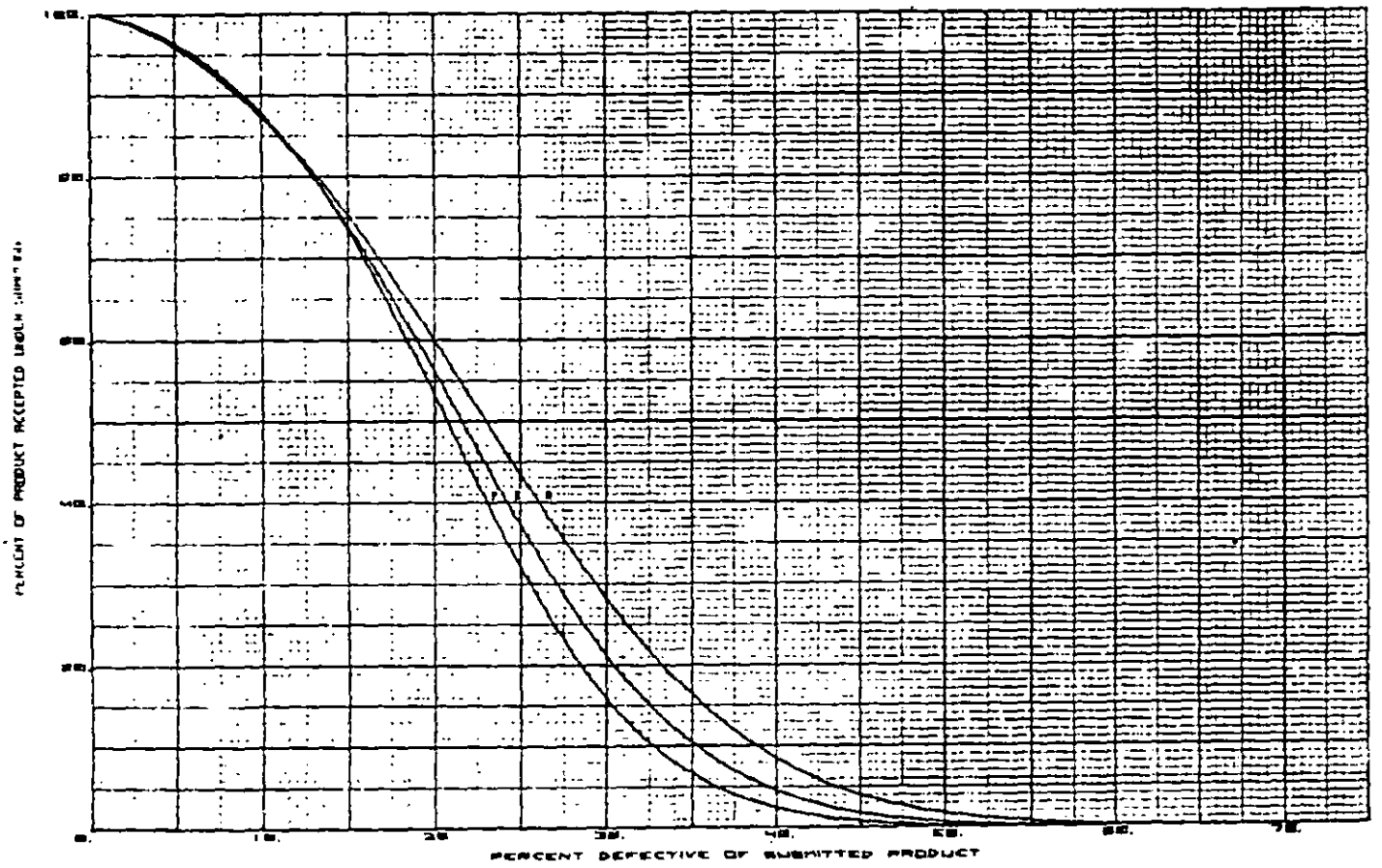

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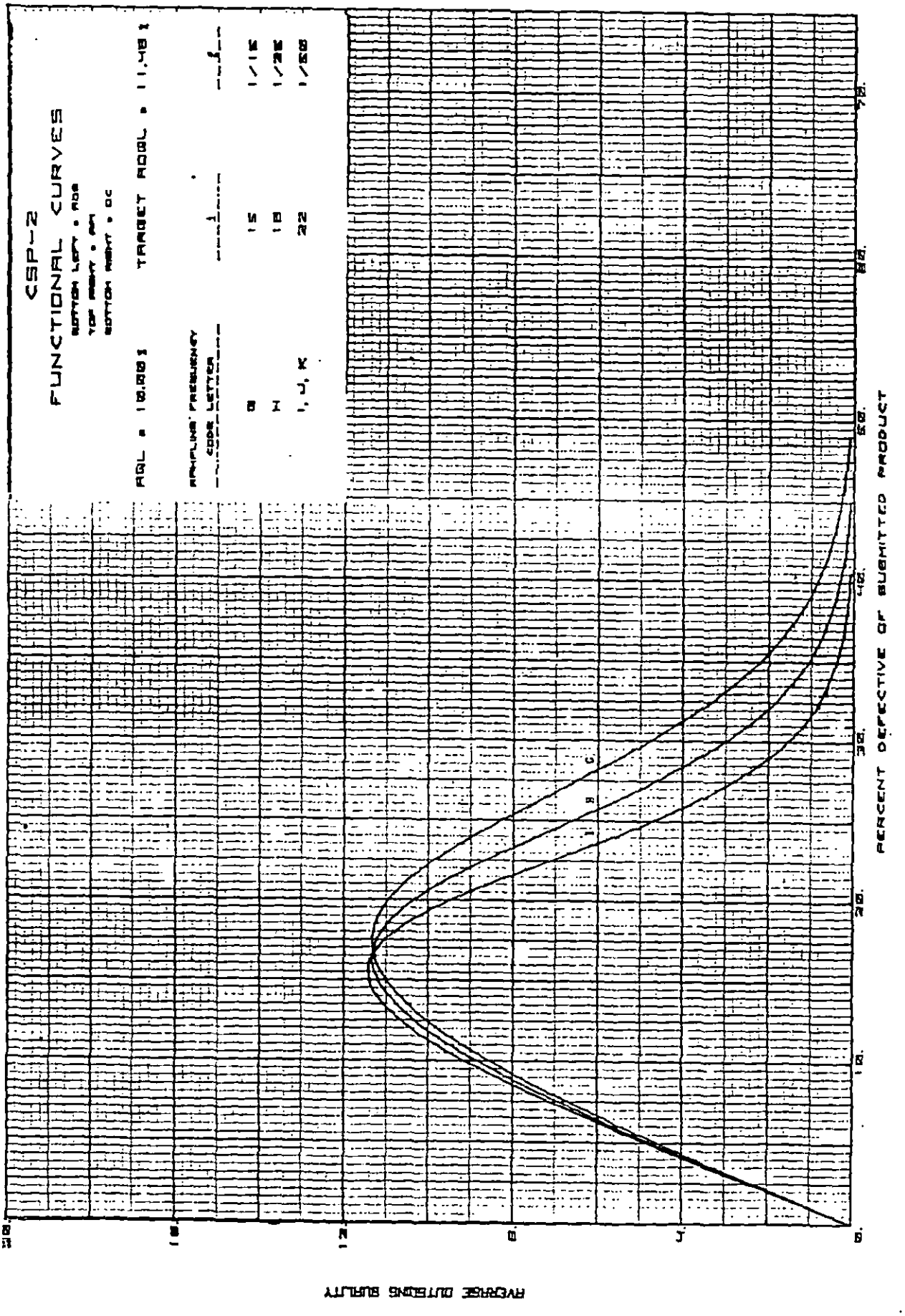

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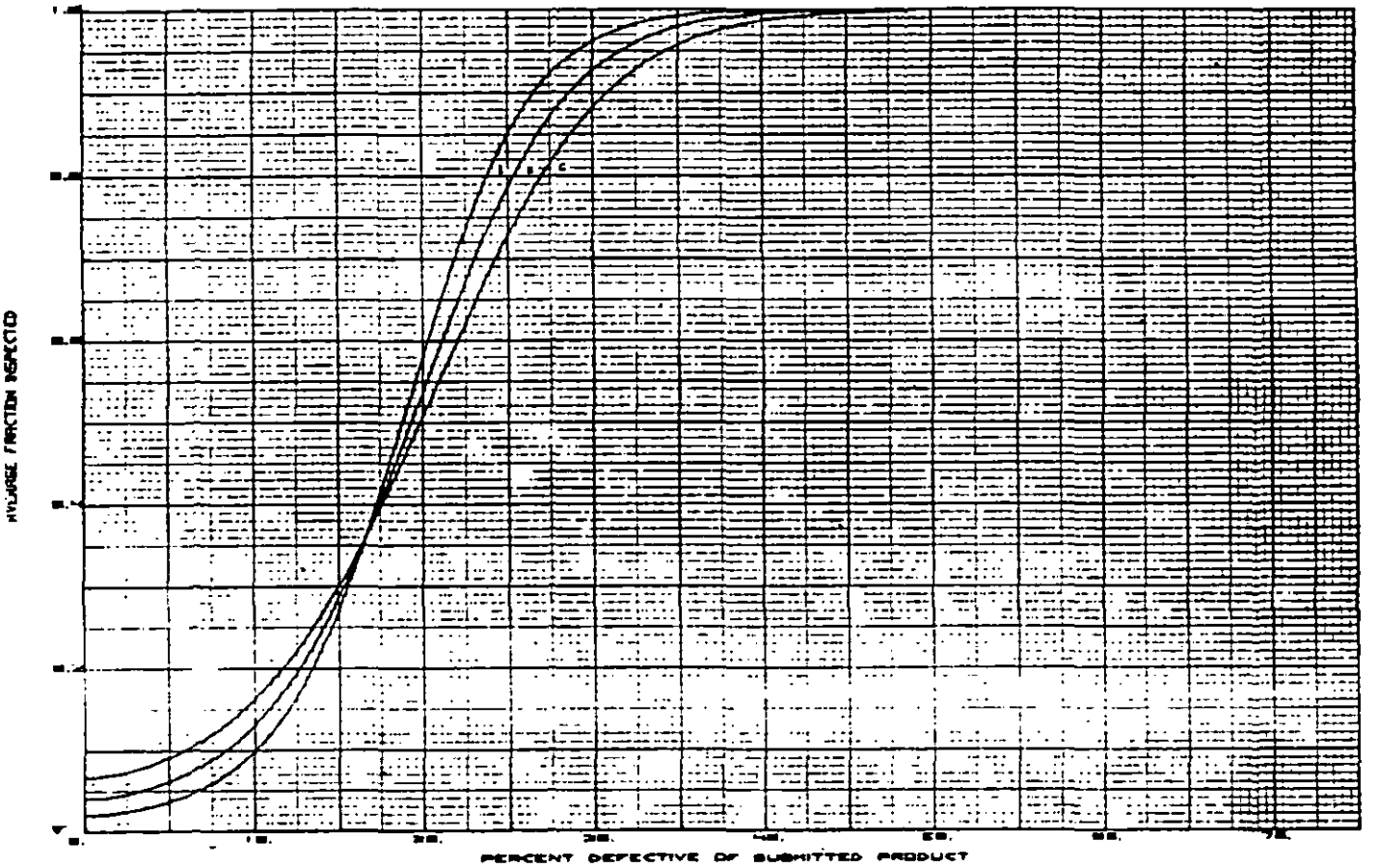

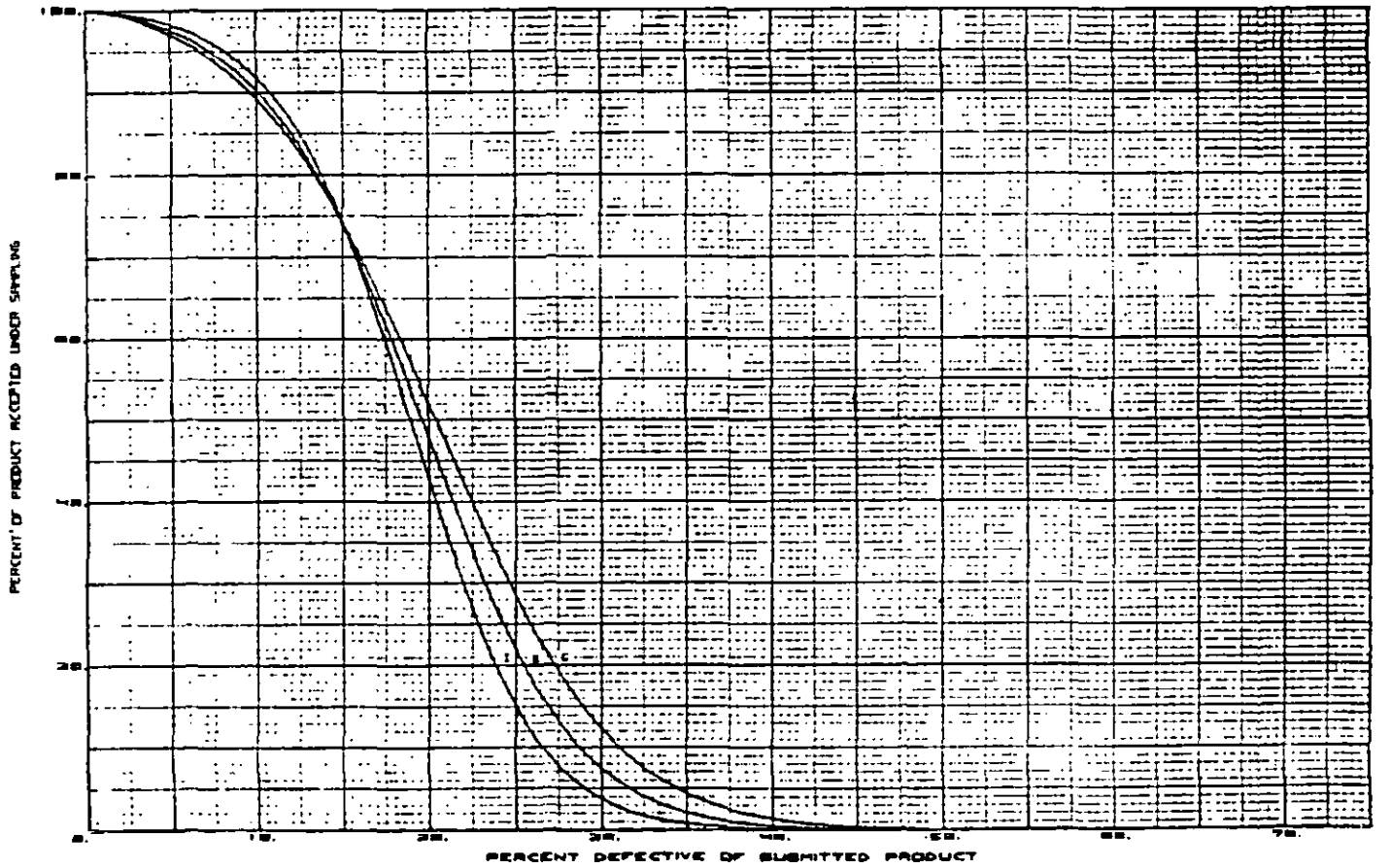

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APPENDIX C

FUNCTIONAL CURVES FOR CSP-T PLANS

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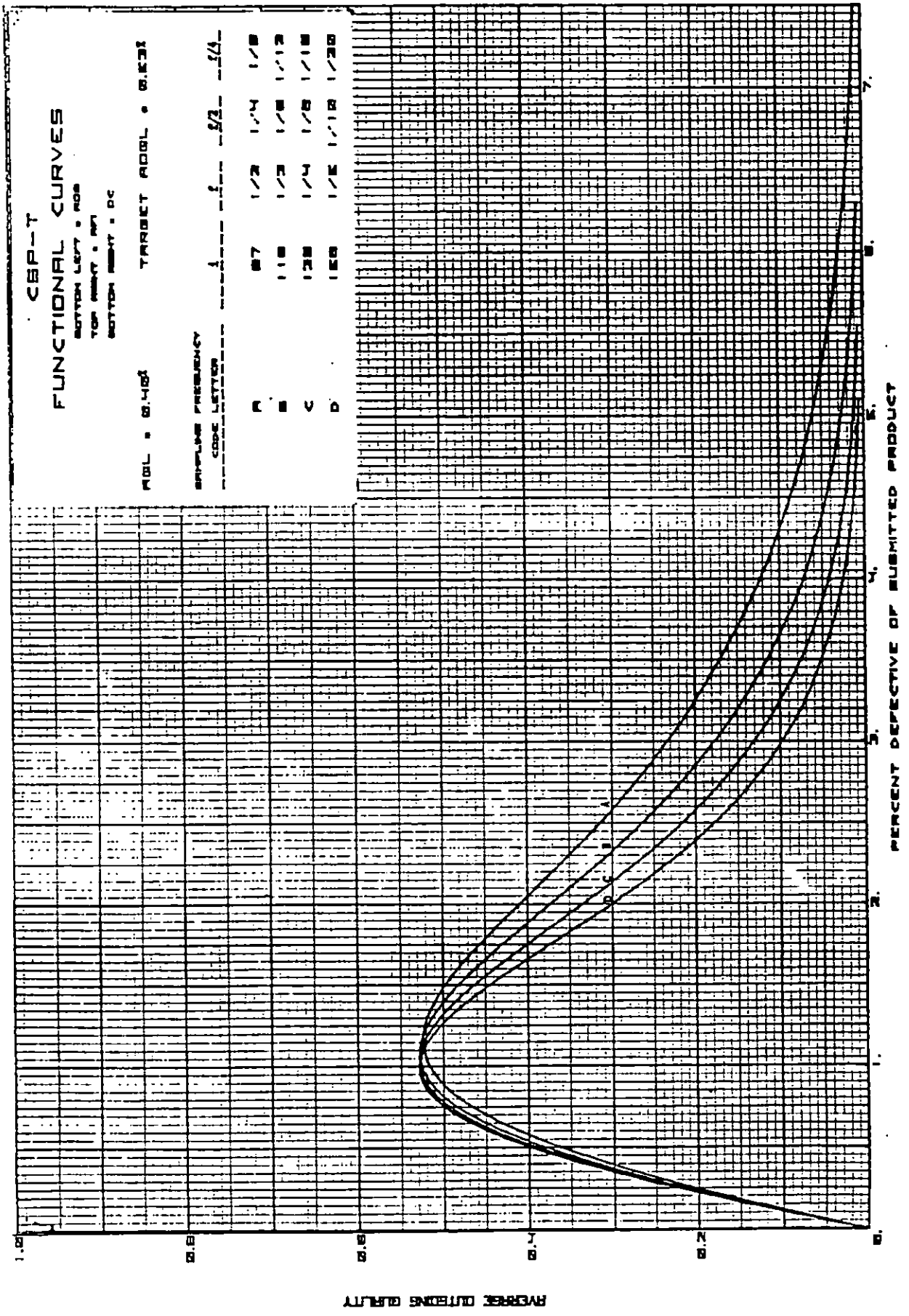

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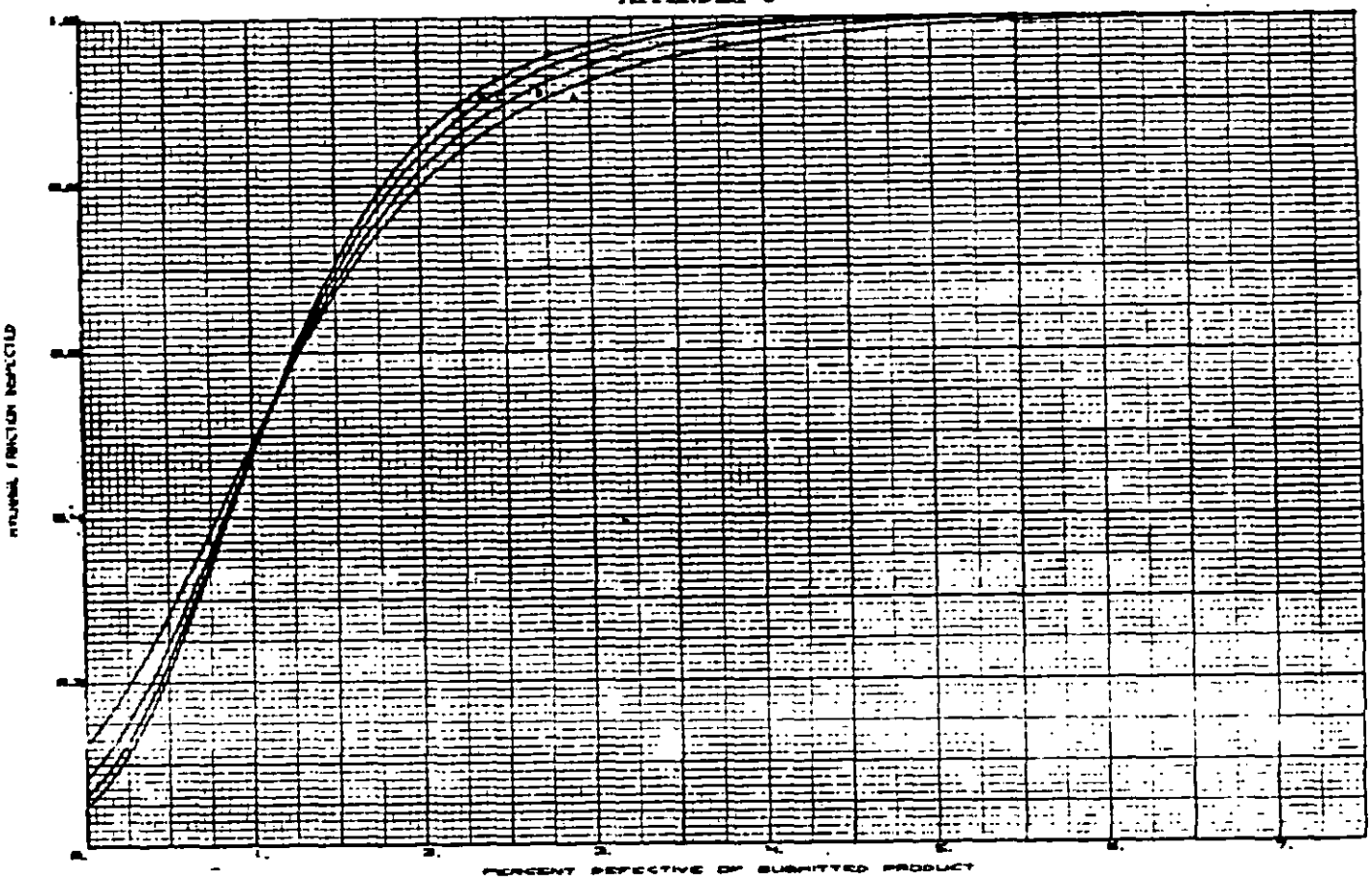

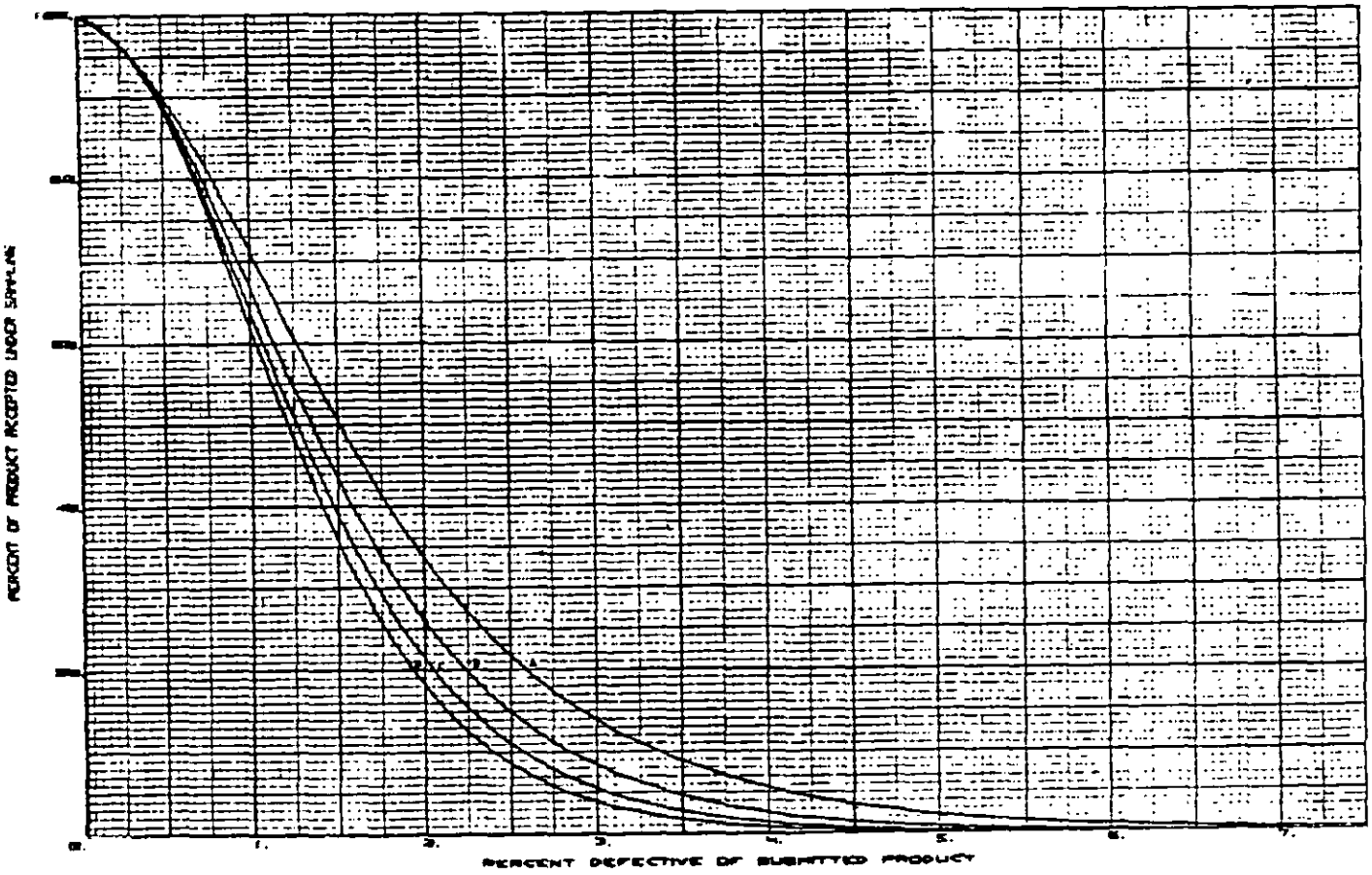

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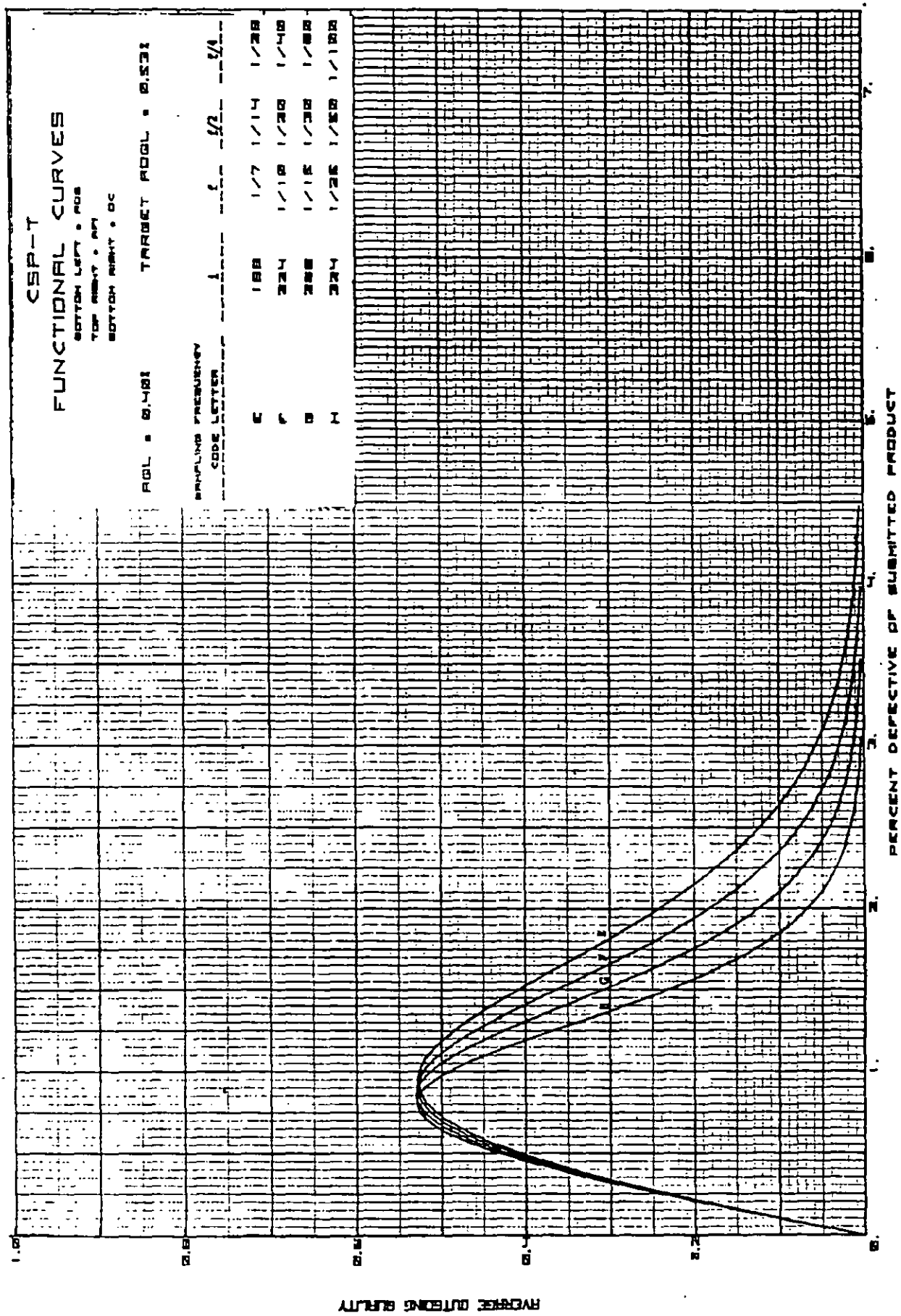

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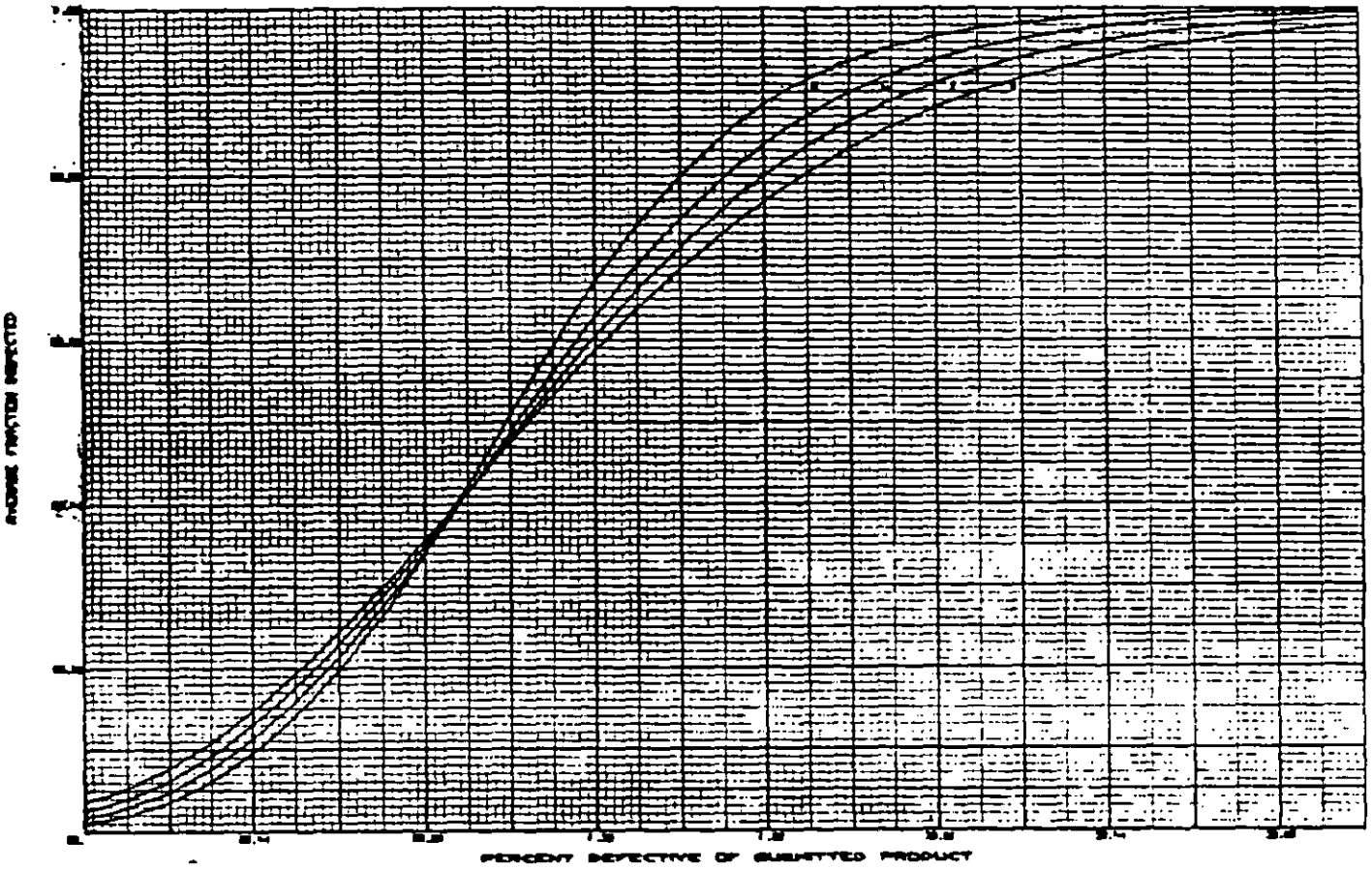

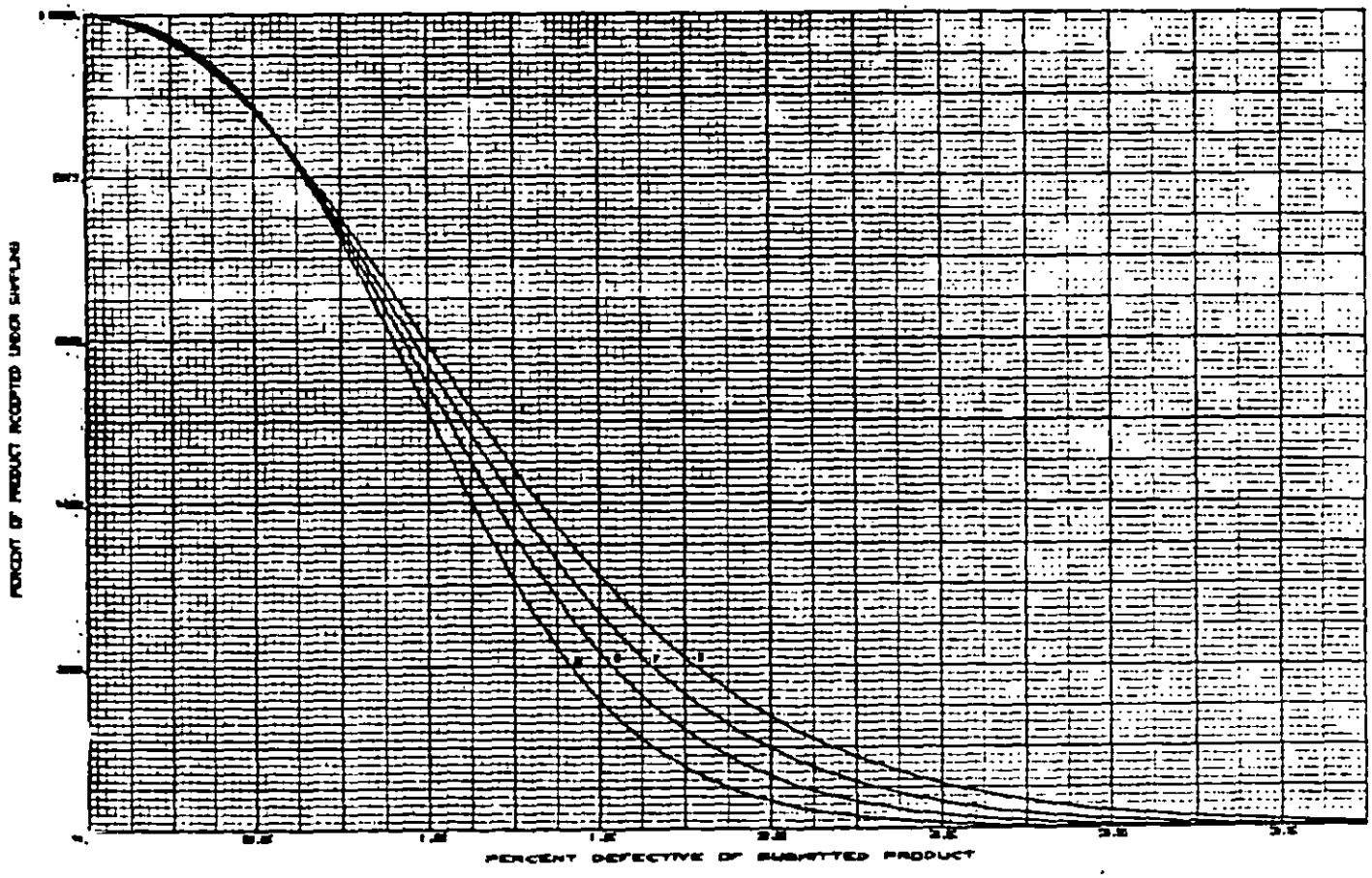

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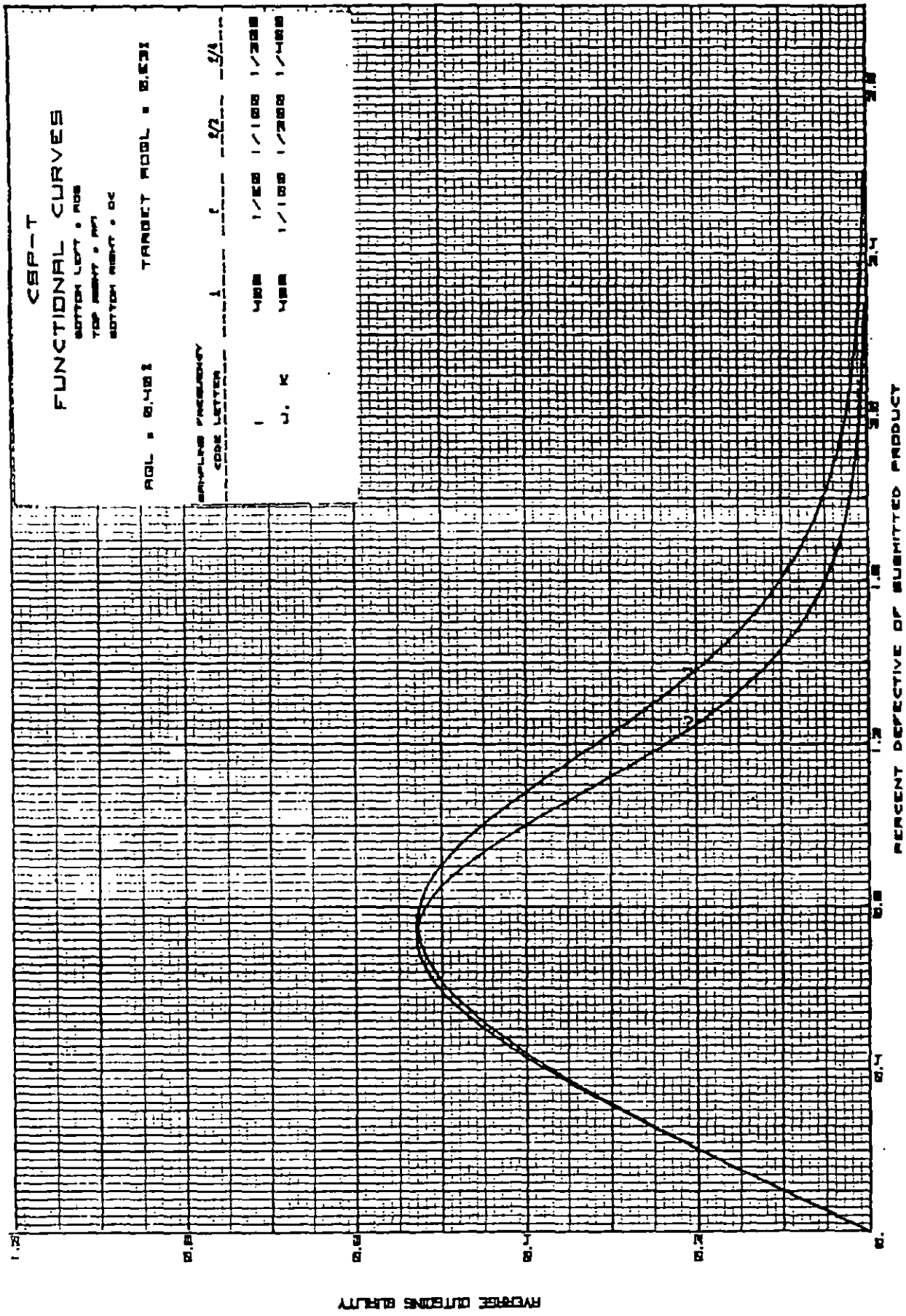

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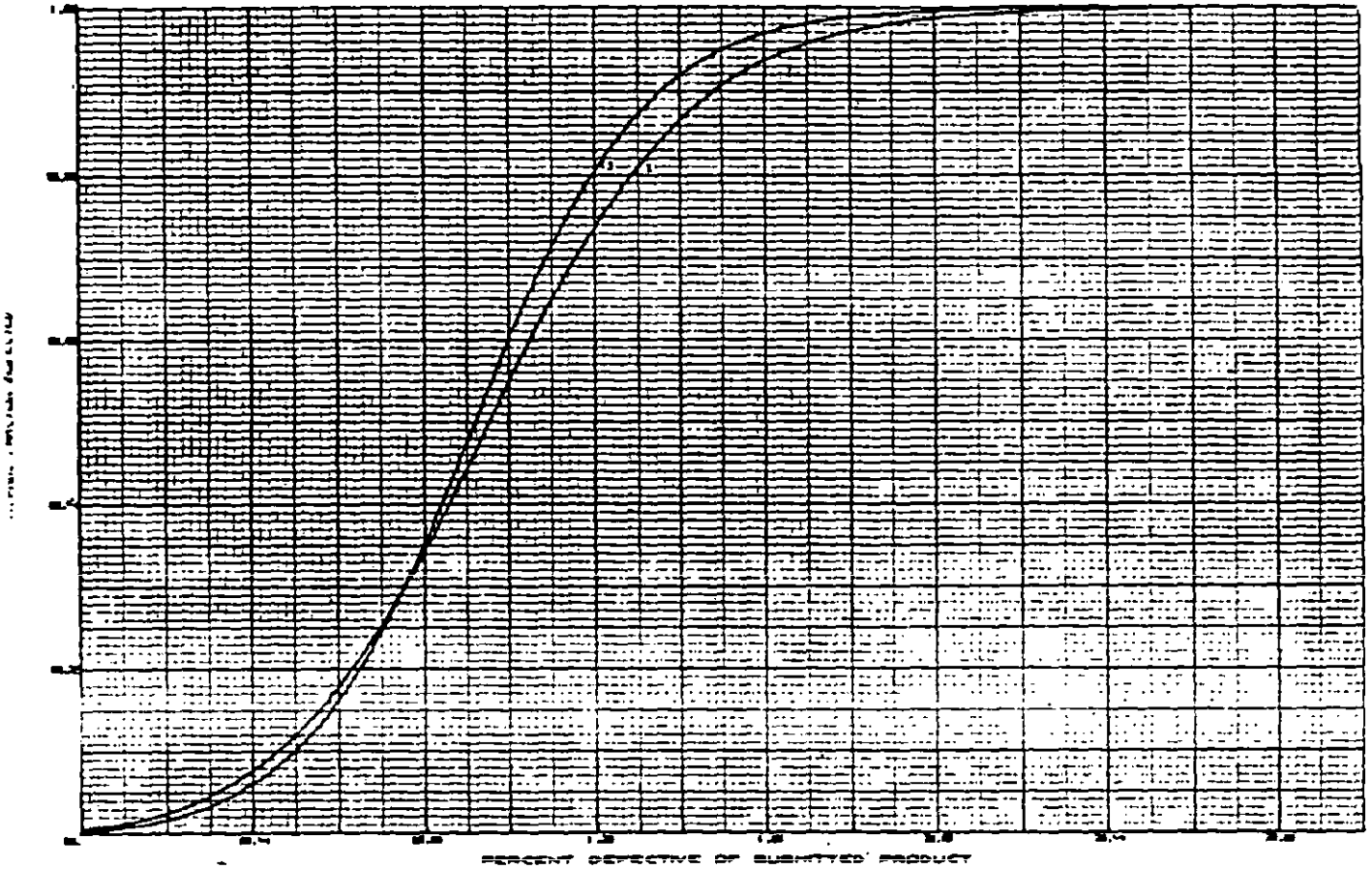

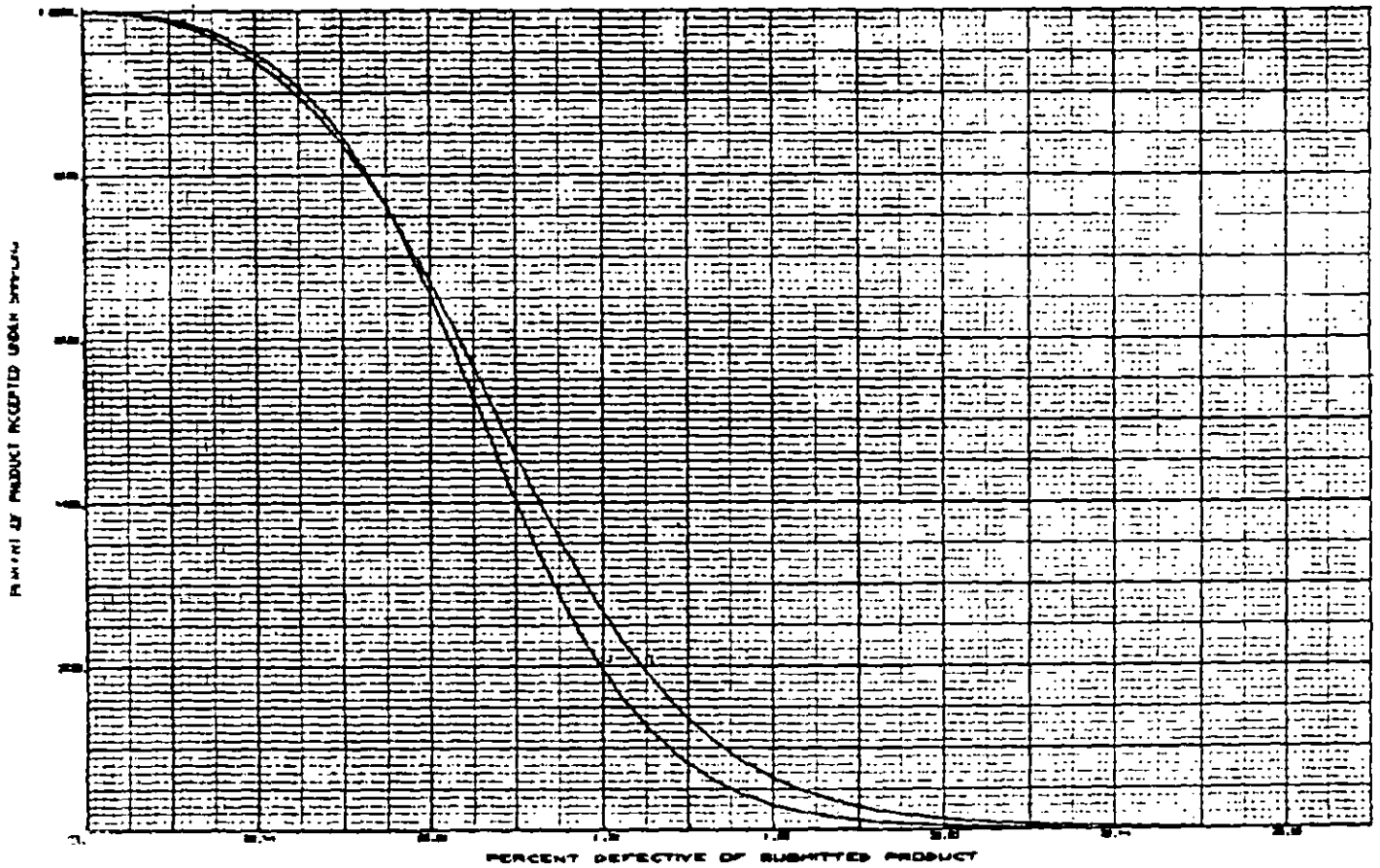

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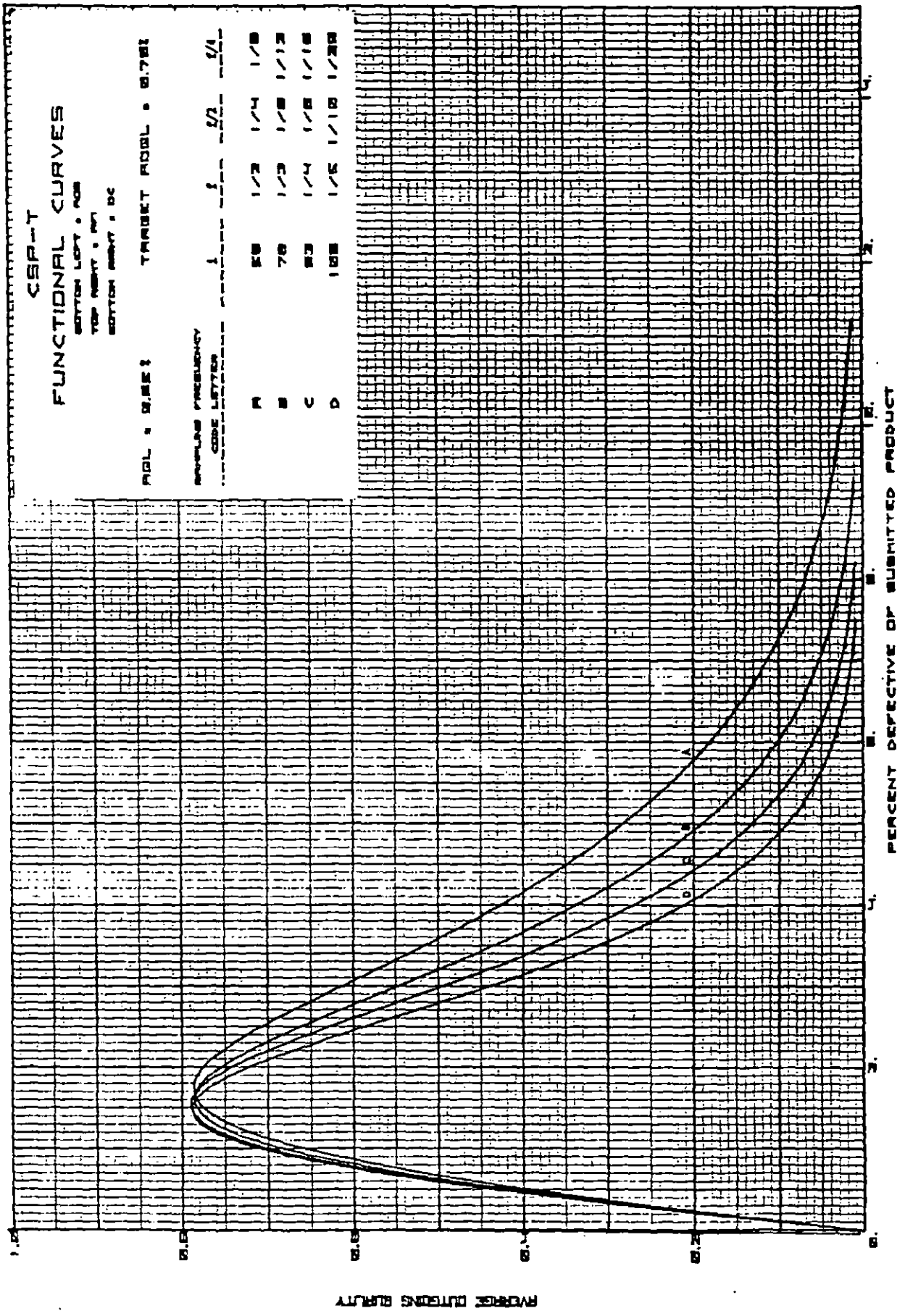

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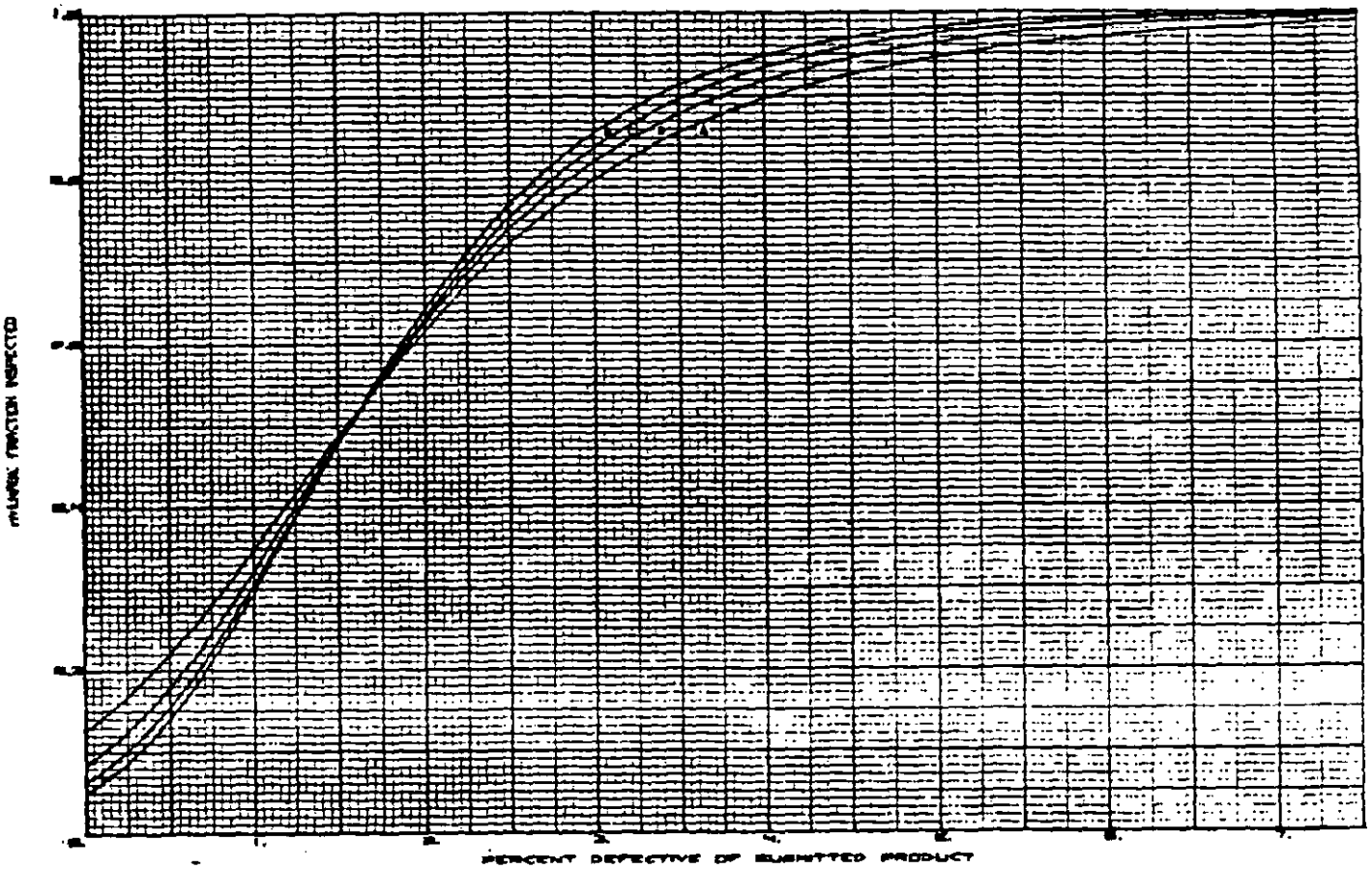

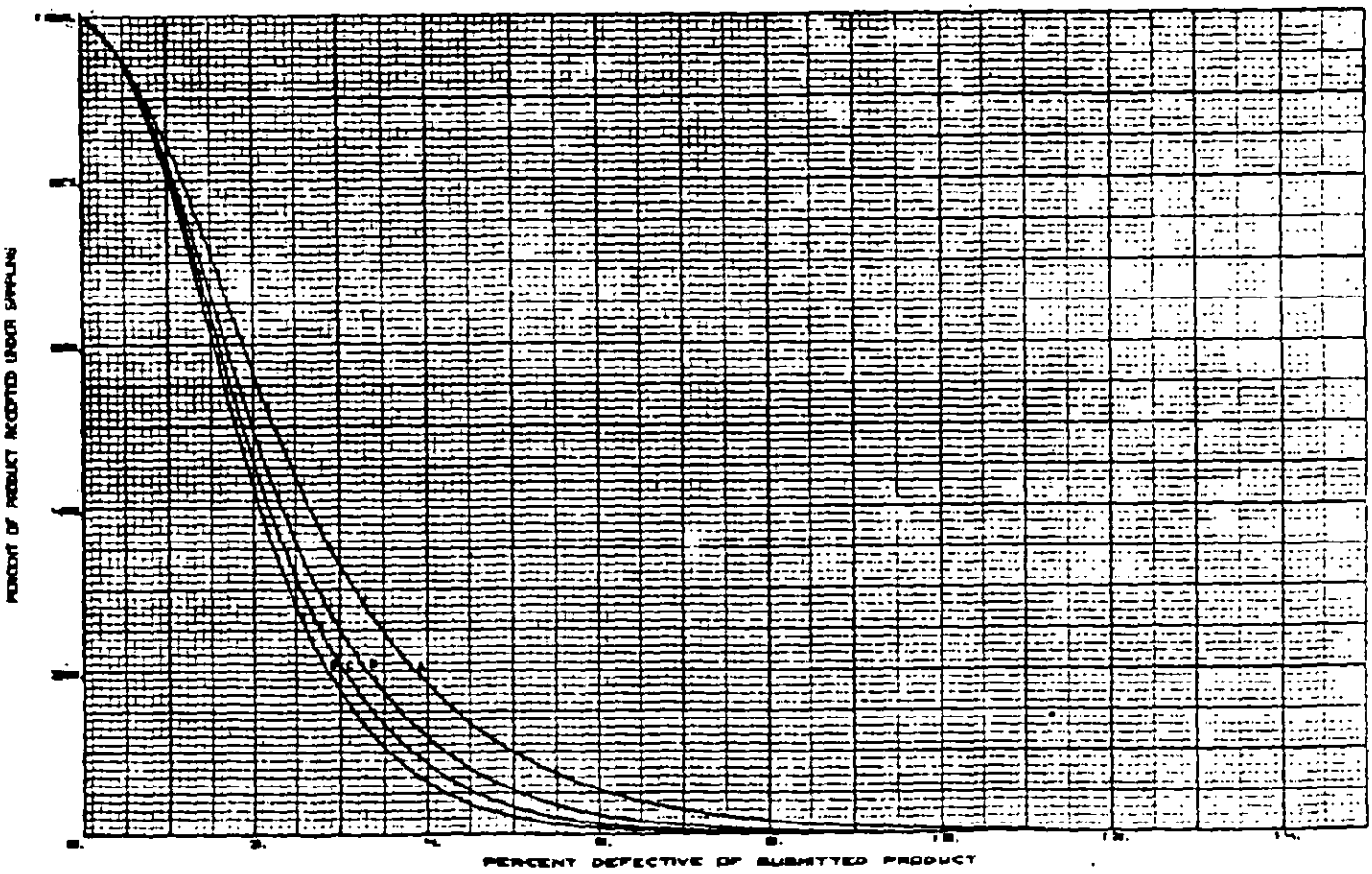

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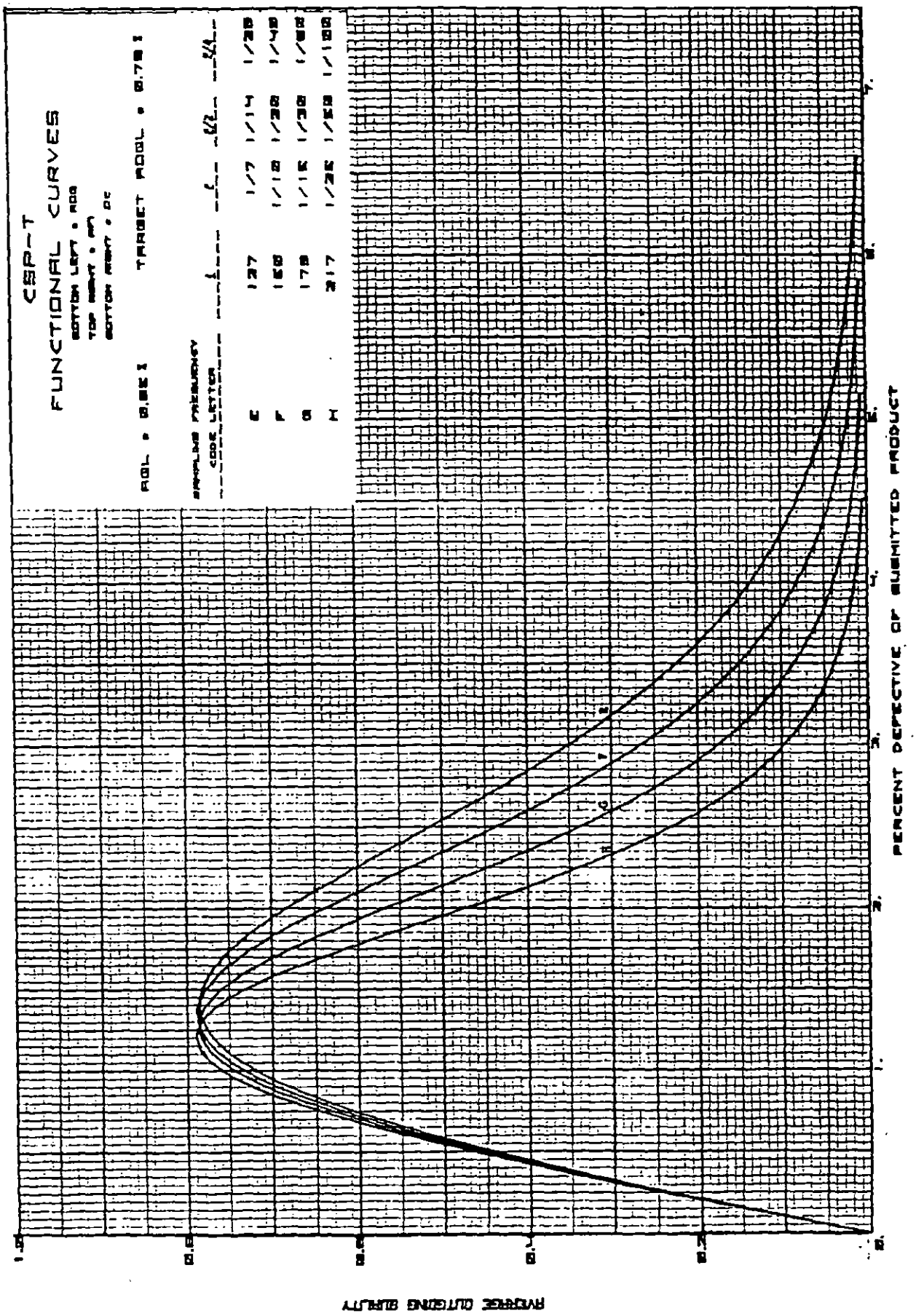

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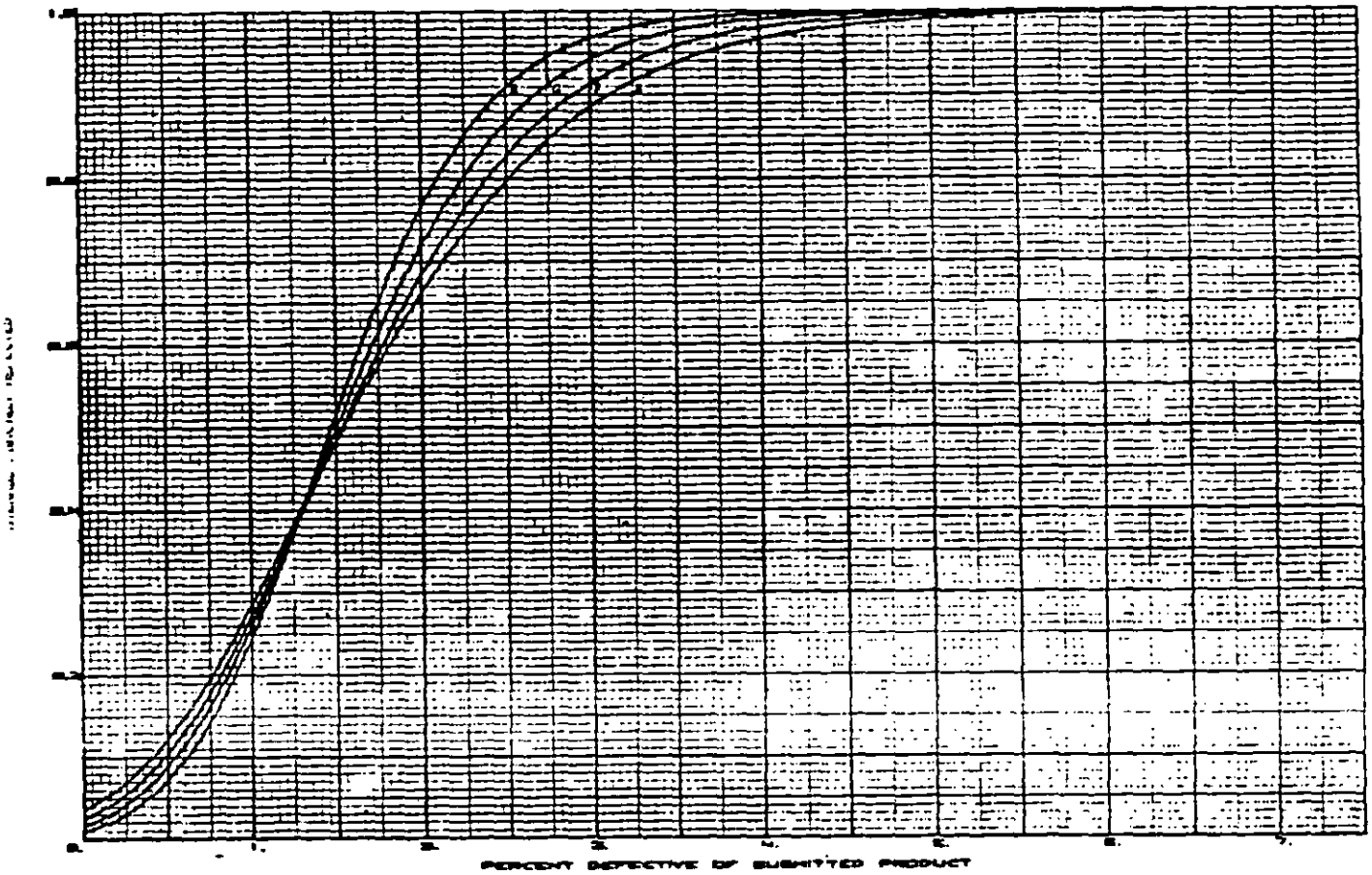

