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COLUMBUS 1, OHIO

September 30, 1948

Director of Laboratory
Watertown Arsenal
Watertown, Massachusetts

Attention: J. F. Sullivan

Dear Sir:

This is an interim report on work pursued under
Contract W33-019, Ord.-6266, "Research Services in Connection
With the Development of Laminated Armor".

Very truly yours,

Randall G Heiligmann

R. G. Heiligmann
Assistant Supervisor
Plastics Division

RGH:bph
Enc. (51)

cc: Cleveland Ordnance District
717 Superior Avenue, N. E.
Cleveland 11, Ohio

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INTERIM REPORT

on

THE DEVELOPMENT OF LAMINATED ARMOR

Contract W33-019
Ord.-6266

to

DIRECTOR OF LABORATORY
WATERTOWN ARSENAL
WATERTOWN, MASSACHUSETTS

by

H. W. Kuhlmann, R. G. Heiligmann, R. W. King, and E. E. McSweeney

INTRODUCTION

This is an interim report for the United States of America (Cleveland Ordnance District) Contract W33-019, Ord.-6266 (Battelle Project No. G-1147) "Research Service in Connection With the Development of Laminated Armor."

The proposal for the present project involved two distinct, although intimately related, lines of investigation, namely, (a) evaluation of various fillers and (b) a study of resin binders. As a result of various delays and difficulties in obtaining equipment and raw materials, additional emphasis was placed on the first part of the program and the work on the second part was drastically reduced. These changes were carried out with the approval of Ordnance representatives.

No restriction was placed on the number and/or types of fillers to be employed in the present study. Those selected, ultimately, were considered to be fairly representative of types which evidence sufficient

variation in structure and/or properties and which are more or less readily adaptable to laminated armor production. Although fiberglass was shown to possess outstanding ballistic properties in previous work (Doron Project), it was deemed propitious to include it in the present program as a pertinent reference point. The search was therefore directed toward securing a filler or combination of fillers which would prove superior to glass cloth. Providing success was achieved in this direction, it was planned to investigate this combination under various conditions of resin content and molding pressures.

The binders employed in this study were restricted, exclusively, to the low-pressure polyester resins which are commonly employed in laminate fabrication. In addition to their ready adaptability, they offer the advantage of having no solvent-removing problem as do other commonly used binders, i.e., phenolic, amino, and various thermoplastic resins.

No ballistic evaluations were undertaken at Battelle Memorial Institute. All laminates were forwarded to either Aberdeen Proving Ground or Watertown Arsenal. Ballistic testing was transferred from Aberdeen to Watertown during the month of January, 1948. While panels of 25 and 45 oz./sq.ft. were fabricated during the early part of the program, it was decided at the meeting of February 18, 1948 (at Watertown), to discontinue fabrication of the heavier panels.

METHOD OF INVESTIGATION

Raw Materials

Fillers

The selection of the fillers and fabrication of laminates from the same was prosecuted at Battelle. The following list summarizes the raw materials and their source of supply.

Fabrics

Nylon - 2 x 2 Basket-Weave (13 oz. duck)	U.S. Army
Nylon 10592 Sharkskin	Cheney Bros.
Nylon 7822	Duplan
Nylon 7823	Duplan
Fiberglas ECC 143	Owens-Corning
Fiberglas ECC 165	U.S. Army
Fiberglas ECC 184	Owens-Corning
Glass Mat U.D 0.020"	Glassflos Co.
Glass Mat	Glassflos Co.
Fortisan (saponified acetate rayon)	U.S. Army
Celanese (acetate rayon)	U.S. Army
Ramie	Sea Island Mills, Inc.
Ramie-Rayon	Sea Island Mills, Inc.
Inconel Fabric (006R26OR13)	Metal Tex Co.

Inconel Fabric (007R210M16)	Metal Tex Co.
Galv. Steel Fabric (009R174GS16)	Metal Tex Co.
Aluminum Sheet (.020" 3S1/2 Hard)	Alcoa
Aluminum Sheet (0.24" 61ST)	Alcoa
Stainless Steel Cloth (80 mesh)	W.S. Tyler Screen Co.
Lucite Sheet (methyl methacrylate polymer)	Dupont
Paraplex P-43 Cast Sheet	Resinous Prod. Co.
Paraplex P-13 Cast Sheet	Resinous Prod. Co.

The fabrics or sheets were used alone or in combination with others. The construction employed in the fabrication of these materials into laminates is summarized in Table 1.

The various fabrics and other fillers used in this project were obtained by writing to weavers and, in the case of the synthetics, to the manufacturer of the fibre who, in turn, supplied the name of weavers or suppliers of the woven fabrics. After contacting the various weavers, samples and specifications for the various cloths were examined and, since it was quite obvious that all fabrics could not be utilized, a representative selection was made and sufficient material ordered.

Some special fabrics were obtained through the Ordnance Dept., these including (a) 2 x 2 basket-weave nylon (13 oz.), which could not be obtained elsewhere unless a minimum order of 10,000 yards was placed, (b) Fiberglas ECC 165, plain and Ethocel Coated, these being no longer supplied by the Owens-Corning Fiberglas Co., and (c) two rayon fabrics, Fortisan and Celanese.

Metal cloths and screen were obtained directly from the manufacturers and the aluminum sheet was procured from a local supply house.

The cast resin sheets which we have included in the category of fillers, as noted above, were obtained directly from the manufacturer, the Paraplex sheets being procured from the Research and Development Department of the Resinous Products and Chemical Company.

Resins

The resins employed as binders in the present study were, exclusively, of the polyester type. (It was decided during a meeting at Watertown Arsenal, Feb. 18, 1948, to continue the program of filler evaluation and to focus our attention on the nylon-polyester system rather than to embark on the second phase of the program, namely, the effect of resin type, as outlined in the original proposal.)

The polyester resins are a general class of unsaturated alkyds prepared by reacting unsaturated dibasic acids (e.g. maleic anhydride) with dihydric alcohols such as ethylene or propylene glycol. Dibasic acids such as phthalic, sebacic, adipic, and many others are often used to give specific characteristics to the resins as in the case of the flexible type where adipic and sebacic are sometimes employed. The polyesters are normally much too viscous to be used as such and, consequently, polymerizable solvents are quite frequently employed to give a workable viscosity. The most common monomer used for this purpose is

styrene. Diallyl phthalate is, likewise, employed for this purpose. Peroxide catalysts are generally used to promote the final curing of these resins, the products being essentially thermosetting as a result of the crosslinking between the polymerizable solvent and the unsaturated alkyd.

Initially, two commercially available rigid polyester resins were examined, namely, Plaskon 920 and Laminac 4125. Laminac 4125 had a comparatively poor storage life and since the ballistic evaluation of a series of test panels employing these two resins gave comparable results, it was deemed propitious to employ the former. The Plaskon 920 Resin is a relatively high-viscosity material and to make a more workable solution for cloth impregnation, 10% styrene was added at the same time the Luperco ATC (peroxide catalyst) was incorporated.

During the latter part of the program which involved a study of the nylon (13 oz.) -polyester system, per se, it was deemed of interest to determine the effect of using a flexible polyester as binder material. Laminac 4134 and Paraplex P-13 were chosen for this investigation.

In the filler evaluation program, comparative data were based on a resin content of 20-30%, while, in the latter part of the investigation involving the nylon (13 oz.) -polyester system, the resin content was varied from approximately 10 to 30%.

Fabrication

Lay-Up

The laminates for the filler study were prepared in 12" x 15" sheets as suggested by the Ordnance Dept. at one of the early meetings in Washington, D. C. However, at the conference held at Watertown Arsenal (Feb. 18, 1948), Battelle requested permission to make smaller (7" x 7") panels since such a size could readily be prepared in one of the conventional, small laboratory presses. This permission was granted and the entire study of the effect of resin concentration and molding pressures was made with the small panels. However, these appeared to delaminate more readily than the larger 12" x 15" panels and a request was received from Watertown to prepare 3 or 4 of the large size, one of which was to be cut to the smaller dimensions for purpose of comparison.

Initially, the weighed amount of resin was applied by hand using a broad bladed spatula. This method proved unsatisfactory since it was time consuming and, in addition, the resin, applied in this manner, lacked uniformity of distribution. Since a coating machine of the required size and construction was not available commercially, it was necessary to build the same at Battelle Memorial Institute.

The high resin pick-up (above 30%, in general) was obtained by passing the fabric through a resin supply tank and then between squeeze rolls. (Figure 4) Fairly uniform control was obtained by this method. However, this technique was not readily applicable where pickups of

materially less than 30% were required. Therefore, two alternative methods were employed to obtain the lower values.

(1). A quantity of cloth was coated with a fairly high resin content (40-60%) and this coated cloth was combined with uncoated plies to give the desired amount.

(2). A means was devised (Figure 5) to operate the coating machine whereby the cloth was passed over the top squeeze roll rather than between them. The resin was transferred from the lower or resin pick-up roll to the upper roll and then to the under surface of the cloth. By careful control of the gap between the squeeze rolls, very low resin contents could be applied to the cloth. This has been termed a "Kiss-Dip" method by some members of the laminate industry.

The use of an additional roll would probably have improved the uniformity of the coating, but would have necessitated almost complete rebuilding of the machine. It was necessary at times to make several passes through the machine, thus gradually building up to the desired concentration.

After the proper resin pick-up had been obtained, the cloth was cut to size on an ordinary paper trimming board and laid up on aluminum cauls using cellophane as a separator. Care was taken to exclude all the air from between the individual plies by using a photographic print roller.

It is obvious that a wide variation in the number of plies of the different fabrics employed in the filler study was necessary in order to

maintain a given weight (25 oz./sq.ft.). However, for the studies involving resin content and molding pressure, a constant number of plies (13) of nylon duck was employed even though a spread in final weight would result. For the studies involving the use of metal filler (wire cloth or sheet), the amount of non-metallic filler was varied so that panels of approximately 25 oz./sq.ft. would be obtained.

Molding

The molding conditions varied somewhat, depending on the resin employed and the specific study being evaluated. This was especially true of the cure cycle, where, for Paraplex P-13, it was necessary to double the cure time as compared to that required for the other resins and, even then, the resulting panels were not completely satisfactory. In general, the length of cure was varied between 60 and 90 minutes with most cures being obtained at 60 minutes.

The most frequently employed temperature for curing was 100°C., although for some of the initial work, cures at 110°C. were made. The resin manufacturers recommendations were followed, and, in general, they offer a fairly wide latitude of time, temperature, and pressure at which these resins may be employed.

In the filler evaluation program, a pressure of 100 p.s.i. was employed, exclusively. However, in the detailed study of the nylon-polyester system, pressures of 15 to 500 p.s.i. were tried.

After the panels were molded for the appropriate period, they

were cooled to room temperatures while under pressure. This was purely a precautionary measure in most cases but, where combinations of fillers were employed, maintenance of pressure was necessary to prevent warping.

Finishing

After removal from the press, the panels were cut to size with a band saw. By using a piece of soft wood under the laminate while it was being cut, fraying of the edge was reduced to a minimum, especially in panels of low resin content. The edges of all panels were bound with cellulose tape to reduce the possibility of delamination by handling.

The panels were weighed and the thicknesses determined by averaging several micrometer measurements taken along each edge. The weights and thicknesses of each set of panels were then averaged and recorded. The resin content was calculated from the final weight and area of the laminate, assuming no flow of the filler itself. This, however, is not quite true but a necessary assumption since it is impossible to extract the polyester resins with a solvent due to their cross-linked nature. The solvent extraction method is readily adaptable to the more readily soluble thermoplastics like methylmethacrylate.

Ballistic Evaluation

The ballistic evaluation was carried out at both Aberdeen Proving Ground and Watertown Arsenal and the following procedure is that described by Aberdeen and is essentially the same as employed at Watertown Arsenal.

Method Used

Description of Facilities Used

1 Barrel Caliber .22

Bullet, Armor Testing, Caliber .22, T37

1 Support, Improvised for holding test panels and
a sheet of 0.020" 24 ST dural, parrallel to and
6" behind the test panel

1 set velocity measuring equipment

Description of Method Used

The panel under test was mounted to afford normal impact (0° obliquity) at a range of twelve feet from the gun muzzle. The first bullet was fired at the estimated velocity of the panel. If the first impact resulted in a partial penetration (failure of bullet to pierce the 0.020" dural witness plate placed parallel to and 6" behind the test panel), the velocity of the second round was increased, whereas, if on the first round a complete penetration was obtained, the velocity of the next round was lowered. On each succeeding round this technique was continued until a zone of mixed results (the velocity range wherein either a complete or a partial penetration might be produced) was established. Since, in most cases, there were three or more panels for each condition, the results obtained for all were combined to give an average evaluation.

From the results obtained, the V_{50} ballistic limit (protection) was calculated, using the following equation:

$$V_{50} \text{ BL (P)} = \frac{SV + (N_p - N_c) K}{N_p + N_c}$$

where

SV = the sum of the velocities of all rounds within
the zone of mixed results

N_p = number of rounds resulting in partial penetration

N_c = number of rounds resulting in complete penetration

$N_p + N_c$ = total number of rounds included in the V_{50} determination

K = a constant introduced to compensate for the difference between the number of partial and the number of complete penetrations. For this firing, a value of K equal to one-half the difference between the upper boundary (highest partial penetration) and the lower boundary (lowest complete penetration) of the zone of mixed results was used.

In addition to calculating the V_{50} ballistic limit by this method, a curve may be plotted to give the V_{50} value directly or to give the percentage of complete penetration to be expected at any velocity level.

The following procedure may be employed in arriving at the curve.

- (1). The numbers of complete and partial penetrations are tallied into class intervals of 40 feet per second,

e.g., 1071 - 1110, 1111 - 1150, 1151 - 1190, etc.

To refine the data, and thus give a more general picture of the probability of a complete penetration for varying velocities, the tallied results are combined into class intervals as follows: 1071 - 1150, 1111 - 1190, 1151 - 1230, etc. This overlapping of class limits permits the use of each observation twice, thus reducing the disadvantage of a small number of observations in each class interval, and also eliminating some of the erratic fluctuations resulting from the use of smaller class intervals.

- (2). Based on Step 1, percentages of complete penetrations ($100\% \frac{CP}{FP + OP}$) are computed and results plotted as the ordinate with the velocities as the abscissa. In accordance with standard practice, the percentages are plotted in the centers of the class intervals. The V_{50} value could then be read directly from the plot.

In the present program, the V_{50} values were supplied to us, these having been calculated by one or both of the previously described methods. Table 5 presents comparative data on the two methods. It can be seen from these values that there is little difference between the V_{50} ballistic limits determined by the two different methods.

Groups 3111-1 to 3111-37, inclusive, were tested ballistically at the Aberdeen Proving Ground and the remainder at the Watertown Arsenal.

The firing data as received from these two sources are given in the Appendix.

Representation of Ballistic Data

In the course of this work, it was pointed out to us by Mr. Sullivan of Watertown Arsenal (conference at Battelle Memorial Institute, May 20, 1948) that it might be possible to interpret the V_{50} value in a more fundamental way. This procedure involves an interpretation of the V_{50} ballistic limit in terms of an energy function and provides a value which has been termed the "Merit Factor". This is obtained by squaring the V_{50} value and dividing by the weight of the panel in oz./sq.ft. This merit factor is proportional to the energy absorbed by the panel according to the equation $E = 1/2 mv^2$, where E is the energy, m is the mass, and v is the velocity. Since the mass of the projectile (Caliber .22, T37) employed in the determination of the V_{50} value remains constant, the energy absorbed by the panel is proportional to the square of the velocity of the projectile at time of impact. It is evident that an evaluation of this nature will magnify the importance of securing accurate V_{50} values. This so-called "Merit Factor" has been employed in evaluating the relative merits of the various compositions.

ANALYSIS OF RESULTS AND CONCLUSIONS

The merit factor value was employed to rate the effectiveness of the various fillers for body armor application. Figure 1 shows, by means of a bar graph, the relative values of such fillers and combinations

thereof that have been employed in this study. Attempts have been made to group the fillers according to their general composition. Considerable thought was given relative to the representation of the data obtained on the filler study. It was concluded that a bar graph as pictured in Figure 1 provided a ready means of comparing all the fillers. In addition, it affords a ready comparison of the relative merits within a filler group and combinations of these fillers. The comparative groups are separated in this graph by wider spaces and by different types of shading. The composition of the panels can be ascertained from the legend in the upper left of the graph with the exception of sets 3111-44, 3111-45, and 3111-46 whose compositions were too complicated to be included in such a system. Specific constructions for all panels are given in Tables 1, 2, 3, and 4.

From Figure 1, then, it is apparent that:

- (1). 2 x 2 basket-weave nylon when used alone was superior to all other fillers employed in this study. (3111-50)
- (2). No advantage, ballistically, was obtained by combining the various fillers, i.e., for a given combination no instance was observed where the ballistic value of the same was equal or superior to the better fabric when used independently.
- (3). Of all the nylon fabrics employed, only the 2 x 2 basket-weave was outstanding, the remaining nylons being generally inferior to the fiberglass.

- (4). Little or no difference exists between the two rigid polyester resins employed in this part of the program.
- (5). The inclusion of metals such as aluminum sheet and stainless steel cloth offered no advantage. In fact, with increasing substitution of metal for 13 oz. nylon (2 x 2 basket-weave) on an approximately equivalent weight basis, progressively lower ballistic values were obtained. (3652-16-1 through 3652-18-1)

Since the 2 x 2 basket-weave 13 oz. nylon proved to be superior ballistically to all other fillers or combinations thereof, it was employed in the subsequent studies involving resin concentration and molding pressure. Figure 2 represents the data obtained when a rigid polyester resin was used to bind thirteen plies of 2 x 2 basket-weave nylon at various resin concentrations and molding pressures. It is readily apparent that superior ballistic properties were obtained at the lower resin concentrations. This is generally true regardless of the method of obtaining the low resin content, i.e. low resin pickup, initially, or reducing the resin content as a result of squeeze-out at the higher pressures employed during the molding operation. The arrows on two sets of panels (Figure 2) indicate the merit factor obtained when firing was continued on these panels after almost total delamination had occurred; only a slight reduction in the merit factor was observed.

In Figure 3, similar data are represented for two flexible polyester resins. Paraplex P-13 was difficult to use in that it had very poor curing characteristics and no physically satisfactory laminate was obtained at 15 p.s.i. at a resin content adaptable to this study. The panels that were submitted for testing, prepared with this resin, were definitely inferior as far as cure was concerned. Laminac 4134, a flexible polyester, was considerably more satisfactory for this study. In comparing Figures 2 and 3, it appears that a flexible polyester (e.g. Laminac 4134) is somewhat superior to the rigid polyester (e.g. Plaskon 920). Unfortunately, it was not possible to prepare a servicable laminate with Laminac 4134 at the low resin contents where Plaskon 920 gave optimum results.

The effect of pressure, also presented in Figures 2 and 3, indicates that, in general, higher molding pressures, at least, up to 250 p.s.i., apparently resulted in improvement of the ballistic performance (i.e., higher merit factors) of the laminates. A series of panels prepared at 300, 400, and 500 p.s.i. (Lab. No. 3652-1-1, 3652-1-2, 3652-2-1 - not shown in Figures 2 and 3) gave significantly lower ballistic values. These lower merit factors at higher pressures may possibly be attributed to the increased density of the panels.

While not presented formally in the summary tables, it was deemed of interest to note the results obtained when nylon-rigid polyester panels were faced with sheets of (1) Lucite, a methyl methacrylate polymer, (2) Paraplex P-43, a rigid polyester, and (3) Paraplex P-13, a flexible polyester. The merit factor values for these panels indicated no improve-

ment over those tested in the absence of these facings.

There was some question as to the effect of size of the panel on ballistic properties of the same and data obtained on the series prepared to investigate this effect are given in Table 4. The results show no appreciable variation since, for three of the four sets, the large panels had a merit factor value approximately 5% higher than the small panels (cut from one large panel) while the reverse was true of the fourth set. While the differences in ballistic values obtained from large and small panels were not great and do not invalidate the data presented herein, it is much easier to collect accurate ballistic data using the large panels. This test involving large and small panels was repeated and results verified.

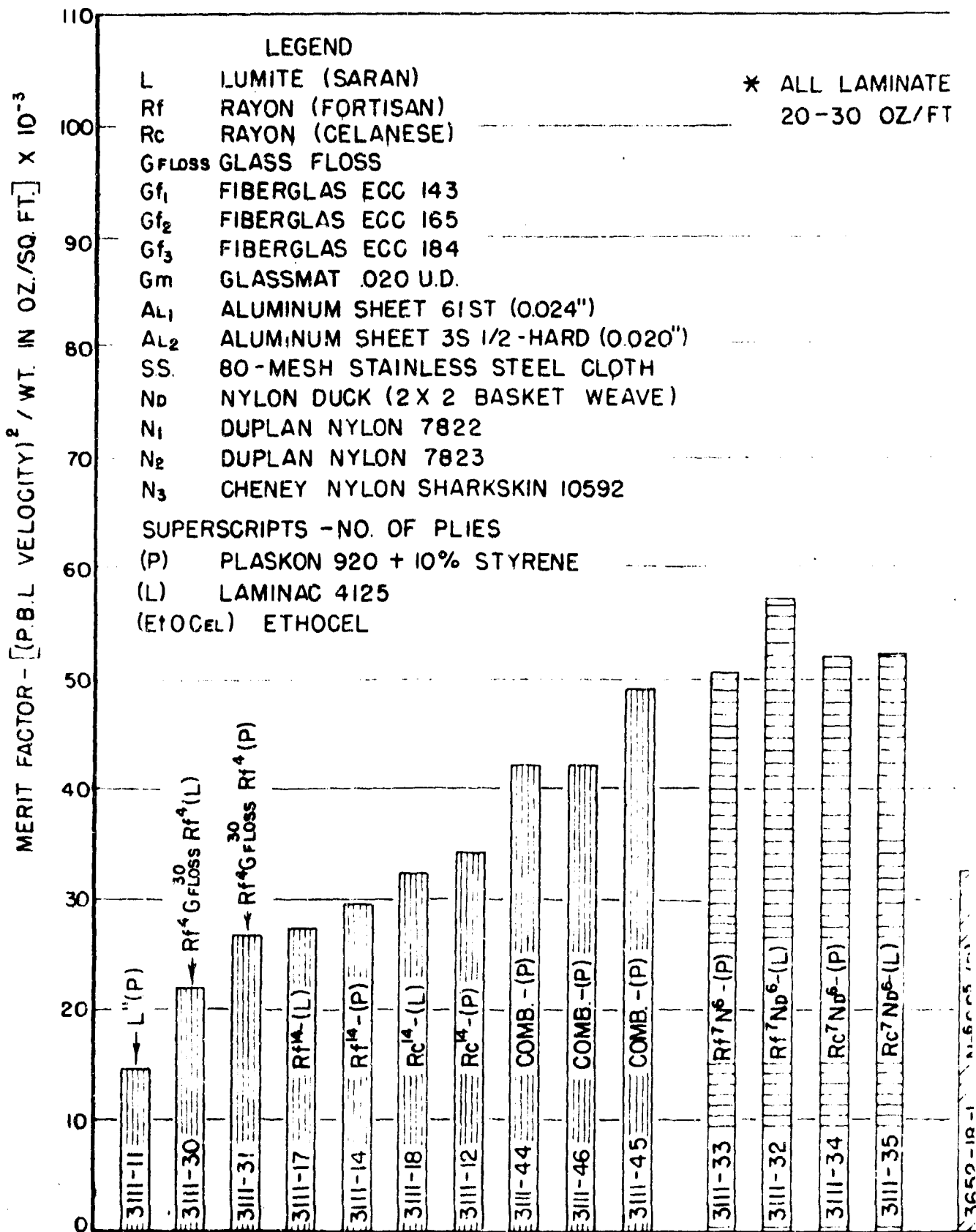
From the work that has been done on this project, it may be remarked, in conclusion, that, of all the fabrics employed as fillers for laminated body armor, 2 x 2 basket-weave nylon (13 oz.) provides the best ballistic protection for a given weight per unit area, within the weight ranges studied. It is also significant that the 2 x 2 basket-weave nylon was much superior to other nylon fabrics. Since the 2 x 2 basket-weave material was the heaviest weight of the nylons employed, it would seem desirable, at least, to examine heavier nylon fabrics. This nylon is the heaviest weight available and even this material must be procured by special order. However, it is believed that some effort should be directed toward the examination of a heavier nylon fabric, wherein consideration is given to (a) number and (b) size of filaments. It would

also be of interest to examine the effect of an unidirectional weave of 13 oz./sq.yd. and heavier.

An extensive program involving the effect of resin structure on ultimate ballistic properties could not be incorporated in the present project for reasons set forth earlier in this report. As previously noted, differences were apparent within a given class of resins (e.g., flexible vs. rigid polyesters). Therefore, it would appear desirable to engage in a study involving the effect of resin structure upon ultimate ballistic properties. Thus, widely different end results may well be obtained by employing resins of widely varying structures. Such a study should include both the thermosetting and thermoplastic types and/or combinations of the same.

