Explosives are divided into 8 classes as follows:

Class 1  Gunpowder
Class 2  Nitrate-mixture
Class 3  Nitro-compound
Class 4  Chlorate-mixture
Class 5  Fulminate
Class 6  Ammunition
Class 7  Fireworks
Class 8  Liquid Oxygen Explosives

**Class 1 – Gunpowder Class**

“Gunpowder” means gunpowder ordinarily so called.

**Class 2 – Nitrate Mixture Class**

“Nitrate-mixture” means any preparation, other than gunpowder which is formed by the mechanical mixture of a nitrate with any form of carbon or with any carbonaceous substance not possessed of explosives properties, whether Sulphur be or be not added to such preparation, and whether such preparation be or be not mechanically mixed with any other non-explosive substance, and includes any explosive containing a perchlorate and not being a chlorate-mixture, fulminate or nitro-compound as defined in this Schedule

**Class 3- Nitro-compound Class**

(1) “Nitro-compound” means any chemical compound which is possessed of explosive properties or is capable of combining with metals to form an explosive compound, and is produced by the chemical action of nitric acid (whether mixed or not, with sulphuric acid), or of a nitrate mixed with sulphuric acid, upon any carbonaceous substance, whether such compound is mechanically mixed with other substances or not.

(2) The Nitro-compound class two divisions namely Division 1 and Division 2.

(3) Division 1, comprising any chemical compound or mechanically mixed preparation which consists, either wholly or partly, of nitro-glycerine or some other liquited nitro-compound that is such explosives as Ballistite, Blasting Gelatine, Cordite, Dynamite, Gelatine Dynamite, Gelignite, etc.

(4) Division 2 comprising any nitro-compound, which is not comprised in Division 1 that is explosives such as Ammonal, E.C. Sporting Powder, gun-cotton, Picric Acid, Smokeless Dimond, Trinitro-toluol (T.N.T.) etc.

**Class 4—Chlorate mixture Class**

(1) “Chlorate-mixture” means any explosive containing a chlorate.
Chlorate-mixture class has 2 divisions namely Division 1 and Division 2.

Division 1, comprising any chlorate preparation which consists partly of nitro-glycerine or of some other liquid nitro-compound.

Division 2, comprising any chlorate mixture which is not comprised in Division 1.

Class 5—Fulminate Class

(1) “Fulminate” means any chemical compound or mechanical mixture whatever, which from its great susceptibility to detonation, is suitable for employment in percussion-caps or any other appliances for developing detonation, or which, from its extreme sensibility to explosion, and from its great instability (that is to say, readiness to undergo decomposition from very slight exciting causes), is specially dangerous.

(2) The Fulminate class consists of two divisions namely division 1 and division 2.

(3) Division 1 comprising such compounds as the Fulminate of silver and of mercury, and preparations of those substances such as are used in percussion caps, and any preparation consisting of a mixture of chlorate with phosphorus, or certain descriptions of compounds of phosphorous, with or without the addition of carbonaceous matter, and any preparation consisting of a mixture of a chlorate with sulphur or with sulphuret, with or without carbonaceous matter.

(4) Division 2 comprises such substances as the chloride and the iodide of Nitrogen, Fulminating Gold and Silver, Diazobenol and the Nitrate of Diazobenzol, Lead Azide and Tetrazine.

Class 6—Ammunition Class

(1) “Ammunition” means an explosive of any of the foregoing classes when the same is enclosed in any case or contrivance, or is otherwise adapted or prepared so as to form: (a) a cartridge or charge for small arms, cannon or any other weapon, or (b) a safety or other fuse for blasting or for shells, or (c) a tube for firing explosive, or (d) a percussion cap, detonator, fog signal, shell, torpedo, war rocket or any other contrivance other than a firework.

(2) The ammunition class has three divisions, namely Division 1, Division 2 and Division 3.

(3) Division 1 comprises exclusively of (i) Safety cartridges (ii) Safety fuses for blasting (iii) Railway for signal and (iv) Percussion caps.

(4) Division 2 comprises any ammunition which does not contain its own means of ignition and is not included in Division 1, such as cartridges for small arms other than safety cartridge, cartridges and charges for cannon shells and torpedoes containing any explosives, tubes for firing explosives, containing their own means of ignition.

(5) Division 3 comprises any ammunition which contains its own means of ignition and is not included in Division 1, such as detonators, fuses for blasting which are not safety fuses, tubes for firing explosives, containing their own means of ignition.

Note: The expression “ammunition containing its own means of ignition” means ammunition having an arrangement, whether attached to or forming part of the ammunition which is adapted to explode or fire the ammunition by friction or percussion “Percussion cap” does not include a detonator.

Class 7—Fireworks Class

(1) Fireworks Class has four divisions, namely, Division 1, Division 2, Division 3, and Division 4.

(2) Division 1 comprises fireworks composition that is to say, any chemical compound or mechanically mixed preparation of an explosive or inflammable nature, which is used for the purpose of making manufactured firework, and is not an explosive of classes 1,2,3,4,5 & 6, any star and any coloured fire composition:
Provided that a substantially constructed hermetically closed metal case, containing not more than 500 gms of coloured fire composition of such a nature, as not to be liable to spontaneous ignition shall be deemed to be “a manufactured firework” and not a “firework composition”.

(3) Division 2 fireworks comprises manufactured fireworks i.e. to say any explosive of class 1,2,3,4 or 6 and any fireworks composition when such explosive or composition is enclosed in any case or contrivance or other articles specially adapted, for the production of pyrotechnic effect for pyrotechnic signal or sound signals.