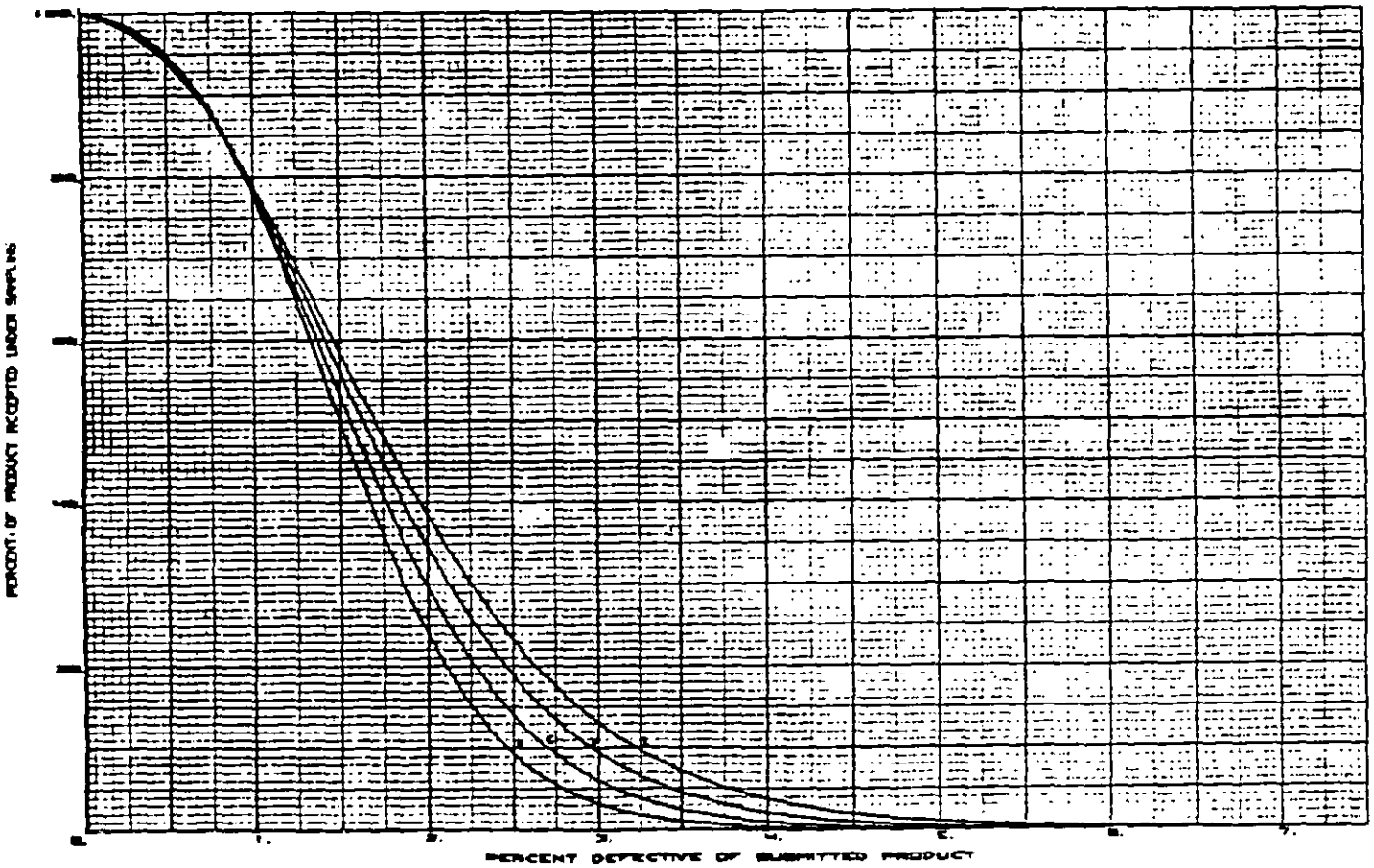

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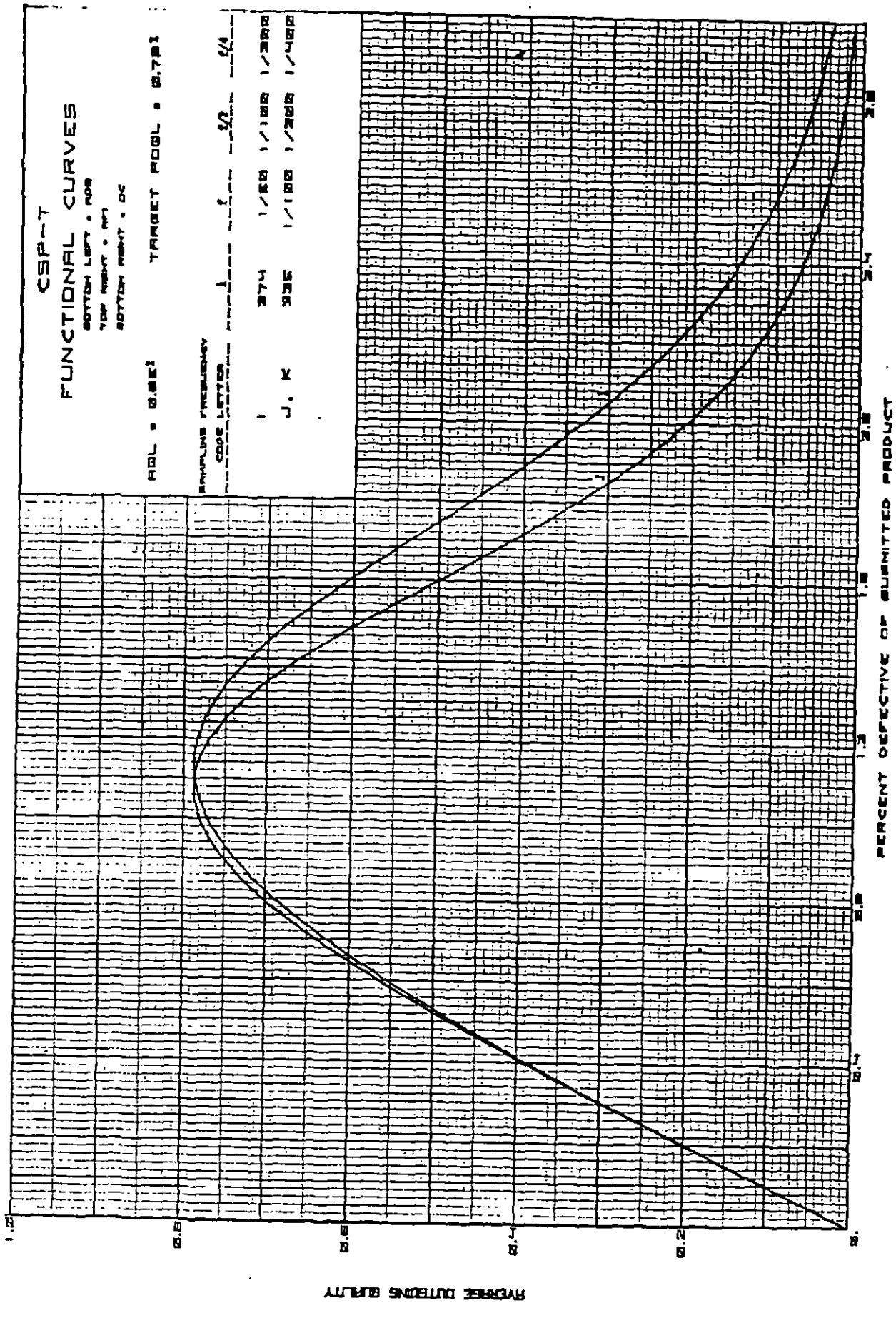

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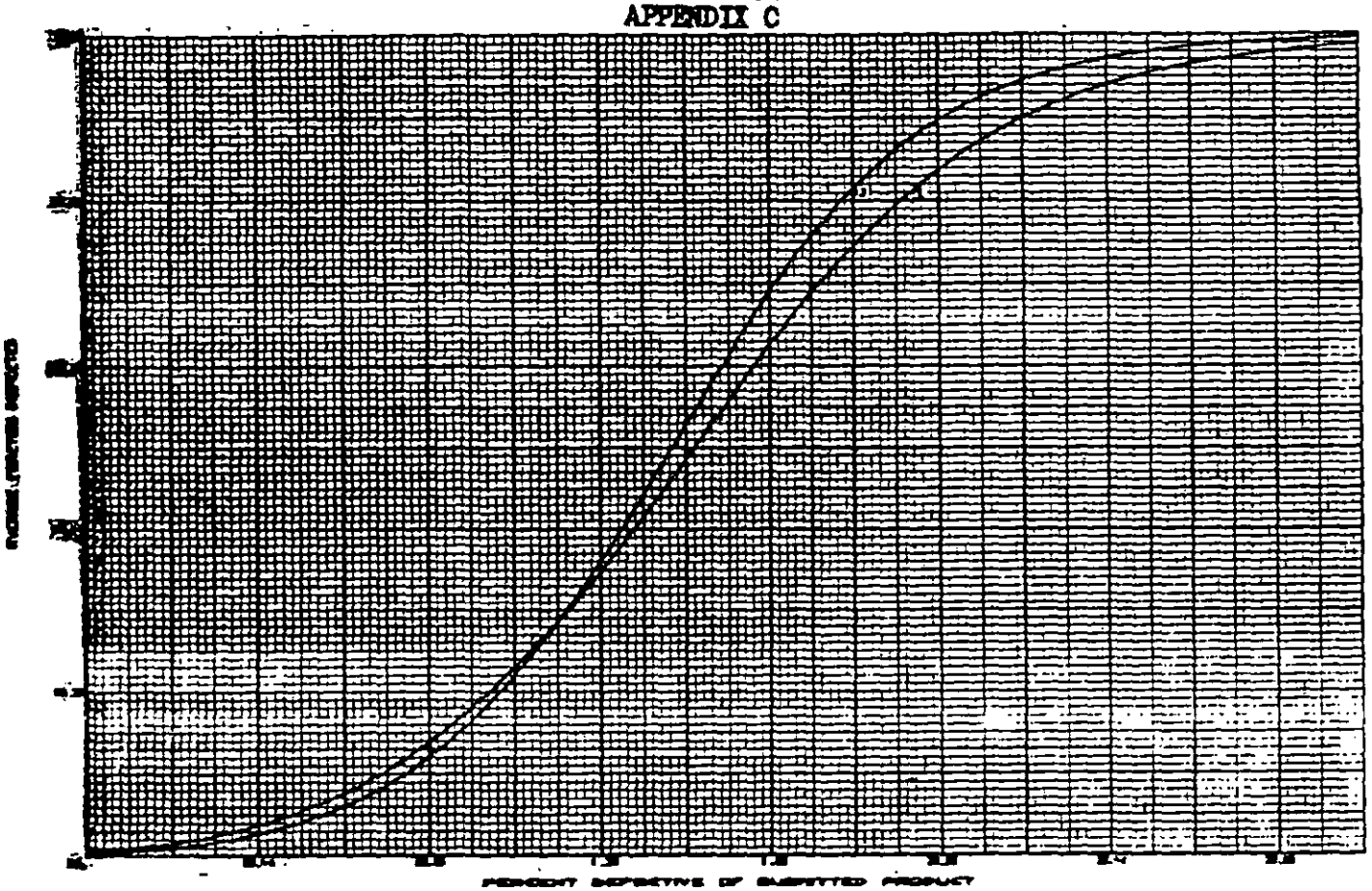

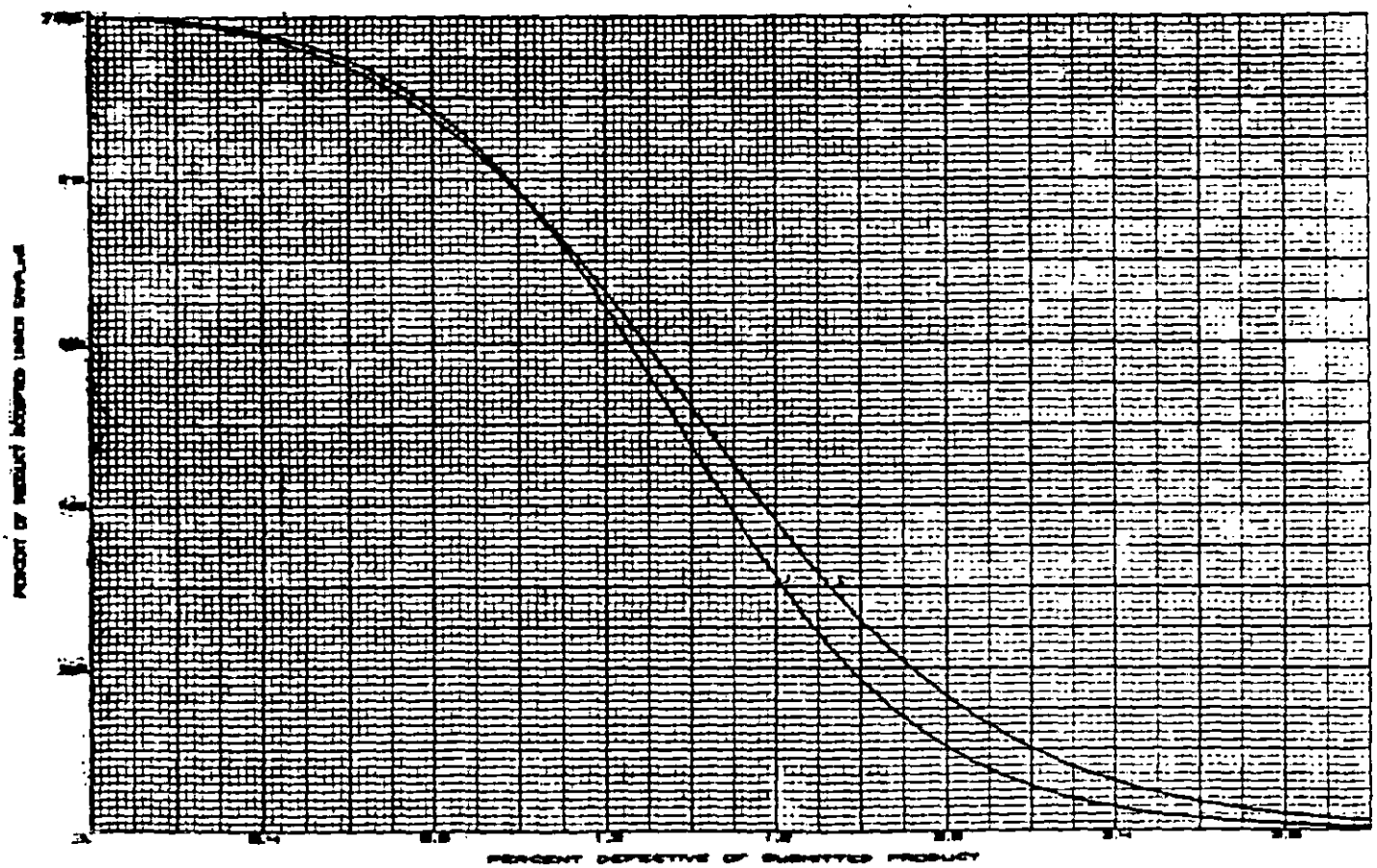

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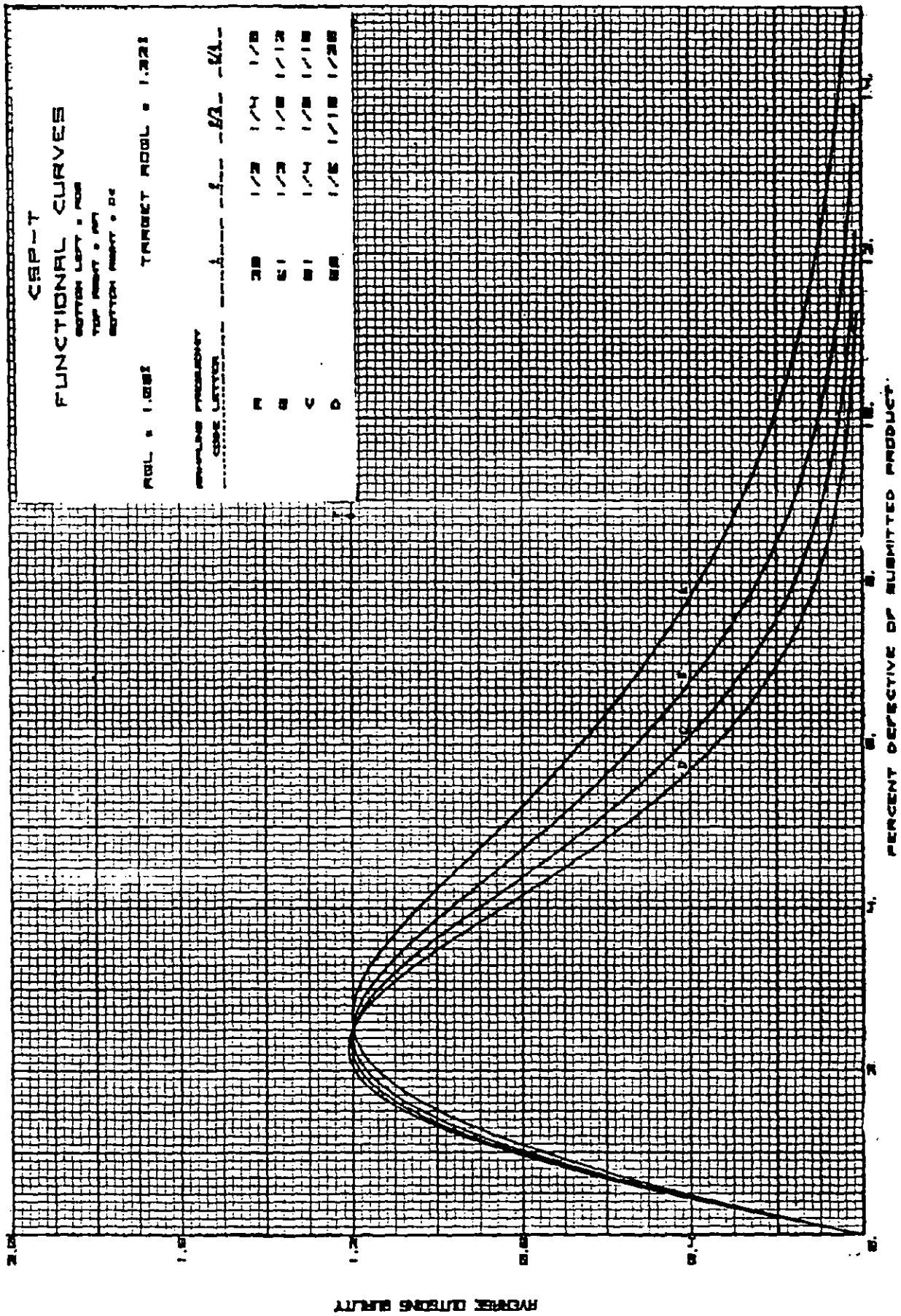

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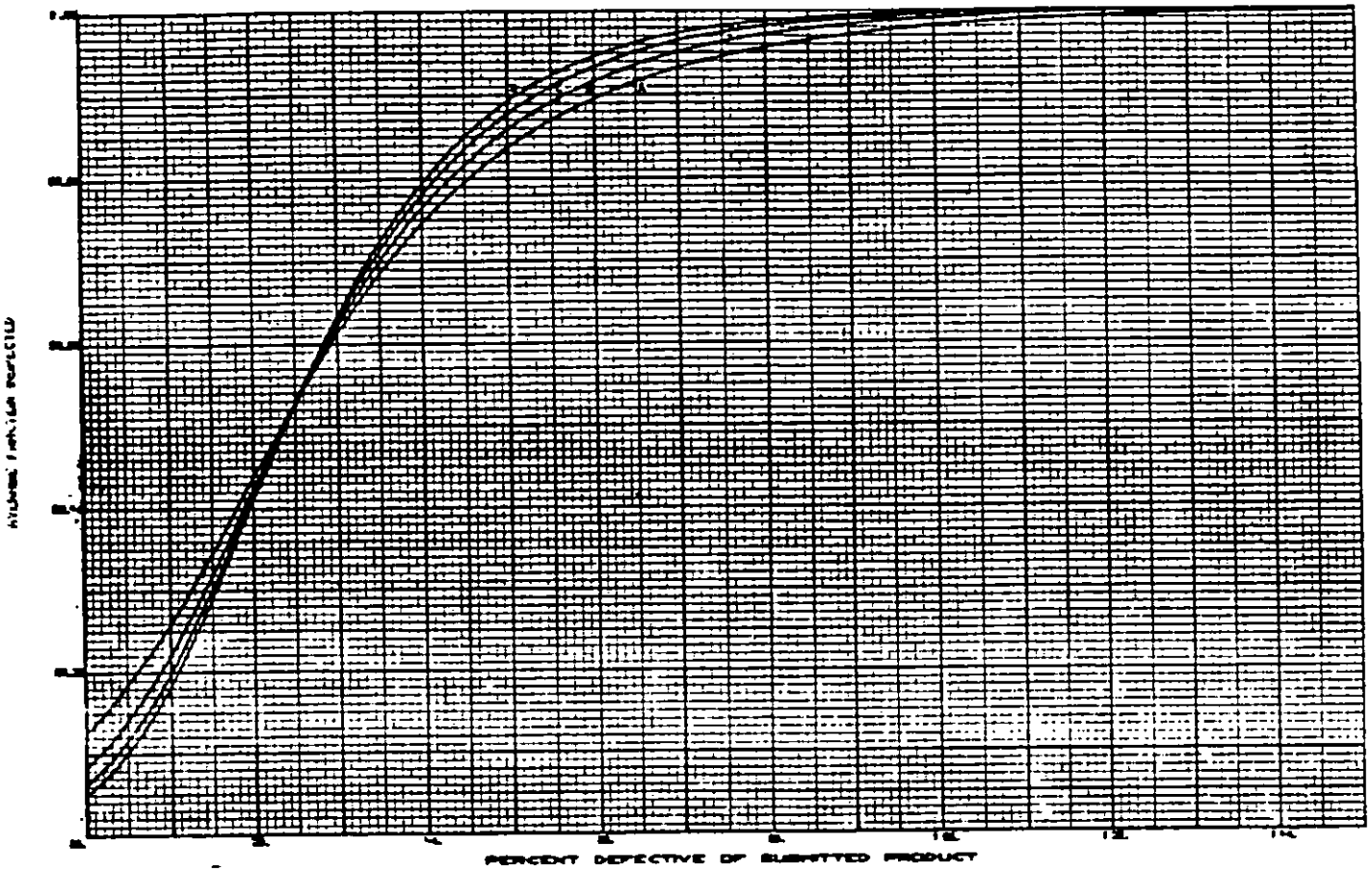

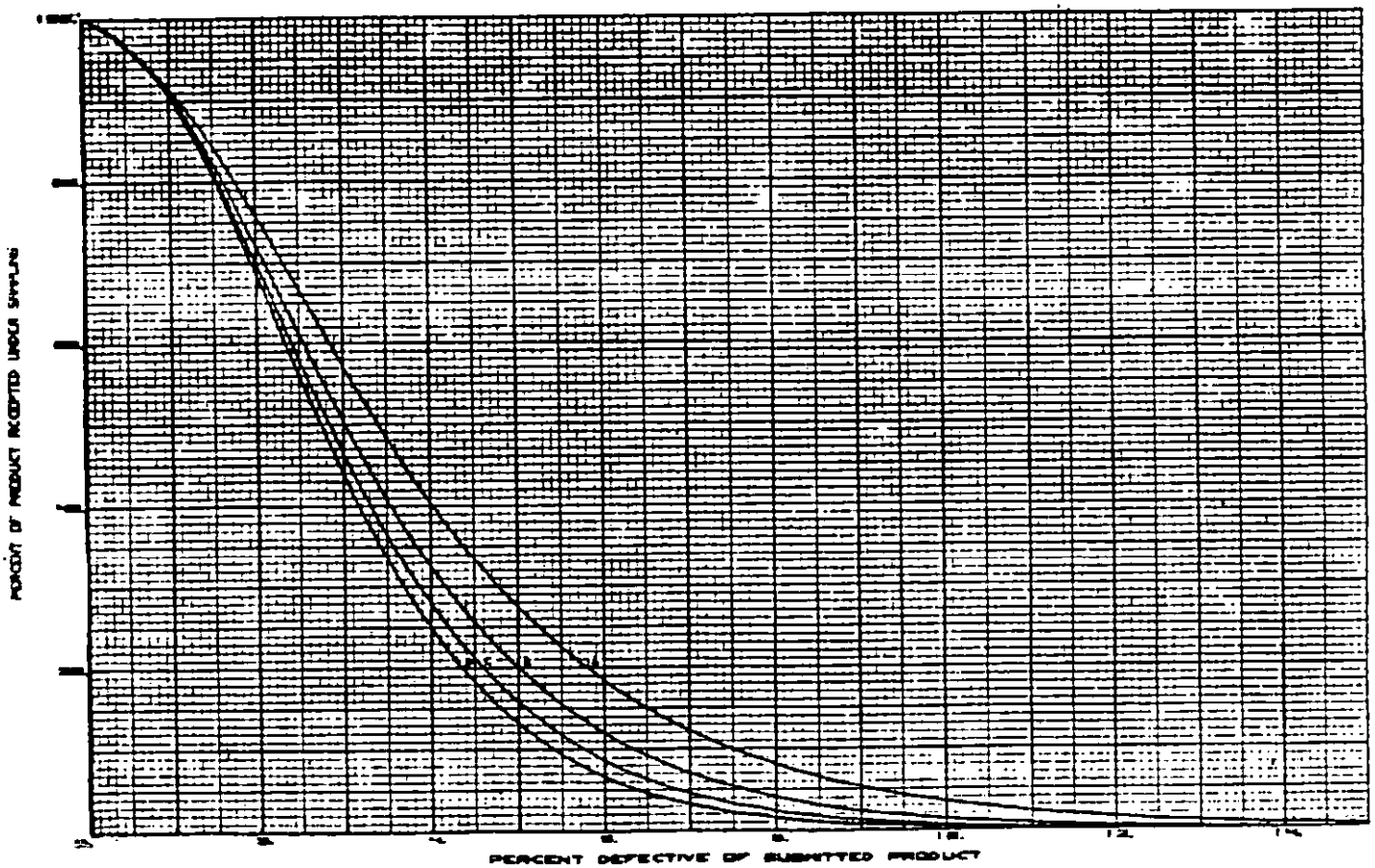

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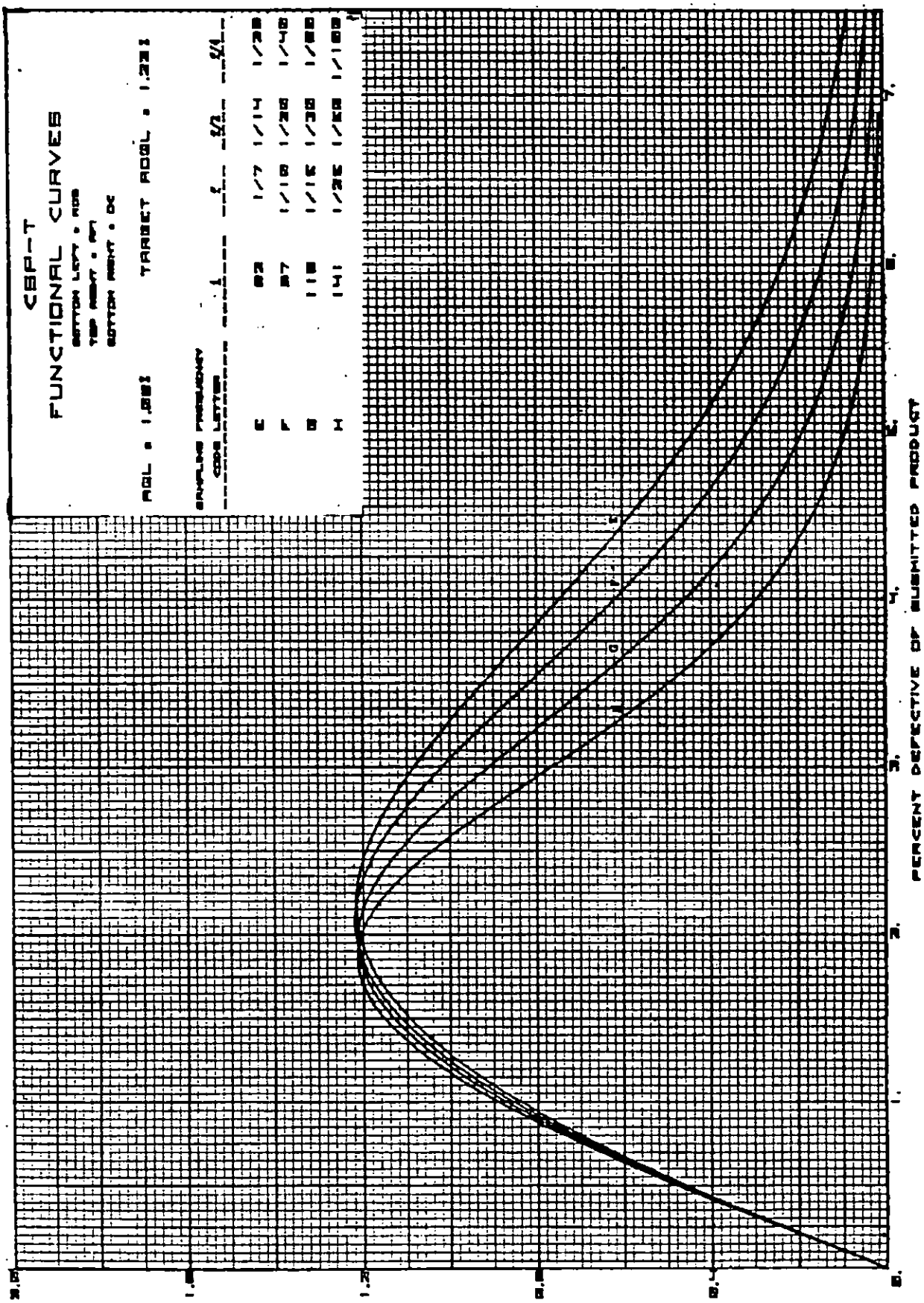

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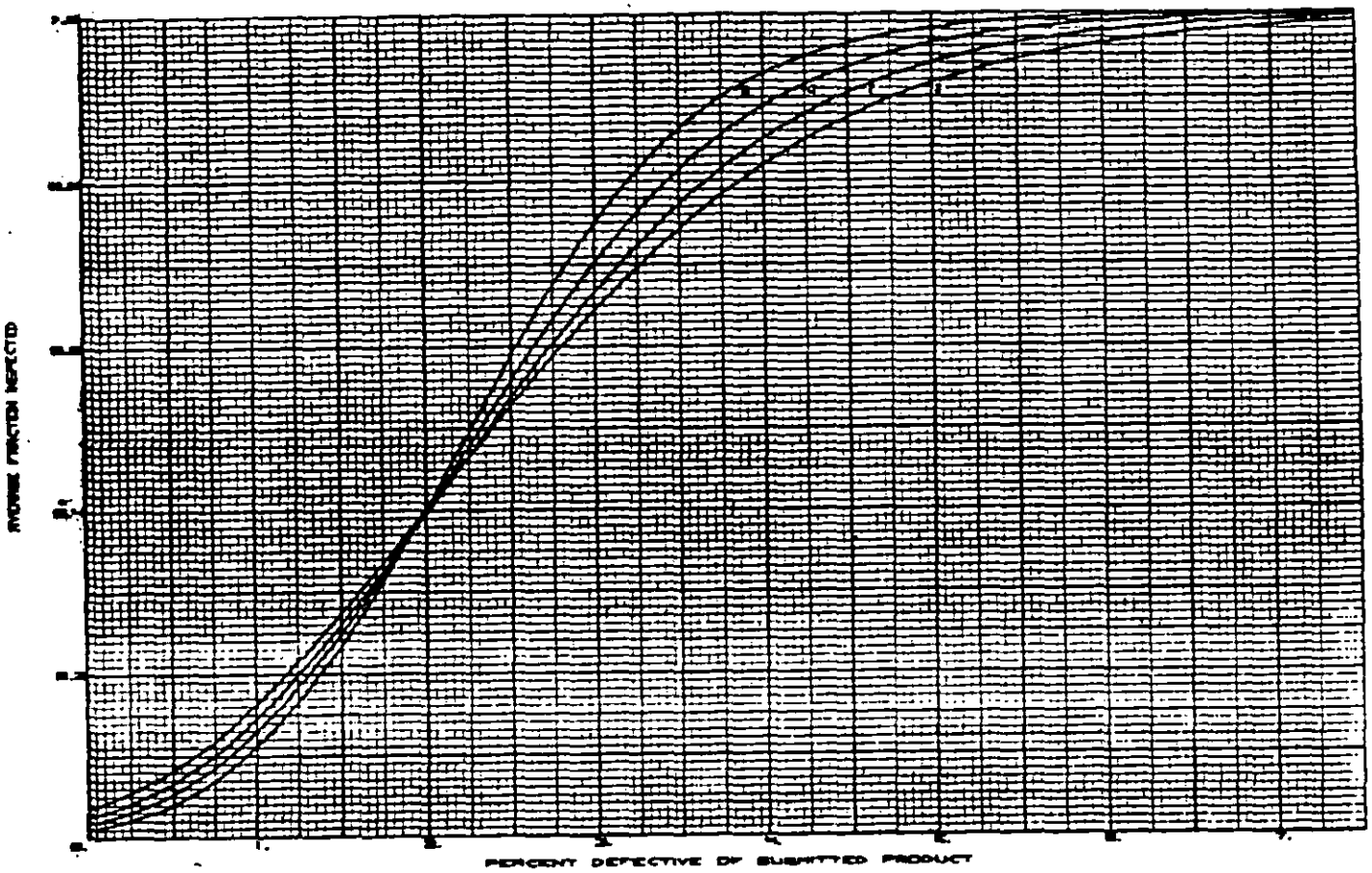

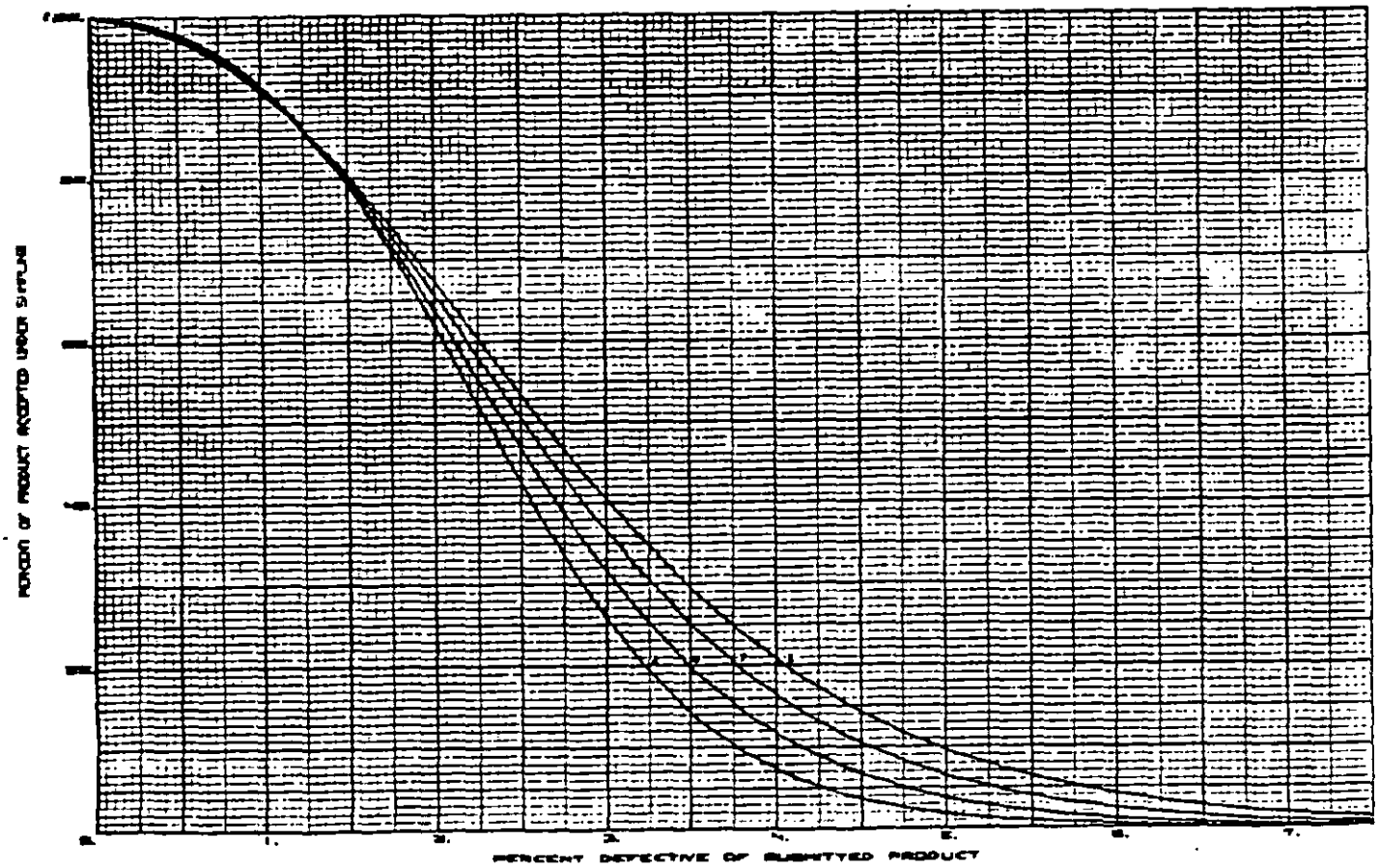

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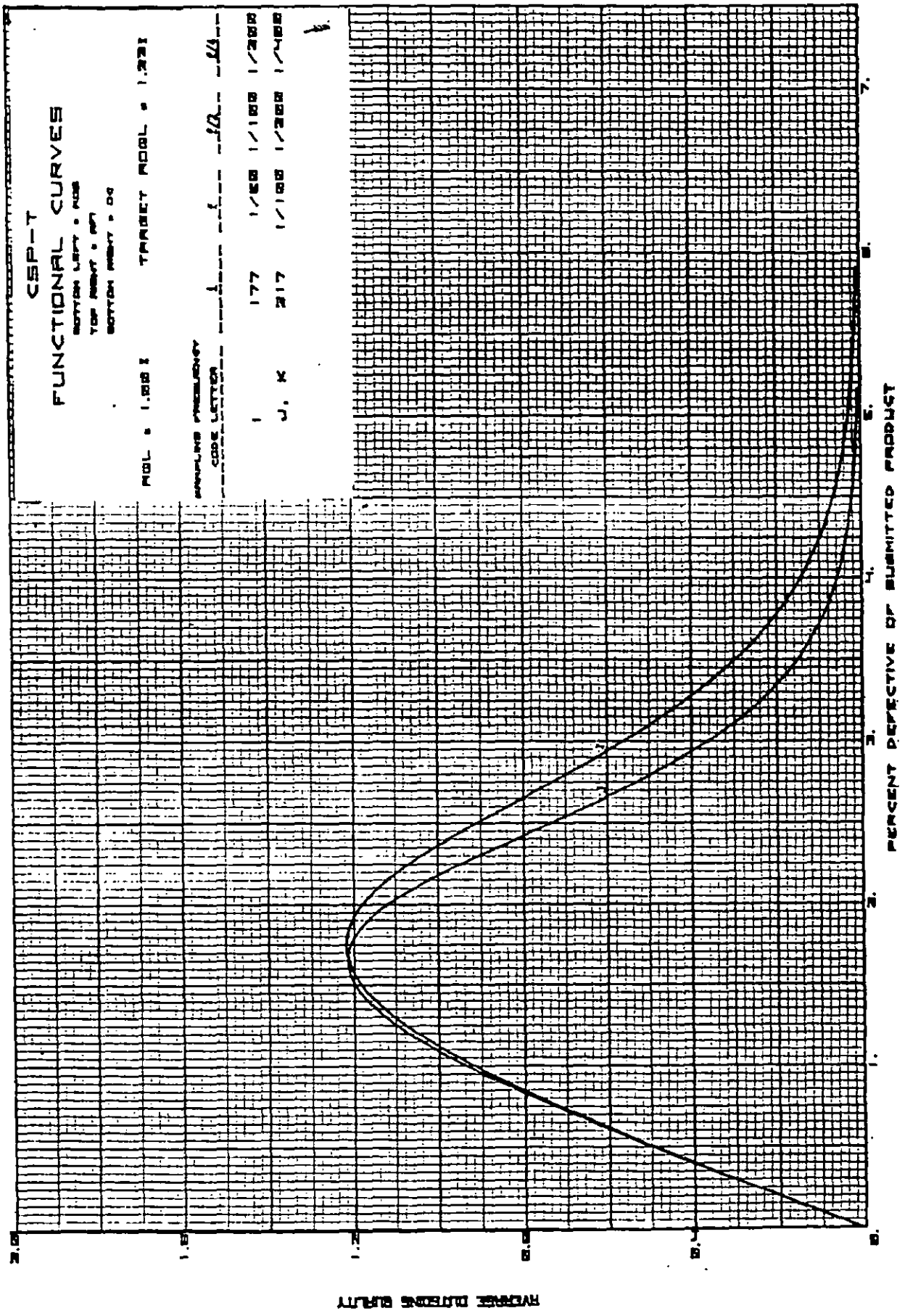

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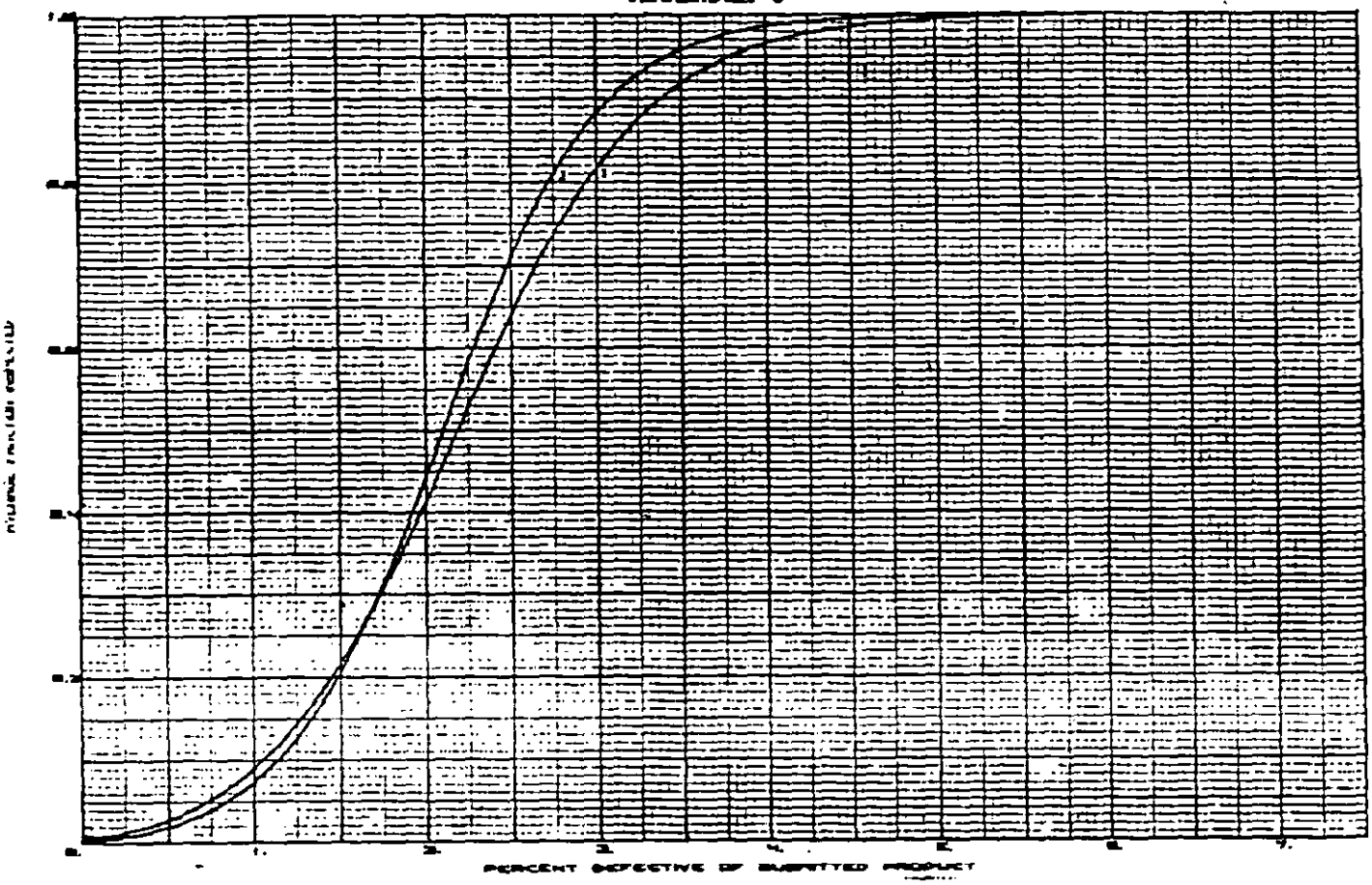

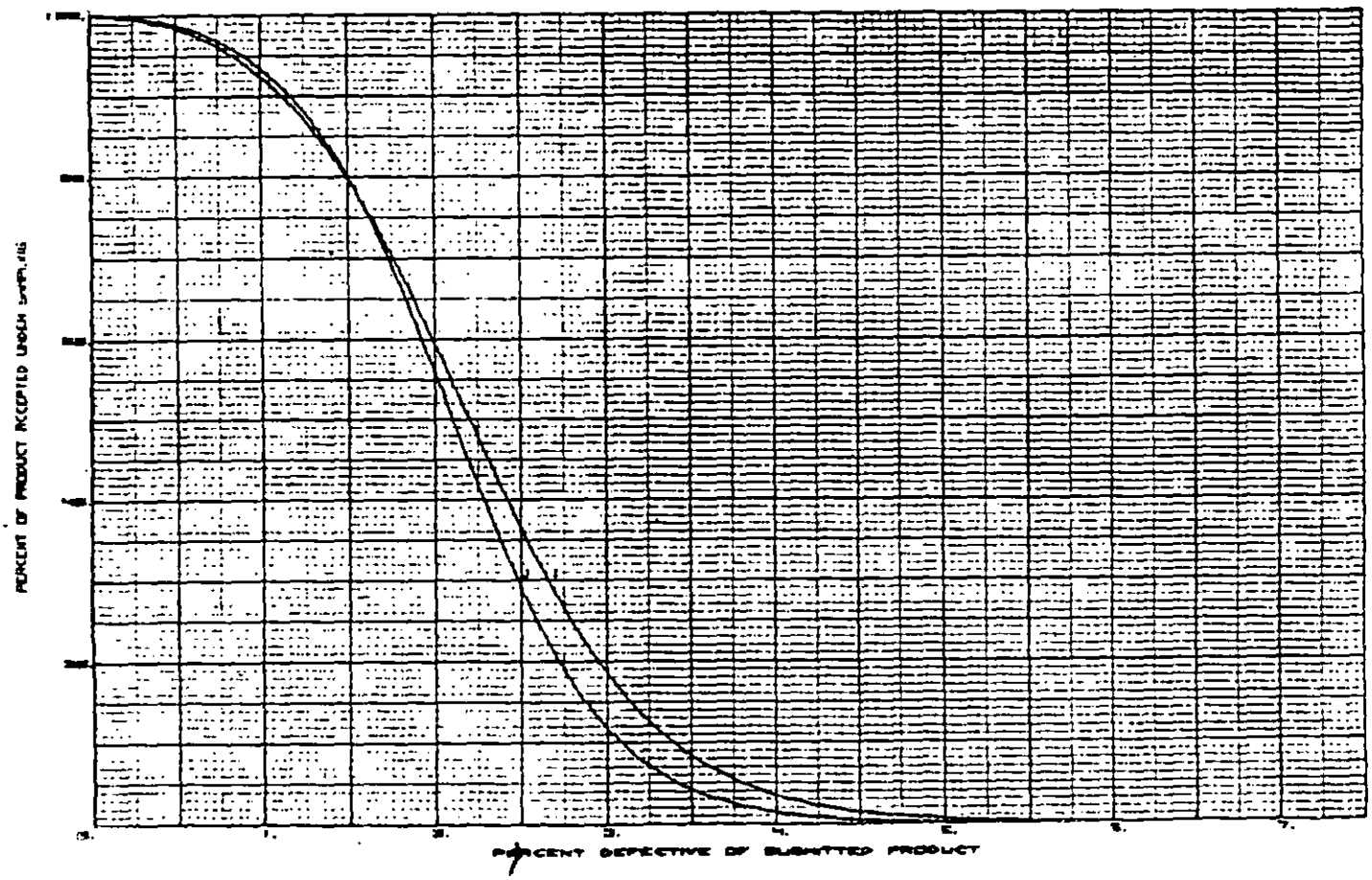

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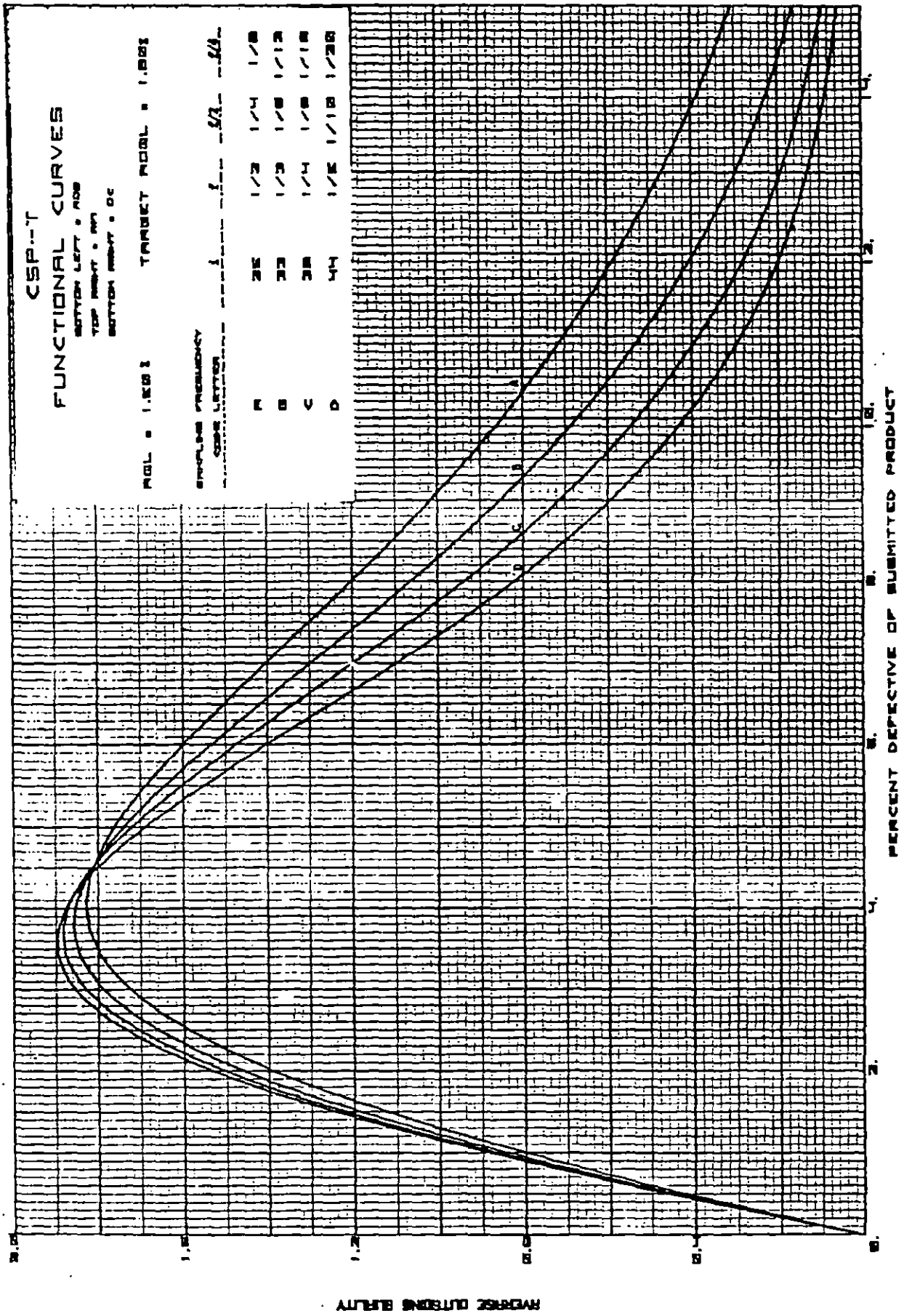

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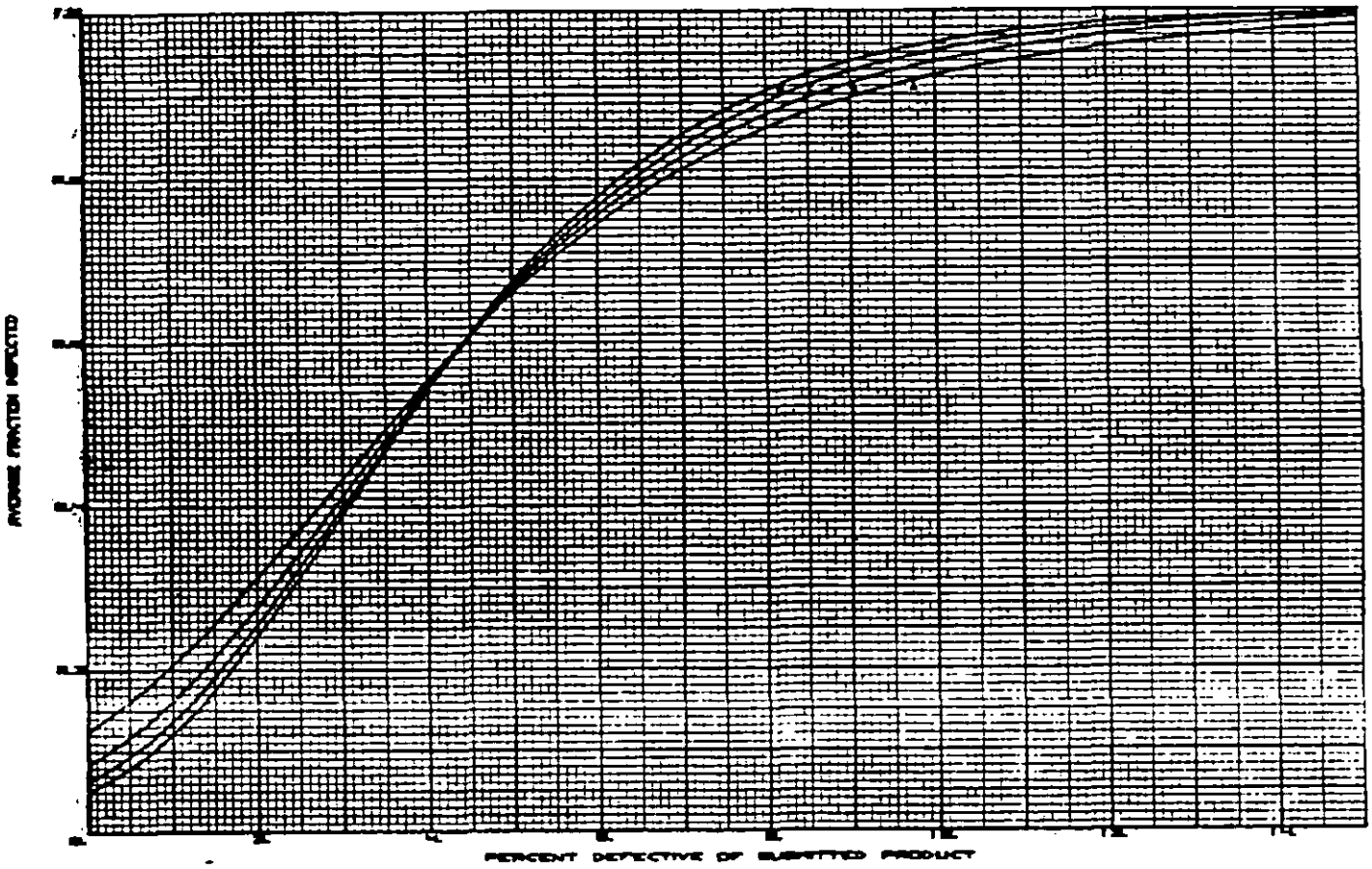

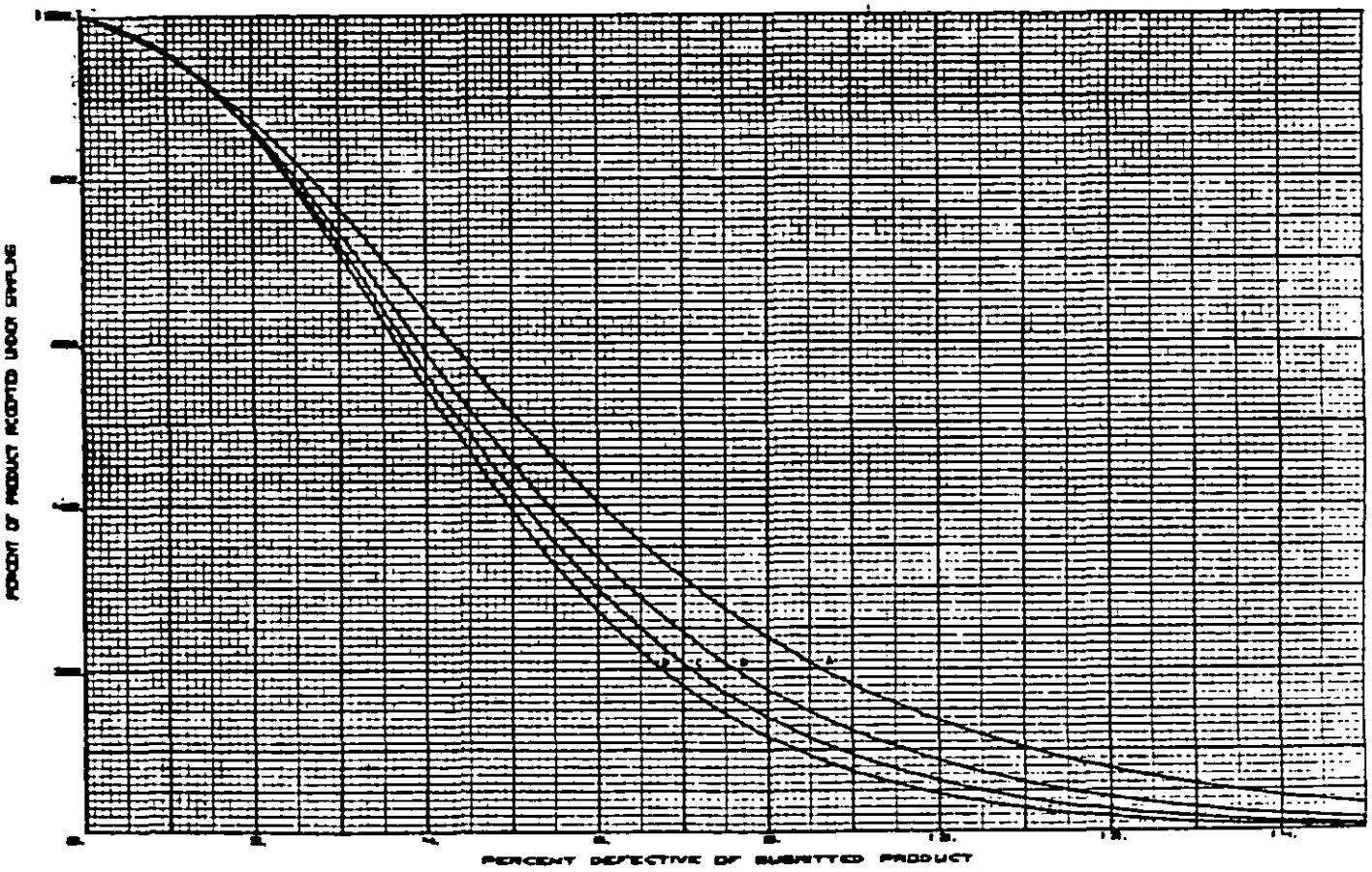

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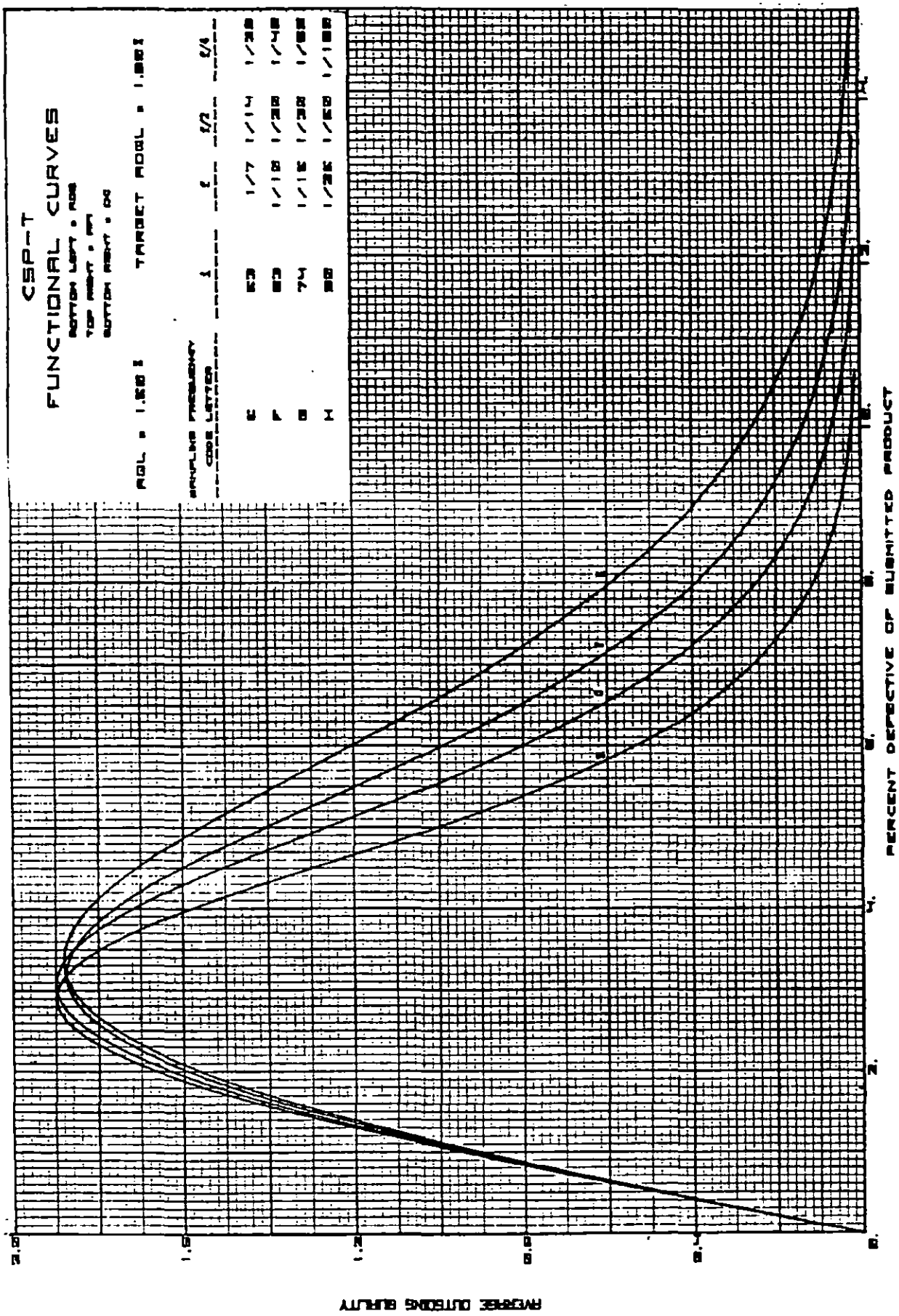

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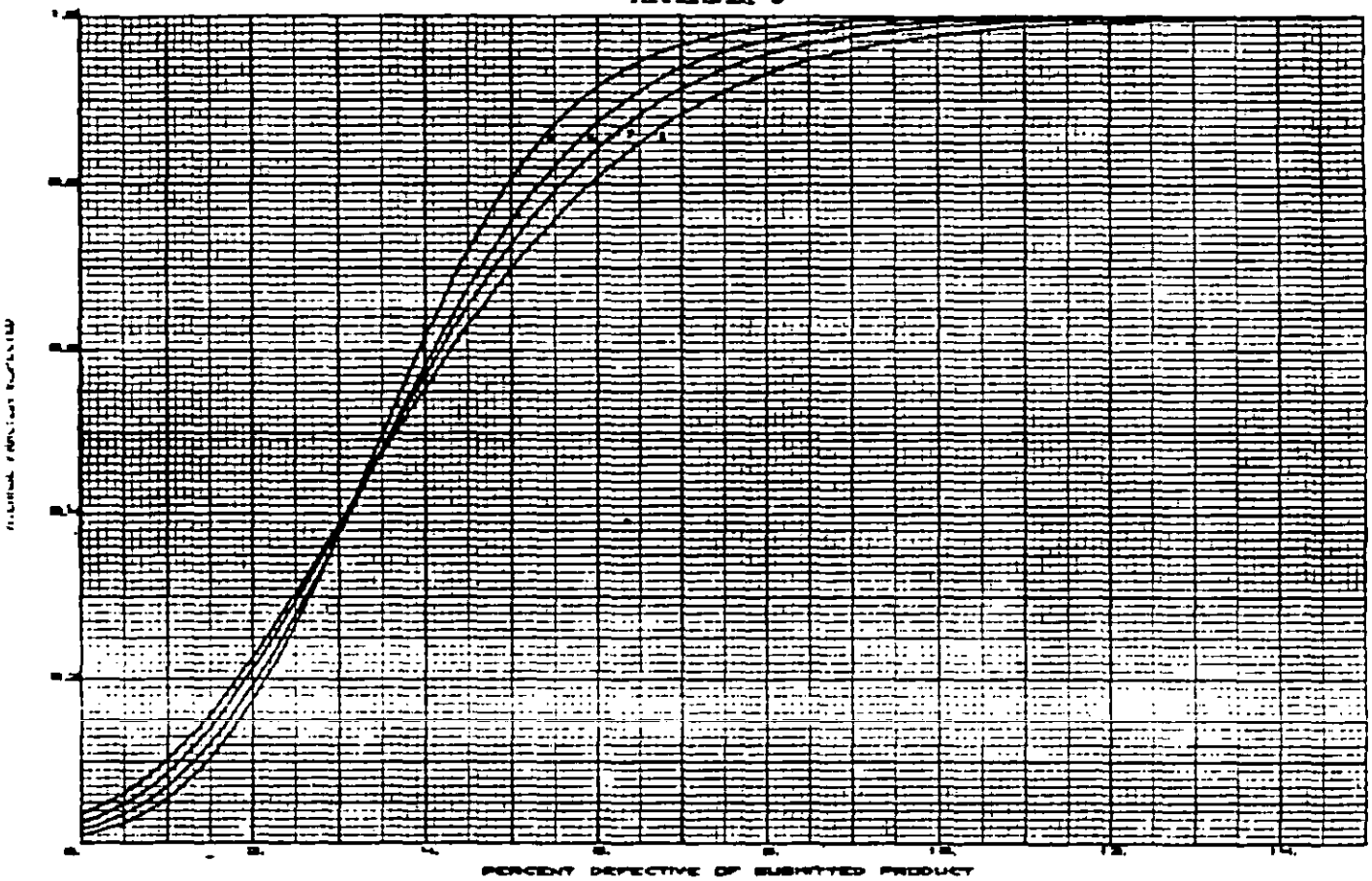

