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Specification
This Issue:
Date:
Replaces:

RT-700
Issue 3
May 18, 2009
Issue 2

Harness System Chemical Agent Exposure and Decontamination

1. SCOPE

This specification covers the qualification requirements for a wire harness covering system when evaluated for resistance to the effects of exposure to chemical agents followed by decontamination. The tests described herein are only performed by test facilities approved by the US. Government. These tests are not conducted at a Tyco Electronics facility.

2. APPLICABLE DOCUMENTS

This specification takes precedence over documents referenced herein. Unless otherwise specified, the latest issue of referenced documents applies. The following documents form a part of this specification to the extent specified herein.

2.1 GOVERNMENT-FURNISHED DOCUMENTS

Military

FM 3-11 US army Field Manual for CBRN Decontamination
TOP 8-2-111 US Army Test Operation Procedure, NBC Contamination Survivability, Small Items of Equipment
AR-50-6 Chemical Surety, Nuclear and Chemical Weapons and Material

3. REQUIREMENTS

3.1 Agent offgassing, expressed in milligrams-minutes/cubic meter, shall not exceed the following limits when testing is performed in accordance with Section 4.4. These tests are typically conducted on cut plaques of Tyco Electronics harness materials submitted for testing.

Offgassing Limits Following Chemical Agent Exposure and Decontamination

Chemical Agent	Maximum Offgassing Limit* After Exterior Exposure	Maximum Offgassing Limit* After Interior Exposure
TGD	3.0	2.5
HD	100	50
VX	1.0	0.25

*expressed in milligram-minutes per cubic meter

3.2 No cracking visible to the unaided eye is permitted following the mandrel bend of Section 4.5.

4. TEST PROCEDURES

4.1 EQUIPMENT

Chemical fume hood
Steel tray to hold harness material specimen
Microsyringes
Toothbrushes
Offgas collection chamber of sufficient diameter and length to hold specimen.
Gas chromatograph with sensitivity appropriate to measure agent quantity at nanogram level.
MINICAM system for analysis of extracted air.

4.2 TEST SPECIMENS

Fabricate harness material test specimens in accordance with typical processes for the components to be evaluated. The specimens shall be molded, crosslinked and precut to fit the flow chamber apparatus.

4.3 CHEMICAL MATERIALS

Threat Agents

Chemical Agent TGD (thickened Soman)
Chemical Agent HD (mustard)
Chemical Agent VX (nerve agent)

Cleaning Agent

MIL-DTL-12468 Decontaminating Agent, STB (super tropical bleach) used in two concentrations: 5% and 40%. Preparation is per US. Army FM 3-11.5 (see note*)

4.4 EXPOSURE PROCEDURE

Danger: Due to the nature of the chemicals used in this exposure, this procedure shall only be performed in laboratories licensed by the government and suitably equipped for handling such materials and utilizing operators having appropriate training and knowledge of these materials.

The harness material exposure procedure consists of five chemical agent exposure-decontamination-agent offgassing measurement steps performed in the sequence described in Section 4.4.1 through Section 4.4.9. Perform the test at two specified chemical agent exposure levels: 1) an *exterior exposure level* of 10 grams per square meter and 2) an *interior exposure level* of 1 gram per square meter. Use a separate harness material for the entire sequence at each specified exposure level.

- 4.4.1 Place the harness material specimen in the tray inside the fume hood at a temperature of $23 \pm 3^{\circ}\text{C}$ ($73 \pm 5^{\circ}\text{F}$). Perform all of the chemical exposure and post exposure tests without removing the specimen from the fume hood.
- 4.4.2 Apply agent TGD to the surface of the harness material specimen at the exposure level selected from Section 4.4. Use a microsyringe to apply the agent and distribute 2 to 5 mm diameter droplets uniformly and assure that all surfaces are covered. Be sure that agent is placed on each component interface. Allow the agent to remain in contact with the harness material for a period of one hour.
- 4.4.3 Decontaminate the specimen by applying STB liberally with a toothbrush and scrub all surfaces vigorously. Allow the specimen to remain in contact with the STB for a total of 30 minutes then rinse with tap water for 7.5 minutes. Perform a second application of STB as before, allow to stand for 30 minutes and again rinse with tap water for 7.5 minutes. The total decontamination time for this sequence is 75 minutes.

***Note:** A 40% solution of STB is to be used to clean Threat Level 1 (10 gr/m^2); a 5% solution of STB is to be used to clean Threat Level 2 (1 gr/m^2)

4.4.4 Place the harness material specimen in the offgas collection chamber and close. Pass air at a volume flow rate of 0.3 liter per minute at $23 \pm 3^{\circ}\text{C}$ into the chamber and sample the air exiting from the opposite end. Determine the quantity of chemical agent in the air sample using the gas chromatograph. Make an immediate determination and then at hourly intervals for a total of 12 hours after decontamination.

4.4.5 Determination of total agent offgassing.

4.4.5.1 Find the offgassing for each individual determination from the expression:

$$\frac{M \times 60}{V}$$

Where: M = Mass of agent in milligrams determined by the gas chromatograph in Section 4.4.4

V = Volume of air in cubic meters sampled from the collection chamber for the individual determination.

4.4.5.2 Construct a curve of the individual values calculated in Section 4.4.5.1 plotted against time for the 12 hour period.

4.4.5.3 Determine the area under the curve either graphically or by use of a planimeter. This area is the total offgas result in milligram-minutes per cubic meter for 12 hours for the agent being measured.