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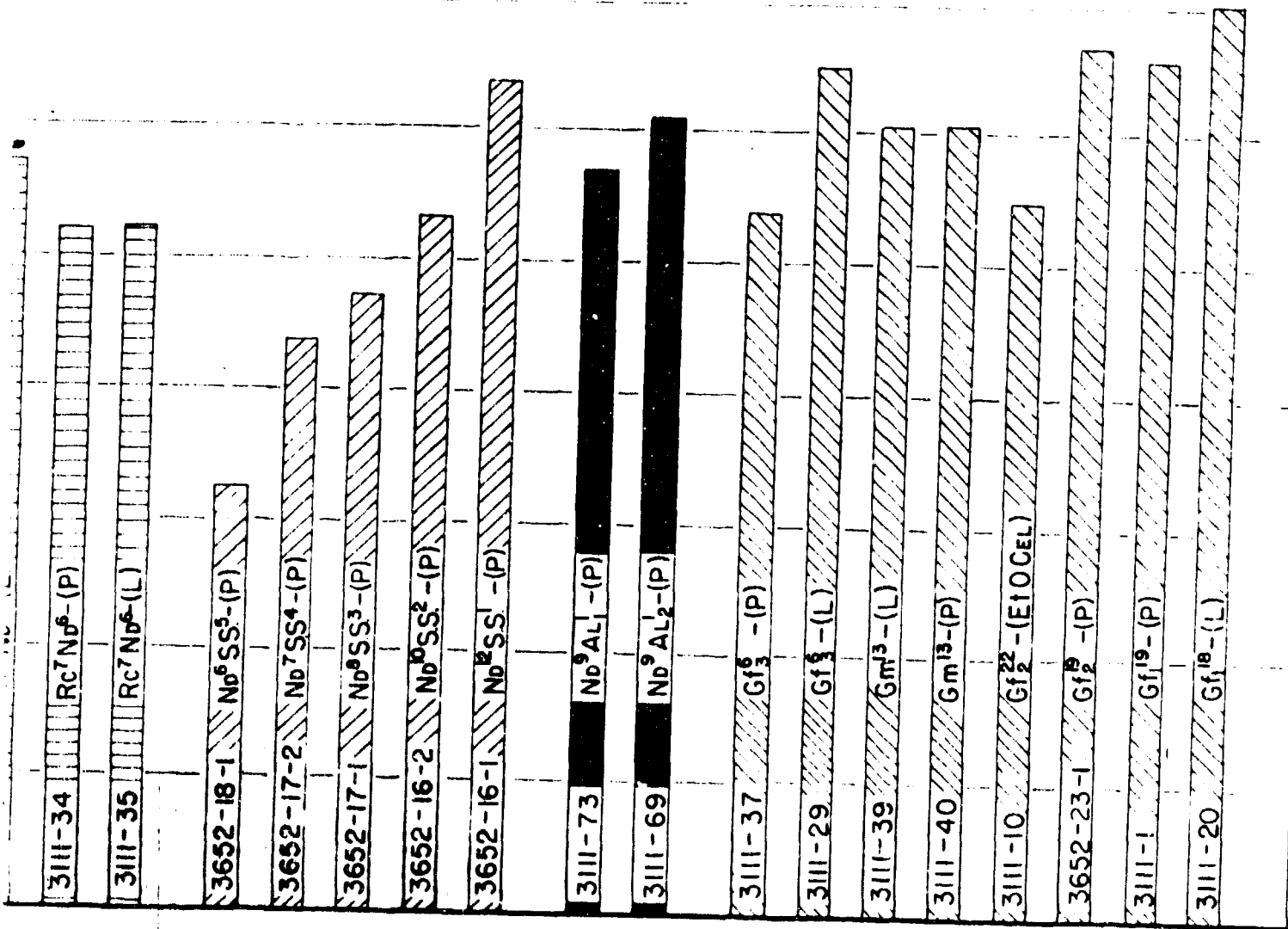
September 28, 1948



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FIGURE 1. EFFECT OF

ALL LAMINATES INCLUDED IN THIS FIGURE (ARE
 20-30 OZ/FT.² WITH A 20-30% RESIN CONTENT



FILLER COMBINATION

EFFECT OF FILLERS ON ULTIMATE BALLISTIC PROPERTIES OF LAMINATED

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3111-39	Gm ¹³ -(L)
3111-40	Gm ¹³ -(P)
3111-10	Gf ²² -(EIOCEL)
3652-23-1	Gf ⁸ -(P)
3111-1	Gf ¹⁹ -(P)
3111-20	Gf ¹⁰ -(L)
3111-21	Gf ³ Nb ⁰ Gf ³ -(L)
3111-8	Gf ³ Nb ⁰ Gf ³ -(P)
311-27	Nb ⁶ Gm ⁹ Nr ⁶ -(P)
3111-26	Nb ⁶ Gm ⁹ Nb ⁶ -(L)
3111-48	N ₂ ²⁴ -(P)
3111-49	N ₂ ¹⁶ -(P)
3111-22	N ₃ ²⁹ -(L)
3111-23	N ₃ ²⁹ -(P)
3111-50	Nb ⁵ -(P)

P. 20 3 of 3

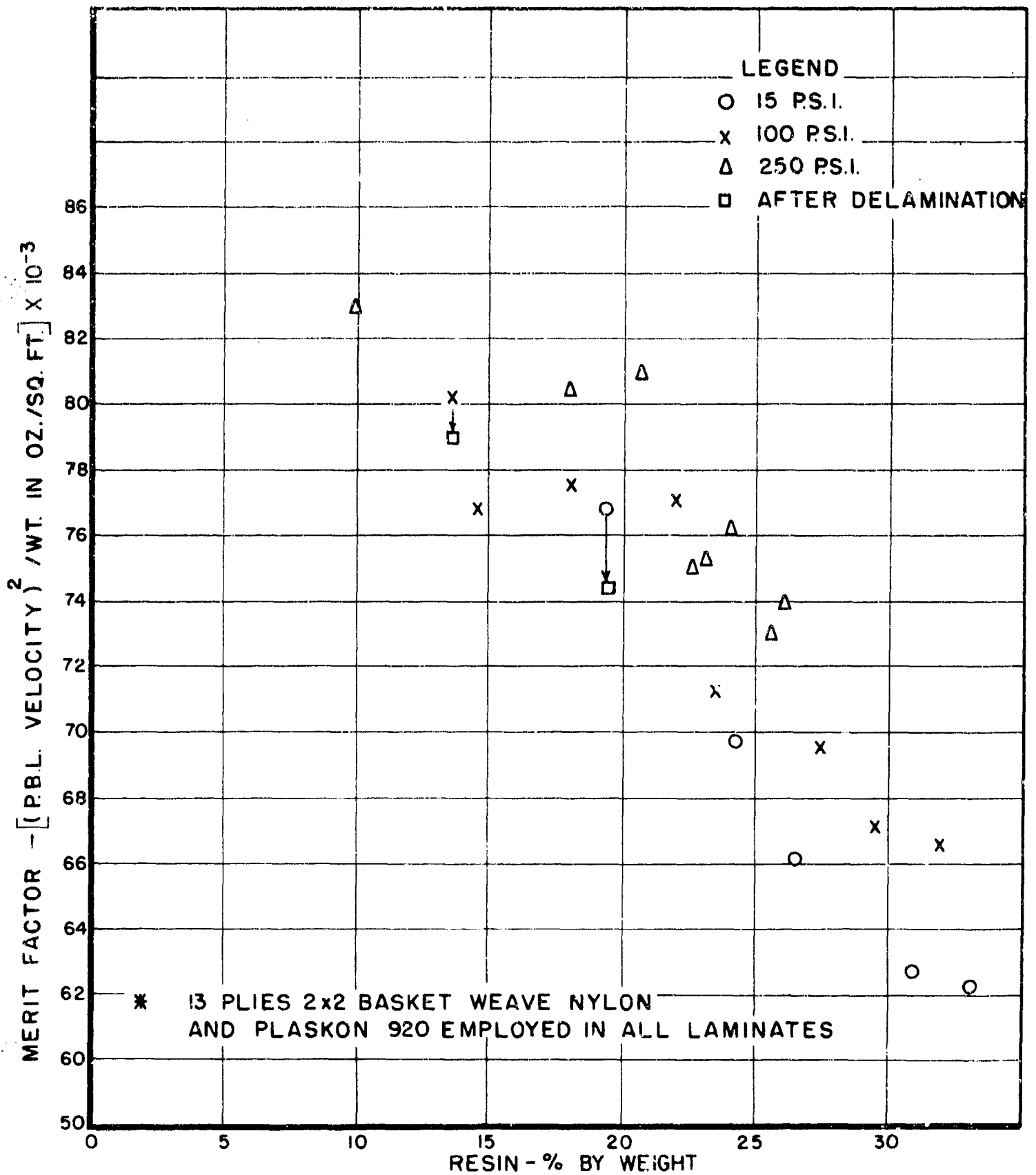


FIGURE 2. MERIT FACTOR VS. RESIN CONTENT AT VARIOUS PRESSURES *

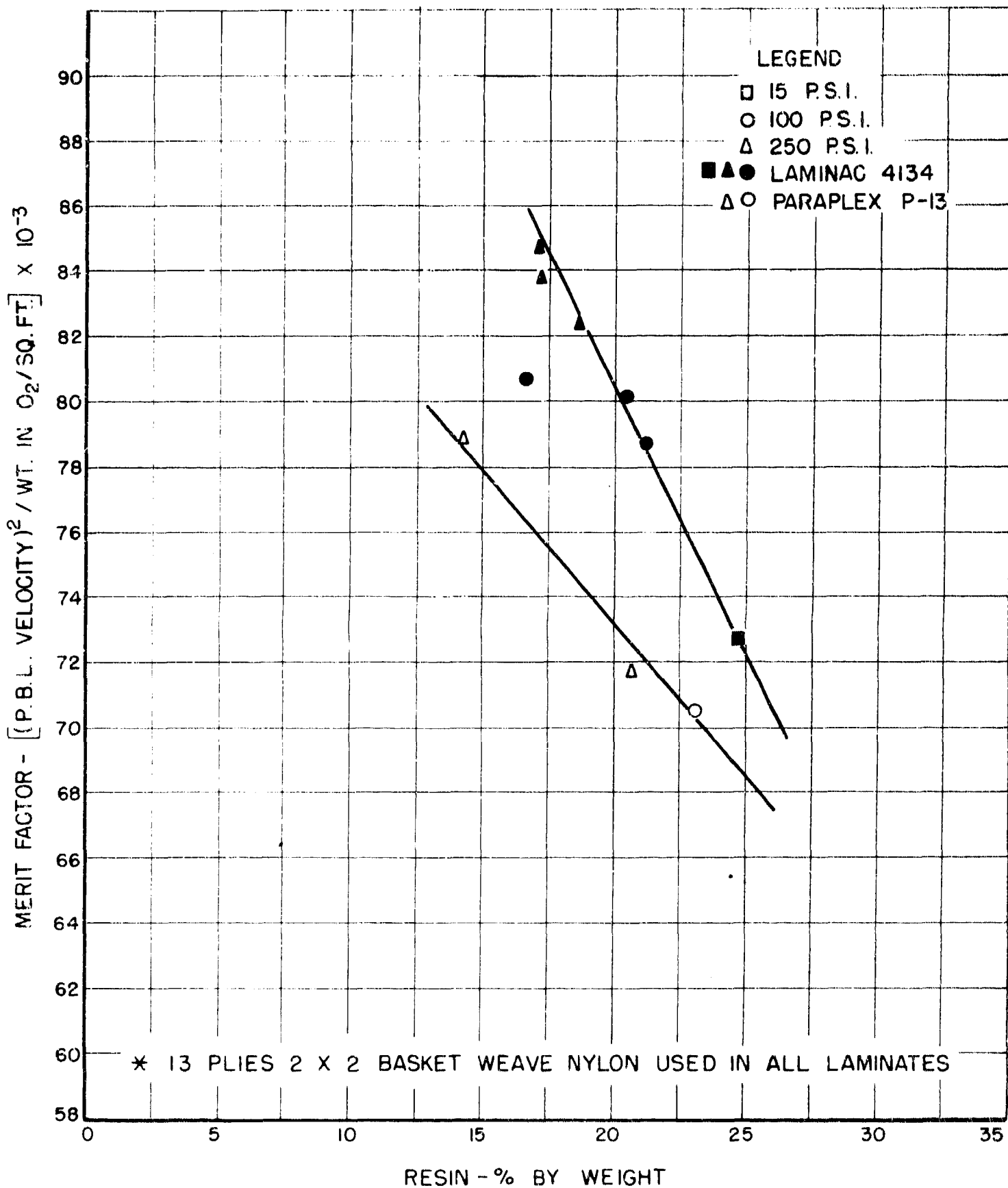


FIGURE 3. MERIT FACTOR VS. RESIN CONTENT (FLEXIBLE POLYESTERS) AT VARIOUS PRESSURES *

TABLE 1. IDENTIFICATION AND CHARACTERISTICS

Laboratory Book Number	L A Y - U P		Molding Conditions			
	No. Plies	Cloth	Resin	Temp., °C.	Time, Min.	Pressure, p.s.i.
3111-1	19 Plies	Fiberglas ECC-143	Plaskon 920 + 10% Styrene	100	60	100
3111-8	3 Plies	Fiberglas ECC-143	Ditto	100	90	100
	10 Plies	Nylon Duck (13 Oz.)				
	3 Plies	Fiberglas ECC-143				
3111-10	22 Plies	Fiberglas ECC-165 (Ethocel Coated)		100	60	200
3111-11	11 Plies	Lumite	Plaskon 920 + 10% Styrene	135	60	110
3111-12	14 Plies	Celanese	Ditto	110	90	100
3111-13	40 Plies	Fiberglas ECC-165 (Ethocel Coated)		110	90	200
3111-14	14 Plies	Fortisan	Plaskon 920 + 10% Styrene	110	90	100
3111-15	23 Plies	Fortisan	Ditto	110	90	100
3111-16	23 Plies	Fortisan	Laminac 4125	110	90	100
3111-17	14 Plies	Fortisan	Ditto	110	90	100
3111-18	14 Plies	Celanese	"	110	90	100
3111-19	24 Plies	Celanese	"	110	90	100
3111-20	18 Plies	Fiberglas -143	"	110	90	100
3111-21	3 Plies	Fiberglas -143	"	110	90	100
	10 Plies	Nylon Duck (13 Oz.)				
	3 Plies	Fiberglas -143				
3111-22	29 Plies	Nylon-10592 (Sharkskin) "		110	90	100
3111-23	29 Plies	Nylon-10592 (Sharkskin)	Plaskon 920 + 10% Styrene	110	90	100
3111-26	6 Plies	Nylon Duck (13 Oz.)	Laminac 4125	110	90	100
	9 Plies	Glass Mat				
	6 Plies	Nylon Duck (13 Oz.)				
3111-27	6 Plies	Nylon Duck (13 Oz.)	Plaskon 920 + 10% Styrene	110	90	100
	9 Plies	Glass Mat				
	6 Plies	Nylon Duck (13 Oz.)				
3111-28	11 Plies	Fiberglas-184	Laminac 4125	110	90	100
3111-29	6 Plies	Fiberglas-184	Ditto	110	90	100

1 of 3

THE FOLLOWING

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PG. 5

SPECIFICATION AND CHARACTERISTICS OF LOW-PRESSURE LAMINATES FOR BODY ARMOR

1-

Molding Conditions		Physical Characteristics					Resin Content, %	F V50
Time, Min.	Pressure, p.s.i.	Panel Size	Weight, Oz./Ft. ²	Thickness, Inch	Ratio: Final Ft. Cloth Ft.			
60	100	18" x 18"	25.2	.155	1.32	24.3	1290	
90	100	12" x 15"	24	.270	1.16	13.8	1275	
60	200	12" x 15"	25.9	.177	-	-	1207	
60	110	12" x 15"	23	.172	1.23	18.7	581	
90	100	12" x 15"	24.7	.222	1.32	24.3	893	
90	200	12" x 15"	44.5	.303	-	-	1743	
90	100	12" x 15"	24.6	.219	1.27	21.3	853	
90	100	12" x 15"	41.5	.383	1.35	25.9	1237	
90	100	12" x 15"	39	.359	1.30	23.1	1236	
90	100	12" x 15"	27.6	.217	1.40	28.6	865	
90	100	12" x 15"	24.5	.221	1.35	25.9	914	
90	100	12" x 15"	42	.373	1.34	25.4	1280	
90	100	12" x 15"	22	.175	1.29	22.5	1248	
90	100	12" x 15"	24.9	.242	1.32	24.3	1276	
90	100	12" x 15"	25.2	.277	1.43	30.0	1236	
90	100	12" x 15"	23.3	.261	1.30	23.1	1221	
90	100	12" x 15"	24.7	.303	1.37	27.0	1342	
90	100	12" x 15"	25.8	.296	1.43	30.0	1357	
90	100	12" x 15"	40.3	.236	1.25	20.0	1792	
90	100	12" x 15"	22.0	.129	1.25	20.0	1201	

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Table 1

Panel No.	Physical Characteristics			Resin Content, %	Ballistic Data	
	Weight, Oz./Ft. ²	Thickness, Inch	Ratio: Final Ft. Cloth Ft.		V50	Merit Factor (V50) ² ÷ Ft./Ft.
15"	23.4	.241	1.30	23.1	713	21,700
15"	24.1	.245	1.35	25.9	803	26,700
15"	24.1	.237	1.35	25.9	1177	57,400
15"	23.9	.240	1.34	25.4	1100	50,600
15"	23.9	.238	1.35	25.9	1114	52,000
15"	23.9	.241	1.35	25.9	1117	52,100
15"	41.0	.237	1.31	23.6	1713	71,700
15"	23.0	.131	1.27	21.3	1118	54,200
15"	26.5	.163	1.31	23.6	1270	60,800
15"	25.4	.160	1.26	20.6	1244	61,000
15"	22.2	.169	1.46	31.5	1094	54,000
15"	29.2	.198	1.31	23.6	1114	42,600
15"	26.8	.188	1.57	36.3	1148	49,000

Laboratory Book Number	L. A. Y. - U. P.		Molding Conditions		Pressure, p.s.i.
	No. Plies Cloth	Resin	Temp., °C.	Time, Min.	
3111-30	4 Plies Fortisan 30 Plies Glass Mat 4 Plies Fortisan	Laminac 4125	110	90	100
3111-31	4 Plies Fortisan 30 Plies Glass Mat 4 Plies Fortisan	Plaskon 920 +10% Styrene	110	90	100
3111-32	7 Plies Fortisan 6 Plies Nylon Duck(13 Oz.) (Placed Alternately)	Laminac 4125	110	90	100
3111-33	7 Plies Fortisan 6 Plies Nylon Duck(13 Oz.) (Placed Alternately)	Plaskon 920 +10% Styrene	110	90	100
3111-34	7 Plies Celanese 6 Plies Nylon Duck(13 Oz.) (Placed Alternately)	Ditto	110	90	100
3111-35	7 Plies Celanese 6 Plies Nylon Duck(13 Oz.) (Placed Alternately)	Laminac 4125	110	90	100
3111-36	11 Plies Fiberglas-184	Plaskon 920 +10% Styrene	110	90	100
3111-37	6 Plies Fiberglas-184	Ditto	110	90	100
3111-39	13 Plies .020 U.D. Glass Mat	Laminac 4125	110	90	100
3111-40	13 Plies .020 U.D. Glass Mat	Plaskon 920 +10% Styrene	110	90	100
3111-43	3 Plies .02 U.D. Glass Mat 4 Plies Nylon Duck(13 Oz.) 3 Plies .02 U.D. Glass Mat	Bitto	110	90	100
3111-44	4 Plies .02 U.D. Glass Mat 1 Ply Nylon Duck(13 Oz.) 1 Ply O06R26OR13 2-1/4#Inconel 2 Plies Nylon Duck(13 Oz.) 1 Ply O06R26OR13 2-1/4#Inconel 1 Ply Nylon Duck(13 Oz.) 4 Plies .02 U.D. Glass Mat	"	110	90	100
3111-45	4 Plies .02 U.D. Glass Mat 1 Ply Nylon Duck(13 Oz.) 1 Ply O07R21OM16 2-1/4#Inconel 2 Plies Nylon Duck(13 Oz.) 1 Ply O07R21OM16 2-1/4#Inconel 1 Ply Nylon Duck(13 Oz.) 4 Plies .02 U.D. Glass Mat	"	110	90	100

TABLE 1. CONTINUED

Molding Conditions			Physical Characteristics				
Temp., °C.	Time, Min.	Pressure, p.s.i.	Panel Size	Weight, Oz./Ft. ²	Thickness, Inch	Ratio: Final Ft. Cloth Wt.	Resin Content, %
110	90	100	12" x 15"	23.4	.241	1.30	23.1
110	90	100	12" x 15"	24.1	.245	1.35	25.9
110	90	100	12" x 15"	24.1	.237	1.35	25.9
110	90	100	12" x 15"	23.9	.240	1.34	25.4
110	90	100	12" x 15"	23.9	.238	1.35	25.9
110	90	100	12" x 15"	23.9	.241	1.35	25.9
110	90	100	12" x 15"	41.0	.237	1.31	23.6
110	90	100	12" x 15"	23.0	.131	1.57	21.3
110	90	100	12" x 15"	26.5	.163	1.31	23.6
110	90	100	12" x 15"	25.4	.160	1.26	20.6
110	90	100	12" x 15"	22.2	.169	1.46	31.5
110	90	100	12" x 15"	29.2	.198	1.31	23.6
110	90	100	12" x 15"	26.8	.188	1.57	36.3

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23A

FIBRE LAMINATES FOR BODY ARMOR 1-

Physical Characteristics				Ballistic Data		
Weight, Oz./Ft. ²	Thickness, Inch	Ratio: Final Wt. Cloth Wt.	Resin Content, %	V50		Merit Factor
				(V50)	(V50) : Wt./Ft. ²	
" 25.2	.155	1.32	24.3	1290		66,100
" 24	.270	1.16	13.8	1275		67,700
" 25.9	.177	-	-	1207		56,100
" 23	.172	1.23	18.7	581		14,700
" 24.7	.222	1.32	24.3	893		32,300
" 44.5	.303	-	-	1743		68,300
" 24.6	.219	1.27	21.3	853		29,500
" 41.5	.383	1.35	25.9	1237		36,200
" 39	.359	1.30	23.1	1236		39,150
" 27.6	.217	1.40	28.6	865		27,100
" 24.5	.221	1.35	25.9	914		34,100
" 42	.373	1.34	25.4	1280		39,000
" 22	.125	1.29	22.5	1248		70,700
" 24.9	.242	1.32	24.3	1276		65,300
" 25.2	.277	1.43	30.0	1236		60,600
" 23.3	.261	1.30	23.1	1221		64,100
" 24.7	.303	1.37	27.0	1342		73,000
" 25.8	.296	1.43	30.0	1357		71,200
" 40.3	.236	1.25	20.0	1792		79,800
" 22.0	.129	1.25	20.0	1201		65,500

-23b

Laboratory Book Number	L A Y - U P		Molding Conditions	
	No. Plies Cloth	Resin	Temp., °C.	Time, Min.
3111-46	4 Plies .02 U.D. Glass Mat 1 Ply Nylon Duck(13 Oz.) 1 Ply 009R174GS16 2-1/4#Gal.Steel 2 Plies Nylon Duck(13 Oz.) 1 Ply 009R174GS16 2-1/4#Gal.Steel 1 Ply Nylon Duck(13 Oz.) 4 Plies .02 U.D. Glass Mat	Plaskon 920 +10% Styrene	110	90
3111-47	24 Plies .02 U.D. Glass Mat	Ditto	110	90
3111-48	24 Plies Nylon 7822	"	110	90
3111-49	18 Plies Nylon 7823	"	110	90
3111-50	13 Plies Nylon Duck(13 Oz.)	"	110	90
3111-51	22 Plies Nylon Duck(13 Oz.)	"	110	90
3111-52	33 Plies Nylon 7823	"	110	90
3111-53	43 Plies Nylon 7822	"	110	90
3111-67	25 Plies Fiberglas ECC 165	"	110	90
3111-68	40 Plies Fiberglas ECC 165	"	110	90
3111-69	9 Plies Nylon Duck(13 Oz.) 1 Ply Aluminum Sheet .020(3 S-1/2 Hard)	"	110	90
3111-70	19 Plies Nylon Duck(13 Oz.) 1 Ply Aluminum Sheet .024(61 ST)	"	110	90
3111-73	9 Plies Nylon Duck(13 Oz.) 1 Ply Aluminum Sheet .024(61 ST)	"	110	90
3111-74	19 Plies Nylon Duck(13 Oz.) 1 Ply Aluminum Sheet .020(3 S-1/2 Hard)	"	110	90

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TABLE 1. CONTINUED

Conditions		Physical Characteristics					Resin Content, %	V5
Time, Min.	Pressure, p.s.i.	Panel Size	Weight Oz./Ft. ²	Thickness, Inch	Ratio: Final Wt. Cloth Wt.			
90	100	12" x 15"	25.2	.176	1.42	29.6	103	
90	100	12" x 15"	39.5	.234	1.06	5.3	170	
90	100	12" x 15"	24.7	.268	1.35	25.9	117	
90	100	12" x 15"	23.3	.261	1.22	18.0	114	
90	100	12" x 15"	25.0	.276	1.31	23.6	142	
90	100	12" x 15"	41.5	.459	1.29	22.5	184	
90	100	12" x 15"	43.1	.479	1.29	22.5	168	
90	100	12" x 15"	43.0	.479	1.30	23.1	167	
90	100	12" x 15"	30.2	.172	1.54	35.0	129	
90	100	12" x 15"	47.7	.281	1.51	33.7	170	
90	100	12" x 15"	22.7	.213	1.28	21.6	118	
90	100	12" x 15"	42.1	.430	1.28	21.8	183	
90	100	12" x 15"	23.4	.214	1.27	21.4	115	
90	100	12" x 15"	42.0	.424	1.30	23.1	177	

23 b

Physical Characteristics				Ballistic Data		
Weight Oz./Ft. ²	Thickness, Inch	Ratio: Final Wt. Cloth Wt.	Resin Content, %	V50	Merit Factor	
					$(V50)^2 \div \text{Wt./Ft.}^2$	
25.2	.176	1.42	29.6	1036	42,700	
39.5	.234	1.06	5.3	1704	73,700	
24.7	.268	1.35	25.9	1175	55,900	
23.3	.261	1.22	18.0	1143	56,200	
25.0	.276	1.31	23.6	1422	80,900	
41.5	.459	1.29	22.5	1841	81,700	
43.1	.479	1.29	22.5	1687	66,100	
43.0	.479	1.30	23.1	1673	65,100	
30.2	.172	1.54	35.0	1296	55,500	
47.7	.281	1.51	33.7	1703	60,900	
22.7	.213	1.28	21.6	1182	61,600	
42.1	.430	1.28	21.8	1831	79,700	
23.4	.214	1.27	21.4	1156	57,500	
42.0	.424	1.30	23.1	1771	74,700	

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TABLE 2. IDENTIFICATION AND C

Laboratory Book Number	L A Y - U P		Resin Pickup, %	Molding Conditions		
	No. Plies Uncoated	Nylon Duck Coated		Temp., °C.	Time, Min.	Pressure p.s.i.
3111-88-1	7	6	61	100	90	100
3111-88-2	5	8		100	90	100
3111-89-1	3	10		100	90	100
3111-89-2	7	6		100	90	15
3111-90-1	5	8		100	90	15
3111-90-2	3	10		100	90	15
3111-91-1	7	6		100	90	250
3111-91-2	5	8		100	90	250
3111-92-1	3	10		100	90	250
3111-92-2	7	6		100	90	100
3111-93-1	5	8		100	90	100
3111-93-2	3	10		100	90	100
3111-94-1(1)	7	6	42	100	90	15
3111-94-2(3652-15-2) (2)	5	8		100	90	15
3111-95-1	3	10		100	90	15
3111-95-2	7	6		100	90	250
3111-96-1	5	8	100	90	250	
3111-96-2	3	10	100	90	250	
3111-97-1		13	55	100	90	100
3111-97-2		13	55	100	90	15
3111-98-1		13	55	100	90	250
3111-98-2		13	42	100	90	15
3111-99-1		13	42	100	90	100
3111-99-2		13	42	100	90	250
3652-1-1		13	37	100	90	300
3652-1-2		13	37	100	90	400
3652-2-1		13	37	100	90	500

(1) Uneven resin distribution - repeated attempts failed to produce satisfactory panels.