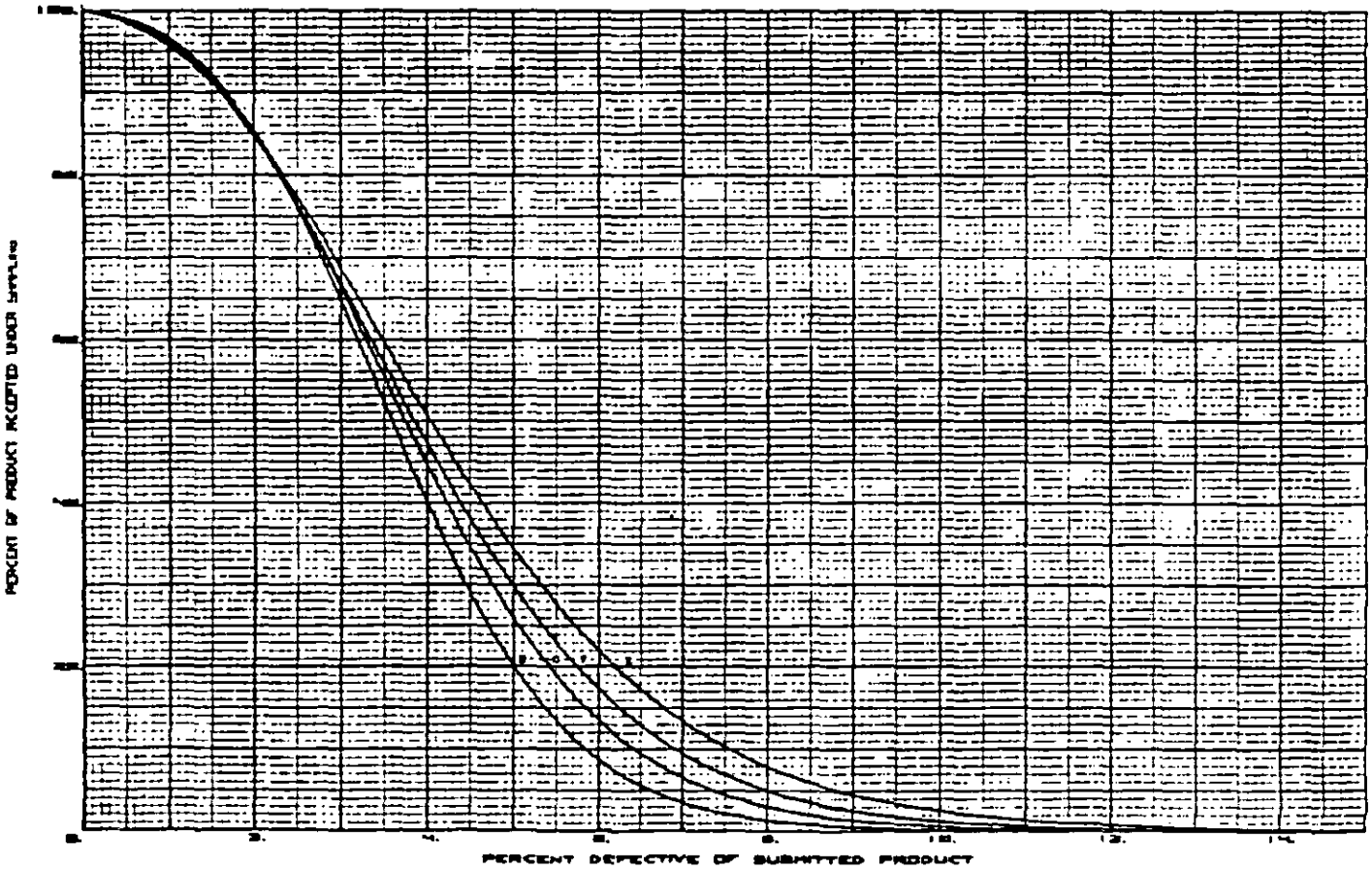

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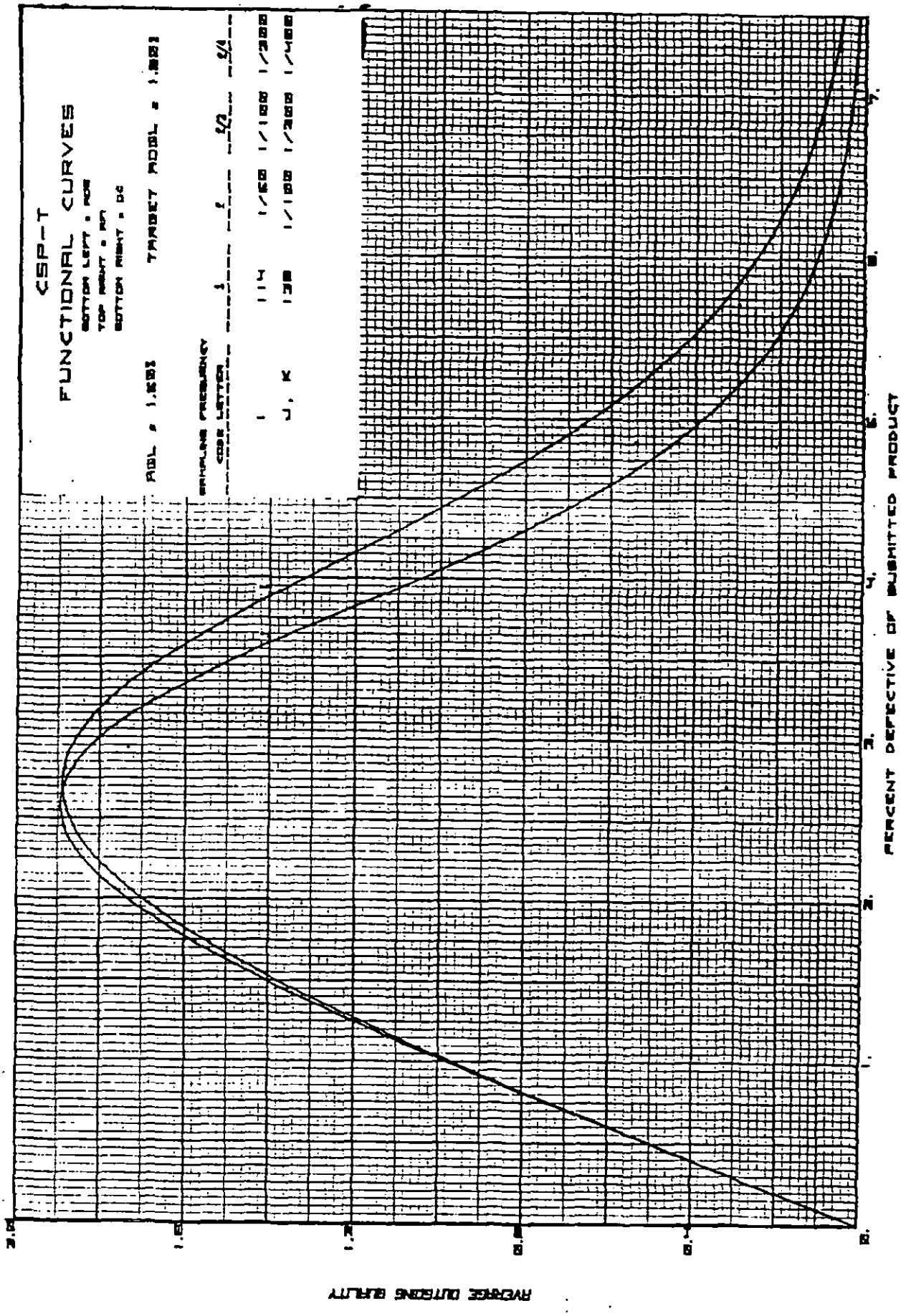

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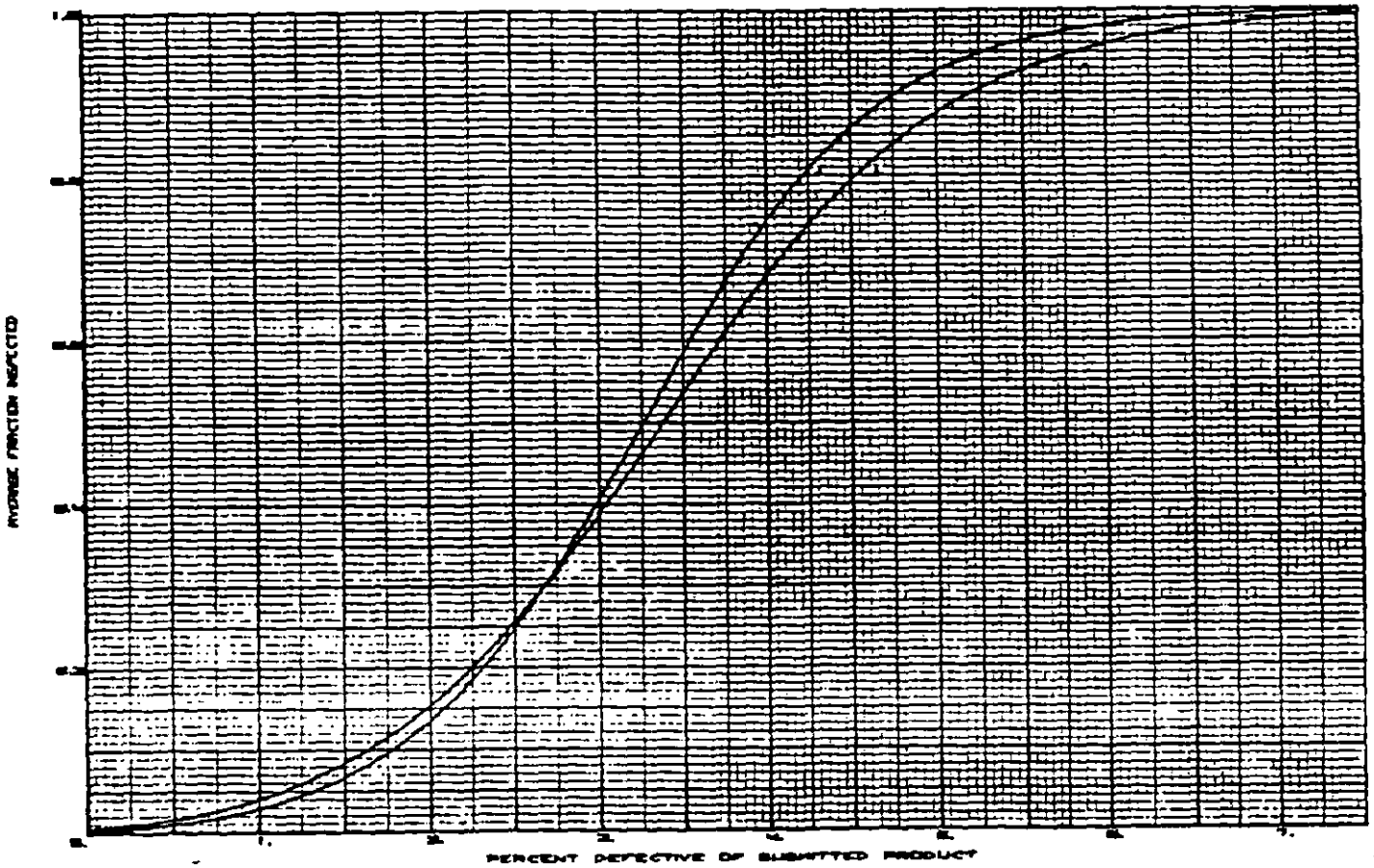

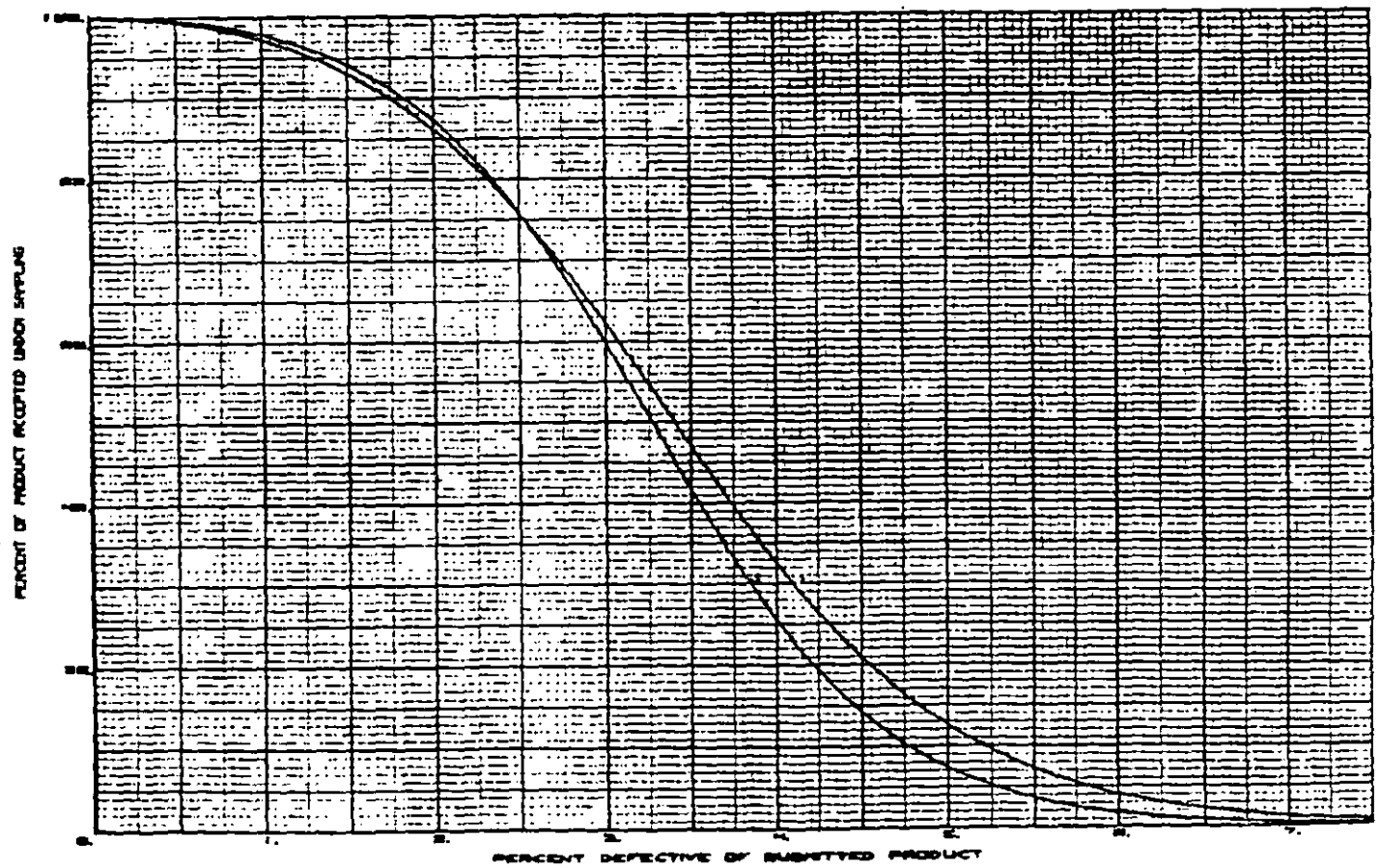

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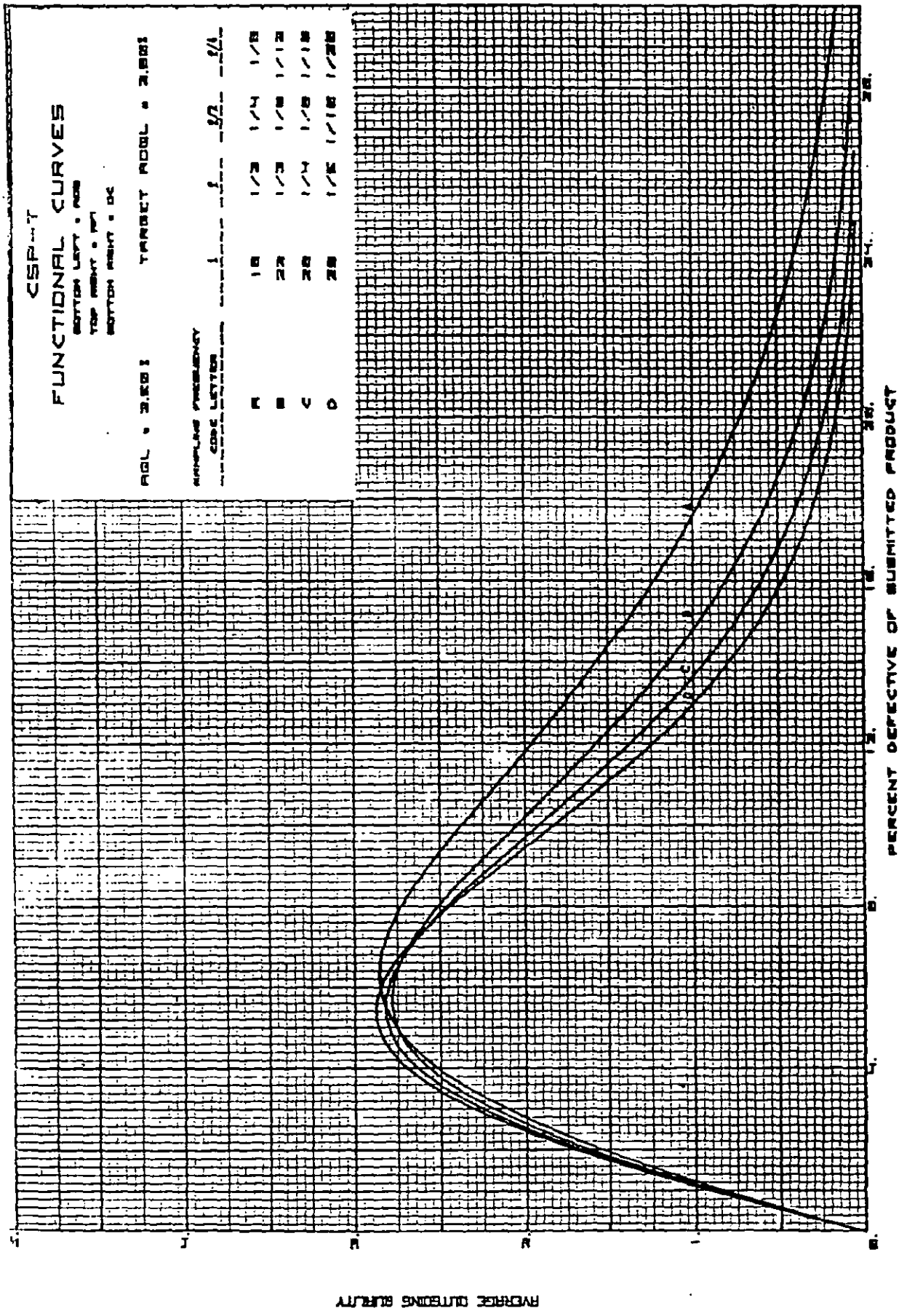

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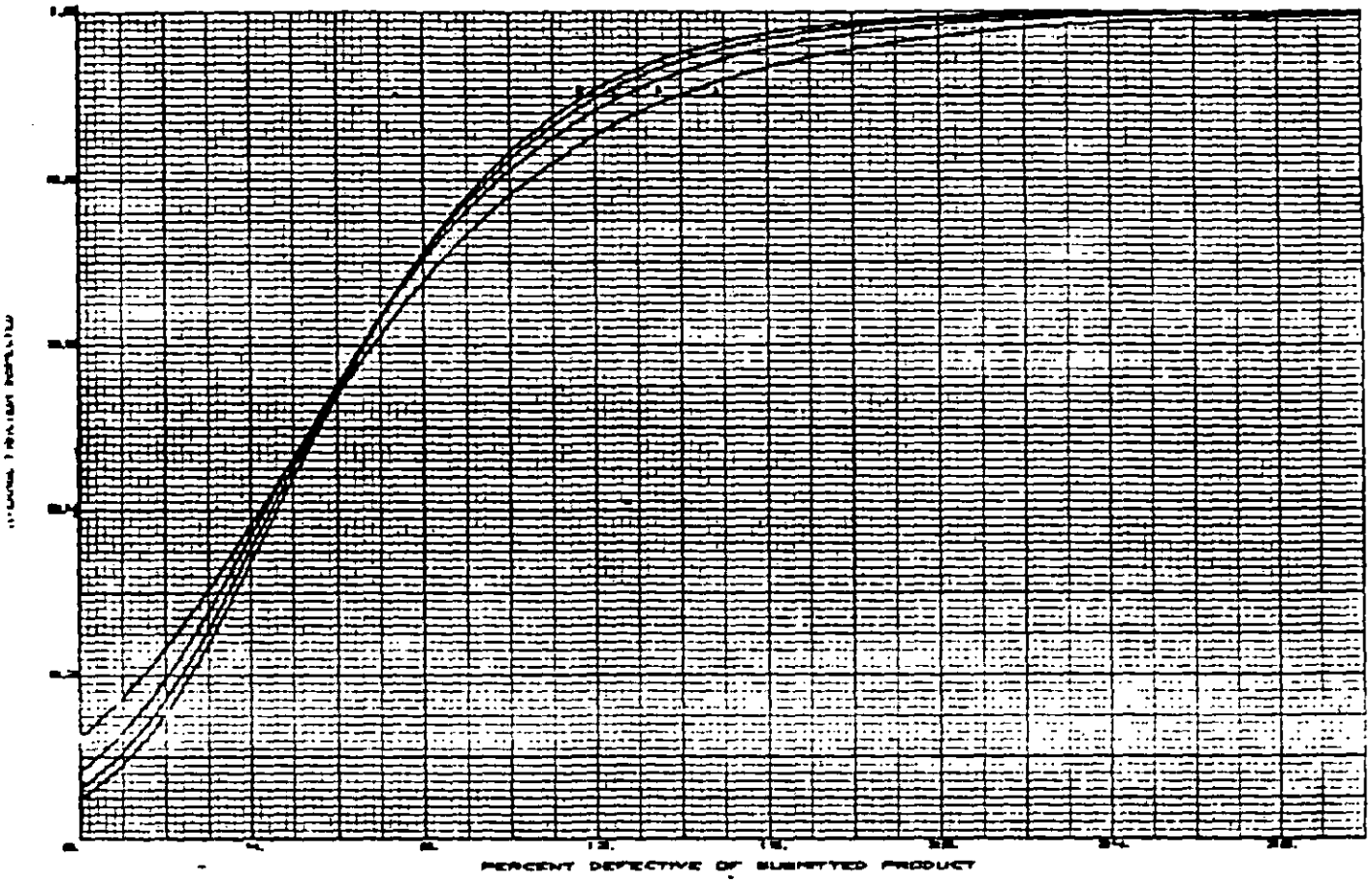

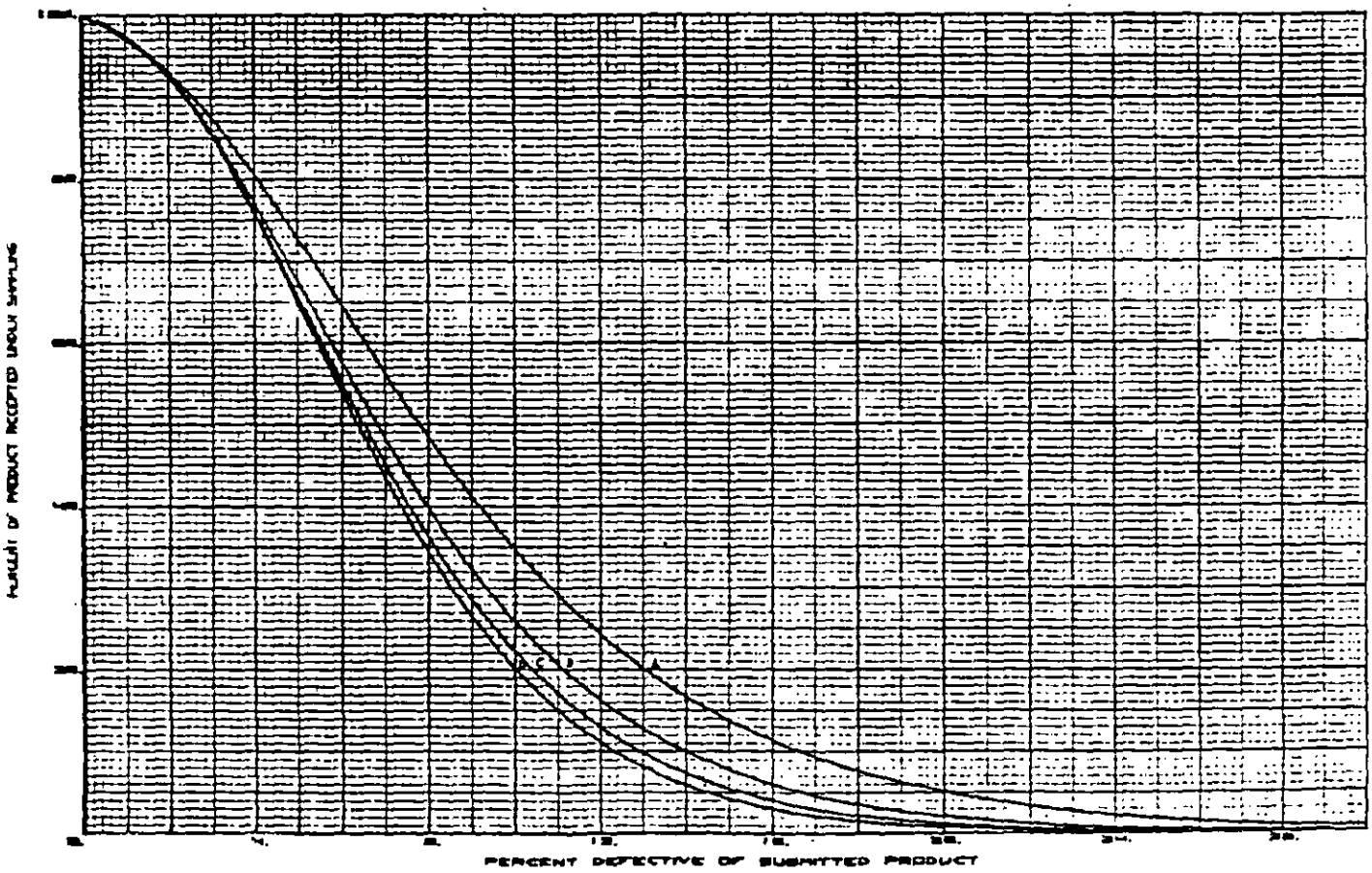

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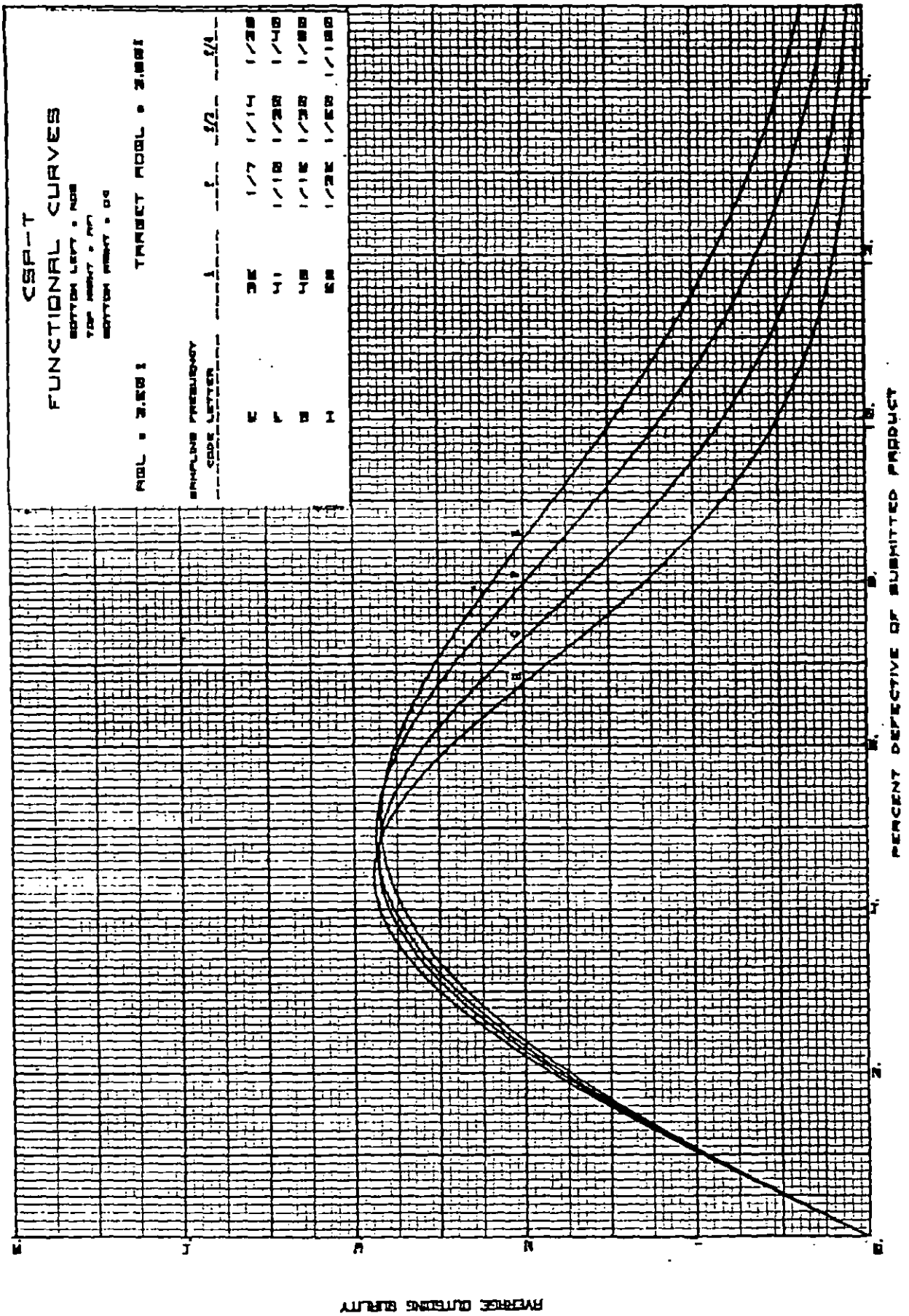

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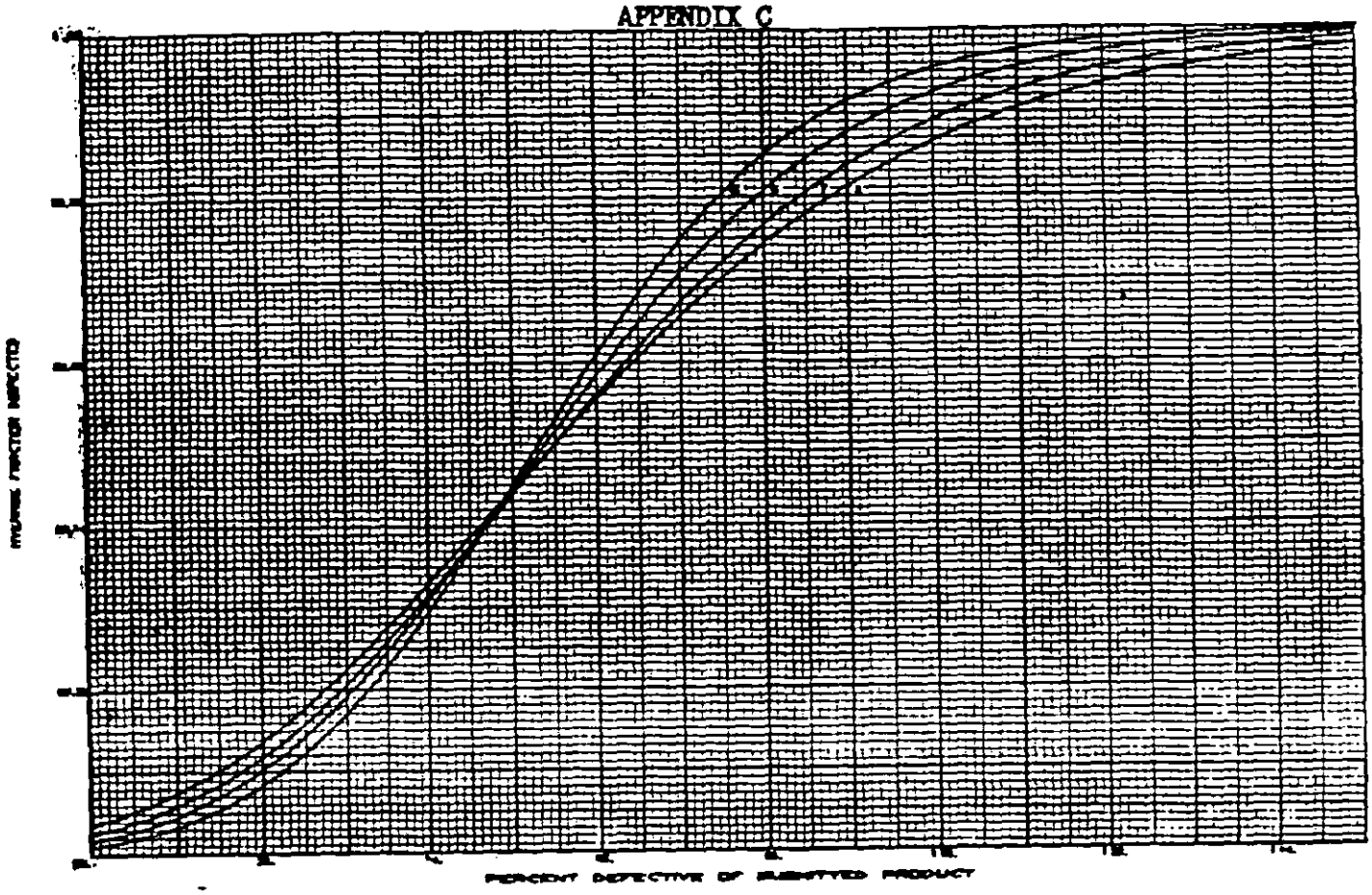

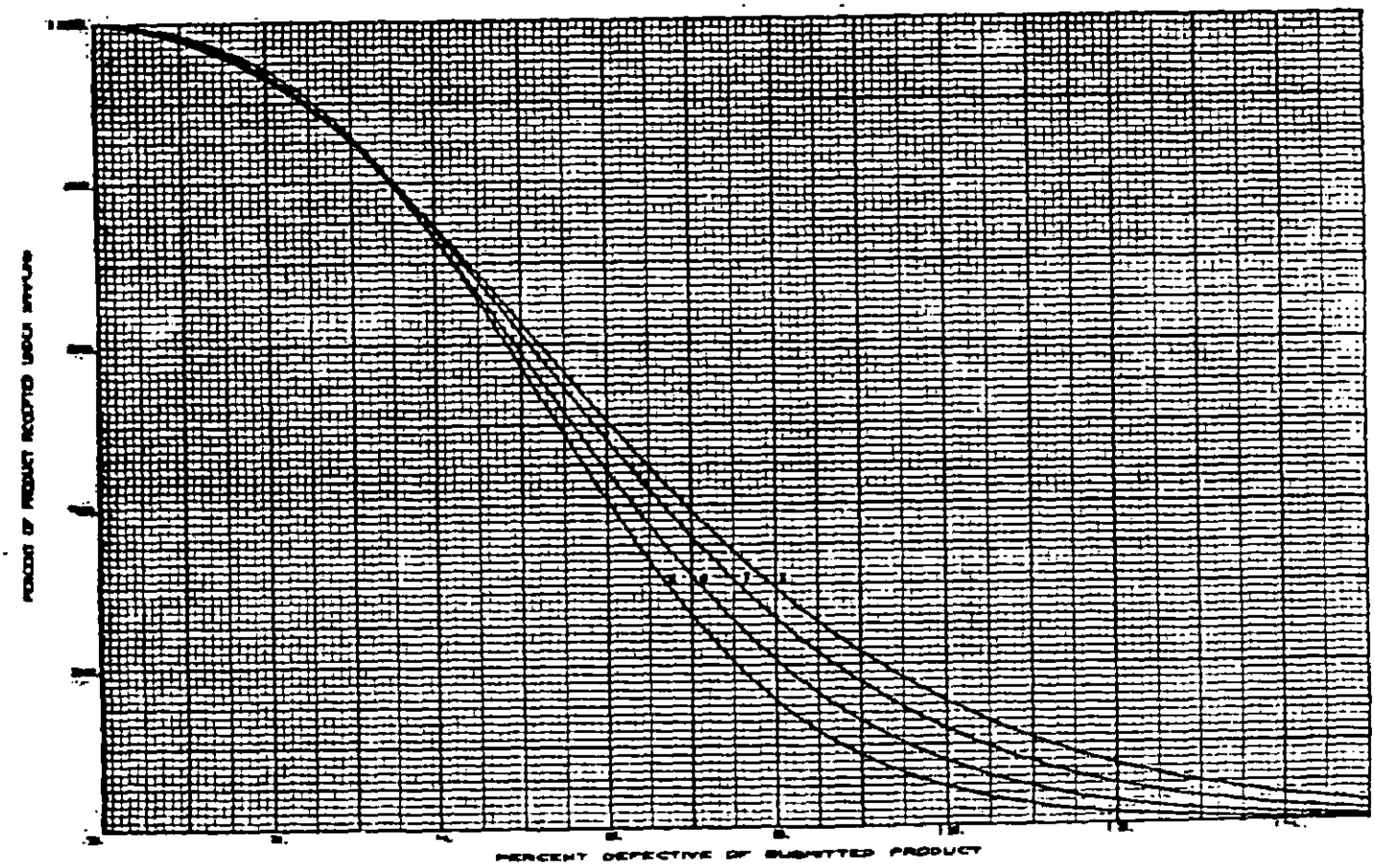

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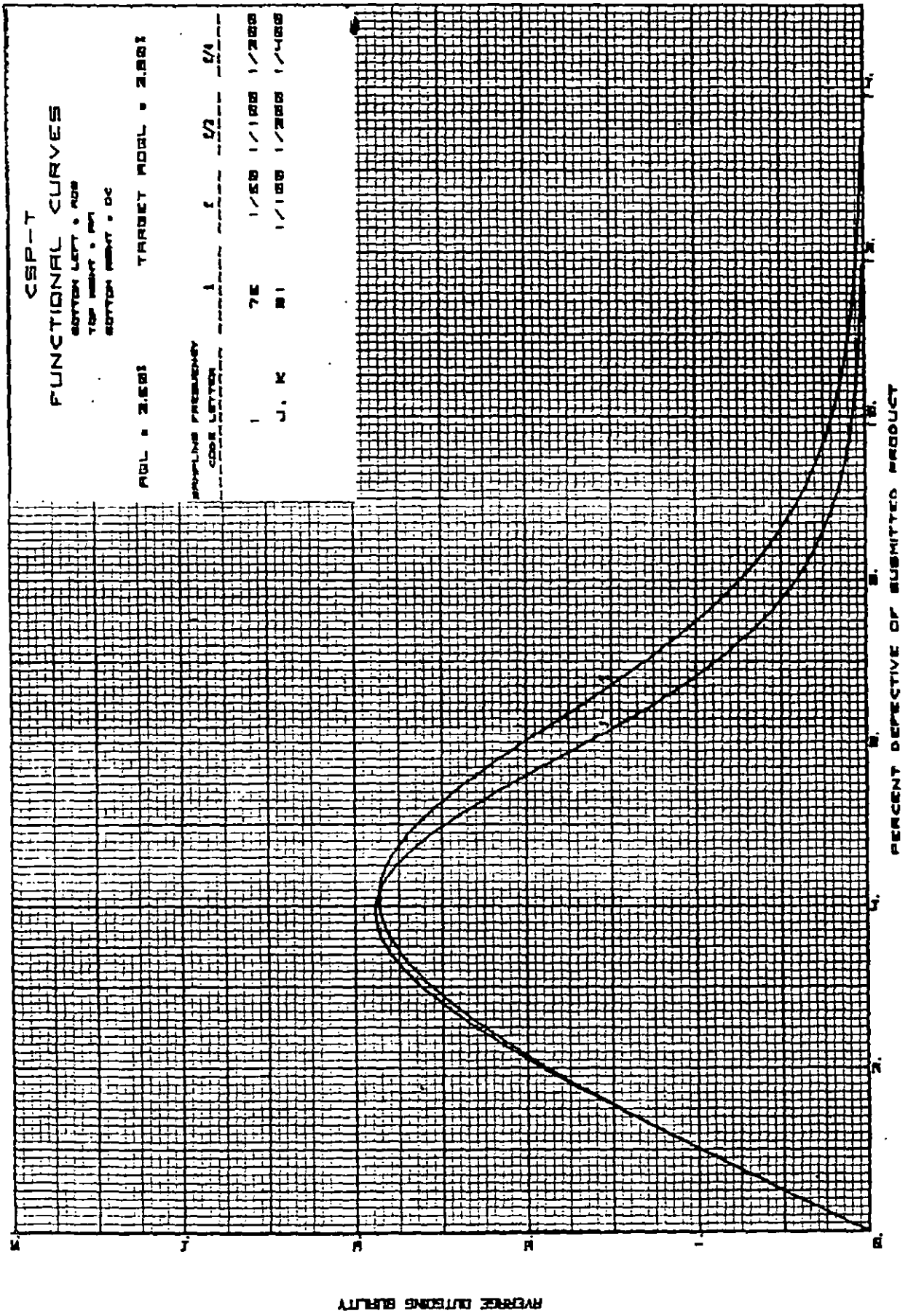

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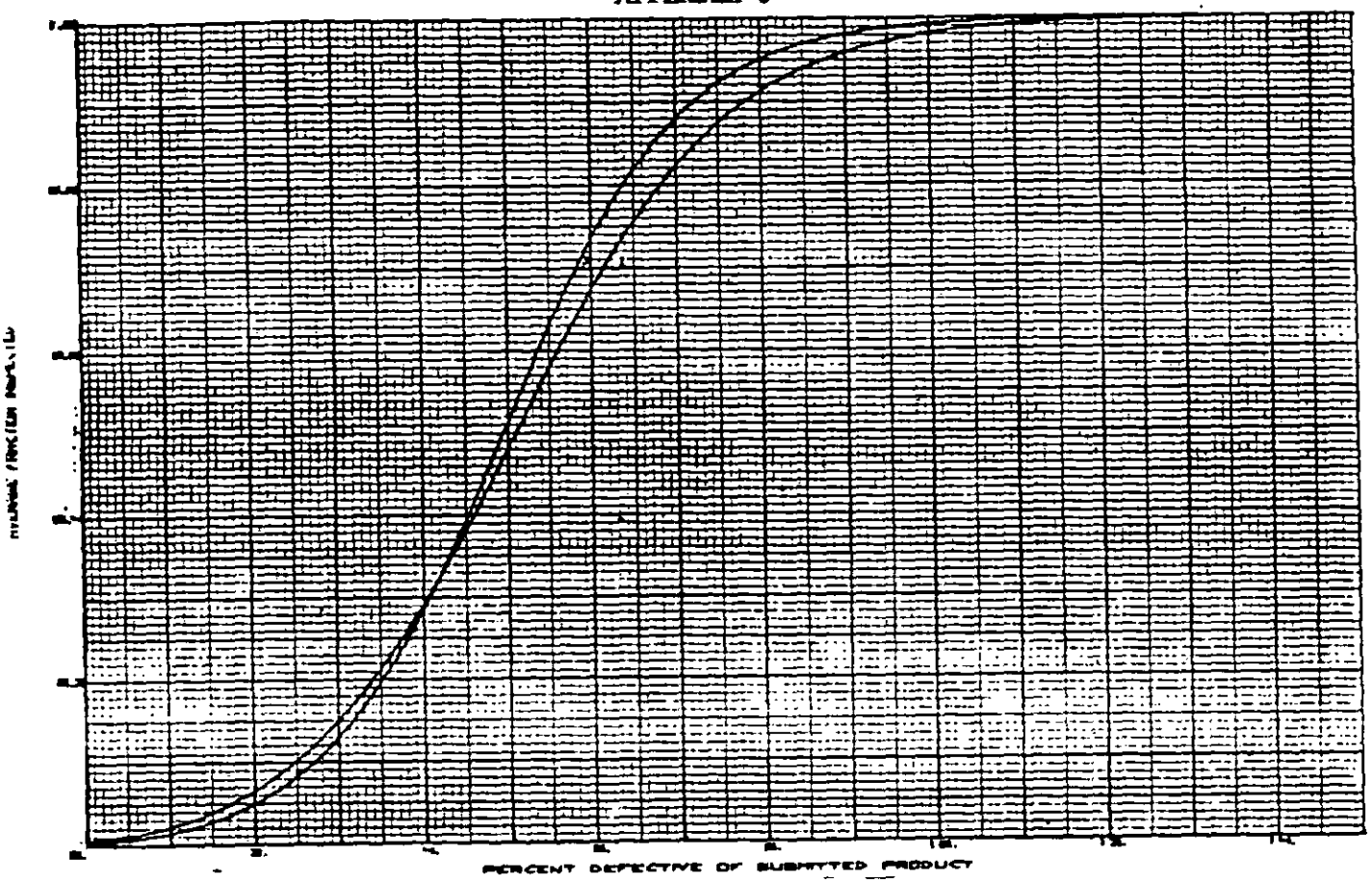

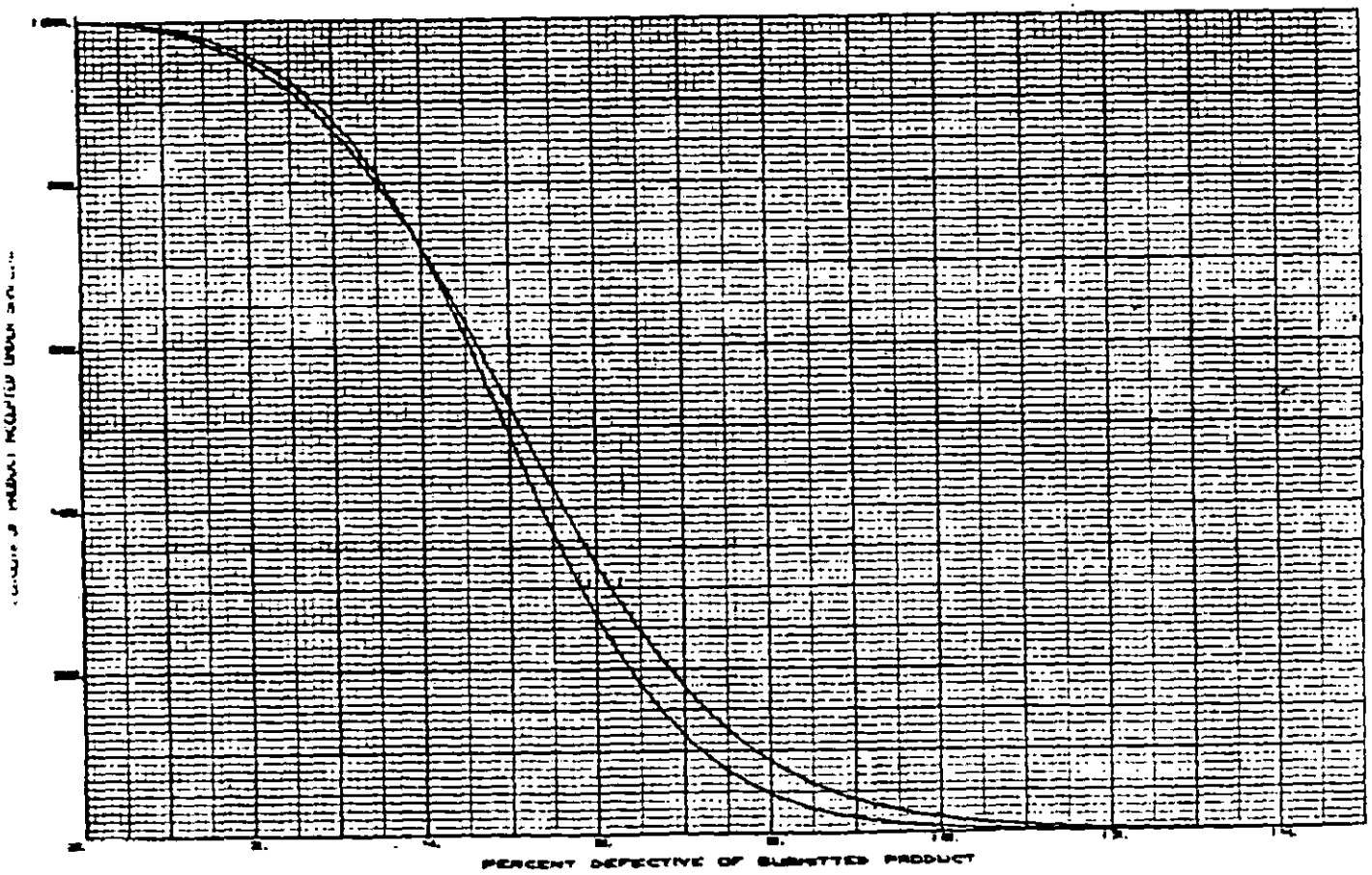

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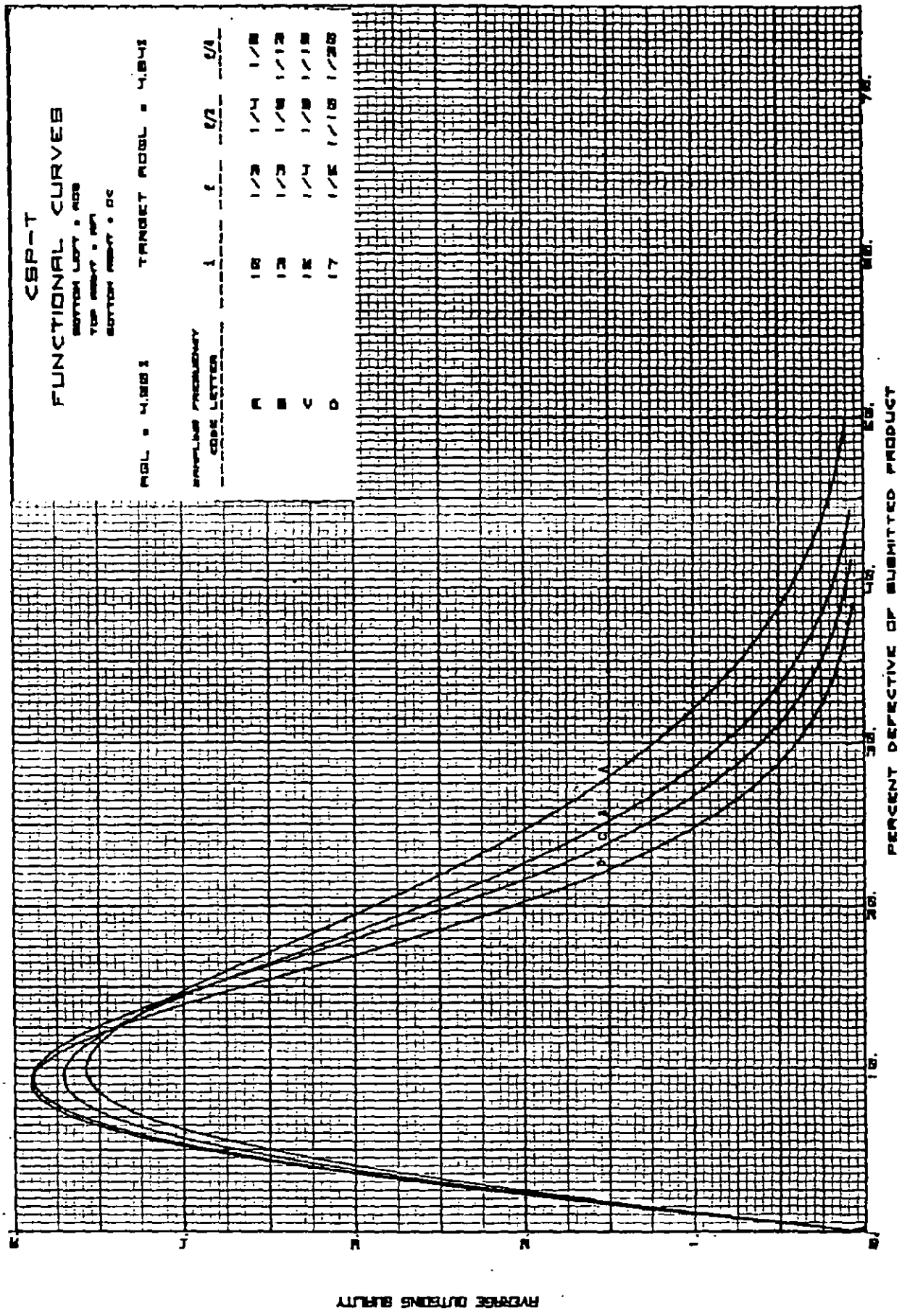

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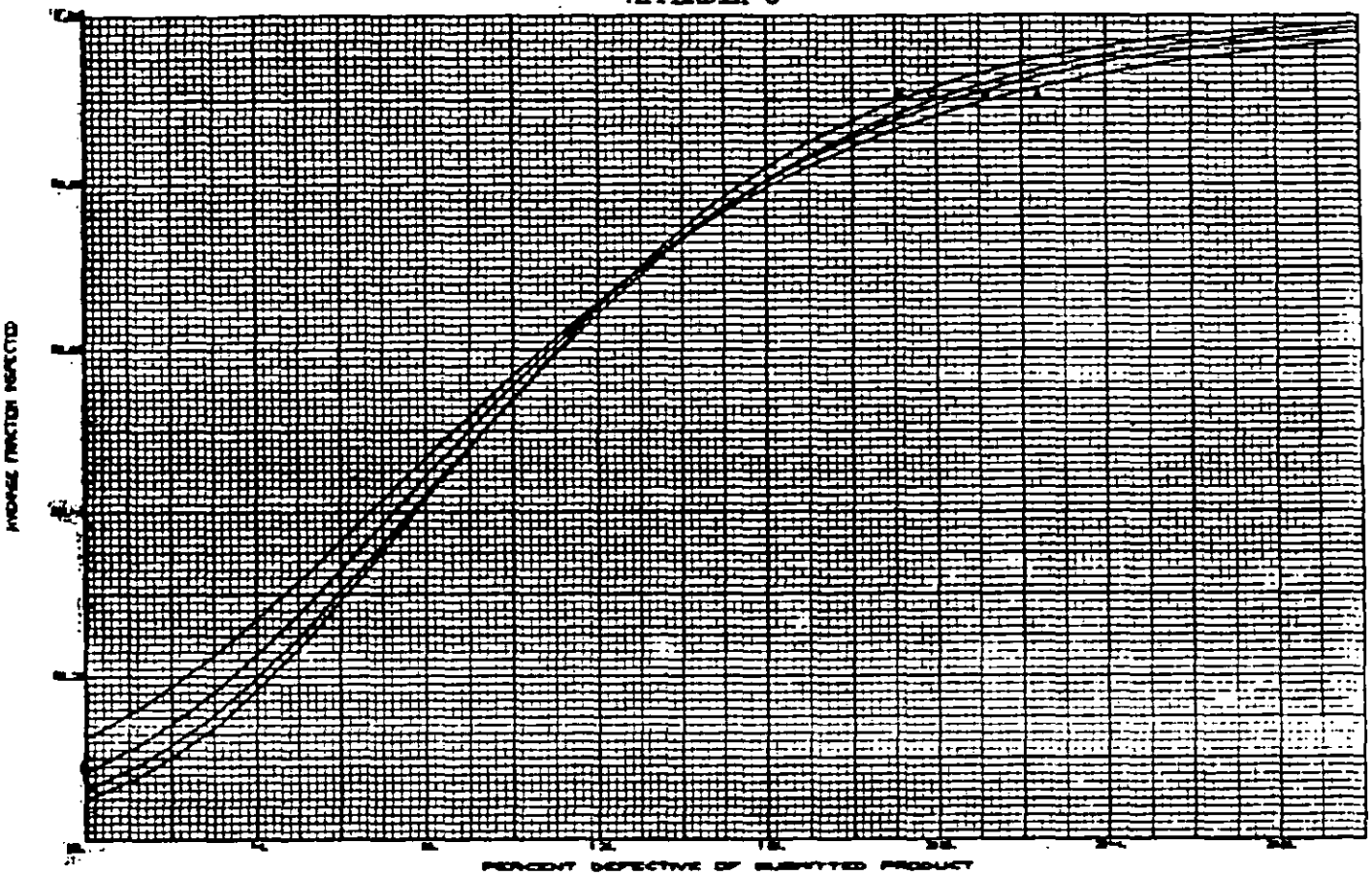

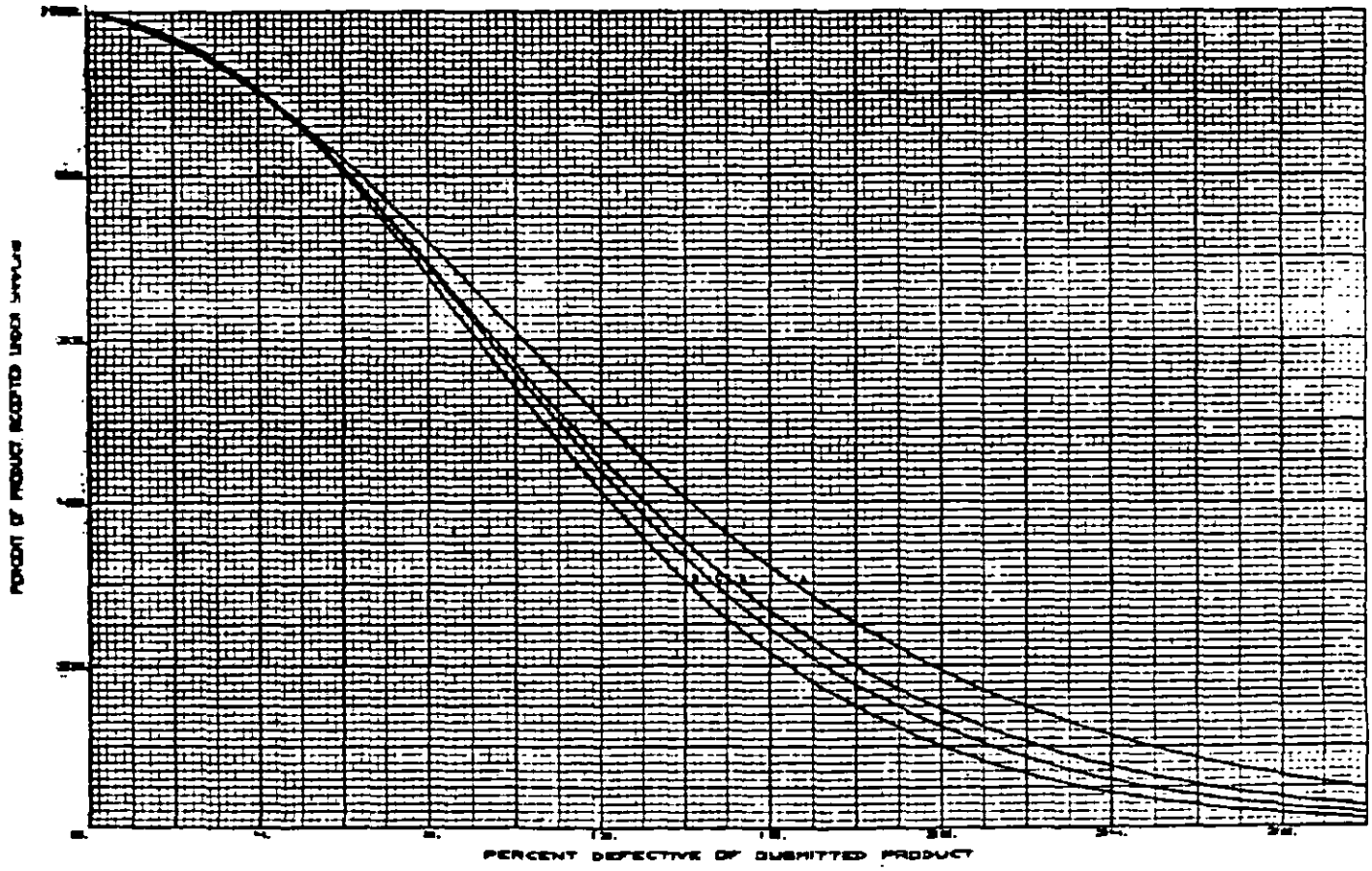

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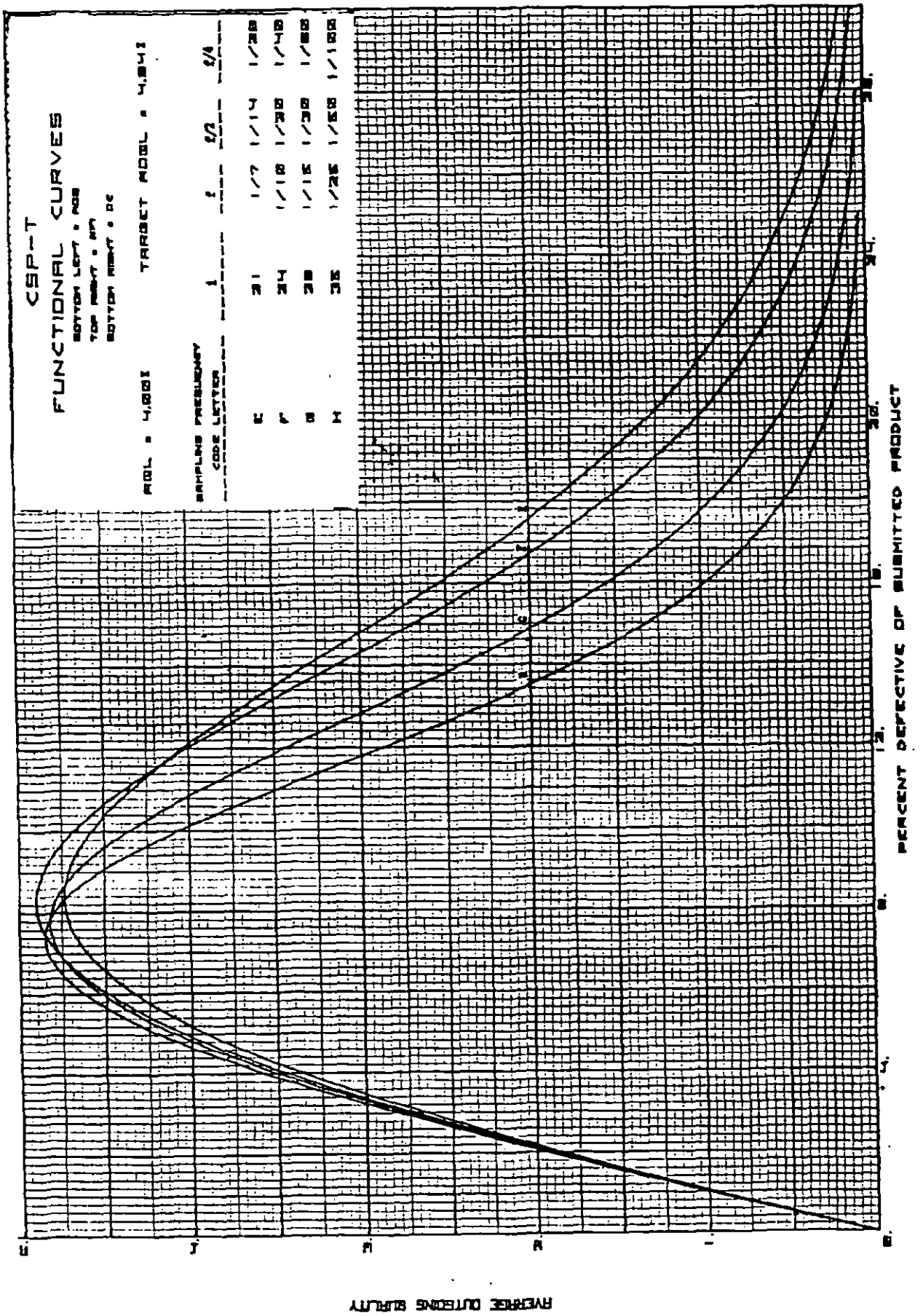

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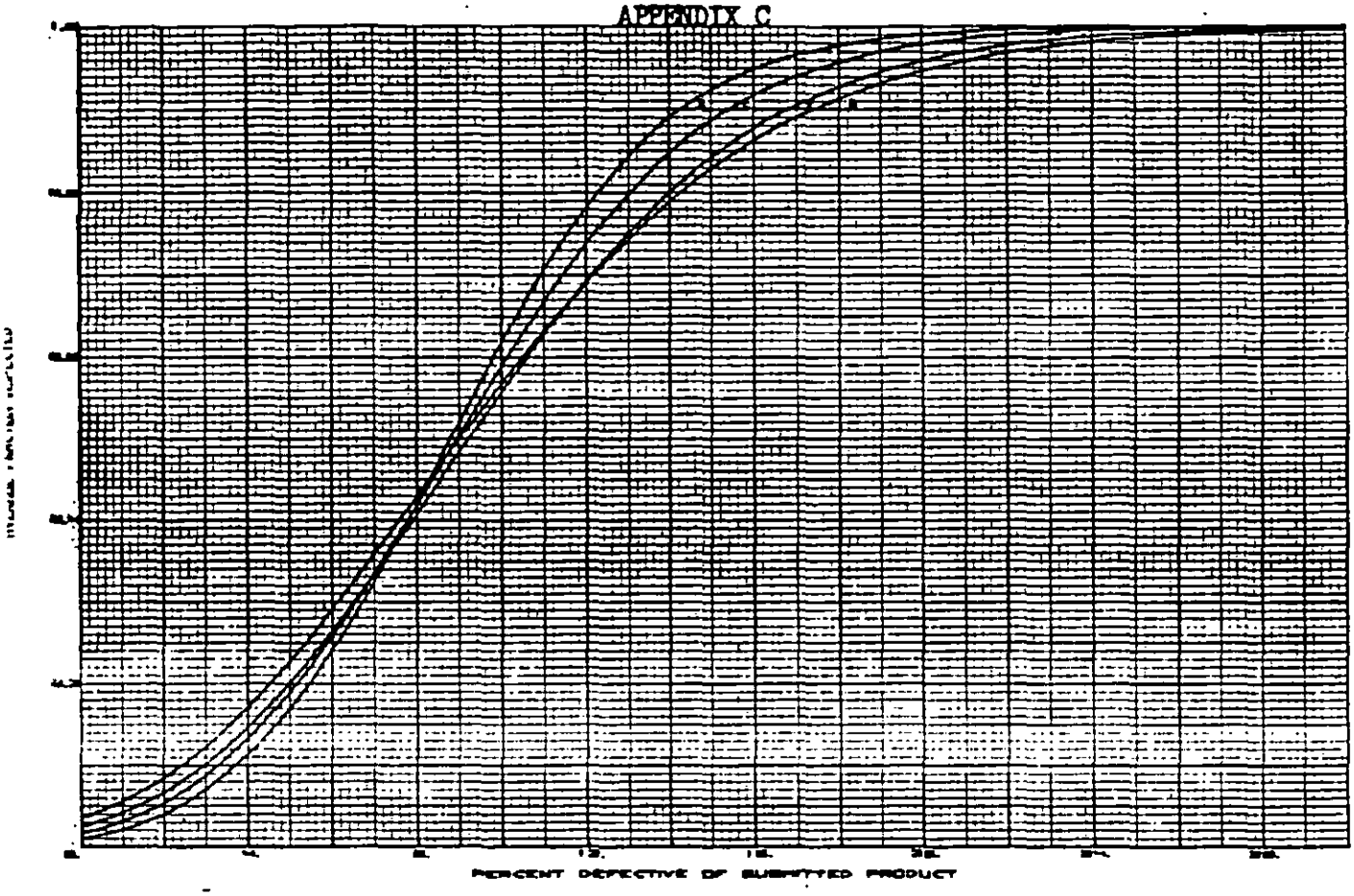

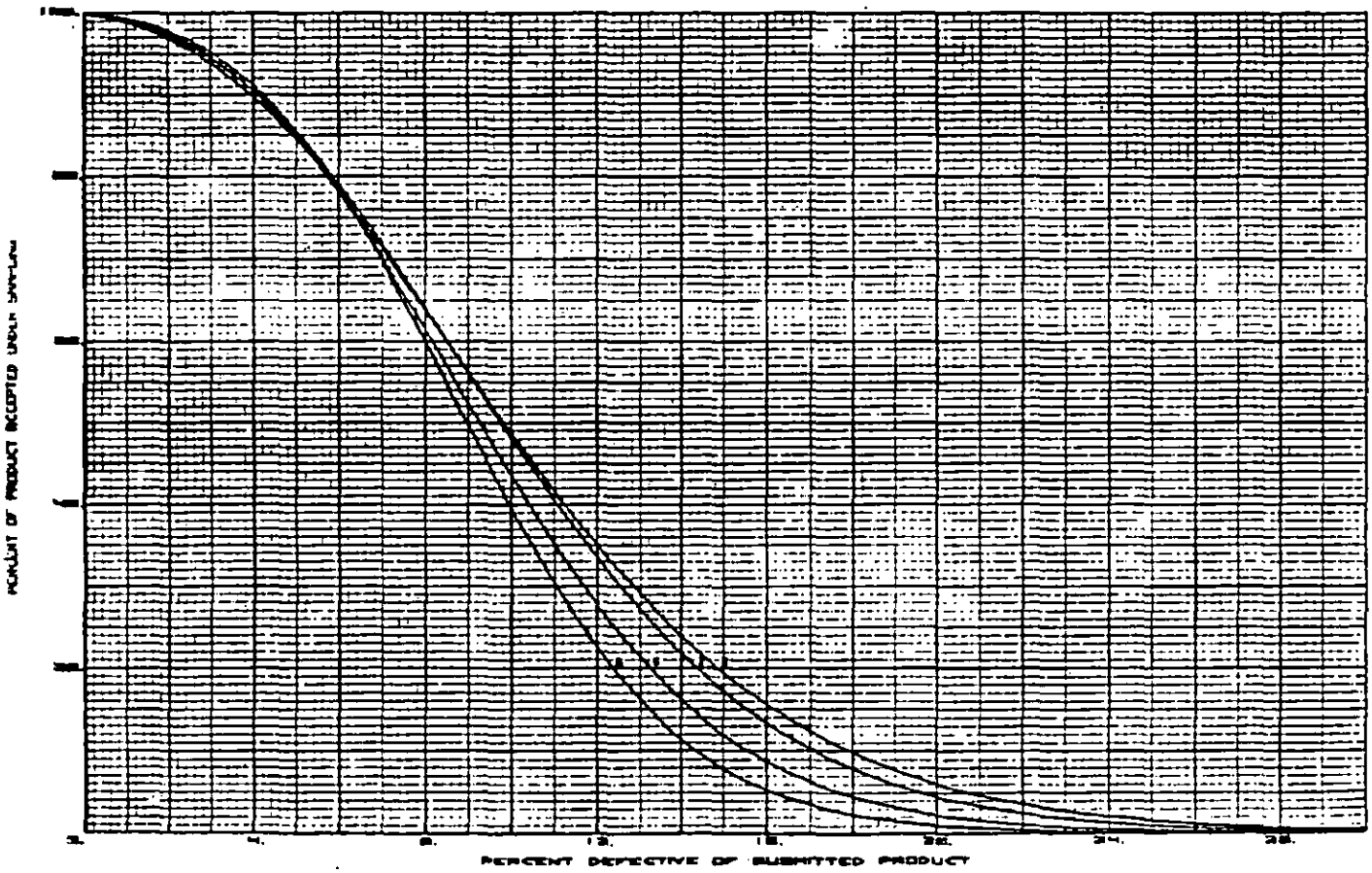

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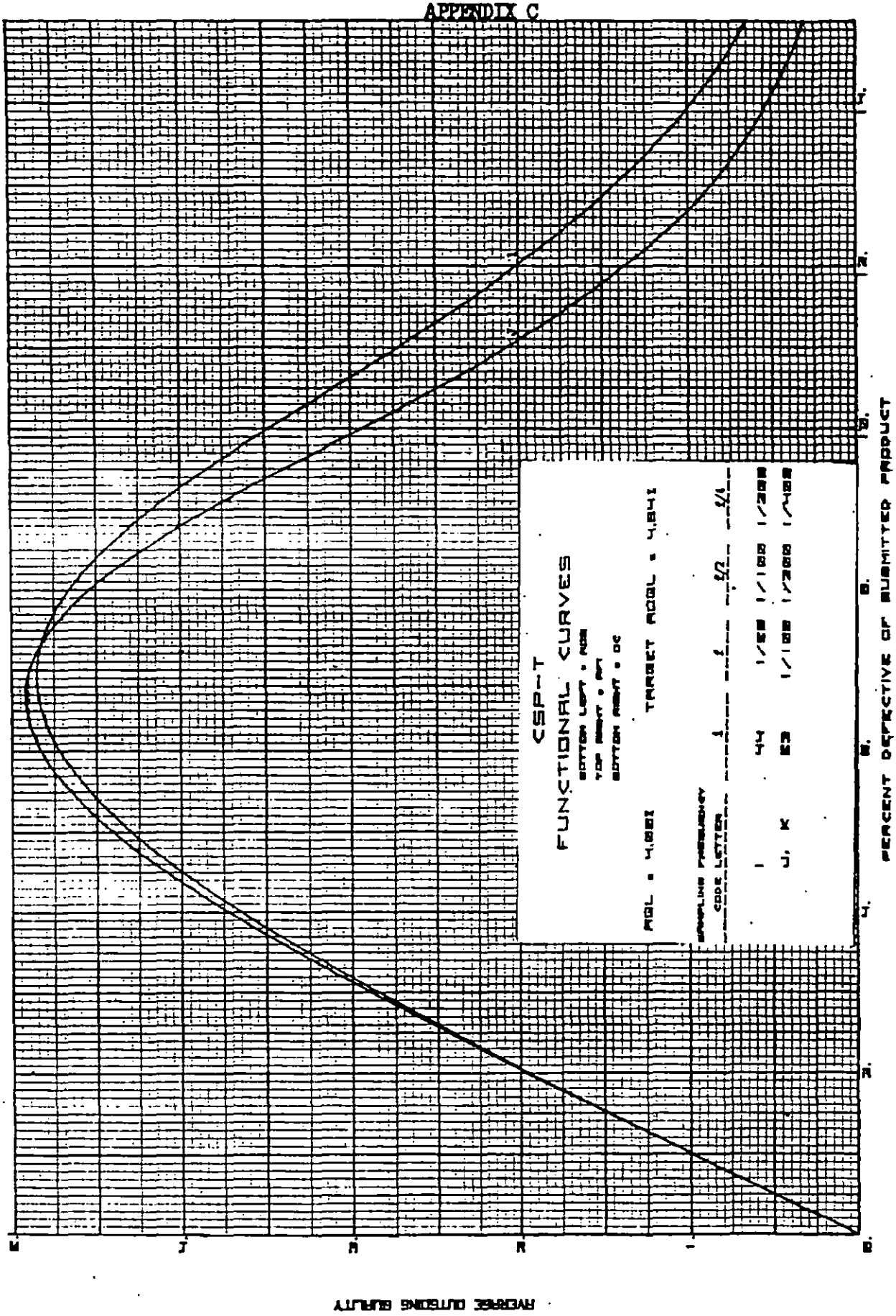

