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ABSTRACT
                 The United States Training and Employment Service
General Aptitude Test Battery (GATB), first published in 1947, has
been included in a continuing program of research to validate the
tests against success in many different occupations. The GATB
consists of 12 tests which measure nine aptitudes: General Learning
Ability; Verbal Aptitude; Numerical Aptitude; Spatial Aptitude; Form
Perception; Clerical Perception; Motor Coordination; Finger
Dexterity; and Manual Dexterity. The aptitude scores are standard
scores with 100 as the average for the general working population,
and a standard deviation of 20. Occupational norms are established in
terms of minimum qualifying scores for each of the significant
aptitude measures which, when combined, predict job performance.
Cutting scores are set only for those aptitudes which aid in
predicting the performance of the job duties of the experimental
sample. The GATB norms described are appropriate only for jobs with
content similar to that shown in the job description presented in
this report. A description of the validation sample is included.
(AG)

TECHNICAL REPORT

ON

STANDARDIZATION OF THE GENERAL APTITUDE TEST BATTERY

FOR

PASTER (brick & tile) 573.884
TILE PLACER (brick & tile) 573.687
TILE SORTER (brick & tile) 573.887 .

S-112

(Supersedes B-337)

U. S. Employment Service in
Cooperation with
Ohio State Employment Service

U. S. DEPARTMENT OF LABOR

Washington , D. C.
December 1957

STANDARDIZATION OF THE GENERAL APTITUDE TEST BATTERY
FOR
PASTER 773.884
TILE PLACER 573.687
TILE SORTER 573.887

S-112

Summary

The General Aptitude Test Battery was administered to three samples of workers employed at the Mosaic Tile Company, Zanesville, Ohio as Paster 773.884 , Tile Placer 573.687 and Tile Sorter 573.887 . The table below shows for each of these samples, the edition of the GATB administered, the year in which data collection was completed, the number included in the final sample and the type of criterion used for validation purposes.

Sample	D.O.T. Title and Code	GATB Edition	Date	N	Criterion
I	Tile Sorter 573.887	B-1002A	1955	50	Production records
II	Tile Placer 573.687	B-1002A	1955	39	Supervisory ratings
III	Paster 773.884	B-1001	1951	38	Supervisory ratings and production records

Data for the three samples were analyzed separately and in combination. On the basis of the statistical and qualitative analysis of the data, Aptitudes P-Form Perception, F-Finger Dexterity and M-Manual Dexterity were selected for inclusion in the test norms.

GATB Norms for Paster 773.884 , Tile Placer 573.687 , and Tile Sorter 573.887 - S-112

Table I shows, for B-1001 and B-1002, the minimum acceptable score for each aptitude included in the test norms for Paster 773.884 ., Tile Placer 573.687 and Tile Sorter 573.887 .

TABLE I

Minimum Acceptable Scores on B-1001 and B-1002 for S-112

B-1001			B-1002		
Aptitude	Tests	Minimum Acceptable Aptitude Score	Aptitude	Tests	Minimum Acceptable Aptitude Score
P	CB-1-A CB-1-L	70	P	Part 5 Part 7	70
F	CB-1-O CB-1-P	75	F	Part 11 Part 12	70
M	CB-1-M CB-1-N	80	M	Part 9 Part 10	80

Effectiveness of Norms

The data in Table IV-D indicate that 23 of the 39 poor workers, or 59 percent of them, did not achieve the minimum scores established as cutting scores on the recommended test norms. This shows that 59 percent of the poor workers would not have been hired if the recommended test norms had been used in the selection process. Moreover, 74 of the 90 workers who made qualifying test scores, or 82 percent, were good workers.

TECHNICAL REPORT

I. Problem

This study was conducted to determine the best combination of aptitudes and minimum scores to be used as norms on the General Aptitude Test Battery for the occupations of Paster 773.884 , Tile Placer 573.687 and Tile Sorter 573.887.

II. Samples

This study is based on three samples of workers employed at the Mosaic Tile Company, Zanesville, Ohio as Paster 773.884 , Tile Placer 573.687 and Tile Sorter 573.887. The test norms were developed on the basis of the results from all three samples.

Sample I - Tile Sorter 573.887.

The GATB, B-1002A, was administered during the period April 6, 1955 to April 20, 1955 to 59 women employed as Tile Sorters at the Mosaic Tile Company. Workers were selected at random and asked by a foreman if they would partici-pate in a test development project. Persons still in training were not solicited. Of the 59 women tested, nine were eliminated from the sample be-cuase of inadequate criterion data. Therefore, the final sample of Tile Sort-ers includes 50 women. Applicants for this job are screened before being hired and the following factors are taken into consideration: height, weight, visual acuity, color vision, alertness and general physical condition. The girls must be over 5'4" in height to work at the sorting boards and they must be of average weight. Visual acuity is measured on the American Optical Company Viewfinder and Snellen Chart. The Pseudo-Isochromatic Plates are used to test for color-blindness. All applicants are given a thorough phy-sical examination by a company doctor.