(2) Ref. No. in brackets indicates number of replacement set of panels.

IDENTIFICATION AND CHARACTERISTICS OF LAMINATES FOR BODY ARMOR

Conditions		Physical Characteristics					Resin Content, %	V50
Time, Min.	Pressure, p.s.i.	Panel Size	Weight Oz./Ft. ²	Thickness, Inch	Ratio: Final Wt. Cloth Wt.			
90	100	7 x 7	21.9	0.289	1.16	13.8	132	
90	100	7 x 7	24.4	0.293	1.31	23.6	131	
90	100	7 x 7	26.7	0.263	1.42	29.6	133	
90	15	7 x 7	23.3	0.368	1.24	19.3	133	
90	15	7 x 7	25.6	0.326	1.36	26.5	130	
90	15	7 x 7	38.4	0.324	1.50	33.3	133	
90	250	7 x 7	23.4	0.261	1.26	20.6	137	
90	250	7 x 7	24.8	0.273	1.32	24.2	137	
90	250	7 x 7	25.2	0.286	1.35	25.9	136	
90	100	7 x 7	22.0	0.297	1.17	14.5	131	
90	100	7 x 7	23.0	0.295	1.22	18.0	133	
90	100	7 x 7	24.0	0.293	1.28	21.9	136	
90	15	7 x 7	20.0	0.310	1.15	13.0	-	
90	15	7 x 7	24.2	0.327	1.28	21.6	131	
90	15	7 x 7	26.8	0.283	1.32	24.2	130	
90	250	7 x 7	21.0	0.213	1.11	9.9	132	
90	250	7 x 7	23.1	0.272	1.22	18.0	136	
90	250	7 x 7	24.3	0.234	1.29	22.5	135	
90	100	7 x 7	27.7	0.297	1.47	32.0	135	
90	15	7 x 7	29.6	0.320	1.57	36.3	137	
90	250	7 x 7	25.2	0.261	1.34	25.4	135	
90	15	7 x 7	27.6	0.321	1.47	32.0	131	
90	100	7 x 7	25.9	0.295	1.38	27.5	134	
90	250	7 x 7	24.4	0.275	1.30	23.1	135	
90	300	7 x 7	24.0	0.262	1.27	21.2	126	
90	400	7 x 7	24.2	0.257	1.28	21.8	125	
90	500	7 x 7	23.9	0.255	1.27	21.2	129	

satisfactory panels.

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LAMINATES FOR BODY ARMOR

Physical Characteristics				Ballistic Data	
Weight /Ft. ²	Thickness, Inch	Ratio: Final Wt. Cloth Wt.	Resin Content, %	V50	Merit Factor (V50) ² = Wt./Ft. ²
11.9	0.289	1.16	13.8	1325	80,200
12.4	0.293	1.31	23.6	1318	71,200
12.7	0.263	1.42	29.6	1338	67,000
13.3	0.368	1.24	19.3	1338	76,800
13.6	0.326	1.36	26.5	1301	66,200
14.4	0.324	1.50	33.3	1330	46,000
14.4	0.261	1.26	20.6	1376	80,900
14.8	0.273	1.32	24.2	1374	76,100
15.2	0.286	1.35	25.9	1365	74,000
15.0	0.297	1.17	14.5	1310	78,000
15.2	0.295	1.22	18.0	1335	77,400
15.0	0.293	1.28	21.9	1360	77,000
15.0	0.310	1.15	13.0	-	-
15.2	0.327	1.28	21.6	1312	71,300
15.8	0.283	1.32	24.2	1305	68,700
16.0	0.213	1.11	9.9	1320	83,000
16.1	0.272	1.22	18.0	1363	80,400
16.3	0.234	1.29	22.5	1350	74,400
16.7	0.297	1.47	32.0	1358	66,500
16.6	0.320	1.57	36.3	1372	63,600
16.2	0.261	1.34	25.4	1357	73,000
16.6	0.321	1.47	32.0	1315	62,700
16.9	0.295	1.38	27.5	1341	69,500
16.4	0.275	1.30	23.1	1354	75,200
16.0	0.262	1.27	21.2	1268	66,900
16.2	0.257	1.28	21.8	1258	65,400
16.9	0.255	1.27	21.2	1291	70,000

3af(3)

TABLE 3. IDENTIFICATION AND C

Laboratory Book Number	L A Y - U P		Resin Pickup, %	Molding	
	No. Plies Cloth	Resin		Temp., °C.	Time
3652-6-2	13 Nylon Duck	Paraplex P-13	34.8	100	1
3652-7-2	Ditto	Ditto	38.2	100	1
3652-10-2	"	"	17.5	100	1
3652-11-2	"	Laminac 4134	18.6	100	
3652-12-1	"	Ditto	18.2	100	6
3652-12-2	"	"	39.0	100	6
3652-13-1	"	"	39.6	100	6
3652-13-2	"	"	32.2	100	6
3652-14-1	"	"	28.6	100	6
3652-21-1	"	"	39.4	100	6
3652-16-1	6 Nylon; 1 S.S. Cloth; 6 Nylon	Plaskon 920 +10% Styrene	39.2	100	6
3652-16-2	4 Nylon; 1 S.S. Cloth; 2 Nylon; 1 S.S. Cloth; 4 Nylon	Ditto	41.0	100	6
3652-17-1	2 Nylon; 1 S.S. Cloth; 2 Nylon; 1 S.S. Cloth; 2 Nylon; 1 S.S. Cloth; 2 Nylon	"	43.3	100	6
3652-17-2	2 Nylon; 1 S.S. Cloth; 1 Nylon; 1 S.S. Cloth; 1 Nylon; 1 S.S. Cloth; 1 Nylon; 1 S.S. Cloth; 2 Nylon	"	40.0	100	6
3652-18-1	6 Nylon; 5 S.S. Cloth Alternately	"	42.4	100	6
3652-20-2	19 ECC 165 Fiberglass	"	43.0	100	6
3652-23-1	19 ECC 165 Crisscross	"	40.0	100	6
3652-23-2	19 ECC 165 Crisscross	"	40.0	100	6
3652-24-1	19 ECC 165 Crisscross	"	40.0	100	6
3652-21-2	33 Silane #3032 (Ramie)	"		100	6
3652-22-1	22 Silane #6121 (Ramie-Rayon)	"	39.1	100	6

TABLE 3. IDENTIFICATION AND CHARACTERISTICS OF LAMINATES FOR BODY ARMOR

M.P.	Resin		Molding Conditions			Physical		
	Resin	Resin Pickup, %	Temp., °C.	Time, Min.	Pressure, p.s.i.	Panel Size	Weight, Oz./Ft. ²	Thickness, In.
	Paraplex P-13	34.8	100	120	100	7" x 7"	24.4	0.20
	Ditto	38.2	100	120	250	7" x 7"	23.8	0.20
	"	17.5	100	120	250	7" x 7"	22.0	0.20
	Laminac 4134	18.6	100	60	250	7" x 7"	22.8	0.20
	Ditto	18.2	100	60	100	7" x 7"	22.7	0.20
	"	39.0	100	60	100	7" x 7"	23.7	0.20
	"	39.6	100	60	250	7" x 7"	23.1	0.20
	"	37.2	100	60	100	7" x 7"	23.9	0.20
	"	28.6	100	60	250	7" x 7"	22.8	0.20
	"	39.4	100	60	15	7" x 7"	25.0	0.30
on	Plaskon 920 +10% Styrene	39.2	100	60	100	7" x 7"	26.5	0.20
on;	Ditto	41.0	100	60	100	7" x 7"	25.2	0.20
on;	"	43.3	100	60	100	7" x 7"	23.8	0.20
on;	"	40.0	100	60	100	7" x 7"	23.9	0.16
S.	"	42.4	100	60	100	7" x 7"	28.4	0.17
h;	"	43.0	100	60	100	7" x 7"	23.8	0.17
ately "	"	40.0	100	60	100	7" x 7"	23.6	0.17
	"	40.0	100	60	15	7" x 7"	25.5	0.16
	"	40.0	100	60	250	7" x 7"	22.4	0.17
	"	40.0	100	90	100	7" x 7"	24.2	0.30
	"	39.1	100	60	100	7" x 7"	24.0	0.20

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FOR BODY ARMOR

1	Physical Characteristics				Ballistic Data	
	Weight, Oz./Ft. ²	Thickness, Inch	Ratio: <u>Final Wt.</u> Cloth Wt.	Resin Content, %	V50	Merit Factor [(V50) ² × Wt./Ft.]
7"	24.4	0.285	1.30	23.1	1312	70,547
7"	23.8	0.269	1.26	20.6	1307	71,775
7"	22.0	0.265	1.17	14.5	1317	78,840
7"	22.8	0.275	1.21	17.3	1382	83,769
7"	22.7	0.292	1.20	16.7	1353	80,684
7"	23.7	0.285	1.26	20.6	1378	80,122
7"	23.1	0.271	1.23	18.7	1380	82,447
7"	23.9	0.288	1.27	21.2	1372	78,761
7"	22.8	0.270	1.21	17.3	1389	84,619
7"	25.0	0.310	1.33	24.8	1348	72,684
7"	26.5	0.278	1.34	25.4	1302	63,970
7"	25.2	0.236	1.30	23.1	1165	53,858
7"	23.8	0.202	1.23	18.7	1067	47,836
7"	23.9	0.190	1.20	16.7	1025	43,959
7"	28.4	0.179	1.18	15.2	901	32,866
7"	23.8	0.143	1.32	24.2	1002	42,185
7"	23.6	0.142	1.31	25.7	1260	67,271
7"	25.5	0.163	1.41	29.0	1220	58,369
7"	22.4	0.131	1.24	19.4	1314	77,080
7"	24.2	0.304	1.36	26.4	680	19,107
7"	24.0	0.277	1.35	26.0	620	16,017

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TABLE 4. STUDY OF THE EFFECT OF PANEL SIZE ON T
FOR 13 PLYS NYLON DUCK BONDED WITH

Laboratory Book Number	Molding Conditions			Physical	
	Temperature, °C.	Time, Min.	Pressure, p.s.i.	Weight, Oz./Ft. ²	Th
3111-95-2	100	90	250	21.0	0
3652-27	100	60	250	23.0	0
3652-27	100	60	250	23.0	0
3652-27	100	60	250	23.0	0
3111-89-2	100	90	15	23.3	0
3652-28	100	60	15	24.1	0
3652-28	100	60	15	24.1	0
3652-28	100	60	15	24.9	0
3652-28	100	60	15	24.9	0
3111-90-2	100	90	15	28.4	0
3652-29-1	100	60	15	26.7	0
3652-29-1	100	60	15	26.7	0
3652-29-1	100	60	15	26.9	0
3111-92-1	100	90	250	25.2	0
3652-29-2	100	60	250	26.0	0
3652-29-2	100	60	250	4.5	0

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THE EFFECT OF PANEL SIZE ON THE PROBABLE BALLISTIC LIMIT
MILS NYLON DUCK BONDED WITH PLASKON 920 RESIN

Spec. No.	Physical Characteristics				Ballistic Data		
	Weight, Oz./Ft. ²	Thickness, Inch	Resin Content, %	Panel Size	V50	Merit Factor;	$\frac{(V50)^2}{Wt}$
	21.0	0.213	9.9	7 x 7	1320	82,971	
	23.0	0.255	9.9	13 x 16	1357	80,063	
	23.0	0.255	9.9	13 x 16	1365	80,010	
	23.0	0.255	9.9	7 x 7	1350	79,239	
	23.3	0.368	19.3	7 x 7	1338	76,834	
	24.1	0.275	19.3	13 x 16	1336	74,062	
	24.1	0.275	19.3	13 x 16	1340	74,506	
	24.9	0.275	19.3	7 x 7	1330	71,040	
	24.9	0.275	19.3	7 x 7	1336	71,683	
	28.4	0.324	33.3	7 x 7	1330	62,285	
	26.7	0.276	33.3	13 x 16	1349	68,157	
	26.7	0.276	33.3	13 x 16	1353	68,562	
	26.9	0.278	33.3	7 x 7	1325	65,265	
	25.2	0.286	25.9	7 x 7	1365	73,937	
	26.0	0.277	25.9	13 x 16	1344	69,474	
	4.5	0.265	25.9	7 x 7	1355	74,940	

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TABLE 5. COMPARATIVE FIRING DATA ON CALCULATED
AND GRAPHICAL V50 VALUES

Lot No.	Average Weight, Oz./Sq.Ft.	Calculated V50 Ballistic Limit (fps)	V50 Ballistic Limit as read directly from Percentage Curves.(fps)
3111-1	24.9	1290	1298
3111-8	28.3	1275	1270
3111-10	25.7	1207	1196
3111-11	23.0	581	570
3111-12	24.9	893	894
3111-13	44.6	1743	1743
3111-14	24.7	853	848
3111-15	42.1	1237	1238
3111-16	38.6	1236	1243
3111-17	24.5	865	857
3111-18	24.5	914	903
3111-19	40.7	1280	1273
3111-20	21.6	1248	1260
3111-21	25.0	1276	1278
3111-22	25.1	1236	1233

APPENDIX

RESTRICTED

DETAILED RESULTS FOR LOT 3111-1

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

Panel No.	Rd. No.	Velocity	Result	Panel No.	Rd. No.	Velocity	Result	Panel No.	Rd. No.	Velocity	Result
1-3	1	1282	PP	2-3	1	1337	CP	3-3	1	1279	CP
	2	1269	PP		2	1295	CP		2	1256	CP
	3	1193	CP		3	1179	PP		3	1208	PP
	4	1129	CP		4	1256	PP		4	1253	CP
	5	1381	CP		5	1256	CP		5	1182	PP
	6	1305	CP		6	1208	PP		6	1182	PP
	7	1340	CP		7	1171	PP		7	1220	PP
	8	1312	CP		8	1253	CP		8	1244	PP
	9	1256	PP		9	1256	PP		9	1220	PP
	10	1266	PP		10	1272	PP		10	1266	PP
	11	1299	PP		11	1299	PP		11	**1235	CP
	12	1348	CP		12	1309	PP		12	1241	PP
	13	1279	PP		13	1279	PP		13	1155	PP
	14	1389	CP		14	1269	CP		14	1235	CP
	15	1282	PP		15	1366	CP		15	1222	PP
	16	1305	CP		16	1333	CP		16	1282	PP
	17	*1351	PP		17	692	PP		17	1326	CP
	18	1359	CP		18	1340	CP		18	1235	PP
	19	1333	CP		19	1393	CP		19	1289	CP
	20	1125	CP		20	1253	PP		20	1351	CP
	21	1205	PP		21	1071	PP		21	1385	CP
	22	1266	PP		22	1253	PP		22	1312	CP
	23	1312	PP		23	1285	PP		23	1370	CP
	24	1289	PP		24	1316	PP		24	1366	CP
	25	1250	CP		25	1225	PP		25	1337	CP
	26	1370	CP		26	1211	PP		26	1190	PP
	27	1344	CP		27	1214	PP		27	1241	PP
	28	1238	PP		28	1217	PP		28	1168	PP
	29	1351	CP		29	1217	PP		29	1188	PP
	30	1266	PP		30	1337	CP				
	31	1250	PP		31	1359	CP				
	32	1276	PP		32	1355	CP				
	33	1312	CP		33	1312	CP				
	34	1188	PP		34	1323	CP				
	35	1196	PP		35	1259	PP				
	36	1282	PP		36	1276	PP				
	37	1259	CP		37	1235	PP				

*High Partial 1351 fps
 **Low Complete 1235
 Zone of Mixed Results 116

No. Partials: 35
 No. Completes: 31

RESTRICTED

DETAILED RESULTS FOR LOT 3111-8

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

Panel No.	Rd. No.	Velocity	Result	Panel No.	Rd. No.	Velocity	Result	Panel No.	Rd. No.	Velocity	Result
1-3	1	1220	PP	2-3	1	1377	CP	3-3	1	1370	CP
	2	1131	PP		2	1312	CP		2	1302	CP
	3	1244	PP		3	1285	CP		3	1377	CP
	4	1272	CP		4	1393	CP		4	1247	PP
	5	1330	CP		5	1393	CP		5	1256	PP
	6	1312	CP		6	1253	CP		6	**1244	CP
	7	1333	CP		7	1348	CP		7	1247	PP
	8	1188	PP		8	1174	PP		8	1244	PP
	9	1289	CP		9	1163	PP		9	1305	CP
	10	1323	CP		10	1092	PP		10	1168	PP
	11	1302	CP		11	1182	PP		11	1295	CP
	12	*1316	PP		12	1256	PP		12	1285	CP
	13	1217	PP		13	1190	PP		13	1188	PP
	14	1269	PP		14	1182	PP		14	1259	PP
	15	1193	PP		15	1326	CP		15	1235	PP
	16	1282	PP		16	1263	CP		16	1292	CP
	17	1139	PP		17	1263	CP		17	1309	CP
	18	1266	PP		18	1066	PP		18	1276	PP
	19	1285	PP		19	1302	CP		19	1344	CP
	20	1263	PP		20	1168	PP		20	1247	PP
	21	1330	CP		21	1289	CP		21	1289	CP
	22	1337	CP		22	1253	PP		22	1179	PP
	23	1333	CP		23	1241	PP		23	1182	PP
	24	1337	CP		24	1333	CP		24	1238	PP
	25	1344	CP		25	1176	PP		25	1182	PP
	26	1393	CP		26	1289	CP		26	1199	PP
	27	1276	CP						27	1196	PP
	28	1295	CP						28	1211	PP
	29	1276	PP						29	1182	PP
	30	1309	CP								
	31	1299	PP								
	32	1279	PP								

* High Partial
** Low Complete
Zone of Mixed Results

1316 fps
1244
72
36

No. Partials: 19
No. Completes: 23

RESTRICTED

DETAILED RESULTS FOR LOT 3111-10

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

Panel No.	Rd. No.	Velocity	Result	Panel No.	Rd. No.	Velocity	Result	Panel No.	Rd. No.	Velocity	Result
1-3	1	1194	PP	2-3	1	1256	CP	3-3	1	1229	PP
	2	1194	CP		2	1266	CP		2	1229	CP
	3	1149	PP		3	1253	CP		3	1166	PP
	4	1199	CP		4	1193	CP		4	1066	PP
	5	1241	PP		5	1208	CP		5	1185	CP
	6	1256	CP		6	1124	PP		6	1259	CP
	7	1244	CP		7	1136	PP		7	1309	CP
	8	1106	PP		8	1190	PP		8	1190	PP
	9	1211	CP		9	917	PP		9	1253	CP
	10	1188	PP		10	1222	CP		10	1263	CP
	11	1004	PP		11	1235	CP		11	1225	CP
	12	1166	PP		12	**1179	CP		12	1244	CP
	13	1185	CP		13	1229	CP		13	1302	CP
	14	1087	PP		14	1202	CP		14	1182	PP
	15	1171	PP		15	1160	PP		15	1225	CP
	16	1106	PP		16	1106	PP		16	1104	PP
	17	1078	PP		17	1031	PP		17	1121	PP
	18	1186	PP		18	1062	PP		18	1149	PP
	19	1171	PP		19	773	PP		19	1106	PP
	20	1202	PP		20	1022	PP		20	1185	PP
	21	1235	CP		21	960	PP		21	1217	CP
	22	1241	PP		22	1002	PP		22	1285	CP
	23	1292	CP		23	1016	PP		23	1229	CP
	24	1179	PP		24	1006	PP		24	1168	PP
	25	1037	PP		25	994	PP		25	1211	PP
	26	1316	CP		26	1142	PP		26	1124	PP
	27	1253	CP		27	1062	PP		27	1185	PP
	28	1121	PP		28	1066	PP		28	1085	PP
	29	1202	PP		29	1179	PP		29	1155	PP
	30	1211	CP		30	1099	PP		30	1149	PP
	31	1250	PP						31	1101	PP
	32	*1266	PP						32	1309	CP

*High Partial 1266 fps
 **Low Complete 1179
 Zone of Mixed Results 87

No. Partial: 18
 No. Complete: 29

RESTRICTED

DETAILED RESULTS FOR LOT 3111-11

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>	<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>
1-1	1	1111	CP	1-1	26	392	PP
	2	887	CP		27	588	CP
	3	619	CP		28	548	PP
	4	481	PP		29	417	PP
	5	605	CP		30	485	PP
	6	855	CP		31	497	PP
	7	737	CP		32	732	CP
	8	529	PP		33	753	CP
	9	**566	CP		34	530	PP
	10	661	CP		35	539	PP
	11	705	CP		36	674	CP
	12	613	CP		37	707	CP
	13	602	CP		38	575	CP
	14	717	CP		39	552	PP
	15	443	PP		40	464	PP
	16	212	PP		41	655	CP
	17	532	PP		42	763	CP
	18	755	CP		43	381	PP
	19	702	CP		44	700	CP
	20	*630	PP		45	328	PP
	21	595	PP		46	178	PP
	22	770	CP		47	299	PP
	23	659	CP				
	24	672	CP				
	25	671	CP				

*High Partial 630 fps
 **Low Complete 566
 Zone of Mixed Results 64

No. Partials: 2
 No. Completes: 7

RESTRICTED

DETAILED RESULTS FOR LOT 3111-12

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

Panel No.	Rd. No.	Velocity	Result	Panel No.	Rd. No.	Velocity	Result	Panel No.	Rd. No.	Velocity	Result
1-3	1	1142	CP	2-3	1	842	PP	3-3	1	951	CP
	2	973	CP		2	992	CP		2	871	PP
	3	442	PP		3	936	CP		3	933	CP
	4	743	PP		4	980	CP		4	1010	CP
	5	870	PP		5	859	PP		5	969	CP
	6	1075	CP		6	724	PP		6	942	CP
	7	839	PP		7	870	PP		7	975	CP
	8	911	CP		8	882	PP		8	940	CP
	9	855	PP		9	994	CP		9	828	PP
	10	893	PP		10	1073	CP		10	812	PP
	11	882	PP		11	850	PP		11	826	PP
	12	865	PP		12	810	PP		12	914	CP
	13	949	CP		13	*914	PP		13	859	PP
	14	1068	CP		14	820	PP		14	867	PP
	15	935	CP		15	678	PP		15	876	CP
	16	952	CP		16	903	PP		16	890	PP
	17	1025	CP		17	836	PP		17	859	CP
	18	998	CP		18	820	PP		18	919	CP
	19	672	PP		19	702	PP		19	919	CP
	20	940	CP		20	936	CP		20	731	PP
	21	909	CP		21	680	PP		21	874	PP
	22	1012	CP		22	973	CP		22	693	PP
	23	781	PP		23	921	CP		23	742	PP
	24	907	CP		24	828	PP		24	705	PP
	25	836	PP		25	862	PP		25	813	PP
	26	810	PP		26	795	PP		26	1004	CP
	27	947	CP		27	836	PP		27	926	CP
	28	774	PP		28	1042	CP		28	919	CP
	29	820	PP		29	965	CP		29	702	PP
	30	947	CP		30	855	PP		30	732	PP
	31	722	PP		31	**845	CP		31	928	CP
	32	963	CP						32	808	PP
									33	766	PP
									34	716	PP
									35	965	CP

*High Partial 914 fps
 **Low Complete 845
 Zone of Mixed Results 69

No. Partials: 18
 No. Completes: 7

RESTRICTED

DETAILED RESULTS FOR LOT 3111-13

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

Panel No.	Rd. No.	Velocity	Result	Panel No.	Rd. No.	Velocity	Result	Panel No.	Rd. No.	Velocity	Result
1-3	1	1222	PP	2-3	1	1779	PP	3-3	1	1832	CP
	2	1404	PP		2	1761	CP		2	1712	CP
	3	1437	PP		3	1672	PP		3	1799	CP
	4	1524	PP		4	1859	CP		4	1639	PP
	5	1488	PP		5	1759	CP		5	1730	CP
	6	1672	PP		6	2016	CP		6	1650	PP
	7	1792	CP		7	1754	PP		7	1623	PP
	8	1866	CP		8	1695	PP		8	1678	PP
	9	1748	CP		9	1701	PP		9	1866	CP
	10	1742	PP		10	1712	PP		10	1650	PP
	11	1724	CP		11	1712	PP		11	1634	PP
	12	1773	PP		12	1761	CP		12	1695	PP
	13	1873	CP		13	1773	CP		13	1706	PP
	14	1718	PP		14	1701	PP		14	**1701	CP
	15	1695	PP		15	1754	CP		15	1792	CP
	16	1684	PP		16	1992	CP		16	1742	PP
	17	1701	PP		17	1730	PP		17	1792	CP
	18	1689	PP		18	1805	CP		18	1818	CP
	19	2049	CP		19	1832	CP		19	1754	CP
	20	1818	CP		20	1773	CP		20	1730	CP
	21	1672	PP		21	1786	CP		21	1805	CP
	22	1754	CP		22	1773	CP		22	1812	CP
	23	1736	CP		23	1736	PP		23	1852	CP
	24	*1805	PP		24	1567	PP		24	1730	CP
	25	1695	PP		25	1773	PP		25	1724	PP
	26	1701	PP		26	1812	CP		26	1742	PP
	27	2024	CP		27	1773	CP		27	1608	PP
	28	1718	PP						28	1724	PP
	29	1567	PP								
	30	1792	CP								