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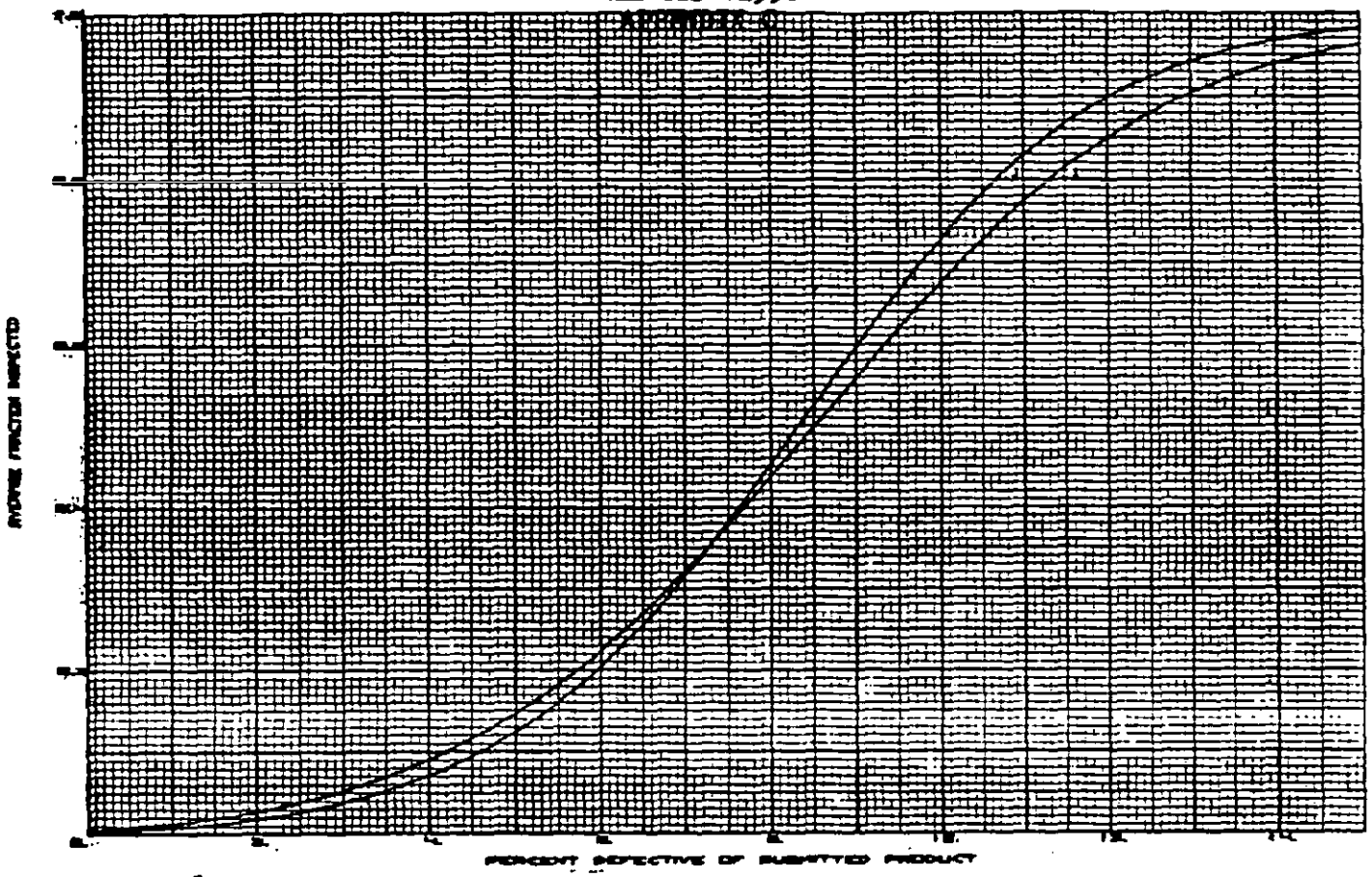

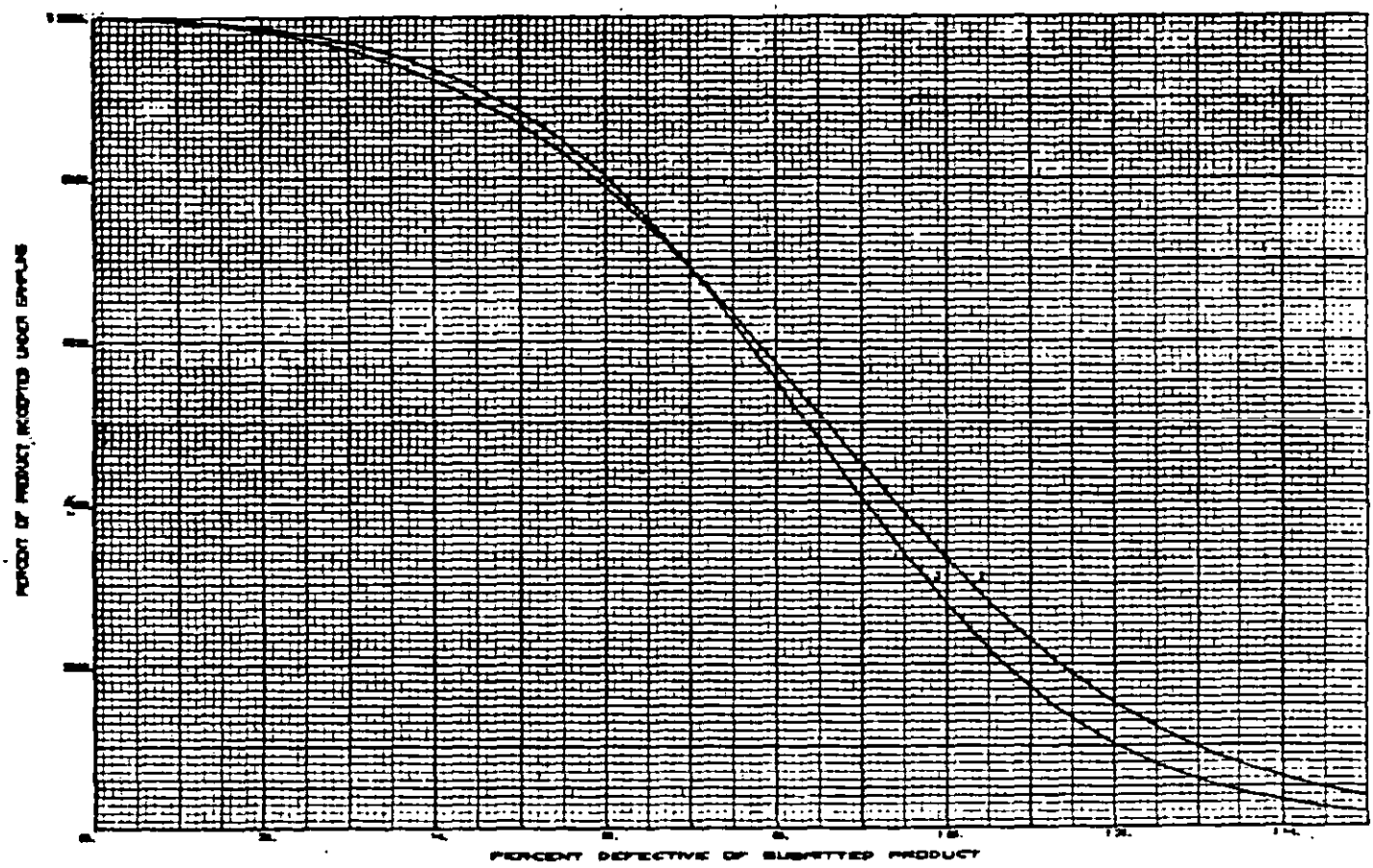

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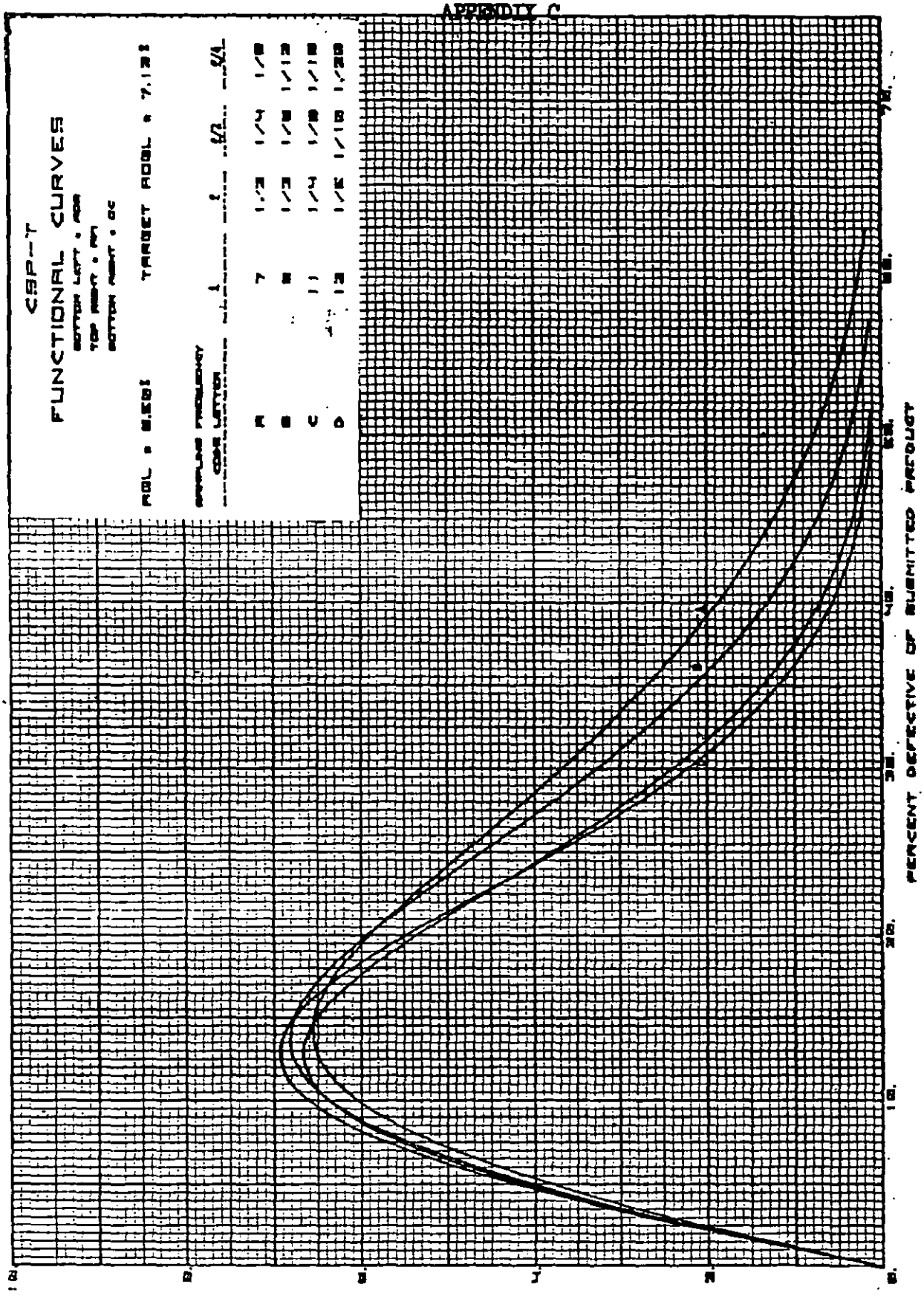

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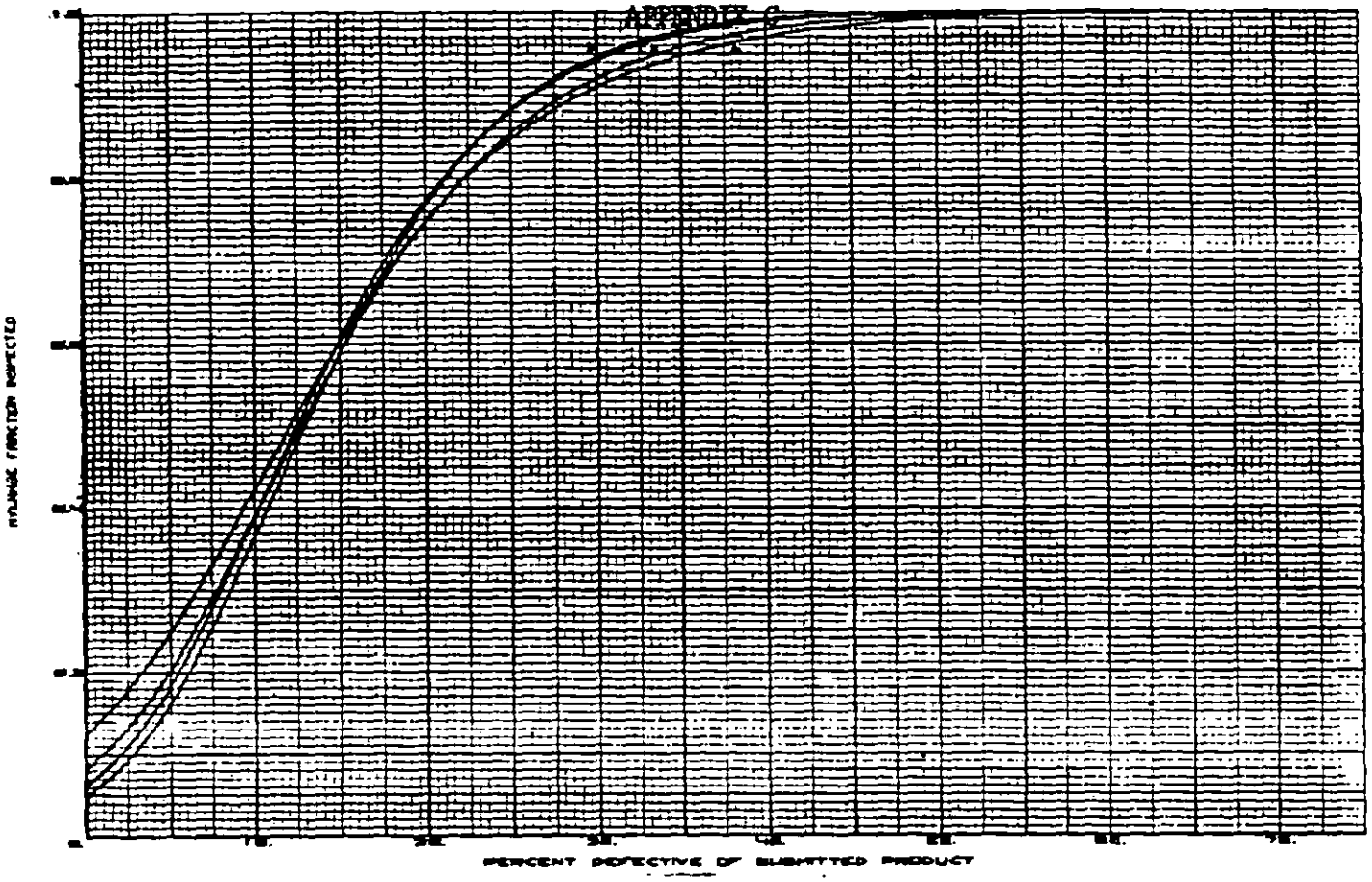

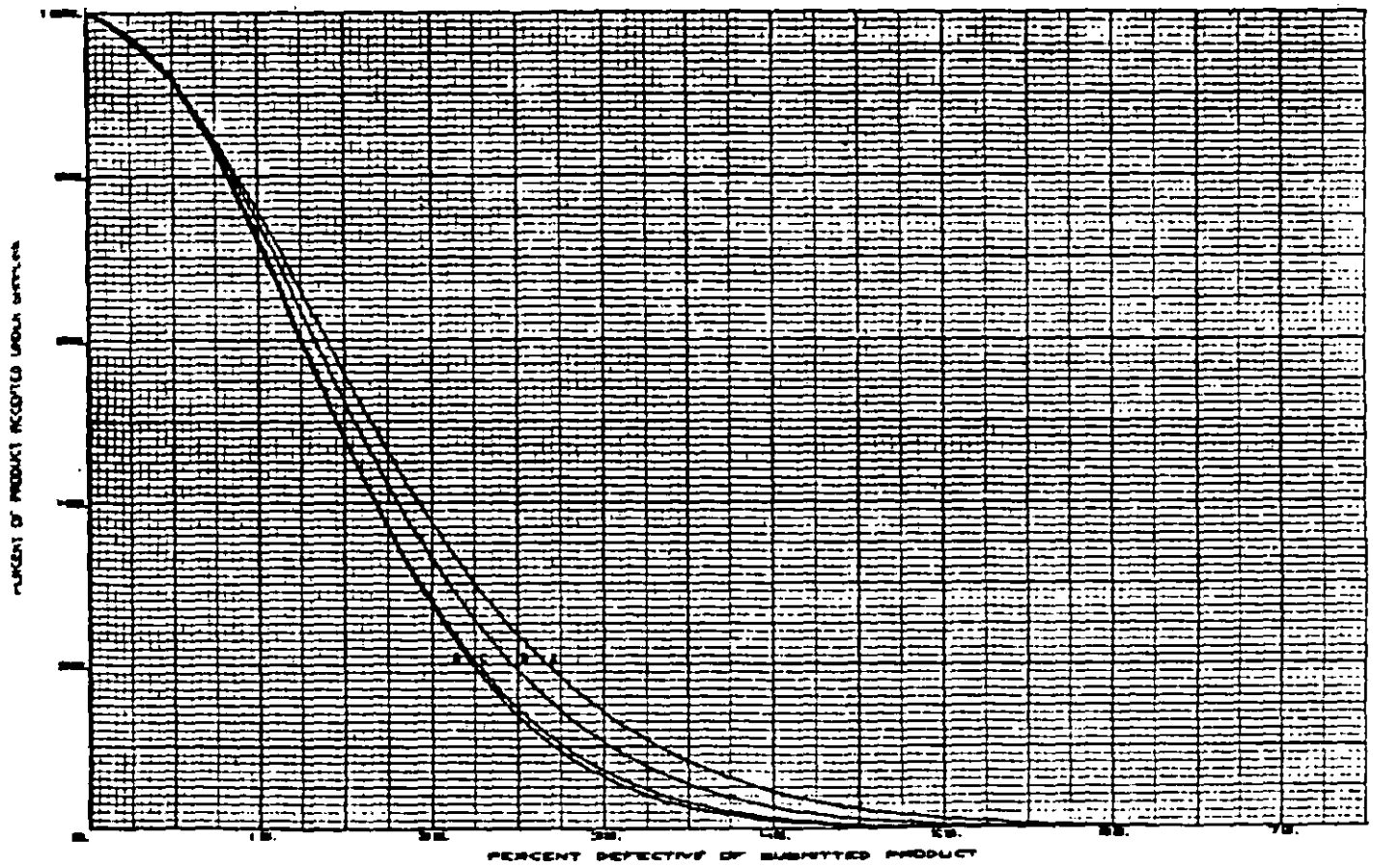

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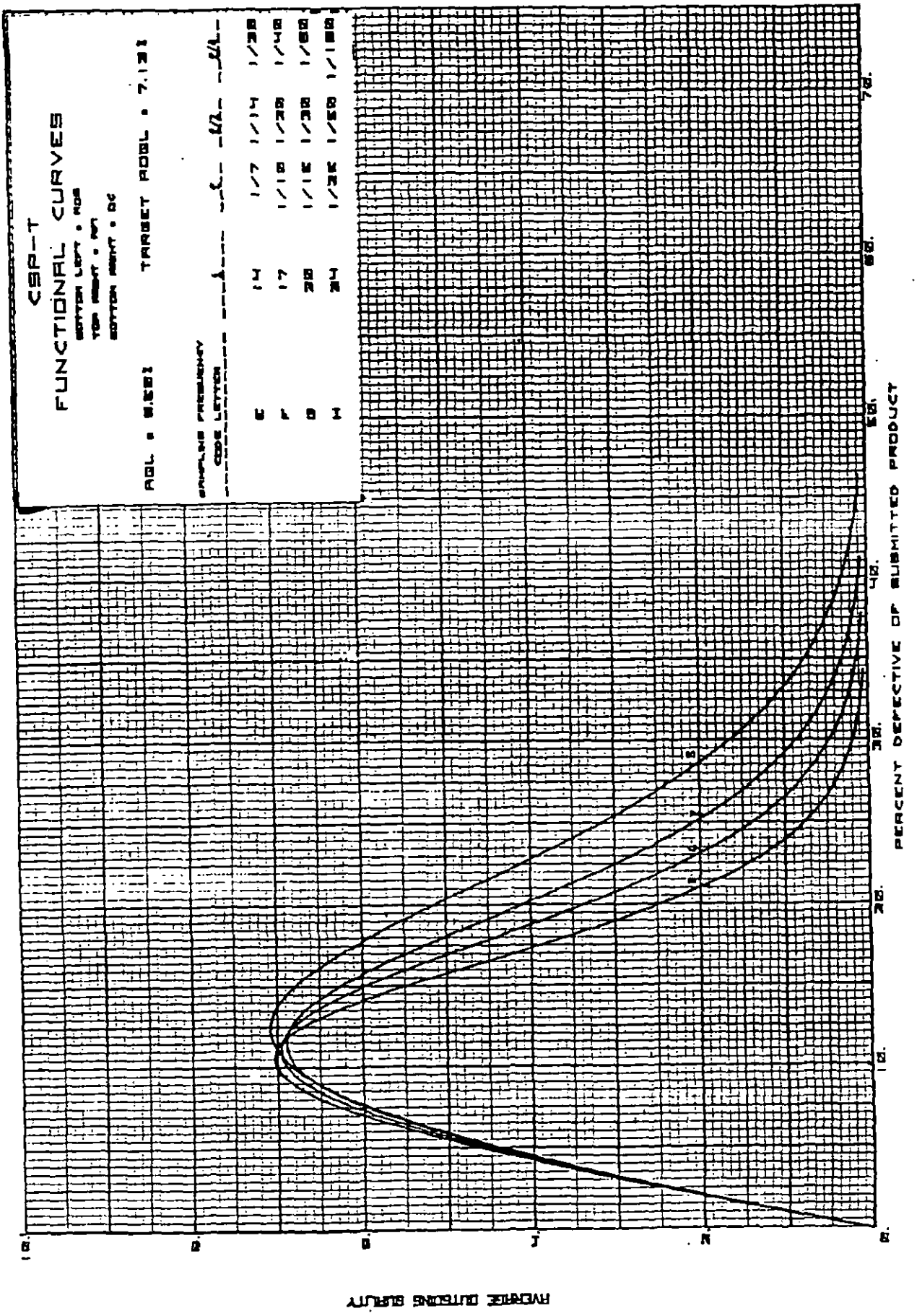

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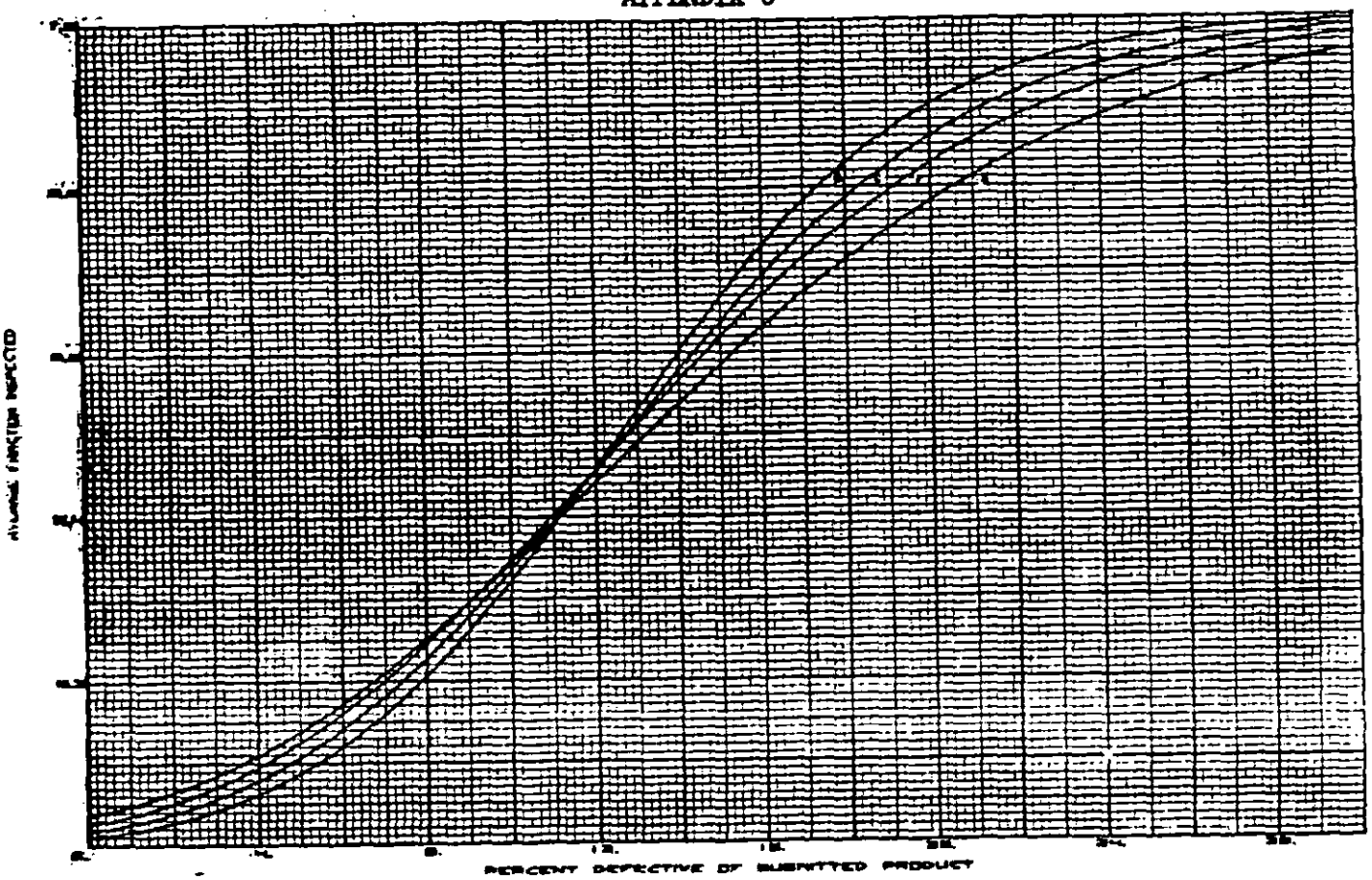

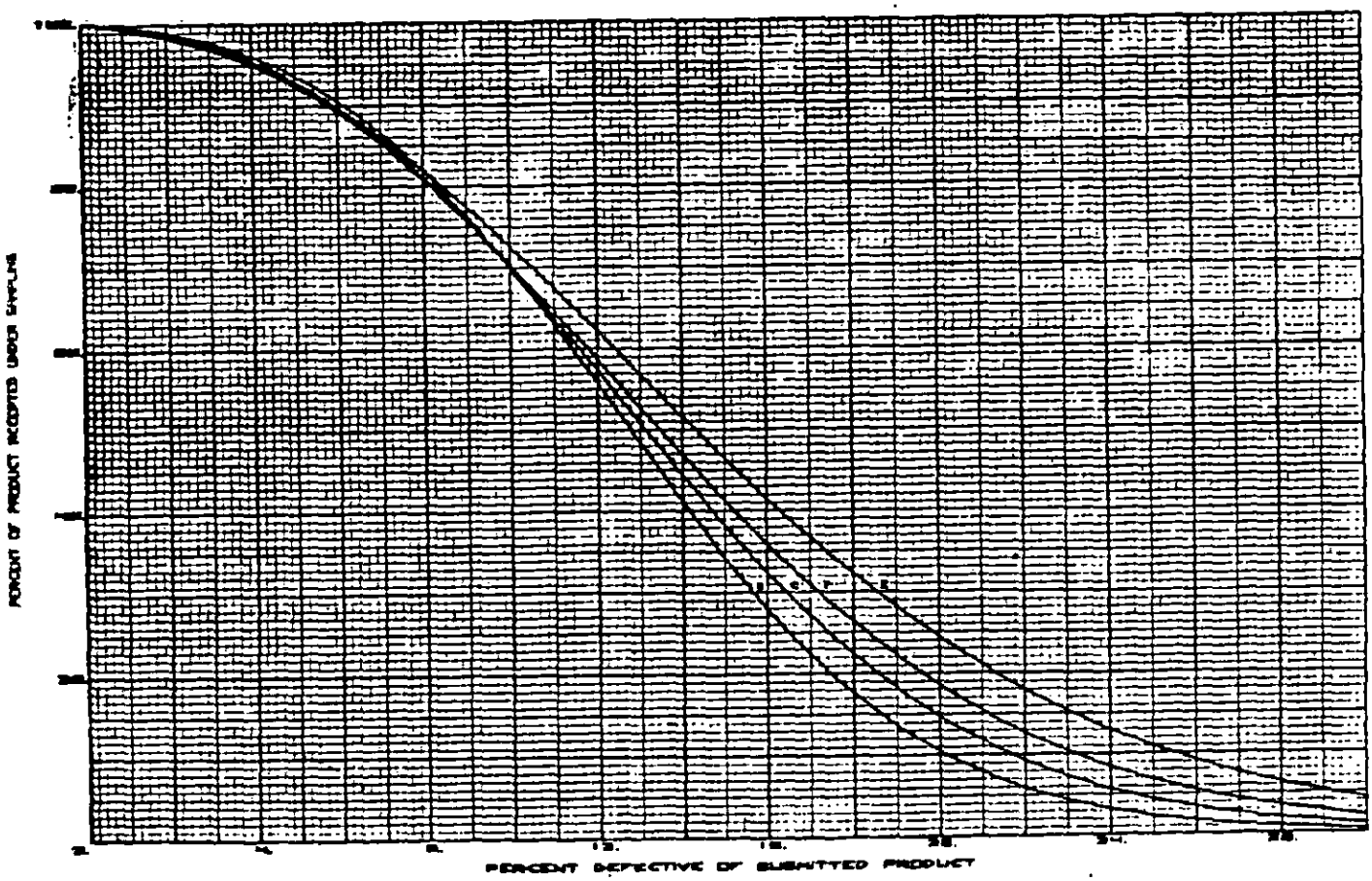

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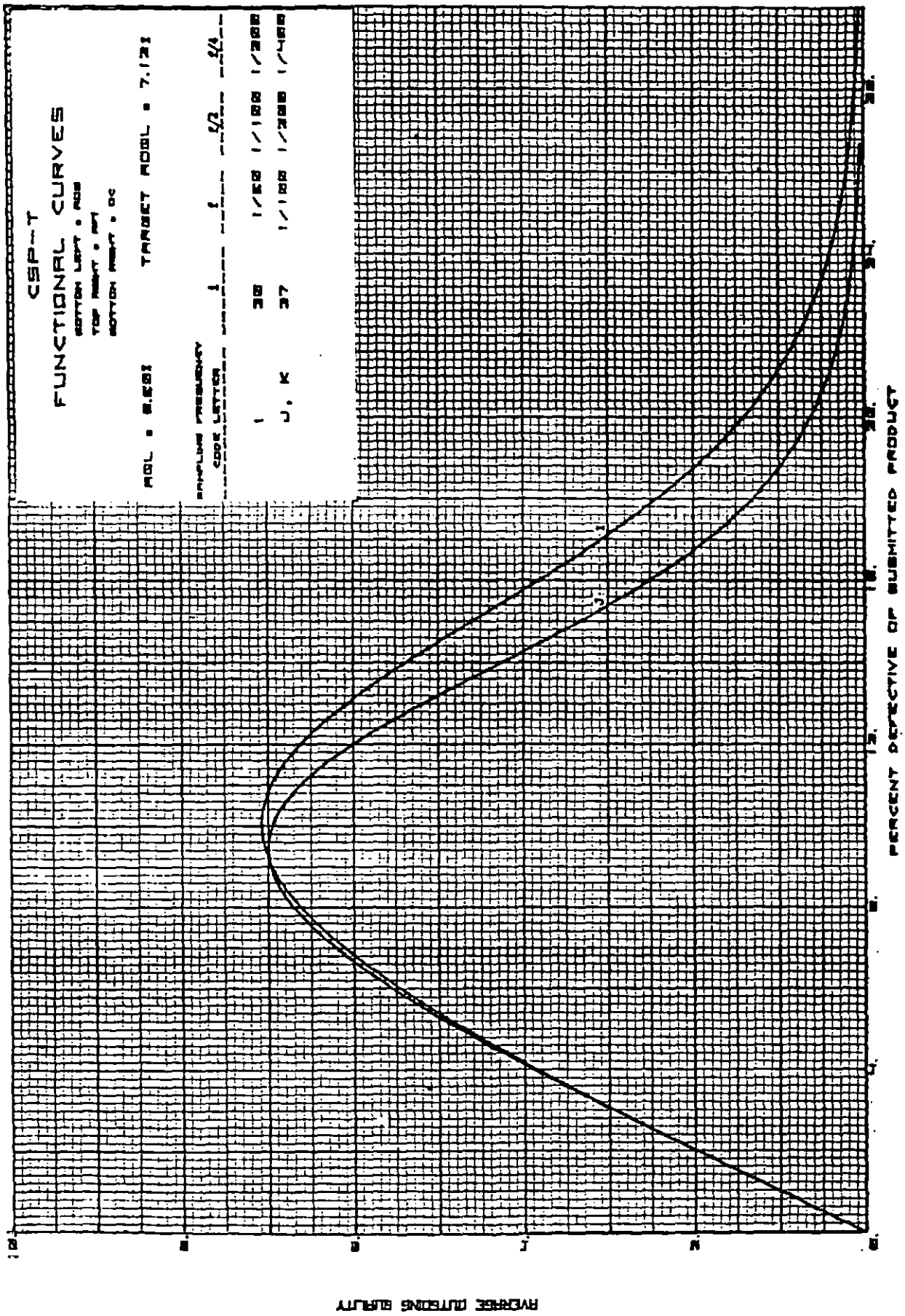

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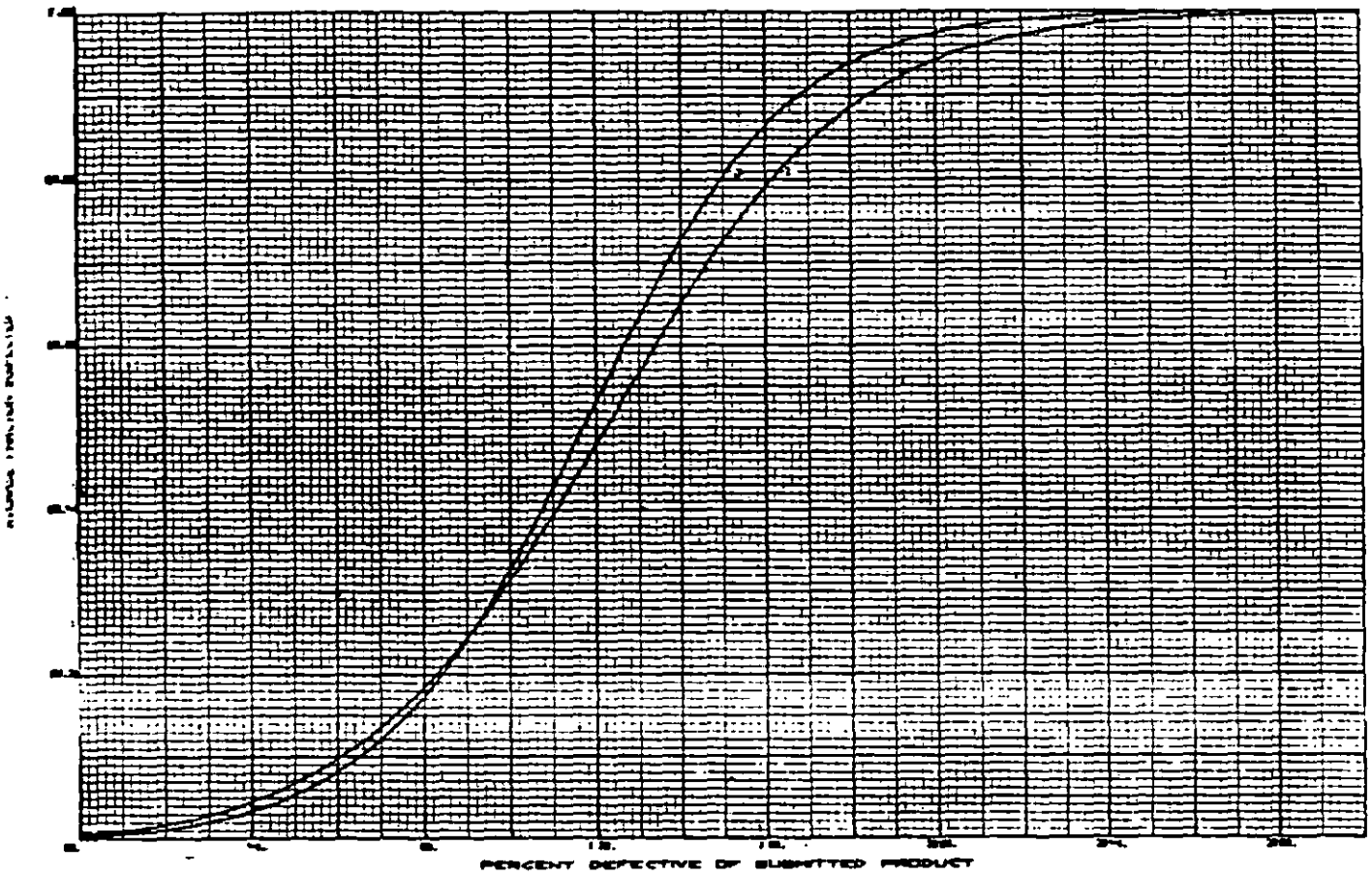

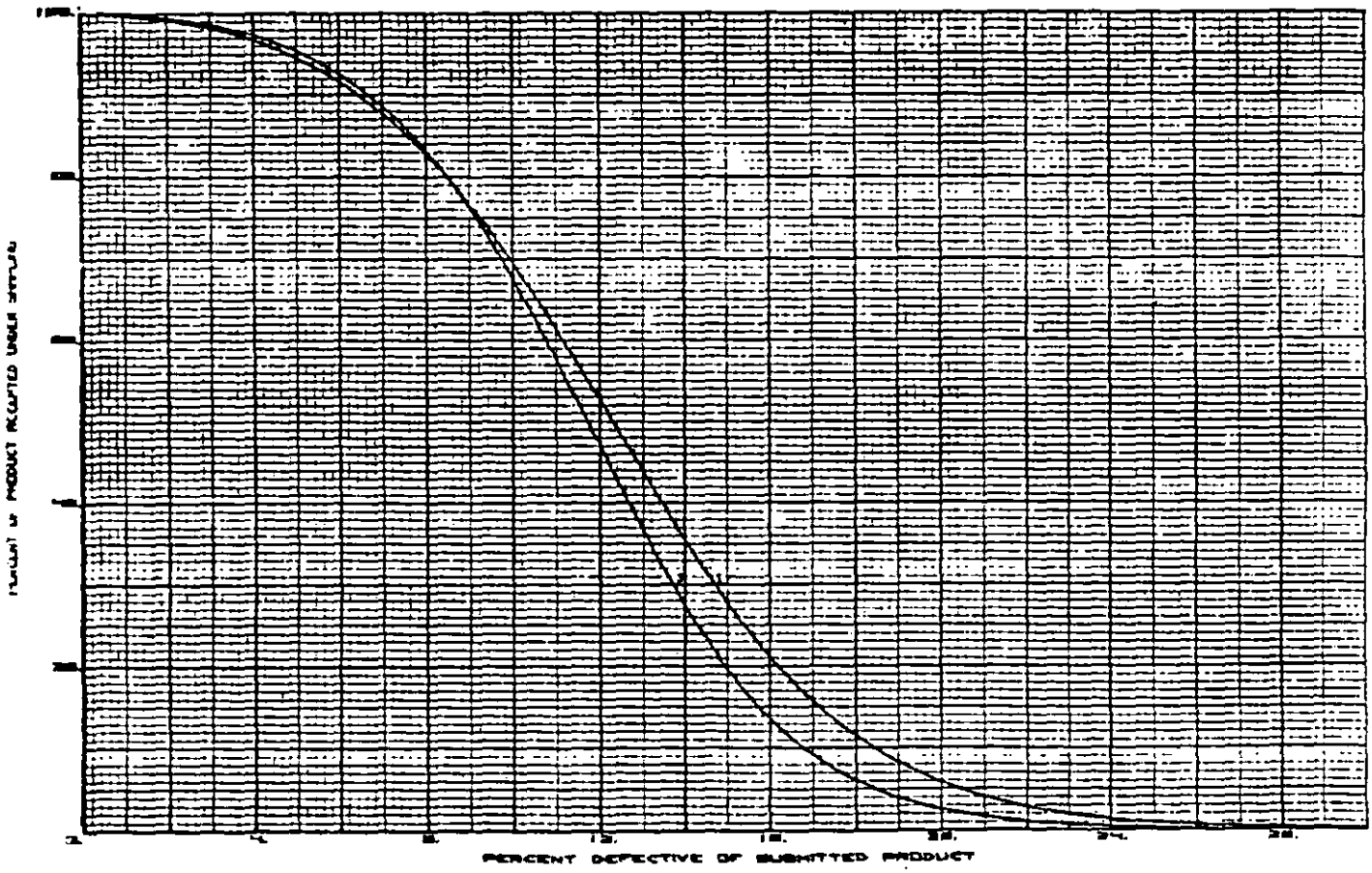

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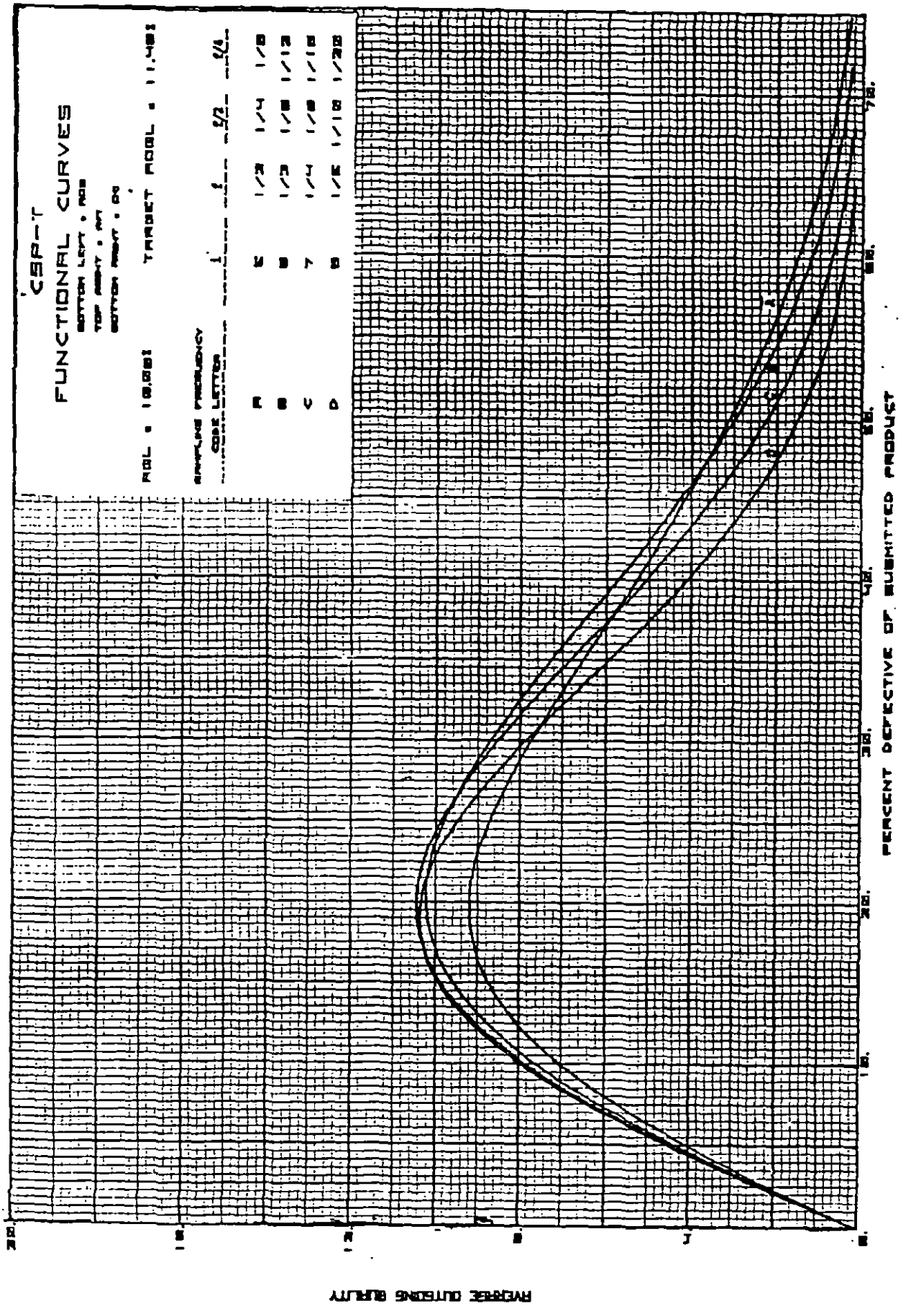

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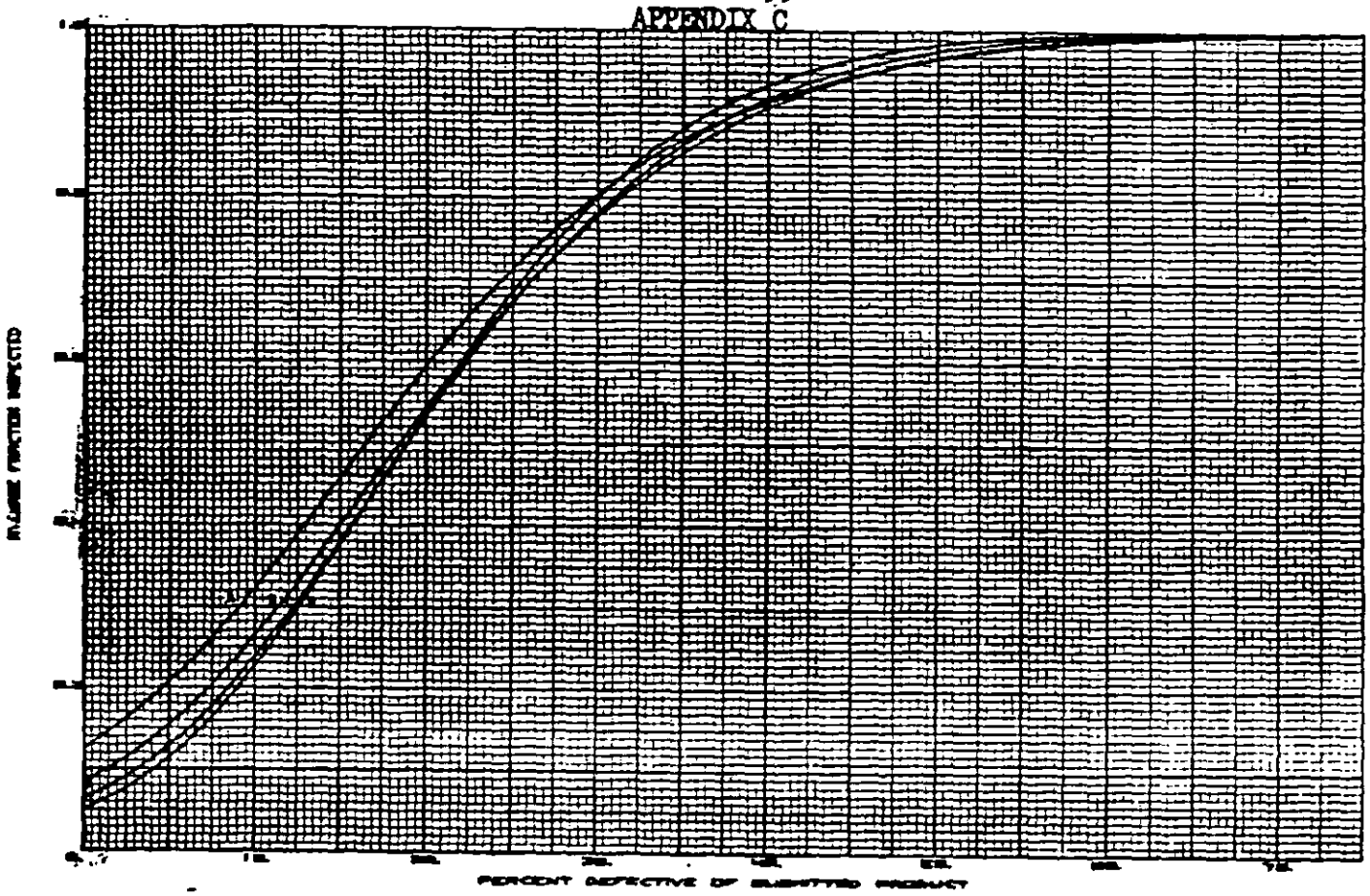

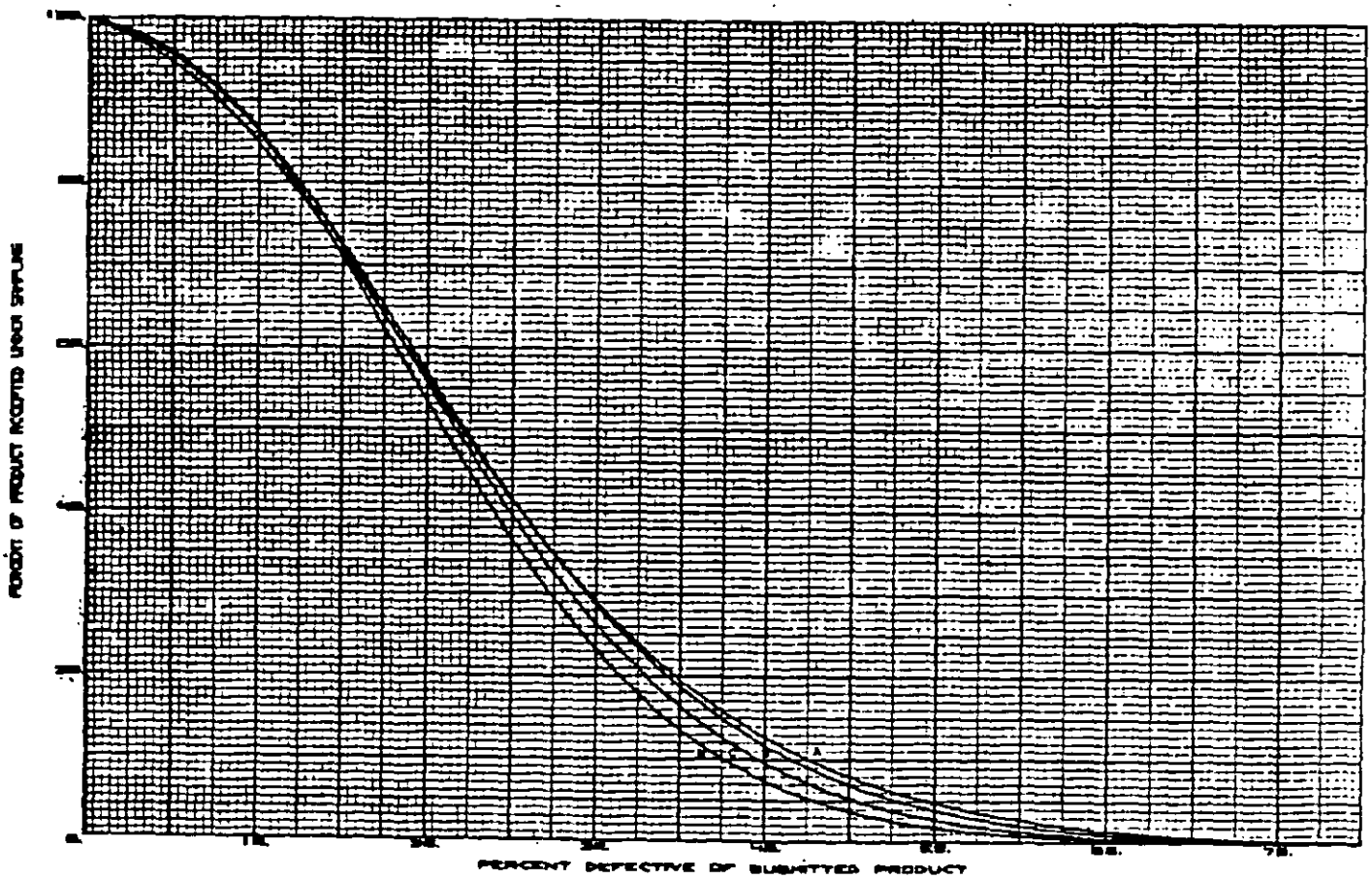

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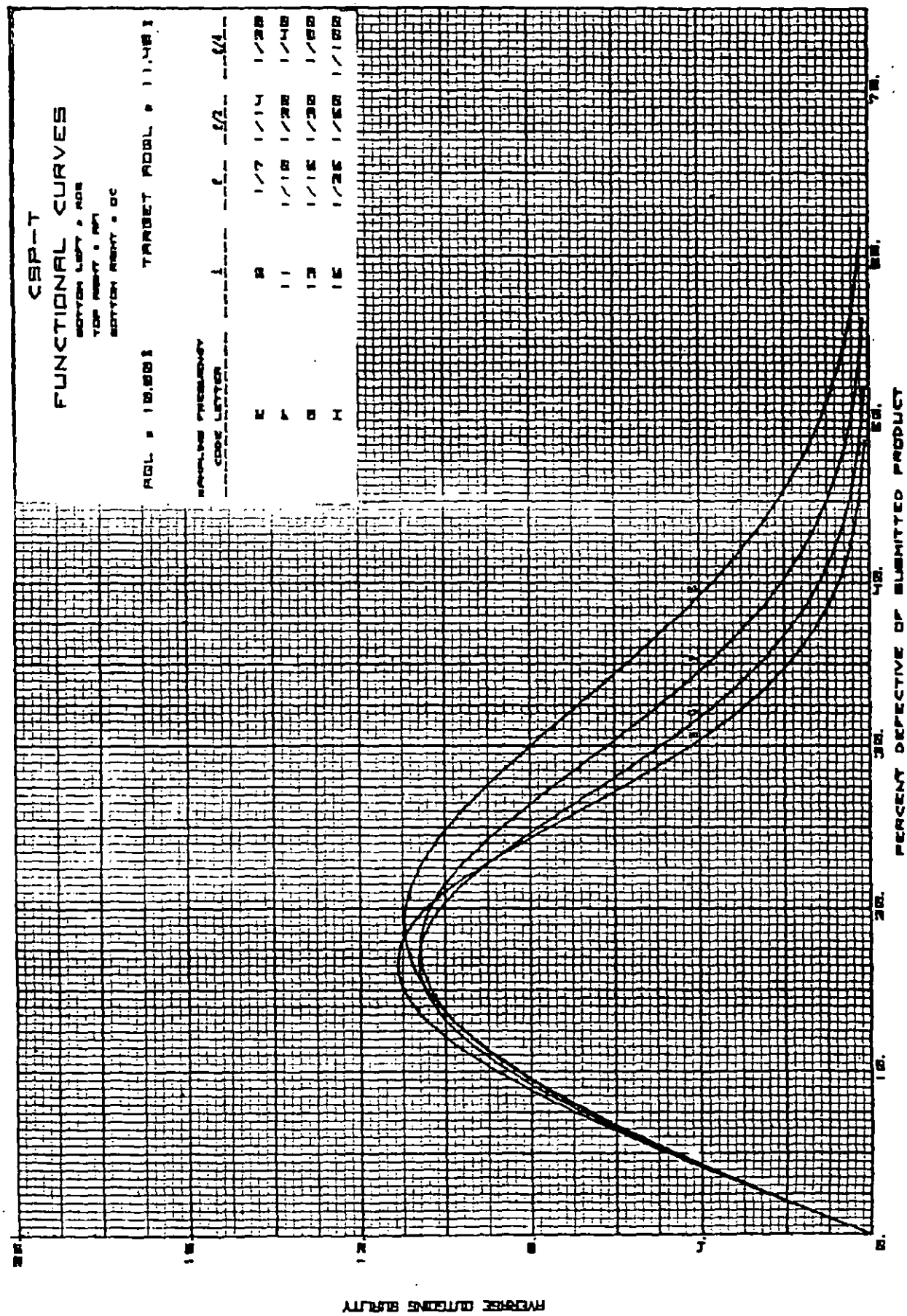

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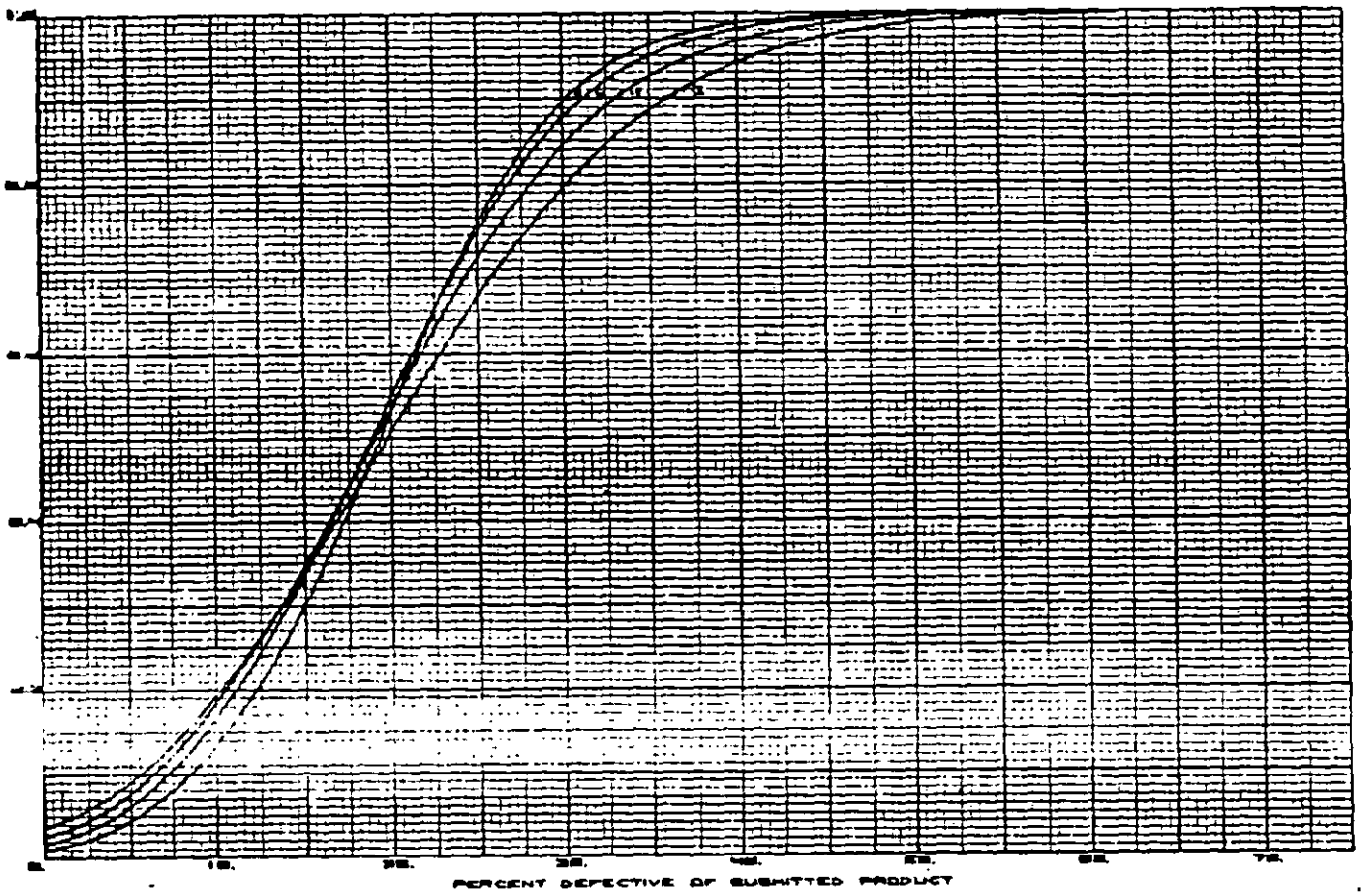

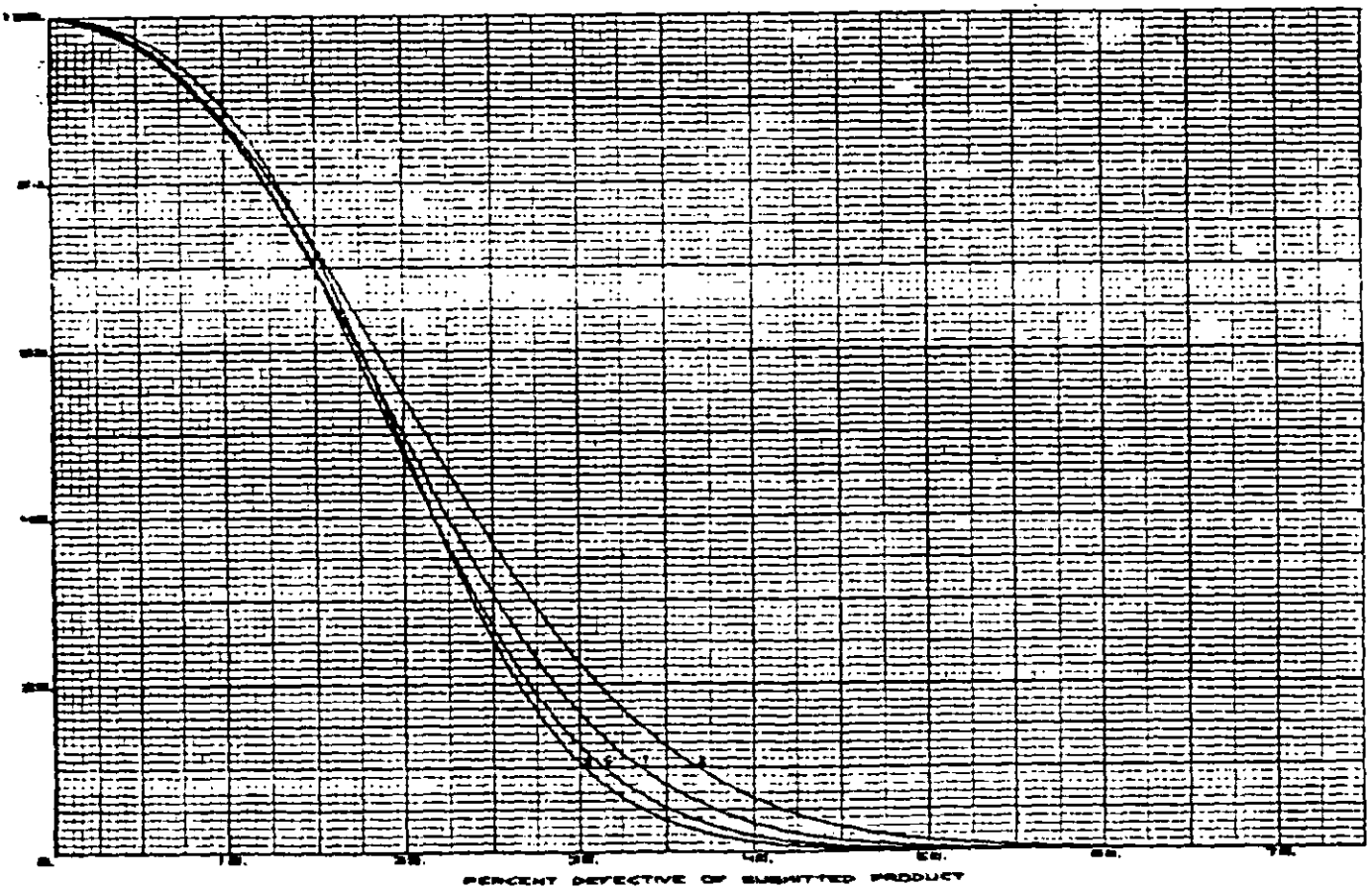

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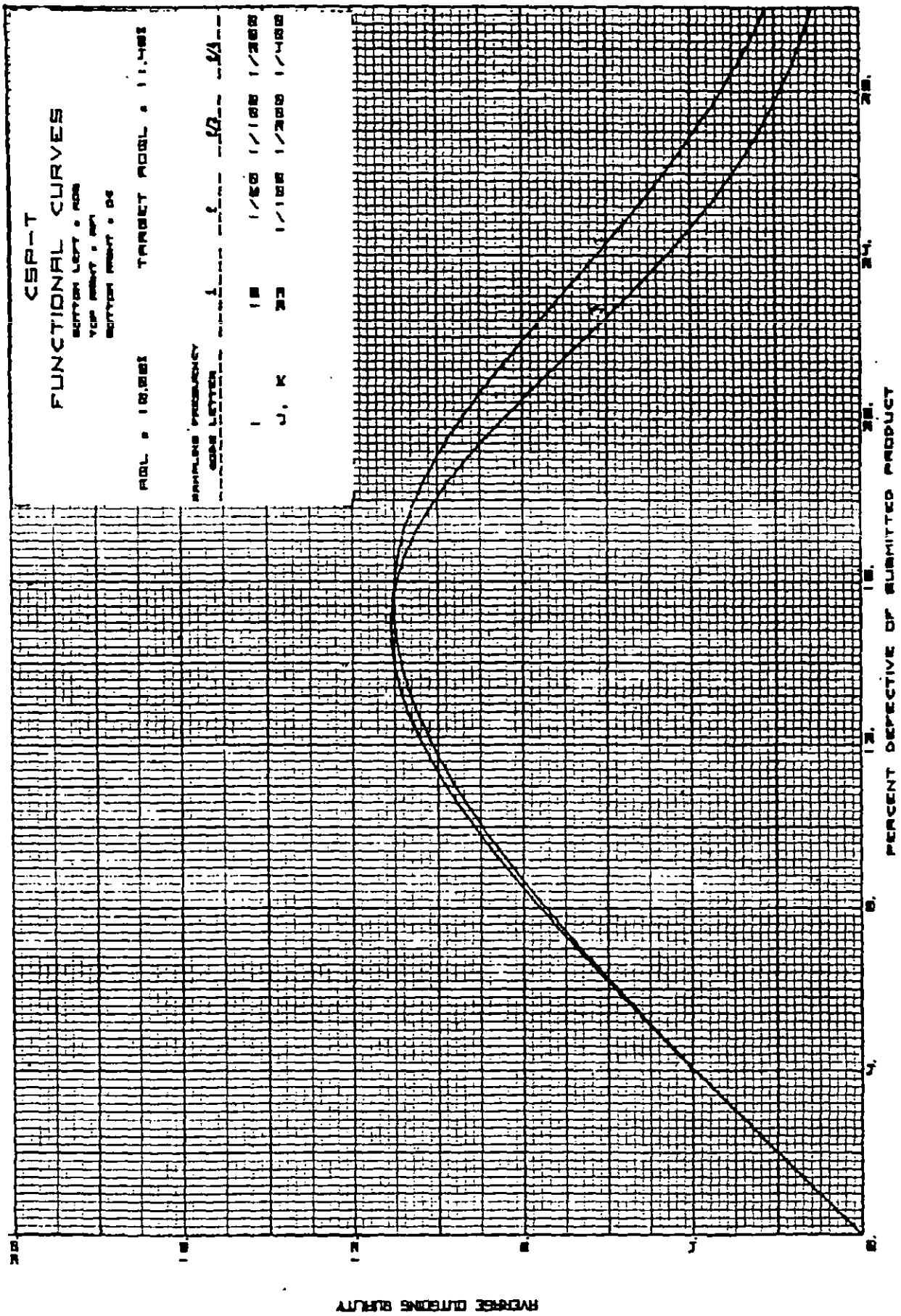

