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# FORMAT FOR SYNOPSIS OF INDIAN STANDARDS

**Number and Title of the Indian Standard:** IS 17377 (Part 1):2020 Textiles — Nuclear Biological Chemical (NBC) Permeable Protective Clothing Part 1 Qualitative Method of Determining Breakthrough Time on Exposure to Chemical Warfare Agent — Sulfur Mustard (HD) [Doc: TXD 32(14498)]'

**Scope:**

**1.1** This standard covers the detailed procedures for test and evaluation of permeable protective clothing against sulfur mustard (HD).

**1.2** This standard specifies qualitative test methods to determine break through time of chemical warfare agent (CWA) challenge through swatches.

**1.3** It specifies the methods for HD breakthrough time (HD-BTT), mandrel, expulsion and inverted expulsion testing of swatches which gives indication of chemical resistance against HD.

**1.4** This standard provides relative ranking or material screening information about the ability of test materials to resist against HD breakthrough.

**1.5** This standard shall be employed as a quality control (QC) measure for developmental, pilot, bulk production and stored samples/lots.

**1.6** This standard does not cover any information regarding toxic industrial chemicals (TICs) and toxic industrial materials (TIMs).

**1.7** The definitions in this standard apply only to this specification and shall be the determining factor(s) when interpreting any word or combination(s) of words.

**1.8** This standard does not cover all the associated safety concerns for handling and testing of protective clothing against HD. It is the responsibility of the user to establish appropriate safety and health practices to determine the applicability of regulatory limitations prior to use.

**1.9** Nothing in this standard prevents to have higher level of protection for handling of CWAs.

**1.10** These tests shall not only be taken as measure of the protection time given by the tested material under actual used conditions.

**1.11** This standard alone is not sufficient to assess the ability of whole ensembles made from tested materials to protect the wearer. These procedures are designed to be used as part of an overall assessment program, evaluating the material performance, manufacturing and integration with other pieces of the protective ensemble.

**a) Salient features of content:**

**Sulfur Mustard – Break Through Time (HD-BTT) Test**

It is qualitative way to determine the HD penetration through fabric at 20 ± 1°C temperature at ambient pressure. The test is based on the generation of HCl gas by the reaction of HD with chlorinating reagent that is spot disc (SD) reagent which changes the color of congo red paper from pink to blue because of acidic nature. Break through time against HD shall be measured as the first appearance of blue spot on the congo red paper.

**Mandrel Test**

It is qualitative way to determine the HD penetrated through carbon coated fabric / protective clothing under stress for one hour duration under ambient temperature and pressure. The HD penetration is ascertained by using three color detector paper (TCD). TCD paper works on dissolution principle, as different chemical warfare agents dissolve different dyes and gives its respective color. Break through time against HD shall be measured as the first appearance of orange-red spot on the TCD paper.

**Expulsion and Inverted Expulsion Test**

It is qualitative way to determine the HD penetrated through carbon coated fabric/ protective clothing under pressure for one hour duration. The HD penetration is ascertained by using TCD. Break through time against HD shall be measured as the first appearance of orange-red spot on the TCD paper.

**b) Types/Grades/Classes; if any covered in the standard**: Nil