4.4.6 Repeat Section 4.4.2 through Section 4.4.5 using agent HD.

4.4.7 Repeat Section 4.4.2 through Section 4.4.5 using agent VX.

4.4.8 Repeat Section 4.4.2 through Section 4.4.5 using agent HD.

4.4.9 Repeat Section 4.4.2 through Section 4.4.5 using agent TGD.

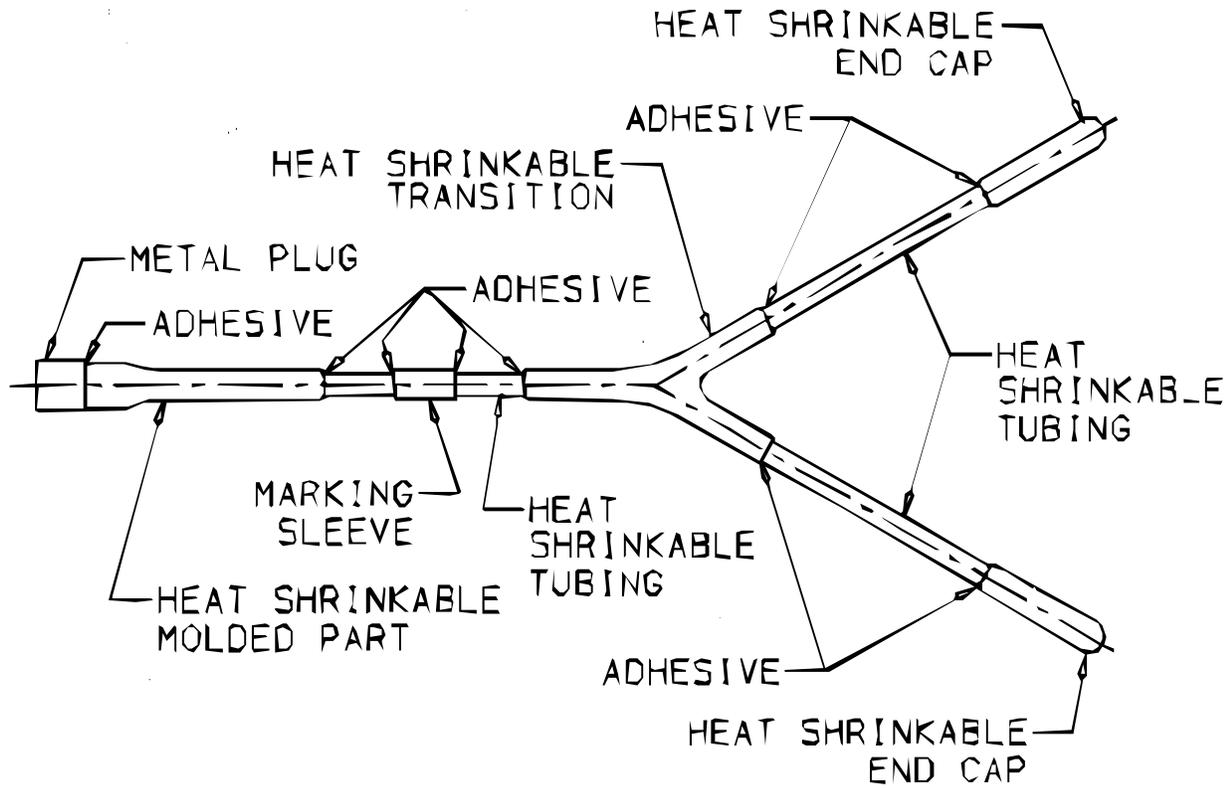


Fig 1

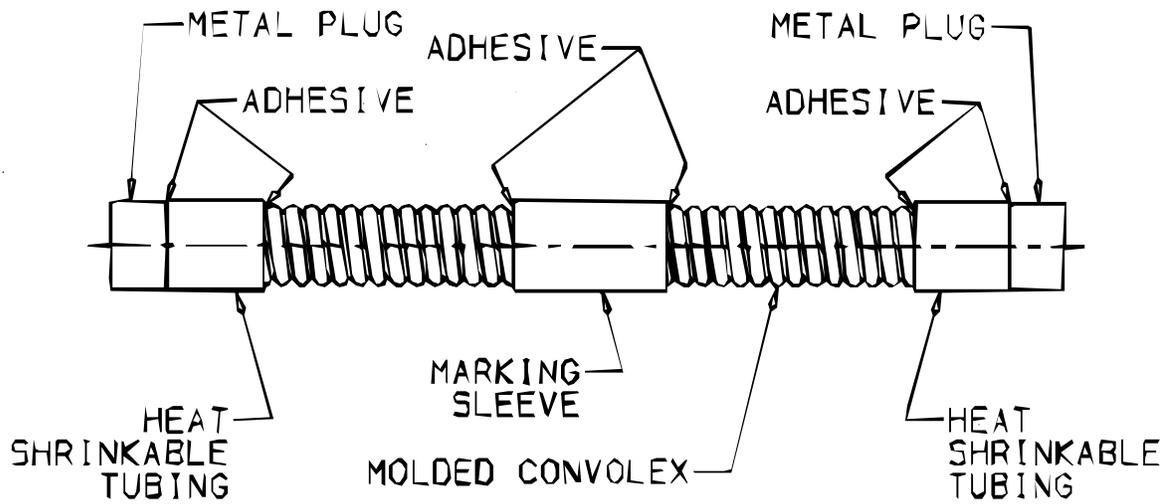


Fig 2
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