Designation: C930 – 12

Standard Classification of Potential Health and Safety Concerns Associated With Thermal Insulation Materials and Accessories[1]

This standard is issued under the fixed designation C930; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

This standard has been approved for use by agencies of the Department of Defense.

1. Scope

1.1 This classification identifies potential concerns and effects that could result from direct contact with thermal insulation materials and accessories, or be caused by indirect action of events such as aging, fire, or physical disturbance.

1.2 *Intent of Classification:*

1.2.1 It is the intent of this classification to alert others to potential concerns, effects, hazards, or risk.

1.2.2 It is not the intent of this classification to establish the degree of risk or hazard or limiting values of potential hazards.

1.2.3 It is not the intent of this classification to establish or recommend methods or markings to reduce or mitigate the potential; however, it is recognized that correct procedures and precautionary measures can substantially reduce or eliminate some of the potential concerns, effects, hazards, or risks.

NOTE 1—See Appendix X1 for commentary.

1.3 This classification recognizes the responsibility of producers and users, as appropriate, to: (*1*) provide information on known effects or hazards, (*2*) advise on established safety and health practices, and (*3*) determine applicable regulatory requirements.

1.4 This classification does not address the health and safety concerns of thermal insulation materials and accessories during manufacture.

1.5 Omission of an item from this classification does not imply an absence of potential concerns or effects.

1.6 There is no importance in the order of listing.

2. Referenced Documents

2.1 *ASTM Standards*[2]

C1055 Guide for Heated System Surface Conditions that Produce Contact Burn Injuries

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *degree of risk*—the probability or expected frequency of the event, multiplied by the expected magnitude of exposure and the potential for harm.

3.1.2 *direct contact*—the straightforward touching resulting from use, manipulation, placement, etc.

3.1.3 *hazard*—a condition or set of circumstances that presents a specific injury or adverse health potential.

3.1.4 *indirect action or events*—the actions or events that are not directly created by, or straightforwardly caused by, the person(s) potentially exposed to the effects or hazards.

3.1.5 *potential*—the possible as opposed to the actual; that which may, but has not yet, come into being; that which is latent, unrealized.

3.1.6 *risk*—the exposure to chance of injury or illness or loss.

4. Significance and Use

4.1 The purpose of this classification is to identify potential concerns and effects which may occur during the life cycle (installation, service, removal, and disposal) of insulation materials and accessories resulting from direct contact or indirect action or events.

4.2 This classification does not identify remedial or preventive steps that may be taken to correct potential problems or

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

hazards; rather it is intended as a checklist that will make it easier to deal constructively with these potentials, and to determine what, if any, specific requirements need to be added to other standards concerning insulation materials or accessories. (See Appendix X2 for sources of information.)

4.3 This classification recognizes that proper handling and installation procedures can substantially reduce the potential concerns and effects. Further, it recognizes that in some situations the presence or creation of potential effects or hazards results from an intervening act of human or natural origin, or depends on access to or contact with the materials or accessories. Lack of compatibility of the individual components of an insulation system with each other or the environmental conditions within which the system will operate, or both, may create unanticipated effects. (See Appendix X3.)

5. Basis of Classification

5.1 Classification is based on several broad groupings of potential concerns that could result from direct contact with thermal insulation materials and accessories, or be caused by indirect actions or events.

5.2 Potentials that occur from direct contact or indirect action or events are described as follows:

5.2.1 *Potential Health Effects*—Those effects that create risk of temporary or permanent changes in normal body functions and biochemical activity. The latter may involve vapors (such as organic solvent fumes), corrosive liquids (acids, alkalies, and organics), and solids (usually high surface area particulates) that react with body tissues or fluids.

5.2.1.1 A Material Safety Data Sheet (MSDS) is required by the Occupational Safety and Health Administration (OSHA), U.S. Department of Labor (29CFR 1910.1200) for hazardous chemicals produced in the United States, or imported. (The MSDS for any product or material is issued and available from the organization producing the product or material.)

5.2.1.2 The MSDS for any insulation product, system, or accessory (including adhesives) should be obtained and reviewed to determine any potential effect on humans using or installing the material.

5.2.1.3 When *tests* are included in a standard, the MSDS for chemicals required ahould be reviewed to ensure that proper guidance for safe handling and use is incorporated.

5.2.2 *Potential Traumatic Injury Effects (*Table 1*)*—These effects may result from sharp or rough materials or accessories which have protrusions or abrasive surfaces, cause overheating, or transmit electrical energy, and generally require direct contact with the material or accessory causing lacerations, abrasions, punctures, etc.