Sample II - Tile Placer 573.687

The GATB, B-1002A, was administered during April 1955 to 39 women employed as Tile Placer 573.687 at the Mosaic Tile Company. The tested sample in-cluded all of the 39 workers employed on this job. All of the women on this job must be at least average height and all applicants are given a thorough physical examination by a company doctor. The training period for this job is considered to be six weeks. All of the workers in this sample had com-pleted the training period.

Sample III - Paster 773.884

Fifty-three women employed as Paster 773.884 by the Mosaic Tile Company were tested in April 1951 with the General Aptitude Test Battery, B-1001. There was considerable disagreement as to the training time for Pasters. It varied from two to five months according to the thinking of different

foremon. In order to obtain a group of Pasters who had completely finished
their training, only those who had over five months of experience were in-
cluded in the sample. After testing, 15 women were eliminated from the sam-
ple; thirteen had not completed the training period; one had only five years
of elementary education and did not comprehend the practice exercises com-
pletely during the administration of the tests; and one was considerably
older than the other workers (66). Thus the final sample consisted of 38
women. In the past, psychometric devices have not been used for selecting
Pastors. The following factors are considered prior to hiring for this job:

   (1) The worker must be able to lift weights up to 18 pounds
       repetitively.

   (2) The preferred age range is 21-35 years.

Table II-A shows the means, standard deviations, ranges and Pearson product-
moment correlations with the criterion for age, education and experience for
Sample I - Tile Sorter 573.687 .; Table II-B shows these data for Sample II -
Tile Placer 573.687 . Table II-C shows the means, standard deviations, ranges,
Pearson product-moment correlations with the criteria consisting of produc-
tion records and of rank order ratings of the night foreman and Pearson pro-
duct-moment correlations (corrected for broad categories) with the criteria
consisting of broad category ratings of the night foreman and of the day
foreman for age, education, and experience for Sample III Paster 773.884.
Table II-D shows the means, standard deviations and ranges for age, education
and experience for the Combined Sample of Tile Sorters, Tile Placers and
Pasters.

<div align="center">

TABLE II-A

Means (M), Standard Deviations (σ), Ranges, and Pearson
Product-Moment Correlations with the Criterion (r) for Age,
Education and Experience

Sample I
Tile Sorter _573.887.

N = 50

</div>

	M	σ	Range	r
Age (years)	36.3	6.4	25- 50	.098
Education (years)	9.6	1.6	6- 13	.124
Experience (months)	53.6	39.2	6-128	.344*

<div align="center">

* Significant at the .05 level

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TABLE II-B

Means (M), Standard Deviations (σ), Ranges, and Pearson
Product-Moment Correlations with the Criterion (r) for Age,
Education and Experience

Sample II
Tile Placer 573.687

N = 39

	M	σ	Range	r
Age (years)	34.3	9.6	19-55	.244
Education (years)	9.6	1.6	7-12	-.097
Experience (months)	62.5	64.8	2-248	.467**

** Significant at the .01 level

TABLE II-C

Means (M), Standard Deviations (σ), Ranges, Pearson Product-Moment
Correlations with the Criteria (r, rF_1), and Pearson Product-Moment
Correlations (Corrected for Broad Categories) with the
Criteria ($_c rF_1$, $_c rF_2$) for Age, Education and Experience

Sample III
Paster 773.884

N = 38

	M	σ	Range	r*	rF_1**	$_c rF_1$***	$_c rF_2$****
Age (years)	36.6	7.8	23-54	.286	.139	.066	.262
Education (years)	9.5	2.1	5-12	.136	.173	.185	.091
Experience (months)	43.1	17.8	16-108	.193	.216	.190	.110

r*	- Production records
rF_1**	- Rank order ratings of night foreman converted to linear values
$_c rF_1$***	- Ratings of night foreman expressed in broad categories
$_c rF_2$****	- Ratings of day foreman expressed in broad categories

TABLE II-D

Means (M), Standard Deviations (σ) and Ranges for Age, Education and Experience

Combined Sample
Tile Sorter .
Tile Placer .
Paster .

