

**SECTION 1: PRODUCT AND COMPANY IDENTIFICATION****PRODUCT NAME:** Flame-Retardant Zero-Halogen Heat-Shrinkable Polymeric Products**MANUFACTURER:** Tyco Electronics Corporation**DIVISION:** Aerospace and Defense**ADDRESS:** 300 Constitution Drive  
Menlo Park, CA 94025-1164 USA**SUPPLIERS****EMERGENCY TELEPHONE NUMBERS:** US: CHEMTREC 1-800-424-9300  
CN: CHEMTREC 1-800-424-9300  
Outside North America: 1-703-527-3887  
(Collect calls accepted)**NON-EMERGENCY HEALTH/SAFETY INFORMATION:** North America: 1- 650-361-4907**CHEMICAL FAMILY:** Heat-Shrinkable Polymeric Products**SYNONYMS:** XFFR, ZH-100, ZH-SCE, ZHS, ZHTM, Molded Parts (-100, -101)**PRODUCT USE:** Typical uses of flame-retardant zero-halogen heat-shrinkable polymeric products include: wire and cable identification; component encapsulation; primary electrical insulation; EMI/RFI shielding; cable jacketing and repair; strain relief; waterproofing; corrosion protection; environmental/mechanical protection; cable joining, splicing, and termination in telecommunications applications.

This product is not hazardous when used as recommended or intended. If this product is overheated, charred, or burned the health and safety information presented in this MSDS may apply.

Thermal decomposition and combustion byproducts may be regulated under US-OSHA; CAN-WHMIS; IOSH; ISO; UK-CHIP; or EU Directives (67/548/EEC-Dangerous Substance Labelling, 98/24/EC-Chemical Agents at Work, 99/45/EC-Preparation Labeling, 2001/58/EC-MSDS Content, and 1907/2006/EC-REACH).

**SECTION 2: HAZARDS IDENTIFICATION****EMERGENCY OVERVIEW:** This product is not hazardous during proper installation, as directed by product installation guides. If overheated to degradation, most significantly if the product burns, thermal degradation and combustion byproducts may be toxic and should not be inhaled.

The thermal degradation and combustion byproducts will depend on the base polymer used, and may include, but are not limited to carbon monoxide, carbon dioxide, aldehydes (including formaldehyde), acetic acid, low molecular weight hydrocarbons, silicon dioxide, and oxides of nitrogen and sulfur.

**POTENTIAL HEALTH EFFECTS:**

Proper installation of this product creates no known acute or chronic health hazards.

**ACUTE HEALTH HAZARDS:****EYES:** This product is not expected to be an eye irritant. Contact with molten material may cause thermal burns.**SKIN:** This product is not expected to be a skin irritant. Contact with the molten material may cause thermal burns. No harmful effects are expected from skin absorption of this product.**INGESTION:** Ingestion of this product is highly unlikely. There is insufficient information available on this material to predict the effects from ingestion**INHALATION:** Thermal degradation and combustion byproducts may be toxic and should not be inhaled. (See comments below and the Thermal Degradation and Combustion Byproducts Section for more specific information.).

**CHRONIC HEALTH HAZARDS:**

None of the ingredients to which users may be exposed and which are present at equal to or greater than 0.1% of the product, are listed by OSHA, NTP, or IARC as suspect carcinogens.

**MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE:**

Overheating the product to charring or burning may produce vapors that may cause eye, skin, nose and throat irritation. Persons with pre-existing eye, skin, or respiratory disorders (e.g., asthma conditions) may be more susceptible to the effects of these vapors.

**SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS**

Not applicable – This product is a manufactured article.

Base polymer materials include polyethylene and olefin copolymers, polyamides, polyesters, and silicones. Heat-shrinkable products may be coated with or used in conjunction with adhesives/mastics, which are based on olefin copolymers or polyamides. Larger products may be coated on their exterior with an acrylic-based temperature-sensitive paint, which indicates to the installer when sufficient heat has been applied to cause the adhesive to flow.

NA – Not applicable      NE – Not Established      ND – Not determined

**SECTION 4: FIRST AID MEASURES**

**EYE CONTACT:** If eye irritation occurs, flush affected eye(s) immediately with clean water for at least 15 minutes while holding eyelids apart. Seek medical attention.

**SKIN CONTACT:** First aid is normally not required. After handling product, it is good work practice to wash your hands. If molten material contacts skin, cool area immediately in water. DO NOT attempt to remove material from the skin. Treat as a burn, and seek medical attention.