5.2.3 *Potential Effects Resulting from Combustion (*Table 2*)*— Those effects that result principally from the emission of heat, gases (toxic and non-toxic), fibers, particulates, and depletion of oxygen which takes place during combustion that exposes or involves insulation materials or accessories.

5.2.4 *Potential Effects from Structural Conditions (*Table 3*)*—Those effects that result principally from the overloading or deterioration of structural members of a building resulting in failure of the structure, or a portion of it, and its collapse on occupants.

TABLE 1 Potential Traumatic Injury

Insulation Product, System, or Accessory	Potential Exposure	Potential Effect on Humans
Cellular glass	abrasive surface	Contact may abrade skin
Encapsulated or reflective insulation	high surface temperature	Contact may cause thermal burns.
Insulation materials and accessories	application of thermal insulation around or adjacent to electrical wiring or fixtures (particularly important if the covering on the electrical circuit is old) may produce:[A]	
	(*a*) overheating that could result in deterioration of the wire covering and contact with electrical energy	Electrical shock
	(*b*) if subject to moisture accumulation could result in deterioration of the wire covering and contact with electrical energy	Electrical shock
	(*c*) overheating that could result in fire	Thermal burns
Man-made vitreous fibers: Glass Mineral wool Refractory	fiber stalks or bundles	Contact may abrade or puncture skin.
Metal encapsulated or reflective insulation	electrically conductive	Contact may transmit electrical energy if touching an electrical circuit resulting in minor or serious electrical shock.
Metal foil	electrically conductive	Contact may transmit electrical energy if touching an electrical circuit resulting in minor or serious electrical shock.
Sheet metal lagging, bands, fasteners, sheet metal	sharp or pointed edges	Contact may cause skin cuts, tears or punctures.

[A] Also see Table 3.

TABLE 2 Potential Effects Resulting from Combustion

Insulation Product, System, or Accessory	Potential Exposure	Potential Effect on Humans
Adhesives, coatings, and mastics containing solvents	combustion of flammable or combustible solvents, during application or from residual solvents	Thermal burns and other effects from flame, flashover or explosion. Impaired vision from smoke. Toxic effects[A]
Organic polymeric foams	combustion of organic materials	Thermal burns. Impaired vision from smoke. Toxic effects[A]
Organic fibers: Animal hair Cellulosic Vegetable	combustion of organic materials	Thermal burns. Impaired vision from smoke. Toxic effects[A]
PVC jacketing	combustion of organic materials	Thermal burns. Impaired vision from smoke. Toxic effects[A]
Urea formaldehyde foam	combustion of organic materials	Thermal burns. Impaired vision from smoke. Toxic effects[A]
Vapor retarders-including asphalt-coated	combustion of organic materials	Thermal burns. Impaired vision from smoke. Toxic effects[A]
Insulations (principally fibrous) organically bound or impregnated	combustion of organic materials	Thermal burns. Impaired vision from smoke. Toxic effects[A]

[A]Toxicity of smoke and fumes depends on materials burning and intensity.

TABLE 3 Potential Effects Resulting from Structural Conditions

Insulation Product, System, or Accessory	Potential Exposure	Potential Effect on Humans
Insulation materials and accessories	contact with metal structural components may result in oxidation of the metal	Long term structural weakening or failure and collapse on occupants.
	additional weight load to structure plus snow or ice.	Structural failure and collapse on occupants if design characteristics are not reevaluated prior to installation.

5.2.5 *Guidance on Burn Injuries.* Guide C1055 provides guidance on burn injuries associated with heated system surface contacts.

6. Keywords

6.1 hazards; health effects; injurysafety

APPENDIXES

(Nonmandatory Information)

X1. COMMENTARY

X1.1 *Background of Standard*—The original concept was to develop two standards that alert task groups writing standards to safety and health concerns associated with thermal insulation materials and accessories *during* installation and *after* installation. Classification C930 – 80 resulted from a number of drafts and concerned the effects *during* installation.

X1.1.1 Subsequently attention was given to the effects *after* installation and a proposed classification standard proceeded through a number of drafts, with several new approaches to the classification and information presented. Finally it was agreed there was sufficient similarity between the existing standard (Classification C930 – 80) and the proposed, so that they should be combined into one standard (Oct. 1982 Subcommittee meeting).

X1.1.2 This revision combines the concerns and effects associated with thermal insulation materials and accessories during installation, and (after) when remodeling, or retrofitting, or as a result of indirect action or events.