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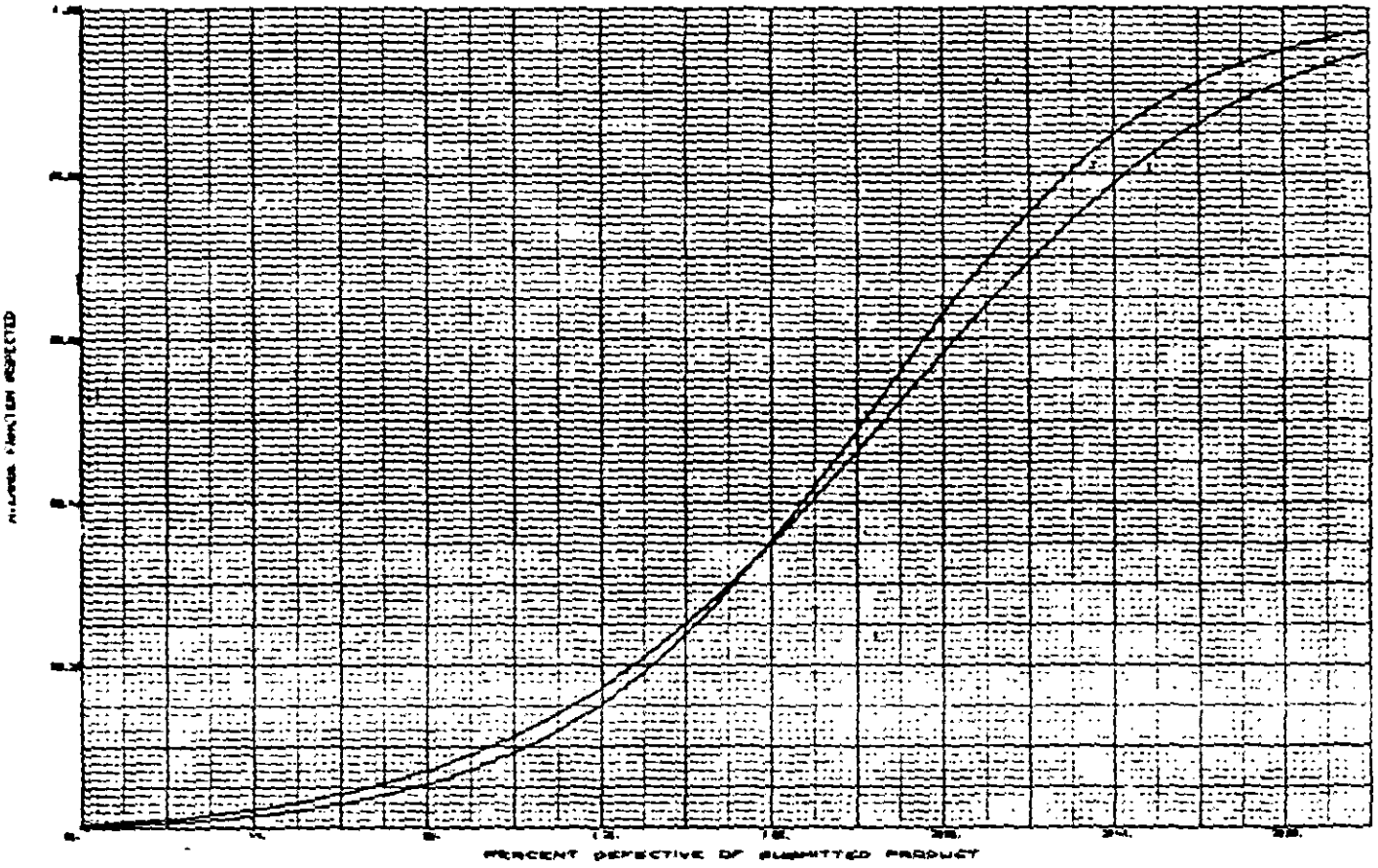

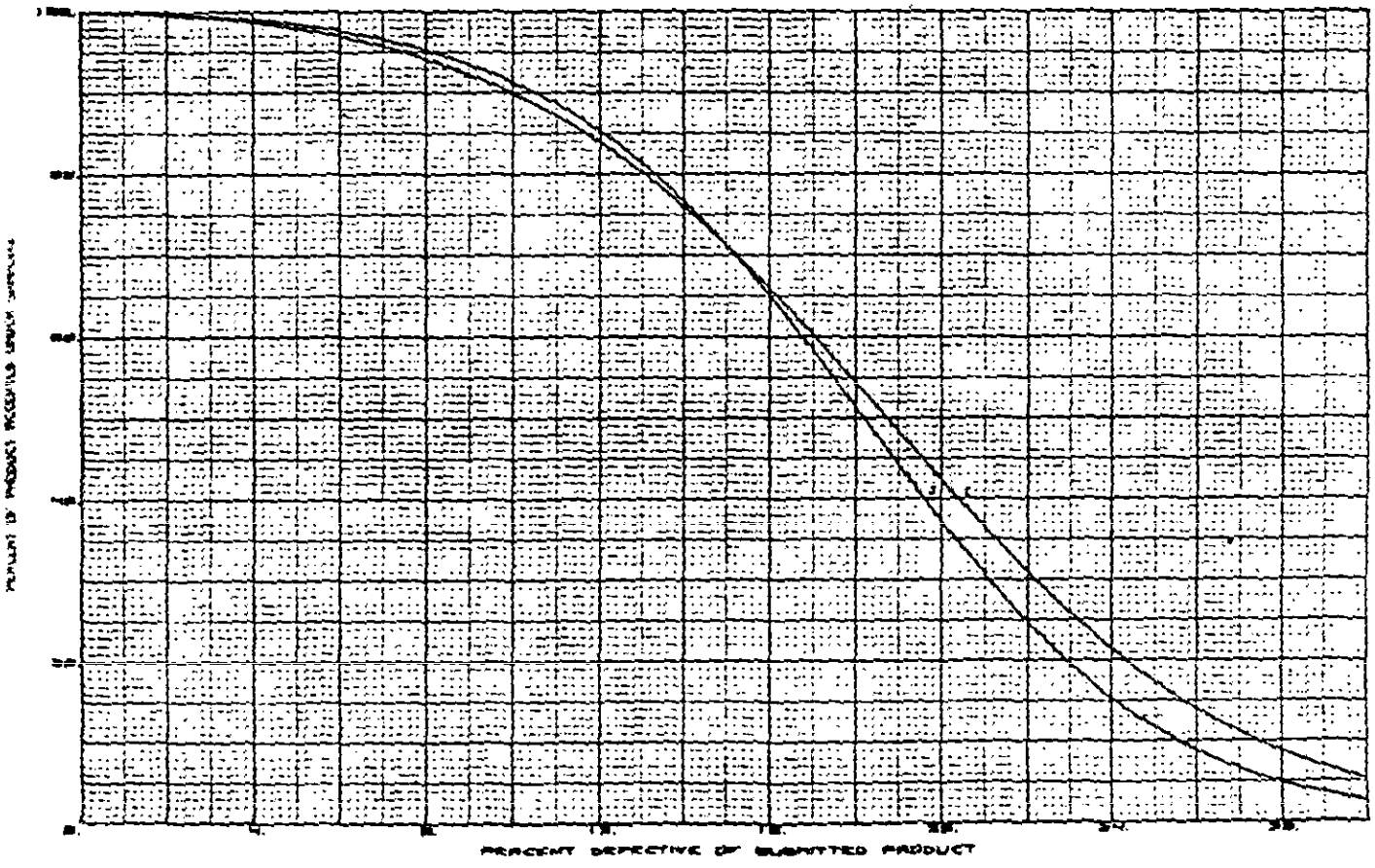

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APPENDIX D

FUNCTIONAL CURVES FOR CSP-V PLANS

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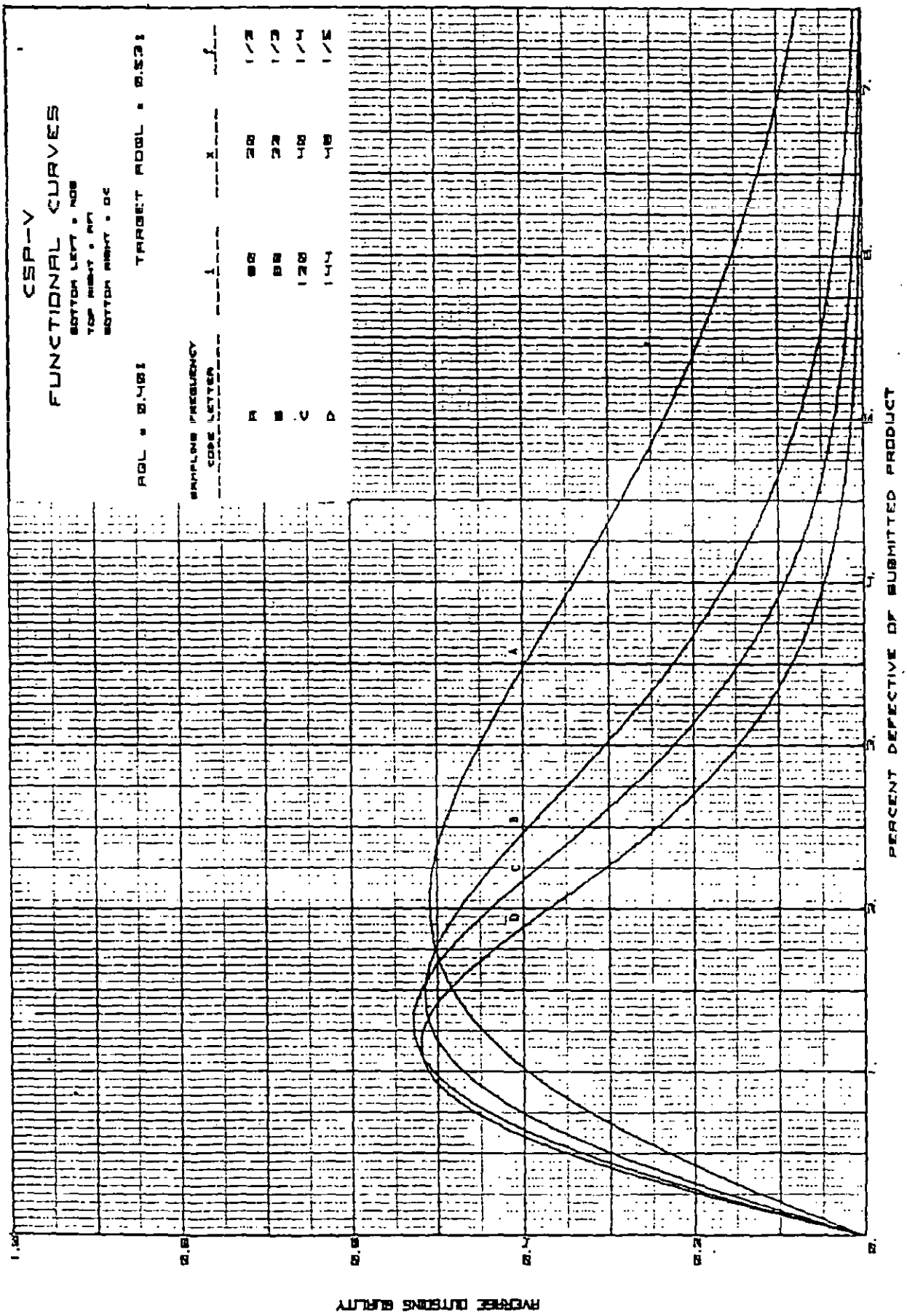

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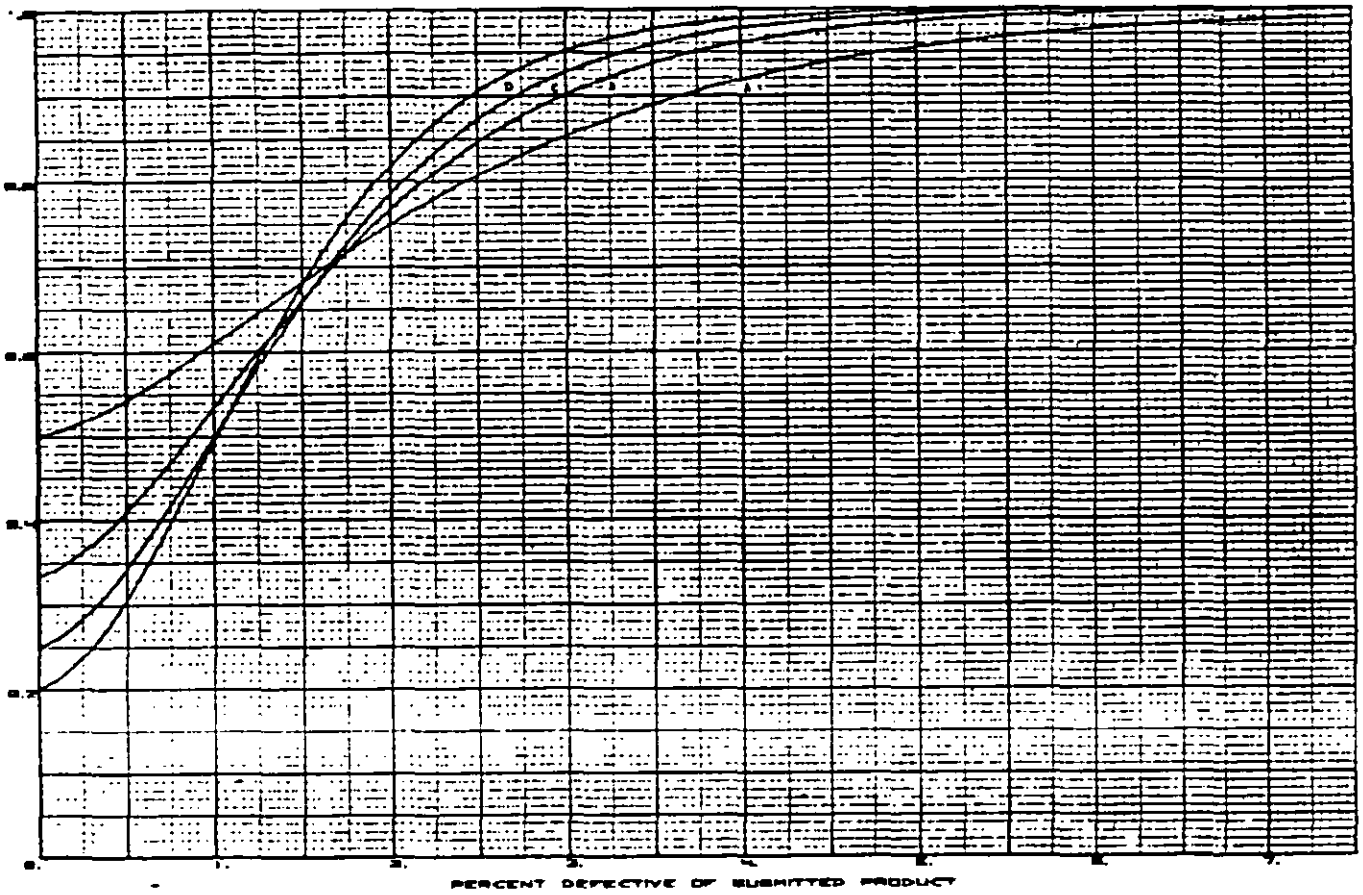

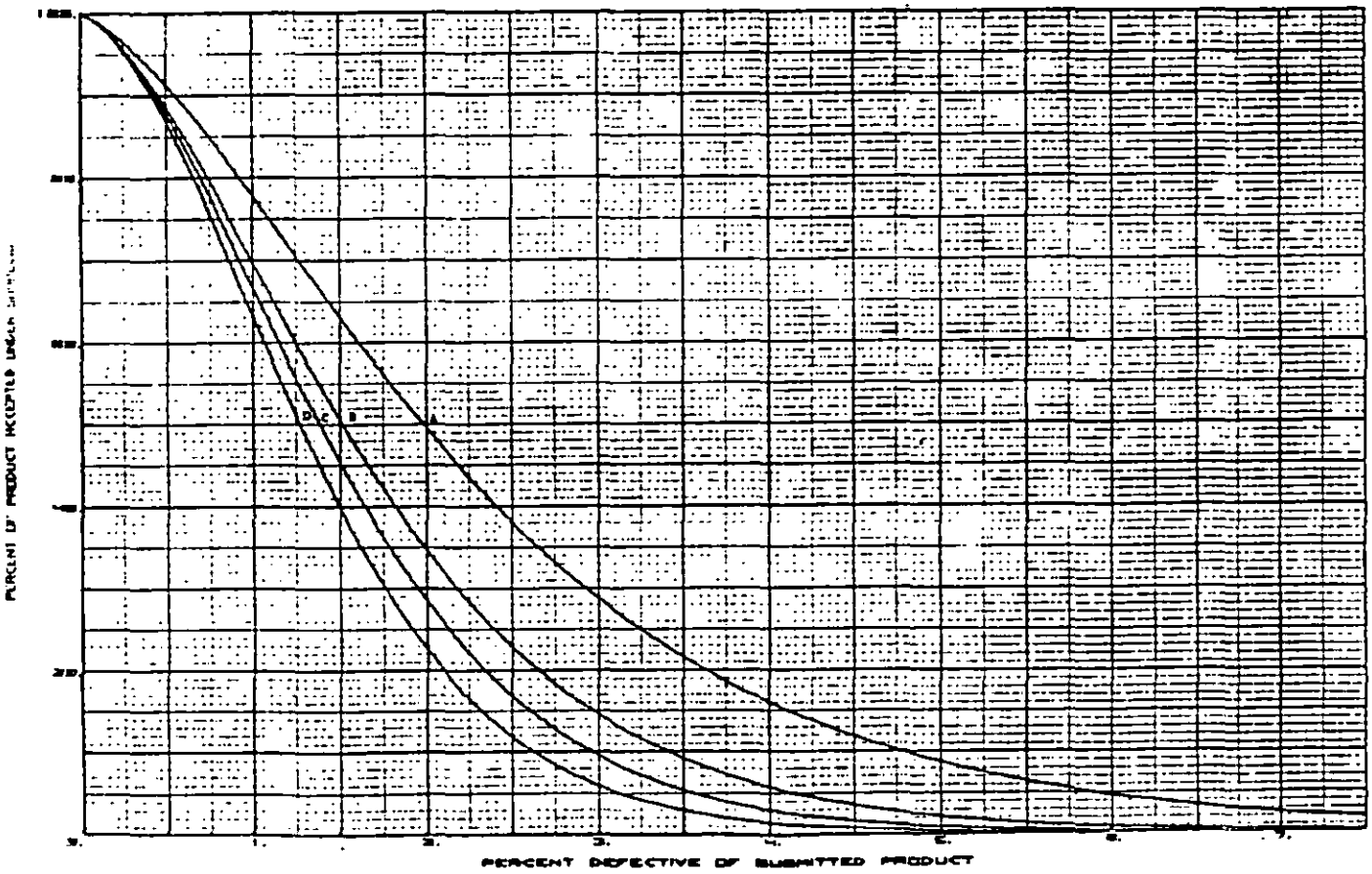

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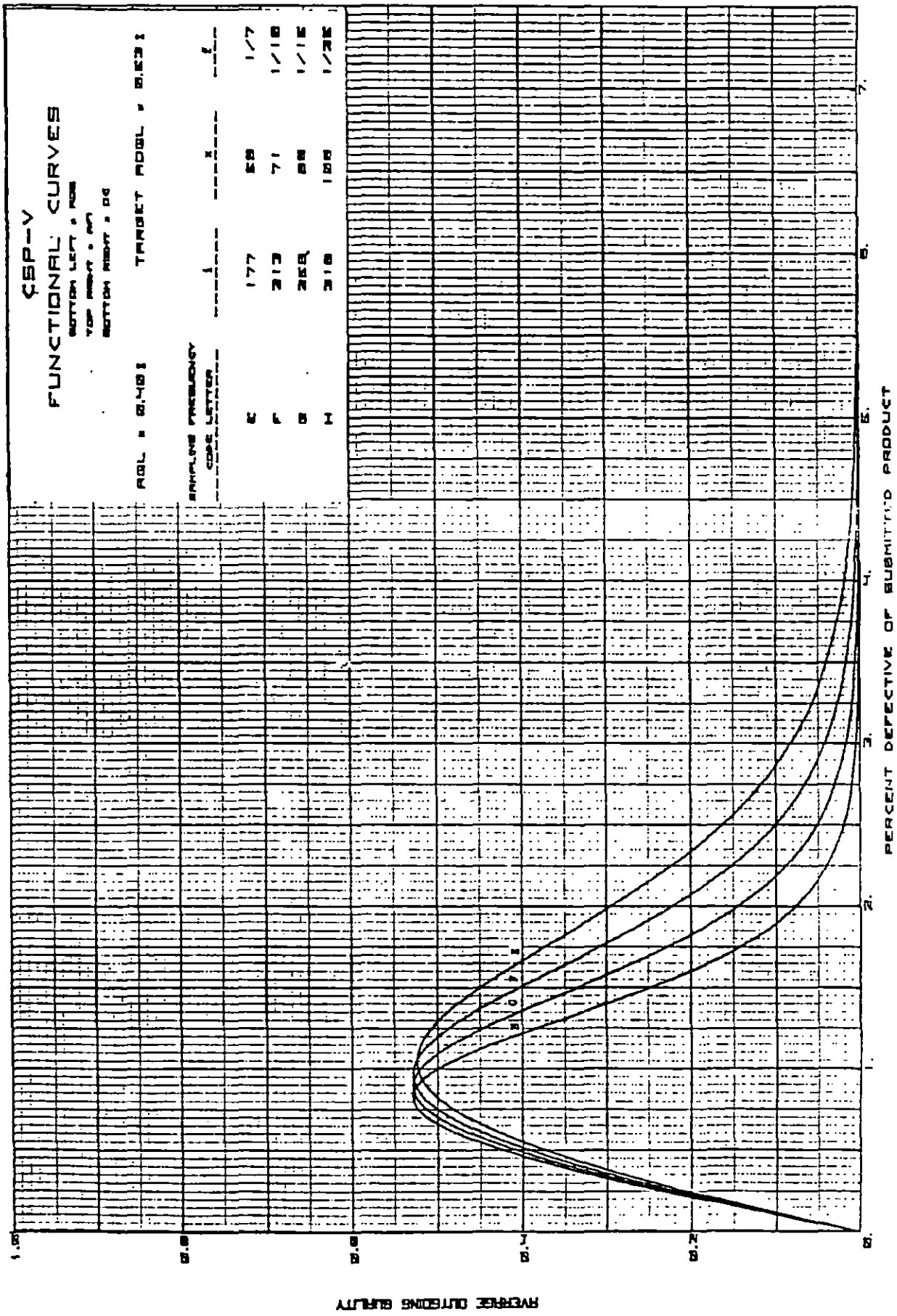

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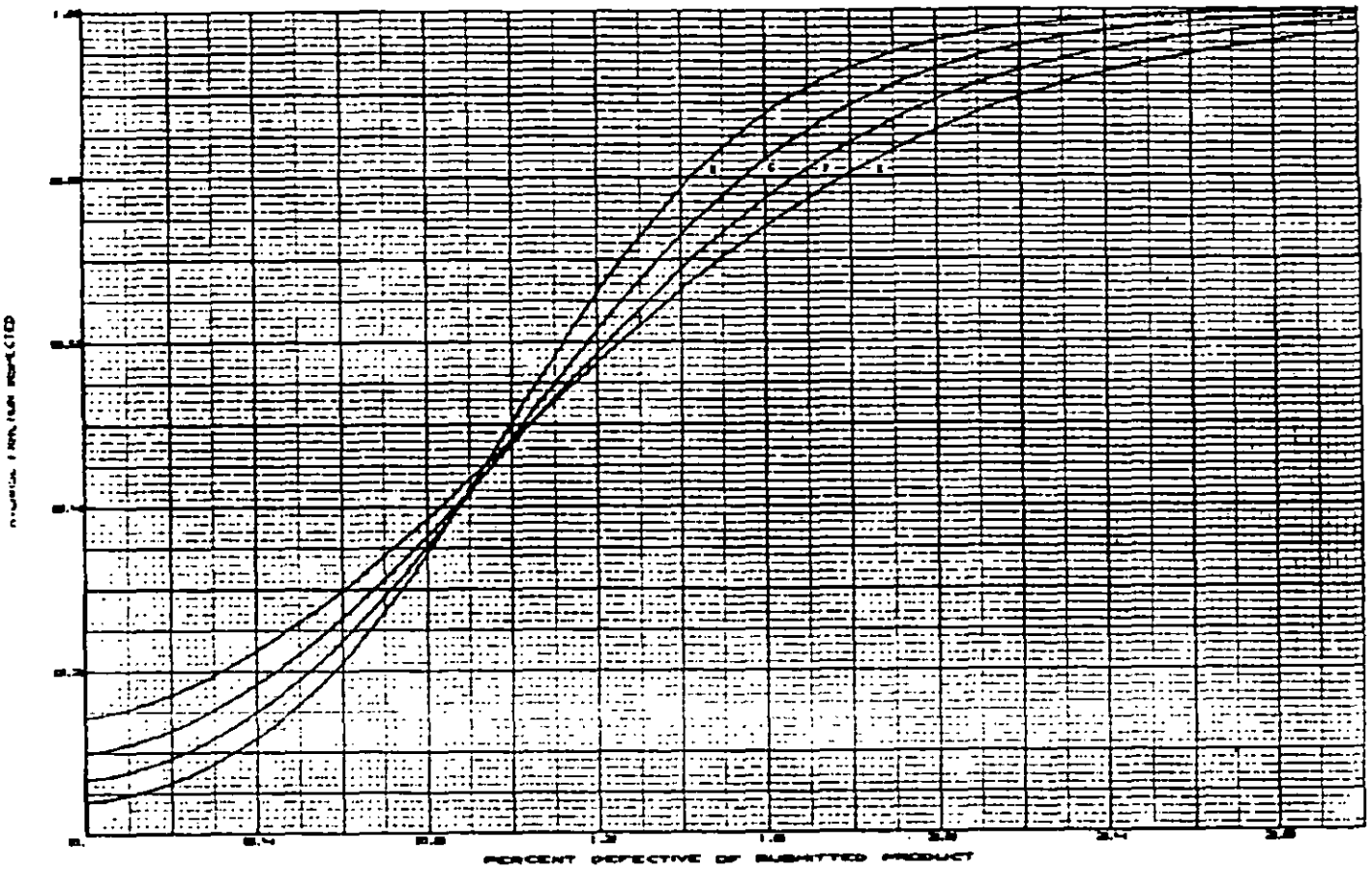

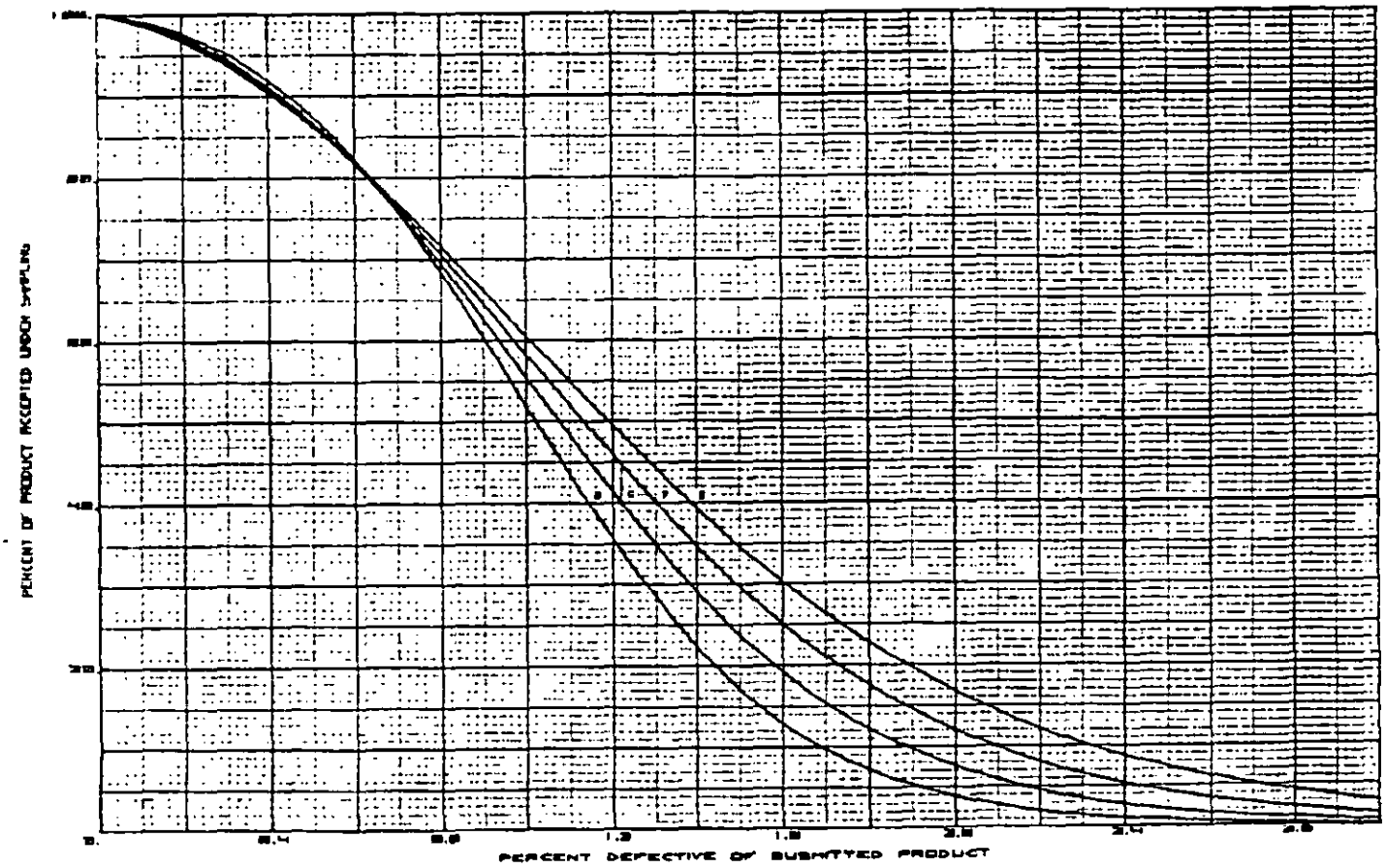

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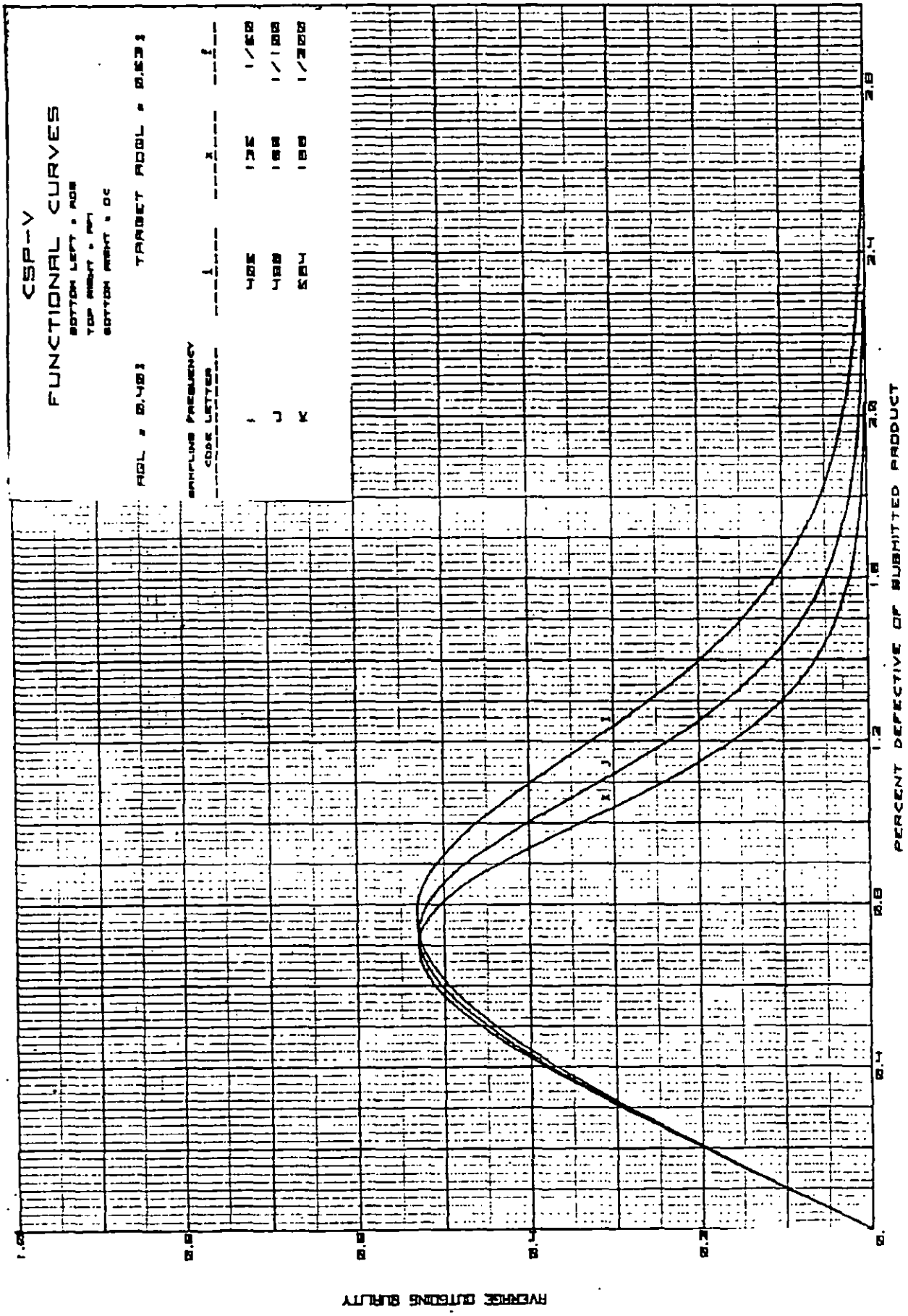

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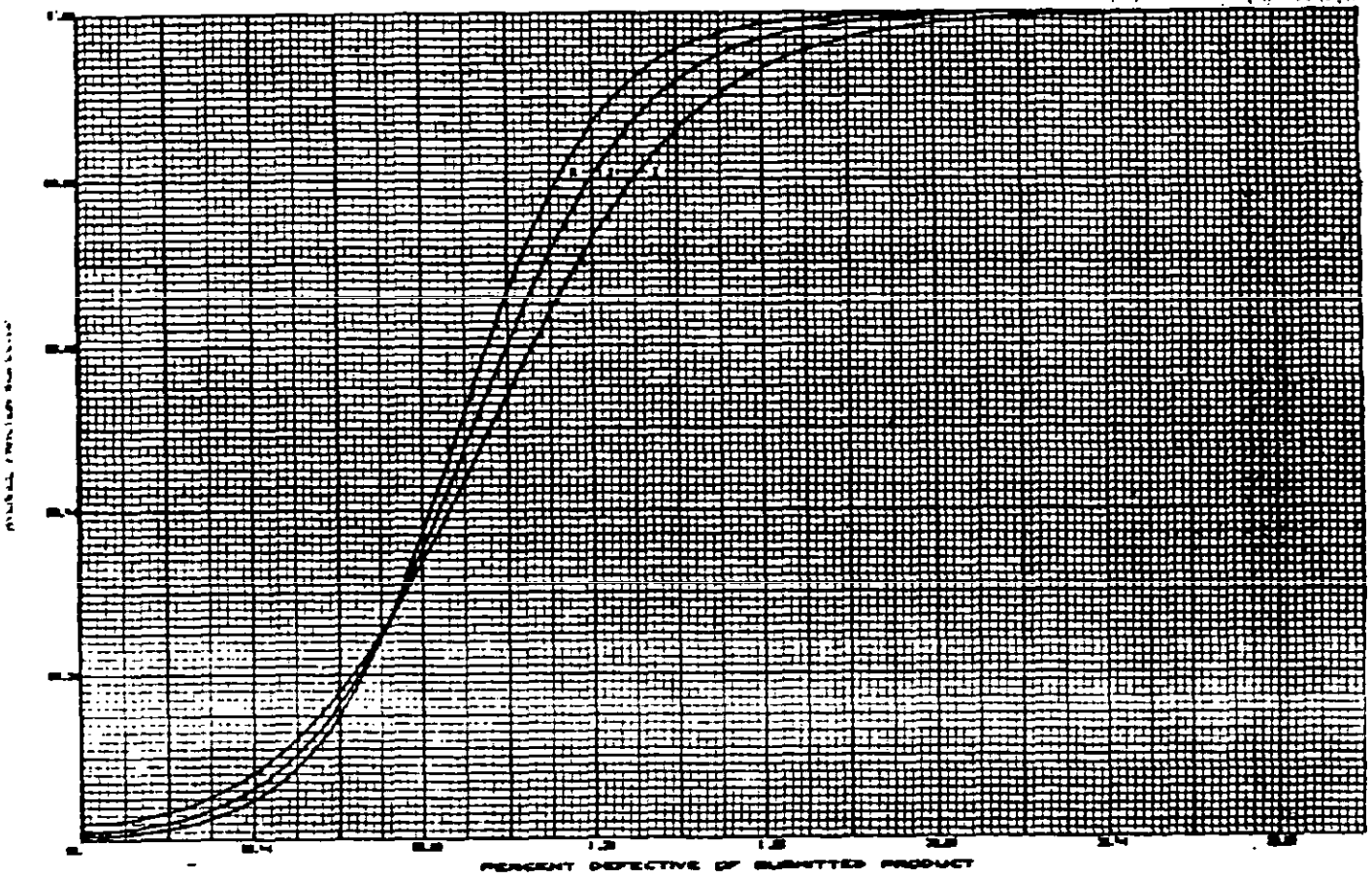

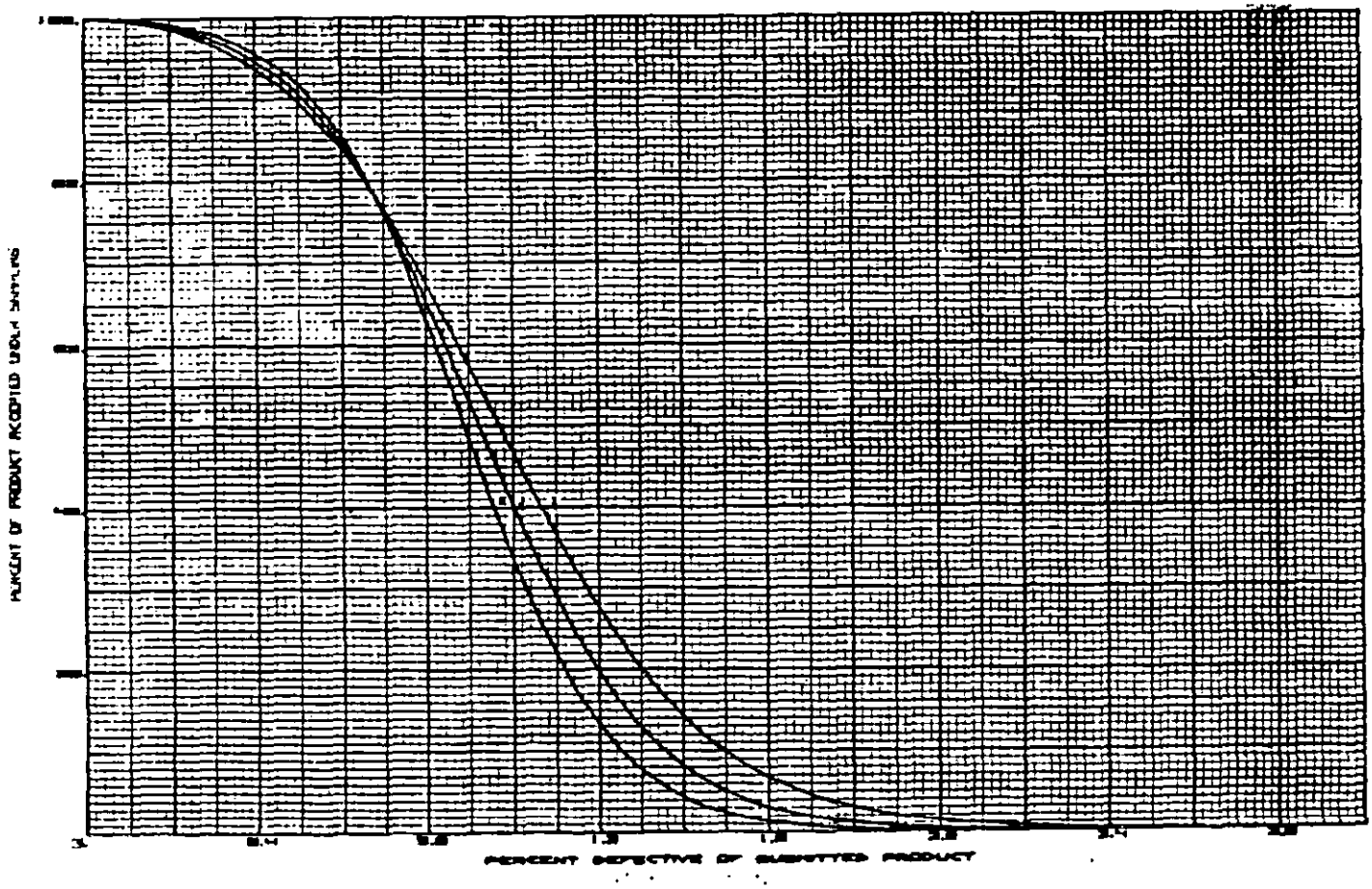

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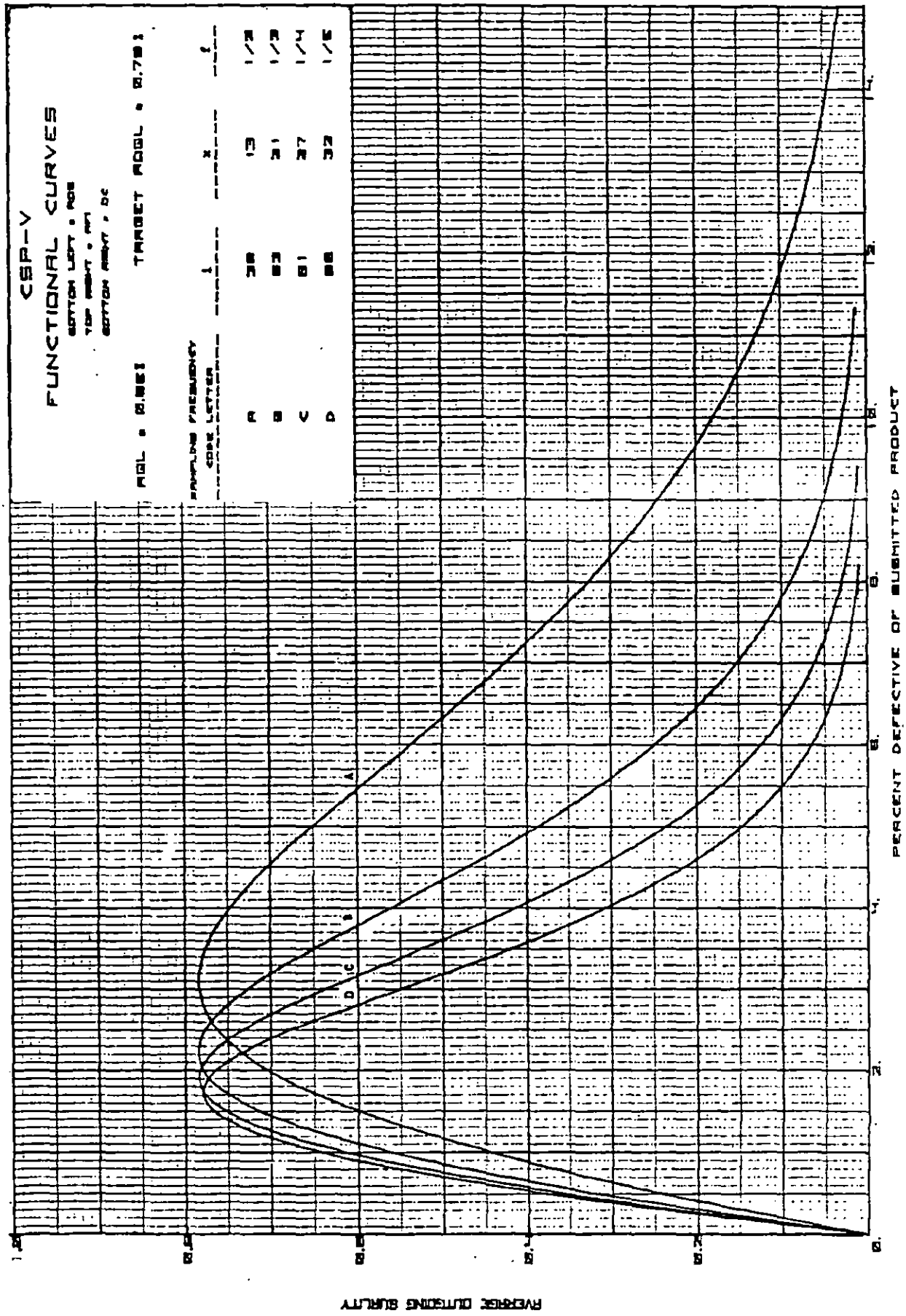

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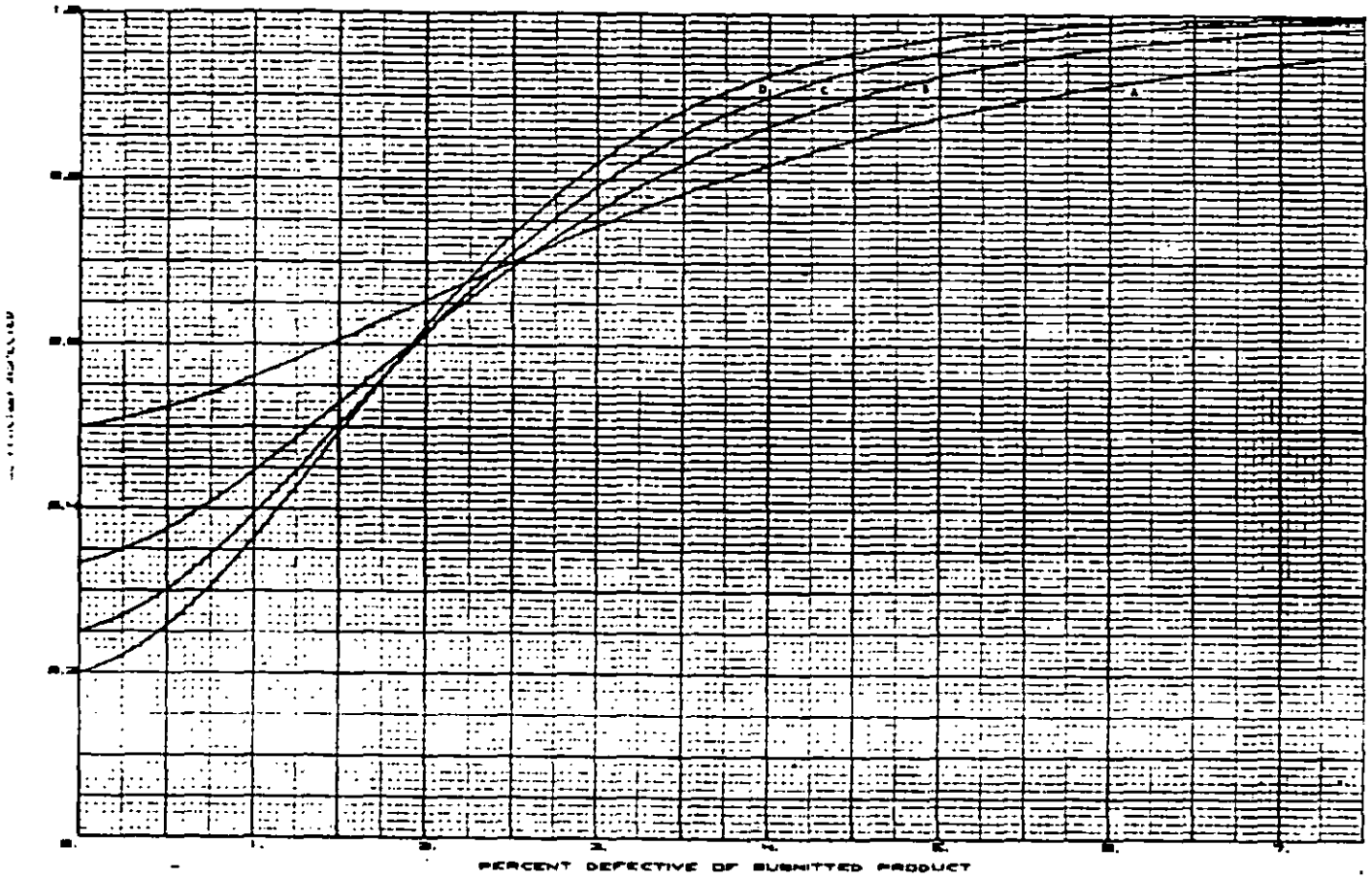

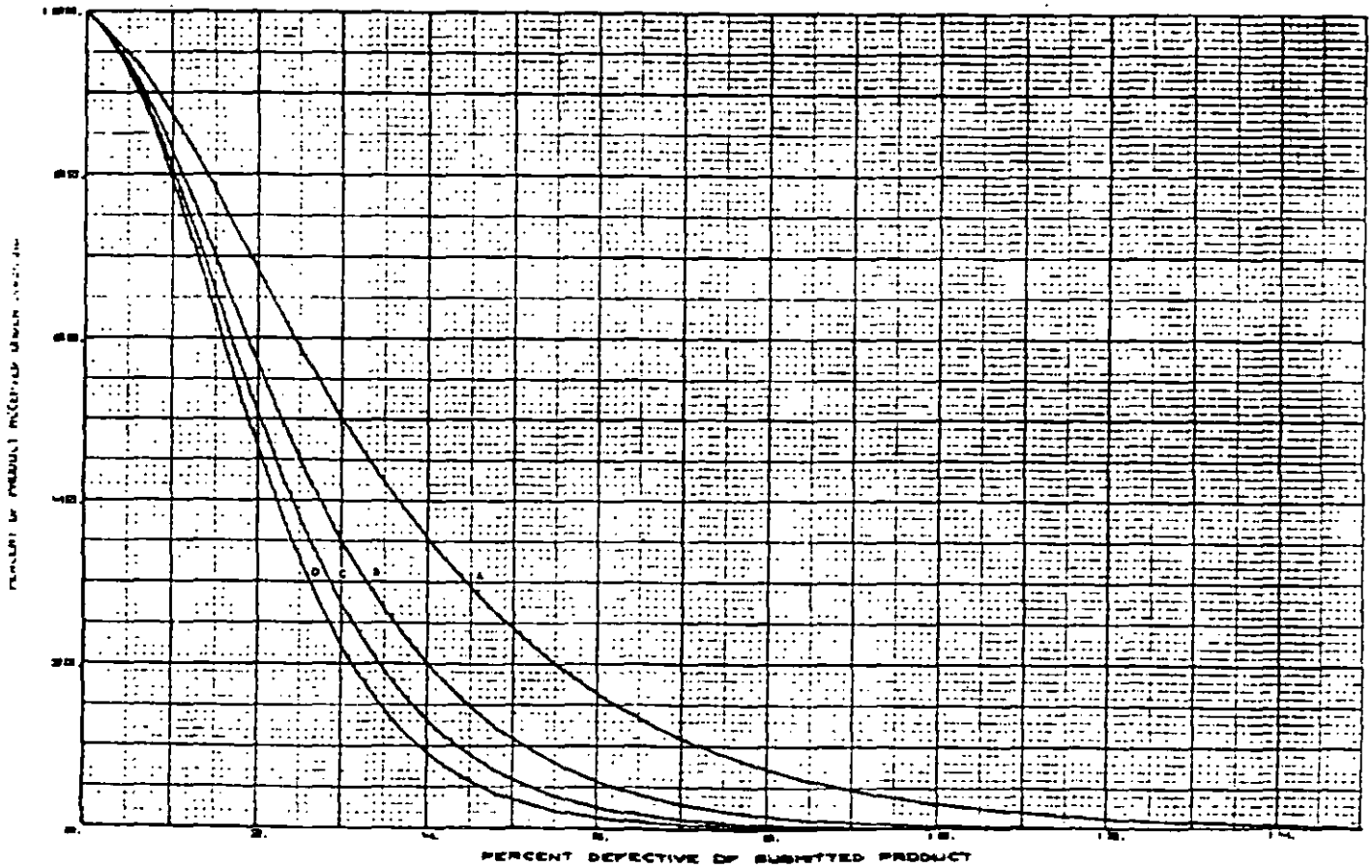

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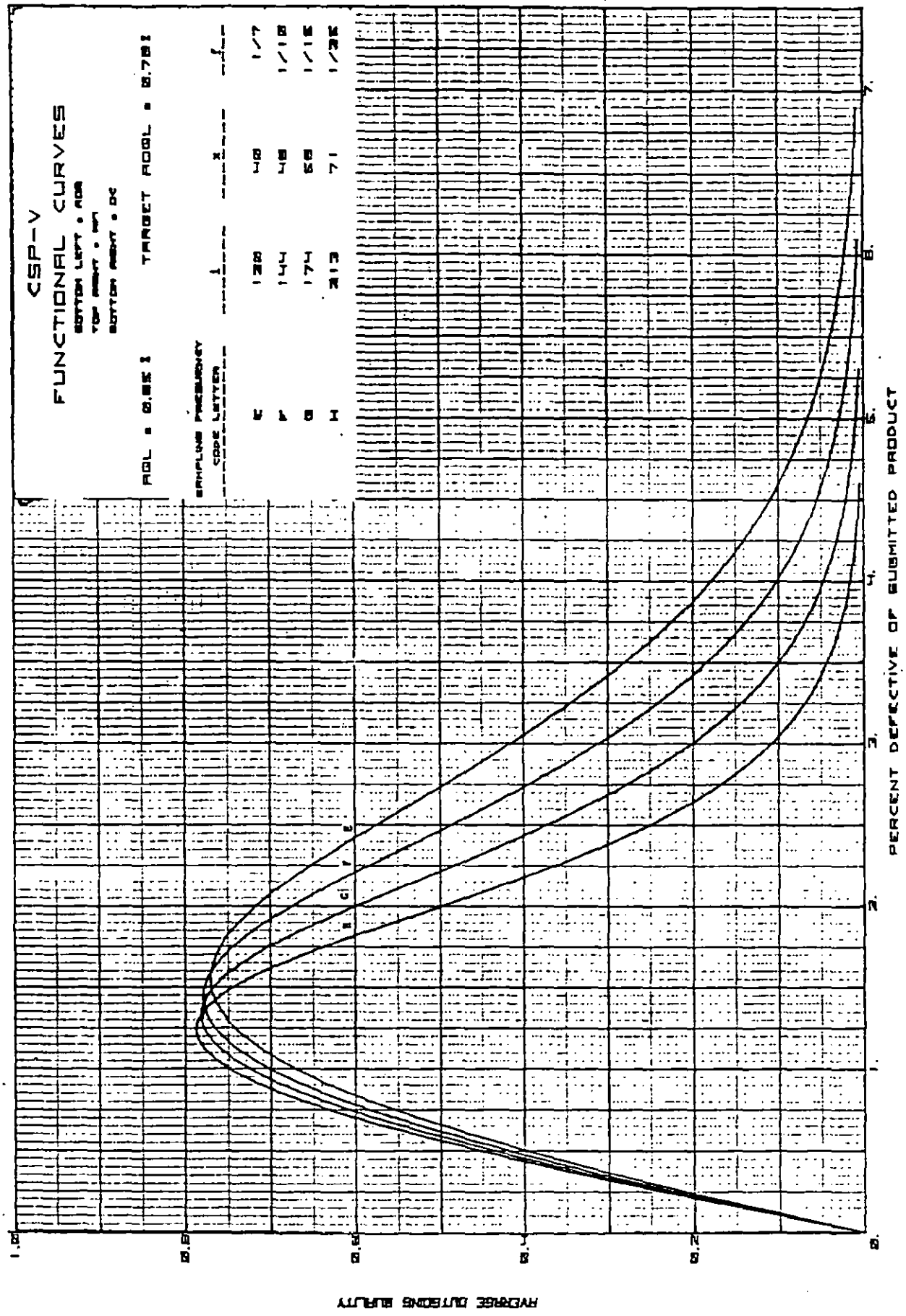

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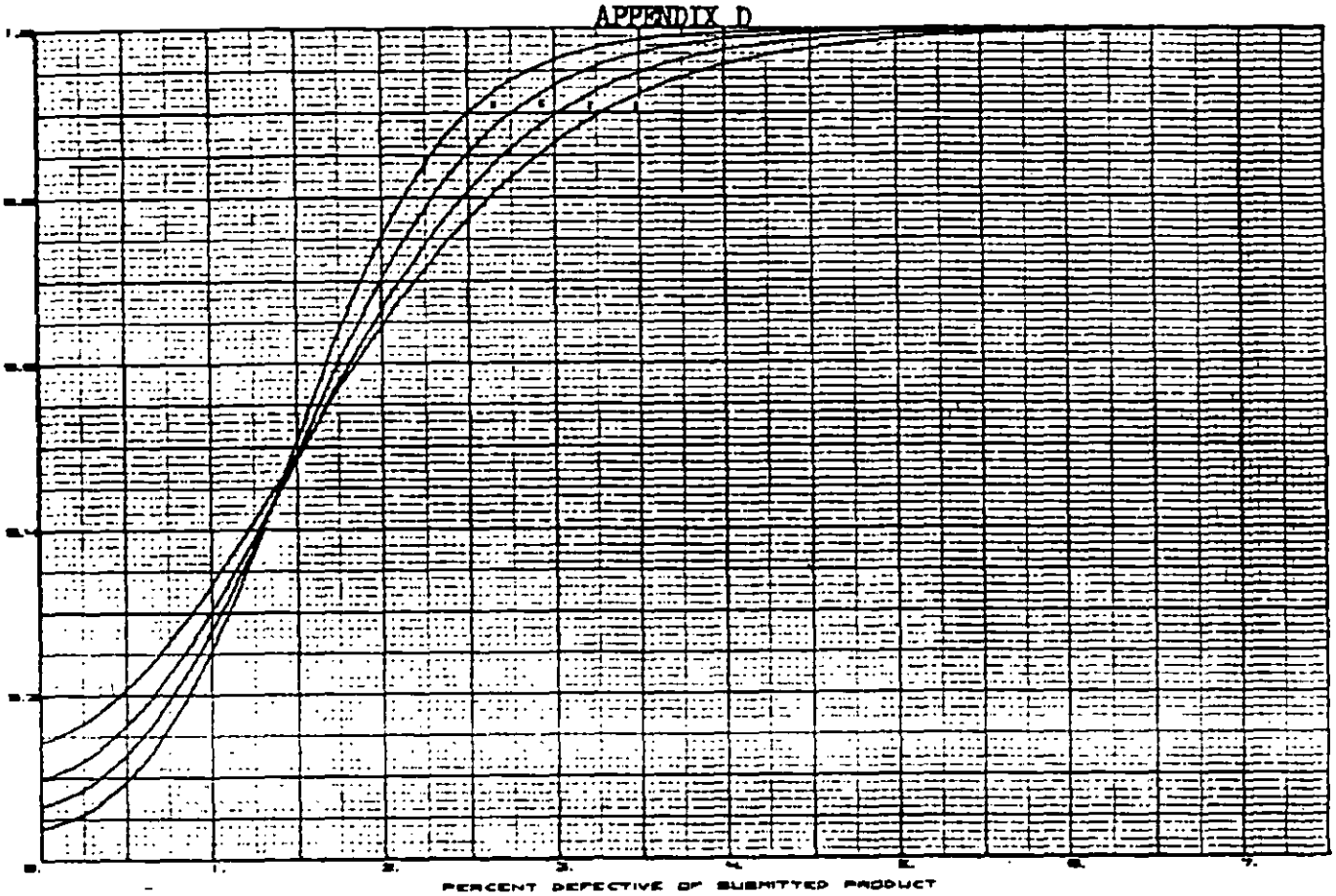

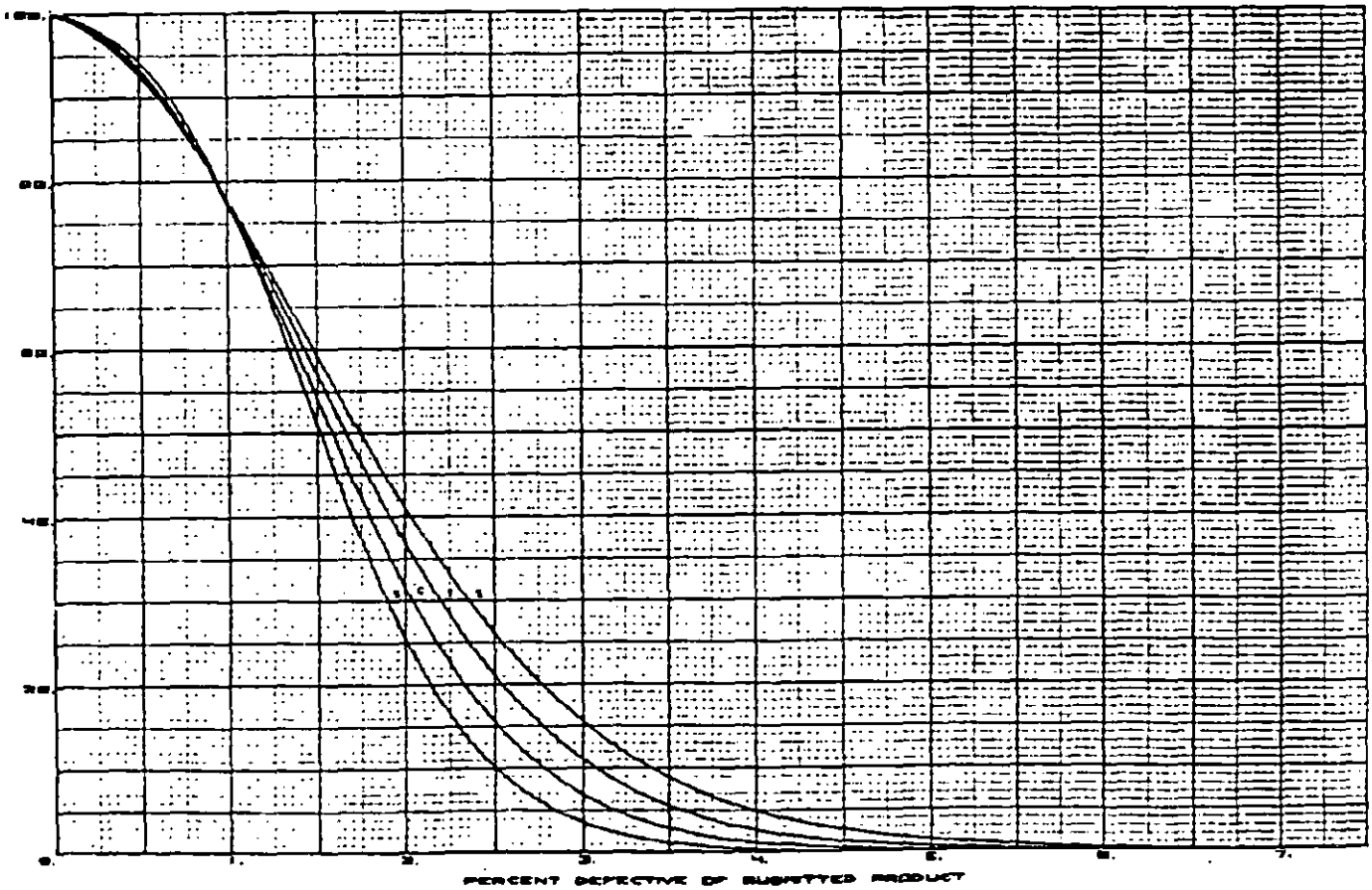

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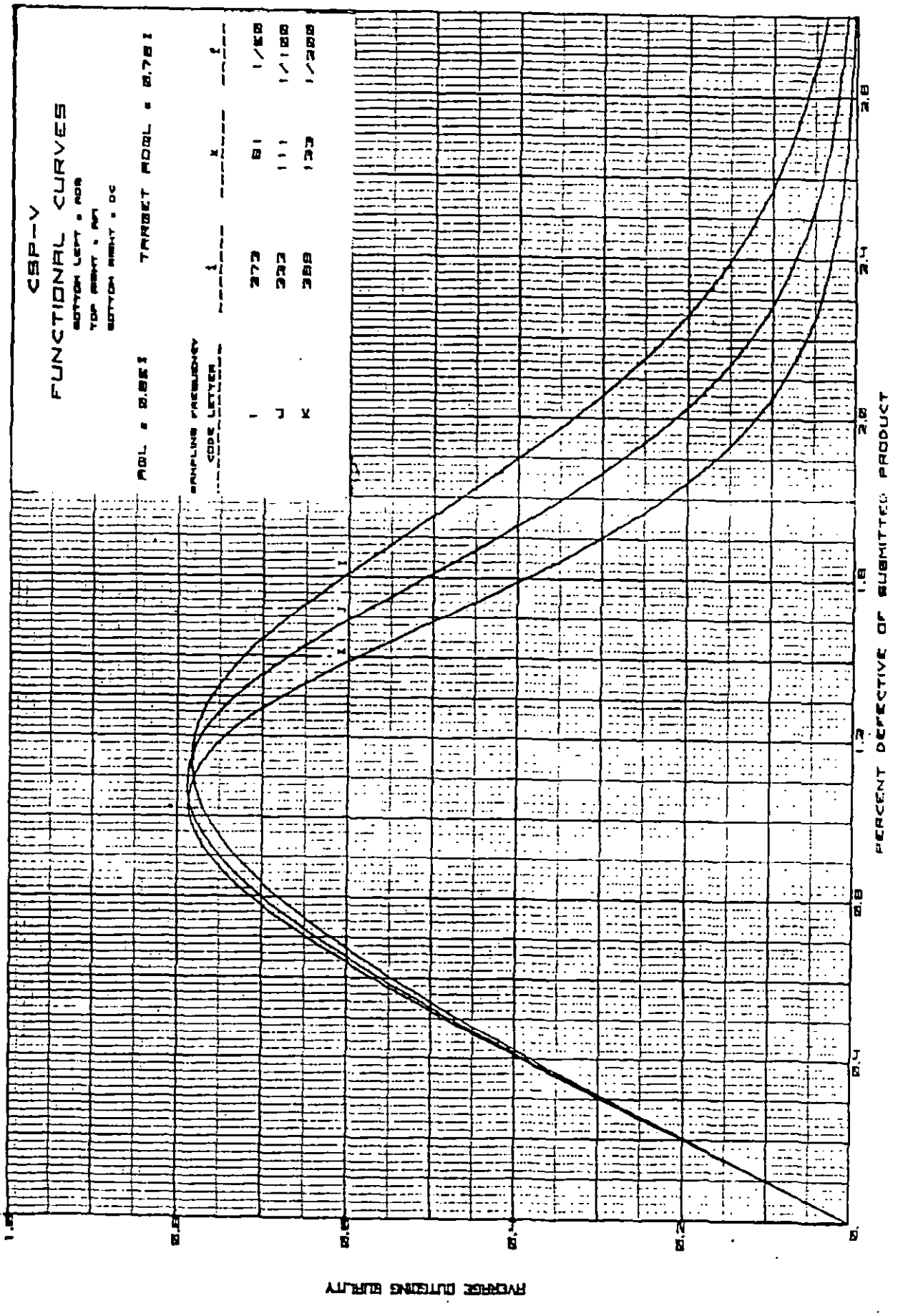

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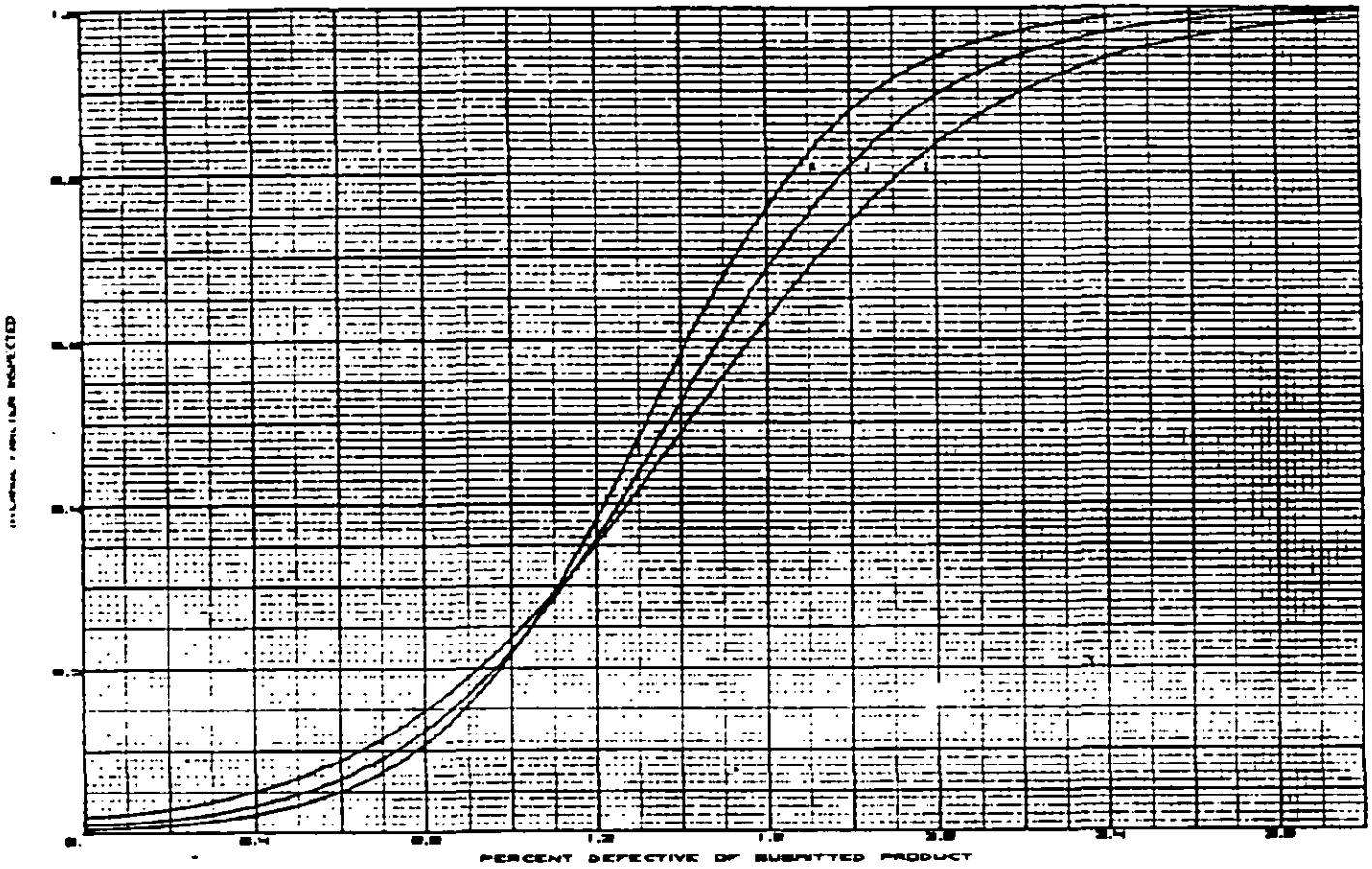