(4) Division 2 fireworks comprises 3 sub-divisions, namely, Sub-division 1, Sub-division 2 and Sub-division 3.

(5) Sub-division 1 of Division 2 fireworks comprises low hazard fireworks which, in the opinion of Chief Controller are relatively innocuous in themselves and are not liable to explode violently or all at once e.g. sparklers [chinese crackers, serpents, etc.]

(6) Sub-division 2 of Division 2 of fireworks comprises high hazard fireworks which, in the opinion of Chief Controller, present a special hazard to a person e.g. rockets, shells, maroons, wheels, barrages, fountains, illumination pieces, distress signals etc.

(7) Sub-division 3 of Division 2 fireworks comprises such fireworks, which are assembled at site purely for the purpose of display.

(8) Division 3 comprises any explosive contrivance required for the manufacture of manufactured fireworks e.g. quick match fuse etc.

(9) Division 4 comprises manufactured fireworks for use of Armed Forces of the Union.

**Class 8—Liquid Oxygen Explosives Class**

“Liquid Oxygen explosives” means an absorbent carbonaceous material such as wood pulp, carbon black, metal powder, coal dust etc. impregnated with liquid air or liquid oxygen with or without the addition of other substances

**SCHEDULE II**

Packing of Explosives

(See rule 8)

(1) In this Schedule unless the context otherwise requires—

The expression “outer package” means a box, barrel, case or cylinder of wood, metal, or other solid material, of such strength, construction and character as not to be liable to be broken or accidentally opened, or to become defective or insecure or to allow an explosive to escape;

The expression “inner package” means a substantial case, bag, canister, or other receptacle, made and closed so as to prevent any explosive from escaping;

Wherever an explosive is distinguished as belonging to a particular class or division of a class, the reference is to the classification specified in Schedule 1;

the expression “propellant” means an authorised explosive of the 3rd (Nitro Compound) Class adapted and intended exclusively for use as a propelling charge in cannon or small arms.

(2) The interior of every package shall be free from grit and otherwise clean.

(3) Save as provided in the Table appended to this Schedule there shall be no iron or steel in the construction of any package unless the same is covered with suitable material so as effectively to prevent the exposure of such iron or steel.

(4) A package when actually used for the packing of one explosive shall not be used for the packing of any other explosive or of any other article or substance:

Provided that nothing in this clause shall be deemed to prohibit—

(a) the packing in the same outer package of inner packages containing a propellant together with inner packages containing gunpowder or another propellant; or

(b) the packing in the same package of any article which is not of inflammable or explosive nature; or liable to cause fire or explosion together with an explosive of the 1st Division of the 6th (Amendment) Class.
(5) Nothing in this Schedule shall be deemed to prohibit the use of an additional package, whether inner or outer, of a character not expressly prohibited in writing by the Chief Controller.

(6) Use of metal bands wires on packages is prohibited unless specifically authorised by the Chief Controller in relation to packing of any explosives.

(7) Material of which the packages and their closures are made must not be liable to attack by the contents and from harmful or dangerous compounds therewith.

(8) Packages must be sufficiently rigid and strong in all their parts to prevent any loosening during transport and to meet normal requirements of such transport. Solid substances shall be firmly secured in their packages, and inner packages shall be firmly secured in outer packages. Unless otherwise specified inner packages may be enclosed in outer packages, either singly or in groups.

(9) Cushioning material, if used, shall be suited to the nature of the contents of the package.

(10) An explosive that is not authorised explosive shall be packed in such a manner as may be directed by the Chief Controller with reference to such explosive.

(11) (a) The outer package shall be used only once for packing and transport of explosives.  
(b) When the explosives contained in outer package are removed therefrom, the outer package shall be destroyed or disposed of in such a manner that it cannot be re-used for any purpose.

(12) Where metal boxes are used, they shall be fitted with closures or safety devices yielding when the internal pressure reaches a value not greater than 3 kg/cm². Such closures or safety devices shall not impair the strength of metal boxes. Boxes made of zinc sheet or aluminium shall be completely lined with wood or fibreboard.

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Class</th>
<th>Method of packing</th>
<th>Amounts in any one outer package</th>
<th>Amount in any one inner package</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Class 1</td>
<td>When the quantity in any one consignment does not exceed 2.5 kg., a single outer package. When the quantity exceeds 2.5 Kg. a double package, the inner and outer packages being as defined in clause (1) of this Schedule. Inner Packages if made of metal shall be secured by cushioning material.</td>
<td>50 Kgs. Provided that and propellants together the amount not exceed. 25 Kgs.</td>
<td>2.5 Kgs. where gun are packed amount shall 2.5 Kgs.</td>
</tr>
<tr>
<td>2</td>
<td>Class 2</td>
<td>The material except site mixed Ammonium Nitrate Fuel Oil explosive shall be suitably cartridged in wrappings made of suitable plastic material or papers so as to make it impermeable and protect from damp. Further packing as for Class 1.</td>
<td>25 Kgs.</td>
<td>2.5 Kgs.</td>
</tr>
<tr>
<td>3</td>
<td>Site Mixed Ammonium Nitrate Fuel Oil</td>
<td>As approved by Chief Controller</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

