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WATERTOWN ARSENAL
WATERTOWN, MASS.



Exp # 30

WAL 710/698

WATERTOWN ARSENAL
LABORATORY

MEMORANDUM REPORT

NO. WAL 710/698

Preliminary Metallurgical Examination of Twenty-Four (24) Samples
of 1 1/2" Cast Homogeneous Armor to be Fired During the 1943-44
Cold Test Program

710/698

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DATE 27 September 1944

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WATERTOWN ARSENAL LABORATORY

MEMORANDUM REPORT NO. WAL 710/698

Sixth Partial Report on Problem B-12.1

A-1

27 September 1944

Preliminary Metallurgical Examination of Twenty-Four (24) Samples
of 1½" Cast Homogeneous Armor to be Fired During the 1943-44
Cold Test Program



1. In accordance with a directive from the Office, Chief of Ordnance¹, twenty-four (24) samples of cast homogeneous armor were received from the Ordnance Research Center for metallurgical examination preliminary to their being fired as part of the 1943-44 Cold Test Program.

2. These samples had been cut at Aberdeen from ballistic test samples in sections approximately 36" x 4". A section 12" x 4" in the center of each sample was selected at this arsenal as most appropriate for metallurgical examination. This section was severed from the balance of the sample by flame-cutting one end and saw-cutting the opposite end.

3. From the saw-cut end a section 4" x 4" was sawed off to be used for hardness survey. This section was Blanchard ground parallel to the Aberdeen cut to a depth sufficient to avoid any flame-hardening effects. A hardness traverse was read diagonally across this surface and these hardness readings were also made on the original plate surface which had also been Blanchard ground. These readings appear in Table I.

4. The remaining section, 8" x 4", was nicked-in by flame 1¼" on each side and broken uniformly fast by a steam forge hammer. The fractured surfaces were read and rated according to fibre fracture test standards. The results appear in Table II.

1. O.O. 470.5/5139(r) - Wtn 470.5/7578(r), dated 28 October 1943.

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5. Examination of additional ballistic test samples for this program will be reported as soon as possible after receipt from Aberdeen.

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TABLE I

Hardness Determinations on Twenty-Four (24) Cast Armor Samples
Received From Ordnance Research Center for
Preliminary Metallurgical Examinations

Number	Brinell Hardness Numbers (3000 kg load)			
	Cross Section		Surface	
	Range	Average	Range	Average
4C312C15	255-255	255	248-255	252
5C313C15	229-235	232	235-241	238
7C314C15	235-241	238	241-241	241
8C315C15	255-262	258	255-255	255
9C316C15	241-255	248	241-248	244
10C317C15	255-269	262	255-262	258
11C318C15	277-285	281	277-277	277
12C319C15	269-277	273	269-277	273
13C320C15	269-269	269	269-269	269
14C321C15	262-269	265	262-269	265
15C322C15	285-285	285	277-285	281
16C323C15	269-277	273	277-285	281
B6C336C15	241-241	241	229-241	235
B9C337A15	235-248	242	235-255	245
B10C338A15	241-248	244	241-241	241
B12C339A15	229-241	235	235-241	238
B13C340A15	241-241	241	229-235	232
B14C341A15	241-248	244	241-248	244
B3C342A15	262-269	265	248-262	255
B4C343A15	262-269	265	255-269	262
B5C344A15	255-262	258	241-255	248
B8C345A15	262-269	265	248-255	252
B11C346A15	262-269	265	248-262	255
B16C347A15	255-269	262	255-262	258

TABLE IIFracture Test Results

<u>Number</u>	<u>Rating</u>
B3C342A15	Fibrous with shrinkage
B4C343A15	" " "
B5C344A15	" " "
B6C336A15	" " "
B8C345A15	Fc 1/5
B9C337A15	Fc trace
B10C338A15	Fibrous with shrinkage
B11C346A15	" " "
B12C339A15	" " "
B13C340A15	" " "
B14C341A15	" " "
B16C347A15	" " "
4C312C15	Fc 1/3
5C313C15	Fc trace
7C314C15	" "
8C315C15	Fc 1/10
9C316C15	Fc 1/4
10C317C15	Fc 1/4
11C318C15	Fc 1/2
12C319C15	Fc 1/2
13C320C15	Fc 1/4
15C321C15	Fc 1/3
16C322C15	Fc 1/2 dendritic
17C323C15	Fc 5/8

NOTE: Fc denotes fibrous matrix with spots of crystallinity. The word trace or fraction following this symbol indicates the estimated surface area which is crystalline.