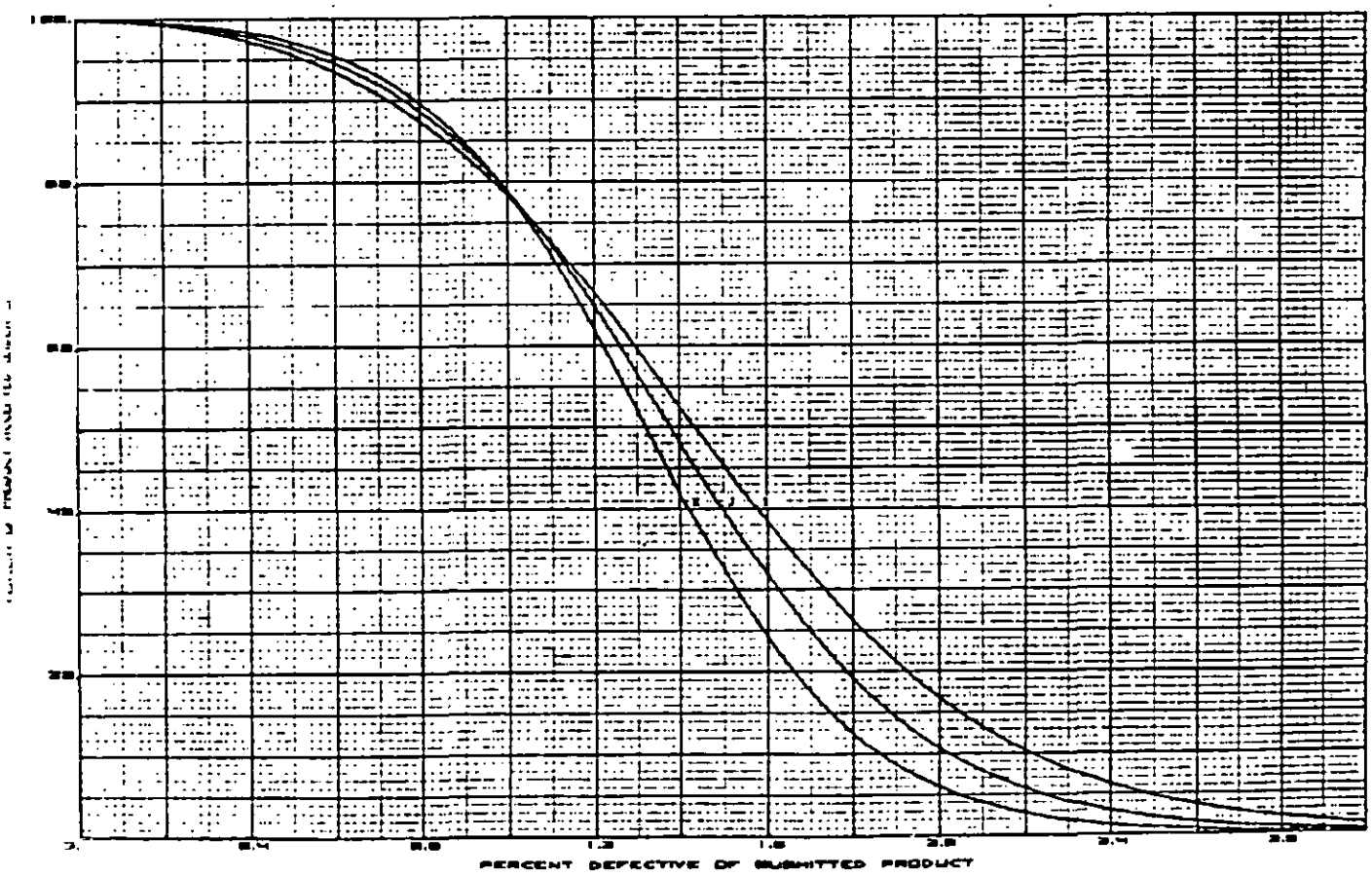

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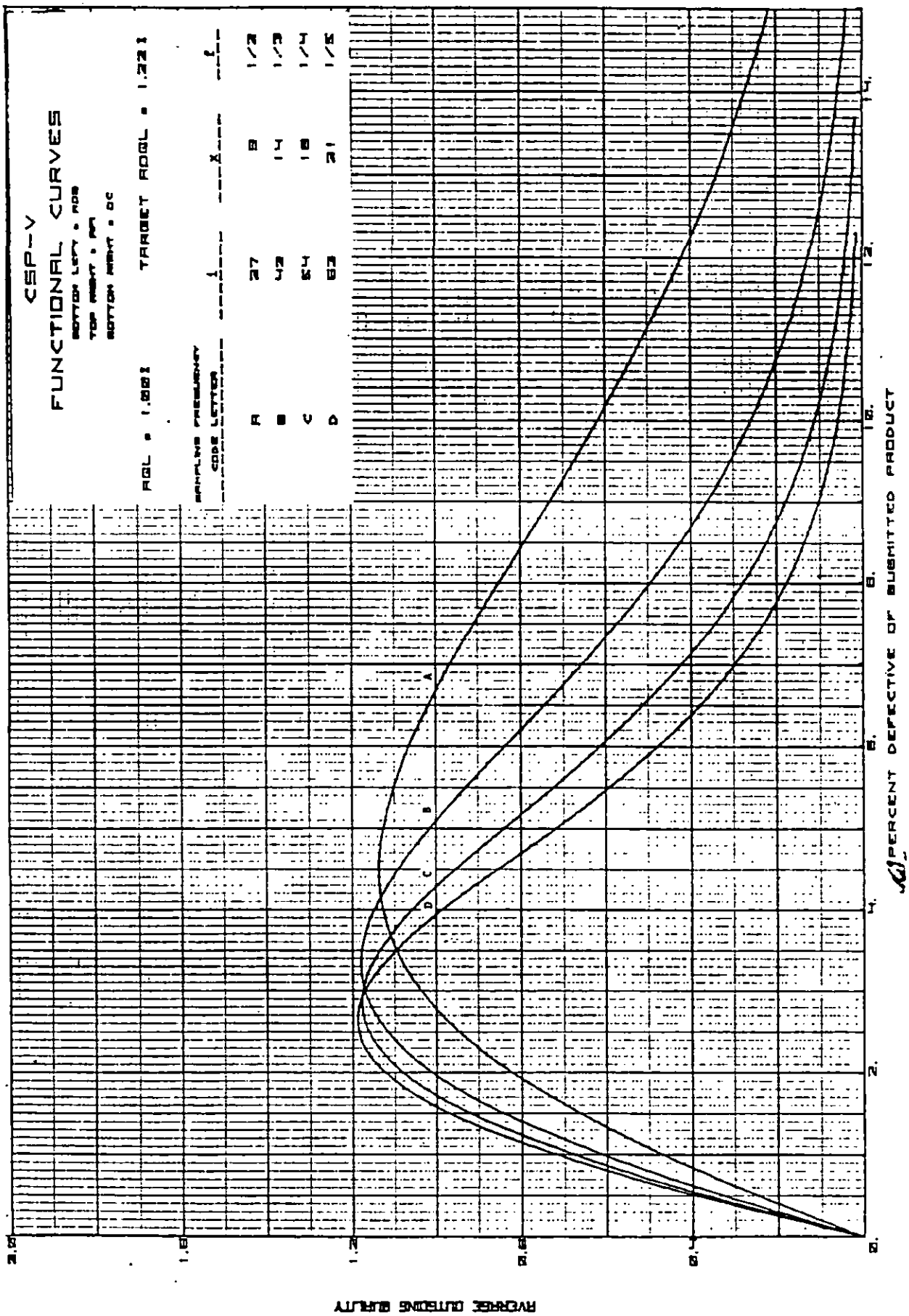

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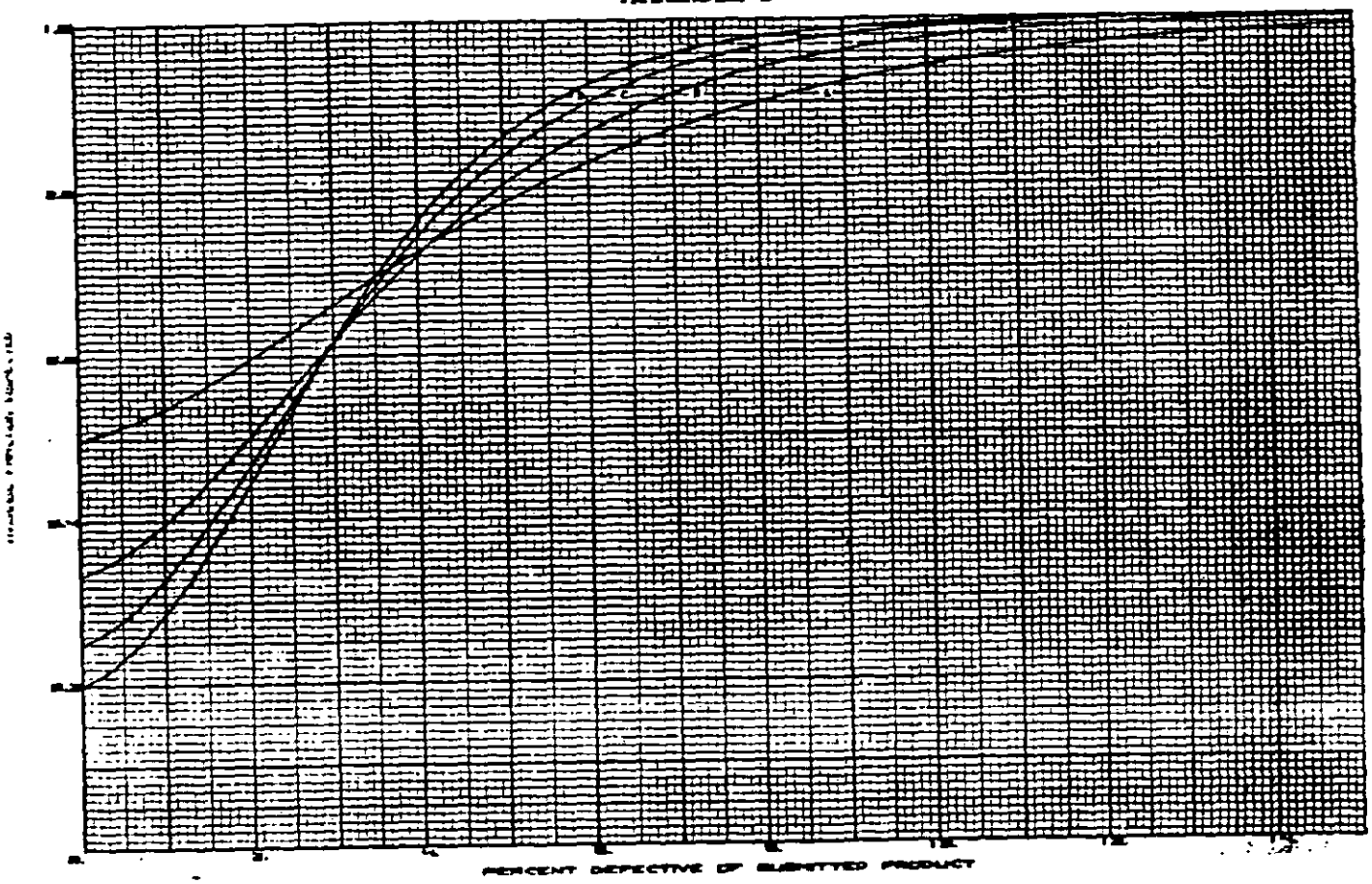

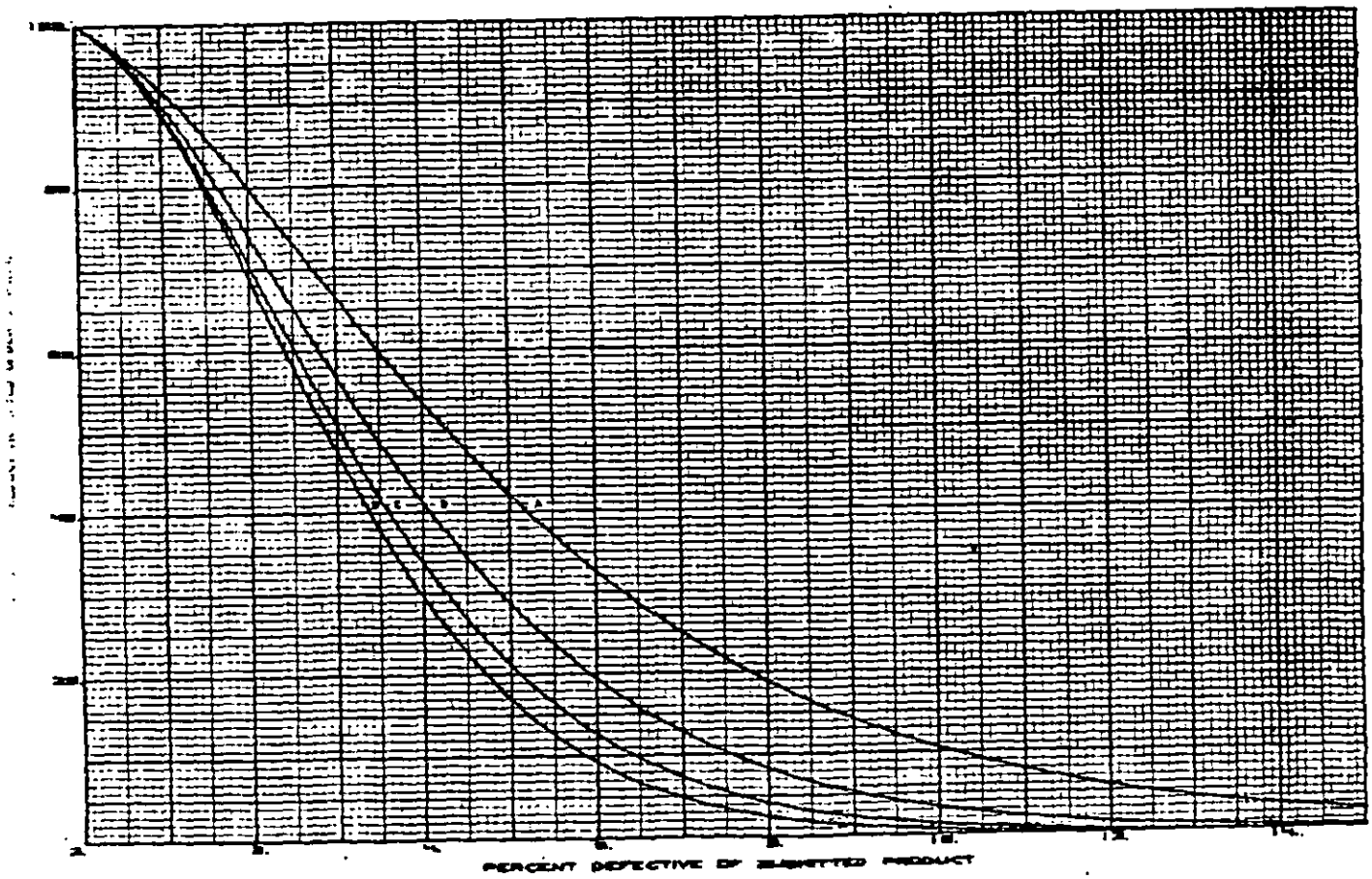

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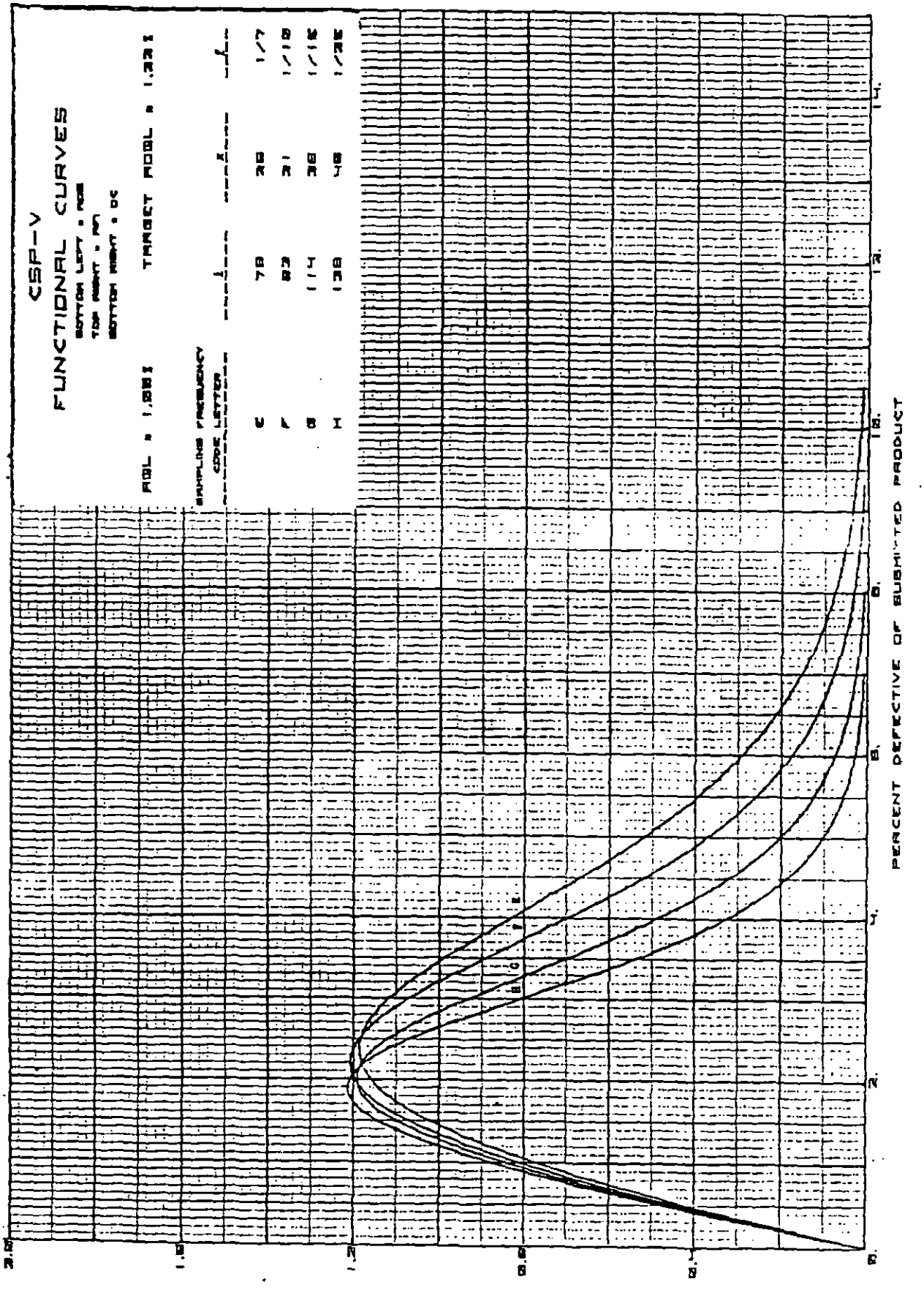

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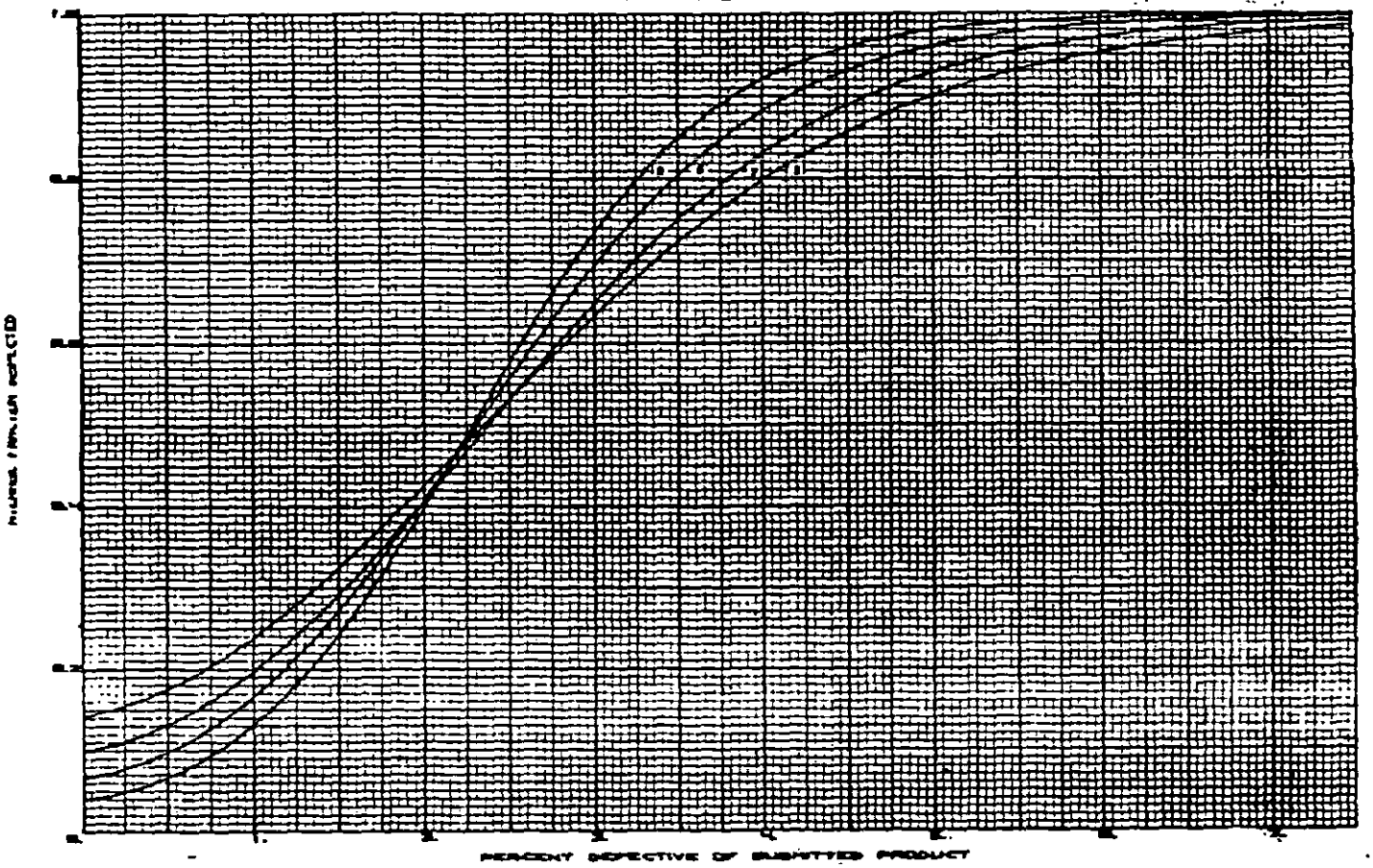

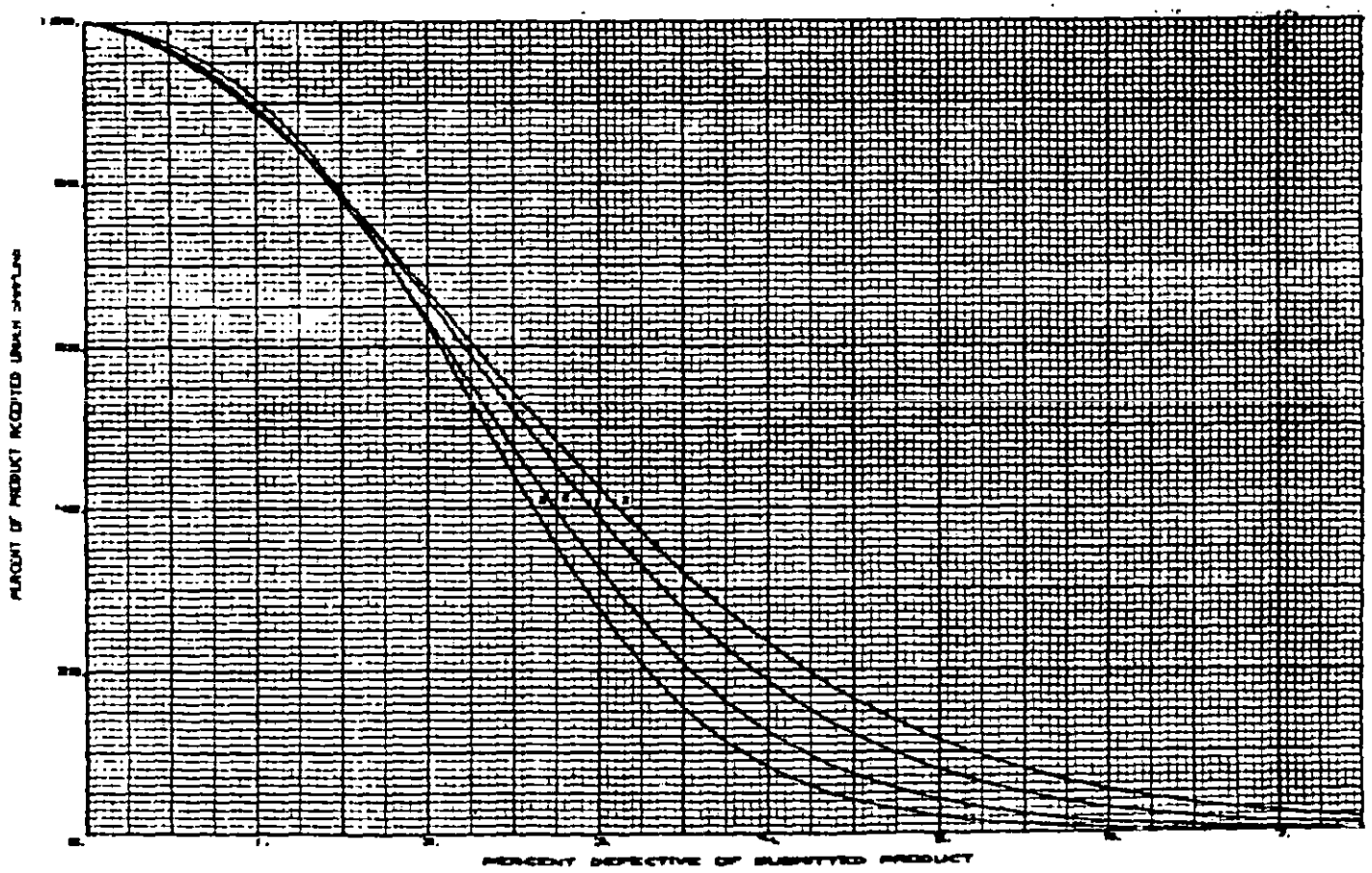

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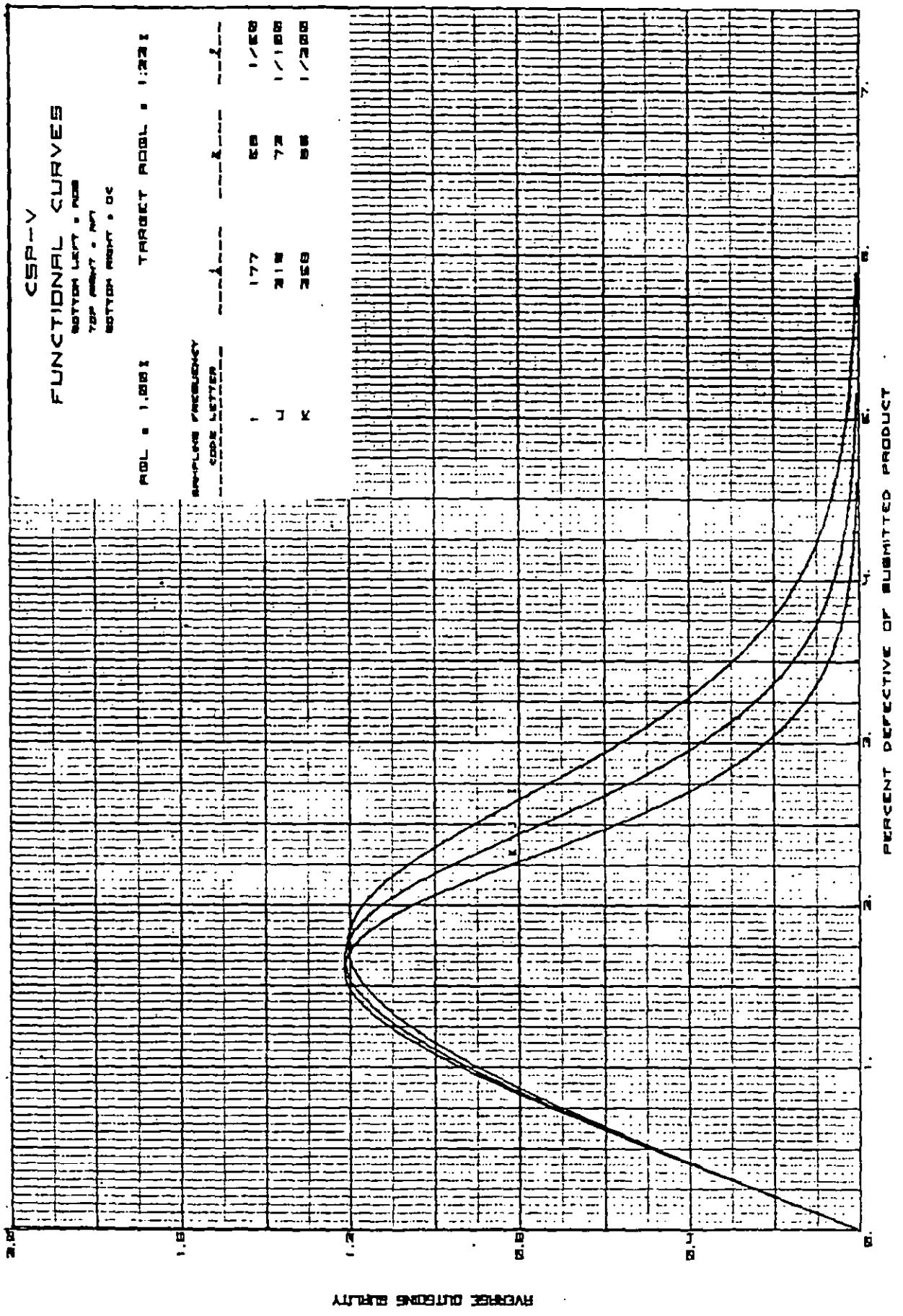

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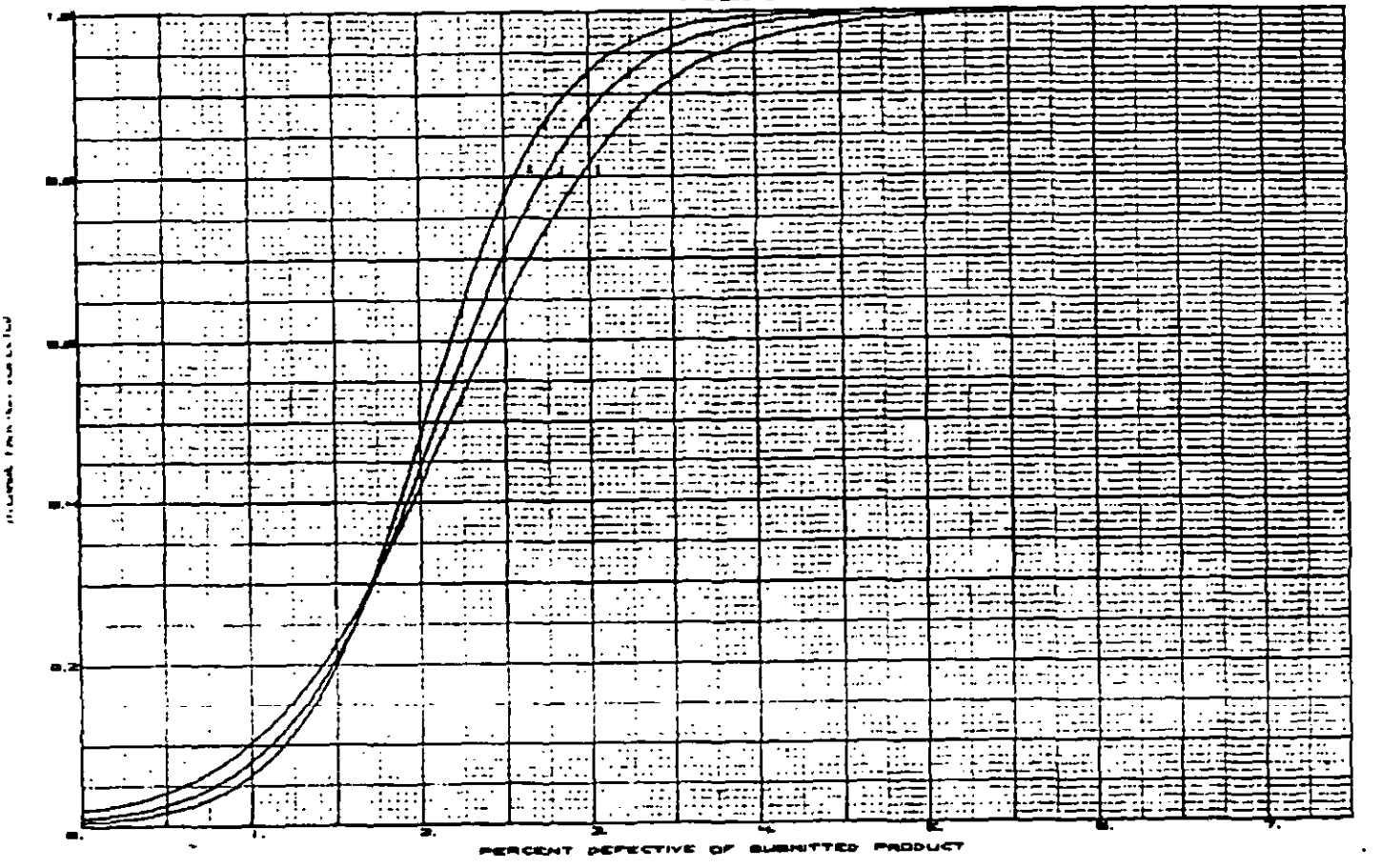

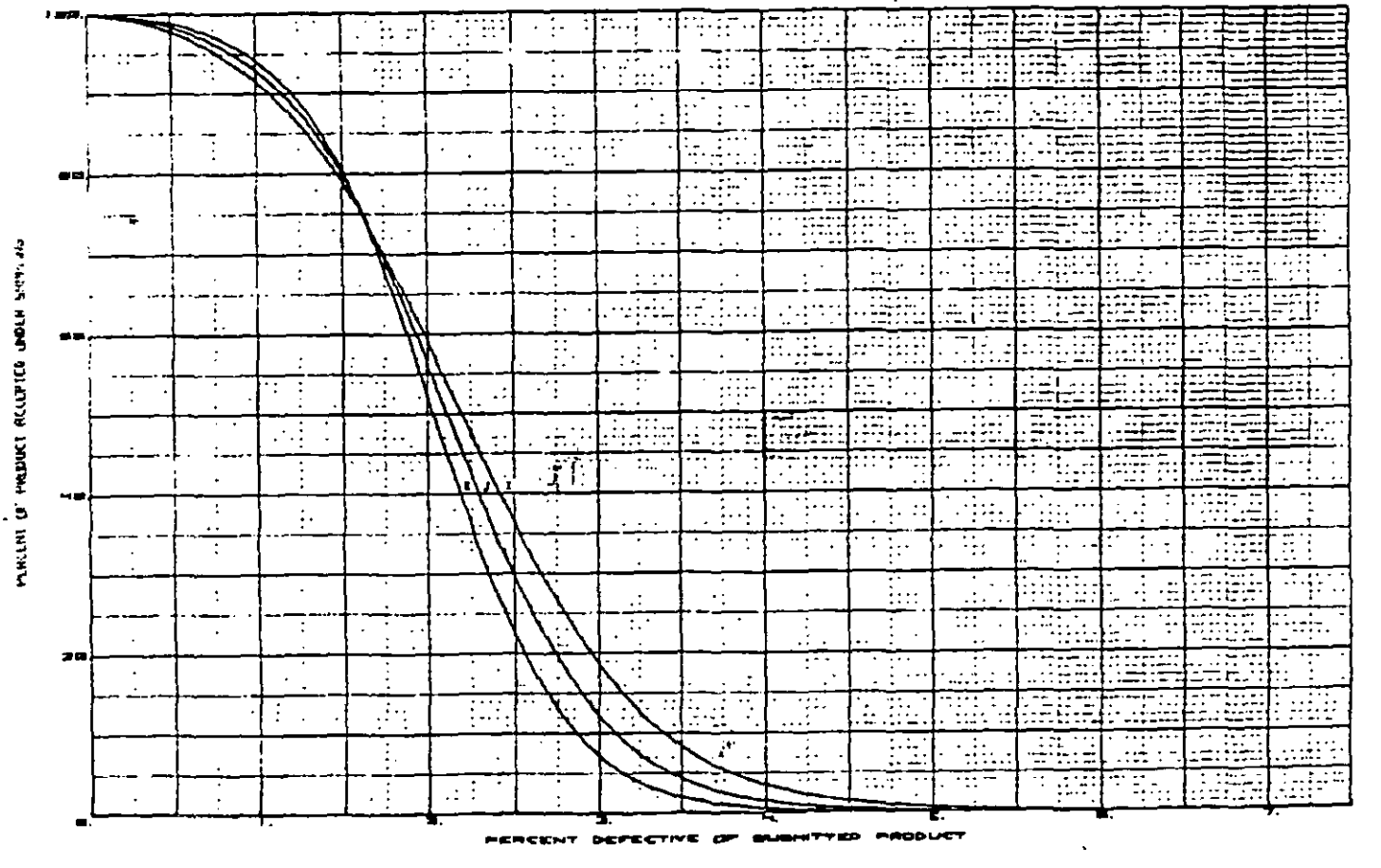

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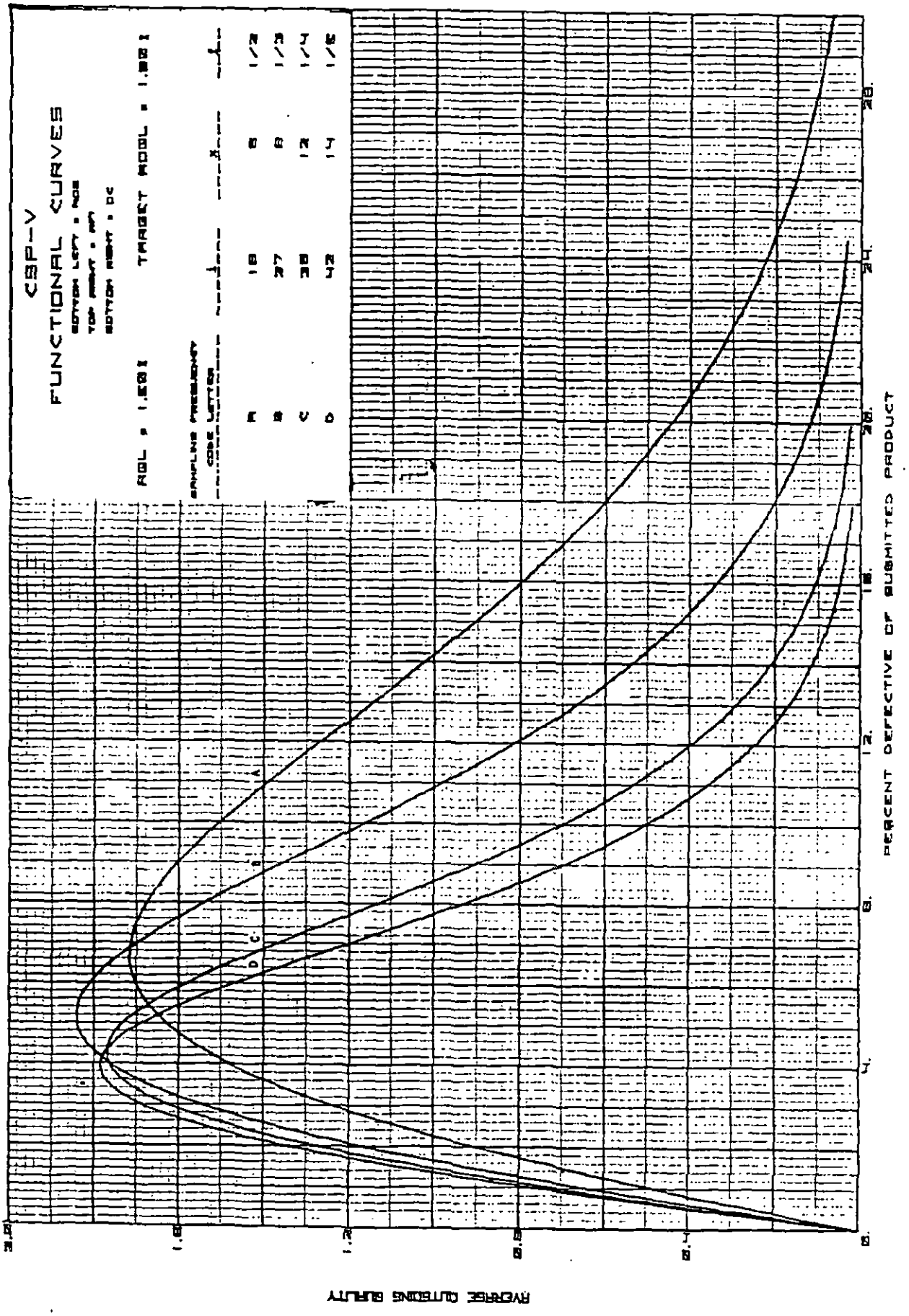

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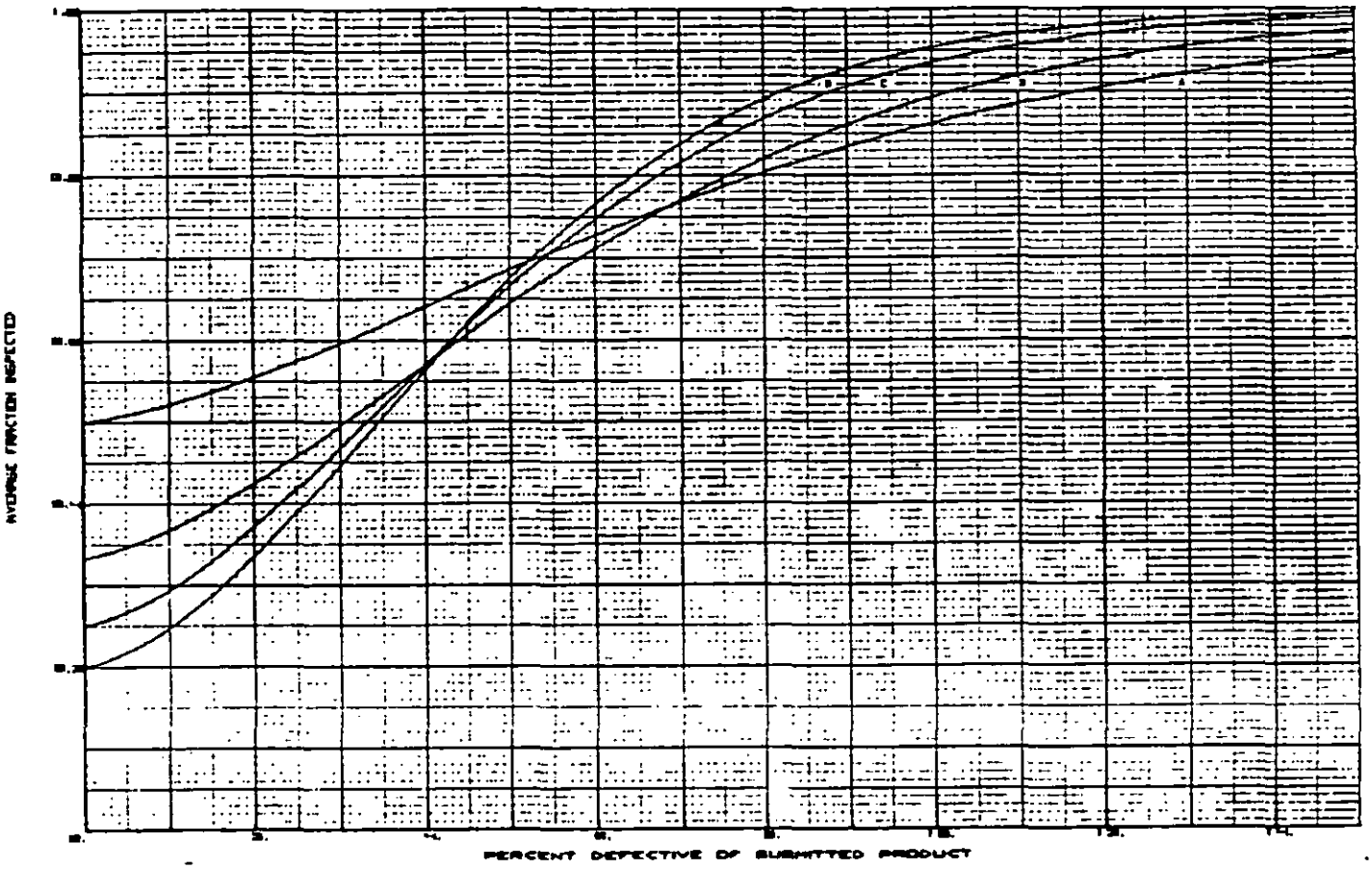

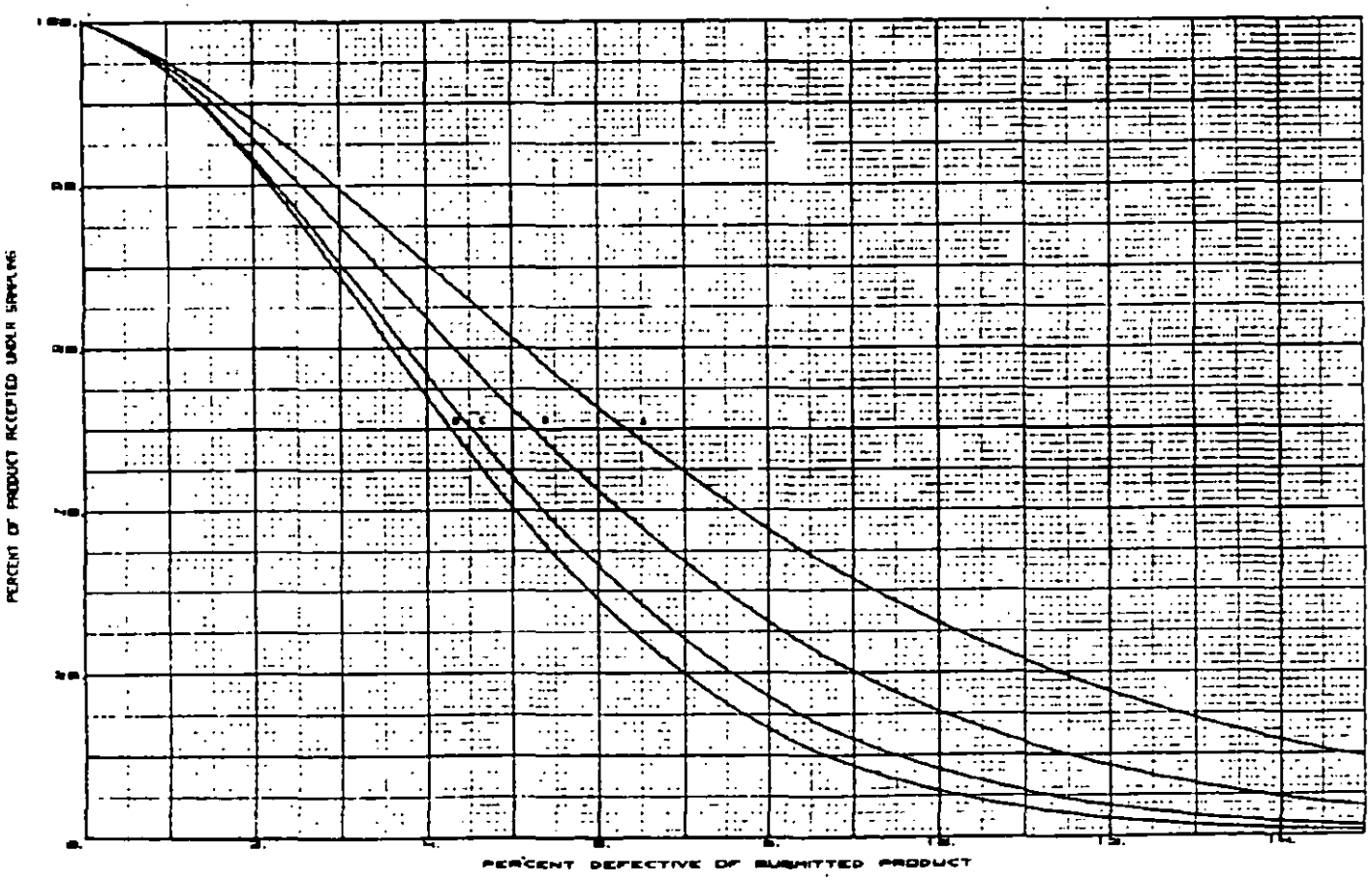

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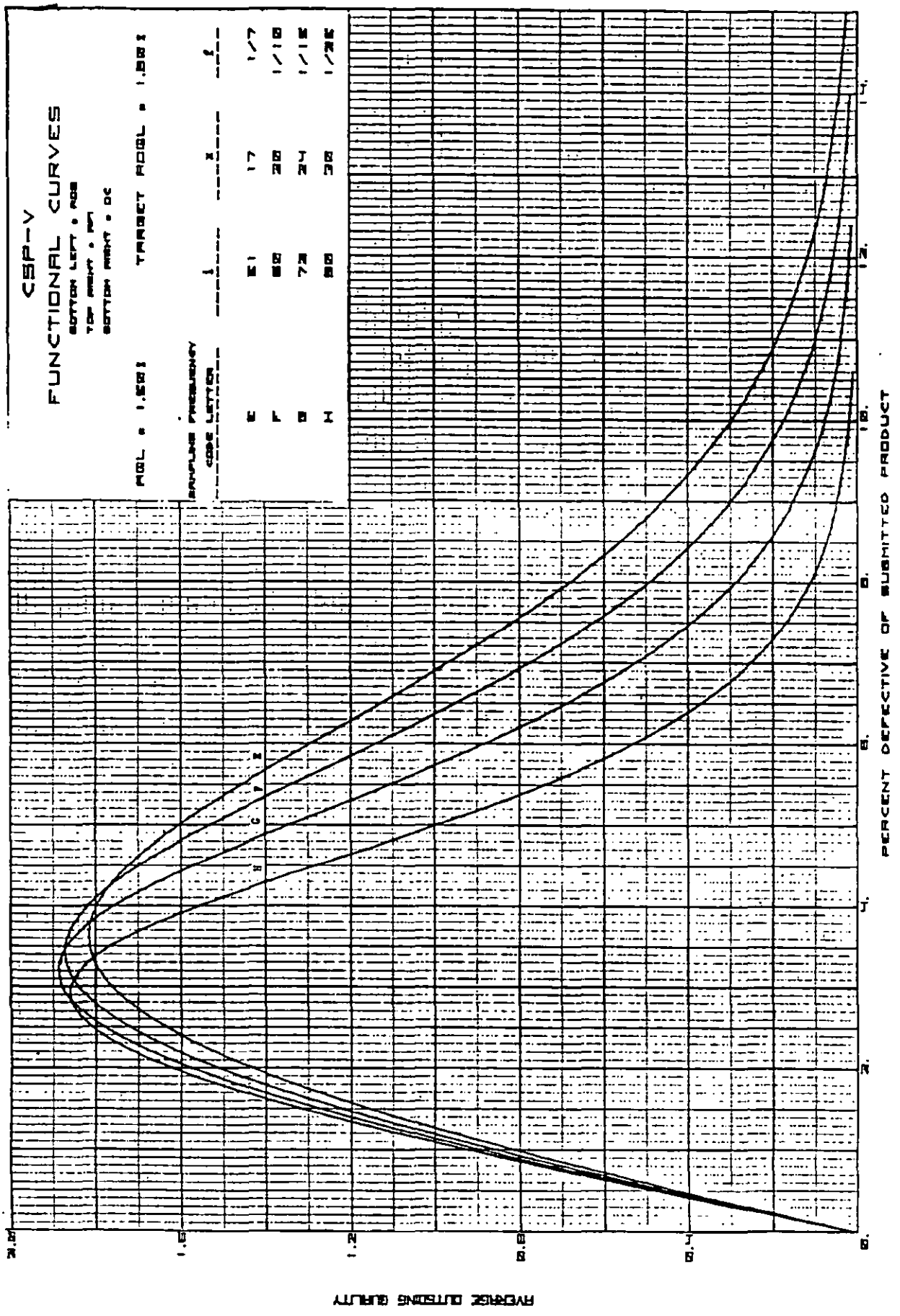

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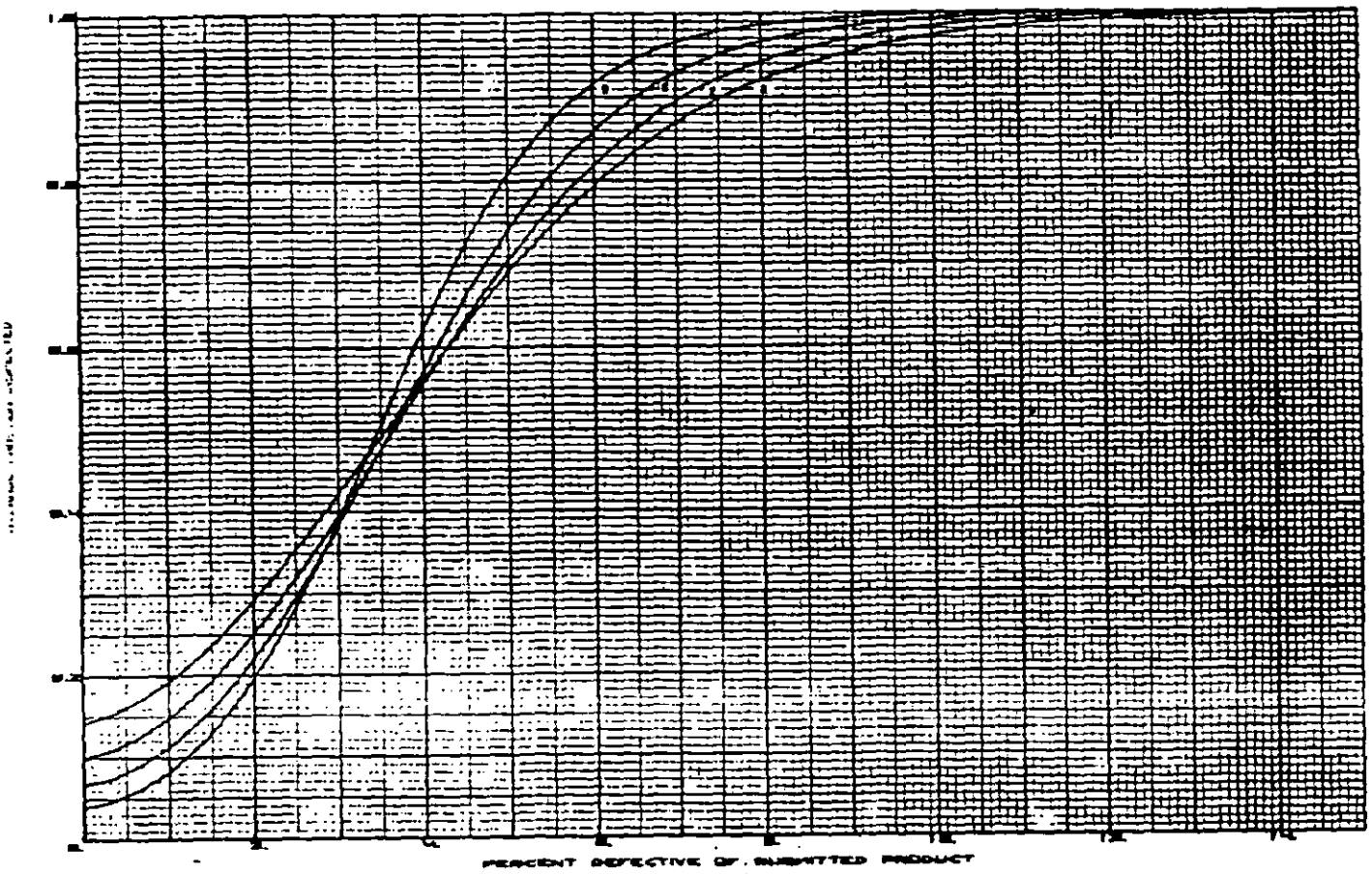

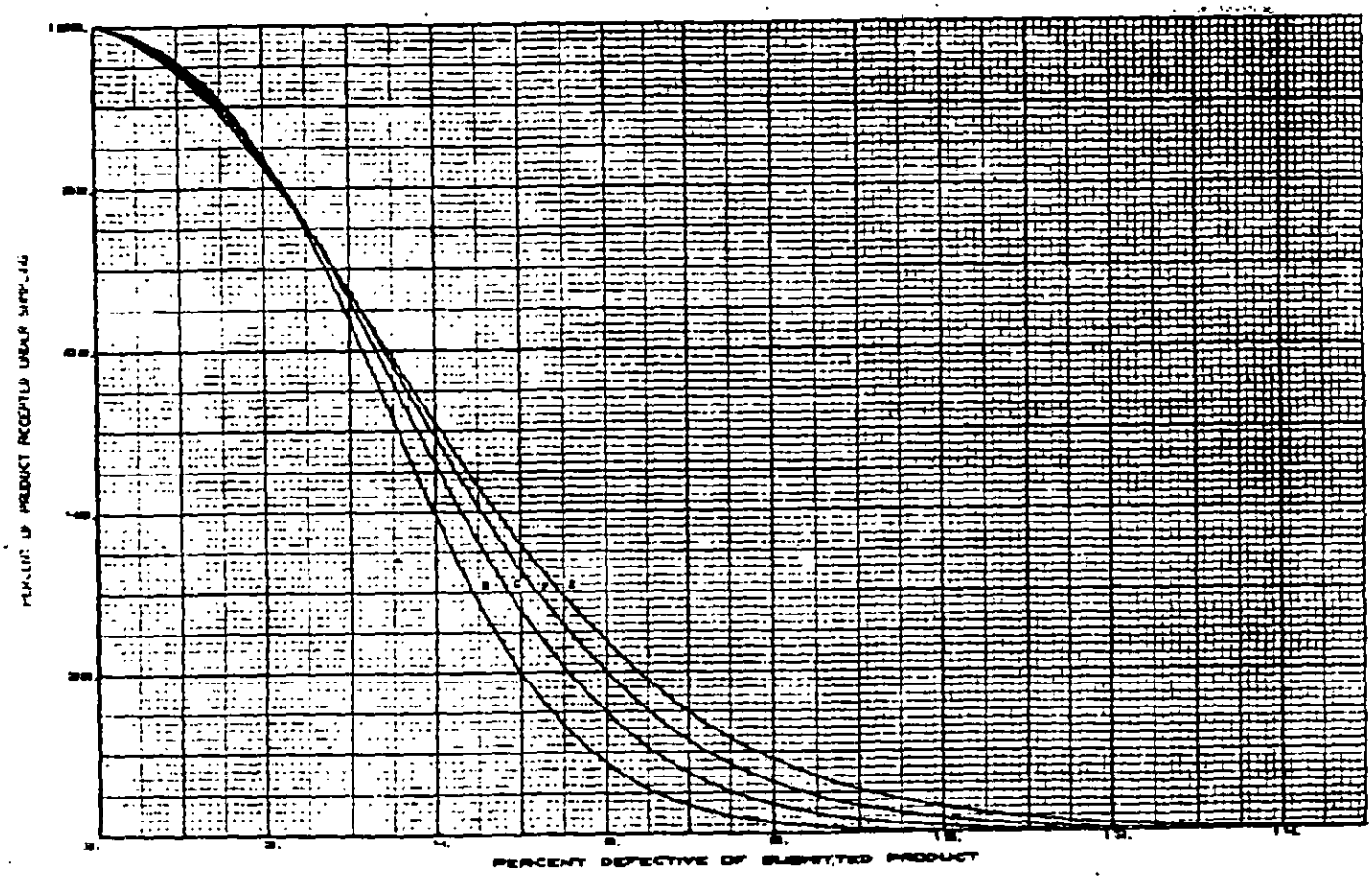

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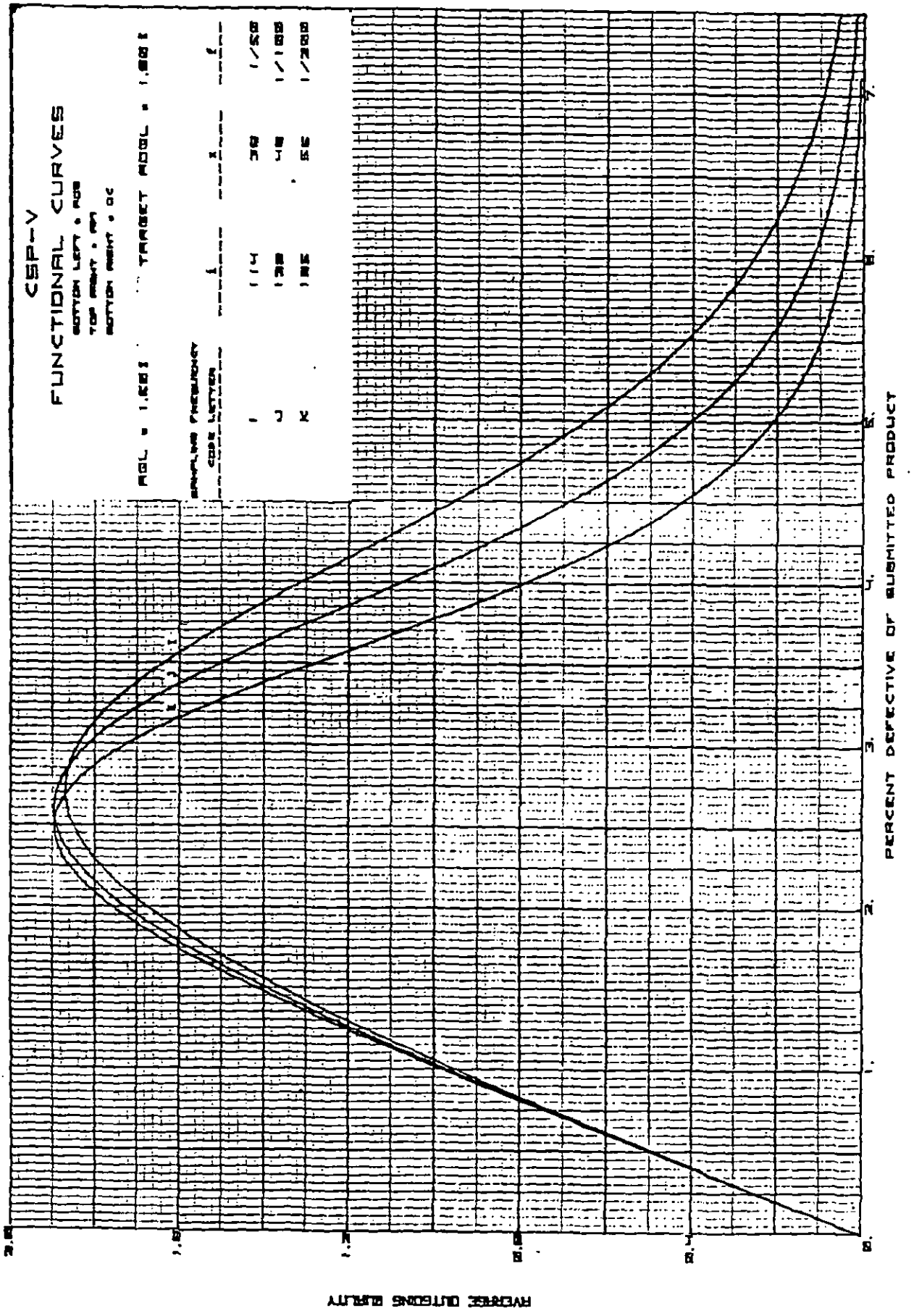

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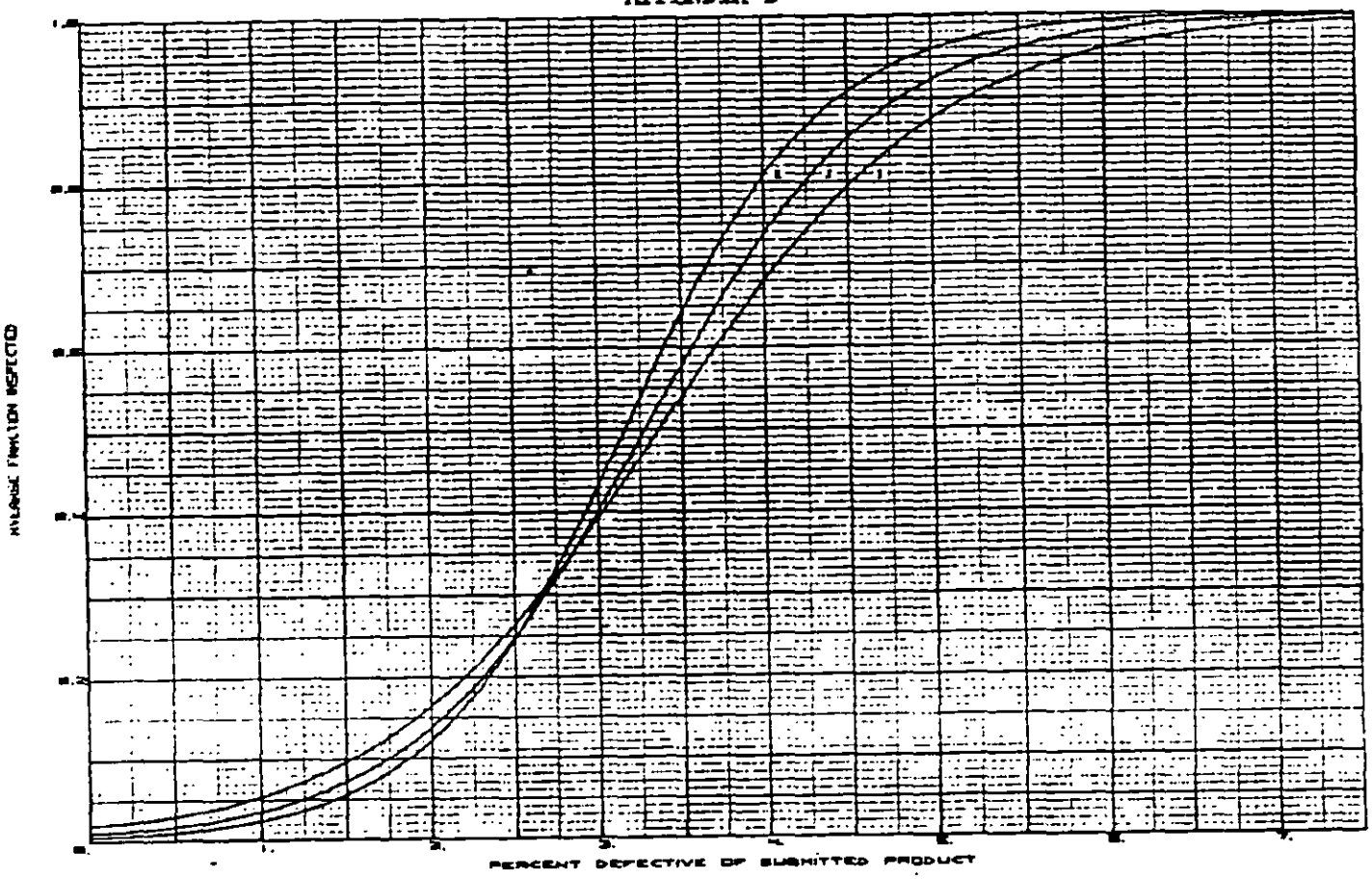