TABLE
<table>
<thead>
<tr>
<th></th>
<th>Class 3 Division 1 other than propellants</th>
<th>The material shall be cartridge in wrappings made of paper or polythene that has been made impermeable. The wrapping should also protect the material from damp. Further packing as for Class 1, provided that either the outer or inner package shall be thoroughly waterproof and no metal shall be used in the construction of the packages, except that (1) nails made of brass, zinc or other soft metal or coated with the same may be used for securing the outer package, and (2) wire stitching may be used for securing the inner package if the wire is effectively prevented from coming into contact with the explosive by means of a sheet of stout cardboard or otherwise.</th>
<th>25 Kgs.</th>
<th>2.5 Kgs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.</td>
<td>Class 3 Division 1 propellants.</td>
<td>As for Class 1</td>
<td>25 Kgs.</td>
<td>25 Kgs.</td>
</tr>
<tr>
<td>6.</td>
<td>Class 3 Division 2 Other than Picric Acid, Wet Gun Cotton Penta Erythritol Tetranitrate RDX, Terinitro Resorcinol (Styphnic Acid).</td>
<td>As for Class 1</td>
<td>25 Kgs.</td>
<td>25 Kgs.</td>
</tr>
<tr>
<td>7.</td>
<td>Picric Acid</td>
<td>As for Class 1, provided that the inner or outer package or both of them shall be of such nature, and so closed, as to prevent any material loss of moisture.</td>
<td>Unlimited</td>
<td>Unlimited</td>
</tr>
<tr>
<td>8.</td>
<td>Gun Cotton so wetted with water as to be absolutely uninflammable</td>
<td>As for Class 1</td>
<td>Unlimited</td>
<td>Unlimited</td>
</tr>
<tr>
<td>9.</td>
<td>Penta- Erythritol Tetranitrate (P.E.T.N Penthrite) containing 25% of moisture</td>
<td>In double package, the inner package shall be a polythene bag closed at the top with twine thread and placed in a bright tin container. Both the bag and the tin container shall be so closed as to prevent any material loss of moisture. The outer package shall be as defined In clause (1) of the Schedule and so closed as to prevent any material loss of moisture.</td>
<td>22.5 Kgs. (dry basis)</td>
<td>11.25 Kgs. (dry basis)</td>
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<tr>
<td>10.</td>
<td>RDX</td>
<td>As for PETN</td>
<td>22.5 Kgs. (dry basis)</td>
<td>11.25 Kgs. (dry basis)</td>
</tr>
<tr>
<td>11.</td>
<td>Tri-Nitro-Resorcinol (Styphnic Acid)</td>
<td>As for Class 1, provided that Trinitro-Resorcinol (Styphnic Acid) shall be wetted with not less than 20% of water calculated on the wet explosives and that the inner package shall be a substantial bag, case or canister so made and closed as to prevent any loss of moisture or escape of explosives.</td>
<td>25 Kgs. of wet explosive</td>
<td>25 Kgs. of wet explosive</td>
</tr>
<tr>
<td>12.</td>
<td>Class 4 Division 1</td>
<td>As for Class 3, Division 1, other than propellants.</td>
<td>25 Kgs.</td>
<td>2.5 Kgs.</td>
</tr>
<tr>
<td>13.</td>
<td>Class 4 Division 2</td>
<td>As for Class 1</td>
<td>25 Kgs.</td>
<td>2.5 Kgs.</td>
</tr>
<tr>
<td>14.</td>
<td>Class 5</td>
<td>The explosives shall be packed wet containing not less than 25% water, and shall in this condition be enclosed in a treble package; the inner most package containing the wet cloth or other suitable material of close mesh but permeable to water; the intermediate package shall contain all the individual packages and sufficient water to keep the explosive in them constantly wet, and may, consistent with the requirements of the security of the whole package, be in the form of a rubber bag, or of a case, or of such special lining to the other packages as will efficiently attain this object, and it must itself be constantly surrounded by or saturated with water, the outer package containing sufficient water constantly to surround the case. Both the intermediate package and the outer package shall be of such construction and material as will not allow water to escape.</td>
<td>100 Kgs.</td>
<td>12.5 Kgs.</td>
</tr>
<tr>
<td>15.</td>
<td>Class 6, Division 1, other than Pinfire cartridges for pistols.</td>
<td>A single outer package. Provided that clause (3) of this Schedule shall not apply to explosives of this Division: Provided also that bulleted cartridges of a calibre exceeding 1.27 cm. And belonging to this Division shall be packed in such a manner that the point of any bullet cannot come in Unlimited</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
|   | Pin-fire cartridges for pistols | (a) Not exceeding 50 in number in any one consignment—So packed in a single package that the bases lie alternately in opposite directions. The bases and pins shall be so fitted into perforations in millboard or other suitable material as to prevent the firing of any one of the said cartridges by an explosion in any other of the said cartridges.  
(b) Exceeding 50 number—In an inner and outer package, the cartridges being packed in inner packages with millboards as above required. | 2500 in number | 50 in number |
<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>16.</td>
<td>Class 6, Division 2</td>
<td>Explosives made up into cartridges or charges for cannon, shell, torpedoes, mines, blasting or other like purposes shall be packed in such manner and in such quantity as is required for the same explosive when not so made up: Provided that, where a double package is required, the enclosing ease of such cartridges or charges may, if it satisfies the conditions required for an inner packages, be deemed to be such inner package. Other ammunition of this Division-A single outer package.</td>
<td>2500 in number</td>
</tr>
<tr>
<td>17.</td>
<td>Class 6 Division 3, other than Detonators and Electric Detonators</td>
<td>As for Class 1 Provided that bulleted cartridges of a calibre exceeding 1.27 cm. And belonging to this Division shall be packed in such a manner that the point of any bullet cannot come in contact with the cap of another cartridge. (a) Not exceeding 1,000 in any one consignment. As for Class 1, provided that the detonators and the spaces between the same and between the sides of the inner package and the said detonators shall all be filled as far as practicable, with fine sawdust or other similar material; a layer of</td>
<td>10,000 in number</td>
</tr>
</tbody>
</table>
felt or other soft yielding material shall be placed between both ends of all the detonators and the interior of the inner package in which the same are placed, in such manner and so secured, that both ends of the detonators will rest upon the said cotton wool or other material, every inner package, if of metal to be lined throughout with the paper or other soft material.