N = 127

	M	σ	Range
Age (years)	35.8	8.0	19-55
Education (years)	9.6	1.8	5-13
Experience (months)	53.2	45.2	2-248

The data in Tables II-A, II-B and II-C indicate that there are no significant correlations between age or education and the criterion for any of the three samples. A correlation significant at the .01 level exists between experience and the criterion for the Tile Placer Sample and a correlation significant at the .05 level exists between experience and the Tile Sorter Sample; this might indicate that the more experienced workers in these two samples tend to be more productive on the job than the less experienced workers, or, in the case of the Tile Placer sample, the significant correlation between experience and the supervisory ratings might indicate that the supervisors tended to be biased in favor of those workers with whom they had been associated longer. Greater similarity exists among the three samples with respect to age and education than with respect to length of experience. However, the three samples appear to be sufficiently similar with respect to job duties, age, education and experience to permit combining the data whenever this would be statistically feasible. The data indicate that the three samples are suitable for test development purposes with respect to age, education and experience.

III. Job Descriptions

Sample I
Job Title: Tile Sorter .

Job Summary: Sorts glazed wall and floor tiles according to size, grade and color and packs tiles for shipment. Racks tiles on a sorting board and determines size by reading a gauge. Inspects tiles for imperfections sorts tiles according to color, guided by shade samples, and packs tiles in cartons.

Work Performed: Picks up stack of loose tiles from supply skid and places tiles on ledge at base of sorting board. Picks up three or four tiles in each hand and slides them down the face of sorting board where the tiles are caught by ridges in the board. Continues racking until the board is filled (6 tiles vertically and 15 tiles horizontally). Determines size of tiles by reading a sizing gauge at the right edge of the board. Inspects tiles for defects such as chips, cracks, pieces of grog and surface waviness. Stacks

bad tiles to one side. Places shade standards at top of board and checks
tiles on board against the shade samples. Removes tiles of same shade by
pulling them forward from the board with right hand and catching them with
left hand. Unfolds empty carton and marks clock number and grade of tile
on flaps. Packs tiles face to back in cartons, keeping shades separate and
packing seconds and standards in different cartons. Marks inspection slip
with style, color and shade. Shoves full carton over packing roll onto
full carton belt. Cleans work area at end of shift.

Sample II
Job Title: Tile Placer 573.687

Job Summary: Picks up flat wall tile and trim from pick-up bolt, inspects
material for defects and places tile in sagger for firing in kiln.

Work Performed: Picks up tile from pick-up belt, using right and left hands
alternately. Turns tile 1/4 turn, holding tile loosely between thumb and
fingers. Places tile horizontally on ribs in sagger and slides tile into
position by pushing against edge with finger. Visually inspects tile and
trim. Discards tile with chips, glaze off, glaze drops or thin glaze. Daubs
glaze on pieces which have a small area of glaze off. Continues picking up,
inspecting and placing tiles in saggers, working coordinately with two other
girls.

Sample III
Job Title: Paster 773.884

Job Summary: Arranges tiles on design board to form specific designs in
accordance with work ticket specifications and size, shape, and color of
design board compartments by shaking design board and manually placing
tiles. Inspects tiles and discards defective tiles. Pastes sheet of paper
on top of tiles on design board, transfers tile sheet to drying board and
sets it in drying racks for subsequent packing and shipping.

Work Performed: Arranges tiles on design board, inspects them and discards
defective tiles: Picks up work ticket and design board from Pasting Clerk
and takes them to workbench. Places shaker frame on design board to prevent
tiles from spilling over sides of design board. Removes tiles supplied by
Tile Carrier from service box at front of workbench, using one or both hands,
judging number of tiles needed to fill compartments of design board. Spreads
tiles evenly over design board, using both hands. Inspects tiles during
removal from service box and during spreading over design board for defects
such as chips, blisters, stuck tile, dirty face, warps, key-stone tile, and
off-size tile. Removes defective tiles and discards them either on front
and sides of workbench, or in service box on left side of workbench. Picks
up, shakes, and tilts design board, placing as many tiles as possible in
proper design board compartments. Removes shaker frame from design board,
manually places tiles not already in proper design board compartments using
both hands. Taps and tilts design board with pasting brush to obtain uni-
form spacing of tiles. Inspects tiles for defects again during hand placing,
tapping, and tilting. Removes and discards defective tiles and replaces
them with good tiles.