*High Partial
**Low Complete
Zone of Mixed Results

1805 fps
1701
104

No. Partials: 21
No. Completes: 26

RESTRICTED

DETAILED RESULTS FOR LOT 3111-14

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

Panel No.	Rd. No.	Velocity	Result	Panel No.	Rd. No.	Velocity	Result	Panel No.	Rd. No.	Velocity	Result
1-3	1	858	CP	2-3	1	891	CP	3-3	1	931	CP
	2	936	CP		2	873	CP		2	853	CP
	3	732	PP		3	828	PP		3	923	CP
	4	800	PP		4	956	CP		4	713	PP
	5	904	CP		5	858	PP		5	954	CP
	6	681	PP		6	888	CP		6	956	CP
	7	742	PP		7	814	PP		7	820	PP
	8	826	PP		8	994	CP		8	856	CP
	9	838	CP		9	947	CP		9	883	CP
	10	612	PP		10	831	PP		10	984	CP
	11	773	PP		11	898	CP		11	858	CP
	12	947	CP		12	901	CP		12	969	CP
	13	980	CP		13	956	CP		13	733	PP
	14	687	PP		14	984	CP		14	756	PP
	15	731	PP		15	876	CP		15	760	PP
	16	743	PP		16	956	CP		16	727	PP
	17	871	PP		17	669	PP		17	787	PP
	18	861	PP		18	743	PP		18	833	CP
	19	952	CP		19	800	PP		19	862	CP
	20	710	PP		20	865	PP		20	832	CP
	21	1006	CP		21	787	PP		21	836	CP
	22	816	PP		22	896	CP		22	996	CP
	23	800	PP		23	805	PP		23	**829	CP
	24	1089	CP		24	781	PP		24	739	PP
	25	1000	CP		25	618	PP		25	563	PP
	26	965	CP		26	701	PP		26	566	PP
	27	808	PP		27	785	PP		27	745	PP
	28	828	PP		28	840	PP		28	931	CP
	29	883	PP		29	691	PP		29	792	PP
	30	829	PP		30	906	CP		30	722	PP
	31	*926	PP		31	924	CP		31	850	PP
	32	704	PP		32	678	PP		32	621	PP
	33	846	PP		33	674	PP				
					34	759	PP				
					35	770	PP				
					36	824	PP				
					37	782	PP				

*High Partial 926 fps
 **Low Complete 829
 Zone of Mixed Results 97

No. Partial: 11
 No. Complete: 22

RESTRICTED

DETAILED RESULTS FOR LOT 3111-15

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

Panel Rd.				Panel Rd.				Panel Rd.			
No.	No.	Velocity	Result	No.	No.	Velocity	Result	No.	No.	Velocity	Result
1-3	1	1333	CP	2-3	1	1299	CP	3-3	1	1244	CP
	2	1193	CP		2	1225	PP		2	1196	PP
	3	1185	CP		3	1208	PP		3	1190	CP
	4	1079	PP		4	1171	PP		4	1340	CP
	5	1179	PP		5	1188	PP		5	1185	PP
	6	1002	PP		6	1199	PP		6	1276	CP
	7	1131	PP		7	1295	CP		7	1202	PP
	8	1235	PP		8	1244	PP		8	1266	CP
	9	1132	PP		9	1272	CP		9	1269	CP
	10	**1134	CP		10	1232	PP		10	1244	CP
	11	1144	PP		11	1253	CP		11	1269	CP
	12	1155	PP		12	1229	PP		12	1235	PP
	13	1272	CP		13	1305	CP		13	1259	CP
	14	1244	PP		14	1276	CP		14	1222	PP
	15	1144	PP		15	1266	CP		15	1250	PP
	16	1269	CP		16	1208	PP		16	992	PP
	17	1160	PP		17	1205	PP		17	1244	PP
	18	1259	CP		18	1355	CP		18	1302	CP
	19	1299	CP		19	1279	CP		19	1292	CP
	20	1323	CP		20	1276	CP		20	1214	PP
	21	1269	CP		21	1282	CP		21	1259	CP
	22	1078	PP		22	*1269	PP		22	1244	PP
	23	1119	PP		23	1269	CP		23	1171	PP
	24	1075	PP		24	1250	CP		24	1220	PP
	25	1220	PP		25	1323	CP		25	1179	PP
	26	1238	PP		26	1259	CP		26	1185	PP
	27	1171	CP		27	1292	CP		27	1199	PP
	28	1225	PP		28	1208	PP		28	1096	PP
	29	1250	CP		29	1292	CP		29	1196	PP
	30	1256	CP		30	1241	CP		30	998	PP
	31	1106	PP		31	1214	PP		31	1276	CP

*High Partial 1269 fps
 **Low Complete 1134
 Zone of Mixed Results 135

No. Partial: 39
 No. Completes: 23

RESTRICTED

DETAILED RESULTS FOR LOT 3111-16

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

Panel Rd.				Panel Rd.				Panel Rd.			
No.	No.	Velocity	Result	No.	No.	Velocity	Result	No.	No.	Velocity	Result
1-3	1	1543	CP	2-3	1	1174	PP	3-3	1	1202	PP
	2	1253	CP		2	1292	CP		2	1205	PP
	3	1087	PP		3	1008	PP		3	1199	PP
	4	1059	PP		4	1196	PP		4	1193	PP
	5	1278	PP		5	1253	CP		5	*1259	PP
	6	1257	PP		6	1355	CP		6	1312	CP
	7	958	PP		7	1269	CP		7	1256	PP
	8	1276	CP		8	1272	CP		8	1312	CP
	9	1229	PP		9	1179	PP		9	1244	CP
	10	1202	PP		10	1214	CP		10	1302	CP
	11	1276	CP		11	**1182	CP		11	1366	CP
	12	1185	PP		12	1152	PP		12	1227	PP
	13	1092	PP		13	1155	PP		13	1276	CP
	14	1188	PP		14	1250	CP		14	1208	CP
	15	1144	PP		15	952	PP		15	1214	PP
	16	1147	PP		16	1037	PP		16	1163	PP
	17	1174	PP		17	1055	PP		17	1285	CP
	18	1126	PP		18	936	PP		18	1220	PP
	19	1250	CP		19	977	PP		19	1199	PP
	20	1241	CP		20	1217	CP		20	1266	CP
	21	1202	PP		21	1134	PP		21	1272	CP
	22	1259	CP		22	1119	PP		22	1071	PP
	23	1247	CP		23	1087	PP		23	1190	PP
	24	1253	PP		24	1082	PP		24	1188	PP
	25	1244	PP		25	1087	PP		25	1179	PP
	26	1247	PP		26	1087	PP		26	1099	PP
	27	1217	PP		27	1089	PP		27	1211	PP
					28	1174	PP				
					29	1253	PP				

*High Partial 1259 fps
 **Low Complete 1182
 Zone of Mixed Results 77

No. Partials: 25
 No. Completes: 12

RESTRICTED

DETAILED RESULTS FOR LOT 3111-17

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

Panel Rd.				Panel Rd.				Panel Rd.			
No.	No.	Velocity	Result	No.	No.	Velocity	Result	No.	No.	Velocity	Result
1-3	1	773	PP	2-3	1	911	CP	3-3	1	805	PP
	2	739	PP		2	986	CP		2	816	PP
	3	992	CP		3	956	CP		3	661	PP
	4	990	CP		4	822	PP		4	749	PP
	5	799	PP		5	916	CP		5	828	PP
	6	978	CP		6	973	CP		6	890	CP
	7	874	PP		7	912	CP		7	773	PP
	8	821	PP		8	880	CP		8	1027	CP
	9	865	PP		9	814	CP		9	1059	CP
	10	978	CP		10	**809	CP		10	1014	CP
	11	1073	CP		11	792	PP		11	*929	PP
	12	1053	CP		12	758	PP		12	822	PP
	13	980	CP		13	865	PP		13	940	CP
	14	909	PP		14	812	PP		14	915	CP
	15	967	CP		15	926	CP		15	890	CP
	16	824	PP		16	598	PP		16	956	CP
	17	933	CP		17	828	PP		17	960	CP
	18	877	PP		18	871	CP		18	653	PP
	19	990	CP		19	893	CP		19	858	CP
	20	831	PP		20	672	PP		20	814	PP
	21	919	CP		21	845	CP		21	862	CP
	22	911	CP		22	756	PP		22	914	CP
	23	975	CP		23	761	PP		23	877	CP
	24	990	CP		24	767	PP		24	906	CP
	25	951	CP		25	765	PP		25	745	PP
	26	888	CP		26	786	PP		26	907	CP
	27	880	PP		27	838	CP		27	672	PP
	28	877	PP		28	821	PP		28	876	PP
	29	858	PP		29	724	PP		29	644	PP

*High Partial 929 fps
 **Low Complete 809
 Zone of Mixed Results 120

No. Partials: 21
 No. Completes: 23

RESTRICTED

DETAILED RESULTS FOR LOT 3111-18

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

Panel No.	Rd. No.	Velocity	Result	Panel No.	Rd. No.	Velocity	Result	Panel No.	Rd. No.	Velocity	Result
1-3	1	833	PP	2-3	1	1018	CP	3-3	1	877	PP
	2	1073	CP		2	858	PP		2	896	CP
	3	917	PP		3	978	CP		3	1085	CP
	4	996	CP		4	813	PP		4	824	PP
	5	803	PP		5	849	PP		5	951	CP
	6	1014	CP		6	917	CP		6	876	PP
	7	893	CP		7	638	PP		7	894	PP
	8	901	PP		8	694	PP		8	893	PP
	9	828	PP		9	986	CP		9	684	PP
	10	931	CP		10	952	CP		10	797	PP
	11	933	CP		11	870	PP		11	**890	CP
	12	809	PP		12	984	CP		12	917	CP
	13	753	PP		13	*952	PP		13	556	PP
	14	839	PP		14	733	PP		14	795	PP
	15	590	PP		15	996	CP		15	809	PP
	16	926	CP		16	855	PP		16	831	PP
	17	796	PP		17	849	PP		17	682	PP
	18	849	PP		18	799	PP		18	741	PP
	19	893	PP		19	1000	CP		19	720	PP
	20	894	CP		20	756	PP		20	933	CP
	21	962	CP		21	1046	CP		21	1002	CP
	22	856	PP		22	899	CP		22	994	CP
	23	940	CP		23	994	CP		23	890	PP
	24	960	CP		24	919	PP		24	963	CP
	25	901	PP		25	832	PP		25	773	PP
	26	929	PP		26	861	PP		26	958	CP
	27	859	PP		27	824	PP		27	975	CP
	28	951	PP		28	978	CP		28	923	CP
	29	1010	CP		29	765	PP		29	786	PP
	30	831	PP		30	774	PP		30	899	CP
	31	924	PP		31	718	PP		31	751	PP
					32	617	PP		32	858	PP
					33	790	PP		33	831	PP
					34	945	PP		34	965	CP

*High Partial 952 fps
 **Low Complete 890
 Zone of Mixed Results 62

No. Partial: 13
 No. Completes: 16

RESTRICTED

DETAILED RESULTS FOR LOT 3111-19

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

Panel Rd.		Velocity	Result	Panel Rd.		Velocity	Result	Panel Rd.		Velocity	Result
No.	No.			No.	No.			No.	No.		
1-3	1	1266	CP	2-3	1	1393	CP	3-3	1	1326	CP
	2	1279	CP		2	1333	CP		2	1381	CP
	3	1166	PP		3	1488	CP		3	1235	CP
	4	1263	PP		4	1370	CP		4	1225	PP
	5	1232	PP		5	1355	CP		5	1147	PP
	6	1295	CP		6	1553	CP		6	1468	PP
	7	1316	CP		7	1712	CP		7	1355	CP
	8	1263	PP		8	1176	PP		8	1232	PP
	9	1225	PP		9	1488	CP		9	1199	PP
	10	1269	CP		10	1295	CP		10	1279	CP
	11	1295	PP		11	1326	CP		11	**1217	CP
	12	1272	CP		12	1385	CP		12	1279	CP
	13	1220	PP		13	1319	CP		13	1282	CP
	14	2075	CP		14	1266	CP		14	1208	PP
	15	1263	PP		15	1351	CP		15	1306	PP
	16	1253	PP		16	1193	PP		16	1256	PP
	17	1174	PP		17	1370	CP		17	1276	CP
	18	1299	CP		18	1259	PP		18	1333	CP
	19	1377	CP		19	1214	PP		19	1185	PP
	20	1157	PP		20	1217	PP		20	1214	PP
	21	1196	PP		21	1362	CP		21	1229	PP
	22	1323	PP		22	1217	PP		22	1075	PP
	23	1381	CP		23	1214	PP		23	1374	CP
	24	1488	CP		24	1157	PP		24	1344	CP
	25	1174	PP		25	1241	PP		25	1131	PP
	26	1323	PP		26	1302	PP		26	1351	CP
	27	1319	PP		27	1309	CP		27	1126	PP
	28	1250	PP		28	1453	CP		28	1155	PP
	29	1235	PP		29	1066	PP		29	1269	CP
	30	1250	PP		30	1229	PP		30	1250	PP
	31	*1326	PP		31	1404	CP		31	1244	PP
	32	1453	CP		32	1147	PP		32	1272	PP
	33	1282	PP		33	1220	PP				

*High Partial 1326 fps
 **Low Complete 1217
 Zone of Mixed Results 109

No. Partials: 31
 No. Completes: 20

RESTRICTED

DETAILED RESULTS FOR LOT 3111-20

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

Panel Rd.		Velocity	Result	Panel Rd.		Velocity	Result	Panel Rd.		Velocity	Result
No.	No.			No.	No.			No.	No.		
1-3	1	637	PP	2-3	1	1302	CP	3-3	1	1244	CP
	2	630	PP		2	1285	CP		2	1168	PP
	3	1136	PP		3	1211	PP		3	1208	CP
	4	1429	CP		4	1217	PP		4	1235	CP
	5	1109	PP		5	1168	PP		5	1211	PP
	6	1285	CP		6	1355	CP		6	1179	PP
	7	1168	PP		7	1196	PP		7	**1188	CP
	8	1202	CP		8	1359	CP		8	1263	PP
	9	1176	PP		9	1182	PP		9	1222	PP
	10	1285	CP		10	1269	CP		10	1244	PP
	11	1199	PP		11	1064	PP		11	1244	CP
	12	1099	PP		12	1272	PP		12	1157	PP
	13	1134	PP		13	1214	PP		13	1155	PP
	14	1214	PP		14	1182	PP		14	1266	PP
	15	1247	CP		15	*1299	PP		15	1229	PP
	16	1196	PP		16	1185	PP		16	1022	PP
	17	1179	PP		17	1176	PP		17	1316	CP
	18	1269	CP		18	1131	PP		18	1259	CP
	19	1295	CP		19	1179	PP		19	1244	CP
	20	1214	CP		20	1182	PP		20	1259	CP
	21	1211	PP		21	1299	CP		21	1295	CP
	22	1295	CP		22	1389	CP		22	1068	PP
	23	1134	PP		23	1259	CP		23	1166	PP
	24	1208	PP		24	1035	PP		24	1351	CP
	25	1312	CP		25	1144	PP		25	1282	CP
	26	1179	PP		26	1116	PP		26	1092	PP
	27	1225	PP		27	1381	CP		27	1253	PP
	28	1126	PP		28	1232	PP		28	1134	PP
	29	1538	CP		29	1160	PP		29	1182	PP
					30	1188	PP		30	1168	PP
					31	1220	PP		31	1250	PP
					32	1121	PP		32	1269	PP
									33	1092	PP
									34	1263	PP
									35	1241	PP

*High Partial 1299 fps
 **Low Complete 1188
 Zone of Mixed Results 1.1

No. Partials: 26
 No. Completes: 22

RESTRICTED

DETAILED RESULTS FOR LOT 3111-21

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

Panel Rd.		Velocity	Result	Panel Rd.		Velocity	Result	Panel Rd.		Velocity	Result
No.	No.			No.	No.			No.	No.		
1-3	1	605	PP	2-3	1	1162	CP	3-3	1	1175	CP
	2	799	PP		2	1348	CP		2	1116	PP
	3	861	PP		3	1104	CP		3	1330	CP
	4	1022	PP		4	1250	PP		4	1393	CP
	5	1166	PP		5	1292	PP		5	1397	CP
	6	1188	PP		6	1241	PP		6	1340	CP
	7	1253	PP		7	1238	PP		7	1359	CP
	8	1344	CP		8	1168	PP		8	1202	PP
	9	1197	CP		9	1285	PP		9	1259	PP
	10	1112	CP		10	1319	CP		10	1340	CP
	11	1137	CP		11	1160	PP		11	1316	CP
	12	1285	PP		12	1333	CP		12	1385	CP
	13	1319	CP		13	1220	PP		13	1256	CP
	14	1374	CP		14	994	PP		14	1196	PP
	15	1359	CP		15	*1299	PP		15	1330	CP
	16	1108	CP		16	1330	CP		16	1217	PP
	17	1344	CP		17	1292	CP		17	1397	CP
	18	1393	CP		18	1225	PP		18	1333	CP
	19	1064	PP		19	1389	CP		19	**1241	CP
	20	1256	PP		20	1235	PP		20	1163	PP
	21	1244	PP		21	1142	PP		21	1282	CP
	22	1217	PP		22	1359	CP		22	1185	PP
	23	1362	CP		23	1348	CP		23	1244	PP
	24	1305	CP		24	1377	CP		24	1299	CP
	25	1279	CP		25	1370	CP		25	1155	PP
	26	1319	CP		26	1155	PP		26	1087	PP
	27	1199	PP		27	1309	CP		27	1202	PP
	28	1199	PP		28	1323	CP		28	1302	CP
	29	1330	CP		29	1362	CP		29	1269	CP
	30	1232	PP		30	1174	PP		30	1316	CP
	31	1289	PP		31	1389	CP		31	1176	PP
	32	1282	CP		32	1295	CP		32	1042	PP
	33	1141	CP		33	1214	PP		33	1057	PP
	34	1344	CP		34	1272	PP		34	1263	CP
	35	1225	PP								
	36	1244	PP								
	37	1285	PP								

*High Partial 1299 fps
 **Low Complete 1241
 Zone of Mixed Results 58

No. Partials: 15
 No. Completes: 10

RESTRICTED

DETAILED RESULTS FOR LOT 3111-22

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

Panel No.	Rd. No.	Velocity	Result	Panel No.	Rd. No.	Velocity	Result	Panel No.	Rd. No.	Velocity	Result
1-3	1	1119	PP	2-3	1	1238	CP	3-3	1	1289	CP
	2	1062	PP		2	1370	CP		2	1309	CP
	3	1182	PP		3	1256	CP		3	1160	PP
	4	1250	CP		4	1174	PP		4	1185	PP
	5	1092	PP		5	1276	CP		5	1182	PP
	6	1266	PP		6	1385	CP		6	1244	CP
	7	1129	CP		7	1295	CP		7	1139	PP
	8	1120	CP		8	1196	PP		8	1199	PP
	9	1120	CP		9	*1333	PP		9	1166	PP
	10	1340	CP		10	1276	CP		10	1196	PP
	11	1351	CP		11	1305	CP		11	1139	PP
	12	1185	PP		12	1171	PP		12	1241	CP
	13	1166	PP		13	1190	PP		13	1235	PP
	14	1326	CP		14	1134	PP		14	1179	PP
	15	1374	CP		15	1279	CP		15	1176	PP
	16	1202	PP		16	1182	CP		16	1109	PP
	17	1381	CP		17	1312	CP		17	1289	CP
	18	1185	PP		18	1174	PP		18	1163	PP
	19	1348	CP		19	1229	CP		19	1238	PP
	20	1163	PP		20	1272	CP		20	1111	PP
	21	1174	PP		21	1134	PP		21	1319	CP
	22	1344	CP		22	1250	CP		22	1370	CP
	23	1362	CP		23	1256	CP		23	1333	CP
	24	1120	CP		24	1316	PP		24	1305	CP
	25	1344	CP		25	1124	PP		25	1305	CP
	26	1160	PP		26	1211	PP		26	1366	CP
	27	1397	CP		27	1247	CP		27	1225	PP
	28	1282	CP		28	1104	PP		28	1157	PP
	29	1312	CP		29	1222	CP		29	1193	PP
	30	1266	PP		30	1272	CP		30	1247	PP
	31	1362	CP		31	1089	PP		31	1211	CP
	32	1253	PP		32	1266	CP		32	1289	CP
	33	1302	CP		33	1149	PP		33	1202	PP
					34	1199	PP				
					35	1220	CP				
					36	1098	PP				
					37	**1163	CP				

*High Partial 1333 fps
 **Low Complete 1163
 Zone of Mixed Results 170

No. Partials: 33
 No. Completes: 35

RESTRICTED

DETAILED RESULTS FOR LOT 3111-23

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

Panel No.	Rd. No.	Velocity	Result	Panel No.	Rd. No.	Velocity	Result	Panel No.	Rd. No.	Velocity	Result
1-3	1	1689	CP	2-3	1	1168	PP	3-3	1	1445	CP
	2	1168	CP		2	1166	PP		2	1272	CP
	3	982	PP		3	962	PP		3	1397	CP
	4	963	PP		4	842	PP		4	1488	CP
	5	1152	CP		5	911	PP		5	1179	PP
	6	1208	CP		6	864	PP		6	1129	PP
	7	1031	PP		7	1190	PP		7	973	PP
	8	926	PP		8	1016	PP		8	967	PP
	9	1064	PP		9	1096	PP		9	1048	PP
	10	1121	PP		10	1196	PP		10	1199	PP
	11	1126	PP		11	*1289	PP		11	1309	CP
	12	1276	CP		12	1211	PP		12	1160	PP
	13	1080	PP		13	1305	CP		13	1106	PP
	14	1199	CP		14	1235	PP		14	933	PP
	15	1059	PP		15	1176	PP		15	1008	PP
	16	1022	PP		16	1309	CP		16	933	PP
	17	1085	PP		17	1182	PP		17	973	PP
	18	**1126	CP		18	1208	PP		18	1059	PP
	19	1205	CP		19	1302	CP		19	1149	PP
	20	990	PP		20	1289	CP		20	1111	PP
	21	1099	PP		21	1437	CP		21	1068	PP
	22	1126	PP		22	1458	CP		22	928	PP
	23	1114	PP		23	1370	CP				
	24	1027	PP		24	1441	CP				
	25	965	PP		25	1196	PP				
	26	1018	PP		26	1220	PP				
	27	808	PP		27	1484	CP				
	28	1119	PP		28	1389	CP				
	29	1089	PP								
	30	1082	PP								

*High Partial 1289 fps

**Low Complete 1126

Zone of Mixed Results 163

No. Partial: 19

No. Completes: 9

RESTRICTED

DETAILED RESULTS FOR LOT 3111-26

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

Panel No.	Rd. No.	Velocity	Result	Panel No.	Rd. No.	Velocity	Result	Panel No.	Rd. No.	Velocity	Result
1-3	1	960	PP	2-3	1	1092	PP	3-3	1	1582	CP
	2	1099	PP		2	1397	CP		2	1449	CP
	3	1096	PP		3	1208	PP		3	1190	PP
	4	1126	PP		4	1493	CP		4	1397	CP
	5	1101	PP		5	1266	PP		5	1488	CP
	6	1292	PP		6	1433	CP		6	1374	CP
	7	982	PP		7	1253	PP		7	1462	CP
	8	1437	CP		8	1441	CP		8	1429	CP
	9	1116	PP		9	1033	PP		9	1377	CP
	10	1222	PP		10	1272	PP		10	1618	CP
	11	1462	CP		11	1366	CP		11	1488	CP
	12	1416	CP		12	1302	PP		12	1520	CP
	13	1285	PP		13	1377	CP		13	1502	CP
	14	1374	CP		14	1147	PP		14	1497	CP
	15	1285	PP		15	1525	CP		15	1449	CP
	16	1453	CP		16	1538	CP		16	1475	CP
	17	1071	PP		17	**1312	CP		17	1534	CP
	18	1256	PP		18	1340	CP		18	1323	PP
	19	1302	PP		19	1337	PP		19	1312	PP
	20	1484	CP		20	1458	CP		20	1348	CP
	21	1160	PP		21	1247	PP		21	1362	CP
	22	1344	PP		22	1385	CP		22	1374	CP
	23	1538	CP		23	1121	PP		23	1515	CP
	24	1309	PP		24	*1377	PP		24	1385	CP
	25	1389	CP		25	1082	PP		25	1266	PP
	26	1269	PP		26	1475	CP				
	27	1208	PP		27	1416	CP				
					28	1471	CP				

