

INCH-POUND

MIL-P-00223C (AR)
AMENDMENT 1
10 June 1997

MILITARY SPECIFICATION

POWDER, BLACK

This Amendment forms a part of Military Specification MIL-P-00223C (AR) dated 5 February 1993, and is approved for use by the U.S. Army Armament Research, Development and Engineering Center, and is available for use by all Departments and Agencies of the Department of Defense.

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3.3.3 Applicable to class 3 only: Add “(See 6.13)” at the end of 3.3.3.

3.5 Delete 3.5 and substitute with the following:

“3.5 Specific gravity.

3.5.1 Specific gravity determined by mercury pycnometer. The specific gravity of black powder shall not exceed the limits of 1.72 minimum and 1.80 maximum for glazed powder, 1.65 minimum and 1.81 maximum for unglazed class 7 powder and 1.69 minimum and 1.76 maximum for unglazed class 8 and 9 powder when determined as specified in 4.5.6.1, 4.5.6.2 or 4.5.6.3.

3.5.2 Specific gravity determined by helium gas pycnometer. The specific gravity of black powder shall not exceed the limits of 1.890 minimum and 2.012 maximum for classes 1 to 6 glazed powder and 1.955 minimum and 1.997 maximum for unglazed class 7 powder when determined as specified in 4.5.6.4.”

3.7 Granulation, Table II:

Class 7: Delete “5%” maximum, and substitute “7%” maximum allowable weight percents of class 7 black powder passing through U.S. Standard Sieve #100 in Table II.

Class 8: Delete “3%” maximum, and substitute “5%” maximum allowable weight percents of class 8 black powder retained on U.S. Standard Sieve #100 in Table II.

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4.5.2.1 Alternate method for moisture: Rename 4.5.2.1, "Alternate method A for moisture".

4.5.2.2 Alternate method for moisture: Rename 4.5.2.2, "Alternate method B for moisture".

4.5.2 Add 4.5.2.3 as follows:

"4.5.2.3 Alternate method C for moisture. An Arizona Instrument Corporation's Computrac MAX-50 moisture analyzer or its equivalent shall be used for this method. The Computrac MAX-50 moisture analyzer is a microprocessor controlled instrument with programmable heating temperatures from 25 deg. C to 225 deg. C which incorporates a closed loop heat sensing system that will maintain temperature control within plus or minus 1 deg. C. Self diagnostics assure that a Fail Safe condition will exist, shall a default occur. The analyzer heats the sample within an enclosed test chamber with the use of a nichrome heating element. Through a prediction feature, the analyzer automatically terminates the test at an accurate end point. A built-in electronic force balance automatically weighs the sample as it is being added then displays the final moisture content as either 'percent moisture' or 'percent solid' at test completion. Resolution of the MAX-50 is 0.01% and is designed to accurately detect moisture levels down to 0.10% (10 gm capacity unit) and 0.04% (20 gm capacity unit).

The unit (Computrac MAX-50 or its equivalent) shall be turned on and allowed to warm up for about 20 minutes. Set the unit to display '%MOIST'. The test temperature shall be set at 85 deg. C. Open the test chamber lid and place a clean sample pan onto the tray support. With the test chamber lid closed, push the 'START' key. When the 'LOAD' light on the display illuminates, open the test chamber lid, and evenly deposit enough black powder onto the sample pan until the display reads between 70 and 90 percent at which time the analyzer will emit a short beep to alert the operator that enough sample has been added. Close the test chamber lid and the test will automatically proceed. The analyzer will emit three short beeps and display '%MOIST', 'FINAL', and 'CHECK' at the completion of the test. The moisture content of the sample shall be read directly from the '%MOIST' display on the analyzer."

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4.5.6 Add 4.5.6.4 as follows:

"4.5.6.4 Specific gravity by helium gas pycnometer. (Applicable to classes 1 to 7). A helium gas pycnometer (Micromeritics, Accupyc 1330, or equivalent) shall be used. An analytical balance accurate to +/-0.01 mg (Fairfax or equivalent) shall be used. The pycnometer shall be calibrated and operated at the conditions and parameters specified

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herein. Pycnometer manufacturer instructions and procedures should be followed for the detailed step-by-step operation of the gas pycnometer.

4.5.6.4.1 Calibration. Calibration shall be performed using factory supplied steel balls (or steel cylinders) with certified values. For refined calibration or trouble-shooting, other certified standards (such as glass bead standards certified by a nationally recognized institute for standards) may be used. The pycnometer shall be calibrated using parameters and conditions specified below:

Helium flow pressure: 20-22 psig (recommended)
Number of purges: 5
Number of runs: 5
Purge pressure: 19.5 to 19.6 psig
Run pressure: 19.5 to 19.6 psig
Equilibration rate: 0.005 psig/min
Use run precision: No. (See note.)
Equipment warm-up: 15 minutes minimum from stand-by and 1 hour minimum from cold start-up.

Note: Run precision may be used for refined calibration or trouble-shooting.

4.5.6.4.2 Procedure for analysis. Sample of black powder shall be acclimated to room temperature before analysis. During winter months, let the unopened sample container warm up to room temperature for at least 16 hours prior to opening the sample container. The black powder sample shall be tested as received. Any action/operation that may cause size attrition or modification, such as grinding or sieving, shall be avoided. The pycnometer shall be checked to verify that it is operating properly prior to sample analysis. An empty sample cup is weighed to the nearest 0.1 mg. Transfer a quantity of sample (about 10 grams) to the cup. The powder must be packed and the cup at least 2/3 full to obtain optimum sample weight for high accuracy analysis. The cup and sample shall be weighed to the nearest 0.1 mg. Place the cup (sample) in the pycnometer chamber and lock the chamber. The sample shall be analyzed following step-by-step operating instructions from the pycnometer manufacturer and at the operating parameters and conditions specified below:

Helium flow pressure: 20 to 22 psig (recommended)
Number of purges: 5
Number of runs: 5
Purge pressure: 16.2 to 16.3 psig. (See note.)
Run fill pressure: 16.2 to 16.3 psig. (See note.)
Equilibration rate: 0.0250 psig/min
Use run precision: Yes
Percent full scale: 0.1

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Note: Purge and run pressure of 19.5 to 19.6 psig can also be used for the determination of specific gravity of class 7 black powder.

Calculate the five volumes from the 5 runs, and average the 5 readings. Calculate the specific gravity of the sample by dividing the individual mass of the sample by its corresponding averaged volume.

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6.13 Changes from previous issue: Renumber this paragraph to 6.14.

6.13 Add 6.13 as follows:

“6.13 Higher moisture content class 3. Class 3 black powder with a moisture content not exceeding 0.70 percent is available and can be specified in the contract or purchase order.”

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Preparing activity:
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