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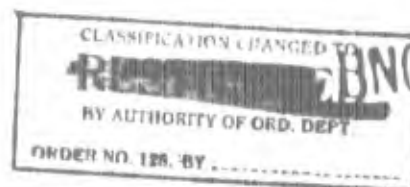
ARMOR PLATE
COLD-ROLLED, 18-8, STEEL PLATES.

D. J. Martin

1933

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Report No. 710/12
Watertown Arsenal.



UNCLASSIFIED

December 9, 1935.

Armor Plate

Cold-Rolled, 18-8, Steel Plates.

Conclusions

The tests conducted show that this material is not equal in ballistic efficiency to standard plate of the same thickness.

Introduction

A confidential report made by Dr. F. T. Llewellyn, U. S. Steel Corporation indicated that very thin sheets of cold-rolled, 18-8 (18 Cr - 8 Ni) steel were markedly superior to ordinary steels in their resistance to ordinary bullet penetration. Through the courtesy of Dr. Llewellyn, Mr. R. B. Cooney, and the Carnegie Steel Company pieces of this material were obtained for test of ballistic efficiency against armor piercing projectiles.

Procedure

There were received for test three sample pieces of cold-rolled 18-8 steel, 12" x 12" x 0.191". The Carnegie Steel Co., reported that these pieces were cold-rolled to the limit of their present equipment and that they represented about the maximum thickness they were then able to cold-roll.

One of the plates was tested for ballistic limit at the Aberdeen Proving Ground.

From another plate specimens were taken for tensile test and for Charpy tensile impact test.

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Results

The results of the ballistic test are set forth in the "Seventy-Fourth Partial Report of Test of This Armor Plate", Aberdeen Proving Ground, October 13, 1933. The ballistic limit, as compared with that obtained with standard armor plate was as follows:

<u>Plate</u>	<u>Thickness</u>	<u>Ballistic Limit</u> f.s./striking velocity gal. .30,A.P., M1922	<u>Brinel</u>
13-S(60443)	.191"	1227	375
D611(st'd)	3/16"	1543	
198P(st'd)	3/16"	1568	

The tensile test of the material gave the following results:

<u>*Specimen</u>	<u>T.S.</u> #/sq.in.	<u>P.L.</u> #/sq.in.	<u>Elong.(2")</u> %	<u>Red. of Area</u> %
60443-1	202,000	64,000	7.0	21.8
-2	180,000	53,000	8.5	42.5

* - See W.A., Report 316/16, 11/8/33.

The Charpy impact test gave the following results:

<u>Specimen</u>	<u>Ft. Lbs.</u>	<u>Ft. Lbs./in³</u>
A	229.1	2386
B	202.3	2107

Discussion

As armor plate the material is inferior to that which is now in use. The reason for the low values obtained probably lies in the fact that it was not possible to obtain the required hardness even with extreme amounts of cold work. Avail-

able data indicates that this material must have been reduced in section about 70% in order to obtain the tensile strength indicated in these results.

It is doubtful that such additional cold-work effect can be produced, except on very thin sheets. Unless it can, it would seem that this material is not suitable for use as armor plate in the thicknesses required by the Ordnance Department.

Respectfully submitted:

D. J. Martin,
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