Pastes sheet of paper on top of tiles on design board; transfers tile sheet to drying board and sets board in drying racks: Applies glue to several sheets of paper at one time, using gluing machine. Spreads glued paper evenly over top of tiles on design board, using both hands, and brushes paper with pasting brush to fasten it firmly. Picks up drying board from floor on right, places drying board over top of design board, turns boards over so that pasted paper of tile sheet is on bottom of drying board. Removes design board from top of tile sheet and places edge up on front of bench. Inspects tiles for defects, removes defective tiles and replaces them with good tiles. Places tile sheet on drying board in drying rack directly behind workbench. Removes approximately three drying boards from drying rack at one time and places them within reaching position on floor to right of workbench.

Continues pasting tile sheets until approximately one hour before completing work order. Obtains new work order from Pasting Clerk to insure constant supply of tiles by Tile Carriers. Completes work order, returns work ticket and design board to Pasting Clerk and picks up previously assigned work ticket and design board.

IV. Experimental Battery

All of the tests of the GATB, B-1002A, were administered to Samples I and II-- Tile Sorter and Tile Placer. All of the tests of the GATB, B-1001, were administered to Sample III--Paster.

V. Criterion

Sample I - Tile Sorter

The criterion consists of production records based on both quality and quantity of production. The quantity of production was expressed in terms of the average percent of a day's work; quality of production was expressed in terms of the percent of returns. The percent of returns for each worker was measured over a series of four or more samplings; in most cases it was based on ten or more samplings. The final criterion score for each worker consisted of the percent of a standard day's work minus the percent of returns. The criterion scores ranged from 54 to 120 with a mean of 92.9 and a standard deviation of 17.1.

Supervisory ratings were also obtained. Since they were available for only 45 of the 50 Tile Sorters, these data were not used in this study.

Sample II - Tile Placer

The criterion consists of rank order ratings made by three foremen. First ratings were made by two foremen who had worked with the workers for several years. It was found that the raters could not dissociate experience and performance. Reratings were made after discussion of this problem with the raters and it was found that the raters still could not dissociate experience and performance. In an effort to obtain more valid rating, three younger foremen were asked to rate the workers. The three foremen made separate rank-order ratings on all of the workers in the sample. Product-moment intercorrelations were obtained for the linear scores derived from the three sets of ratings. The following results were obtained:

9

	Foreman A	Foreman B
Foreman B	.64	
Foreman C	.64	.44

The reliability of the three sets of ratings combined as estimated by the Generalized Spearman-Brown Formula is .80. The sums of the linear scores derived from the three foremen were selected as the most reliable criterion for validation purposes. Although the combined ratings of the three younger foremen were significantly related to length of experience, the obtained relationship was substantially less than that obtained between experience and the ratings of the older foremen. Therefore, the final criterion for this study consists of the sums of the linear scores derived from the rank order ratings made by the three younger foremen.

Sample III - Paster

For the 38 Pasters in the sample, two kinds of criteria were available: (1) daily incentive earnings and (2) supervisory ratings.

Daily incentive earnings were totalled and averaged for each person in the sample for the six-month period from July 1950 through December 1950. This average was weighted in accordance with the number of days actually worked by the Paster during this six-month period. The range of the number of days on which the Pasters worked during this period was 49 to 122. During the first five working days in July 1950, all of the Pasters were on vacation.

An examination of daily incentive earnings revealed that there were two days, December 21 and 22, during which incentive earnings sharply decreased for nearly all of the Pasters in the sample. These were the two days prior to the Christmas holiday. It was thought that incentive earnings for those two days did not validly reflect ability on the job. Therefore, the production records for these two days were not considered in obtaining a daily average over a six-month period for each Paster.

Daily incentive earnings were in the form of "earned hours." Standards were set on the basis of earnings of average workers during an eight-hour day. The worker who does not attain eight "earned hours" per day is paid the standard eight-hour rate. If "earned hours" exceed the standard eight "earned hours," the worker is paid the standard eight-hour rate plus the rate for the number of hours in excess of eight "earned hours." The daily incentive earnings ranged from 660 to 1307, with a mean of 881.4 and a standard deviation of 126.5.

The Pasters were rated by two foremen.. The day foreman and the night foreman assigned ratings under the direction of a test technician. Both foremen made their ratings from a list of 47 Pasters, indicating those who were still in the "trainee" stage and those who were "marginal." The "trainee" groups consisted of workers who, in the opinion of the foremen, were not performing as proficiently as they would after more experience on the job. The "marginal" groups consisted of workers who would be the first to be released if satisfactory replacements for them could be found.