**INGESTION:** Not a normal route of exposure. However, if swallowed and symptoms develop seek medical attention.

**INHALATION:** In case of inhalation where symptoms of exposure develop, move victim to fresh air. If symptoms persist, seek medical attention. If breathing difficulties develop, oxygen should be administered by qualified personnel. If victim is not breathing, move to fresh air and immediately begin artificial respiration. Keep victim warm and quiet. Seek immediate medical attention.

**SECTION 5: FIRE-FIGHTING MEASURES****FLAMMABLE PROPERTIES**

**FLASHPOINT:** Not determined  
**METHOD USED:** Not applicable

**FLAMMABLE LIMITS**

**UPPER FLAMMABILITY LIMIT (% BY VOLUME):** Not applicable  
**LOWER FLAMMABILITY LIMIT (% BY VOLUME):** Not applicable

**AUTOIGNITION TEMPERATURE:** Not determined

**SUITABLE EXTINGUISHING MEDIA:**

Use carbon dioxide, water, dry chemical, foam or dry powder.

Selection of extinguishing media should be based upon the size of the fire, the firefighting training/experience of the individual attempting to extinguish or control the fire, and the packaging materials exposed to the fire.

**SPECIAL FIRE FIGHTING PROCEDURES & PROTECTIVE EQUIPMENT:**

Firefighters should wear self-contained breathing apparatus with a full-facepiece operated in the positive pressure demand mode when fighting fires. Use water spray to keep fire-exposed containers cool.

**UNUSUAL FIRE AND EXPLOSION HAZARDS:**

Toxic fumes may be given off in a fire. See also sections on Thermal Degradation and Combustion Byproducts and Other Precautions.

**SPECIFIC HAZARDS IN CASE OF FIRE:**

As with most organic materials, thermal degradation and combustion byproducts may be toxic and should not be inhaled.

**HAZARDOUS COMBUSTION PRODUCTS:**

The thermal degradation and combustion byproducts will depend on the base polymer used, and may include, but are not limited to carbon monoxide, carbon dioxide, aldehydes (including formaldehyde), acetic acid, low molecular weight hydrocarbons, silicon dioxide, and oxides of nitrogen and sulfur.

**SECTION 6: ACCIDENTAL RELEASE MEASURES**

**PERSONAL PRECAUTIONS:**

Wear appropriate personal protection when responding, as specified under Section 8: EXPOSURE CONTROLS / PERSONAL PROTECTION

**ENVIRONMENTAL PRECATIONS:**

Prevent spilled material from entering sewers and waterways.

**SPILL CONTAINMENT & CLEANUP METHODS/MATERIALS:**

Sweep up and collect in a suitable container for disposal or reuse.

**SECTION 7: HANDLING AND STORAGE**

**PRECAUTIONS FOR SAFE HANDLING AND STORAGE:**

**Handling:** Avoid any vapors given off if the product is heated to decomposition, as shown by a darkening and browning of the sleeve. Avoid contact with molten material. Heat-resistant gloves are required if hot products are handled after installation. Do not consume food, beverages or tobacco in the immediate work area. Wash hands before eating, drinking or smoking.

**Storage:** This product is stable under normal conditions.

**OTHER PRECAUTIONS (e.g.; Incompatibilities):**

Avoid heating products beyond temperatures required for normal installation. See installation instructions for proper installation procedures. If product chars or burns, immediately stop heating. Avoid inhaling any fumes, which may be given off under such circumstances. Allow vapors to disperse and ventilate before continuing work in the area.

**SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION**

**ENGINEERING CONTROLS/SYSTEM DESIGN INFORMATION:**

No special engineering controls needed when used during normal installation.

**VENTILATION:**

Provide general or local exhaust ventilation systems during installation.

**RESPIRATORY PROTECTION:**

If installation occurs in a confined, unventilated area, NIOSH/MSHA-approved respirators are recommended.

**EYE PROTECTION:**

Use safety glasses with side shield or goggles to prevent contact with eyes, as appropriate to the given operation.

**SKIN PROTECTION:**

Avoid skin contact with heated material. Use heat resistant rated gloves to prevent skin contact, as appropriate to the given operation. If it is necessary to handle grossly overheated or fire-damaged products, wear natural rubber gloves to prevent possible contact with potentially corrosive inorganic acid residues.

**OTHER PROTECTIVE CLOTHING OR EQUIPMENT:**

None

**EXPOSURE GUIDELINES & LIMITS:**

There are no established exposure limits for polymer mixtures.