X1.1.3 This is a resource document intended solely to alert standards writers and users of insulating materials and accessories to *potentials.* It is most emphatically *not* an evaluation of comparative risks, nor is it a predictor of inevitable problems. No effort has been made to address the numerous preventive or remedial measures available to manufacturers and users, even though it is recognized that many of these are routinely used. The user in a corporate sense has a responsibility to advise the installer (tradesman), as an employee, of the information supplied by the manufacturer.

X1.1.4 During deliberations on the revision of C930 – 80, many requests to add qualifying or explanatory phrases and footnotes that indicate increased or decreased potential risk with specific products were received. It became clear that this qualifying or explanatory information would move the classification into territory beyond its own scope by noting palliative measures and assigning degrees of risk to some products and

not others. Consequently it was agreed that the tables should not contain comparative risk information.

X1.1.5 The tables are non-qualitative, non-quantitative lists of potential hazards to be used by standards writers, manufacturers, and users who are responsible for taking the potentials into account. Thus they are no more, no less, than checklists.

X1.1.6 Since adoption of Classification C930 – 85, an OSHA (Occupational Safety and Health Administration, U.S. Department of Labor) Regulation on Hazard Communication 29CFR 1910.1200 has been implemented. The use and availability of Material Safety Data Sheets (MSDSs) has become widespread. MSDSs are more comprehensive and up-to date than Table 1 in Classification C930 – 85. Therefore, Table 1 has been deleted. Standards writers and users should refer to MSDSs and applicable federal, state, and local laws and regulations for potential health effects.

X1.2 *Summary of Changes in Classification C930 – 85:*

X1.2.1 *Descriptions of Terms Specific to This Standard*—This section replaced the former Section 2 on Definitions. All of the terms were new and relate to terms used.

X1.2.2 *Significance and Use*—This section was new. It focuses on identification of the potential concerns and effects that may occur during the life cycle (installation, service, removal, and disposal) of insulation materials and accessories, and points out that remedial or preventative steps are not identified.

X1.2.3 *Basis of Classification*—This section replaced the previous 4, "General Types of Hazard" of Classification C930–80. It reflects a new approach to the grouping and identification of potentials. All sections are concerned with potentials that may occur during and after installation.

X1.2.4 Table 1, *Potential Health Effects*—The terminology of products, etc., were upgraded and the quantifiers were removed from "potential effects on humans."

X1.2.5 Table 2, *Potential for Traumatic Injury*—This table replaced the former Table 2, "Mechanical Safety Hazards," and principally covers electric shock potentials.

X1.2.6 Table 3, *Potential Effects Resulting from Combustion*—This table reflects the intent of the previous Table 3.

X1.2.7 *Table 4, Potential Effects Resulting from Structural Conditions*—This new category recognizes that there may be an effect from moisture on certain structural components, or from uncontemplated additional weight load of added insulating materials. All items listed in the previous Table 4 of Classification C930 – 80 are now listed under Table 1 and Table 2.

X1.2.8 *Appendix X1*—This appendix provides details on the current changes to Classification C930.

X1.2.9 *Appendix X2*—This appendix continues the sources of information listed in Classification C930 – 80.

X1.2.10 *Appendix X3*—This appendix covers additional items of concern on possible situations where generalization is difficult, but where there may be lack of compatability between individual components of an insulation system. These items were contained in Section 4 of Classification C930 – 80.

X1.3 *Summary of Changes in Classification C930 – 92:*

X1.3.1 *Basis of Classification*—Paragraph 5.2.1 reflects a revised approach to identifying potential health effects on humans through use of the MSDS, which are readily available and which provide comprehensive, up-to-date information.

X2. SOURCES OF INFORMATION

X2.1 Where questions arise about the effects of a specific insulation component, by itself, or in combination with other materials in a system for use in a specific environment, the first source for knowledgeable information is the component or system manufacturer should be the first contact for information. Information from trade or industry associations, government agencies, and others shoud be regarded as secondary. Some specific sources are listed below.