(b) Exceeding 1,000 detonators. The detonators shall be packed in inner packages, with sawdust and cotton wool as above described. Such inner packages shall be placed inside a substantial case of wood or metal, made and closed so as to prevent any of the inner packages escaping therefrom, and such case shall be placed inside an outer package in such manner and so secured as to leave a clear space of not less than 7.5 cm. Between the case and every part of the interior of the said outer packages, notwithstanding that such clear space may, if preferred be filled with sawdust, straw or other similar material or may contain a light framework or battens of wood to keep the case aforesaid in position in the outer package.

(c) Where the number of detonators exceeds 5,000 such other packages shall be provided with handles or other contrivance, by means of which it can be safely and conveniently carried.

| 20. | Electric Detonators | As for Class 1, provided that where the number in any other package exceeds 3,000 such outer packages shall be provided with handles or other contrivance, by means of which it can be safely and conveniently carried. | 5,000 in number | 100 in number |
| 21. | Class 7 Division 1 | Double package, the inner package being hermetically closed and | 10 Kgs. | 0.5 Kgs. |
22. Class 7, Division 2 Single outer package, provided that clause (3) of this Schedule shall not apply to explosives of this class and Division. 50 Kgs. --

22(a) Class 7 Division 3 Single outer package 25 Kgs. --

22(b) Class 7, Division 4 Single outer package provided that clause (3) of this Schedule shall not apply. 50 Kgs. --

23. Class 8, L.O.X. (Liquid Oxygen Explosives) Cartridges packed and transported for immediate use in insulated packing boxes of a design approved by the Chief Controller -- --

SCHEDULE III
METHODS OF TESTING
(See Rule 21)
An explosive of the 3rd (Nitro-compound) Class or of the 4th (Chlorate-mixture) Class shall comply with the tests set forth in this Schedule as applicable to such explosive.

THE HEAT TEST AS APPLIED TO EXPLOSIVES

1. Apparatus and Materials employed

<table>
<thead>
<tr>
<th>Specification</th>
<th>Pattern No.</th>
<th>Article</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>I</td>
<td>Balance</td>
</tr>
<tr>
<td></td>
<td>II</td>
<td>Bath, water</td>
</tr>
<tr>
<td></td>
<td>III</td>
<td>Bath, water, for hot water heating *</td>
</tr>
<tr>
<td></td>
<td>IV</td>
<td>Beaker, glass, 1 1/3 litres</td>
</tr>
<tr>
<td></td>
<td>V</td>
<td>Bottle, dropper, brown glass, 28.4 cc. (for glycerine and water mixture)</td>
</tr>
<tr>
<td></td>
<td>VI</td>
<td>Bottle, glass-stoppered, brown glass, 28.4 cc (for standard tint papers)</td>
</tr>
<tr>
<td></td>
<td>VII</td>
<td>Bottle, glass-stoppered, brown glass, 56.8 cc (for test papers)</td>
</tr>
<tr>
<td></td>
<td>VIII</td>
<td>Brush, cleaning</td>
</tr>
<tr>
<td></td>
<td>IX</td>
<td>Brush, cleaning, test tube</td>
</tr>
<tr>
<td></td>
<td>X</td>
<td>Burner, gas, Argand, and screen</td>
</tr>
<tr>
<td></td>
<td>XI</td>
<td>Caps, for test tubes</td>
</tr>
<tr>
<td></td>
<td>XII</td>
<td>Chalk, French</td>
</tr>
<tr>
<td></td>
<td>XIII</td>
<td>Forceps, lifting, heat test papers</td>
</tr>
<tr>
<td></td>
<td>XIV</td>
<td>Funnel, aluminium</td>
</tr>
<tr>
<td></td>
<td>XV</td>
<td>Funnel, glass</td>
</tr>
<tr>
<td></td>
<td>XVI</td>
<td>Knife, cordite</td>
</tr>
<tr>
<td></td>
<td>XVII</td>
<td>Glycerine 28.4 cc bottle</td>
</tr>
</tbody>
</table>

A sufficient supply A sufficient supply |
SPECIFICATION A—ACID, ACETIC

The acetic acid is to be clear, colourless and free from all impurities, and is not to contain less than 96 per cent CH₃COOH. When 1 cc. of N/10 potassium permanganate solution is added to 100 c.c. of the acetic acid maintained at 15°C, the distinctive colour is to remain for not than 15 minutes.

One drop of the diluted acetic acid—one volume acetic acid diluted with four volumes of distilled water—when placed by means of a glass rod on freshly-prepared potassium iodide-starch paper is to produce no colour.

SPECIFICATION B—CHALK, FRENCH
The French chalk is to be equal in colour, to the standard sample and is not to contain more than 0.5 per cent of moisture.