From the list of 47 Pasters, the day foreman designated seven Pasters as "trainees" and two Pasters as "marginal" workers. He did not know two workers well enough to rate them. The day foreman then indicated which of the remaining 36 Pasters were the best 25%, then which were the poorest 25%, leaving an average, or middle 50% group. He did not adhere strictly to these percentages, but attempted to approximate the 25:50:25 distribution. Two of these 36 Pasters were dropped from the sample. Thus ratings of 36 Pasters, who had been placed in the "marginal" group, the upper 25%, the lower 25%, or the middle 50% by the day foreman were utilized in this study. In addition, the day foreman indicated which were the best two workers in his upper 25% group. Thus, the day foreman's ratings were spread over five categories: (1) "Marginal"; (2) Lower 25%; (3) Middle 50%; (4) Upper 25%; and (5) "Best Two-Upper 25%." The day foreman was unable to place the workers in each category in rank order.

The two workers with whom the day foreman was not well enough acquainted to be able to rate were assigned to the day foreman's categories which corresponded to the categories in which the night foreman had placed them. This was done to eliminate the necessity of computing additional statistics due to a difference in N's for the two sets of ratings. After the two additional workers were arbitrarily assigned to the day foreman's rating categories, the five categories in which the day foreman rated the workers, from lowest to highest, included 2, 5, 19, 9 and 3 workers, respectively; for statistical purposes, the ratings in each of the five broad categories were converted to quantitative scores of 29, 38, 48, 59 and 69, respectively.

After eliminations were made from the list of 47 Pasters, broad category ratings prepared by the night foreman were available for the same 38 workers who were in the final sample rated by the day foreman. Although the night foreman began by attempting to place the Pasters in upper 25%, middle 50% and lower 25% categories, he did not adhere to those percentages. One worker was rated as marginal and two were designated as the best two workers in the sample. His final ratings consisted of five broad categories which included, in ascending order of ability, 1, 4, 23, 8 and 2 workers respectively; for statistical purposes, the ratings in each of the five broad categories were converted to quantitative scores of 27, 35, 48, 60 and 70, reppectively.

In addition, the night foreman placed the 38 Pasters in rank order with respect to job performance ability. The rank order ratings of the 38 Pasters were converted to linear scores for computational purposes.

A product-moment correlation corrected for broad categories was computed between the broad category ratings of the day foreman and linear scores based on the rank order ratings of the night foreman. The correlation obtained was .785. This indicates substantial agreement between the ratings of the two foremen, even considering the fact that ratings for two individuals were arbitrarily designated as the same in each set of criterion values. (A correlation of .413 is required for significance at the .01 level of confidence when N = 38.)

Ratings of the two foremen were also correlated with production records (average incentive earnings over a six-month period). These correlations are shown below:

$$N = 38$$

	rF_1*	$c^{rF_1}**$	$c^{rF_2}***$
Production Records	.668	.695	.704

rF_1* - Rank order ratings of night foreman converted to linear values.

$c^{rF_1}**$ - Ratings of night foreman expressed in broad categories.

$c^{rF_2}***$ - Ratings of day foreman expressed in broad categories.

Ratings of both foremen are significantly related to production records. The ratings of the foremen correlated slightly higher with each other (.785) than with production records. However, there is a relatively small difference between the lowest of these criterion intercorrelations (.668) and the highest (.785). The obtained correlations are sufficiently high for the criteria to be regarded as reliable.

VI. Statistical and Qualitative Analysis

The data for the three samples were analyzed separately and in combination on the basis of both statistical and qualitative considerations. Means, standard deviations and correlations with the criterion were calculated for the aptitude scores for each sample separately. Means and standard deviations of the aptitude scores were also calculated for the Combined Sample.

Since the Tile Placer Sample and the Tile Sorter Sample were each tested with the B-1002A edition of the GATB and the Paster Sample was tested with the B-1001 edition of the GATB, it was necessary to convert the B-1001 aptitude score means and standard deviations of the Paster Sample to equivalent B-1002 means and standard deviations before combining the data for the three samples. The conversions were based on standard score equations for B-1001 and B-1002 aptitude scores. Appropriate formulae were used to combine the data to obtain means and standard deviations of the B-1002 aptitude scores for the Combined Sample.

Table III-A shows the B-1002 means, standard deviations and Pearson product-moment correlations with the criterion for the aptitudes of the GATB, for Sample I - Tile Sorter 573.887. Table III-B shows the B-1002 means, standard deviations, and Pearson product-moment correlations with the criterion for the aptitudes of the GATB, for Sample II - Tile Placer 573.687 Table III-C shows the B-1001 means and standard deviations, equivalent B-1002 means and standard deviations and Pearson product-moment correlations with the criteria for the aptitudes of the GATB, for Sample III - Paster 773.884 . Table III-D shows the means and standard deviations for the aptitudes of the GATB, B-1002, for the Combined Sample.