*High Partial 1377 fps
**Low Complete 1312
Zone of Mixed Results 65

No. Partials: 5
No. Completes: 10

RESTRICTED

DETAILED RESULTS FOR LOT 3111-27

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

Panel No.	Rd. No.	Velocity	Result	Panel No.	Rd. No.	Velocity	Result	Panel No.	Rd. No.	Velocity	Result
1-3	1	1208	PP	2-3	1	1355	CP	3-3	1	1344	PP
	2	1312	PP		2	1323	PP		2	1269	PP
	3	1319	PP		3	1312	PP		3	1326	PP
	4	1295	PP		4	1366	CP		4	1404	CP
	5	1404	CP		5	1401	CP		5	1370	CP
	6	996	PP		6	1374	CP		6	1462	CP
	7	1404	CP		7	1401	CP		7	1330	PP
	8	1462	CP		8	1370	CP		8	1381	CP
	9	1475	CP		9	1381	CP		9	1538	CP
	10	1437	CP		10	**1344	CP		10	1276	PP
	11	1458	CP		11	1374	CP		11	1529	CP
	12	1309	PP		12	1381	CP		12	1385	CP
	13	1205	PP		13	1351	CP		13	1441	CP
	14	1279	PP		14	1466	CP		14	*1374	PP
	15	1389	CP		15	1337	PP		15	1397	CP
	16	1244	PP		16	1374	CP				
	17	1309	PP		17	1453	CP				
	18	1441	CP		18	1344	PP				
	19	1272	PP		19	1401	CP				
	20	1425	CP		20	1190	PP				
	21	1302	PP		21	1160	PP				
	22	1449	CP		22	1462	CP				
	23	1362	PP		23	1511	CP				
	24	1259	PP		24	1462	CP				
					25	1355	PP				
					26	1370	CP				
					27	1488	CP				

*High Partial 1374 fps
 **Low Complete 1344
 Zone of Mixed Results 30

No. Partials: 5
 No. Completes: 10

RESTRICTED

DETAILED RESULTS FOR LOT 3111-28

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

Panel Rd.		Velocity	Result	Panel Rd.		Velocity	Result	Panel Rd.		Velocity	Result
No.	No.			No.	No.			No.	No.		
1-3	1	1873	CP	2-3	1	1887	CP	3-3	1	1825	CP
	2	1916	CP		2	1587	PP		2	1810	CP
	3	1629	PP		3	1812	CP		3	1812	CP
	4	1689	PP		4	1832	CP		4	1901	CP
	5	1684	PP		5	1953	CP		5	1916	CP
	6	1667	PP		6	1901	CP		6	1887	CP
	7	1645	PP		7	1873	CP		7	1825	CP
	8	1761	PP		8	1805	PP		8	1923	CP
	9	1712	PP		9	1812	CP		9	1724	PP
	10	1754	PP		10	1873	CP		10	1832	PP
	11	1767	PP		11	1873	CP		11	1805	PP
	12	1712	PP		12	1894	CP		12	1894	CP
	13	1645	PP		13	1887	CP		13	1792	CP
	14	1529	PP		14	1887	CP		14	1931	CP
	15	1706	PP		15	1916	CP		15	1845	CP
	16	1825	CP		16	1748	PP		16	1873	CP
	17	**1736	CP		17	1805	CP		17	1894	CP
	18	1748	CP		18	1770	PP		18	1894	CP
	19	1866	CP		19	1742	PP		19	1799	CP
	20	1852	CP		20	1761	PP		20	1812	CP
	21	1792	CP		21	1724	PP		21	1832	CP
	22	1832	PP		22	1799	PP		22	1931	CP
	23	1866	CP		23	1852	CP		23	1832	CP
	24	1818	PP		24	1832	CP		24	1832	CP
	25	*1859	PP		25	1852	CP		25	1754	CP
	26	1742	PP		26	1845	CP		26	1825	CP
	27	1792	PP		27	1866	CP		27	1767	CP
					28	1916	CP		28	1894	CP
					29	1859	CP		29	1792	CP
					30	1859	CP		30	1754	CP
					31	1859	CP		31	1786	PP
					32	1812	PP				
					33	1916	CP				
					34	1845	PP				
					35	1832	PP				

*High Partial 1859 fps
 **Low Complete 1736
 Zone of Mixed Results 123

No. Partial: 19
 No. Complete: 32

RESTRICTED

DETAILED RESULTS FOR LOT 3111-29

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

Panel No.	Rd. No.	Velocity	Result	Panel No.	Rd. No.	Velocity	Result	Panel No.	Rd. No.	Velocity	Result
1-3	1	1217	CP	2-3	1	1282	CP	3-3	1	1425	CP
	2	1285	CP		2	1312	CP		2	1202	CP
	3	1351	CP		3	1276	CP		3	1222	CP
	4	1211	CP		4	1126	PP		4	1142	PP
	5	879	PP		5	1179	CP		5	1330	CP
	6	1040	PP		6	1182	PP		6	1374	CP
	7	808	PP		7	1309	CP		7	1362	CP
	8	870	PP		8	1475	CP		8	1155	PP
	9	1053	PP		9	1217	CP		9	1340	CP
	10	1010	PP		10	1381	CP		10	1351	CP
	11	1035	PP		11	1232	PP		11	1282	CP
	12	1416	CP		12	1319	CP		12	**1166	CP
	13	1319	CP		13	1370	CP		13	1222	CP
	14	1279	CP		14	1312	PP		14	1330	CP
	15	1111	PP		15	1244	CP		15	1292	CP
	16	1144	PP		16	1174	PP		16	1312	CP
	17	1059	PP		17	1214	CP		17	1319	CP
	18	1190	CP		18	1247	CP				
	19	1080	PP		19	1109	PP				
	20	1035	PP		20	1119	PP				
	21	1136	PP		21	1073	PP				
	22	1124	PP		22	1241	CP				
	23	1193	PP		23	1295	CP				
	24	1188	PP		24	1253	CP				
	25	1062	PP		25	1344	CP				
	26	1055	PP		26	1111	PP				
	27	1208	PP		27	1420	CP				
	28	*1250	PP		28	1333	CP				
	29	1174	PP		29	1389	CP				
	30	1362	CP		30	1217	PP				
	31	1247	CP		31	1250	CP				
	32	1142	PP		32	1289	CP				
	33	1235	CP								
	34	1295	CP								
	35	1269	CP								

*High Partial 1250 fps
 **Low Complete 1166
 Zone of Mixed Results 84

No. Partials: 9
 No. Completes: 16

RESTRICTED

DETAILED RESULTS FOR LOT 3111-30

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

Panel Rd.				Panel Rd.				Panel Rd.			
No.	No.	Velocity	Result	No.	No.	Velocity	Result	No.	No.	Velocity	Result
1-3	1	1126	CP	2-3	1	539	PP	3-3	1	836	CP
	2	1082	CP		2	720	CP		2	470	PP
	3	996	CP		3	668	PP		3	896	CP
	4	1101	CP		4	597	PP		4	876	CP
	5	794	CP		5	846	CP		5	**631	CP
	6	*805	PP		6	786	CP		6	617	PP
	7	818	CP		7	1016	CP		7	745	CP
	8	649	PP		8	515	PP		8	903	CP
	9	614	PP		9	992	CP		9	690	PP
	10	996	CP		10	616	PP		10	824	CP
	11	816	CP		11	722	PP		11	720	PP
	12	667	PP		12	1006	CP		12	695	CP
	13	707	PP		13	928	CP		13	741	CP
	14	891	CP		14	619	PP		14	879	CP
	15	749	PP		15	720	CP		15	469	PP
					16	732	CP		16	784	CP
									17	714	CP

*High Partial 805 fps
 **Low Complete 631
 Zone of Mixed Results 174

No. Partials: 9
 No. Completes: 11

RESTRICTED

DETAILED RESULTS FOR LOT 3111-31

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

Panel No.	Rd. No.	Velocity	Result	Panel No.	Rd. No.	Velocity	Result	Panel No.	Rd. No.	Velocity	Result
1-3	1	1016	CP	2-3	1	1040	CP	3-3	1	489	PP
	2	796	PP		2	801	CP		2	744	PP
	3	969	CP		3	840	CP		3	619	PP
	4	717	PP		4	852	CP		4	984	CP
	5	*831	PP		5	804	PP		5	536	PP
	6	580	PP		6	885	CP		6	745	PP
	7	975	CP		7	882	CP		7	893	CP
	8	818	CP		8	969	CP		8	712	PP
	9	958	CP		9	561	PP		9	574	PP
	10	801	CP		10	766	PP		10	865	CP
	11	430	PP		11	332	CP		11	354	PP
	12	806	PP		12	859	CP		12	765	PP
	13	853	CP		13	862	CP		13	797	CP
	14	880	CP		14	661	PP		14	916	CP
	15	**794	CP		15	730	PP		15	679	PP
	16	1075	CP		16	898	CP		16	971	CP
	17	845	CP		17	883	CP				
	18	481	PP		18	663	PP				
	19	890	CP		19	833	CP				
	20	980	CP		20	732	PP				
	21	689	PP		21	846	CP				
	22	883	CP		22	645	PP				
	23	501	PP								

*High Partial 831 fps
 **Low Complete 794
 Zone of Mixed Results 37

No. Partials: 4
 No. Completes: 5

RESTRICTED

DETAILED RESULTS FOR LOT 3111-32

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

Panel No.	Rd. No.	Velocity	Result	Panel No.	Rd. No.	Velocity	Result	Panel No.	Rd. No.	Velocity	Result
1-3	1	535	PP	2-3	1	1196	CP	3-3	1	1316	CP
	2	544	PP		2	1256	CP		2	1193	CP
	3	982	PP		3	1196	CP		3	1253	CP
	4	891	PP		4	1185	CP		4	1238	CP
	5	758	PP		5	1250	CP		5	1266	CP
	6	890	PP		6	1362	CP		6	1312	CP
	7	1182	CP		7	1269	CP		7	940	PP
	8	973	PP		8	1330	CP		8	1040	PP
	9	850	PP		9	1299	CP		9	1124	PP
	10	870	PP		10	1462	CP		10	1136	PP
	11	706	PP		11	1312	CP		11	*1174	PP
	12	1175	CP		12	1366	CP		12	1062	PP
	13	994	PP		13	1285	CP		13	1002	PP
	14	1393	CP		14	1269	CP		14	1351	CP
	15	**1179	CP		15	1282	CP		15	1445	CP
	16	1323	CP		16	1196	CP		16	836	PP
	17	1225	CP		17	1147	PP		17	1106	PP
	18	1163	PP		18	1385	CP		18	1316	CP
	19	1316	CP		19	1326	CP				
	20	1073	PP		20	1266	CP				
	21	1292	CP		21	1312	CP				
	22	1279	CP		22	1147	PP				
	23	1199	CP		23	1256	CP				
	24	1160	PP		24	1205	CP				
	25	1401	CP		25	1362	CP				
					26	1244	CP				
					27	1299	CP				
					28	1217	CP				
					29	1412	CP				
					30	1445	CP				
					31	1377	CP				

*High Partial 1174 fps

**Low Complete 1179

The above firing resulted in no zone of mixed results being obtained, consequently Ballistic Limit (Protection) is based on the average of the highest velocity resulting in partial penetration (1174 fps), and the lowest velocity resulting in complete penetration (1179 fps) = 1177 fps.

RESTRICTED

DETAILED RESULTS FOR LOT 3111-33

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

Panel No.	Rd. No.	Velocity	Result	Panel No.	Rd. No.	Velocity	Result	Panel No.	Rd. No.	Velocity	Result
1-3	1	1222	CP	2-3	1	1136	CP	3-3	1	867	PP
	2	1031	PP		2	1196	CP		2	1012	PP
	3	1048	PP		3	965	PP		3	978	PP
	4	975	PP		4	1068	CP		4	969	PP
	5	868	PP		5	*1057	CP		5	1012	PP
	6	1174	CP		6	1155	CP		6	1094	PP
	7	986	PP		7	1040	PP		7	1099	CP
	8	1058	PP		8	717	PP		8	1057	PP
	9	1027	PP		9	1205	CP		9	896	PP
	10	1174	CP		10	1031	PP		10	988	PP
	11	1053	PP		11	984	PP		11	1131	CP
	12	952	PP		12	1160	CP		12	988	PP
	13	1064	PP		13	1134	CP		13	1018	PP
	14	984	PP		14	825	PP		14	1134	CP
	15	1006	PP		15	1121	CP		15	1149	CP
	16	1020	PP		16	893	PP		16	969	PP
	17	954	PP		17	980	PP				
	18	1031	PP		18	935	PP				
	19	1119	PP		19	1129	PP				
	20	1129	CP		20	1008	PP				
	21	982	PP		21	1188	CP				
	22	1139	CP		22	1018	PP				
	23	1152	CP		23	921	PP				
	24	880	PP		24	1064	PP				
	25	943	PP		25	*1136	PP				
	26	971	PP		26	911	PP				
	27	1144	CP		27	973	PP				
	28	933	PP								
	29	938	PP								
	30	1020	PP								
	31	942	PP								
	32	954	PP								
	33	1053	PP								
	34	1142	CP								
	35	1193	CP								

*High Partial 1136 fps
 **Low Complete 1057
 Zone of Mixed Results 79

No. Partials: 8
 No. Completes: 9

RESTRICTED

DETAILED RESULTS FOR LOT 3111-34

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

Panel Rd.		Velocity	Result	Panel Rd.		Velocity	Result	Panel Rd.		Velocity	Result
No.	No.			No.	No.			No.	No.		
1-3	1	1211	CP	2-3	1	**1073	CP	3-3	1	1085	PP
	2	1029	PP		2	1016	PP		2	1022	PP
	3	1147	CP		3	1010	PP		3	1002	PP
	4	1202	CP		4	943	PP		4	1179	CP
	5	1016	PP		5	1018	PP		5	973	PP
	6	1116	CP		6	998	PP		6	1064	PP
	7	994	PP		7	870	PP		7	1053	PP
	8	885	PP		8	1126	PP		8	1073	PP
	9	1111	CP		9	943	PP		9	*1147	PP
	10	1048	PP		10	1092	PP		10	1136	PP
	11	1114	CP		11	1142	CP		11	1000	PP
	12	1157	CP		12	943	PP		12	1010	PP
	13	1027	PP		13	996	PP		13	1160	CP
	14	853	PP		14	975	PP		14	992	PP
	15	975	PP		15	1096	PP		15	1171	CP
	16	1066	PP		16	1031	PP		16	1089	PP
	17	1171	CP		17	1094	PP		17	1136	CP
	18	994	PP		18	1109	PP		18	832	PP
	19	1111	CP		19	766	PP		19	1071	PP
	20	980	PP						20	1155	CP
	21	896	PP						21	1114	CP
	22	1104	CP						22	958	PP
	23	1000	PP						23	1134	PP
	24	1190	CP						24	883	PP
	25	962	PP						25	1166	CP
	26	899	PP						26	835	PP

*High Partial 1147 fps
 **Low Complete 1073
 Zone of Mixed Results 74

No. Partials: 11
 No. Completes: 10

RESTRICTED

DETAILED RESULTS FOR LOT 3111-35

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

Panel Rd. No.	No.	Velocity	Result	Panel Rd. No.	No.	Velocity	Result	Panel Rd. No.	No.	Velocity	Result
1-3	1	**1080	CP	2-3	1	1025	PP	3-3	1	1166	CP
	2	907	PP		2	916	PP		2	1235	CP
	3	1014	PP		3	1131	CP		3	1316	CP
	4	1185	CP		4	1000	PP		4	1269	CP
	5	1166	CP		5	911	PP		5	1142	PP
	6	1096	PP		6	1025	PP		6	1096	PP
	7	1160	CP		7	1111	CP		7	742	PP
	8	1104	CP		8	1053	PP		8	1029	PP
	9	919	PP		9	1002	PP		9	1250	CP
	10	1002	PP		10	1062	PP		10	1059	PP
	11	1046	PP		11	1220	CP		11	1053	PP
	12	1006	PP		12	982	PP		12	1326	CP
	13	1012	PP		13	1094	PP		13	998	PP
	14	963	PP		14	1104	PP		14	1106	PP
	15	1149	CP		15	917	PP		15	1292	CP
	16	975	PP		16	1075	PP		16	1075	PP
	17	1147	CP		17	1094	PP		17	1211	CP
	18	992	PP		18	1008	PP		18	1048	PP
	19	1016	PP		19	1085	PP				
	20	1057	PP		20	952	PP				
	21	1044	PP		21	1217	CP				
	22	1087	PP		22	1075	PP				
	23	982	PP		23	1104	PP				
	24	1078	PP		24	1166	CP				
	25	986	PP		25	1385	CP				
	26	896	PP		26	1217	CP				
	27	1129	CP		27	*1163	PP				
					28	1319	CP				

*High Partial 1163 fps
 **Low Complete 1080
 Zone of Mixed Results 83

No. Partials: 10
 No. Completes: 9

RESTRICTED

DETAILED RESULTS FOR LOT 3111-36

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

Panel Rd.				Panel Rd.				Panel Rd.			
No.	No.	Velocity	Result	No.	No.	Velocity	Result	No.	No.	Velocity	Result
1-3	1	1859	CP	2-3	1	1718	CP	3-3	1	1748	CP
	2	1845	CP		2	1718	PP		2	1887	CP
	3	1873	CP		3	1689	PP		3	1689	PP
	4	1825	CP		4	1799	CP		4	1779	CP
	5	1845	CP		5	1597	PP		5	1873	CP
	6	1852	CP		6	1748	CP		6	1852	CP
	7	1695	PP		7	1724	CP		7	1799	CP
	8	1684	PP		8	1689	CP		8	1639	PP
	9	1623	PP		9	1582	PP		9	1812	CP
	10	1667	PP		10	1724	CP		10	1018	CP
	11	1629	PP		11	1608	PP		11	1901	CP
	12	1613	PP		12	*1767	PP		12	1880	CP
	13	1701	CP		13	1695	PP		13	1825	CP
	14	1730	CP		14	1639	PP		14	1859	CP
	15	1645	PP		15	1845	CP		15	1786	CP
	16	**1661	CP		16	1724	PP		16	1761	CP
	17	1754	CP		17	1736	CP		17	1754	CP
	18	1805	CP		18	1706	PP		18	1859	CP
					19	1845	CP		19	1736	PP
									20	1761	CP

*High Partial 1767 fps
 **Low Complete 1661
 Zone of Mixed Results 106

No. Partials: 11
 No. Completes: 14

RESTRICTED

DETAILED RESULTS FOR LOT 3111-37

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

Panel Rd.				Panel Rd.				Panel Rd.			
No.	No.	Velocity	Result	No.	No.	Velocity	Result	No.	No.	Velocity	Result
1-3	1	1312	CP	2-3	1	1050	PP	3-3	1	998	PP
	2	1381	CP		2	919	PP		2	965	PP
	3	1072	PP		3	1145	PP		3	882	PP
	4	1222	CP		4	1116	CP		4	975	PP
	5	1157	CP		5	1094	PP		5	1040	PP
	6	1157	CP		6	1057	PP		6	1202	CP
	7	1344	CP		7	894	PP		7	1152	CP
	8	**1092	CP		8	1157	CP		8	1160	CP
	9	1259	CP		9	963	PP		9	1101	PP
	10	1136	CP		10	923	PP		10	1057	PP
	11	1208	CP		11	1048	PP		11	1139	PP
	12	692	PP		12	975	PP		12	1055	PP
	13	1025	PP		13	810	PP		13	*1149	PP
	14	1211	CP		14	1139	CP		14	1205	CP
	15	1157	CP		15	836	PP		15	911	PP
	16	1022	PP		16	969	PP		16	1046	PP
	17	977	PP		17	1104	PP		17	943	PP
	18	1089	PP		18	1096	CP		18	1080	PP
	19	1208	CP		19	992	PP				
	20	870	PP		20	1168	CP				
	21	1035	PP		21	973	PP				
	22	782	PP		22	1241	CP				
	23	919	PP		23	1253	CP				
	24	1152	CP		24	1185	CP				
	25	1044	PP		25	1139	PP				
	26	1114	CP								

*High Partial 1149 fps

**Low Complete 1092

Zone of Mixed Results 57

No. Partials: 6

No. Completes: 6

RESTRICTED

DETAILED RESULTS FOR LOT 3111-39

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

Panel Rd.				Panel Rd.				Panel Rd.			
No.	No.	Velocity	Result	No.	No.	Velocity	Result	No.	No.	Velocity	Result
1-3	1	1090	PP	2-3	1	1090	PP	3-3	1	1290	CP
	2	**1165	CP		2	1120	PP		2	1140	PP
	3	1125	PP		3	1250	PP		3	1260	CP
	4	1170	CP		4	1370	CP		4	1200	PP
	5	1165	PP		5	*1330	PP		5	1160	PP
	6	1190	PP		6	1400	CP		6	1230	PP
	7	1250	PP		7	1420	CP		7	1230	PP
	8	1305	CP		8	1290	PP		8	1310	CP
	9	1200	PP		9	1340	CP		9	1290	PP
	10	1195	CP		10	1320	CP		10	1240	PP
	11	1225	CP		11	1350	CP		11	1305	CP
	12	1260	CP		12	1200	PP		12	1280	CP
	13	1185	PP		13	1210	PP		13	1170	PP
	14	1180	PP		14	1295	CP		14	1260	PP
	15	1120	PP		15	1340	CP		15	1310	CP
	16	1230	PP		16	1260	PP		16	1250	PP
	17	1290	CP		17	1280	PP		17	1310	CP
	18	1205	PP		18	1240	CP		18	1300	CP
	19	1290	PP		19	1280	CP		19	1300	CP
	20	1190	PP		20	1225	PP		20	1310	CP
	21	1170	PP								
	22	1300	CP								

*High Partial 1330 fps
 **Low Complete 1165
 Zone of Mixed Results 165

No. Partials; 27
 No. Completes; 25

RESTRICTED

DETAILED RESULTS FOR LOT 3111-40

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

Panel Rd.				Panel Rd.				Panel Rd.			
No.	No.	Velocity	Result	No.	No.	Velocity	Result	No.	No.	Velocity	Result
1-3	1	1050	PP	2-3	1	1170	PP	3-3	1	1175	CP
	2	1180	PP		2	1240	PP		2	1100	PP
	3	1240	CP		3	1245	PP		3	1080	PP
	4	1260	CP		4	1230	PP		4	1120	PP
	5	1200	PP		5	Lost	CP		5	1130	PP
	6	**1175	CP		6	1340	CP		6	1140	PP
	7	1240	PP		7	1370	CP		7	1180	CP
	8	1175	PP		8	1290	CP		8	1155	PP
	9	1185	PP		9	1275	CP		9	1250	CP
	10	1245	CP		10	1275	CP		10	1190	CP
	11	1210	PP		11	1190	PP		11	1280	CP
	12	1260	PP		12	1210	CP		12	1215	CP
	13	1300	CP		13	1270	CP		13	1140	PP
	14	1330	CP		14	1210	CP		14	1130	PP
	15	1115	PP		15	1190	PP		15	1130	PP
	16	1290	CP		16	1140	PP		16	1200	CP
	17	1320	CP		17	1180	PP		17	1200	PP
	18	1215	PP		18	1210	PP		18	1180	PP
	19	1165	PP		19	1230	PP		19	1230	PP
	20	1150	PP		20	*1280	PP		20	1240	PP
					21	1290	CP		21	1310	CP
									22	1290	CP

*High Partial 1280 fps
 **Low Complete 1175
 Zone of Mixed Results 105

No. Partials: 23
 No. Completes: 21

RESTRICTED

DETAILED RESULTS FOR LOT 3111-43

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

Panel Rd.				Panel Rd.				Panel Rd.			
No.	No.	Velocity	Result	No.	No.	Velocity	Result	No.	No.	Velocity	Result
1-3	1	1205	CP	2-3	1	1115	CP	3-3	1	1185	CP
	2	1160	CP		2	1255	CP		2	1070	PP
	3	1085	PP		3	1110	CP		3	1150	CP
	4	1095	PP		4	**1070	CP		4	1050	PP
	5	1090	PP		5	1110	CP		5	1005	PP
	6	1065	PP		6	1040	PP		6	1090	PP
	7	1125	CP		7	1080	CP		7	*1120	PP
	8	1195	CP		8	1140	CP		8	1120	CP
	9	1135	CP		9	1040	PP		9	1090	PP
	10	1090	PP		10	1060	PP		10	990	PP
	11	1130	CP		11	1050	PP		11	1090	CP
	12	1120	CP		12	1070	PP		12	1080	CP
	13	1090	CP		13	1040	PP		13	1140	CP
	14	1065	PP		14	1060	PP		14	1070	PP
	15	1130	CP		15	1080	PP		15	1105	CP
	16	900	CP		16	1185	CP		16	1130	CP
	17	Lost			17	1105	CP		17	1030	PP
	18	Lost			18	1000	PP		18	1060	PP
	19	Lost			19	1005	PP		19	1095	CP
	20	Lost			20	1045	PP		20	1090	PP
	21	1060	PP								
	22	1180	CP								
	23	1135	CP								
	24	1080	CP								

*High Partial 1120 fps
 **Low Complete 1070
 Zone of Mixed Results 50

No. Partial: 12
 No. Complete: 22

RESTRICTED

DETAILED RESULTS FOR LOT 3111-44

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

Panel Rd.				Panel Rd.				Panel Rd.			
No.	No.	Velocity	Result	No.	No.	Velocity	Result	No.	No.	Velocity	Result
1-3	1	1000	PP	2-3	1	1200	CP	3-3	1	1190	CP
	2	1140	CP		2	1030	CP		2	1170	CP
	3	1150	CP		3	1000	PP		3	1090	PP
	4	1060	PP		4	980	PP		4	1070	PP
	5	*1115	PP		5	1000	PP		5	1160	CP
	6	1170	CP		6	1160	CP		6	1130	CP
	7	1115	CP		7	1110	CP		7	1075	PP
	8	1080	PP		8	1030	PP		8	1110	PP
	9	1055	PP		9	1010	PP		9	1105	PP
	10	1170	PP		10	1080	CP		10	1070	PP
	11	1060	PP		11	1070	CP		11	1065	PP
	12	1145	CP		12	1000	PP		12	1075	PP
	13	1175	CP		13	1030	CP		13	1085	PP
	14	1195	CP		14	1070	CP		14	1165	CP
	15	1045	PP		15	1040	CP		15	1070	PP
	16	1080	PP		16	1070	CP		16	1165	CP
	17	1030	PP		17	1040	CP		17	1190	CP
	18	1125	CP		18	**1010	CP		18	1200	CP
	19	1090	PP		19	1005	PP		19	1180	CP
	20	1160	CP		20	980	PP		20	1140	CP