The bulk of the French chalk is to be such that a volume of 50 cc. Will weight 23.5 ±1.0 grammme. This to be determined as follows:

A glass funnel, the stem of which is 11 cm. In length tapering, internally from 8 mm. at the top to 5 mm. at the end, is to be clamped vertically above a 50 cc cylinder so that the mouth of the latter is 7 cm. Below the lowest point of the funnel. The cylinder is to be 2.5 cm. in internal diameter, with a ground edge. The French Chalk is to be poured gradually into the funnel and allowed to flow into the cylinder until the latter overflows. This should take one minute. The surface of the chalk is then to be levelled off, without tapping into the funnel and allowed to flow into the cylinder until the latter overflows. This should take one minute. The surface of the chalk is then to be levelled off, without tapping or shaking the cylinder, by drawing a straight edge over the mouth of the cylinder. The cylinder and contents are then to be weighed.

The fitness of the French chalk is to be such that it will all pass, without rubbing, through a 0.075 mm. wire scive of 6.400 meshes per square centimeter.

The French chalk is not to contain more than 0.1 per cent of soluble alkali salts calculated as CaCO$_3$. This is to be determined as follows:

10 grams of the chalk are to be boiled with 250 cc. of water for one minute, filtered, washed and the filtrate titrated with N/10 hydrochloric acid.

The French chalk, when warmed with hydrochloric acid is not to give off more than 1 per cent and not less than 0.25 per cent of carbonic acid gas.

The French chalk is not to absorb more than 0.5 per cent of moisture after being dried at 100$^\circ$C till constant in weight, and then exposed under a bell-jar to saturated atmosphere at 15$^\circ$C to 20$^\circ$C for 24 hours.

Note:- Before use in heat-test experiments the French chalk is to be carefully washed with distilled water, dried in a water oven at 65—70$^\circ$C, and exposed to a saturated atmosphere for 24 hours. It is to be kept in a well-stoppered bottle.

**SPECIFICATION C—GLYCERINE**

The glycerine is to comply with the latest edition of British Pharmacopoeia Specification in all respects.

**SPECIFICATION D—PAPER, FILTERS**

The paper for making heat test paper is to consist entirely of pure normal cotton cellulose of strongly resistant quality and free from any loading or sizing.

During manufacture, the paper is not to be submitted to artificial heat of any kind.

The paper is to have a smooth white surface, and both sides are to be as nearly alike as possible.

The average length of the fibres is to be 2±0.5 mm.
The sheets, when measured with a Ciceri smith’s patent fixed pressure micrometer, are to have a thickness of $1.8 \pm 0.2$ mm.

The last treatment in its preparation is to be a thorough washing with pure distilled water and subsequent air drying in a pure atmosphere.

The paper is to be free from all traces of chemical or other impurity particularly acids, chlorine and peroxides.

On boiling with 3 per cent, caustic soda solution for 60 minutes, the paper is to lose more than 7.5 per cent of its weight.

When heated for 15 minutes at 100$^\circ$C with Fehling’s solutions, diluted with twice its volume of boiling water, it is not to produce more than 1.25 per cent of its weight of cuprous oxide ($\text{Cu}_2\text{O}$).

It is to be supplied in sheets 50 cm. long by 15 cm. wide, and each 100 sheets packed separately in a hermetically sealed tin case closed by a tear-off strip.

For use in the extraction of notro-glycerine from dynamite it is to be supplied in circles 5.5 cm. in diameter, each 100 papers being packed separately.

**SPECIFICATION E—PAPERS, TEST**

The papers are to be prepared and tested by the method laid down in Appendix II.

Each batch of papers is to be tested by carrying out four consecutive tests of four papers on each of two days. The mean test obtained is to be $18.5 \pm 0.75$ minutes. A test different from the mean by more than two minutes is to be considered abnormal, and is to be disregarded unless there are more than one of such abnormal testes amongst the 32 papers tested, in which case the batch is to be condemned.

**SPECIFICATION E—PAPERS, TEST**

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Each batch of papers is to be tested by carrying out four consecutive testes of four papers on each of two days. The mean test obtained is to be $18.5 \pm 0.75$ minutes. A test different from the mean by more than two minutes is to be considered abnormal, and is to be disregarded unless there are more than on of such abnormal testes amongst the 32 papers tests, in which case the batch is to be condemned.

**SPECIFICATION F—PAPERS, STANDARD TINT**

The standard tint papers are to be made by the method described in, and are to conform to the conditions laid down in Appendix I.

II—Preparation of the sample to be tested:
All the operations in preparing a sample for testing are to be carried out as expeditiously as possible, avoiding exposure to light, as far as practicable and the test is to be carried out as soon as the sample is prepared.

In weighing out heat test quantities, an accuracy of ± 0.05 gramme is sufficient. These quantities are to be weighed out into test tubes which have been fitted with rubber rings, the Explosives of Class 3, Division 1.

(1) Friable Nitro-glycerine preparations from which the nitro-glycerine or liquid nitro-compound cannot be conveniently extracted with water—
   (a) A cartridge of the sample to be tested is to be opened at one end and rotated with one hand while with the other contents of the cartridge are to be loosened by means of pressure between the thumb and forefinger. The first 12.7 mm. of the sample so loosened is to be rejected.
   (b) The cartridge is then to be inverted over the scoop and the loosening operation continued so as to transfer a portion of the explosive to the scoop.
   (c) When the weight of the sample in the scoop has been adjusted to 3.2 grammes the sample is to be transferred by means of the aluminium funnel to a heat test tubes collected at the bottom by gently tapping the side of the tube with the fingers and pressed down to a height of 3 centimetres by means of the flat-headed glass rod. The sample is then ready to be heat tested.