TABLE III-A

B-1002 Means (M), Standard Deviations (σ), and Pearson Product-Moment
Correlations with the Criterion (r) for the Aptitudes of the GATB

Sample I
Tile Sorter 573.887

N = 50

Aptitudes	M	σ	r
G-Intelligence	84.8	14.4	.352*
V-Verbal Aptitude	89.6	15.8	.281*
N-Numerical Aptitude	84.5	14.7	.399**
S-Spatial Aptitude	83.6	15.1	.229
P-Form Perception	85.5	19.5	.429**
Q-Clerical Perception	93.9	16.3	.322*
K-Motor Coordination	98.5	17.8	.551**
F-Finger Dexterity	96.2	17.9	-.048
M-Manual Dexterity	98.2	15.3	.339*

** Significant at the .01 level
* Significant at the .05 level

TABLE III-B

B-1002 Means (M), Standard Deviations (σ), and Pearson Product-Moment
Correlations with the Criterion (r) for the Aptitudes of the GATB

Sample II
Tile Placer .573.687

N = 39

Aptitudes	M	σ	r
G-Intelligence	85.9	16.7	.062
V-Verbal Aptitude	87.3	12.2	.120
N-Numerical Aptitude	87.0	18.3	.173
S-Spatial Aptitude	86.1	17.1	-.200
P-Form Perception	87.5	19.3	-.224
Q-Clerical Perception	95.2	14.8	.029
K-Motor Coordination	98.5	15.9	-.069
F-Finger Dexterity	96.7	17.2	-.143
M-Manual Dexterity	101.7	20.1	-.148

TABLE III-C

B-1001 Moans (M), Standard Deviations (σ), Equivalent B-1002 Means (M)
and Standard Deviations (σ) and Pearson Product-Moment Correlations
with the Criteria (r, rF₁), and Pearson Product-Moment Correlations
(Corrected for Broad Categories) with the Criteria (crF₁, crF₂),
for Aptitudes of the GATB

Sample III
Paster

$N = 38$

Aptitudes	B-1001		Equivalent B-1002		r*	rF₁**	crF₁***	crF₂****
	M	σ	M	σ				
G-Intelligence	95.2	14.8	90	14	.163	.130	.242	.096
V-Verbal Aptitude	95.5	14.7	95	15	.225	.249	.436###	.216
N-Numerical Aptitude	98.6	17.0	94	16	.212	.215	.342#	.213
S-Spatial Aptitude	94.0	15.4	90	15	.038	.013	-.004	-.136
P-Form Perception	91.4	13.5	89	13	.084	.370#	.412#	.072
Q-Clerical Perception	92.3	18.3	93	16	-.142	.117	.259	.087
A-Aiming[1]	91.4	19.9	92	19	.239	.332#	.469###	.281
T-Motor Speed[1]	91.1	17.5	94	18	.371#	.372#	.483###	.292
F-Finger Dexterity	98.1	15.6	94	16	.285	.239	.314	.141
M-Manual Dexterity	97.8	21.0	95	21	.417###	.505###	.594###	.325#

Significant at the .01 level
Significant at the .05 level

    r*   - Production Records (Product-Moment Correlations)
    rF₁**   - Rank order ratings of night foreman converted to linear values
             (Product-Moment Correlations)
  crF₁***   - Broad Category Ratings of night foreman (Product-Moment
             Correlations corrected for broad categories)
  crF₂**** - Broad Category Ratings of day foreman (Product-Moment
             Correlations corrected for broad categories)
   1 Converts to equivalent B-1002 score on Aptitude K-Motor Coordination

TABLE III-D

Means (M) and Standard Deviations for the Aptitudes of tho GATB, B-1002

Combined Sample
Tile Sorter 573.887
Tile Placer 573.687
Paster 773.884

N = 127

Aptitudes	M	σ
G-Intelligence	887	15
V-Verbal Aptitude	90	15
N-Numerical Aptitude	88	17
S-Spatial Aptitude	87	16
P-Form Perception	87	18
Q-Clerical Perception	94	16
K-Motor Coordination[1]	97	18
F-Finger Dexterity	96	17
M-Manual Dexterity	99	19

1 Based on combination of converted Aptitude T
   data for the Paster Sample and Aptitude K data
   for the Tile Placer and Tile Sorter Samples.

The statistical results were interpreted in the light of the job analysis
data for each sample. The job analysis for Tile Sorter indicated that the
following aptitudes measured by the GATB appeared to be important for this
occupation:

Form Perception (P) - required to inspect for chips, cracks and pieces
of grog in the tiles and also to sort the tiles according to differ-
ences in colors and shades.