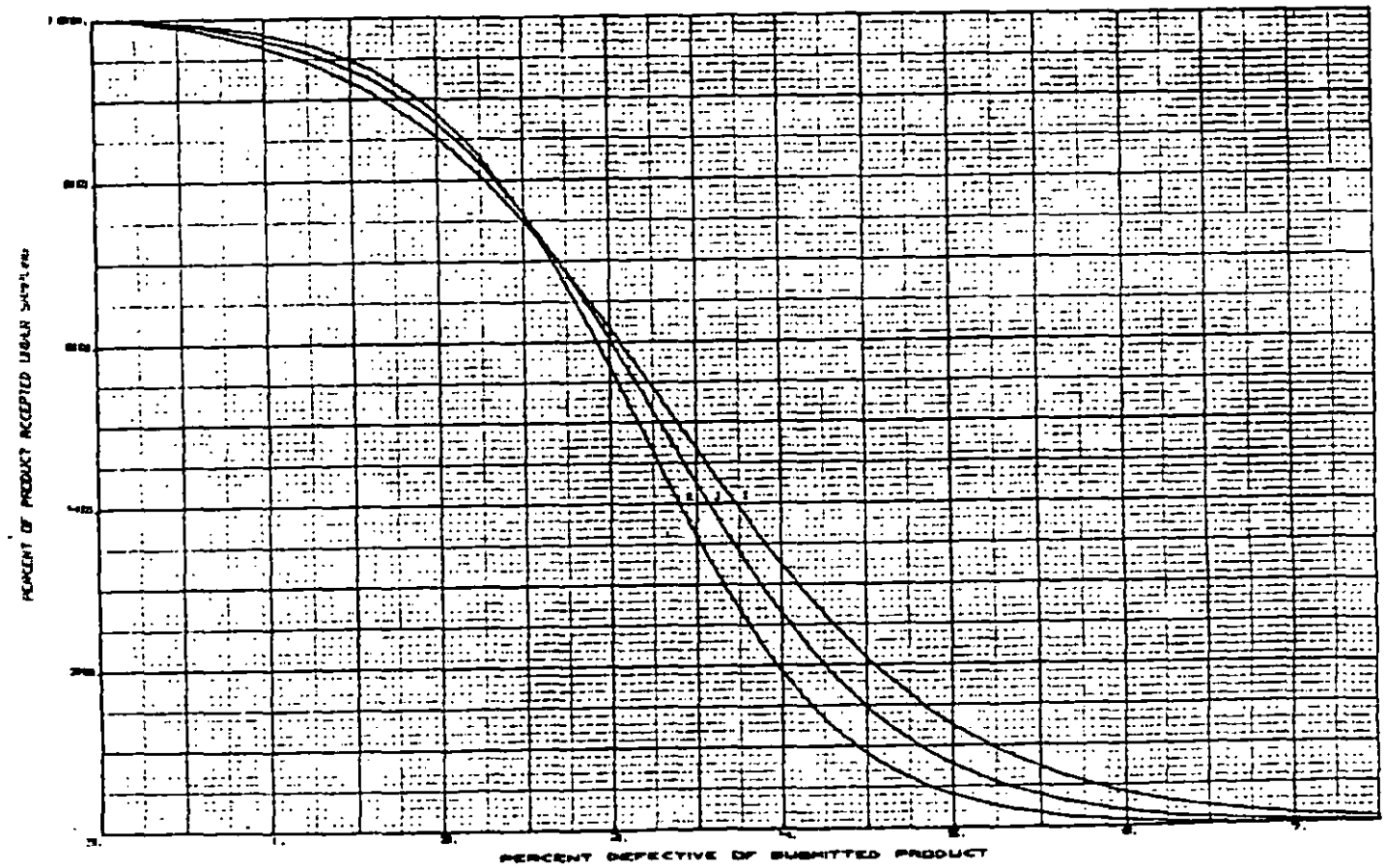

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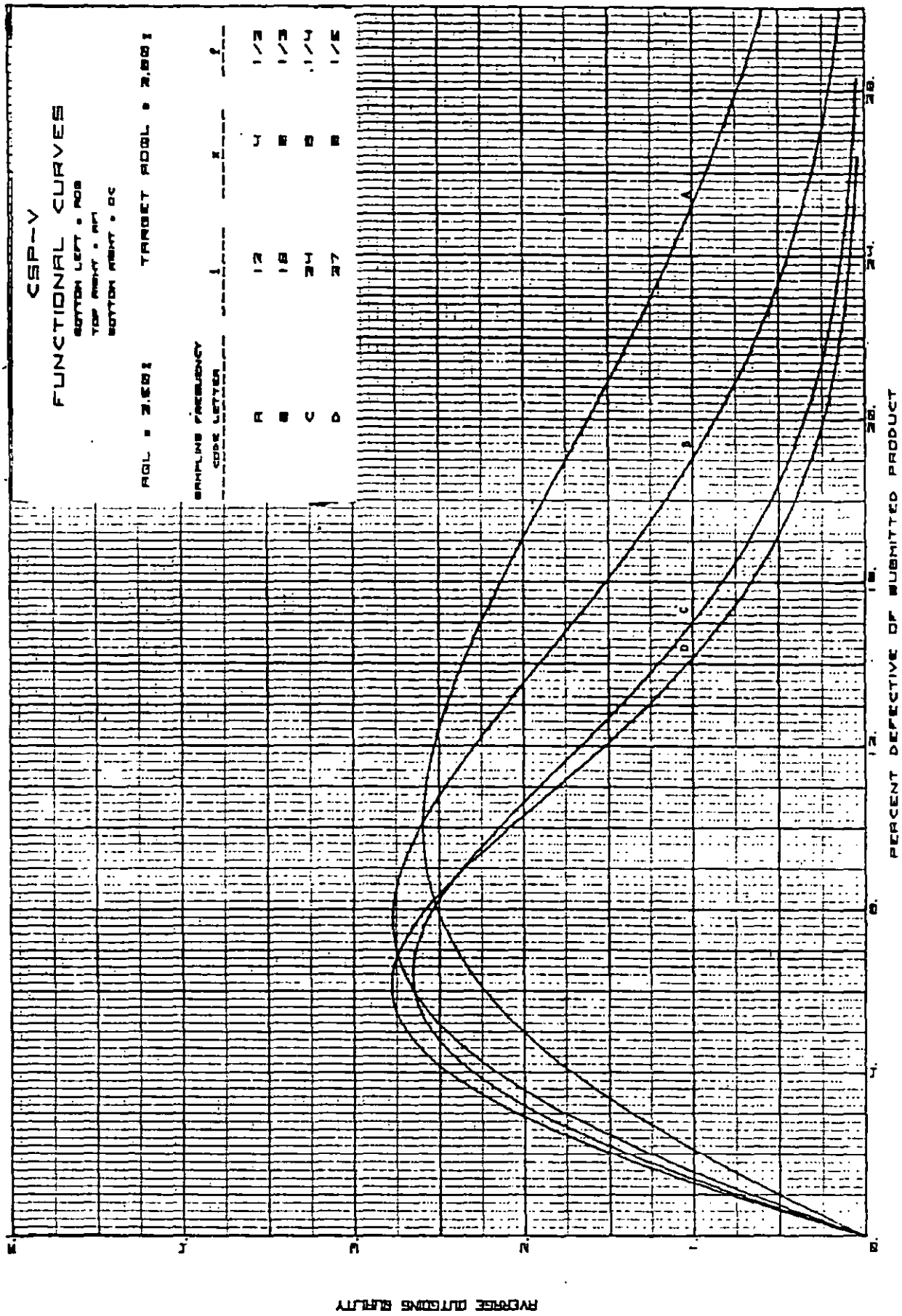

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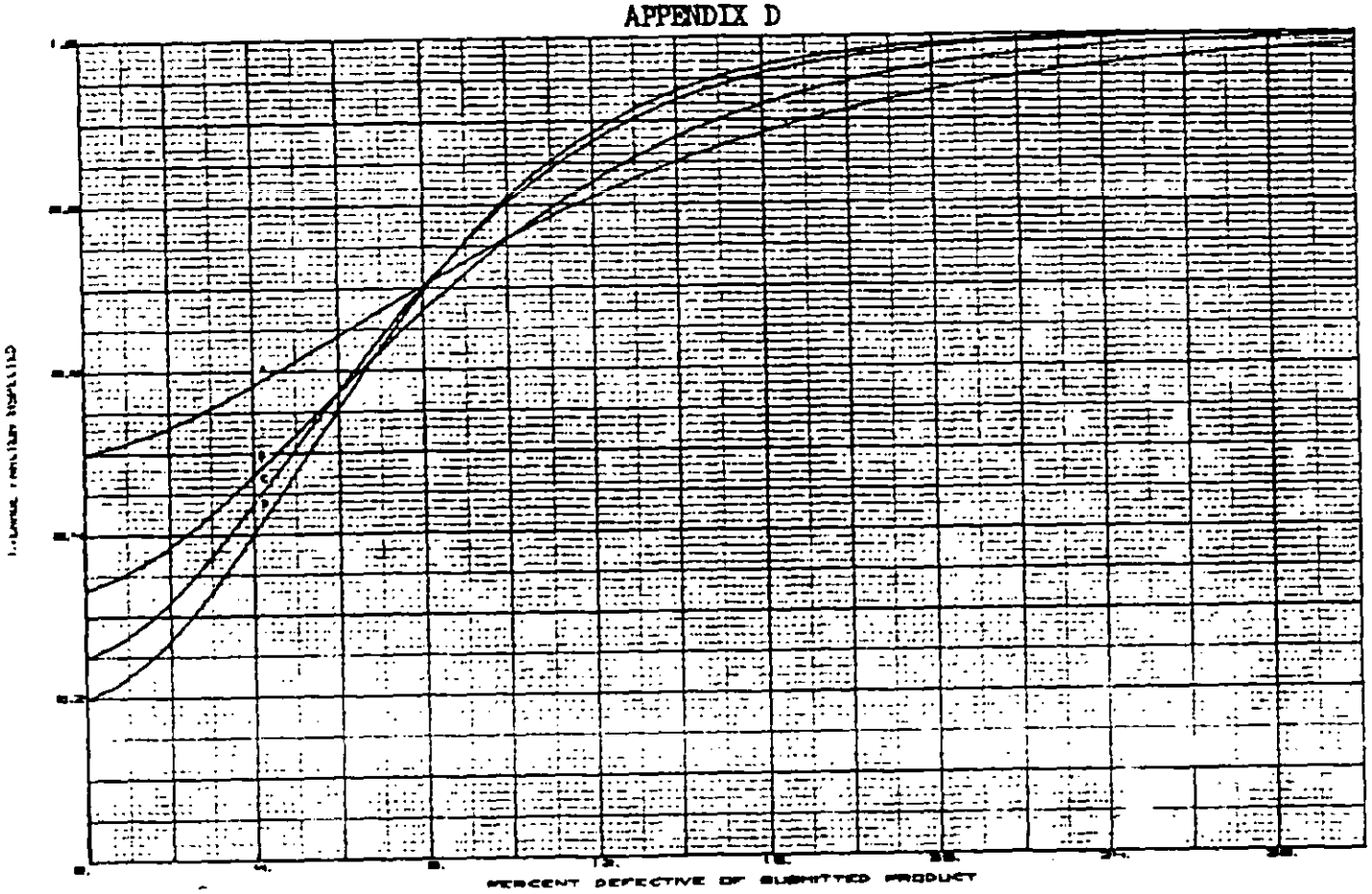

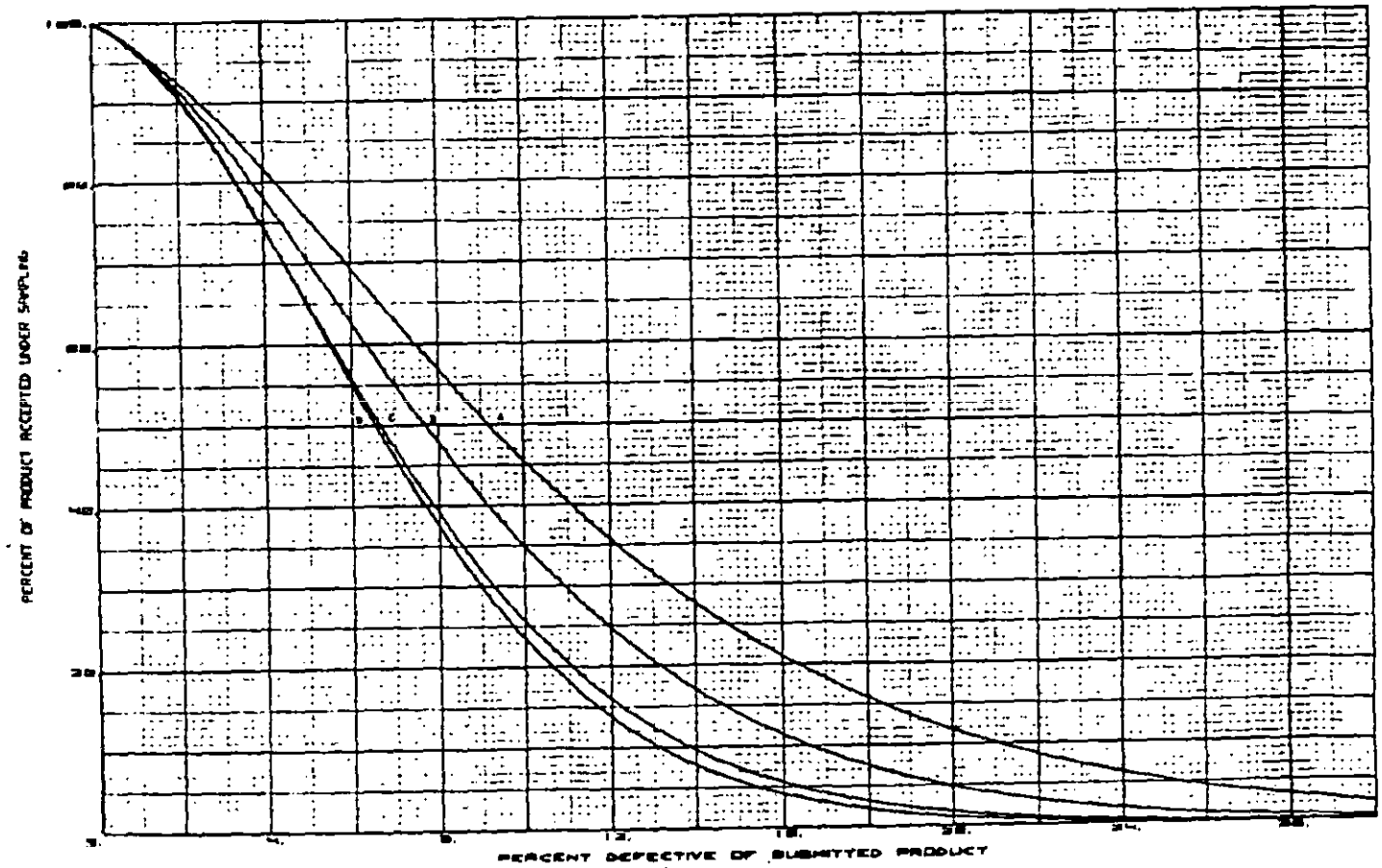

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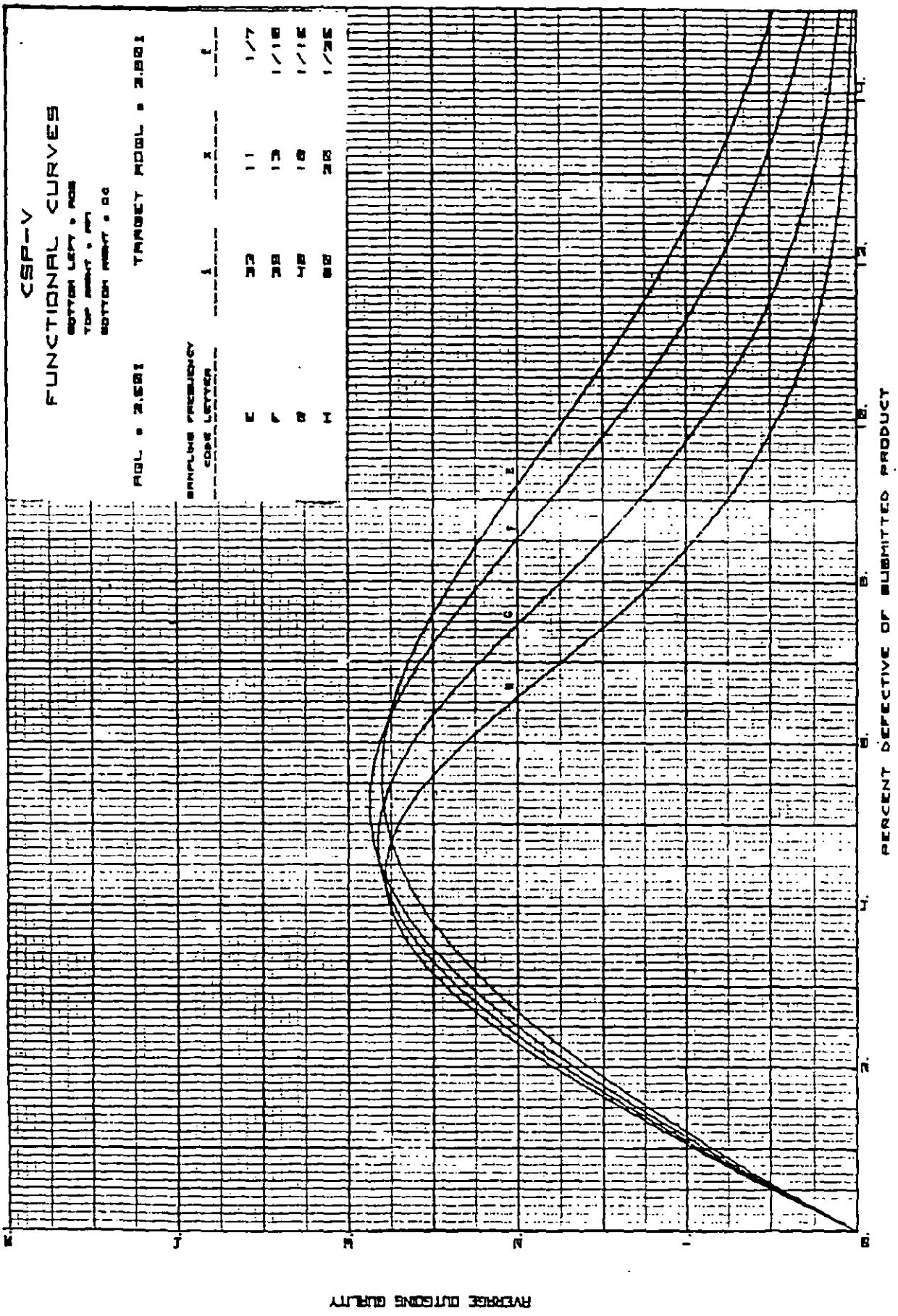

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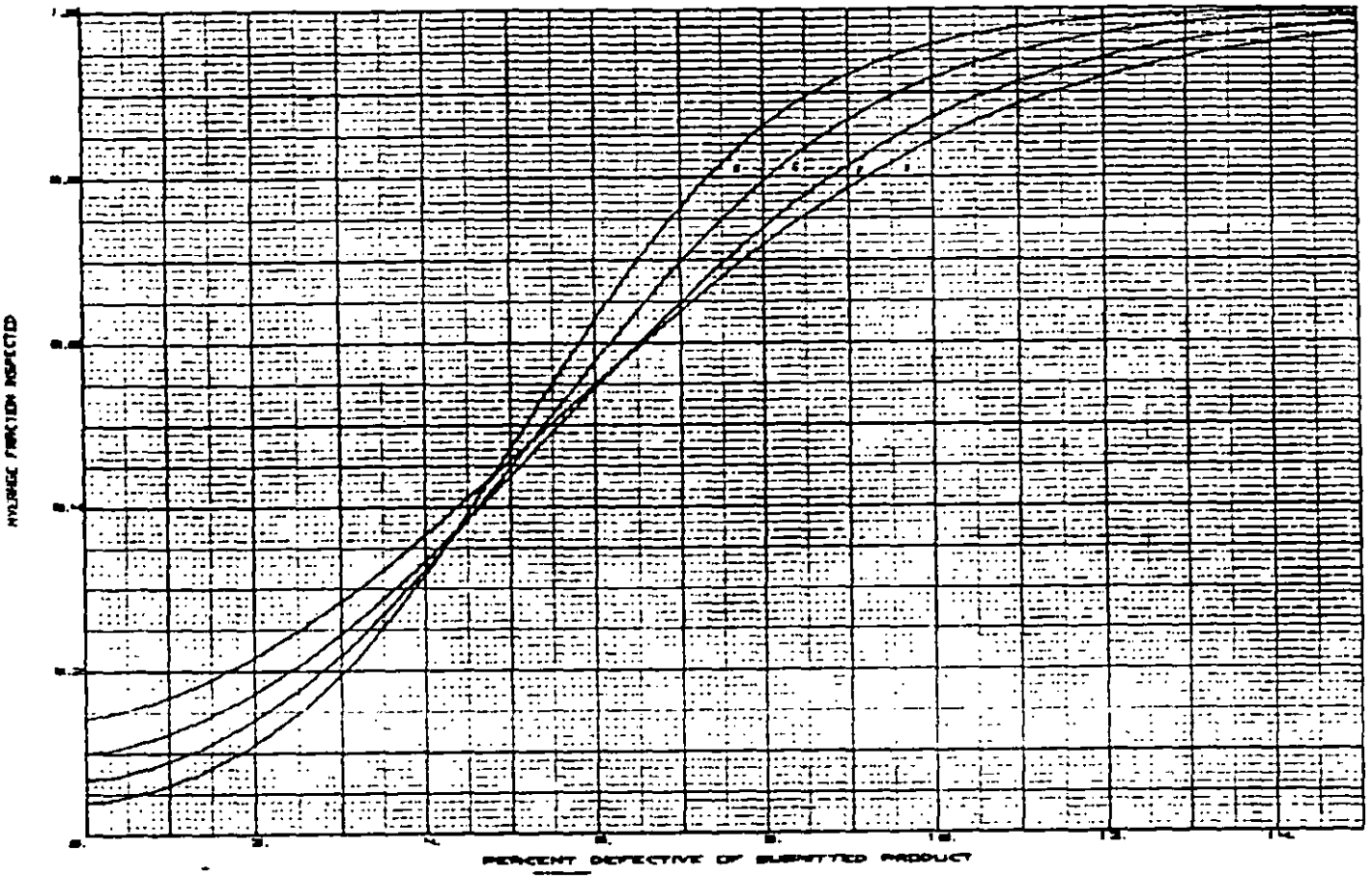

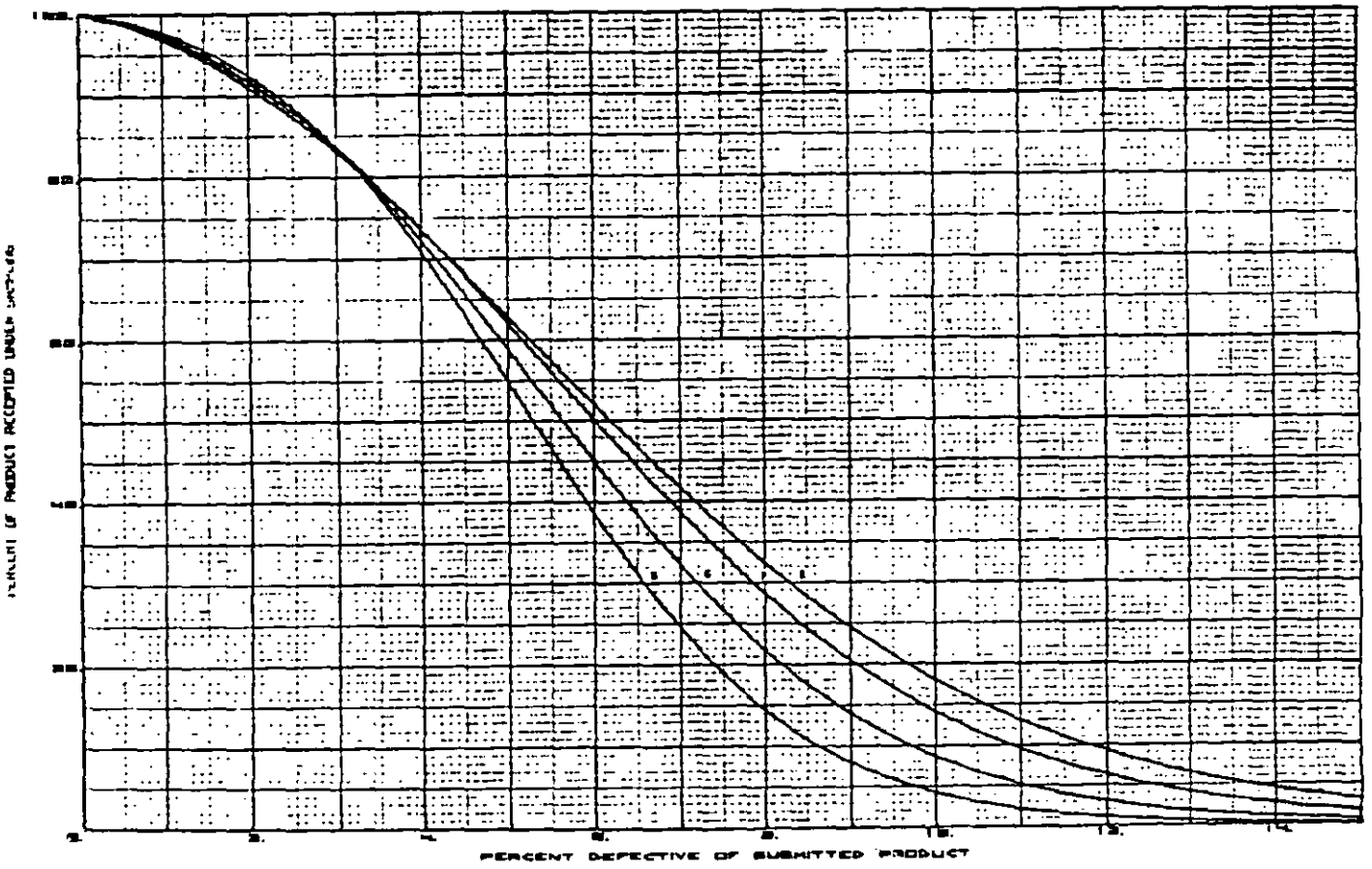

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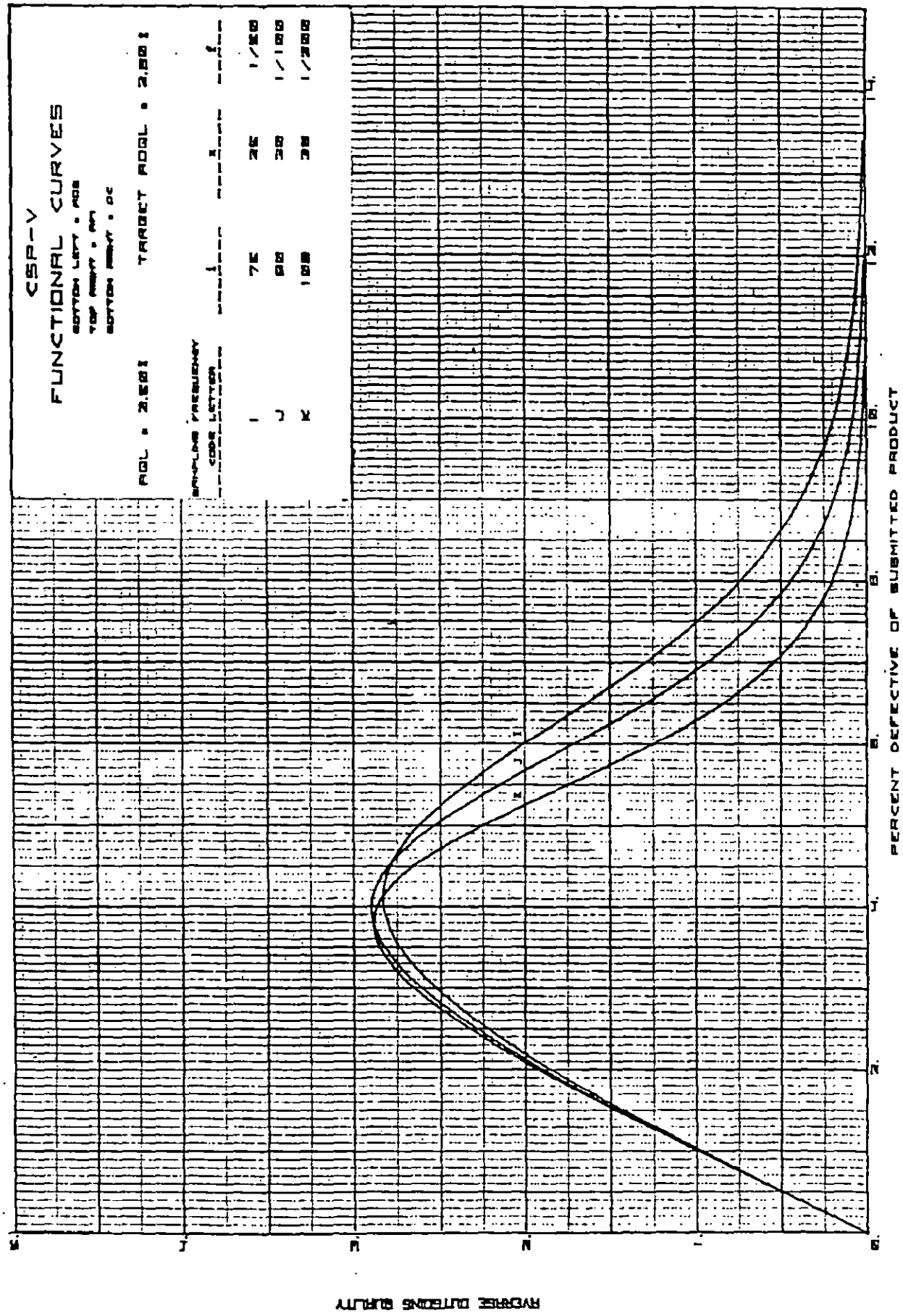

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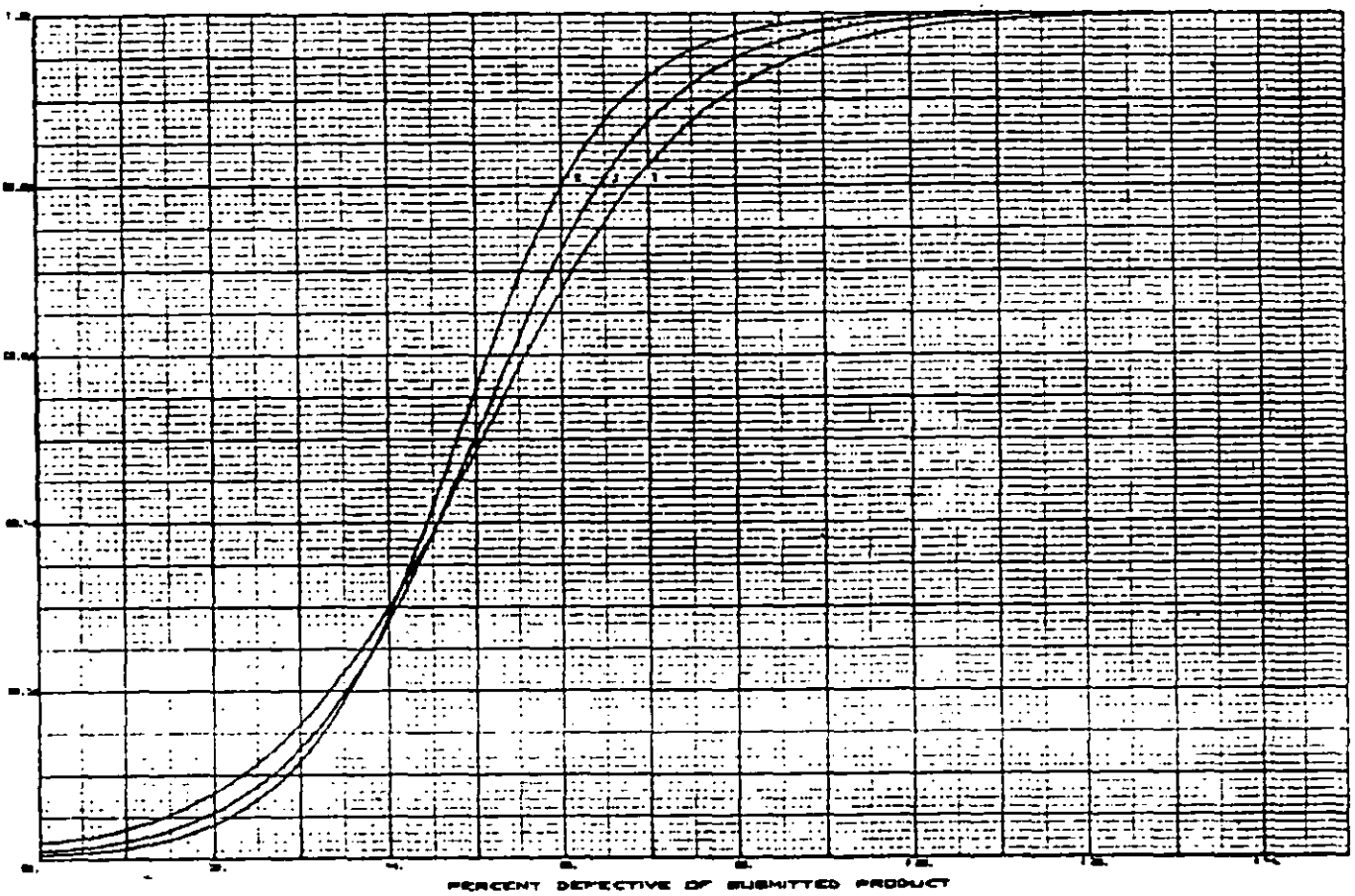

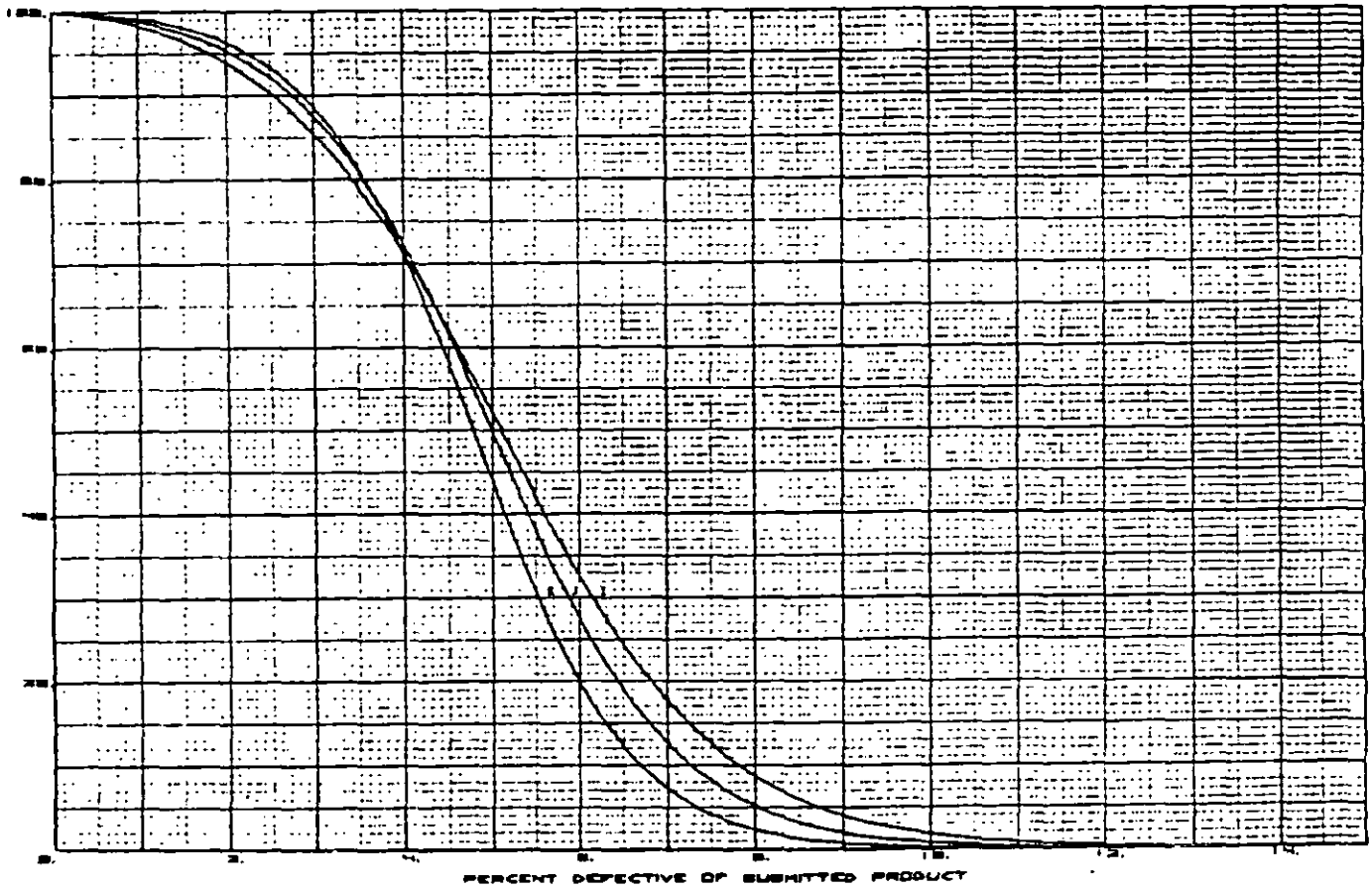

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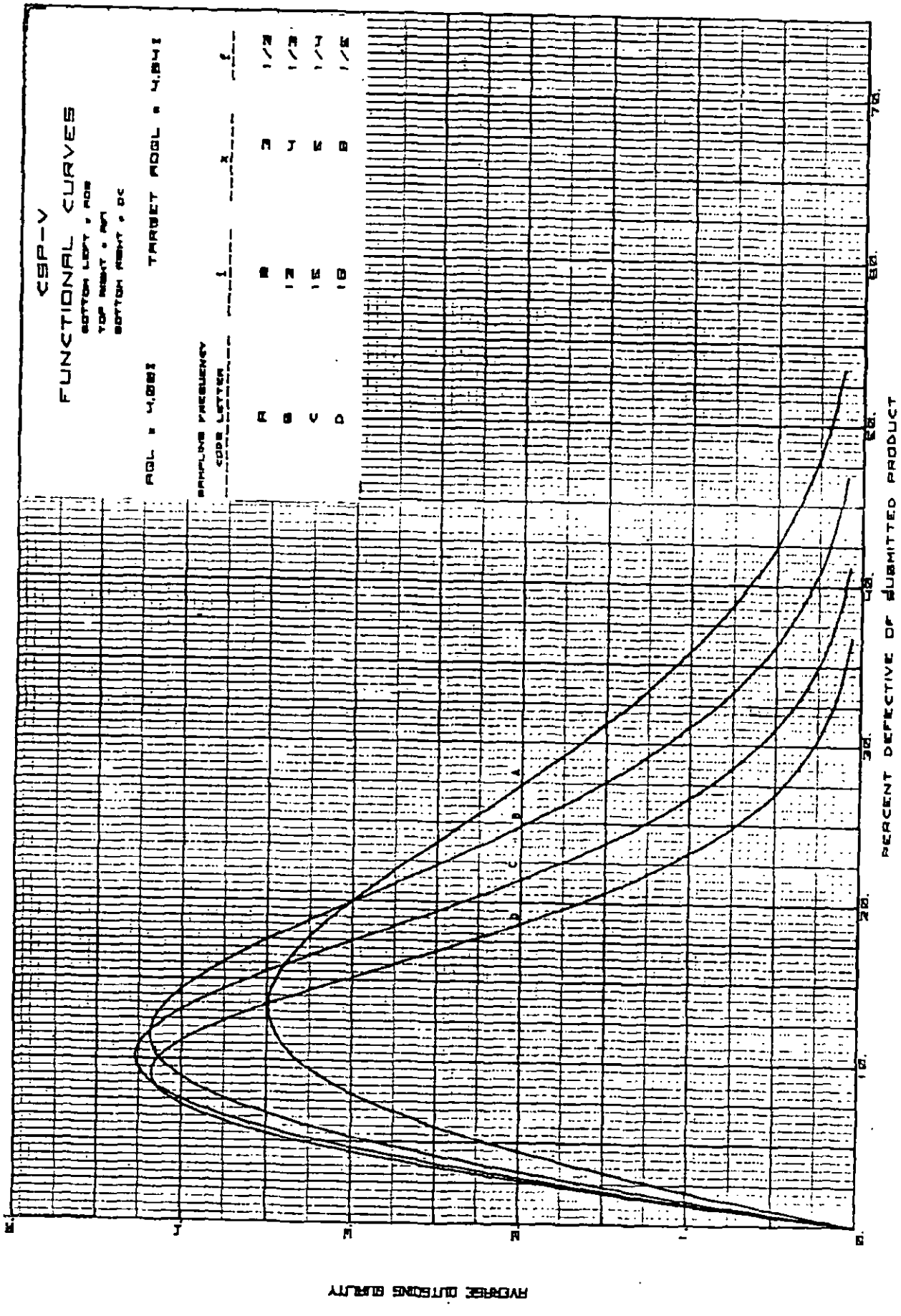

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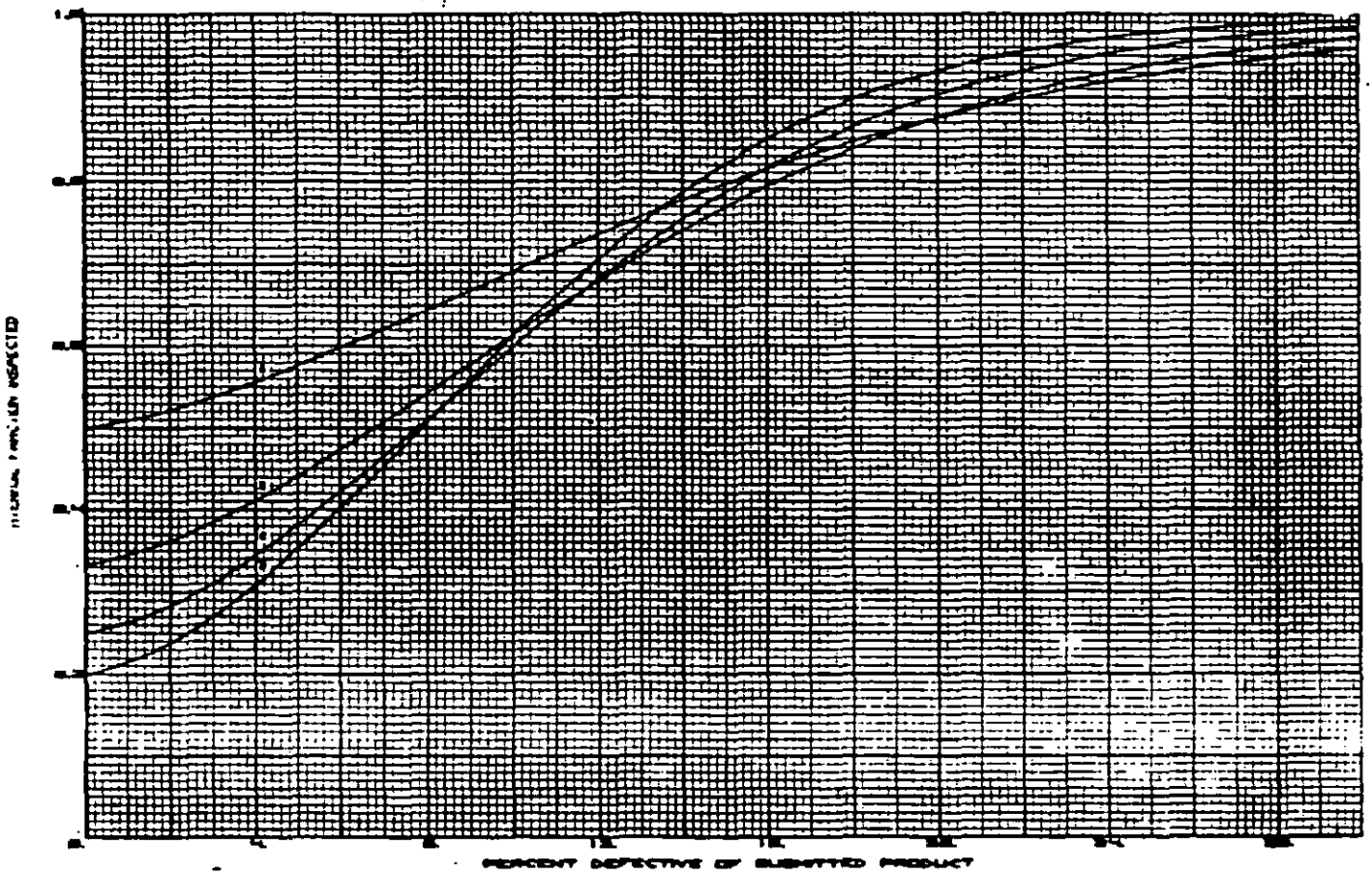

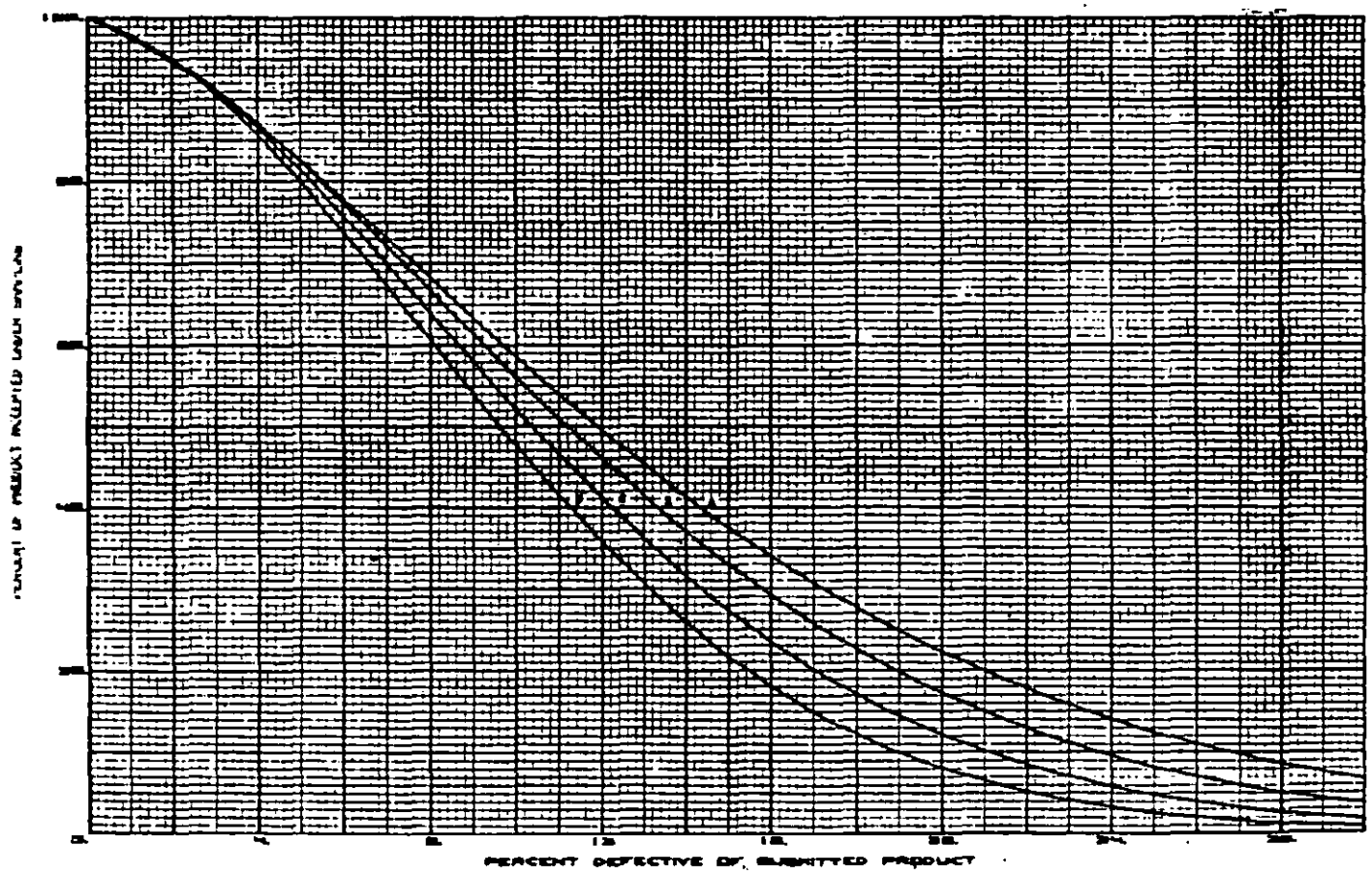

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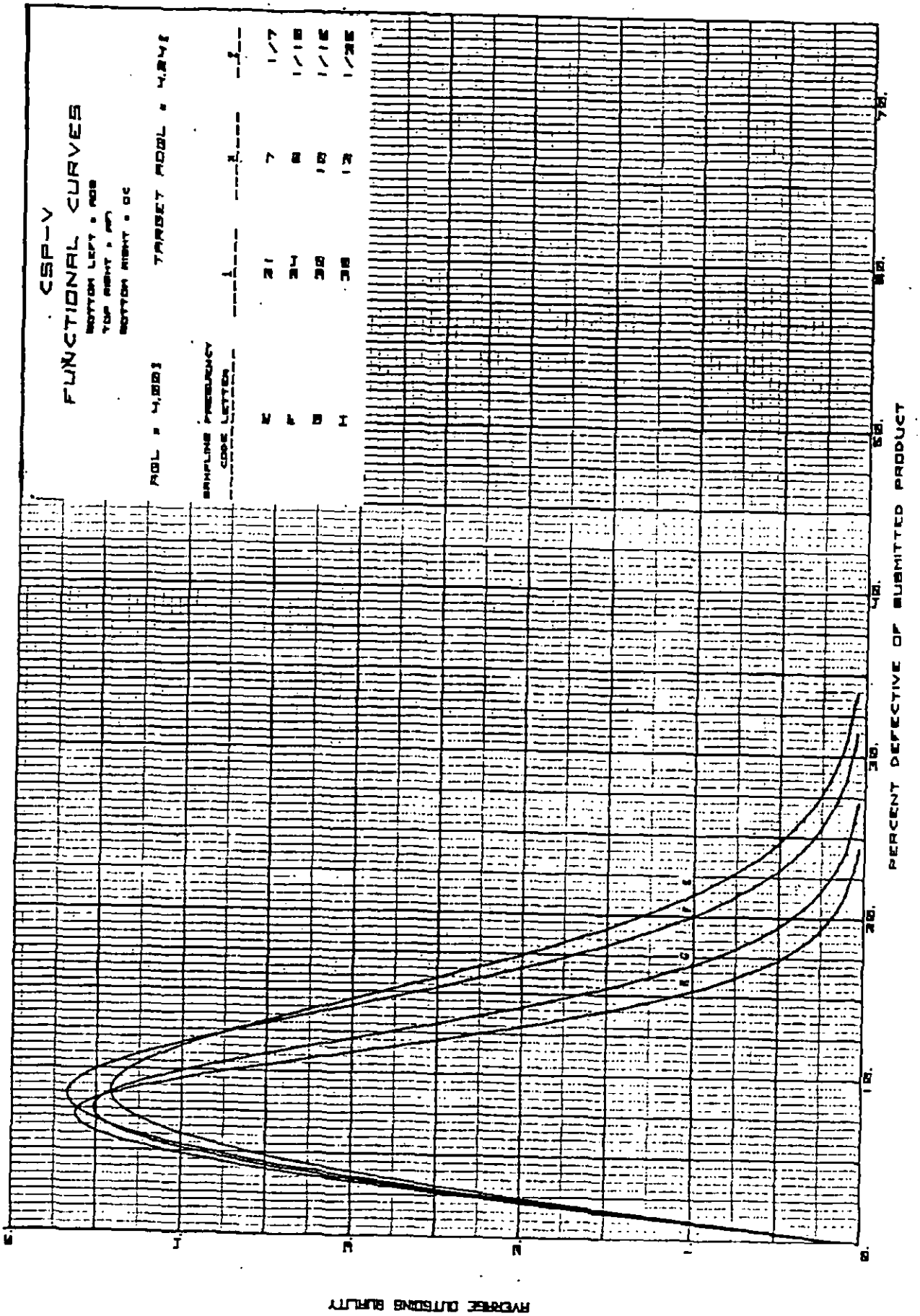

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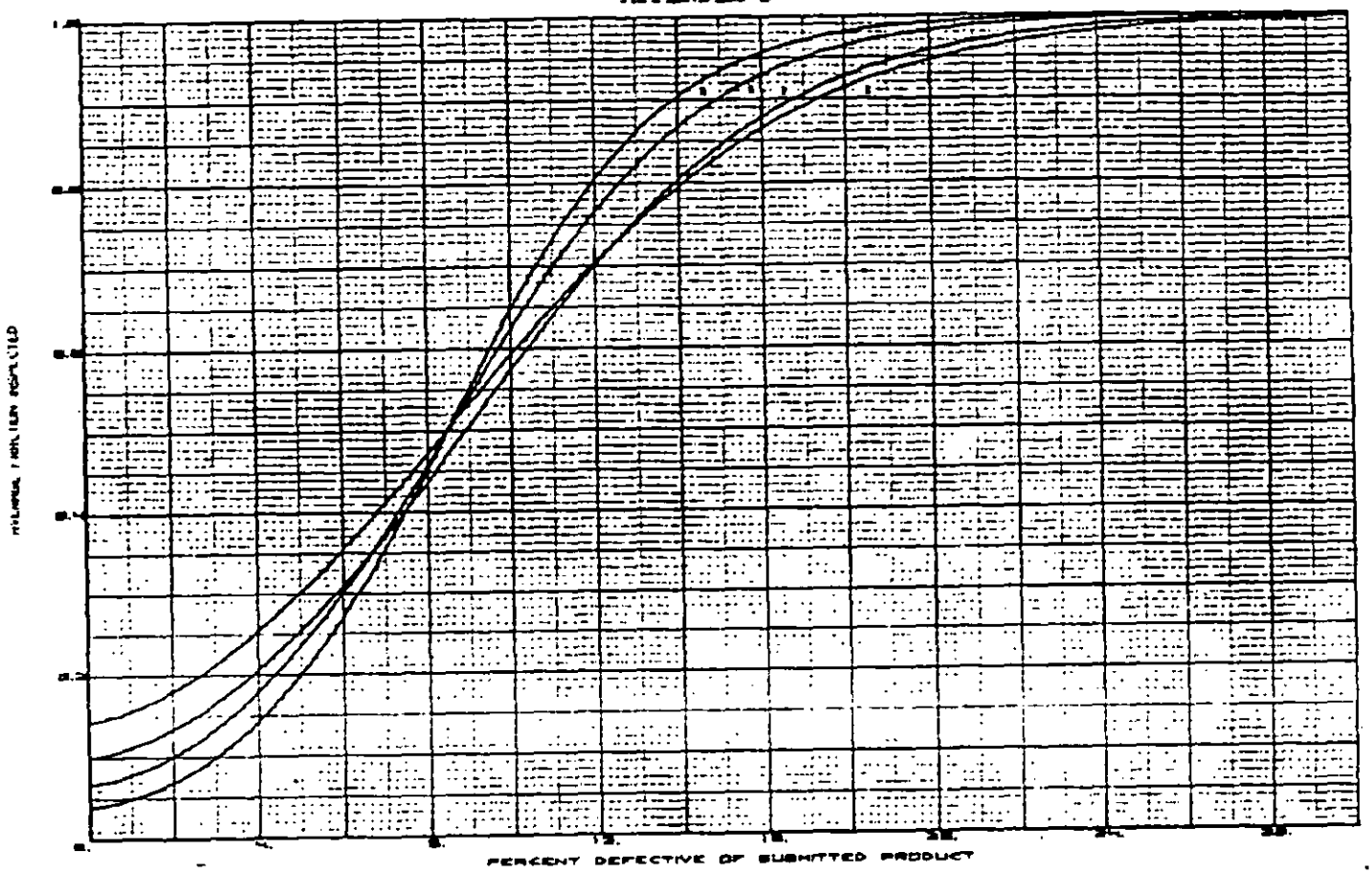

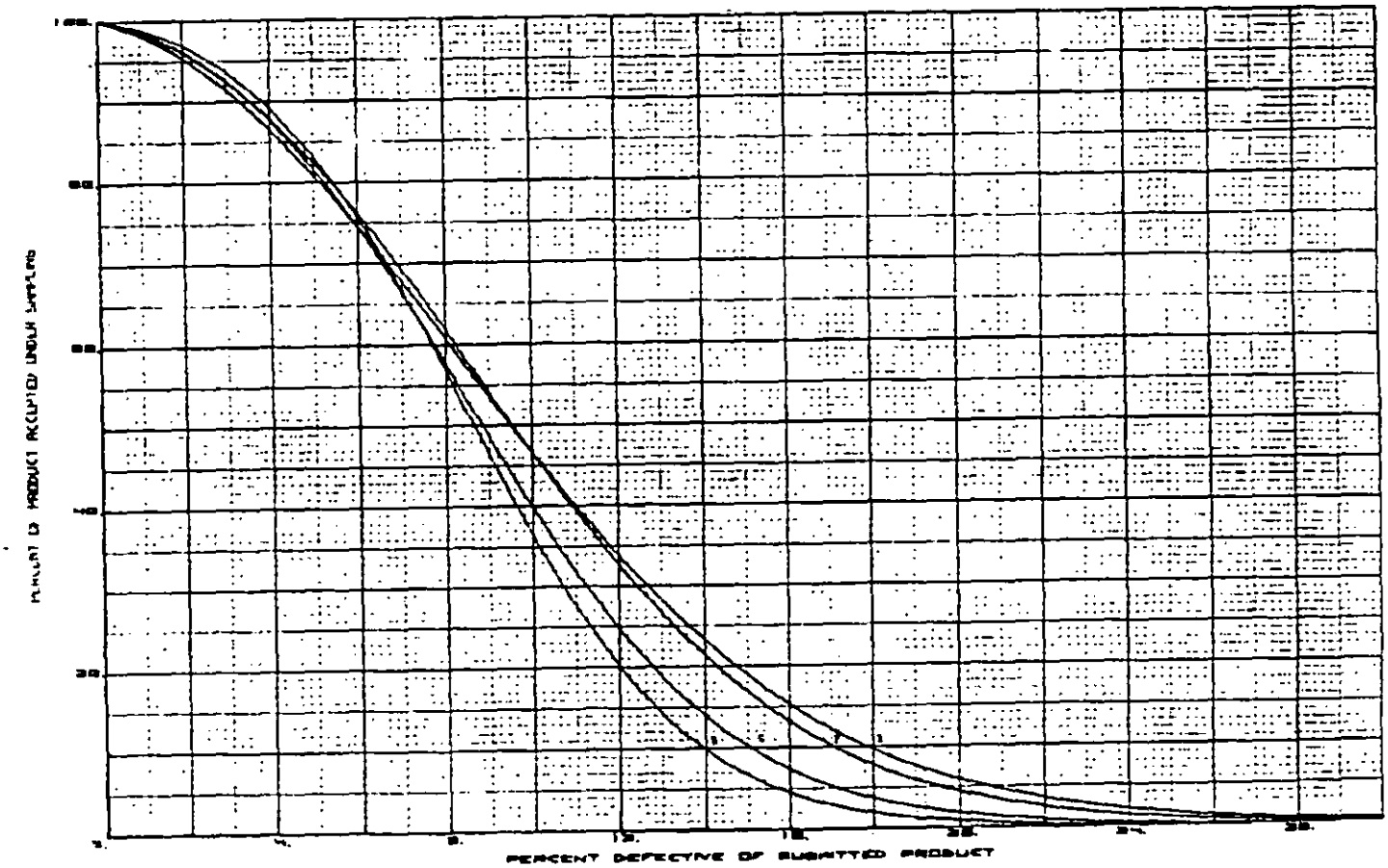

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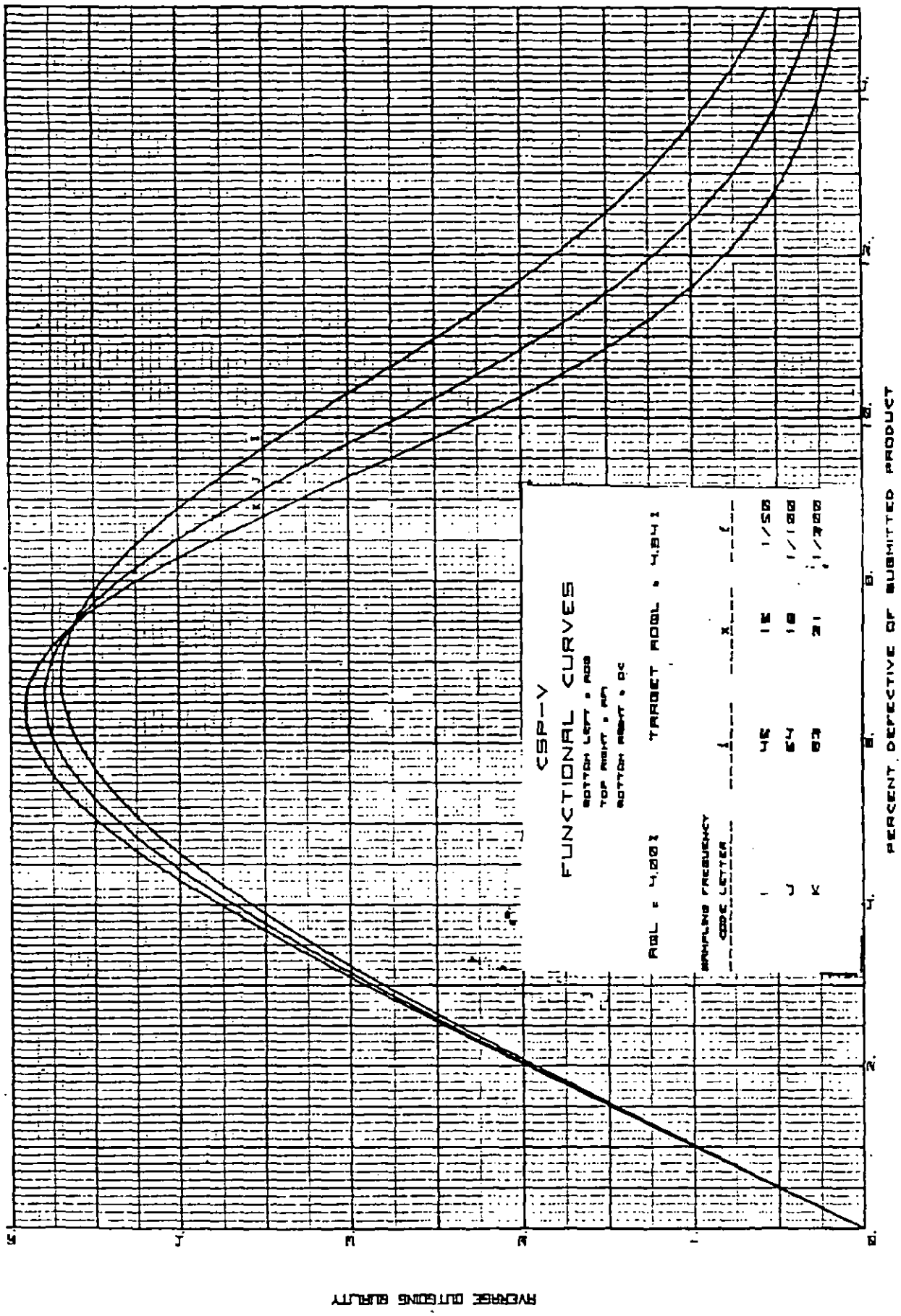

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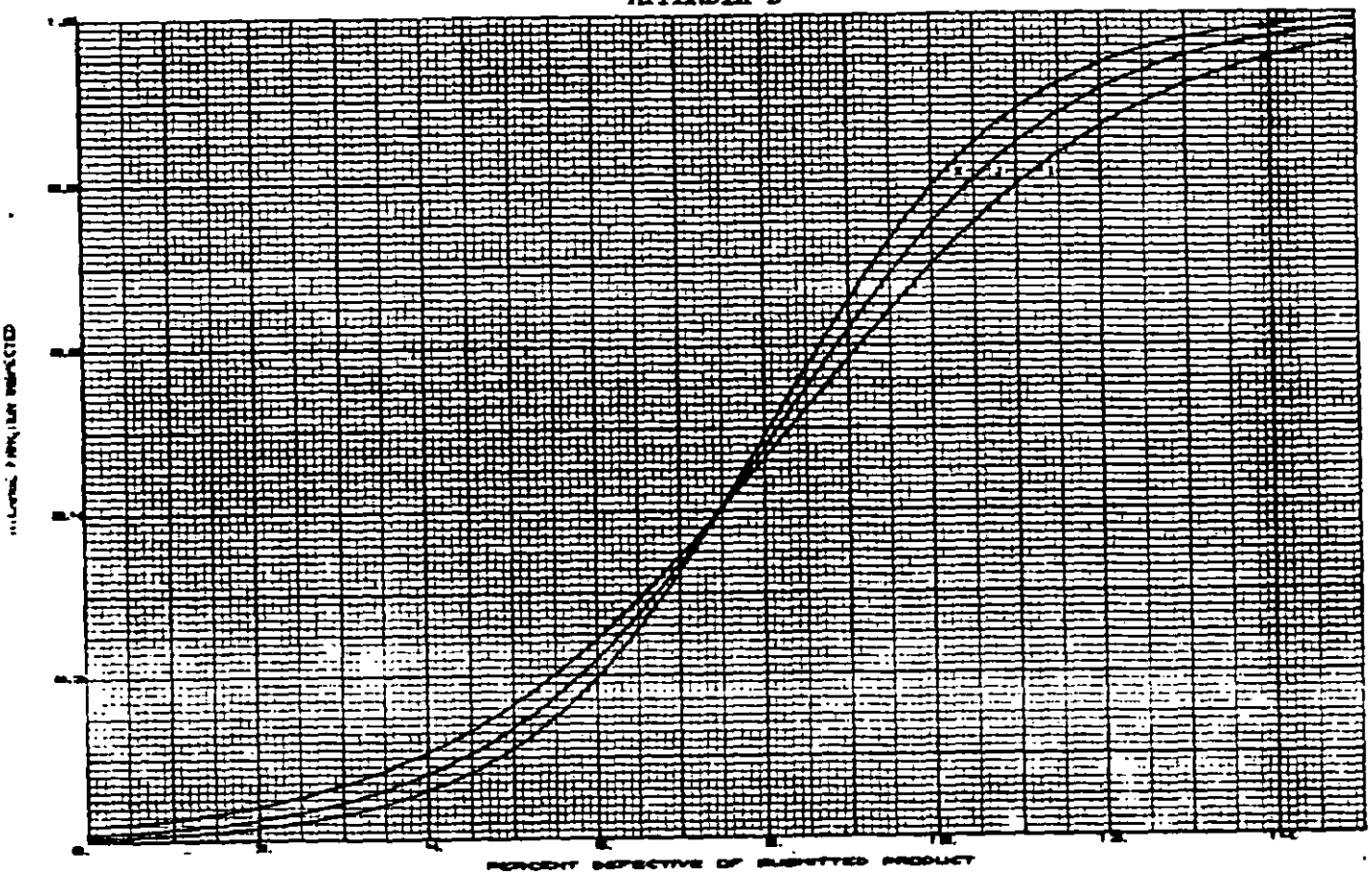

