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MINISTRY OF DEFENCE AND MINISTRY OF TECHNOLOGY (AVIATION GROUP)

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POLYTHENE MOULDING AND EXTRUSTION MATERIALS FOR AMMUNITION APPLICATIONS

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DEFENCE STANDARD NO. 13 - 9, Issue 1

This Defence Standard supersedes Defence Specification: DEF-102, dated 21st October 1959.

POLYTHENE MOULDING and EXTRUSION MATERIALS for AMMUNITION APPLICATIONS

1. This Standard specifies polythene moulding and extrusion materials for ammunition applications to be used in equipments and components for the Navy, Army, and Air Force Departments of the Ministry of Defence, and for the Ministry of Technology (Aviation Group).

2. The materials specified are in the form of granules suitable for the production of moulded or extruded articles specifically for use in contact with solid explosives. They are of three types, which are fully defined in the Scope (clause 1) of the specification set out within this Standard.

Note: It is recommended that Defence Guide DG-9, 'Notes for guidance in the choice of polythene moulding and extrusion materials' be read in conjunction with this Standard.

3. The materials shall conform in all respects to the Specification set out within this Standard.

4. Related specifications are listed in Appendix B to this Standard.

5. This Standard contains all necessary technical information and it is the definitive specification for these materials. It is to be invoked for all tender and contract purposes.

6. These decisions apply to all requirements for polythene moulding and extrusion materials for ammunition applications arising after the date of this Standard.

Authorities shall take action accordingly to implement them.

1st January 1968

Copies of this Standard may be obtained from:

Directorate of Standardization,
Ministry of Defence,
London.

SPECIFICATION
for
POLYTHENE MOULDING and EXTRUSION MATERIALS for AMMUNITION APPLICATIONS

1. SCOPE

This Specification relates to polythene materials in the form of granules suitable for the production of moulded or extruded articles specifically for use in contact with solid explosives.

Three types are specified:

Type XD Dielectric quality material of natural colour. This type is not resistant to sunlight and is not recommended for high frequency electrical insulation or other applications where maximum retention of low power factor is required.

Type XDA Dielectric quality material of substantially natural colour for use where the maintenance of low power factor is of primary importance. This type should be used for high frequency electrical insulation. It is not resistant to sunlight.

Type XWA Black coloured weather-resistant quality material for uses where resistance to direct sunlight is of primary importance. It may be used for outdoor protection of the other types.

All types of material are graded according to their density and melt flow index (M.F.I.).

Note 1: None of the above types is suitable for applications where development of an electro-static charge could give rise to an explosive hazard.

Note 2: Polythene to this specification is compatible with common service high explosives based on TNT, RDX, HMX, CE, PETN, ammonium and barium nitrates, and with solid propellants. It is also compatible with many initiatory and pyrotechnic explosives and with gunpowder. It is liable to become embrittled, or otherwise deteriorate, when in contact over prolonged periods with certain of the above types of explosives containing ingredients which it is capable of absorbing.

2. INFORMATION to be SUPPLIED by the PURCHASER

The purchaser shall state clearly in his contract or order, the type, the nominal M.F.I., and nominal density of the material required e.g. polythene material, type XDA, the number of this Defence Standard, nominal M.F.I. 20, nominal density 0.920.

COMPOSITION of [illegible]

a. General

The material shall consist either of homopolymers of ethylene or co-polymers of ethylene in which the other comonomer is an alkene and does not exceed 10 per cent of the whole. It shall have a nominal density within the range 0.915 to 0.967 g/ml at 23°C and nominal M.F.I. not exceeding 25. It shall be suitably compounded, if necessary, according to the type so that it complies with the relevant requirements of this specification. Where used additives shall be uniformly dispersed throughout the material from which the granules are cut.

