1. Scope

1.1 This specification covers all exothermic mate-
rials which are molded to shape and rammed in place
against the pattern to extend the feeding range in
steel castings.

2. Acknowledgment

2.1 When specified, a vendor shall indicate this
specification number in all quotations and when
acknowledging purchase orders.

3. Identification

3.1 Containers for exothermic moldable materials
shall be plainly marked “Exothermic Moldable Mate-
rial” or by vendor’s trade name.

3.2 The name of the manufacturer and batch num-
ber shall be legibly marked on each container.

4. Quality

4.1 The material shall be of uniform color and free
from foreign materials.

5. Sample Preparation

5.1 The number of containers to be sampled by the
consumer for routine testing shall depend on the
number of containers in a shipment.

5.1.1 When the shipment consists of 10 containers
or less, the number of containers sampled at random
shall be not less than 2 and preferably 4.

5.1.2 When the shipment consists of more than 10
containers, the number of containers to be sampled
at random shall be not less than 4 containers and
preferably 30 percent of the total number in the ship-
ment or a maximum of 10 containers (see Note 1).

5.2 The composite sample shall not weigh less than
40 pounds or greater than 200 pounds and shall be
obtained by taking approximately equal weights from
each random selected container in the sample lot.

5.2.1 The composite sample shall be reduced by
quartering until a minimum 20-pound sample is
obtained.

5.2.2 An alternate method for reducing the gross
sample is by the use of a sample splitter, such as
described in the AFS “Foundry Sand Handbook,” Sev-
enth Edition, Section III.

5.3 Identification of the sample shall indicate mate-
rial, trade name, manufacturer, batch number, source
of shipment and date shipment was received.

5.4 In case of a dispute between manufacturer and
purchaser, the number of units to be sampled shall
be according to ASTM C322, Procedure C.

Note 1.-Fractional units shall be converted to the nearest whole
number, e.g., 4.4 containers=4 containers, 4.6 containers= 5
containers.

6. Technical Requirements

6.1 Contaminators in the Exothermic Pad Material.

6.1.1 Boron . . . . . . . less than 0.005 percent

6.1.2 Lead . . . . . . . less than 0.050 percent

6.1.3 Magnesium . . . . less than 0.100 percent

6.1.4 Tin . . . . . . . less than 0.120 percent

6.1.5 Zinc . . . . . . . less than 0.150 percent

6.2 Exothermic Pad Requirements for Casting Sound
Plate.

6.2.1 By the use of a tapered exothermic pad of pre-
scribed dimension, a 1x5x15-inch carbon steel plate,
est, cast horizontally, shall conform to Class 1 of ASTM
E-71-52 in respect to internal soundness.

6.3 Bend Test.

6.3.1 The degree of bend in a normalized carbon
steel plate (0.25 percent +/− 0.03 percent carbon) shall
be equal to or greater than 70 degrees. The bend
portion of the bar shall not contain more than 3
cracks, none of which shall be over 1/4 inch long in
any direction. Figure 1 illustrates how measurement
of degrees (‘bend’) is taken (see Note 2).

Note 2.-If the fractured surface of the bend bar indicates a
visual flaw in the steel, such as sand and/or slag inclusions,
porosity and/or gas holes, etc., a retest shall be permitted.
6.4 Contaminators in the Steel Casting.

6.4.1 The maximum pickup (see Note 3) in aluminum, boron, and silicon 0.025 inch below the test casting-exothermic pad interface shall conform to the following limitations:

6.4.1.1 Aluminum ............ 0.10 percent
6.4.1.2 Silicon .............. 0.80 percent
6.4.1.3 Boron ................. none

**Note 3:** Pick up refers to the percentage of contaminators in excess of the base composition of the test plate.

7. Acceptance Tests

7.1 Contaminators in Exothermic Pad Materials.

7.1.1 The manufacturer, upon request, shall furnish within ten days to the purchaser a certified representative analysis of the contaminators as indicated in 6.1.

7.2 Test Procedure for Determining Feeding Ability of Exothermic Pad Material.

7.2.1 Cast horizontally a steel plate with pad as shown in Figure 2.

7.2.1.1 Foundry practice for test shall be according to drawing shown in Figure 2.

7.2.1.2 Test plate shall be cast in 0.22-0.28 percent carbon steel,

7.2.1.3 Pouring temperature of the steel shall be not less than 2850 degrees F.

7.2.2 Pressure blast plate, remove gate and riser, and then normalize 1600 degrees F.

7.2.3 Place film adjacent to plate-pad interface, radiograph test plate to a quality level of a 2-2T (ASTM-EY4) for internal shrinkage (see Note 4).

**Note 4:** Further checking of the exothermic material not required if test plate does not conform to Class 1 of ASTM E-71-52 in respect to internal soundness.

7.3 Performing the Bend Test.

7.3.1 Preparation of bend specimen.

7.3.1.1 Remove bend bar specimen from plate as illustrated in Figure 3. It shall be machined (see 7.3.1.2) to 1 by 1/16 inch in section with corners rounded to a radius not over 1/16 inch.

7.3.1.2 No machining or grinding will be permitted on casting-plate interface of the bend specimen.

7.3.2 Test procedure.

7.3.2.1 The bend test specimen shall stand being bent cold through an angle of 70 degrees.

7.3.2.2 The bend shall be made around a pin 1 inch in diameter with the unmachined pad-casting interface being on the outside of the bend (the side of the bend specimen experiencing tensile forces).

7.3.2.3 The bend test shall be conducted in accordance with ASTM A-370, Methods and Definitions.

7.4 Determining Pickup of Contaminators (Al, Si and B) in Test Plate.

7.4.1 Analytical procedures shall be limited to spectrographic methods.

7.4.2 Specimen for spectrographic analysis shall be taken approximately 9 inches from the riser end of the plate and 1 inch from either edge of the plate.

7.4.3 Spectrographic tests shall be made 0.025 inch below the plate-exothermic pad interface.
7.4.4 Preparation of casting surface for spectrographic analysis shall be by machining (see Note 5).

7.4.5 Spectrographic test for base composition (Al, Si and B) shall be made from the side opposite the exothermic pad. Use the spectrographic specimen from Item 7.4.2.

7.4.6 Referee Procedure.

7.4.6.1 Surface preparation for spectrographic analysis for contaminators shall be by either electropolishing or by a milling operation.

Note 5.-Surface preparation for spectrographic analysis by grinding is permitted provided the ground surface is cleaned with hydrochloric acid to remove any aluminum or silicon contaminants. Grinding is permitted without hydrochloric acid cleaning provided a silicon carbide belt is used for aluminum sparking and an aluminum oxide belt is used for silicon sparking.

8. Number of Tests

8.1 One test plate shall be made for each shipment under test.

8.2 One bend test shall be made for each shipment under test.

8.3 If any bend specimen shows defective machining or develops a visual flaw, it may be discarded and another specimen substituted.

9. Retest

9.1 If the result of the bend test does not conform to the requirements specified, another test plate may be cast.

10. Rejection

10.1 Any rejection based on tests made in accordance with Section 7 which does not conform to the requirements in Section 6 shall be reported to the manufacturer within two weeks by the purchaser.

10.2 Materials which do not conform to the requirements of this specification will be subject to rejection by the purchaser.