Motor Coordination (K) - Finger Dexterity (F) - Manual Dexterity (M) -
required to place and remove tiles from the sorting board rapidly and
to pack tiles.

The job analysis for Tile Placer indicated that the following aptitudes
measured by the GATB appeared to be important for this occupation:

Form Perception (P) - required to perceive imperfections in the tiles,
such as chips, glaze off, glaze drops and thin glaze.

Motor Coordination (K) - required for accurate and rapid placement of
tiles in saggers.

Finger Dexterity (F) and Manual Dexterity (M) - required for accurate
and rapid turning of tiles in fingers and for picking tiles from pick-
up belt in order to transfer them to the sagger.

production records, it did correlate significantly with the night foreman's ratings. Knowledge of the job duties, the details of the criteria, and the degree of familiarity of the foremen with abilities of the workers provides us with some basis for a speculative explanation of the variations in the validity coefficients. It is likely that Aptitude P is significant in determining quality rather than quantity of production and, therefore, would not be reflected in the production records. Since the production records were based on quantity of production, this would tend to produce the negligible correlation between Aptitude P and production records. The night foreman, who was reported to have had a much better knowledge of this occupational group's job performance than the day foreman, might have been well aware of the differences in the quality of the work of the various employees. The night foreman's ratings would be determined in part by quality of production, which might account for the significant relationship between the night foreman's ratings and Aptitude P. The consistently low correlations between the day foreman's ratings and each of the aptitudes, with the exception of Aptitude M, might be accounted for by the fact that the day foreman was not as fully acquainted with the job performance of the workers as the night foreman. The consistently significant correlations of Aptitude M might be attributed to a high degree of importance of this aptitude in performance of the jobs.

Table III-D, which presents means and standard deviations of the aptitudes measured by the B-1002 edition of the GATB for the Combined Sample, shows that the highest mean scores in decreasing order of magnitude were obtained for Aptitudes M, K and F, respectively, and that the lowest standard deviations were obtained for Aptitudes G and V.

On the basis of the qualitative and quantitative evidence cited above, Aptitudes P, K, F and M (P, A, T, F and M for B-1001) warranted further consideration for inclusion in the test norms. All of these aptitudes appear to be important in terms of the job analysis data for the three samples. Aptitudes K, F and M have high mean scores for the Tile Placer, the Tile Sorter and the Combined Samples. Aptitudes F and M also have relatively high mean scores for the Paster Sample. Aptitudes P, K and M show significant correlations with one or more of the criteria. Although there is some statistical evidence of significance for some of the other aptitudes, none of the other aptitudes was considered further for inclusion in the norms because they did not appear to be important in terms of the job analysis data for the three samples.

Various combinations of Aptitudes P, K, F and M (P, A, T, F and M for the Paster Sample) with appropriate cutting scores were selected as trial norms. The relationship between each set of trial norms and the dichotomized criterion was determined for each sample separately and for the Combined Sample. A comparison of the results showed that B-1002 norms consisting of P-70, F-70 and M-80 (P-70, F-75 and M-80 for B-1001) had better selective efficiency than any other set of norms tried. Each aptitude cutting score is within 10 points of one standard deviation below the respective aptitude mean of the Combined Sample.

VII. Concurrent Validity of Norms

In order to compute tetrachoric correlation coefficients between the norms and the criterion for the three separate samples and for the Combined Sample, the criterion for each sample was dichotomized.

The dichotomy of the criterion for the sample of Tile Sorters was set at a production level which represented a standard day's work minus an acceptable percent of error. For this purpose, the critical criterion score was set at 90. All of those workers who received a criterion score of 90 or more were placed in the high criterion group and those with a score of 89 or less were placed in the low criterion group. This placed 20, or 40 percent of the 50 workers, in the low criterion group.

The criterion for the Tile Placer Sample was dichotomized by placing one-third of the sample in the low criterion group, which resulted in a criterion critical score of 142.

For the sample of Pasters, the ratings criteria were dichotomized by placing in each low criterion group the number of workers rated low by the day foreman and by the night foreman. The day foreman had rated 7 people low and the night foreman rated 5 people low. When the production records criterion was dichotomized, 6 people were placed in the low criterion group because this was the average of the numbers of workers rated low by the day foreman and the night foreman. This resulted in a critical score of 770 on the production records criterion. All those workers whose production average was 770 or more were placed in the high criterion group; the remainder of the sample was placed in the low criterion group. Tetrachoric correlations were computed between the test norms and each of the three criteria. A tetrachoric correlation coefficient greater than twice its standard error was obtained only for the production records criterion. The results obtained for the production records criterion are shown in Table IV-C.