(2) Blasting Gelatine and Analogous Preparations—
   (a) The wrapper of the cartridge is to be opened out and 12.7 mm. of the sample is to be removed with the spatula and rejected. A price weighing 3.2 grammes as nearly as can be judged is then to be cut off for test. The sample is to lie on its own wrapper during these operations, and direct contact of the operator’s hands with the sample is to be avoided.
   (b) The portion of the sample removed is to be weighted in the scoop and pieces added to, or removed from it, until 3.2 grammes are obtained. This quantity is then to be transferred to the mortar. 6.5 grammes of French Chalk are to be weighed out using the spatula and scoop and also transferred to the mortar.
   (c) The sample is to be incorporated with the French Chalk by repeatedly squeezing it with the end of the pestle, until it is in a condition in which it can be ground. The times for normal samples should generally be as follows:

   Blasting gelatine 1 ½ minutes.
   Gelatine dynamite 1 minute.
   Gelignite and Similar Explosives containing less than 63 per cent of Nitro-glycerine ½ minute.

   The mixture is then to be ground by a circular movement of the pestle for a further period of half a minute, and should then be homogenous in appearance.

   (d) The mixture is to be transferred to a test-tube by means of the horn spatula and the aluminium funnel, and gently pressed down to a height of 5 centimetres with the flat headed glass rod. The sample is then ready to be heat tested.
(e) The pestle and mortar after each grinding are to be thoroughly washed with tap water, rinsed with distilled water, dried with a clean towel, and finally dried in a bath at 100°C. The pestle and mortar are to be allowed to cool to the ordinary temperature before being used again.

(3) Cordite, Ballistite and other propellants of Class 3, Division 1—

(i) Explosives in the form of sticks or tubes—
   (a) The operator is to wash his hands carefully, thoroughly rinse them in distilled water, and dry them with a clean towel.
   (b) The sticks or tubes to be tested are to be wiped out with clean filter paper.
   (c) The sample is to be reduced to a condition suitable for grinding in the cordite mill by being cut into small pieces about 3.175 mm. long by means of the cordite knife, 12.7 mm. being rejected from each end of the sticks or tubes to be tested.
   (d) The set of sieves with the lid removed is to be placed under the mill so as to allow the ground material to fall directly on the top sieve.
   (e) The cut sample is to be transferred from the cordite tray to the mill and ground. The first portion passing through the mill is to be rejected. A sufficient quantity of the sample is to be taken to ensure that enough material is obtained on the second sieve without grinding the whole quantity introduced into the mill.
   (f) The lid is to be replaced on the set of sieves and the sample is sieved for one minute. The material which remains on the second sieve is to be taken for heat test, except in the case of powder in sticks or tubes the nominal diameter of which is less than 0.762 mm. in this case, the material in the bottom compartment is to be taken for heat test.
   (g) 1.6 grammes of the ground and sieved sample are to be weighed out in the scoop, transferred by means of the aluminium funnel to a heat test tube and collected at the bottom by gently tapping the side of the tube with the fingers. Three such test quantities are to be weighed out. The sample is then ready to be heat tested.
   (h) The set of sieves and the cordite mill are to be cleaned with the cleaning brush before and after the preparation of each sample.

(ii) Explosives in the form of grains for small arms.—1.6 grammes of the sample is to be weighed out in the scoop, transferred by means of the aluminium funnel to a heat test tube and collected at the bottom by gently tapping the side of the tube with the fingers. Three such test quantities are to be weighed out. The sample is then ready to be heat tested.

Explosives of Class 3, Division 2

(1) Nitro-cellulose Pulp—
   (a) The operator is to wash his hands carefully, thoroughly rinse them with distilled water and dry them with a clean towel.
   (b) Six thicknesses of filter paper are to be laid on top of one another. Sufficient of the sample to be tested, to give about 5.6 grammes after the final pressing, is to be spread on the top sheet. Six other thicknesses of filter paper are to be similarly laid over the sample. The whole is then to be placed under pressure as, for instance, in a hand screw press, and pressure applied for three minutes. On removal from the press, the sample is to be rubbed up by hand on the filter paper and again pressed for three minutes on fresh filter paper. The sample is then to be transferred to the rectangular sieve and rubbed through it with the hand.
   (c) 5 grammes of the sieved sample are to be weighed out in the scoop and spread evenly on an aluminium tray.
(d) The oven is to have been brought to, and is to be maintained at a temperature of 48.9°C (120°F) the tray is to be placed in the oven and kept there for 15 minutes with the door closed.

(e) The tray is to be removed from the oven and the sample transferred to the top sieve of the set of sieves. The lid is to be replaced, and the sample sieved for two minutes. For this operation the second sieve is not to be used.

(f) The portion of the sample, which passes through, the top sieve is again to be spread evenly on an aluminium tray and exposed to the air of the room for four hours.

(g) 1.3 grammes of the exposed sample are to be weighed out in the scoop and transferred by means of the aluminium funnel to a heat test tube. Two such test quantities are to be so weighed out. The material in each is to be gently pressed down with the flat headed glass rod to a height of three centimeters. The sample is then ready to be heat tested.

(h) The wire sieve and the set of sieves are to be cleaned with the cleaning brush before and after each sample has been sieved.

(2) Compressed Guncotton:

(a) About 10 grammes of guncotton are to be removed from the centre of the primer or slab by scrapping with the horn spatula.

(b) The scrapping so obtained are to be placed in the glass beaker two thirds full of cold distilled water. The sample is to be frequently stirred up on the water during 15 minutes with the flat headed glass rod, and then allowed to settle. The water is to be poured off and replaced by a similar quantity of distilled water in which the sample is to be frequently stirred up as before during 15 minutes. After setting, the second wash water is to be poured off.

(c) The operator is to wash hands carefully, thoroughly rinse them with distilled water and collect the sample by hand squeezing out the excess of water.