OSHA	Permissible Exposure Limit (PEL/TWA)	NE
ACGIH	Threshold Limit Value (TLV)	NE
Quebec	Permissible Exposure Value (PEV)	NE
United Kingdom	Occupational Exposure Standard (OES)	NE

TWA – 8-Hour Time Weighted Average NE – Not Established

**SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES**

<b>APPEARANCE:</b>	Plastic marker sleeves, tubing and molded parts in a variety of shapes, sizes and colors.
<b>ODOR:</b>	No Odor
<b>ODOR THRESHOLD:</b>	Not applicable
<b>PHYSICAL STATE:</b>	Solid
<b>pH:</b>	Not applicable
<b>BOILING POINT:</b>	Not applicable
<b>MELTING POINT:</b>	Not applicable
<b>FREEZING POINT:</b>	Not applicable
<b>VAPOR PRESSURE (mmHg @ 20°C):</b>	Not applicable
<b>VAPOR DENSITY (AIR = 1):</b>	Not applicable
<b>VOLATILITY (% by Volume)</b>	Not applicable
<b>SPECIFIC GRAVITY (H<sub>2</sub>O = 1):</b>	Not applicable
<b>EVAPORATION RATE (Butyl acetate=1):</b>	Not applicable
<b>SOLUBILITY IN WATER:</b>	Insoluble
<b>FLASH POINT:</b>	Not applicable
<b>AUTO-IGNITION TEMPERATURE:</b>	Not applicable
<b>LOWER EXPLOSIVE LIMIT (LEL):</b>	Not applicable
<b>UPPER EXPLOSIVE LIMIT (UEL):</b>	Not applicable
<b>PARTITION COEFFICIENT:</b>	Not applicable
<b>VISCOSITY (centipoise @ 25° C):</b>	Not applicable
<b>DECOMPOSITION TEMPERATURE:</b>	Not established

**FLAMMABILITY/HMIS HAZARD CLASSIFICATIONS (US/CN/EU):**

Not applicable – This product is a manufactured article.

HEALTH:

FLAMMABILITY:

REACTIVITY:

**SECTION 10: STABILITY AND REACTIVITY**

<b>STABILITY:</b>	This product is stable under normal conditions, at ambient temperature.
<b>INCOMPATIBILITY (MATERIAL TO AVOID):</b>	None known.
<b>HAZARDOUS DECOMPOSITION OR BY-PRODUCTS:</b>	See Section 5: FIRE FIGHTING MEASURES (Hazardous Combustion Products).
<b>HAZARDOUS POLYMERIZATION:</b>	Will not occur. No known polymerization conditions to avoid.
<b>CONDITIONS TO AVOID:</b>	Avoid overheating of product.

**SECTION 11: TOXICOLOGICAL INFORMATION****ACUTE TOXICITY (Test Results Basis and Comments):**LD<sub>50</sub> (Oral, Rat): Not determined.LC<sub>50</sub> (Inhalation, Rat): Not determined.**ROUTES OF ENTRY/EFFECTS OF ACUTE OVEREXPOSURE:**

If overheated to degradation, most significantly if the product burns, thermal degradation and combustion byproducts may be toxic and should not be inhaled. Combustion byproducts may cause eyes, skin, nose, and throat irritation.

**SUBCHRONIC/CHRONIC TOXICITY (Test Results and Comments):**

Not determined

**IRRITANCY OF PRODUCT:** Vapors from the heated product may cause irritation of the eyes, skin, nose, and throat.

**SENSITIZATION TO MATERIAL:** Not determined.

**CARCINOGENICITY:** Not determined.

**REPRODUCTIVE TOXICITY:** Not determined.

**TERATOGENICITY:** Not determined.

**MUTAGENICITY:** Not determined.

**TOXICOLOGICALLY SYNERGISTIC PRODUCTS:** Not available.

**SECTION 12: ECOLOGICAL INFORMATION**

**PERSISTENCE & DEGRADABILITY:**

No data available on biodegradation.

**BIO-ACCUMULATIVE POTENTIAL (Including Mobility):**

No data available on bioaccumulation.

**AQUATIC TOXICITY (Test Results & Comments):**

No data available on aquatic toxicity.

Additional Information

- No known effects on stratospheric ozone depletion.
- Water Endangering Class (WGK): NA

**SECTION 13: DISPOSAL CONSIDERATIONS**

**WASTE DISPOSAL METHOD:**

Treatment, storage, and disposal must be in accordance with applicable, federal, state, provincial, and local regulations.

**HAZARDOUS WASTE**

Not applicable during normal installation. If product chars or burns, consult with applicable, federal, state, provincial, and local regulations for acceptable disposal methods.

**CLASS/CODE:**

US - Not applicable to material as manufactured for distribution into commerce.  
 CN – Not applicable to material as manufactured for distribution into commerce.  
 EWC – Not applicable to material as manufactured for distribution into commerce.