The B-1002 norms were used to compute the tetrachoric correlation coefficients and apply the Chi Square test for the Tile Placer and Tile Sorter Samples, and the equivalent B-1001 norms were used when these computations were made for the Paster Sample.

Tables IV-A and IV-B show the relationship between the B-1002 norms (P-70, F-70 and M-80) for the Tile Sorter and the Tile Placer Samples. Table IV-C shows the relationship between the B-1001 norms (P-70, F-75 and M-80) for the Paster Sample. Table IV-D, a composite of these three tables, shows the relationship between the test norms and the criterion for the Combined Sample. Workers in each low criterion group have been designated as "poor workers" and workers in each high criterion group have been designated as "good workers."

TABLE IV-A

Relationship between B-1002 Test Norms Consisting of Aptitudes P, F and M
with Critical Scores of 70, 70 and 80, Respectively,
and the Criterion for Sample I
Tile Sorter 573.887

N = 50

	Non-Qualifying Test Scores	Qualifying Test Scores	Total
Good Workers	6	24	30
Poor Workers	12	8	20
Total	18	32	50

$r_{tet} = .61$ $\qquad$ $X^2 = 6.688$

$\sigma_{r_{tet}} = .23$ $\qquad$ $P/2 < .005$

The data in the above table indicate a significant relationship between the
test norms and the criterion for Sample I.

TABLE IV-B

Relationship between B-1002 Test Norms Consisting of Aptitudes P, F and M
with Critical Scores of 70, 70 and 80, Respectively
and the Criterion for Sample II
Tile Placer 573.687

N = 39

	Non-Qualifying Test Scores	Qualifying Test Scores	Total
Good Workers	4	22	26
Poor Workers	7	6	13
Total	11	28	39

$r_{tet} = .63$ $\qquad$ $X^2 = 4.574$

$\sigma_{r_{tet}} = .28$ $\qquad$ $P/2 < .025$

The data in the above table indicate a significant relationship between
the test norms and the criterion for Sample II.

TABLE IV-C

Relationship between B-1001 Test Norms Consisting of Aptitudes P, F and M
with Critical Scores of 70, 75 and 80, Respectively,
and the Criterion for Sample III
Pastor 773.884

N = 38

	Non-Qualifying Test Scores	Qualifying Test Scores	Total
Good Workers	4	28	32
Poor Workers	4	2	6
Total	8	30	38

$r_{tet} = .79$ $\qquad$ $x^2 = 5.958$

$\sigma_{r_{tet}} = .35$ $\qquad$ $P/2 < .01$

The data in the above table indicate a significant relationship between the
test norms and the criterion for Sample III.

TABLE IV-D

Relationship between Test Norms and the Criterion
for the Combined Sample

B-1001 Norms: P-70, F-75, M-80
B-1002 Norms: P-70, F-70, M-80

Tile Sorter 573.887
Tile Placer 573.687
Paster 773.884

N = 127

	Non-Qualifying Test Scores	Qualifying Test Scores	Total
Good Workers	14	74	88
Poor Workers	23	16	39
Total	37	90	127

$r_{tet} = .67$ $\qquad$ $x^2 = 22.234$

$\sigma_{r_{tet}} = .15$ $\qquad$ $P/2 < .0005$

The data in the above table indicate a significant relationship between the
test norms and the criterion for the Combined Sample.

VIII. Conclusions

On the basis of mean scores, correlation coefficients, the job analysis data and their combined selective efficiency, Aptitudes P, F and M with minimum scores of 70, 70 and 80, respectively, are recommended as B-1002 norms for the occupations of Tile Placer 573.687 Tile Sorter 573.887 and Paster 773.884 . The equivalent B-1001 norms are P-70, F-75 and M-80.

IX. Determination of Occupational Aptitude Pattern

When the specific test norms for an occupation include three aptitudes, only those occupational aptitude patterns which include the same three aptitudes with cutting scores that are within 10 points of the cutting scores established for the specific norms are considered for that occupation. The only one of the existing 23 occupational aptitude patterns which meets these criteria for this study is OAP-16, which consists of P-75, F-80 and M-80 for B-1002. The selective efficiency of OAP-16 for the Combined Sample was determined by means of the tetrachoric correlation technique. A tetrachoric correlation of .49 with a standard error of .15 was obtained, which indicates a significant relationship between OAP-16 and the criterion of the combined experimental sample. The proportion of the sample screened out by OAP-16 was .42, which is within the required range of .10 to .60. Therefore, it is recommended that OAP-16 be used in counseling for the occupations of Paster 773.884., Tile Placer 573.687 and Tile Sorter 573.887.