(d) Six thicknesses of filter paper are to be laid on top of one another. The washed guncotton is to be spread on the top sheet. Six other thicknesses of filter paper are to be similarly laid over the sample. The whole is then to be placed under pressure as, for instance, in a hand screw press and pressure applied for three minutes. On removal from the press, the sample is to be rubbed up on the filter paper by hand and again pressed for three minutes on fresh filter paper. The sample is then to be transferred to the rectangular sieve and rubbed through it by hand.

(e) 5 grammes of the sieved sample are to be weighed out in the scoop and spread evenly on an aluminium tray.

(f) The above is to have been brought to, and is to be maintained at a temperature of 48.9°C (120°F). The tray is to be placed in the oven and kept there for 15 minutes, with the door closed.

(g) The tray is to be removed from the oven and the sample transferred to the top sieve of the set of sieves. The lid is to be replaced, and the sample sieved for two minutes. For this operation the second sieve is not to be used.

(h) The portion of the sample which passes through the top sieve is to be again spread evenly on an aluminium tray and exposed to the air of the room for four hours.

(i) 1.3 grammes of the exposed sample are to be weighed out in the scoop and transferred by means of the aluminium funnel to a heat test tube. Two such test quantities are to be so weighed out. The material in each is to be gently pressed down with the flat-headed glass rod to a height of three centimetres. The sample is then ready to be heat tested.
(j) The wire sieve and the set of sieves are to be cleaned with the cleaning brush before and after each sample has been sieved.

(3) **Nitro-cellulose Propellant** –

(i) Explosives in the form of sticks or tubes:

(a) The operator is to wash his hands carefully, thoroughly rinse them in distilled water, and dry them with a clean towel.

(b) The sticks or tubes to be tested are to be wiped with clean filter paper.

(c) The sample is to be reduced to a condition suitable for grinding in the cordite mill by being cut into small pieces about 3.175 mm. long by means of the cordite knife 12.7 mm. being rejected from each end of the sticks or tubes to be tested.

(d) The set of sieves with the lid removed, is to be placed under the mill so as to allow the ground material to fall directly on to the top sieve.

(e) The cut sample is to be transferred from the cordite tray to the mill and ground. The first portion passing through the mill is to be rejected. A sufficient quantity of the sample is to be taken to ensure that enough material is obtained on the second sieve without grinding the whole quantity introduced into the mill.

(f) The lid is to be replaced on the set of sieves and the sample is to be sieved for one minute. The material which remains on the second sieve is to be taken for heat test, except in the case of powder in sticks or tubes, the nominal diameter of which is less than 0.762 mm. in this case, the material in the bottom compartment is to be taken for heat test.

(g) 1.6 grammes of the ground and sieved sample are to be weighed out in the scoop, transferred by means of the aluminium funnel to a heat test tube, and collected at the bottom by gently tapping the side of the tube with the fingers. Three such test quantities are to be so weighed out. The sample is then ready to be heat tested.

(h) The set of sieves and the cordite mill are to be cleaned with cleaning brush before and after the preparation of each sample.

(i) The explosives in the form of grants for small arms—

(a) A quantity of the sample sufficient for the tests required is to be spread evenly on an aluminium tray.

(b) The oven is to have been brought to, and is to be maintained at a temperature of 48.9°C (120°F). The tray is to be placed in the oven and kept there for 15 minutes, with the door closed.

(c) The tray is to be removed from the oven and exposed to the air of the room for 4 hours.

(d) 1.3 grammes of the exposed sample are to be weighed out in the scoop and transferred, by means of the aluminium funnel to a heat test tube. Three such test quantities are to be so weighed out. The sample is then ready to be heat tested.

III—Application of the Test

(a) The water bath is to be fitted up and is to be levelled and filled with water up to the overflow. It is to be placed on a table of convenient height in such a position that the heat test tint can readily be observed by reflected light. No part of the apparatus is to be exposed to direct sunlight.

(b) The thermometer fixed in the rubber stopper, is to be inserted in the wire cage provided for the purpose on the under side of the water bath of 7.6 cm. The water is
heated to the required temperature, and maintained at a constant temperature and
depth. The temperatures for the various explosives are given in Table-I.

(c) The glass rod with platinum wire hook is to be inserted in the rubber stopper. A test
paper is then to be removed from the brown glass bottle by means of the forceps
placed on the glass plate so that its edges coincide with the lines on the plate, and
pierced by passing the needle through the paper and the hole in the plate. The test
paper is then to be held by means of the forceps, and a mixture of equal volumes of
distilled water and glycerine is to be applied to the upper edge of the test paper by
means of the glass rod of the dropping bottle in sufficient quantity to moisten the
upper half of the test paper by the time the test is complete. The platinum wire hook
of the glass rod is then to be passed through the hole in the paper. At no time is the
operator to touch the paper with his finger.

(d) The rubber stopper carrying the glass rod and test paper is at once to be firmly
pressed into the test tube containing the explosives to be tested until the bottom of the
stopper coincides with the top line etched on the test tube and the position of the
glass rod is to be adjusted, so that the lower edge of the wet portion of the test paper,
which edge is to be approximately horizontal, coincides with the middle etched line
on the test tube. The test tube is then to be inserted in one of the wire cages of the lid
of the water bath, so that the bottom line etched on the test tube coincides with the
upper surface of the lid. The rubber ring is to be pressed down on the bath and the cap
placed in position over the tube.

The quantities of the various explosives to be placed in the test tube are given in Table-I.
The test paper is not to be inspected by lifting the cap until shortly before the time
explosive ought to stand the test as given in Table-I.

