

**UNCLASSIFIED**

~~RESTRICTED~~



*124 # 2a*

*WAL  
695.101.*

**AD-A954 233**

**WATERTOWN ARSENAL  
LABORATORY**

**MEMORANDUM REPORT**

NO. WAL 710/589

Preliminary Metallurgical Examination of Thirty-two Samples  
of Rolled Homogeneous Armor to be Fired During  
the 1933-44 Cold Test Program

17

BY

J. F. SULLIVAN

Jr. Engineer

**DTIC FILE COPY**

**DTIC  
ELECTE  
APR 18 1985**

**UNCLASSIFIED**

This document has been approved for public release and sale; its distribution is unlimited.

DATE 12 February 1944

**WATERTOWN ARSENAL  
WATERTOWN, MASS.**

## **DISCLAIMER NOTICE**

**THIS DOCUMENT IS BEST QUALITY PRACTICABLE. THE COPY FURNISHED TO DTIC CONTAINED A SIGNIFICANT NUMBER OF PAGES WHICH DO NOT REPRODUCE LEGIBLY.**



RESTRICTED

6. Section D was prepared by Blanchard grinding and belt grinding for a Brinell hardness traverse according to Figure 2. The individual readings of the traverse and their average is set out in Table 1. One surface of each sample was prepared on a grinding wheel for Brinell impression and an average of these readings is included in Table I.

7. By examination of the fractures the orientation with respect to the direction of major rolling of the samples cut at Aberdeen has been determined. The results appear in the column entitled "Rolling Direction". "L" indicates that the 36" edges of the samples were parallel to this direction, whereas "T" indicates that this edge was perpendicular.

8. The results of metallurgical examinations of further groups of samples will be reported as they become available.

*J. F. Sullivan*  
J. F. SULLIVAN  
Jr. Engineer

APPROVED:

*N. A. Matthews*  
N. A. MATTHEWS  
Major, Ordnance Dept.



Accession For	
NTIS GRA&I	<input checked="" type="checkbox"/>
DTIC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	
By _____	
Distribution/	
Availability Codes	
Dist	Avail and/or Special
A-1	23

UNANNOUNCED *EIR*

TABLE I

Summary of Metallurgical Examinations Conducted Prior to Ballistic Testing  
of 12 Samples of Rolled Homogeneous Armor to be Fired  
During the 1947-48 Cold Test Program

Sample No.	Nominal Gauge	Rolling Direction <sup>1</sup>	Steel Quality <sup>2</sup>		Fibre Fracture <sup>3</sup>		Brinell Hardness Number <sup>4</sup>					Surface Ave.	
			A	C	B	C	Cross Section						
							1	2	3	4	5		Ave.
18103	3/8	L	B	B	Fc	Fc	363	363	363	-	-	363	375
28203	3/8	L	B	B	Fc	Fc	363	363	375	-	-	369	363
38303	3/8	L	B	B	Fc	Fc	363	363	363	-	-	363	375
48403	3/8	L	B	B	Fc	Fc	363	363	363	-	-	363	371
58503	3/8	L	B	B	Fc	Fc	363	363	363	-	-	363	368
68603	3/8	L	B	B	Fc	Fc	363	363	363	-	-	363	367
78703	3/8	L	B	B	Fc	Fc	363	363	375	-	-	369	371
18705	1/2	L	B	C	Fc	Fc	341	341	341	341	-	341	341
28805	1/2	L	C	D	F tr.	FC	352	341	352	352	-	349	345
38905	1/2	L	B	C	Fc	F tr	363	363	363	363	-	363	363
49005	1/2	L	C	B	Fc	Fc	352	352	352	352	-	352	352
59105	1/2	L	C	D	F tr.	F	363	352	352	352	-	355	345
69205	1/2	L	B	B	Fc	Fc	363	352	363	363	-	360	359
79305	1/2	L	B	C	Fc	Fc	352	363	352	352	-	355	348
10581005	1/2	L	B	B	F	F	352	352	352	352	-	352	356
10581015	1/2	L	B	B	F	F	363	363	363	363	-	363	356
10581025	1/2	L	B	B	F	F	363	363	363	363	-	363	359
10581035	1/2	L	B	B	F	F	363	363	363	363	-	363	363
10581045	1/2	L	B	C	F	F	363	375	363	363	-	366	363
10581055	1/2	L	B	B	F	F	352	363	363	363	-	360	359
1898110515	1-1/2	T	B	B	F	F	293	302	285	302	293	295	287
1898110715	1-1/2	T	B	D	F	F	293	302	302	302	302	300	296
1898110915	1-1/2	L	B	B	F	F	302	293	293	302	293	295	287
1898111115	1-1/2	T	B	B	F	F	293	302	302	302	293	298	299
1898111315	1-1/2	T	B	B	F	F	293	293	302	302	293	297	293
1898111515	1-1/2	L	B	B	F	F	293	302	302	302	293	298	291
1898111715	1-1/2	L	B	B	F	F	262	269	277	269	269	269	264
1898111915	1-1/2	L	C	B	F	F	269	269	272	269	269	268	267
1898112115	1-1/2	L	C	B	F	F	269	262	269	269	269	267	265
1898112315	1-1/2	L	D	B	F	F	269	269	269	269	269	269	267
1898112515	1-1/2	L	B	B	F	F	262	263	269	269	269	267	265