Type XD shall contain no additive
Type XDA shall contain only an anti-oxidant
Type XWA shall contain only an anti-oxidant and carbon black

Note: Natural polythene materials may often contain small amounts (up to 0.05 per cent) of anti-oxidant incorporated during the polymerisation process. For the purposes of this specification, such amounts shall not be regarded as additives and the materials will be acceptable as type XD provided that the anti-oxidant concerned is one of those listed in Appendix A.

b. Anti-oxidant

The anti-oxidant used in types XDA and XWA shall be one of those listed in Appendix A. The amount used shall be such that the compound complies with the requirements laid down in clause 4 of this specification but in no case shall the amount of anti-oxidant exceed 0.3 per cent of the compound by weight.

c. Carbon Black

The carbon black in type XWA shall be a channel or furnace type and have a particle size between 10 and 25 millimicrons.

TESTING

a. Samples taken from any portion of the supply shall be of the composition stated in clause 3. In all other respects the material shall comply fully with the requirements of B.S. 3412 for the type corresponding to that ordered as follows:

Type ordered	Corresponding type in B.S. 3412
✓XD	D
✗XDA	DA
✗ XWA	WA

b. pH value of water extract

When determined by method 406A of B.S. 2782, the pH value of the water extract of a specimen prepared as in B.S. 3412 shall be within the range 5.0 to 8.0.

c. Lead and compounds of lead

When determined by a method agreed with the Inspection Authority nominated in the order or contract, the total lead content of the material, calculated as Pb, shall not exceed 0.03 per cent.

5. FREQUENCY of TESTING

a. Each batch of material shall be tested for compliance with the specification requirements in respect of

Appearance (including carbon black dispersion in type XWA)
Density
M.F.I.
Anti-oxidant content
Ageing by hot air oven (type XDA only)
pH of water extract
Lead and compounds of lead

b. Other tests specified in B.S. 3412 may be applied less frequently at the discretion of the Inspection Authority. All material supplied to this specification shall nevertheless comply with all the relevant specified requirements.

c. A batch of material is a quantity so designated by the manufacturer as being substantially uniform in quality.

6. CONTAINERS and MARKING of CONTAINERS

a. The material shall be filled into sound, clean, dry containers which, after filling, shall hold an agreed quantity and shall be securely closed.

b. The containers shall each be legibly and durably marked with any markings called for by statutory requirements and in addition with the following details:

Description of contents, including type
The number of this Standard (DEF STAN 13 - 9)
Nominal M.F.I. and nominal density
Contract or order number
Batch number
Weight of contents
Date of manufacture
Contractor's initials or recognized trade mark
Additional markings called for in the contract or order

c. The amount of lead or lead compounds, calculated together as metallic lead, shall in no part of the containers exceed 0.5 per cent. This restriction applies to the material used in the construction of the containers, any metallic coating thereof, and any solder used for their manufacture, repair or sealing.

d. Any paint used on the containers and the paint or other materials used for marking shall not contain lead or lead compounds, calculated as metallic lead, together exceeding 0.2 per cent.

e. Care must be taken that all paint, particularly any on the inside of the package, is thoroughly dried before the polythene material is packed.

7. INSPECTION

a. The material and the containers in which it is filled shall be to the satisfaction of the Inspection Authority.

b. Samples of the material and the containers may be taken from any portion of the batch. If on examination any sample is found not to comply with the requirements of this specification the whole batch may be rejected. All samples shall be supplied free of charge.

APPENDIX A

PERMITTED ANTI-OXIDANTS

1. NN'-di-2-naphthyl-p-phenylenediamine
2. bis-[2-hydroxy-5-methyl-3-(1-methylcyclohexyl)phenyl]methane
3. 2,6-ditertbutyl-p-cresol

APPENDIX B

RELATED SPECIFICATIONS

Reference is made in this Standard to:

British Standard 2782, 'Methods of testing Plastics'
British Standard 3412, 'Polythene Materials for Moulding and Extrusion'
Defence Guide DG-9 'Notes for Guidance in the choice of Polythene Moulding and Extrusion Materials'.

Reference in this Standard to a British Standard (undated) means, in any tender or contract, the edition current at the date of such tender or contract.

APPENDIX C

HISTORY OF THIS STANDARD

Date	Details
21st October 1959	Originally issued as DEF-102. 'Low Density Polythene Moulding and Extrusion Materials for Ammunition Applications'.
1st January 1968	DEF-102 cancelled and replaced by Defence Standard, with general amendments.