American Conference of Governmental Industrial Hygienists
P. O. Box 1937
Cincinnati, OH 45201
American Industrial Hygiene Assn.
475 Wolf Ledges Parkway
Akron, OH 44311
American National Standards Inst.
1430 Broadway
New York, NY 10018
American Society for Testing and Materials
(Committees C16 and E-34)
100 Barr Harbor Drive
West Conshohocken, PA 19428
Asbestos Information Association/
North America
Crystal Plaza 4, Suite 509
1745 Jefferson Davis Highway
Arlington, VA 22202
Consumer Product Safety Commission
1111 18th St., N.W.
Washington, DC 20207
Department of Energy
1000 Independence Ave, S.W.
Washington, DC 20207
Environmental Protection Agency
401 M St., S.W.
Washington, DC 20460
Federal Trade Commission
Pennsylvania Ave. at 6th St., N.W.
Washington, DC 20580
Insulation Contractors Association of America

1321 Duke St., #303
Alexandra, VA 22314
International Isocyanate
Institute, Inc.
30 Rockefeller Plaza
New York, NY 10020
Library of Congress
10 First St., S.E.
Washington, DC 20540
Manufacturing Chemists Assn.
1825 Connecticut Ave., N.W.
Washington, DC 20009
National Academy of Sciences
2101 Constitution Ave., N.W.
Washington, DC 20418
National Association of Urea Foam Insulation
Manufacturers
8025 Dixie Highway
Florence, KY 41042
National Fire Protection Assn.
Batterymarch Park
Quincy, MA 02269
National Institute for Occupational Safety and Health
Center for Disease Control
1600 Clifton Rd.
Atlanta, GA 30333
National Research Council
2101 Constitution Ave., N.W.
Washington, DC 20418
National Roofing Contractors Association
8600 Bryn Mawr Ave.
Chicago, IL 60631
National Safety Council
444 N. Michigan Ave.
Chicago, IL 60611
National Science Foundation
1800 G St., N.W.
Washington, DC 20550
National Technical Information Service
U. S. Department of Commerce
5285 Port Royal Road
Springfield, VA 22161
North American Insulation Manufacturers Assn.
44 Canal Center Plaza, Suite 310
Alexandria, VA 22314
Occupational Safety and Health Administration
200 Constitution Ave., N.W.
Washington, DC 20210
Office of Toxic Substances, EPA
401 M St., S.W.
Washington, DC 20460
Polyisocyanurate Insulation Manufacturers Association
1001 Pennsylvania Ave, NW, 5th Floor
Washington, DC 20004
R&D Services, Inc.
PO Box 2400,
Cookeville, TN 38502
Reflective Insulation Manufacturers Association
4519 E. Lone Cactus Drive,
Phoenix, AZ 85050
Society of the Plastics Industry
1667 K Street, NW, Suite 1000
Washington, DC 20006–1301
Spray Polyurethane Foam Association
4400 Fair Lakes Court, Suite 105,
Fairfax VA 22033
Synthetic Organic Chemical Manufacturers Assn.
1850 M Street NW, Suite 700,
Washington, DC 20036–5810
Thermal Insulation Manufacturers Assn.
7 Kirby Plaza
Mt. Kisco, NY 10549
Underwriters Laboratories, Inc.
333 Pfingsten Rd.
Northbrook, IL 60062–2096
World Health Organization
525 23rd Street, N.W.
Washington, DC 20037

X3. OTHER CONCERNS

X3.1 Lack of compatability of the individual components of an insulation system with each other, or the environmental conditions within which the system will operate, or both, may create unanticipated potentials. Generalization about such potentials is difficult, but three examples may be illustrative, as follows:

X3.1.1 Under certain conditions, the presence of chloride ion can cause stress corrosion cracking failure of austenitic stainless steel. Some insulation materials may contain chlorides or act to collect chlorides from the environment in sufficient quantity to initiate such failure. If the stainless steel is serving to contain a hazardous material, failure of the steel will result in uncontrolled release of the hazardous material.

X3.1.2 Aluminum is frequently used as a protective and reflective surface in insulation systems. However, within the containment vessel of some types of nuclear power units, the use of aluminum is prohibited. The reason for this prohibition is that under loss of reactor coolant conditions, the reactor coolant (acidic) coming in contact with aluminum, generates hydrogen, creating potentially explosive conditions.

X3.1.3 Some high-flash point organic-based liquids (terphenyl compounds, hydraulic fluids, and others) have their autoignition temperature reduced by several hundred degrees Celsius when they are absorbed by some (calcium silicate is one)

insulations and then exposed to elevated temperatures. Spontaneous combustion can occur under such circumstances, at temperatures well below those considered safe for such liquids.

X3.1.4 The above examples are only three of many possible situations. Other potential concerns and effects not listed in this standard should be brought to the attention of ASTM Committee C16 for consideration and possible incorporation into this classification.