<sup>1</sup>"L" indicates that length of sample cut by Aberdeen was parallel to direction of major rolling.

<sup>2</sup>"T" indicates that length of sample cut was perpendicular to direction of major rolling.

<sup>3</sup>"A", "B", and "C" were three samples cut from lengths supplied by Aberdeen as shown in Figure 1.

<sup>4</sup>Numbers indicate position of Brinell impression on cross section (See Figure 2). Surface values are average of three readings.

## Explanation of Ratings:

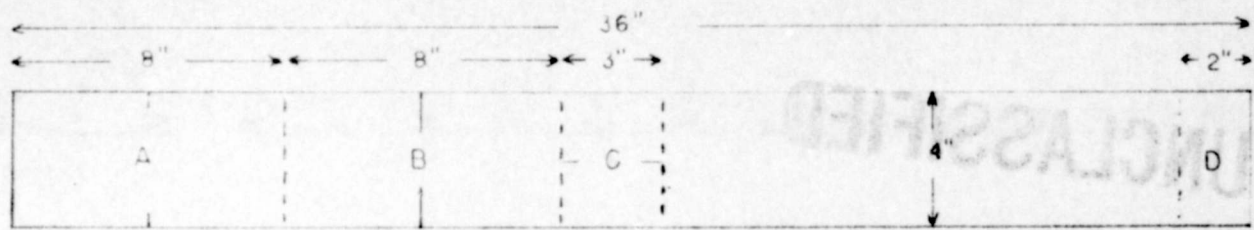
Steel Quality: A to E according to Specification AMS-486.

Fibre Fracture: F - Fibrous

Fc - Fibrous, slightly crystalline.

FC - Fibrous and crystalline.

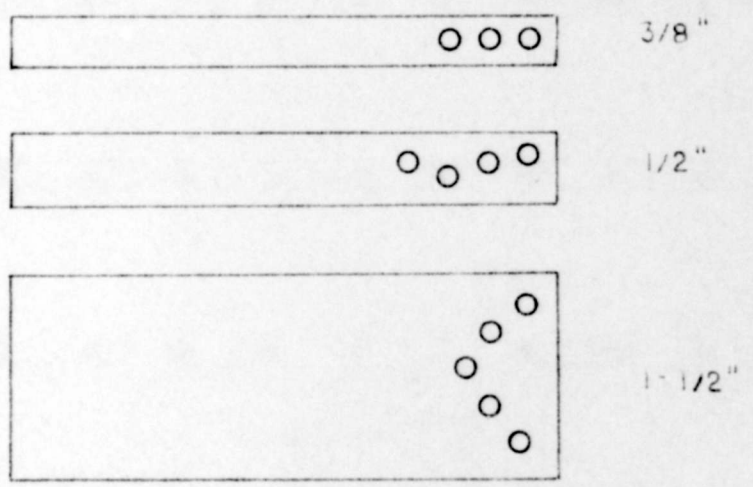
F tr. - Fibrous, very slight traces of crystallinity.



--- SAW-CUT  
 — NICKED IN BY SAW OR ABRASIVE WHEEL

METHOD OF SECTIONING SAMPLES

FIGURE 1



↑ THIS EDGE SAW-CUT AT APG

LOCATION OF BRINELL IMPRESSIONS

FIGURE 2