*High Partial 1115 fps

**Low Complete 1010

Zone of Mixed Results 105

No. Partials; 21

No. Completes; 10

RESTRICTED

DETAILED RESULTS FOR LOT 3111-45

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>	<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>
1-3	1	1235	CP	2-3	1	1200	CP
	2	*1150	PP		2	1140	CP
	3	1090	PP		3	1085	PP
	4	1130	PP		4	1057	PP
	5	1230	CP		5	Lost	
	6	1180	CP		6	**1065	CP
	7	1140	PP		7	1145	CP
	8	1205	CP		8	1090	PP
					9	1055	PP

*High Partial 1150 fps
**Low Complete 1065
Zone of Mixed Results 85

No. Partials: 8
No. Completes: 3

RESTRICTED

DETAILED RESULTS FOR LOT 3111-46

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

Panel Rd.				Panel Rd.				Panel Rd.			
No.	No.	Velocity	Result	No.	No.	Velocity	Result	No.	No.	Velocity	Result
1-3	1	1090	CP	2-3	1	1110	CP	3-3	1	1105	CP
	2	1115	CP		2	1030	PP		2	1050	PP
	3	1090	CP		3	Struck Round #2			3	1110	CP
	4	1035	PP		4	1160	CP		4	1080	No Witness: Plate
	5	*1080	PP		5	1070	CP		5	1065	PP
	6	1090	CP		6	1085	CP		6	1105	CP
	7	980	PP		7	1100	CP		7	1105	CP
	8	1075	CP		8	1055	CP		8	1115	CP
	9	1025	PP		9	990	PP		9	1115	CP
	10	1100	CP		10	965	PP		10	1075	CP
	11	1040	PP		11	1030	CP		11	945	PP
	12	1060	PP		12	1055	CP		12	1035	CP
	13	970	PP		13	920	PP		13	1005	PP
	14	1065	CP		14	935	PP		14	1095	CP
	15	1080	CP		15	**1015	CP		15	1060	CP
	16	1090	CP		16	1035	CP		16	1020	PP
	17	1105	CP		17	1035	CP		17	1035	PP
	18	1065	CP		18	995	PP		18	1045	CP
	19	1015	PP		19	1025	PP		19	1060	CP
	20	1000	PP		20	1040	CP		20	1005	PP
					21	1050	CP				

*High Partial 1080 fps
 **Low Complete 1015
 Zone of Mixed Results 65

No. Partial: 12
 No. Completes: 18

RESTRICTED

DETAILED RESULTS FOR LOT 3111-47

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

Panel Rd.		Velocity	Result	Panel Rd.		Velocity	Result	Panel Rd.		Velocity	Result
No.	No.			No.	No.			No.	No.		
1-3	1	1140	PP	2-3	1	1310	PP	3-3	1	1735	CP
	2	1295	PP		2	1670	PP		2	1605	PP
	3	1410	PP		3	*1780	PP		3	1650	PP
	4	Lost			4	1805	CP		4	Lost	
	5	1610	PP		5	1815	CP		5	1610	PP
	6	1725	PP		6	1815	CP		6	1690	PP
	7	1770	CP		7	1740	PP		7	1640	PP
	8	1740	CP		8	1765	CP		8	**1670	CP
	9	1730	CP		9	1810	CP		9	1690	CP
	10	1730	PP		10	Lost			10	1650	PP
	11	1750	PP		11	1850	CP		11	1705	CP
	12	1740	PP		12	1705	CP		12	1610	PP
	13	1740	PP		13	Lost			13	1705	CP
	14	1790	CP		14	1665	PP		14	1710	PP
	15	1795	CP		15	1700	CP		15	Lost	
	16	1800	CP		16	1700	CP		16	Lost	
	17	1785	CP		17	1650	PP		17	1690	PP
	18	1790	CP		18	1730	CP		18	Lost	
	19	1680	PP		19	1620	PP		19	1610	PP
	20	1780	CP		20	1650	PP		20	1750	CP
	21	1700	CP		21	1670	PP		21	Lost	
									22	Lost	
									23	1720	CP
									24	1665	PP
									25	1755	CP

*High Partial 1780 fps
 **Low Complete 1670
 Zone of Mixed Results 110

No. Partials: 13
 No. Completes 16

RESTRICTED

DETAILED RESULTS FOR LOT 3111-1,8

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

Panel No.	Rd. No.	Velocity	Result	Panel No.	Rd. No.	Velocity	Result	Panel No.	Rd. No.	Velocity	Result
1-3	1	1105	CP	2-3	1	1155	CP	3-3	1	1060	PP
	2	1310	CP		2	1060	PP		2	1330	CP
	3	1240	CP		3	1170	CP		3	1250	CP
	4	1100	PP		4	1145	PP		4	1175	PP
	5	1145	PP		5	1085	PP		5	1170	CP
	6	1170	PP		6	1130	PP		6	1210	CP
	7	1195	CP		7	1035	PP		7	1240	CP
	8	1170	CP		8	1075	PP		8	1210	CP
	9	*1180	PP		9	1135	PP		9	1250	CP
	10	1030	PP		10	1185	PP		10	1190	CP
	11	1120	PP		11	1080	PP		11	1135	PP
	12	1195	CP		12	1200	CP		12	1125	PP
	13	1125	PP		13	1165	CP		13	1080	PP
	14	1150	PP		14	1230	CP		14	1095	PP
	15	1105	PP		15	**1150	CP		15	990	PP
	16	1250	CP		16	1150	PP		16	1105	PP
	17	1185	CP		17	1220	CP		17	1130	PP
	18	1230	CP		18	1200	CP		18	1200	CP
	19	1165	PP		19	1210	CP		19	1210	CP
	20	1180	CP		20	1090	PP		20	1175	PP
					21	1165	PP		21	1115	PP
					22	1150	PP		22	1070	PP

*High Partial 1130 fps
 **Low Complete 1150
 Zone of Mixed Results 30

No. Partials: 10
 No. Completes: 8

RESTRICTED

DETAILED RESULTS FOR LOT 3111-49

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity. Zero

Panel Rd.				Panel Rd.				Panel Rd.			
No.	No.	Velocity	Result	No.	No.	Velocity	Result	No.	No.	Velocity	Result
1-3	1	1320	CP	2-3	1	1340	CP	3-3	1	1000	PP
	2	1145	CP		2	1140	PP		2	1040	PP
	3	1130	CP		3	1300	CP		3	1240	CP
	4	1140	CP		4	1265	CP		4	1220	CP
	5	1135	CP		5	1320	CP		5	1180	CP
	6	1160	CP		6	1215	CP		6	1130	PP
	7	1085	PP		7	1240	CP		7	1105	PP
	8	**1110	CP		8	1195	CP		8	1095	PP
	9	980	PP		9	1360	CP		9	1210	CP
	10	1070	PP		10	1075	PP		10	1145	PP
	11	1120	CP		11	1150	PP		11	1200	CP
	12	1100	PP		12	1125	PP		12	1160	CP
	13	1120	PP		13	1190	CP		13	1105	PP
	14	1070	PP		14	*1195	PP		14	1140	PP
	15	1150	CP		15	1205	CP		15	1160	CP
	16	1110	PP		16	1100	PP		16	1190	CP
	17	1060	PP		17	1120	PP		17	1150	PP
	18	1075	PP		18	1145	PP		18	1150	CP
	19	1025	PP		19	1145	CP		19	1140	PP
	20	1030	PP		20	1145	PP		20	1180	PP
	21	1160	CP		21	1090	PP		21	1135	PP
	22	1150	CP		22	1140	CP		22	1210	CP
					23	1120	PP				

*High Partial 1195 fps
 **Low Complete 1110
 Zone of Mixed Results 85

No. Partials: 17
 No. Completes: 19

RESTRICTED

DETAILED RESULTS FOR LOT 3111-50

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

Panel No.	Rd. No.	Velocity	Result	Panel No.	Rd. No.	Velocity	Result	Panel No.	Rd. No.	Velocity	Result
1-3	1	1380	PP	2-3	1	1400	PP	3-3	1	1300	PP
	2	1405	PP		2	1530	CP		2	1335	PP
	3	1510	CP		3	1460	CP		3	1425	PP
	4	1455	CP		4	1440	CP		4	1560	CP
	5	1385	PP		5	1520	CP		5	1490	CP
	6	1485	CP		6	1500	CP		6	1500	CP
	7	1480	CP		7	1290	PP		7	1375	PP
	8	1480	CP		8	**1400	CP		8	1420	PP
	9	1380	PP		9	1380	PP		9	1370	PP
	10	1415	PP		10	1380	PP		10	1370	PP
	11	1390	PP		11	1335	PP		11	1510	CP
	12	1450	CP		12	1370	PP		12	1520	CP
	13	1425	CP		13	1400	PP		13	*1440	PP
	14	1450	CP		14	1345	PP		14	1445	CP
	15	1420	PP		15	1360	PP		15	1450	CP
	16	1410	PP		16	1520	CP		16	1500	CP
	17	1420	CP		17	1560	CP		17	1460	CP
	18	1440	CP		18	1425	CP		18	1410	PP
	19	1420	PP		19	1400	PP		19	1400	PP
	20	1470	CP		20	1290	PP		20	1450	CP
	21	1380	PP		21	1345	PP		21	1410	PP
					22	1405	CP		22	1440	CP

*High Partial
**Low Complete
Zone of Mixed Results

1440 fps
1400
40

No. Partials: 14
No. Completes: 8

RESTRICTED

DETAILED RESULTS FOR LOT 3111-51

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

Panel Rd.				Panel Rd.				Panel Rd.			
<u>No.</u>	<u>No.</u>	<u>Velocity</u>	<u>Result</u>	<u>No.</u>	<u>No.</u>	<u>Velocity</u>	<u>Result</u>	<u>No.</u>	<u>No.</u>	<u>Velocity</u>	<u>Result</u>
1-3	1	1650	PP	2-3	1	1980	CP	3-3	1	1655	PP
	2	1755	PP		2	1910	CP		2	1700	PP
	3	1780	PP		3	1810	PP		3	1890	CP
	4	1835	PP		4	1820	PP		4	1915	CP
	5	1960	CP		5	1840	CP		5	1905	CP
	6	1910	CP		6	1815	PP		6	1880	CP
	7	1895	CP		7	1815	PP		7	1840	CP
	8	1960	CP		8	1840	CP		8	1780	PP
	9	*1880	PP		9	1840	PP		9	1775	PP
	10	1875	PP		10	1870	CP		10	1815	CP
	11	1895	CP		11	1860	CP		11	1795	PP
	12	1715	PP		12	1860	PP		12	1860	CP
	13	1780	PP		13	1825	PP		13	1820	PP
	14	1840	PP		14	1860	CP		14	1750	PP
	15	1790	PP		15	1830	PP		15	1680	PP
	16	1915	CP		16	1860	CP		16	1850	CP
	17	1930	CP		17	1895	CP		17	1855	CP
	18	1750	PP		18	1850	PP		18	1825	CP
	19	1910	CP		19	1800	PT		19	1845	CP
	20	1895	CP		20	1840	CP		20	1805	PP
	21	1925	CP		21	1870	PP		21	**1785	CP
	22	1910	CP								

*High Partial 1880 fps
 **Low Complete 1785
 Zone of Mixed Results 95

No. Partials: 19
 No. Completes: 16

RESTRICTED

DETAILED RESULTS FOR LOT 3111-52

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

Panel No.	Rd. No.	Velocity	Result	Panel No.	Rd. No.	Velocity	Result	Panel No.	Rd. No.	Velocity	Result
1-3	1	1930	CP	2-3	1	1800	CP	3-3	1	1580	PP
	2	1810	CP		2	1730	CP		2	1700	CP
	3	1730	PP		3	1685	PP		3	1740	CP
	4	1750	CP		4	1690	PP		4	1750	CP
	5	1750	CP		5	1680	CP		5	1675	CP
	6	1720	PP		6	1670	CP		6	1670	CP
	7	1730	CP		7	1675	CP		7	1620	PP
	8	1750	CP		8	1690	CP		8	1615	PP
	9	1750	CP		9	1630	PP		9	1680	CP
	10	1715	PP		10	1670	PP		10	**1665	CP
	11	1755	CP		11	1670	PP		11	1680	PP
	12	1705	PP		12	Lost			12	1605	PP
	13	1705	PP		13	Lost			13	1680	CP
	14	1755	CP		14	1595	PP		14	1605	PP
	15	* 1780	PP		15	1680	PP		15	1685	CP
	16	1715	PP		16	1700	CP		16	1560	PP
	17	1730	PP		17	1710	PP		17	1690	CP
	18	1725	PP		18	1640	PP		18	1640	PP
	19	1730	PP		19	1660	PP		19	1605	PP
	20	1765	CP		20	1710	CP		20	1560	PP
	21	1720	PP		21	1695	PP		21	1605	PP
					22	1700	PP		22	1600	PP
					23	1740	CP				

*High Partial
**Low Complete
Zone of Mixed Results

1780 fps
1665
115

No. Partials: 20
No. Completes: 26

RESTRICTED

DETAILED RESULTS FOR LOT 3111-53

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

Panel Rd.				Panel Rd.				Panel Rd.			
No.	No.	Velocity	Result	No.	No.	Velocity	Result	No.	No.	Velocity	Result
1-3	1	1680	CP	2-3	1	1670	PP	3-3	1	1140	PP
	2	1660	PP		2	1880	CP		2	1500	PP
	3	1625	PP		3	*1740	PP		3	1740	CP
	4	1595	PP		4	1760	CP		4	1555	PP
	5	1580	PP		5	1740	CP		5	1550	PP
	6	1605	PP		6	1760	CP		6	1680	PP
	7	1655	CP		7	1740	CP		7	1685	PP
	8	1675	CP		8	1740	CP		8	1640	PP
	9	1610	PP		9	1650	PP		9	1140	PP
	10	1625	PP		10	1750	CP		10	1635	PP
	11	1680	CP		11	1690	CP		11	1790	CP
	12	1650	PP		12	1680	CP		12	1725	PP
	13	1720	CP		13	1650	PP		13	1645	PP
	14	1680	CP		14	1685	PP		14	1655	PP
	15	1650	PP		15	1740	CP		15	1785	CP
	16	1720	CP		16	1700	CP		16	1730	PP
	17	1625	PP		17	1550	PP		17	1815	CP
	18	1675	CP		18	1635	PP		18	1700	PP
	19	**1635	CP		19	1675	CP		19	1760	CP
	20	1635	PP		20	1675	CP		20	1790	CP
					21	1635	PP		21	1745	CP
									22	1590	PP

*High Partial 1740 fps
 **Low Complete 1635
 Zone of Mixed Results 105

No. Partials: 20
 No. Completes: 19

RESTRICTED

DETAILED RESULTS FOR LOT 3111-67

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

Panel Rd.				Panel Rd.				Panel Rd.			
No.	No.	Velocity	Result	No.	No.	Velocity	Result	No.	No.	Velocity	Result
1-3	1	1460	CP	2-3	1	1360	CP	3-3	1	1045	PP
	2	1335	PP		2	1320	CP		2	1185	PP
	3	1300	PP		3	1270	CP		3	1275	CP
	4	1370	CP		4	1115	PP		4	1220	PP
	5	1350	CP		5	1095	PP		5	1180	PP
	6	1305	CP		6	1110	PP		6	1230	PP
	7	1295	PP		7	1210	PP		7	1220	PP
	8	1245	CP		8	1225	PP		8	1300	PP
	9	1280	PP		9	1265	CP		9	1270	CP
	10	1290	PP		10	1300	CP		10	1380	CP
	11	1230	PP		11	1290	PP		11	1275	CP
	12	1265	PP		12	1265	CP		12	**1235	CP
	13	1270	PP		13	1215	PP		13	1195	PP
	14	1365	CP		14	1155	PP		14	1240	PP
	15	*1330	PP		15	1140	PP		15	1200	PP
	16	1340	CP		16	1250	PP		16	1180	PP
	17	1360	CP		17	1250	PP		17	1320	CP
	18	1345	CP		18	1240	PP		18	1300	PP
	19	1270	PP		19	1320	CP		19	1300	PP
	20	1320	CP		20	1320	PP		20	1150	PP
	21	1360	CP		21	1355	CP		21	1250	PP
					22	1365	CP		22	1305	CP
									23	1280	PP
									24	1250	PP

*High Partial 1330 fps
 **Low Complete 1235
 Zone of Mixed Results 95

No. Partials: 19
 No. Completes: 16

RESTRICTED

DETAILED RESULTS FOR LOT 3111-68

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

Panel Rd.				Panel Rd.				Panel Rd.			
No.	No.	Velocity	Result	No.	No.	Velocity	Result	No.	No.	Velocity	Result
1-3	1	1630	PP	2-3	1	1605	PP	3-3	1	1380	PP
	2	1710	PP		2	1750	CP		2	1400	PP
	3	1740	PP		3	1630	PP		3	1570	PP
	4	Lost			4	Lost			4	1740	CP
	5	1710	PP		5	1670	PP		5	1690	PP
	6	*1785	PP		6	1720	CP		6	1680	PP
	7	1825	CP		7	1665	PP		7	1760	CP
	8	1830	CP		8	1720	CP		8	1680	CP
	9	1860	CP		9	1720	CP		9	1720	CP
	10	1805	CP		10	1660	PP		10	1660	CP
	11	1825	CP		11	1700	CP		11	1670	CP
	12	Lost			12	1655	PP		12	**1615	CP
	13	1760	CP		13	1735	CP		13	1610	PP
	14	1870	CP		14	Lost			14	1630	PP
	15	1800	CP		15	1670	PP		15	1605	PP
	16	1795	CP		16	1640	PP		16	1700	PP
	17	1730	CP		17	1730	CP		17	1640	PP
	18	1820	CP		18	1710	CP		18	1660	PP
	19	1700	PP		19	1630	PP		19	1705	CP
	20	1790	CP		20	1665	PP		20	1710	PP
	21	1750	PP		21	Lost			21	1700	CP
	22	1700	PP		22	1680	CP		22	1730	CP
	23	1690	PP		23	1640	PP				

*High Partial 1785 fps
**Low Complete 1615
Zone of Mixed Results 170

No. Partials: 25
No. Completes: 22

RESTRICTED

DETAILED RESULTS FOR LOT 3111-69

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

Panel Rd.				Panel Rd.				Panel Rd.			
No.	No.	Velocity	Result	No.	No.	Velocity	Result	No.	No.	Velocity	Result
1-3	1	1165	PP	2-3	1	1215	CP	3-3	1	1120	PP
	2	1210	CP		2	1165	CP		2	1145	PP
	3	1250	CP		3	1160	PP		3	1190	CP
	4	1245	CP		4	1100	PP		4	1230	CP
	5	1160	PP		5	1100	PP		5	1205	CP
	6	1220	CP		6	1100	PP		6	1180	PP
	7	1225	CP		7	1080	PP		7	1210	CP
	8	1155	PP		8	1165	PP		8	1175	PP
	9	1160	PP		9	* 1220	CP		9	1100	PP
	10	1245	CP		10	1175	PP		10	**1165	CP
	11	1180	CP		11	1220	PP		11	1185	PP
	12	1170	CP		12	1240	CP		12	1140	PP
	13	1185	CP		13	1240	CP		13	1175	CP
	14	1165	PP		14	1230	CP		14	1180	PP
	15	1180	PP		15	1170	CP		15	1095	PP
	16	1180	PP		16	1240	CP		16	1225	CP
	17	1170	PP		17	1140	PP		17	1220	CP
	18	1140	PP		18	1100	PP		18	1080	PP
	19	1180	PP		19	1190	CP		19	1215	CP
	20	1200	CP		20	1160	PP		20	1210	CP
					21	1150	PP				

*High Partial 1220 fps
 **Low Complete 1165
 Zone of Mixed Results 55

No. Partials: 13
 No. C ompletes: 19

RESTRICTED

DETAILED RESULTS FOR LOT 3111-70

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

Panel No.	Rd. No.	Velocity	Result	Panel No.	Rd. No.	Velocity	Result	Panel No.	Rd. No.	Velocity	Result
1-3	1	1875	CP	2-3	1	Lost		3-3	1	1590	PP
	2	1710	PP		2	1805	CP		2	Lost	
	3	1880	CP		3	1805	CP		3	Lost	
	4	1885	CP		4	1805	PP		4	1700	PP
	5	1775	PP		5	1630	PP		5	1865	PP
	6	1805	PP		6	1845	PP		6	1780	PP
	7	1795	PP		7	1890	PP		7	1615	PP
	8	**1800	CP		8	1940	CP		8	1760	PP
	9	1815	PP		9	*1920	PP		9	1880	CP
	10	1875	CP		10	1955	CP		10	1870	CP
	11	1790	PP		11	1940	CP		11	1765	PP
	12	1840	CP		12	1905	PP		12	1845	CP
	13	1860	CP		13	1905	CP		13	1855	CP
	14	1790	PP		14	1940	CP		14	1770	PP
	15	1830	CP		15	1900	CP		15	1770	PP
	16	1745	PP		16	1855	PP		16	1870	CP
	17	1795	PP		17	1845	PP		17	1820	CP
	18	1820	PP		18	1835	PP		18	1785	PP
	19	1855	CP		19	1850	PP		19	1795	PP
	20	1825	CP		20	1940	CP		20	1775	PP
					21	Lost			21	1825	CP
					22	1840	CP		22	1760	PP
					23	1780	PP		23	1845	CP
					24	1760	PP		24	1860	CP

*High Partial 1920 fps
 **Low Complete 1800
 Zone of Mixed Results 120

No. Partials: 12
 No. Completes: 25

RESTRICTED

DETAILED RESULTS FOR LOT 3111-73

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

Panel Rd.		Velocity	Result	Panel Rd.		Velocity	Result	Panel Rd.		Velocity	Result
No.	No.			No.	No.			No.	No.		
1-3	1	1220	CP	2-3	1	1170	CP	3-3	1	1210	CP
	2	1170	CP		2	1140	PP		2	1265	CP
	3	1185	CP		3	1200	CP		3	1215	CP
	4	1145	PP		4	1175	CP		4	1120	PP
	5	1150	PP		5	1170	CP		5	*1180	PP
	6	1120	PP		6	1130	PP		6	1190	PP
	7	1100	PP		7	1080	PP		7	1205	CP
	8	1195	CP		8	1120	PP		8	1215	CP
	9	1155	CP		9	1085	PP		9	1170	PP
	10	1210	CP		10	1290	CP		10	1155	PP
	11	1195	CP		11	1185	CP		11	1250	CP
	12	1175	PP		12	1200	CP		12	1100	PP
	13	1160	CP		13	1070	PP		13	1150	PP
	14	1175	CP		14	1065	PP		14	1100	PP
	15	**1145	CP		15	1085	PP		15	1190	CP
	16	1115	PP		16	1200	CP	(1)	16	1200	CP
	17	1140	PP		17	1180	PP	(2)	17	1200	CP
	18	1100	PP		18	1180	CP		18	1205	CP
	19	1130	PP		19	1195	CP		19	1270	CP
	20	1170	PP		20	1080	PP		20	1150	PP
									21	1160	PP
								(3)	22	1230	CP
									23	1210	CP
									24	1120	PP
									25	1130	PP
									26	1200	CP
									27	1130	PP
									28	1150	PP
									29	1225	CP
									30	1165	CP

*High Partial 1180 fps

**Low Complete 1145

Zone of Mixed Results 35

No. Partials: 12

No. Completes 10

(1) Disregard No. 16 - Struck Round No. 8

(2) Disregard No. 17 - "Edge" of Plate

(3) Rounds No. 1 - 22 were fired using the aluminum plate as a back surface.

