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MEMORANDUM REPORT

NO. WAL 710/657

Resistance of Light-Gauge Aluminum Alloy (75 ST) to Perforation by  
Fragment-Simulating Projectiles

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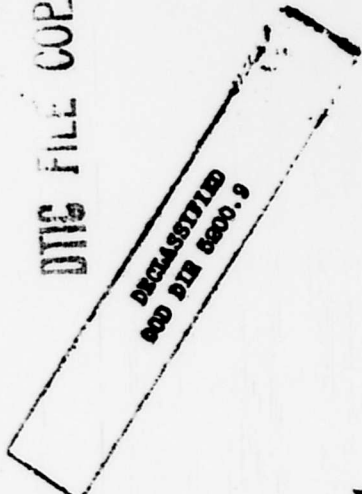
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WATERTOWN ARSENAL LABORATORY

MEMORANDUM REPORT NO. WAL 710/657

Fourteenth Partial Report on Problem B-8.2

3 July 1944

Resistance of Light-Gauge Aluminum Alloy (75 ST) to Perforation by  
Fragment-Simulating Projectiles

1. As a result of a request from the Office, Chief of Ordnance<sup>1</sup>, there is being conducted at this arsenal a program of development of improved body armor components. As part of this program penetration tests have recently been conducted on several light-gauge samples of the aluminum alloy, 75 ST, as supplied by the Aluminum Company of America.

2. Under impact of the cal. .22 fragment-simulating projectile, G-2<sup>2</sup>, the resistance of these samples was only about one-half that of Hadfield manganese steel of equivalent weight. Under impact of cal. .45 (steel-jacketed) ball projectiles their resistance was also inferior to that of Hadfield steel although it was inferior to that of several ferritic steels tested here.

3. Samples from consecutive lots 38031 to 38034 of 75 ST duralumin were received from the Aluminum Company of America. From these a random selection was made of two plates from each lot. Each of these was fired with cal. .45 (steel-jacketed) ball projectiles and one of each pair was tested with the 17-grain cal. .22 fragment-simulator G-2. During these tests these samples were clamped rigidly to wooden ballistic frames which allowed an area 8"x8" to remain unsupported from the rear. Fire was directed into the face of these areas. The results are shown in Table I.

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1. O.O. 422.3/71 - Wtn 470.5/7443(c), dated 28 September 1943.
  2. Watertown Arsenal Laboratory Memorandum Report No. WAL 762/253(c), Development of a Projectile, to Be Used in Testing Body Armor, to Simulate Fragments of a 20 mm. H.E. Projectile. 7 January 1944.

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Table I

Summary of Penetration Tests Conducted at Watertown Arsenal on

Light-Gauge Samples of Aluminum Alloy (75 ST)

<u>Sample</u>	<u>Gauge</u>	<u>Equivalent Steel Gauge</u>	<u>G-2<sup>1</sup></u>	<u>Cal. .45<sup>2</sup></u>
Lot 38031-1	.127"	.045"	820	818
38031-2	.126"	.045"	-	776
Lot 38032-1	.123"	.044"	786	765
38032-2	.124"	.044"	-	780
Lot 38033-1	.122"	.043"	825	684
38033-2	.123"	.044"	-	681
Lot 38034-1	.121"	.043"	837	839
38034-2	.123"	.044"	-	788
<u>For Comparison:</u>				
Hadfield Manganese Steel	-	.043"	1645	930

<sup>1</sup>Cal. .22 fragment-simulating projectile - 17 grains.

<sup>2</sup>Cal. .45 (steel-jacketed) ball projectile - 230 grains.