(e) The test is completed when the faint brown line, which after time makes its
appearance at the margin between the wet and the dry positions of the test paper,
equals in depth of tint the brown line on the standard tint paper.

For any given explosives to pass the test, the time elapsing between the introduction of
the tube into the bath and the production of the tint equal to the standard must not be less
than the time given in Table-I.

After the test is finished, the explosive is to be carefully removed from the tubes, and the
tubes thoroughly washed out with tap water by means of the test tube brush. They are
then to be rinsed out and allowed to drain for a few minutes. The washing is repeated
with distilled water, the tubes rinsed, allowed to drain, and finally dried in a bath at 100°C.
The tubes are to be allowed to cool to the ordinary temperature before being used
again.

<table>
<thead>
<tr>
<th>Class</th>
<th>Division</th>
<th>Explosive Nature</th>
<th>Temperature of Heat Test Tested</th>
<th>Quantity of Explosive Heat Tested</th>
<th>Time explosive should stand the Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>1</td>
<td>Friable Nitro-glycerine preparations form which the Nitro-glycerine cannot conveniently be extracted by water.</td>
<td>0°C 71.1 (160°F)</td>
<td>3.2 grammes</td>
<td>Min 7</td>
</tr>
<tr>
<td>No</td>
<td></td>
<td>Blasting Gelatine, and Analogous preparations.</td>
<td>71.1(^\circ)C (160(^\circ)F)</td>
<td>3.2 grammes +6.5 grammes French chalk 1.6 grammes</td>
<td>10</td>
</tr>
<tr>
<td>----</td>
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<td>-----------------------------------------------</td>
<td>----</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>Nitro-cellulose, pulp, compressed Gun cotton.</td>
<td>76.7(^\circ)C (170(^\circ)F)</td>
<td>1.3 grammes 1.3 grammes</td>
<td>10</td>
</tr>
</tbody>
</table>

IV-Exudation and Liquefaction Test for Blasting Gelatine and analogous preparations

**Test for Liquefaction**

A cylinder of blasting gelatine is to be cut from the cartridge to be tested, the length of the cylinder to be about equal to its diameter and the ends being cut flat.

The cylinder is to be placed on end on a flat surface without any wrapper and secured by a pin passing vertically through its centre.

In this condition the cylinder is to be exposed for one hundred and forty-four (144) consecutive hours (six days and nights) to a temperature ranging from 29.4\(^\circ\)C to 32.2\(^\circ\)C and during such exposure the cylinder shall not diminish in height by more than one-fourth of its original height, and the upper cut surface shall retain its flatness and the sharpness of its edge.

Note:- If the blasting gelatine and gelatine dynamite to be tested cannot be made up in cylindrical form, the test is to be applied with necessary modifications.

There shall be no separation from the general mass of the blasting gelatine or gelatine dynamite of any intraglycerine or liquid nitro-compound under any conditions of storage, transport or use, or when the material is subjected three times in succession to alternate freezing and thawing or when subjected to the liquefaction test herein before described.

V-Picric Acid

(1) The material shall contain not more than 0.3 part of mineral or non-combustible matter in 100 parts by weight of the material dried at 71.1\(^\circ\)C (160\(^\circ\)F).
(2) It should not contain more than a minute trace of lead.
(3) One hundred parts of the dry material shall not contain more than 0.3 part of total (free and combined) sulphuric acid, of which not more than 0.1 part shall be free sulphuric acid.
(4) Its melting point should be between 120\(^\circ\)C and 122.8\(^\circ\)C.
VI- Testing Chlorate mixtures

The material must not be too sensitive and must show no tendency to increase in sensitiveness on keeping.

The material must contain nothing liable to reduce the chlorate.
Chlorites calculated, as potassium chloride must not exceed 0.25 per cent.
The material must contain no free acid, or substance liable to produce free acid.
Explosives of this class containing nitro-compounds will be subject to the heat test as they belonged to Class 3.

Note:--These explosive will considered too sensitive if they can be exploded however, partially by means of a glancing blow with a broom stick on soft wood such as deal.

VII—PETN Penta Erythritol Tetranitrate
(A) Heat Test:--
If the sample is received dry, it is to be transferred to a clean sheet of paper and mixed thoroughly in an atmosphere free from dust. Sample of moist PETN is to be dried prior to being heat tested by taking the same in a tared flat-bottomed dish and expose the dish and its contents in an oven at a temperature not exceed $60^0$ C until constant in weight.

1.3 grammes of the dry sample is carefully transferred to a heat test tube by means of the aluminium funnel. After removal of the funnel the sample is to be collected at the bottom of the tube by tapping with the fingers. It is then to be heat tested at a temperature of $76.6^0$ C and the time explosive should stand the test, should not be less than 10 minutes.

(B) Other tests and requirements—
(1) The PETN should be in the form of white crystals.
(2) It should be free from gritty particles, visible impurities and foreign matter.
(3) Melting point—The melting point of the PETN should be between $139^0$ C and $142^0$ C.
(4) Insoluble matter—The total insoluble matter in acetone should matter in acetone should not be more than 0.05 per cent.
(5) Volatile matter—Volatile matter should not be more than 0.15 per cent.
(6) Acidity—The acidity, calculated as HNO$_2$ should not exceed 0.01%.
(7) Alkalinity—The alkalinity, calculated as Na$_2$CO$_3$, should not be more than 0.01%.
(8) Nitrogen content—The nitrogen content should be not less than 17.40 per cent and not more than 27.80 per cent.