RESTRICTED

DETAILED RESULTS FOR LOT 3111-74

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

Panel Rd. No.	No.	Velocity	Result	Panel Rd. No.	No.	Velocity	Result	Panel Rd. No.	No.	Velocity	Result
1-3	1	1900	CP	2-3	1	1510	PP	3-3	1	1710	PP
	2	1820	CP		2	1835	CP		2	1855	CP
	3	1695	PP		3	1830	CP		3	1860	CP
	4	Lost			4	1720	PP		4	1830	CP
	5	1730	PP		5	1770	CP		5	1780	PP
	6	1740	PP		6	1780	CP		6	1845	CP
	7	*1790	PP		7	1730	PP		7	1755	PP
	8	1745	PP		8	1725	PP		8	1780	CP
	9	1705	PP		9	1750	PP		9	1700	PP
	10	1685	PP		10	1705	PP		10	1780	CP
	11	1800	CP		11	1820	CP		11	1730	PP
	12	1810	CP		12	1720	PP		12	1840	CP
	13	1780	PP		13	1765	CP		13	1820	CP
	14	1800	CP		14	**1760	CP		14	1795	CP
	15	1835	CP		15	Lost			15	1825	CP
	16	1840	CP		16	1745	PP		16	1805	CP
	17	1785	CP		17	1805	CP		17	1780	CP
	18	1740	PP		18	1755	PP		18	1690	PP
	19	1805	CP		19	Lost			19	1755	PP
	20	1815	CP		20	Lost			20	1720	PP
	21	1785	PP		21	1760	PP		21	1680	PP
					22	1815	CP				
					23	1780	PP				
					24	1735	PP				

*High Partial 1790 fps
**Low Complete 1760
Zone of Mixed Results 30

No. Partials: 6
No. Completes: 8

RESTRICTED

DETAILED RESULTS FOR LOT 3111-88

Test of Laminated Armor with Cal. .22 T37
 Fragment-Simulating Projectile
 Obliquity: Zero

<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>	<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>
1-1	1	1280	PP	1-2	1	1130	PP
	2	1460	CP		2	1200	PP
	3	1250	PP		3	1300	PP
	4	1250	PP		4	1330	CP
	5	1240	PP		5	1200	PP
	6	Lost	.		6	1335	CP
	7	1300	CP		7	1195	PP
	8	1280	PP		8	**1295	CP
	9	1365	CP		9	1280	PP
	10	1360	CP		10	1260	PP
	11	1235	PP				
	12	1320	CP				
1-3	1	1365	CP	1-4	1	1290	PP
	2	1380	CP		2	1325	PP
	3	1315	PP		3	1400	CP
	4	1330	CP		4	1220	PP
	5	1325	CP		5	1320	CP
	6	1260	PP		6	1215	PP
	7	1270	PP		7	1375	CP
	8	1280	PP		8	1255	PP
	9	1335	CP		9	1330	CP
	10	*1325	PP		10	1245	PP
	11	1310	PP				
	12	1305	PP				

*High Partial 1325 fps
 **Low Complete 1295
 Zone of Mixed Results 30

No. Partial: 7
 No. Complete: 5

RESTRICTED

DETAILED RESULTS FOR LOT 3111-88

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>	<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>
2-1	1	1365	CP	2-2	1	1370	CP
	2	1215	PP		2	*1315	PP
	3	1220	PP		3	1290	PP
	4	1360	CP		4	1310	PP
					5	1365	CP
2-3	1	1305	PP	2-4	1	1285	PP
	2	**1320	CP		2	1305	PP
	3	1305	PP		3	Lost	.
	4	1345	CP		4	1345	CP
			5		1320	CP	
			6		1290	PP	

*High Partial 1315 fps
**Low Complete 1320
Zone of Mixed Results 5

No. Partials: 1
No. Completes: 2

RESTRICTED

DETAILED RESULTS FOR LOT 3111-89

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>	<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>
1-1	1	*1350	FP	1-2	1	1380	CP
	2	1325	PP		2	1260	PP
	3	1420	CP		3	1300	PP
	4	1380	CP		4	1335	PP
	5	1370	CP		5	1405	CP
					6	1330	PP
1-3	1	1340	CP	1-4	1	1310	PP
	2	1230	PP		2	1365	CP
	3	1315	PP		3	1305	PP
	4	1270	PP		4	1360	CP
	5	1270	PP		5	1310	PP
	6	**1320	CP		6	1300	PP
	7	1335	CP		7	1360	CP
	8	1370	CP				
	9	1280	PP				
	10	1310	PP				

*High Partial 1350 fps
 **Low Complete 1320
 Zone of Mixed Results 30

No. Partial: 4
 No. Complete: 3

RESTRICTED

DETAILED RESULTS FOR LOT 3111-89

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>	<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>
2-1	1	1300	PP	2-2	1	1335	PP
	2	1340	CP		2	*1350	PP
	3	1345	CP		3	1425	CP
	4	1340	CP		4	1390	CP
	5	1305	PP		5	1250	PP
	6	1355	CP		6	Lost	
	7	1285	PP		7	1290	PP
	8	1290	PP		8	1360	CP
	9	1305	PP		9	1330	CP
	10	1295	CP		10	1330	CP
	11	1315	PP				
	12	1320	CP				
2-3	1	1355	CP	2-4	1	1320	PP
	2	1330	CP		2	1375	CP
	3	1280	PP		3	1380	CP
	4	1280	PP		4	1295	PP
	5	1330	PP		5	1370	CP
	6	**1265	CP		6	1315	CP
	7	1245	PP		7	1280	PP
	8	1275	PP		8	1270	PP
	9	1320	CP		9	1235	PP
	10	1200	PP		10	Lost	
	11	1240	PP		11	1260	PP
	12	1270	PP		12	1320	CP

*High Partial 1350 fps
 **Low Complete 1265
 Zone of Mixed Results 85

No. Partials: 18
 No. Completes: 14

RESTRICTED

DETAILED RESULTS FOR LOT 3111-90

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>	<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>
1-1	1	1260	FP	1-2	1	1360	CP
	2	1345	CP		2	1280	PP
	3	1320	CP		3	1350	CP
	4	1300	CP		4	1360	CP
	5	1270	PP		5	1320	CP
	6	1210	PP		6	1335	CP
	7	1270	PP		7	1285	PP
	8	1290	PP		8	1270	PP
1-3	1	1250	PP	1-4	1	1380	CP
	2	1330	CP		2	1345	CP
	3	1290	PP		3	1265	PP
	4	1315	CP		4	1300	CP
	5	* 1315	PP		5	1315	CP
	6	1310	PP		6	**1280	CP
					7	1225	PP
					8	1260	PP

*High Partial 1315 fps
 **Low Complete 1280
 Zone of Mixed Results 35

No. Partials: 6
 No. Completes: 5

RESTRICTED

DETAILED RESULTS FOR LOT 3111-90

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>	<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>
2-1	1	1315	PP	2-2	1	1315	PP
	2	1365	CP		2	1380	CP
	3	1350	CP		3	1325	PP
	4	1325	CP		4	*1375	PP
	5	1340	CP		5	1396	CP
	6	1275	PP		6	1325	PP
	7	1290	PP		7	1370	CP
	8	1275	PP		8	1425	CP
2-3	1	1320	CP	2-4	1	1340	CP
	2	1300	PP		2	1120	PP
	3	**1315	CP		3	1180	PP
	4	1320	CP		4	1320	PP
	5	1360	CP		5	1325	PP
	6	1300	PP		6	1100	PP
	7	1340	PP		7	1335	CP
	8	1280	PP		8	1390	CP
			9		1395	CP	
			10		1385	CP	
			11		1375	PP	
			12		1365	PP	

*High Partial 1375 fps
 **Low Complete 1315
 Zone of Mixed Results 60

No. Partial: 10
 No. Completes: 11

RESTRICTED

DETAILED RESULTS FOR LOT 3111-91

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>	<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>
1-1	1	1215	PP	1-2	1	Lost	
	2	1300	PP		2	1310	PP
	3	1270	PP		3	1345	PP
	4	1380	CP		4	*1400	PP
	5	1365	PP		5	1420	CP
	6	1380	CP		6	1440	CP
					7	**1320	CP
					8	Lost	
					9	1320	PP
1-3	1	1405	CP	1-4	1	1300	PP
	2	1330	PP		2	1360	CP
	3	1325	PP		3	1300	PP
	4	1365	CP		4	1340	PP
	5	1370	PP		5	1370	PP
	6	1330	PP		6	1355	PP
	7	1460	CP		7	1460	CP
	8	1360	CP		8	1455	CP

*High Partial 1400 fps
**Low Complete 1320
Zone of Mixed Results 80

No. Partial: 10
No. Complete: 6

RESTRICTED

DETAILED RESULTS FOR LOT 3111-91

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>	<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>
2-1	1	1320	PP	2-2	1	1300	PP
	2	1310	PP		2	1355	PP
	3	1310	PP		3	1430	CP
	4	1440	CP		4	1370	CP
	5	1405	PP		5	1375	CP
	6	1425	CP		6	1355	PP
	7	1375	CP				
	8	1430	CP				
2-3	1	1350	PP	2-4	1	1290	PP
	2	1360	PP		2	1400	CP
	3	1435	CP		3	**1340	CP
	4	1430	CP		4	1320	PP
	5	1390	CP		5	1350	PP
	6	*1385	PP		6	1400	CP

*High Partial 1385 fps
 **Low Complete 1340
 Zone of Mixed Results 45

No. Partial: 6
 No. Complete: 4

RESTRICTED

DETAILED RESULTS FOR LOT 3111-92

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>	<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>
1-1	1	1415	CP	1-2	1	1400	CP
	2	**1355	CP		2	1330	PP
	3	1355	PP		3	1360	PP
	4	1295	PP		4	1405	CP
	5	1275	PP		5	1340	PP
	6	1385	CP		6	*1375	PP
	7	1360	CP				
1-3	1	1435	CP	1-4	1	1365	PP
	2	1495	CP		2	1360	PP
	3	1300	PP		3	1440	CP
	4	1365	CP		4	1405	CP
	5	1380	CP		5	1395	CP
	6	1320	PP		6	1380	CP
	7	1380	CP				

*High Partial 1375
**Low Complete 1355
Zone of Mixed Results 20

No. Partials: 5
No. Completes: 3

RESTRICTED

DETAILED RESULTS FOR LOT 3111-92

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>	<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>
2-1	1	1430	CP	2-2	1	1230	PP
	2	**1280	CP		2	1295	CP
	3	1235	PP		3	*1325	PP
2-3	1	1345	CP	2-4	1	1315	PP
	2	1300	PP		2	1320	PP
					3	1365	CP
					4	1315	CP
					5	1295	PP

*High Partial 1325
 **Low Complete 1280
 Zone of Mixed Results 45

No. Partials: 5
 No. Completes: 3

RESTRICTED

DETAILED RESULTS FOR LOT 3111-93

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>	<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>
1-1	1	1385	CP	1-2	1	1255	PP
	2	1280	PP		2	1275	PP
	3	1350	CP		3	1380	CP
	4	1365	CP		4	1280	PP
1-3	1	1235	PP	1-4	1	1265	PP
	2	1310	PP		2	*1330	PP
	3	1370	CP		3	1365	CP
	4	1360	CP		4	**1340	CP
	5	1340	CP				

*High Partial 1330 fps
**Low Complete 1340
Zone of Mixed Results -

No. Partials: 1
No. Completes: 2

RESTRICTED

DETAILED RESULTS FOR LOT 3111-93

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>	<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>
2-1	1	1240	PP	2-2	1	1175	PP
	2	1230	PP		2	1320	PP
	3	1330	PP		3	1425	CP
	4	1430	CP		4	*1360	PP
	5	1425	CP		5	1305	PP
					6	1330	PP
2-3	1	1260	PP	2-4	1	1320	PP
	2	1365	CP		2	**1360	CP
	3	1285	PP		3	1290	PP
	4	1265	PP		4	1345	PP
	5	1345	PP		5	1390	CP
	6	1360	CP				

*High Partial 1360 fps
**Low Complete 1360
Zone of Mixed Results 0

No. Partial: 1
No. Complete: 2

RESTRICTED

DETAILED RESULTS FOR LOT 3111-95

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>	<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>
1-1	1	1365	CP	1-2	1	1290	PP
	2	1240	PP		2	*1320	PP
	3	1305	PP		3	1390	CP
	4	1235	PP		4	1325	CP
	5	1310	PP				
1-3	1	1330	CP	1-4	1	1310	CP
	2	1280	PP		2	1315	CP
	3	1330	CP		3	**1295	CP
	4	1300	CP		4	1150	PP
					5	1215	PP

*High Partial 1320 fps
**Low Complete 1295
Zone of Mixed Results 25

No. Partials: 3
No. Completes: 4

RESTRICTED

DETAILED RESULTS FOR LOT 3111-95

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>	<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>
2-1	1	1235	PP	2-2	1	1280	PP
	2	1435	CP		2	1305	PP
	3	1315	PP		3	1290	PP
	4	1330	CP		4	1325	PP
					5	1320	PP
2-3	1	*1345	PP	2-4	1	1365	CP
	2	1410	CP		2	1270	PP
	3	1350	CP		3	1265	PP
	4	1420	CP		4	**1275	CP

*High Partial 1345 fps
 **Low Complete 1275
 Zone of Mixed Results 70

No. Partials: 7
 No. Completes: 2

RESTRICTED

DETAILED RESULTS FOR LOT 3111-96

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>	<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>
1-1	1	1310	PP	1-2	1	1415	CP
	2	1310	PP		2	1340	PP
	3	1340	PP		3	1415	CP
	4	1430	CP		4	1365	CP
	5	1340	PP		5	**1305	CP
	6	1405	CP		6	1355	PP
1-3	1	1310	PP	1-4	1	1365	CP
	2	1385	CP		2	1390	CP
	3	1300	PP		3	1350	CP
	4	1345	PP		4	1315	PP
	5	1440	CP		5	1235	PP
	6	*1375	PP				

*High Partial 1375 fps
 **Low Complete 1305
 Zone of Mixed Results 70

No. Partial: 10
 No. Complete: 4

RESTRICTED

DETAILED RESULTS FOR LOT 3111-96

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>	<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>
2-1	1	1360	CP	2-2	1	1390	CP
	2	1195	PP		2	1300	PP
	3	1310	PP		3	1320	PP
	4	**1350	CP		4	1330	PP
	5	1265	PP		5	1410	CP
	6	1310	PP		6	*1350	PP
2-3	1	1300	PP	2-4	1	1390	CP
	2	1390	CP		2	1320	PP
	3	1325	PP		3	1375	CP
	4	1325	PP		4	1350	PP
	5	1345	PP		5	1385	CP
					6	1345	PP

*High Partial 1350 fps
 **Low Complete 1350
 Zone of Mixed Results 0

No. Partials: 2
 No. Completes: 1

RESTRICTED

DETAILED RESULTS FOR LOT 3111-97

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>	<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>
1-1	1	1345	PP	1-2	1	1305	PP
	2	1320	PP		2	1335	PP
	3	1420	CP		3	1290	PP
	4	1425	CP		4	**1355	CP
	5	*1365	PP		5	1395	CP
	6	1315	PP		6	1335	PF
1-3	1	1320	PP	1-4	1	1305	PP
	2	1385	CP		2	1435	CP
	3	1335	PP		3	1430	CP
	4	1425	CP		4	1410	CP
	5	1415	CP		5	1340	PP
	6	1400	CP		6	1335	PP
					7	1365	CP

*High Partial 1365 fps
**Low Complete 1355
Zone of Mixed Results 10

No. Partials: 1
No. Completes: 2

RESTRICTED

DETAILED RESULTS FOR LOT 3111-97

Test of Laminated Armor with Cal. .22 T37

Fragment-Simulating Projectile

Obliquity: Zero

<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>	<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>
2-1	1	1240	PP	2-2	1	1345	PP
	2	1340	PP		2	1405	CP
	3	*1425	PP		3	1345	PP
	4	1415	CP		4	1355	PP
	5	1430	CP		5	1445	CP
	6	1395	CP		6	1375	PP
	7	1380	CP		7	1415	CP
	8	1320			8	1365	CP
2-3	1	1335	PP	2-4	1	1425	CP
	2	1330	PP		2	1315	PP
	3	1385	CP		3	1265	PP
	4	**1355	CP		4	1355	CP
	5	1310	PP		5	1340	PP
	6	1325	PP		6	1390	CP
	7	1350	PP		7	1330	PP
	8	1405	CP		8	1425	CP

*High Partial 1425 fps
 **Low Complete 1355
 Zone of Mixed Results 70

No. Partials: 3
 No. Completes: 13

RESTRICTED

DETAILED RESULTS FOR LOT 3111-98

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>	<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>
1-1	1	1315	PP	1-2	1	1280	PP
	2	1345	PP		2	1350	PP
	3	1385	CP		3	1415	CP
	4	1390	CP		4	1400	CP
	5	1405	CP		5	1405	CP
	6	1360	CP		6	1325	PP
					7	1405	CP
					8	1355	CP
1-3	1	1370	CP	1-4	1	1350	PP
	2	1350	CP		2	1395	CP
	3	1305	CP		3	*1360	PP
	4	1320	PP		4	1385	CP
	5	**1300	CP		5	1385	CP
	6	1295	PP		6	1425	CP
	7	1380	CP				
	8	1410	CP				

*High Partial 1360 fps
 **Low Complete 1300
 Zone of Mixed Results 60

No. Partials: 7
 No. Completes: 5

RESTRICTED

DETAILED RESULTS FOR LOT 3111-98

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile
Obliquity: Zero

<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>	<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>
2-1	1	1420	CP	2-2	1	1380	CP
	2	**1310	CP		2	1350	CP
	3	1285	PP		3	1300	PP
	4	1350	CP		4	1265	PP
	5	1345	CP		5	1225	PP
	6	1300	PP		6	1300	PP
	7	1340	CP				
2-3	1	1465	CP	2-4	1	1345	CP
	2	1325	CP		2	1290	PP
	3	1235	PP		3	1380	CP
	4	1290	PP		4	1300	PP
	5	1380	CP		5	1290	PP
	6	1275	PP		6	1375	CP
	7	1240	PP		7	*1325	PP
	8	1375	CP		8	1330	CP

*High Partial 1325 fps
 **Low Complete 1310
 Zone of Mixed Results 15

No. Partials: 1
 No. Completes: 2

RESTRICTED

DETAILED RESULTS FOR LOT 3111-99

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>	<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>
1-1	1	**1330	CP	1-2	1	1330	CP
	2	1295	PP		2	1285	PP
	3	1245	PP		3	1245	PP
	4	1340	PP		4	1235	PP
	5	1290	PP		5	1285	PP
	6	1335	PP		6	1345	CP
	7	1395	CP				
	8	1390	CP				
1-3	1	1380	CP	1-4	1	1280	PP
	2	*1365	PP		2	1135	PP
	3	1355	CP		3	1125	PP
	4	1325	PP		4	1385	CP
	5	1320	PP		5	1315	PP
	6	1360	PP		6	1415	CP
	7	1380	CP		7	1365	CP
	8	1405	CP		8	1385	CP

*High Partial 1365 fps
 **Low Complete 1330
 Zone of Mixed Results 35

No. Partials: 4
 No. Complete: 5

RESTRICTED

DETAILED RESULTS FOR LOT 3111-99

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>	<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>
2-1	1	1395	CP	2-2	1	1270	PP
	2	1310	PP		2	1410	CP
	3	1330	PP		3	1275	PP
	4	1285	PP		4	1335	PP
	5	1300	PP		5	1330	PP
	6	1285	PP		6	*1370	PP
					7	1435	CP
2-3	1	**1330	CP	2-4	1	1180	PP
	2	1395	CP		2	1340	PP
	3	1400	CP		3	1350	PP
	4	1265	PP		4	1465	CP
	5	1205	PP		5	1400	CP
	6	1320	PP		6	1460	CP
	7	1340	CP		7	1350	PP
	8	1410	CP		8	1335	CP

*High Partial 1370 fps
 **Low Complete 1330
 Zone of Mixed Results 40

No. Partials: 6
 No. Completes: 3

RESTRICTED

DETAILED RESULTS FOR LOT 3652-1

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>	<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>
1-1	1	Lost		1-2	1	1290	CP
	2	Lost			2	1200	PP
	3	1250	PP		3	1315	CP
	4	1300	CP		4	**1255	CP
	5	* 1300	PP		5	1290	CP
	6	1355	CP		6	1270	CP
	7	1275	PP				
1-3	1	1355	CP	1-4	1	1215	PP
	2	1315	CP		2	1340	CP
	3	1365	CP		3	1270	CP
	4	1265	PP		4	1275	CP
	5	1290	PP		5	1175	PP
	6	1320	CP		6	1195	PP
	7	1260	PP				

*High Partial 1300 fps
**Low Complete 1255
Zone of Mixed Results 45

No. Partials: 3
No. Completes: 7

RESTRICTED

DETAILED RESULTS FOR LOT 3652-1

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>	<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>
2-1	1	1285	CP	2-2	1	1055	PP
	2	1175	PP		2	1170	PP
	3	1255	PP		3	1250	PP
	4	1250	PP		4	1210	PP
	5	1260	PP		5	1360	CP
					6	1345	CP
					7	*1265	PP
2-3	1	1250	CP	2-4	1	1310	CP
	2	1170	PP		2	1320	CP
	3	1165	PP		3	**1240	CP
	4	1275	CP		4	1250	CP
	5	1180	PP		5	1130	PP
	6	1170	PP		6	1210	PP
					7	1215	PP
					8	1255	PP

*High Partial 1265 fps
 **Low Complete 1240
 Zone of Mixed Results 25

No. Partials: 6
 No. Completes: 3

RESTRICTED

DETAILED RESULTS FOR LOT 3652-2

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>	<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>
1-1	1	1340	CP	1-2	1	1255	PP
	2	1245	PP		2	1305	CP
	3	1310	CP		3	1200	PP
	4	1405	CP		4	1265	PP
	5	1325	CP		5	1280	PP
	6	1255	PP				
1-3	1	1305	CP	1-4	1	*1285	PP
	2	1240	PP		2	1365	CP
	3	**1300	CP		3	1360	CP
	4	1300	CP		4	1215	PP
	5	1270	PP		5	1260	PP
	6	1315	CP				

*High Partial 1285 fps
 **Low Complete 1300
 Zone of Mixed Results -

No. Partials: 1
 No. Completes: 2

RESTRICTED

DETAILED RESULTS FOR LOT 3652-6

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>	<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>
2-1	1	1360	CP	2-2	1	1310	CP
	2	1300	PP		2	1290	PP
	3	1305	PP		3	1275	PP
	4	1295	PP		4	1295	PP
	5	1315	CP		5	1320	CP
	6	1315	PP		6	1310	PP
	7	1345	CP		7	1325	CP
	8	*1315	PP		8	1300	PP
2-3	1	1300	PP	2-4	1	1345	CP
	2	1285	PP		2	**1300	CP
	3	1315	CP		3	1315	PP
	4	1240	PP		4	1265	PP
	5	1400	CP		5	1350	CP
	6	1315	PP		6	1385	CP
	7	1360	CP		7	1395	CP
	8	1340	CP		8	1370	CP
					9	1415	CP

*High Partial 1315 fps
**Low Complete 1300
Zone of Mixed Results 15

No. Partials: 8
No. Completes: 4

RESTRICTED

DETAILED RESULTS FOR LOT 3652-7

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>	<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>
2-1	1	1340	CP	2-2	1	1280	PP
	2	1255	PP		2	1270	PP
	3	1345	CP		3	1460	CP
	4	1265	PP		4	1410	CP
	5	1280	PP		5	1365	CP
	6	1300	PP		6	1265	PP
	7	1340	CP		7	1335	CP
					8	1315	CP
2-3	1	1340	CP	2-4	1	1275	PP
	2	1290	PP		2	1320	CP
	3	1275	PP		3	1300	PP
	4	1255	PP		4	1345	CP
	5	1315	CP		5	**1305	CP
	6	1300	PP		6	1320	CP
	7	1345	CP		7	1315	CP
	8	1375	CP		8	*1315	PP
			9		1355	CP	

*High Partial 1315 fps
 **Low Complete 1305
 Zone of Mixed Results 10

No. Partials: 1
 No. Completes: 4

RESTRICTED

DETAILED RESULTS FOR LOT 3652-10

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>	<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>
2-1	1	1300	CP	2-2	1	1265	PP
	2	1235	PP		2	1255	PP
	3	1305	PP		3	1260	PP
	4	1325	CP		4	1315	CP
	5	1295	PP		5	1360	CP
	6	1300	PP		6	1285	PP
	7	1315	PP		7	1385	CP
	8	**1295	CP		8	1320	PP
2-3	1	1235	PP	2-4	1	1180	PP
	2	1225	PP		2	1240	PP
	3	1255	PP		3	1325	CP
	4	1305	PP		4	1300	PP
	5	1365	CP		5	1255	PP
	6	1330	CP		6	*1345	PP
	7	1290	PP		7	1350	CP
	8	1385	CP				

*High Partial 1345 fps
**Low Complete 1295
Zone of Mixed Results 50

No. Partials: 8
No. Completes: 6

RESTRICTED

DETAILED RESULTS FOR LOT 3652-11

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>	<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>
2-1	1	*1420	PP	2-2	1	1450	CP
	2	1380	PP		2	1375	PP
	3	1425	CP		3	1315	PP
	4	1475	CP		4	**1365	CP
	5	1440	CP		5	1330	PP
	6	1390	PP		6	1370	PP
					7	1430	CP
2-3	1	1300	PP	2-4	1	1340	PP
	2	1390	CP		2	1320	PP
	3	1415	CP		3	1450	CP
	4	1370	CP		4	1410	CP
	5	1425	CP		5	1305	PP
					6	1330	PP

*High Partial 1420 fps
 **Low Complete 1365
 Zone of Mixed Results 55

No. Partials: 5
 No. Completes: 5

RESTRICTED

DETAILED RESULTS FOR LOT 3652-12

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>	<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>
1-1	1	*1355	PP	1-2	1	1335	PP
	2	1325	PP		2	1325	PP
	3	1420	CP		3	1380	CP
	4	1385	CP		4	1335	PP
	5	1385	CP		5	**1350	CP
1-3	1	1295	PP	1-4	1	1200	PP
	2	1345	PP		2	1270	PP
	3	1400	CP		3	1250	PP
	4	1305	PP		4	1270	PP
	5	1325	PP		5	1315	PP
					6	1340	PP

*High Partial 1355 fps
**Low Complete 1350
Zone of Mixed Results 5

No. Partials: 1
No. Completes: 1

RESTRICTED

DETAILED RESULTS FOR LOT 3652-12

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>	<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>
2-1	1	1315	PP	2-2	1	1390	CP
	2	1325	PP		2	1345	PP
	3	1330	PP		3	1320	PP
	4	1390	CP		4	1385	CP
	5	1315	PP		5	**1360	PP
	6	1370	PP		6	1375	PP
	7	*1385	PP		7	1315	PP
	8	1345	PP				
2-3	1	1345	CP	2-4	1	1380	CP
	2	1340	PP		2	1405	CP
	3	1360	CP		3	1385	PP
	4	1360	PP		4	1320	PP
	5	1380	CP		5	1325	PP
	6	1400	CP		6	1370	PP
	7	1345	PP		7	1425	CP

*High Partial 1385 fps
**Low Complete 1360
Zone of Mixed Results 25

No. Partials: 6
No. Completes: 4

RESTRICTED

DETAILED RESULTS FOR LOT 3652-13

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>	<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>
1-1	1	*1375	PP	1-2	1	1390	CP
	2	1340	PP		2	1275	PP
	3	1330	PP		3	1290	PP
	4	1360	PP		4	1315	PP
	5	1400	CP		5	1285	PP
	6	1400	CP		6	1285	PP
	7	1410	CP		7	1435	CP
	8	1370	PP		8	1445	CP
1-3	1	1425	CP	1-4	1	1370	PP
	2	1260	PP		2	1430	CP
	3	1320	PP		3	1330	PP
	4	1310	PP		4	1265	PP
	5	**1385	CP		5	1355	PP
	6	1310	PP		6	1445	CP
					7	1350	PP
					8	1355	PP