Additional Information

Not Included – Dispose/Recycle as allowed by local jurisdiction for the end-of-life characteristics as-disposed.

**SECTION 14: TRANSPORT INFORMATION**

**GROUND – US-DOT/CAN-TDG/EU-ADR/APEC-ADR:**

Proper Shipping Name	Not Subject to HMR		
Hazard Class	NA	ID Number	NA
Packing Group	NA	Labels	NA

**AIRCRAFT – ICAO-IATA:**

Proper Shipping Name	Not Subject to DGR		
Hazard Class	NA	ID Number	NA
Packing Group	NA	Labels	NA

**VESSEL – IMO-IMDG:**

Proper Shipping Name	Not Subject to IMDG		
Hazard Class	NA	ID Number	NA
Packing Group	NA	Labels	NA

Additional Information

- Transportation must be in accordance with applicable, federal, state, provincial, and local regulations.
- Transport requires proper packaging and paperwork, including the Nature and Quantity of goods, per applicable origin/destination/customs points as-shipped. Statement of Jurisdictional/Modal Special Provision(s) required.

- Not restricted for any mode of international transport as finished goods.
- Not a Marine Pollutant as-shipped per IMO/IMDG.

**SECTION 15: REGULATORY INFORMATION**

**INVENTORY STATUS:**

All components are listed on the TSCA; EINECS/ELINCS; and DSL, unless noted otherwise below.

**U.S. FEDERAL REGULATIONS:**

**TSCA Section 8b – Inventory Status:** All chemicals comprising this product are either exempt or listed on the TSCA Inventory.

**TSCA Section 12b – Export Notification:** If the product contains chemicals subject to TSCA Section 12b export notification they are listed below:

<u>Chemical</u>	<u>CAS #</u>
None	NA

**CERCLA (COMPREHENSIVE RESPONSE COMPENSATION, AND LIABILITY ACT)**

Chemicals present in the product which could require reporting under the statute:

<u>Chemical</u>	<u>CAS #</u>
None	NA

**SARA TITLE III (SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT)**

If the product contains chemicals subject to the reporting requirements of Section 313 of SARA Title III, they are listed below.

<u>Chemical</u>	<u>CAS #</u>	<u>% wt</u>
None	NA	NA

**CERCLA SECTION 311/312 HAZARD CATEGORIES:** Note that this product is exempt from these regulations.

Fire Hazard	No
Pressure Hazard	No
Reactivity Hazard	No
Immediate Hazard	No
Delayed Hazard	No

**STATE REGULATIONS (US):**

**California Proposition 65**

The following chemicals identified to exist in the product as distributed into commerce are known to the State of California to cause cancer, birth defects, or other reproductive harm:

<u>Chemical</u>	<u>CAS #</u>	<u>% Wt</u>
None	NA	NA

**INTERNATIONAL REGULATIONS (Non-US):**

**Canadian Domestic Substance List (DSL)**

Not applicable.

**WHMIS Classifications**

Not applicable.

This product has been classified in accordance with the hazard criteria of the *Controlled Products Regulations* and the MSDS contains all of the information required by the *Controlled Products Regulations*."

**NPRI and Ontario Regulation 127/01**

This product contains the following chemicals subject to the reporting requirements of Canada NPRI and/or Ont. Reg. 127/01:

<u>Chemical</u>	<u>CAS #</u>	<u>% Wt</u>
None	Not applicable.	Not applicable.

**European Inventory of Existing Commercial Chemical Substances (EINECS)**

All ingredients remaining in the product as distributed into commerce are exempt from, or included on, the European Inventory of Existing Commercial Chemical Substances.

European Communities (EC) Hazard Classification according to directives 67/548/EEC and 1999/45/EC.

**R-Phrases**

Not applicable.

**S-Phrases**

Not applicable.

**Additional Information**

This product may be regulated under additional regulations and laws not identified above, such as for uses other than described or as designed/intended by the manufacturer, or for distribution into specific domestic destinations.

**SECTION 16: OTHER INFORMATION****OTHER INFORMATION:**

Distribution into Quebec to follow Canadian Controlled Product Regulations (CPR) 24(1) and 24(2).

Distribution into the EU to follow applicable Directives to the Use, Import/Export of the product as-sold.

**MSDS/SDS PREPARATION INFORMATION:**

**Department Issuing MSDS:** Tyco Electronics, Menlo Park

**DATE OF ISSUE:** **April 3, 2009**

**SUPERSEDES:** **March 10, 2009**

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**END**