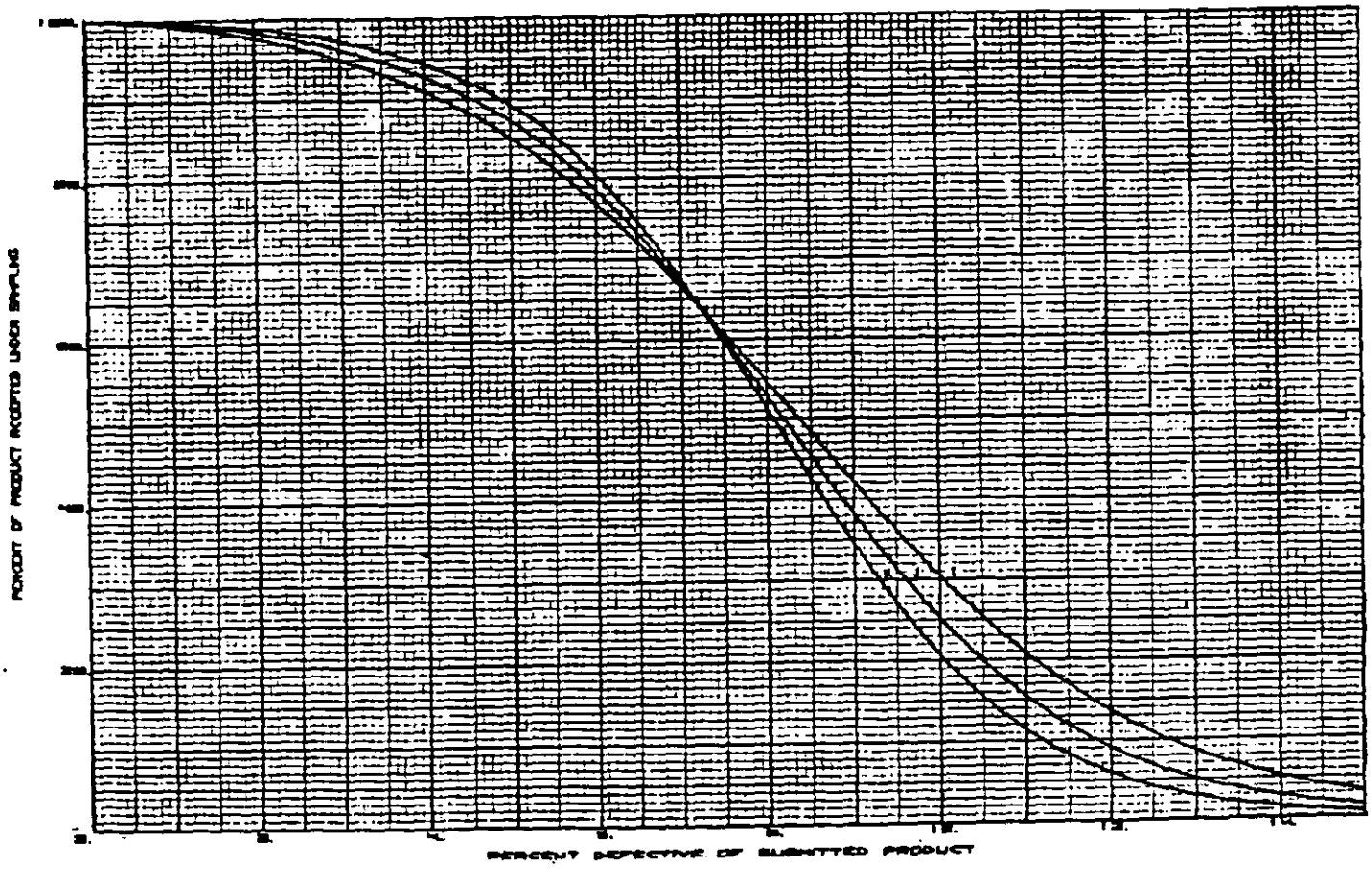

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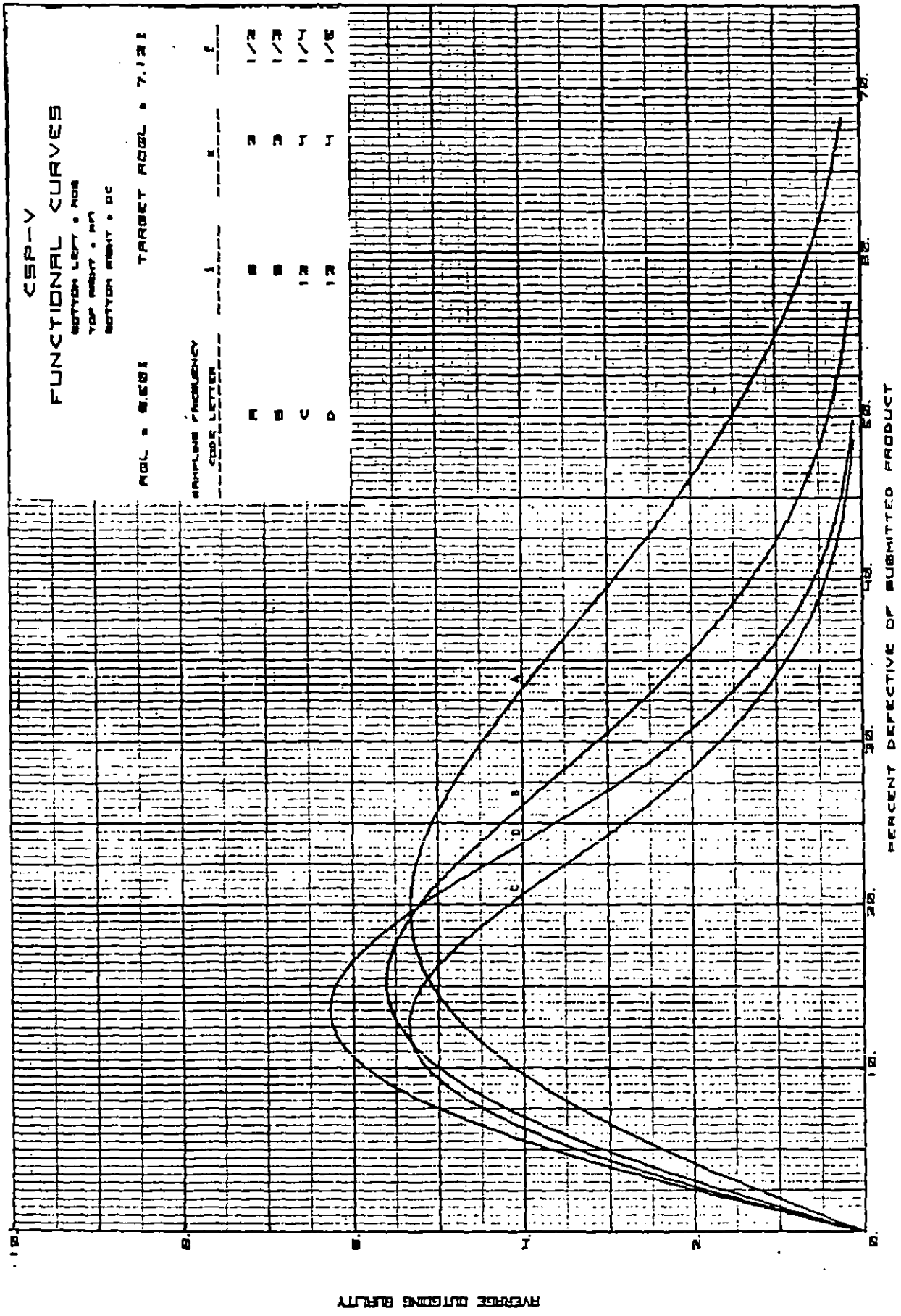

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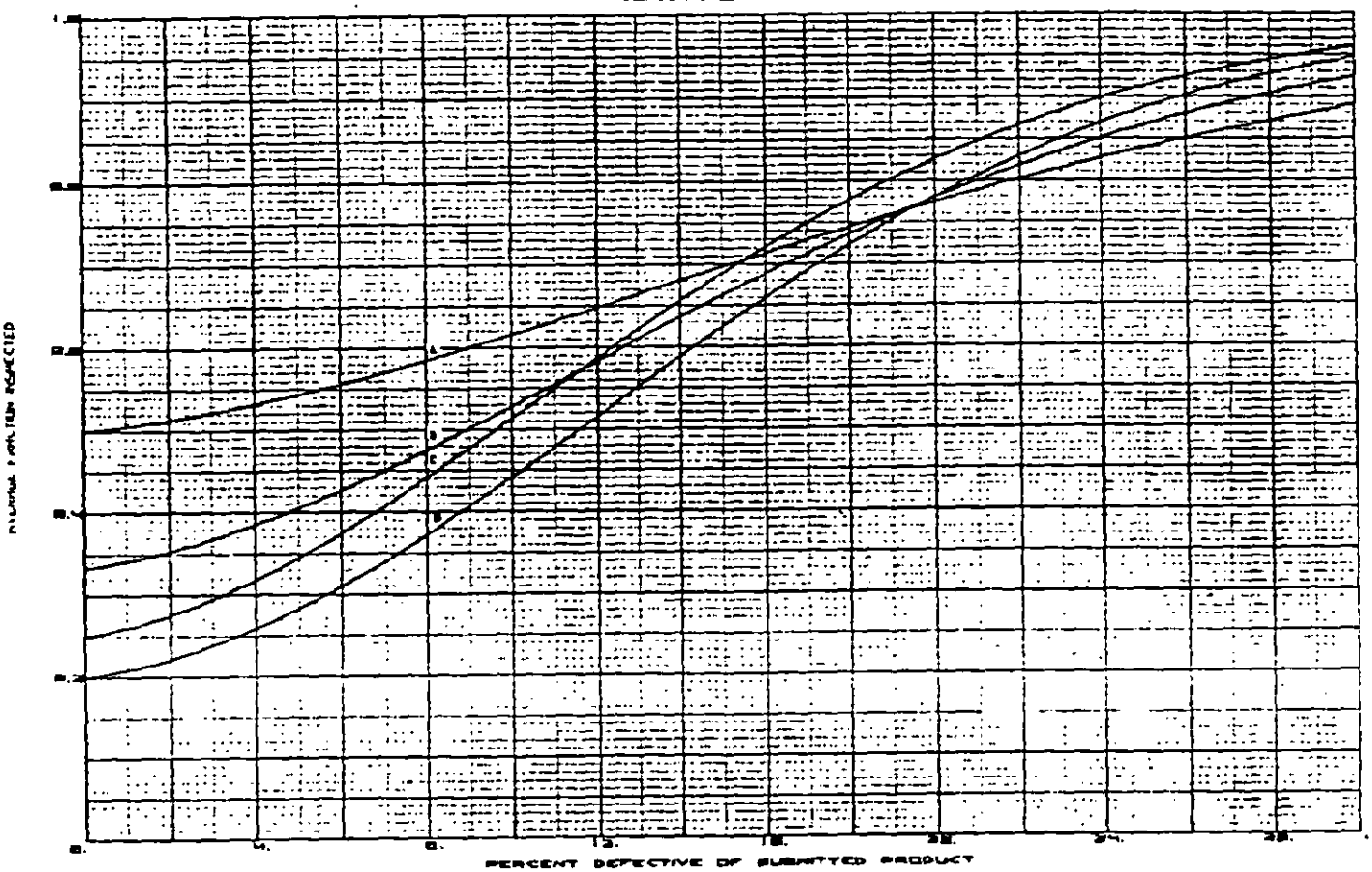

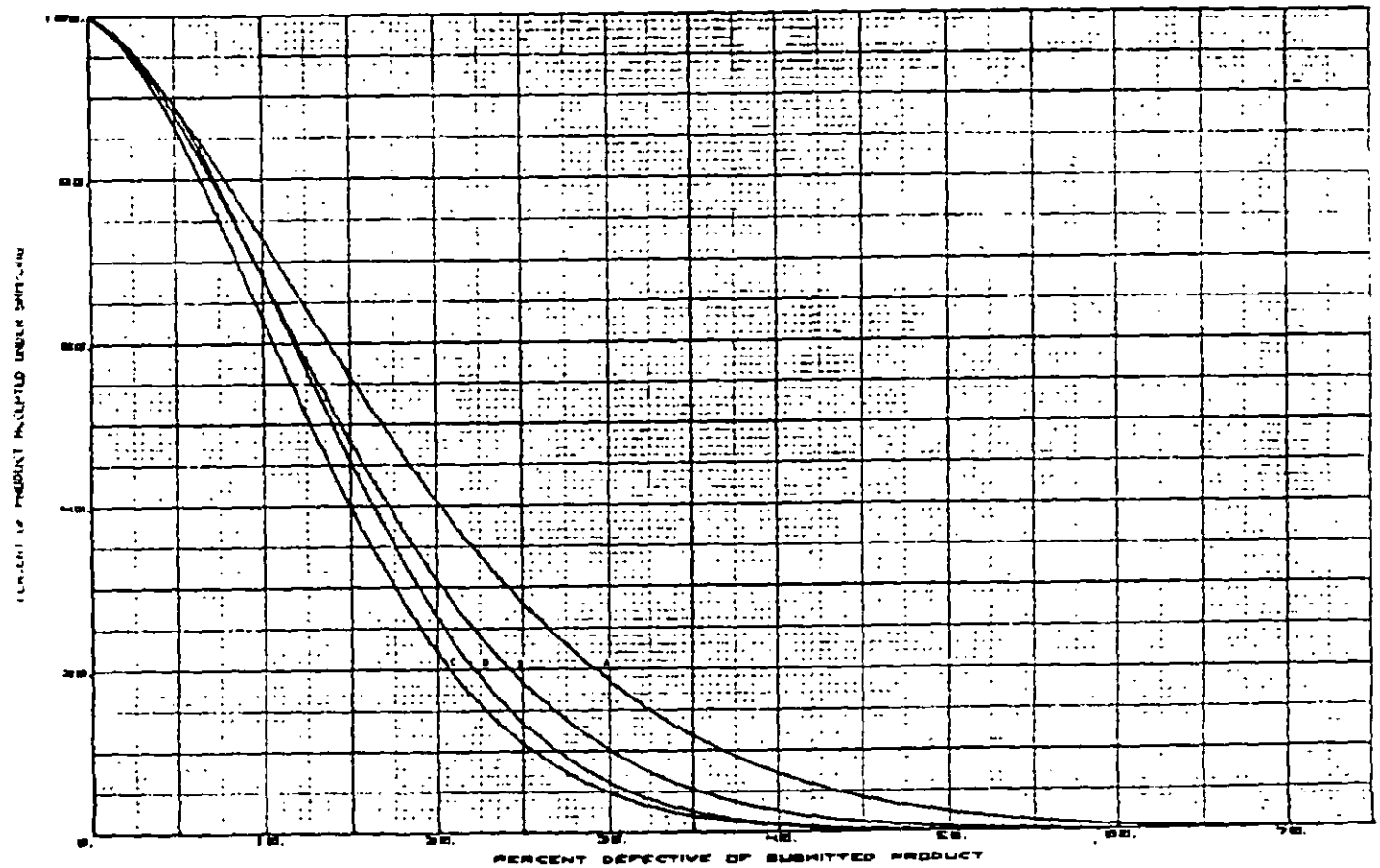

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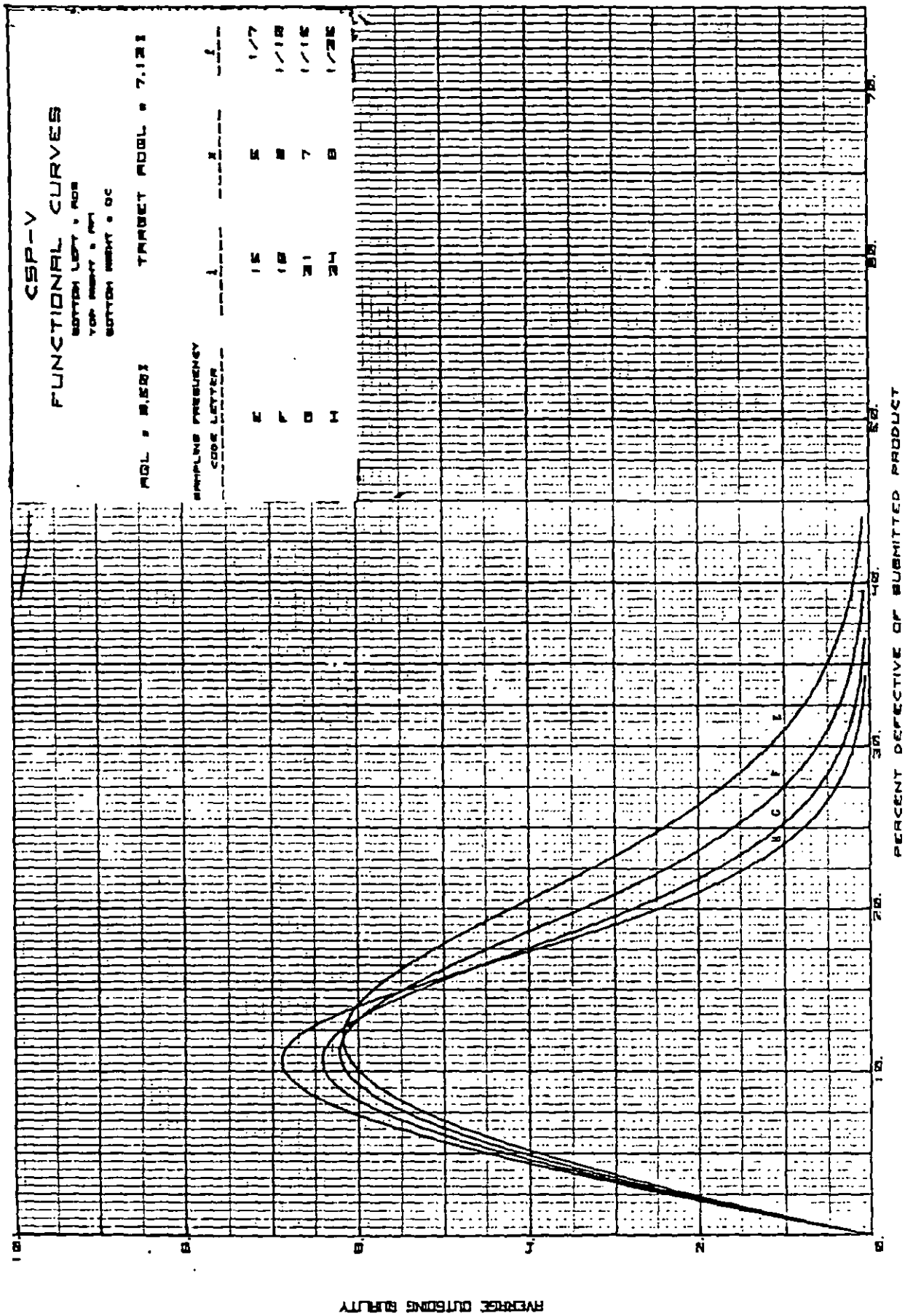

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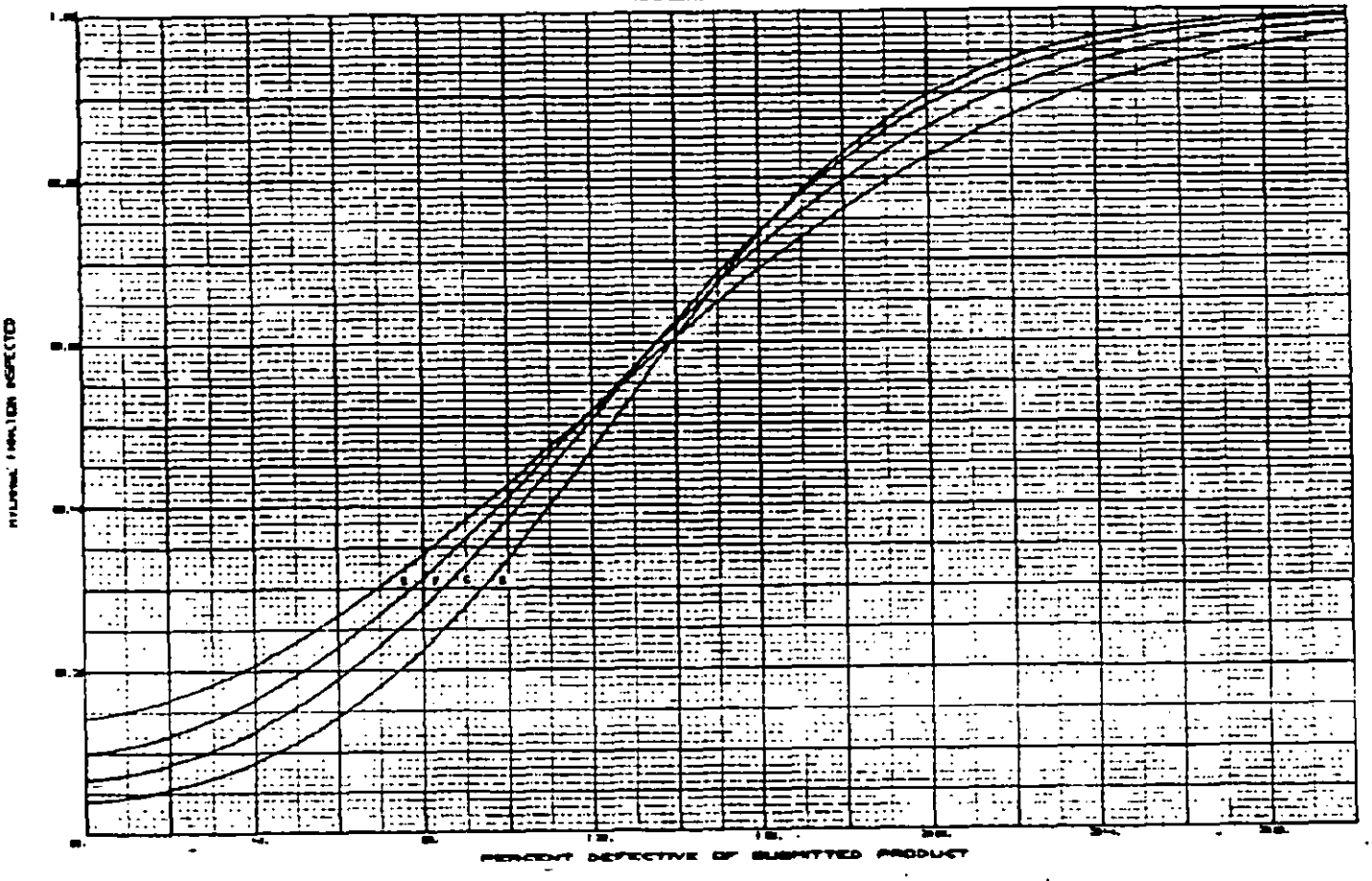

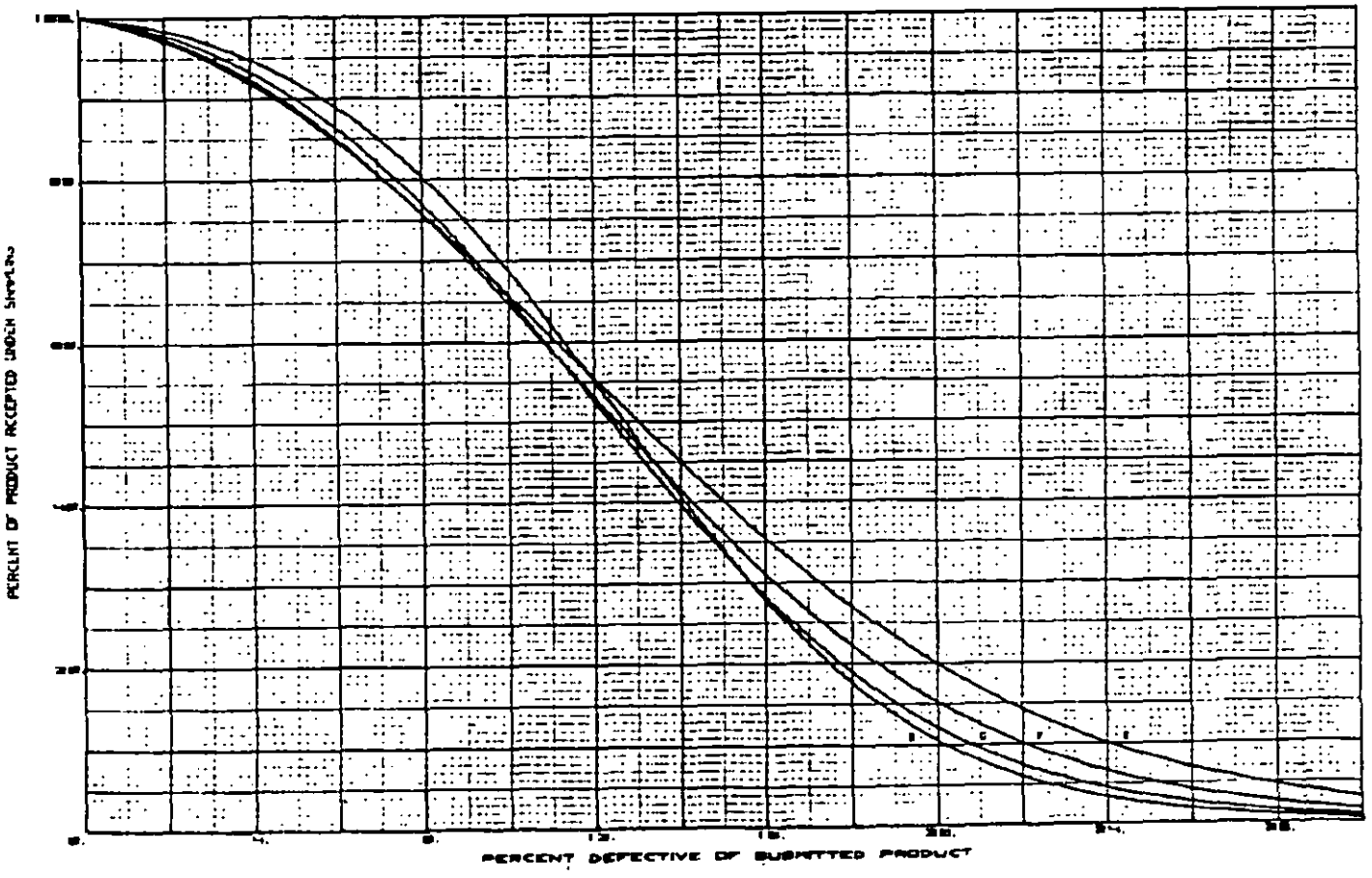

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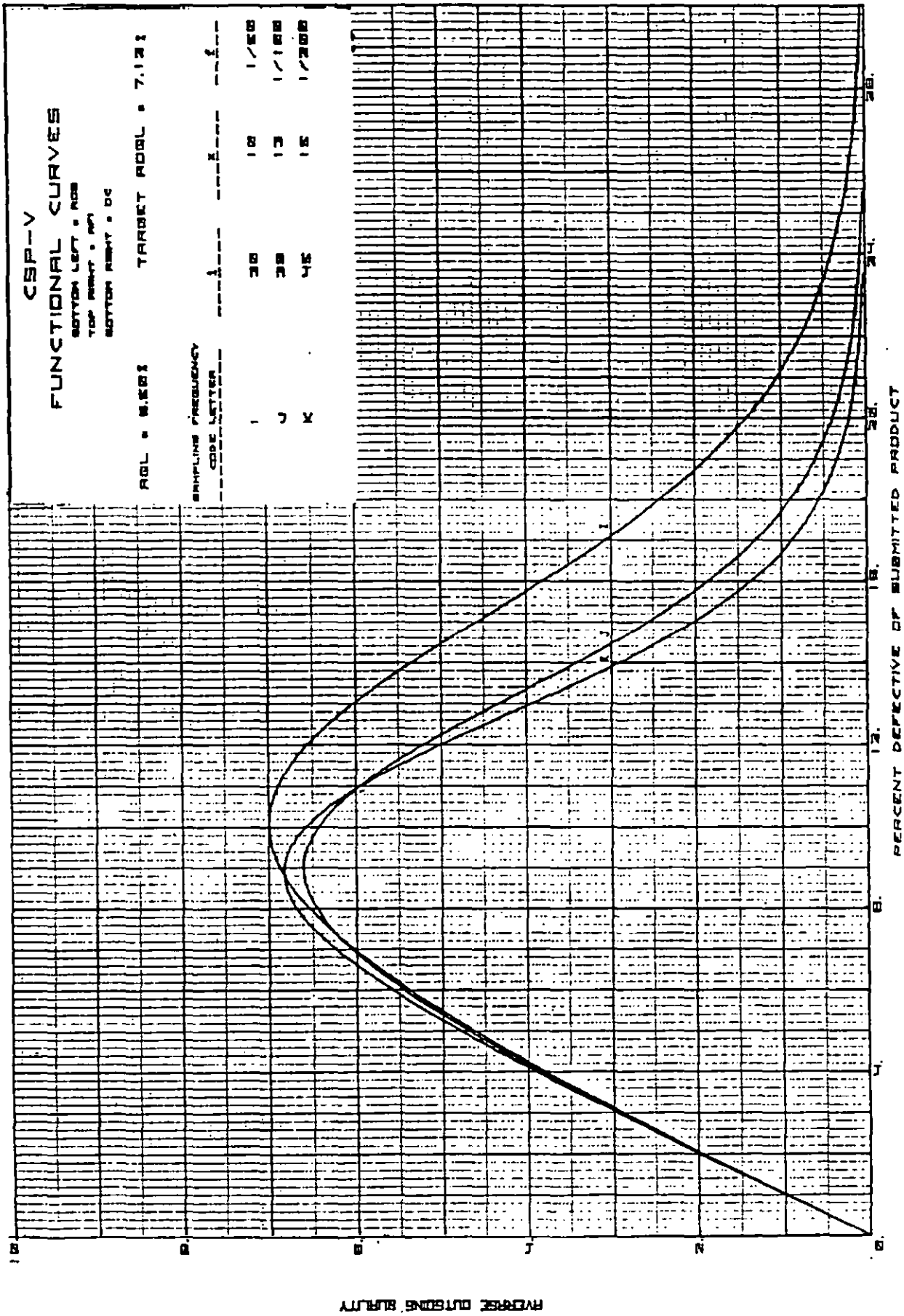

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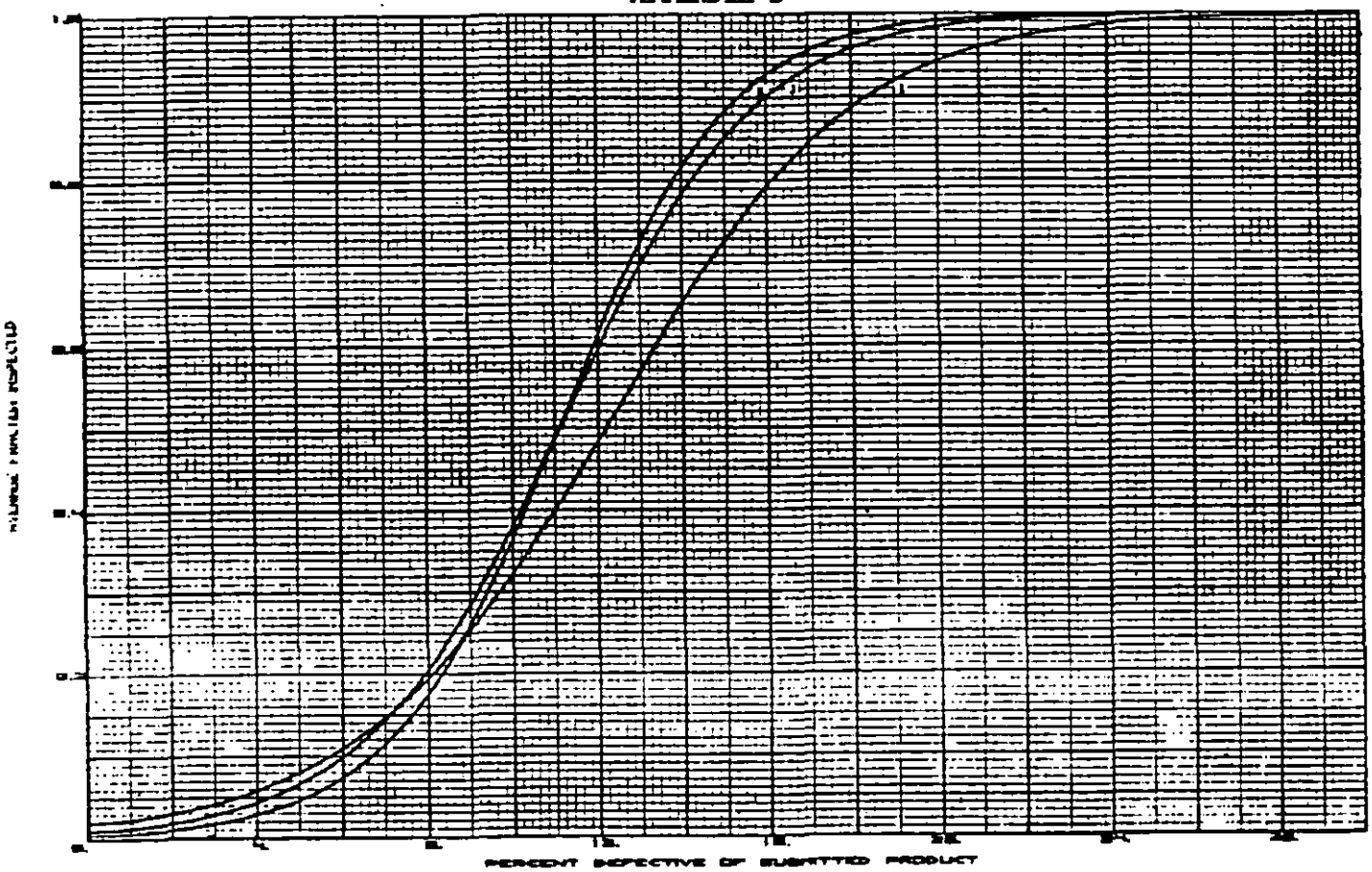

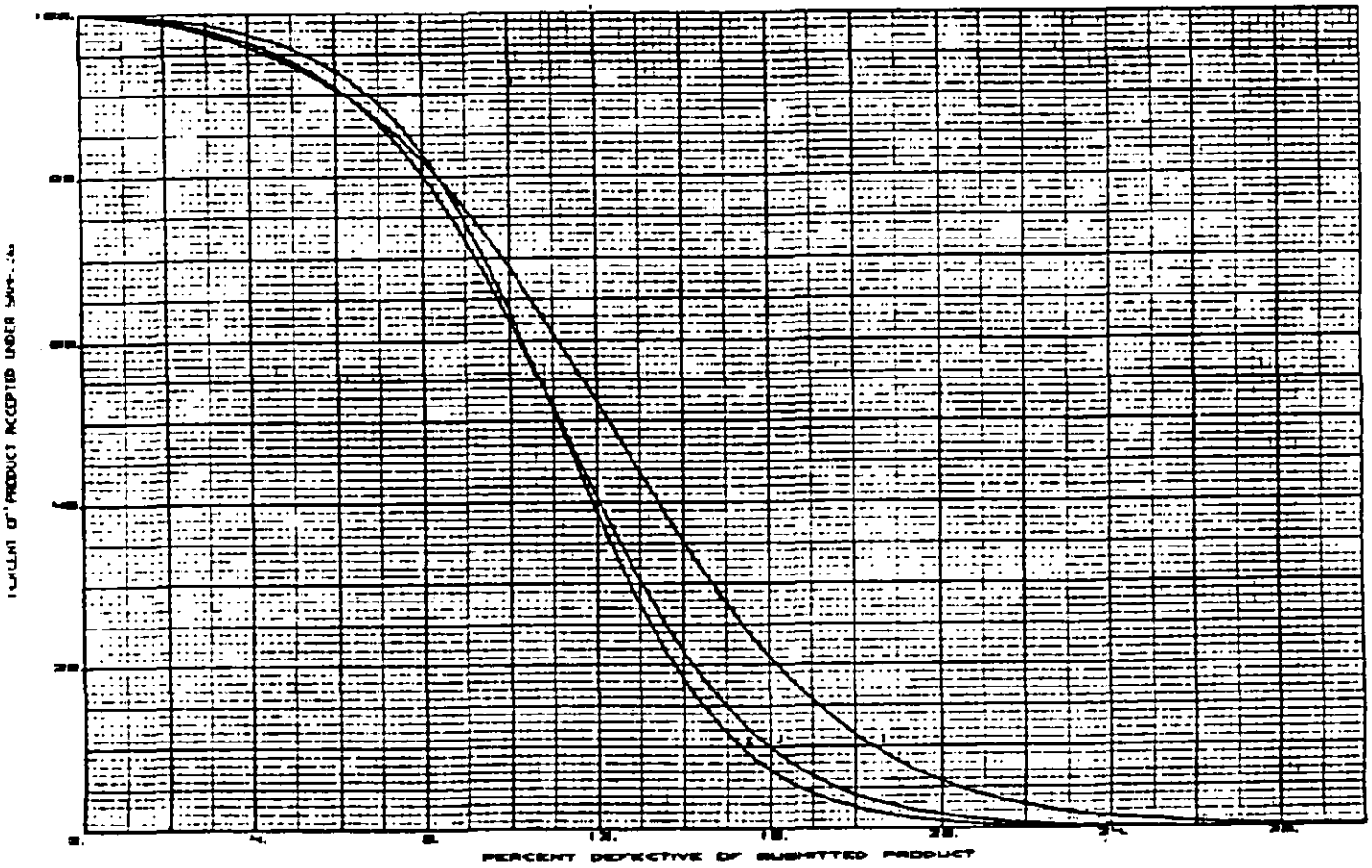

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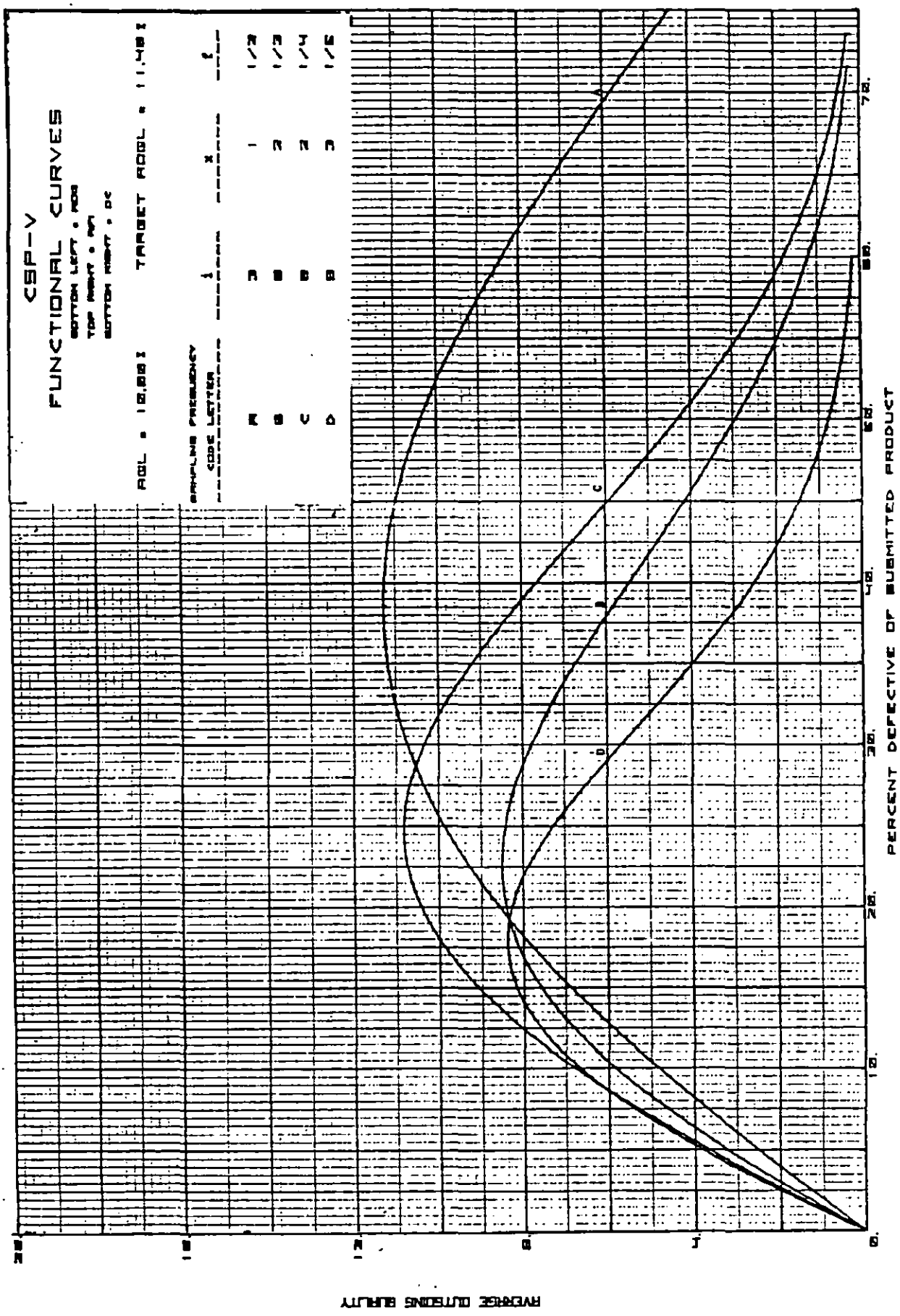

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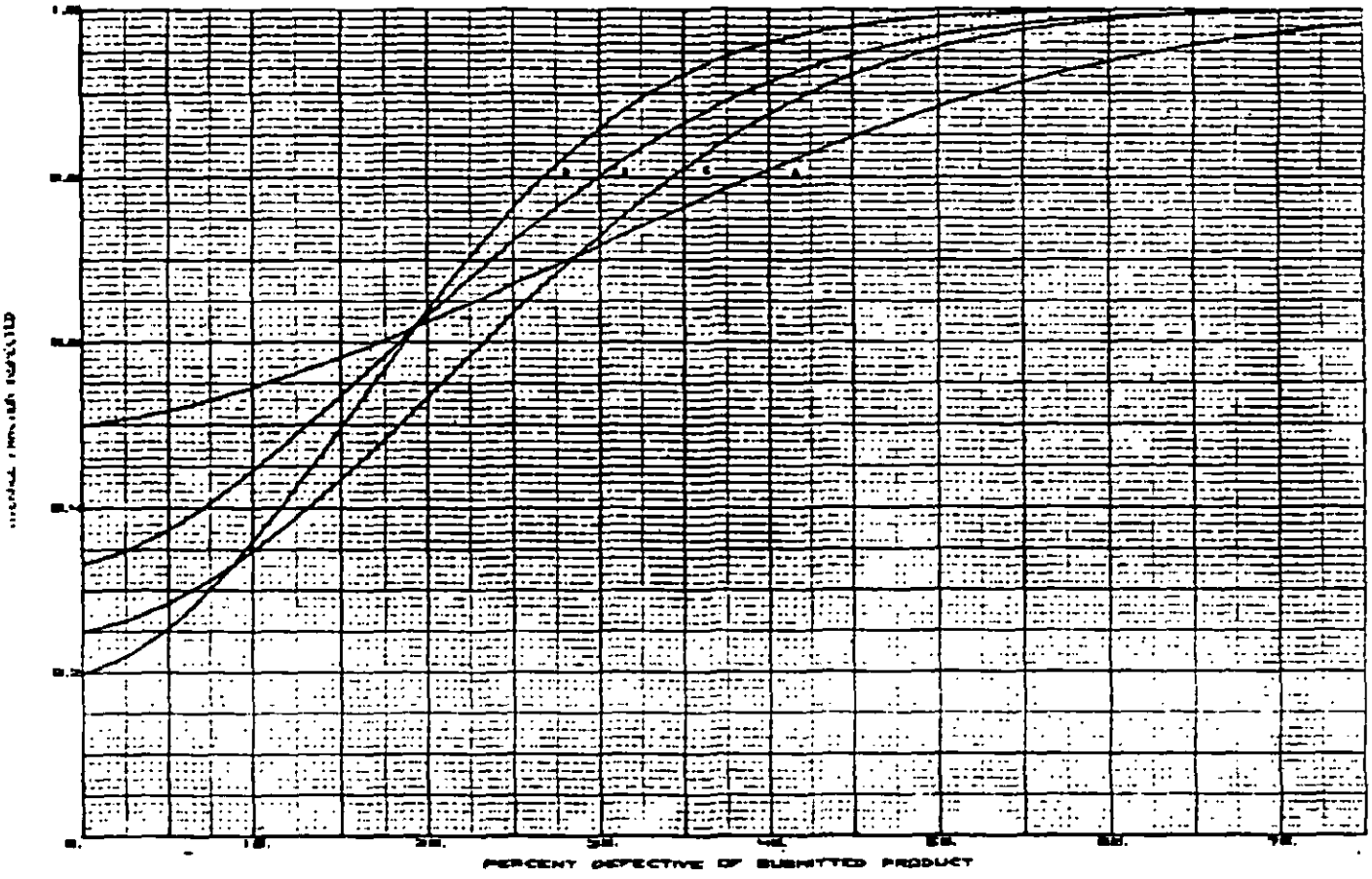

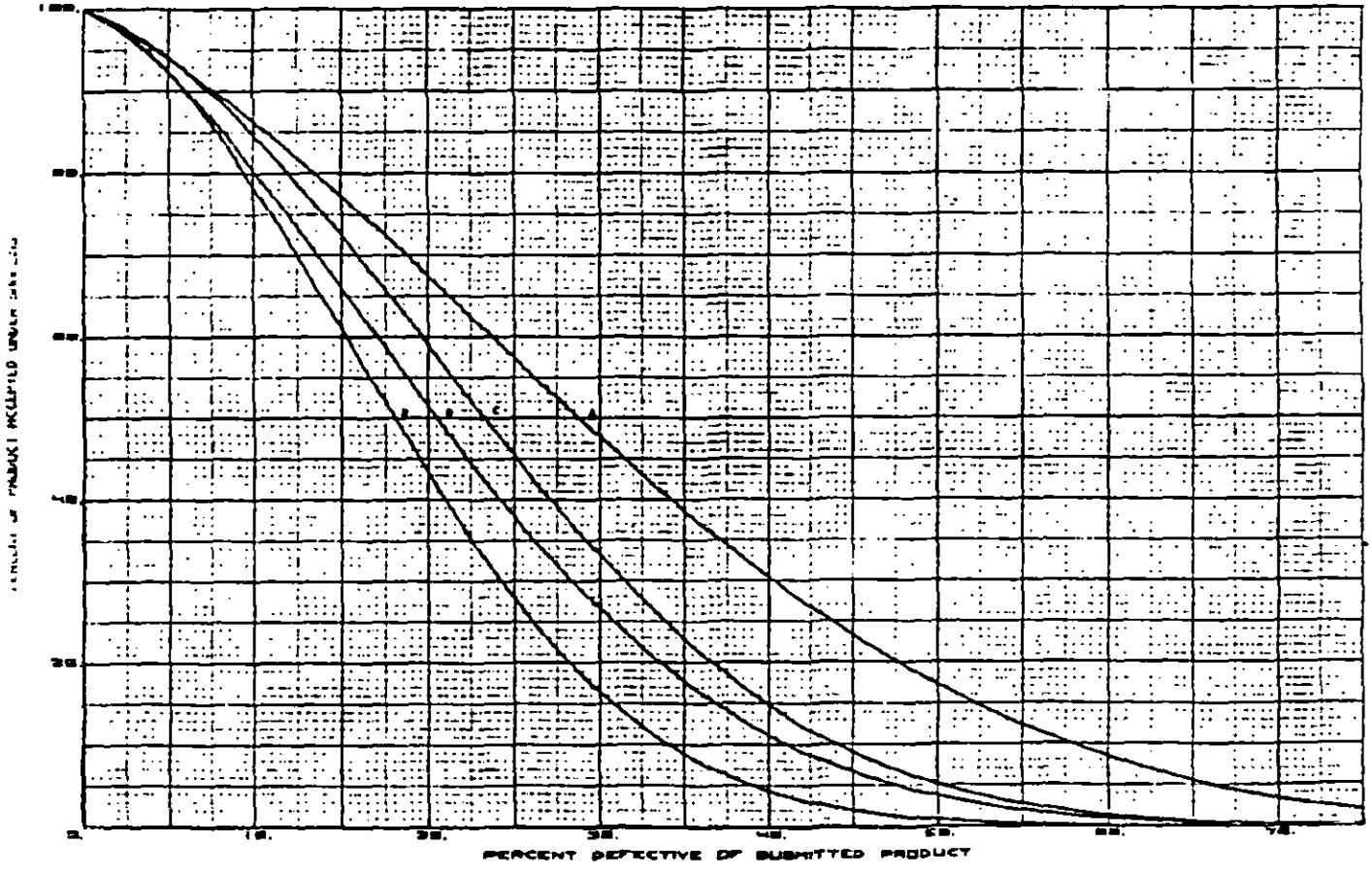

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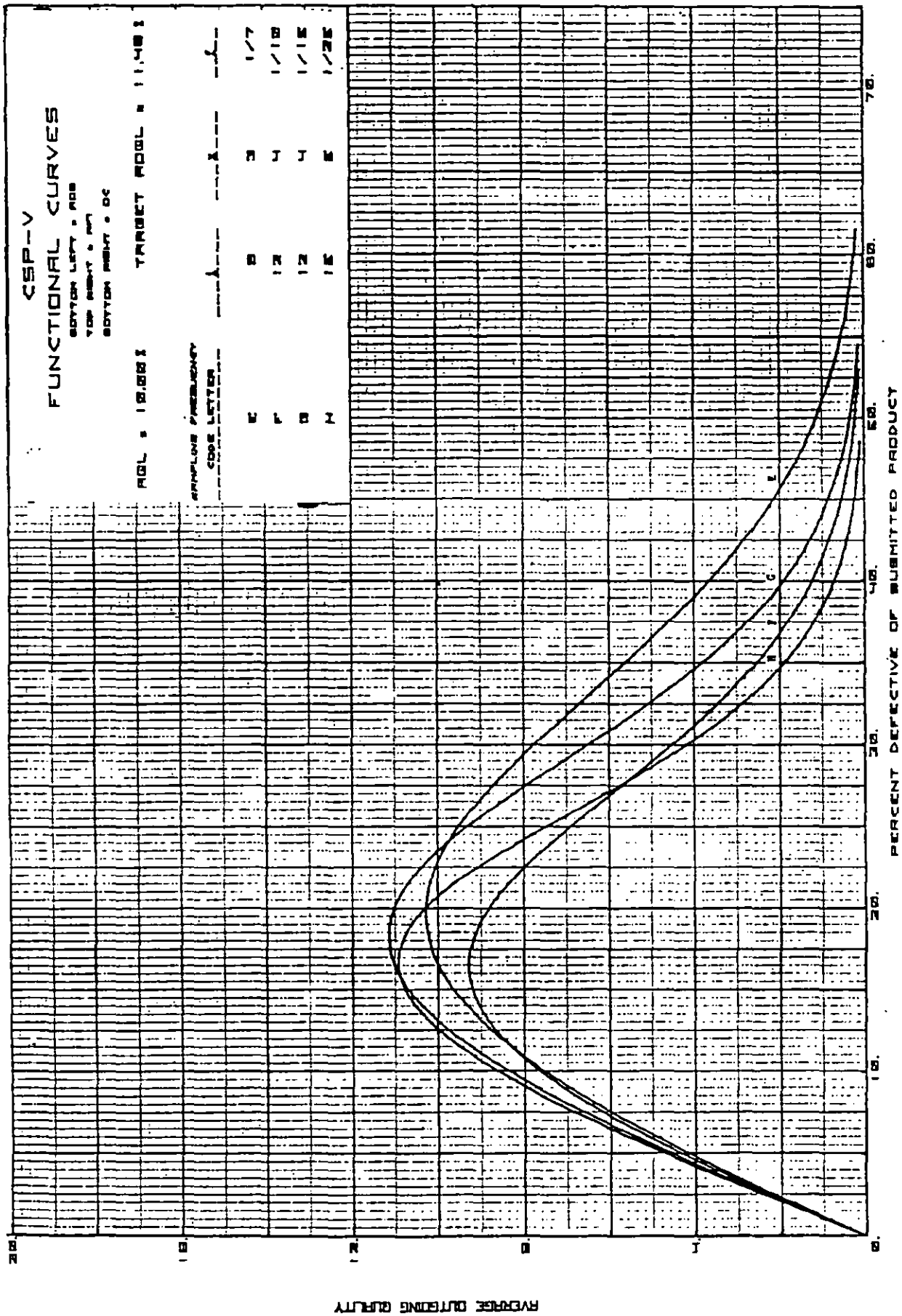

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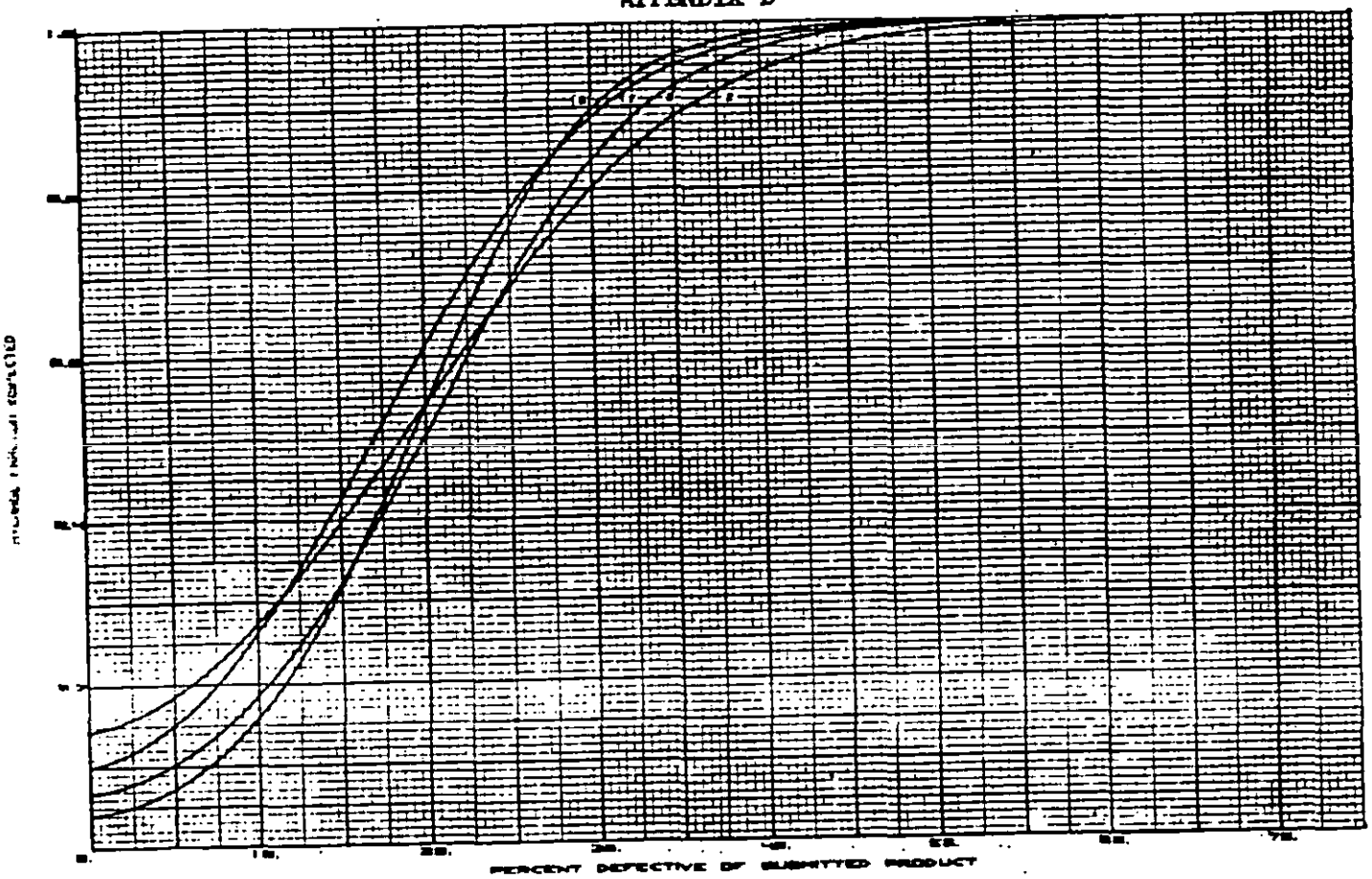

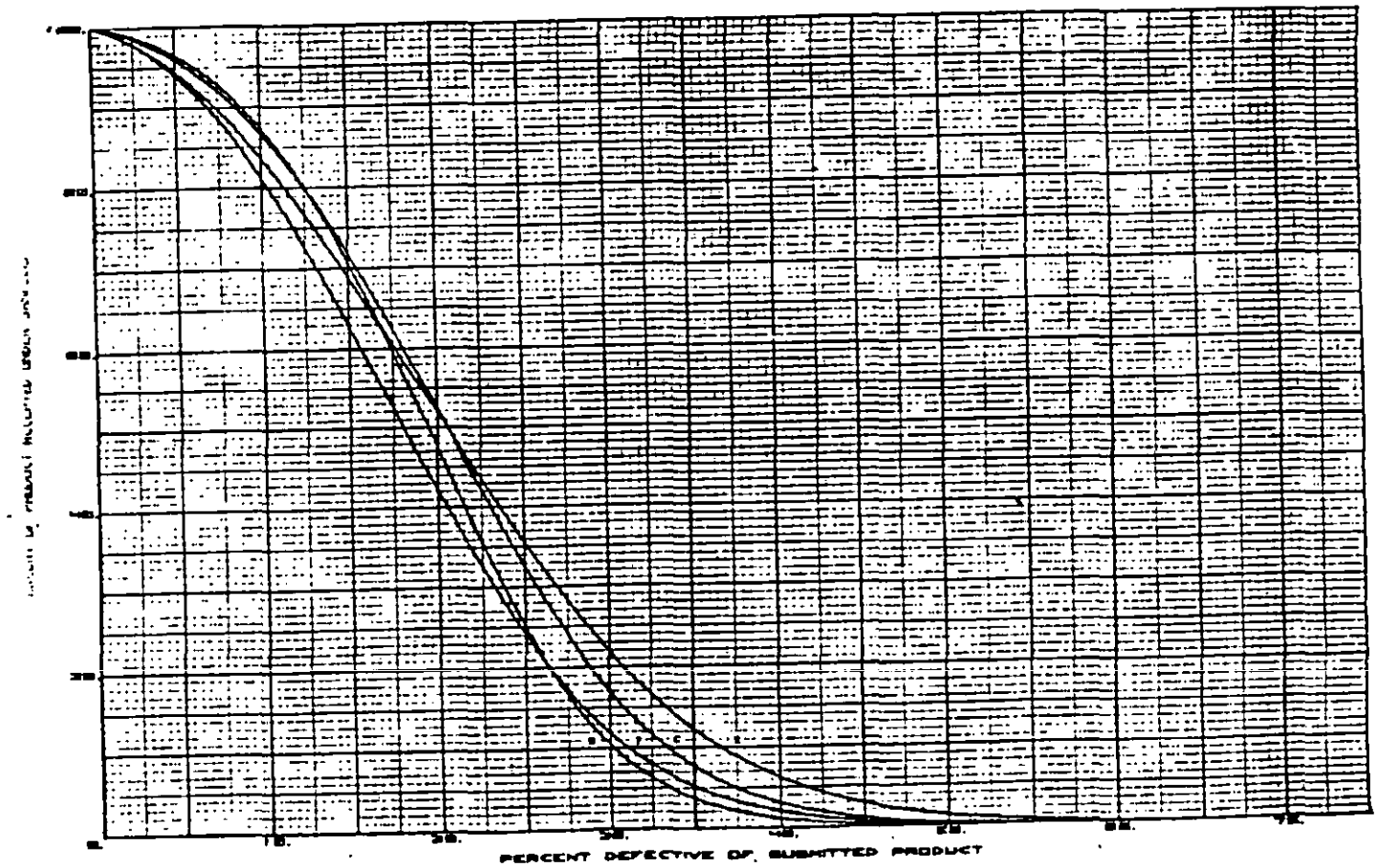

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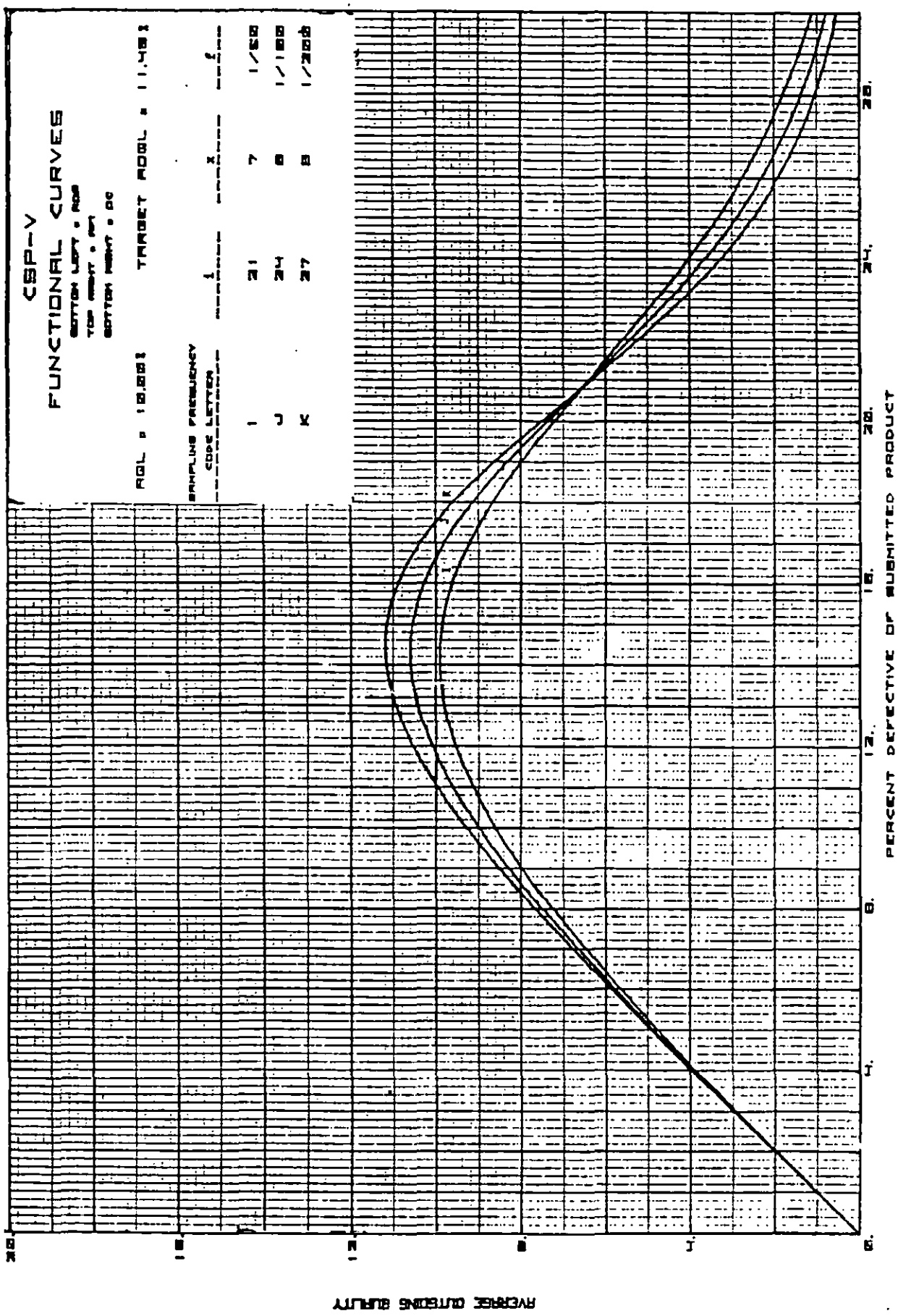

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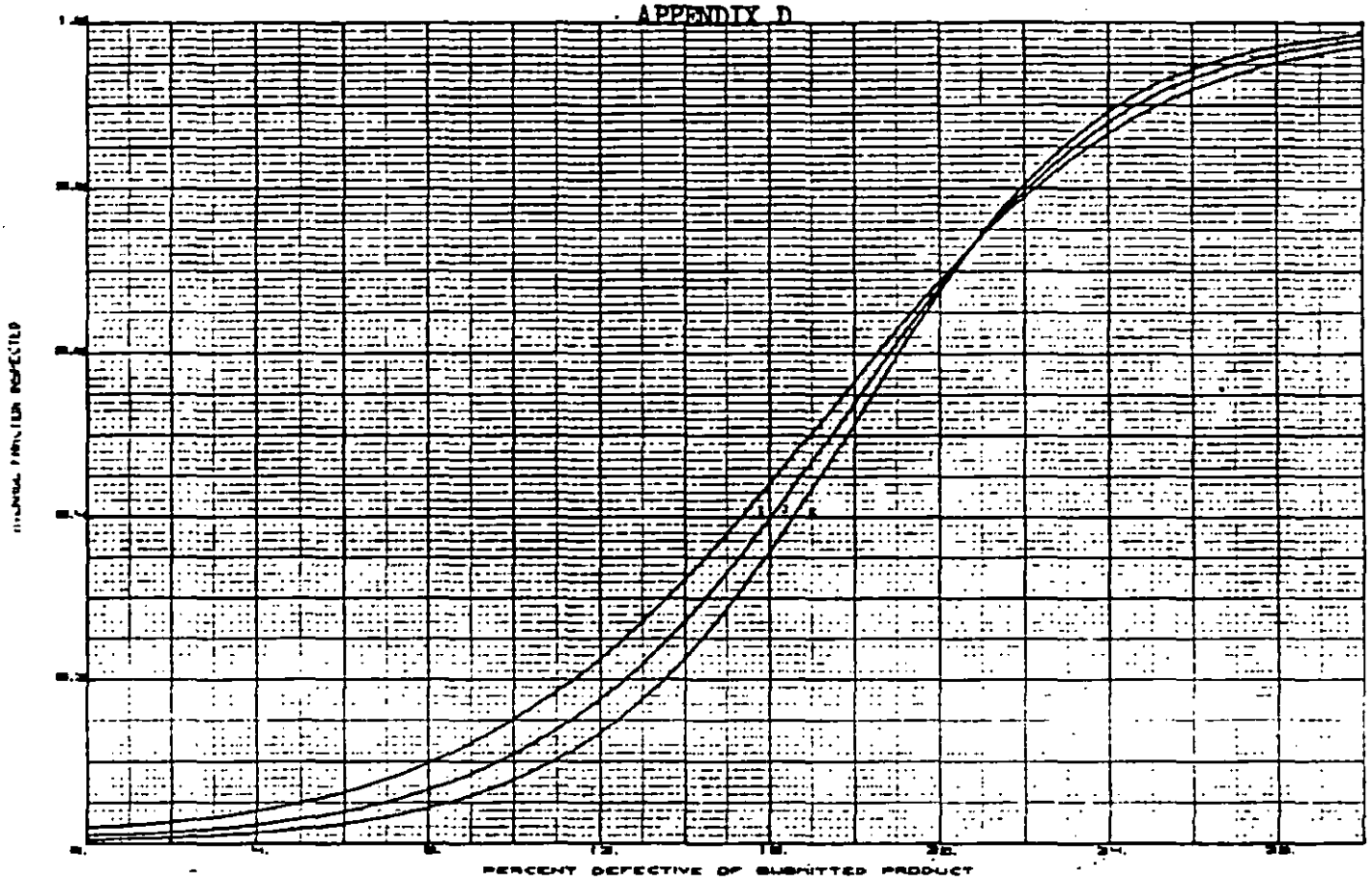

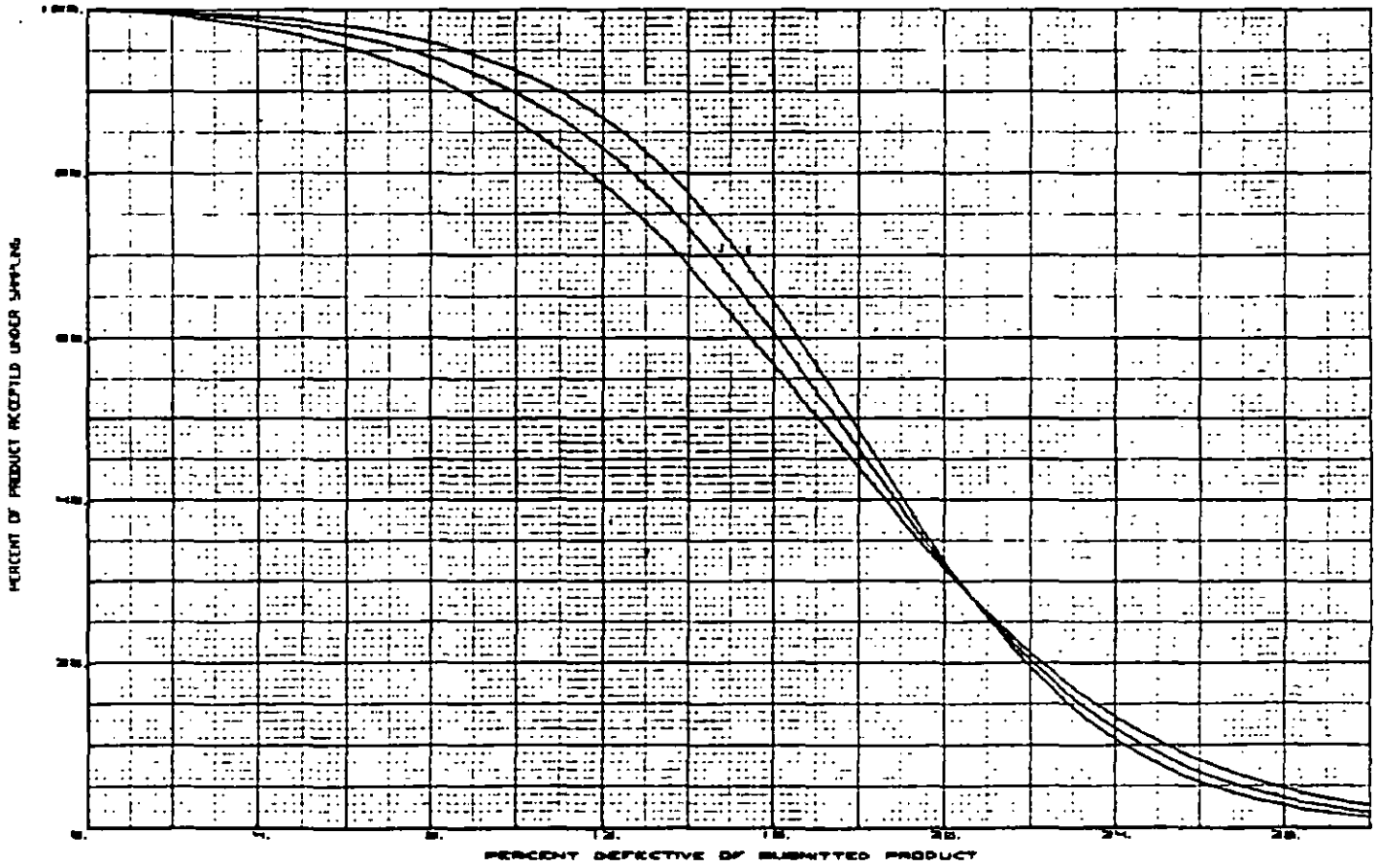

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