*High Partial 1375 fps
 **Low Complete 1385
 Zone of Mixed Results -

No. Partial: 1
 No. Complete: 1

RESTRICTED

DETAILED RESULTS FOR LOT 3652-13

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>	<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>
2-1	1	1330	PP	2-2	1	1225	PP
	2	Lost	CP		2	1255	PP
	3	** 1345	CP		3	1300	PP
	4	1405	CP		4	1340	PP
	5	1355	PP		5	1355	PP
	6	1390	CP		6	1465	CP
	7	1310	PP		7	1420	CP
	8	1410	CP		8	1590	CP
2-3	1	1400	CP	2-4	1	1310	PP
	2	1345	PP		2	1400	CP
	3	1330	PP		3	1335	PP
	4	1370	CP		4	1305	PP
	5	1390	CP		5	1325	PP
	6	1315	PP		6	*1400	PP
	7	1360	PP		7	1340	PP
	8	Lost			8	1355	PP

*High Partial 1400 fps
 **Low Complete 1345
 Zone of Mixed Results 55

No. Partial: 6
 No. Complete: 7

RESTRICTED

DETAILED RESULTS FOR LOT 3652-14

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>	<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>
1-1	1	**1385	CP	1-2	1	1320	PP
	2	1335	PP		2	1335	PP
	3	1305	PP		3	1385	PP
	4	1295	PP		4	1420	CP
	5	1365	PP		5	*1390	PP
	6	1340	PP		6	1390	PP
	7	1320	PP				
1-3	1	1375	PP	1-4	1	1320	PP
	2	1445	CP		2	1315	PP
	3	1390	PP		3	Lost	
	4	1350	PP		4	Lost	
	5	1420	CP		5	Lost	
	6	1430	CP		6	1300	PP
					7	1355	PP
					8	1425	CP

*High Partial 1390 fps
 **Low Complete 1385
 Zone of Mixed Results 5

No. Partials: 4
 No. Completes: 1

RESTRICTED

DETAILED RESULTS FOR LOT 3652-15 (Replacements for Lab. No. 3111-94-2)

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>	<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>
2-1	1	**1315	CP	2-2	1	1235	PP
	2	1340	CP		2	1350	CP
	3	1255	PP		3	1320	CP
	4	1330	CP		4	1255	PP
	5	1210	PP		5	1265	PP
	6	1285	PP				
2-3	1	1260	PP	2-4	1	1255	PP
	2	1380	CP		2	1300	PP
	3	1215	PP		3	1310	PP
	4	1255	PP		4	1320	CP
	5	1245	PP		5	1325	CP
	6	1385	CP				
	7	1365	CP				
	8	1340	CP				

Lot 3111-94-2-1

1	1380	CP
2	1290	PP
3	*1330	PP

*High Partial 1330 fps
 **Low Complete 1315
 Zone of Mixed Results 15

No. Partials: 1
 No. Completes: 5

RESTRICTED

DETAILED RESULTS FOR LOT 3652-16

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>	<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>
1-1	1	1370	CP	1-2	1	1300	PP
	2	1195	PP		2	1255	PP
	3	1310	CP		3	1295	PP
	4	1290	CP		4	*1340	PP
	5	**1275	CP		5	1360	CP
	6	1300	PP		6	1375	CP
	7	1260	PP		7	1385	CP
	8	1310	CP				
1-3	1	1165	PP	1-4	1	1300	CP
	2	1270	PP		2	1340	CP
	3	1310	PP		3	1290	PP
	4	1265	PP		4	1310	CP
	5	1340	CP		5	1250	PP
	6	1300	PP		6	1235	PP
	7	1300	PP		7	1260	PP
	8	1285	PP				

*High Partial 1340 fps
 **Low Complete 1275
 Zone of Mixed Results 65

No. Partials: 9
 No. Completes: 9

RESTRICTED

DETAILED RESULTS FOR LOT 3652-16

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>	<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>
2-1	1	1190	CP	2-2	1	1305	CP
	2	1210	CP		2	1295	CP
	3	1065	PP		3	1220	CP
	4	1080	PP		4	**1140	CP
	5	1195	CP		5	1085	PP
	6	1140	PP		6	1115	PP
	7	1115	PP		7	1235	CP
	8	1120	PP				
2-3	1	1230	CP	2-4	1	1250	CP
	2	1230	CP		2	1270	CP
	3	1245	CP		3	1155	PP
	4	1230	CP		4	1220	CP
	5	1210	CP		5	1250	CP
	6	1235	CP		6	* 1180	PP
					7	1165	PP
					8	1230	CP

*High Partial: 1180 fps
**Low Complete: 1140
Zone of Mixed Results: 40

No. Partials: 4
No. Completes: 1

RESTRICTED

DETAILED RESULTS FOR LOT 3652-17

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>	<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>
1-1	1	*1080	PP	1-2	1	850	PP
	2	1180	CP		2	905	PP
	3	1095	CP		3	1040	PP
	4	1115	CP		4	1055	PP
	5	1135	CP		5	1070	CP
1-3	1	1080	CP	1-4	1	1055	PP
	2	1070	CP		2	1070	PP
	3	1105	CP		3	1030	PP
	4	1100	CP		4	1015	PP
	5	**1035	CP		5	1075	PP

*High Partial 1080 fps
 **Low Complete 1035
 Zone of Mixed Results 45

No. Partials: 6
 No. Completes: 5

RESTRICTED

DETAILED RESULTS FOR LOT 3652-17

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>	<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>
2-1	1	935	PP	2-2	1	1315	CP
	2	*1025	PP		2	1240	CP
	3	1035	CP		3	1185	CP
	4	1105	CP		4	1070	CP
	5	1035	CP		5	1035	CP
	6	1005	PP		6	1095	CP
					7	1070	CP
					8	880	PP
					9	935	PP
					10	1015	PP
2-3	1	985	PP	2-4	1	1070	CP
	2	975	PP		2	965	PP
	3	980	PP		3	1075	CP
	4	1165	CP		4	1075	CP
	5	**1025	CP		5	970	PP
	6	1055	CP		6	1000	PP

*High Partial 1025 fps
 **Low Complete 1025
 Zone of Mixed Results 0

No. Partials: 1
 No. Completes: 1

RESTRICTED

DETAILED RESULTS FOR LOT 3652-18

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>	<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>
1-1	1	930	CP	1-2	1	*950	PP
	2	960	CP		2	865	PP
	3	925	CP		3	1000	CP
	4	885	PP		4	970	CP
	5	905	CP		5	930	CP
	6	965	CP		6	900	CP
	7	**895	CP				
1-3	1	930	CP	1-4	1	775	PP
	2	895	PP		2	1155	CP
	3	945	CP		3	1165	CP
	4	920	CP		4	1055	CP
	5	970	CP		5	1035	CP
	6	950	CP		6	975	CP
	7	835	PP		7	905	PP
					8	895	PP

*High Partial 950 fps
 **Low Complete 895
 Zone of Mixed Results 55

No. Partials: 4
 No. Completes: 10

RESTRICTED

DETAILED RESULTS FOR LOT 3652-20

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>	<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>
2-1	1	1240	CP	2-2	1	1010	PP
	2	1200	CP		2	1050	CP
	3	1140	CP		3	*1050	PP
	4	1110	CP		4	1075	CP
	5	1015	PP		5	1040	CP
	6	1070	CP		6	1045	CP
	7	1160	CP				
	8	1100	CP				
2-3	1	990	PP	2-4	1	1330	CP
	2	925	PP		2	1080	CP
	3	990	PP		3	1060	CP
	4	1040	PP		4	**935	CP
	5	1060	CP		5	935	PP
	6	1065	CP		6	990	CP
					7	980	PP
					8	895	PP

*High Partial 1050 fps
**Low Complete 935
Zone of Mixed Results 115

No. Partials: 8
No. Completes: 5

RESTRICTED

DETAILED RESULTS FOR LOT 3652-21

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>	<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>	
1-1	1	1285	PP	1-2	1	**1350	CP	
	2	1330	PP		2	1265	PP	
	3	1385	CP		3	1320	PP	
	4	1405	CP		4	1260	PP	
	5	1345	PP		5	1290	PP	
	6	1415	CP		6	1290	PP	
	7	1405	CP		7	1330	PP	
	8	1345	PP					
1-3	1	920	PP	1-4	1	1255	PP	
	2	1065	PP		2	1180	PP	
	3	Unfair Rd.			3	1265	PP	
	4	1180	PP		4	1360	CP	
	5	1180	PP		5	1270	PP	
	6	1270	PP		6	1285	PP	
	7	1335	PP		7	1305	PP	
	8	1440	CP		8	1255	PP	
	9	*1425	PP					
	10	1405	PP					
	11	1395	PP					

*High Partial 1425 fps
 **Low Complete 1350
 Zone of Mixed Results 75

No. Partial: 3
 No. Complete: 6

RESTRICTED

DETAILED RESULTS FOR LOT 3652-21

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Results</u>	<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>
2-1	1	1370	CP	2-2	1	685	CP
	2	1285	CP		2	590	PP
	3	1155	CP		3	500	PP
	4	940	CP		4	485	PP
	5	860	CP		5	620	PP
	6	570	PP		6	545	PP
	7	690	PP		7	615	PP
	8	875	CP				
	9	775	CP				
	10	*710	PP				
2-3	1	** 665	CP	2-4	1	875	CP
	2	700	CP		2	765	CP
	3	605	PP		3	800	CP
	4	570	PP		4	765	CP
	5	525	PP		5	785	CP
	6	735	CP		6	680	CP
	7	685	PP		7	695	CP
			8		500	PP	
			9		625	PP	
			10		605	PP	

*High Partial 710 fps
 **Low Complete 665
 Zone of Mixed Results 45

No. Partials: 3
 No. Completes: 5

RESTRICTED

DETAILED RESULTS FOR LOT 3652-22

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>	<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>
1-1	1	1125	CP	1-2	1	880	CP
	2	1155	CP		2	775	CP
	3	1020	CP		3	625	CP
	4	930	CP		4	540	PP
	5	835	CP		5	635	CP
	6	785	CP		6	665	CP
	7	665	CP		7	700	CP
	8	790	CP		8	545	PP
	9	625	PP		9	720	CP
	10	490	PP		10	730	CP
1-3	1	670	CP	1-4	1	745	CP
	2	715	CP		2	715	CP
	3	490	PP		3	725	CP
	4	625	CP		4	605	PP
	5	495	PP		5	630	CP
	6	525	PP		6	**605	CP
	7	820	CP		7	675	CP
			8		565	PP	
			9		595	PP	
			10		*640	PP	

*High Partial 640 fps
 **Low Complete 605
 Zone of Mixed Results 35

No. Partials: 3
 No. Completes: 3

RESTRICTED

DETAILED RESULTS FOR LOT 3652-23

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>	<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>
1-1	1	1320	CP	1-2	1	**1245	CP
	2	1260	PP		2	1310	CP
	3	1245	PP		3	1255	CP
	4	1240	PP		4	1335	CP
1-3	1	1225	PP	1-4	1	1175	PP
	2	1165	PP		2	1245	PP
	3	*1265	PP		3	1225	PP
	4	1310	CP		4	1320	CP

*High Partial 1265 fps
 **Low Complete 1245
 Zone of Mixed Results 20

No. Partial: 4
 No. Complete: 2

RESTRICTED

DETAILED RESULTS FOR LOT 3652-23

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>	<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>
2-1	1	1200	PP	2-2	1	**1215	CP
	2	1135	PP		2	1135	PP
	3	1210	PP		3	1240	CP
	4	1285	CP		4	1155	PP
2-3	1	1240	CP	2-4	1	995	PP
	2	1150	PP		2	1230	CP
	3	1230	CP		3	1230	CP
	4	*1225	PP		4	1095	PP

*High Partial 1225 fps
**Low Complete 1215
Zone of Mixed Results 10

No. Partials: 1
No. Completes: 1

RESTRICTED

DETAILED RESULTS FOR LOT 3652-24

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>	<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>
1-1	1	1315	PP	1-2	1	850	PP
	2	1315	PP		2	1075	PP
	3	1280	PP		3	1225	PP
	4	1360	CP		4	1285	PP
					5	*1360	PP
					6	1475	CP
					7	1400	CP
1-3	1	1380	CP	1-4	1	1250	PP
	2	1350	CP		2	1315	CP
	3	1350	CP		3	1315	PP
	4	1325	CP		4	1295	PP
	5	1135	PP		5	1355	PP
	6	**1275	CP		6	1360	CP

*High Partial 1360 fps
 **Low Complete 1275
 Zone of Mixed Results 85

No. Partial: 5
 No. Complete: 7

RESTRICTED

DETAILED RESULTS FOR LOT 3652-27 (Large Panels)

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>	<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>
A	1	1385	CP	B	1	1435	CP
	2	1335	CP		2	1320	PP
	3	1385	CP		3	1320	PP
	4	1360	PP		4	1310	PP
	5	1380	CP		5	1425	CP
	6	1305	PP		6	1390	CP
	7	1375	CP		7	1345	CP
	8	1355	PP		8	1340	PP
	9	1395	CP		9	1385	CP
	10	1340	PP		10	1360	CP
	11	1390	CP		11	1350	PP
	12	1345	PP		12	1305	PP
	13	1370	CP		13	1315	PP
	14	1415	CP		14	1380	CP
	15	*1370	PP		15	1415	CP
	16	**1340	CP		16	1405	CP
	17	1365	CP		17	1410	CP
	18	1365	CP		18	1320	PP
	19	1360	PP		19	1345	CP
	20	1360	CP		20	1325	PP
C	1	1400	CP				
	2	1335	PP				
	3	1390	CP				
	4	1355	PP	*High Partial	1370 fps		
	5	1380	CP	**Low Complete	1340		
	6	1395	CP	Zone of Mixed Results	30		
	7	1340	PP				
	8	1335	PP				
	9	1330	PP				
	10	1275	PP				
	11	1350	PP				
	12	1355	PP				
	13	1405	CP				
	14	1410	CP				
	15	1375	CP				
	16	1340	PP				
	17	1420	CP				
	18	1395	CP				
	19	1325	PP				
	20	1425	CP				

No. Partials: 12
No. Completes: 7

RESTRICTED

DETAILED RESULTS FOR LOT 3652-27 (Small Panels)

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>	<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>
A	1	1310	PP	B	1	1395	CP
	2	*1350	PP		2	1340	PP
	(1)3	1380	Note:		(2)3	1415	CP
	4	1405	CP		4	1400	CP

(1) On Round 3 the last ply was 1" short: The panel separated here and the last ply was not penetrated; it folded back and projectile was thrown aside missing the witness plate.

(2) On Round 3, last ply was too short (did not cover the plate; it was pulled away) disregard.

C	1	1320	PP	D	1	1340	PP
	2	1415	CP		2	1425	CP
	3	1435	CP		3	**1350	CP
	4	1335	PP		4	1295	PP

*High Partial 1350 fps
 **Low Complete 1350
 Zone of Mixed Results 0

No. Partial: 1
 No. Complete: 1

RESTRICTED

DETAILED RESULTS FOR LOT 3652-28 (Large Panels)

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

Panel A				Panel B				Panel C			
<u>Panel</u>	<u>Rd.</u>	<u>Velocity</u>	<u>Result</u>	<u>Panel</u>	<u>Rd.</u>	<u>Velocity</u>	<u>Result</u>	<u>Panel</u>	<u>Rd.</u>	<u>Velocity</u>	<u>Result</u>
<u>No.</u>	<u>No.</u>			<u>No.</u>	<u>No.</u>			<u>No.</u>	<u>No.</u>		
A	1	1270	PP	B	1	1310	CP	C	1	1425	CP
	2	1315	PP		2	1365	CP		2	1400	CP
	3	1435	CP		3	1295	PP		3	1325	PP
	4	1360	CP		4	1335	PP		4	1370	CP
	5	1370	CP		5	1355	CP		5	1415	CP
	6	1360	CP		6	1290	PP		6	1320	CP
	7	1305	PP		7	1325	PP		7	1325	PP
	8	*1370	PP		8	1330	PP		8	Lost	
	9	1295	PP		9	1360	CP		9	1275	PP
	10	1335	CP		10	1275	PP		10	Lost	
	11	1335	PP		11	1385	CP		11	1265	PP
	12	1290	PP		12	1360	CP		12	1340	PP
	13	1295	PP		13	1325	PP		13	1405	CP
	14	1305	PP		14	1300	PP		14	1350	CP
	15	1325	PP		15	1395	CP		15	1345	PP
	16	1350	CP		16	1300	PP		16	1350	CP
					17	**1290	CP		17	1345	CP
					18	1340	CP		18	1340	CP
					19	1265	PP				
					20	1340	CP				

*High Partial 1370 fps
 **Low Complete 1290
 Zone of Mixed Results 80

No. Partials: 21
 No. Completes: 19

RESTRICTED

DETAILED RESULTS FOR LOT 3652-28 (Small Panels)

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>	<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>
1-A	1	1390	CP	1-B	1	**1315	CP
	2	1305	PP		2	1235	PP
	3	1325	PP		3	1245	PP
	4	1380	CP		4	1330	PP
1-C	1	1260	PP	1-D	1	1360	CP
	2	1315	PP		2	1350	CP
	3	1265	PP		3	1350	CP
	4	1405	CP		4	*1335	PP

*High Partial 1535 fps
**Low Complete 1315
Zone of Mixed Results 20

No. Partials: 4
No. Completes: 1

RESTRICTED

DETAILED RESULTS FOR LOT 3652-29-1 (Large Panels)

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

Panel Rd.				Panel Rd.				Panel Rd.			
No.	No.	Velocity	Result	No.	No.	Velocity	Result	No.	No.	Velocity	Result
1-A	1	1395	CP	1-B	1	1335	PP	1-C	1	1335	PP
	2	1280	PP		2	1355	CP		2	1410	CP
	3	1305	PP		3	1355	CP		3	1415	CP
	4	1380	CP		4	1330	PP		4	1380	CP
	5	1345	PP		5	1340	PP		5	1345	PP
	6	1405	CP		6	1360	CP		6	1380	CP
	7	1315	PP		7	1275	PP		7	1370	CP
	8	1335	PP		8	**1315	CP		8	1405	CP
	9	1385	CP		9	1340	CP		9	1325	PP
	10	1410	CP		10	1340	CP		10	1345	PP
	11	1255	PP		11	1345	CP		11	1350	CP
	12	1335	PP		12	1365	CP		12	1305	PP
	13	1300	PP		13	1375	CP		13	1365	CP
	14	1410	CP		14	1325	PP		14	1385	CP
	15	1400	CP		15	1290	PP		15	1295	PP
	16	1370	CP		16	1325	PP		16	1315	PP
	17	1350	PP		17	1315	PP		17	1325	PP
	18	1350	PP		18	1385	CP		18	1345	PP
	19	1330	PP		19	*1355	PP		19	1295	PP
	20	1385	CP		20	1375	CP		20	1385	CP

*High Partial 1355 fps
 **Low Complete 1315
 Zone of Mixed Results 40

No. Partials: 19
 No. Completes: 7

RESTRICTED

DETAILED RESULTS FOR LOT 3652-29 -1 (Small Panels)

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>	<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>
1-A	1	1445	CP	1-B	1	1350	CP
	2	1385	CP		2	**1345	CP
	3	1290	PP		3	1370	CP
	4	1265	PP		4	1305	PP
1-C	1	1285	PP	1-D	1	1445	CP
	2	1275	PP		2	1365	CP
	3	1365	CP		3	1390	CP
	4	*1305	PP		4	1255	PP
					5	1270	PP

*High Partial 1305 fps
 **Low Complete 1345
 Zone of Mixed Results -

No. Partials: 2
 No. Completes: 1

RESTRICTED

DETAILED RESULTS FOR LOT 3652-29-2 (Large Panels)

Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>	<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>
2-A	1	1385	CP	2-B	1	*1405	PP
	2	1350	PP		2	1425	CP
	3	1380	CP		3	1405	CP
	4	1300	PP		4	1390	CP
	5	1395	CP		5	1385	PP
	6	1315	PP		6	1430	CP
	7	1355	CP		7	1435	CP
	8	1340	PP		8	1425	CP
	9	1265	PP		9	1445	CP
	10	1415	CP		10	1360	PP
	11	1405	CP		11	1420	CP
	12	1335	PP		12	1345	PP
	13	1395	CP		13	1360	PP
	14	1350	CP		14	1370	CP
	15	1285	PP		15	1380	CP
	16	1340	CP		16	1380	CP
	17	**1325	CP		17	1370	PP
	18	1285	PP		18	1395	CP
	19	1270	PP		19	1425	CP
	20	1310	PP		20	1365	PP

*High Partial 1405 fps
**Low Complete 1325
Zone of Mixed Results 80

No. Partials: 10
No. Completes: 15

RESTRICTED

DETAILED RESULTS FOR LOT 3652-29-2 (Small Panels)

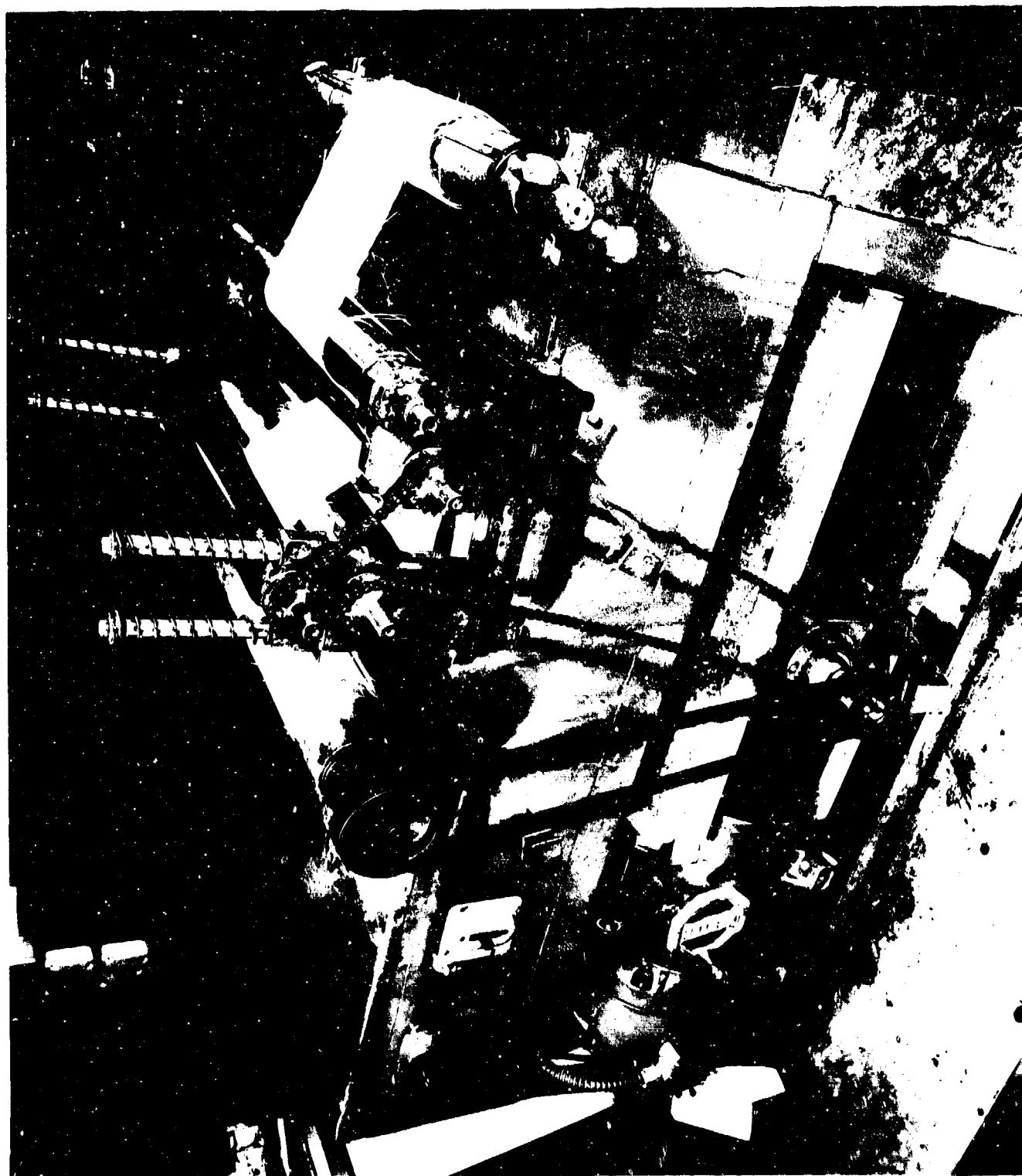
Test of Laminated Armor with Cal. .22 T37
Fragment-Simulating Projectile

Obliquity: Zero

<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>	<u>Panel No.</u>	<u>Rd. No.</u>	<u>Velocity</u>	<u>Result</u>
2-A	1	**1345	CP	2-B	1	1370	CP
	2	1340	PP		2	1335	PP
	3	1365	CP		3	1395	CP
	4	1415	CP		4	1385	CP
2-C	1	1350	PP	2-D	1	1385	CP
	2	1330	PP		2	1320	PP
	3	*1365	PP		3	1335	PP
	4	1380	CP		4	1315	PP

*High Partial 1365 fps
 **Low Complete 1345
 Zone of Mixed Results 20

No. Partials: 2
 No. Completes: 2



58250

FIGURE 4. FABRIC COATING MACHINE-HIGH RESIN PICKUP



58249

FIGURE 5. FABRIC COATING MACHINE--"KISS-DIP METHOD" FOR LOW RESIN PICKUP