

OBSOLETE SPECIFICATION (1041126):
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CFC AND HCFC RESTRICTIONS STILL APPLY

Expanded Packaging Materials:
Prohibited Expansion Agents

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1.0 Introduction

1.1 Abstract

IBM is very concerned about the effects its products have on the environment. Fully halogenated chlorofluorocarbons (CFCs) and hydrogenated chlorofluorocarbons (HCFCs) are suspected of destroying the earth's protective stratospheric ozone layer and should not be used in the manufacture of expanded packaging materials (i.e. foam).

1.2 Purpose

1. To specify that chlorofluorocarbons (CFCs) and hydrogenated chlorofluorocarbons (HCFCs) are prohibited during any stage of the expanded foam manufacturing process.
2. To identify the types of foam packaging material that may contain prohibited expansion agents

1.3 Compliance

Compliance with the requirements herein will be enforced as a condition of purchase per IBM purchase contracts. When the requirements of this specification conflict with the Montreal Protocol, the U. S. Clean Air Act, or other legislation, the most stringent shall take precedence.

1.4 Definitions and Key Terms

Blowing Agent: Or, "expansion agent". A chemical or gas compound used to expand the resin to form a cellular foam structure.

CFC: Fully halogenated chlorofluorocarbons, suspected of reducing the stratospheric ozone layer when released into the atmosphere.

Expanded Foam: Expanded resinous material with a cellular structure, manufactured by the dispersion of a gas in the liquid resin, and the subsequent setting of the expanded mass.

Fabricated Foam: Foam, usually expanded and extruded in plank form, that is cut and/or pieced into its useful form.

Foam-In-Place: Two liquid components combined under heat to produce a polyurethane foam which is cast and formed around a particular shape. This process may be performed in either of two ways:

1. using a mold, as with pre-molding where finished cushions will be sent to the packager, or
2. using only the item to be packaged and the shipping carton, as with free-rise foam-in-place.

HCFC: Non-fully halogenated CFCs or hydrogenated CFCs; HCFCs have an additional hydrogen molecule.

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Molded Foam:	Foam that has been cast into a particular form and allowed to expand and form its cellular, bubble-like structure.
Montreal Protocol:	The international treaty, signed September 1987 in Montreal, Canada, aimed at reducing ozone-depleting CFCs and halons.
Primary Package:	The first layer of packaging in contact with the part.
Secondary Package:	The second layer, contains primary package(s).
Tertiary Package:	This includes the shipping container and all additional internal dunnage materials if any.
U. S. "Clean Air Act":	Public Law 101-549 Title VI Stratospheric Ozone Protection (104 STAT 2651) designed to limit ozone depleting substances (ODS)..

2.0 Scope

This specification defines the types of expansion agents that must not be used during any stage of production or manufacture of expanded foam materials. Expanded foam materials include, but are not limited to the following types:

- Expanded Polyethylene (EPE)
- Expanded Polypropylene (EPP)
- Expanded Polystyrene (EPS)
- Expanded Polyurethane (EPU)

This specification is applicable to suppliers of packaging materials and packaging components to IBM, its suppliers, and vendors performing work on contract for IBM.

2.1 Fully Halogenated Chlorofluorocarbons (CFCs) and Hydrogenated Chlorofluorocarbons (HCFCs)

This specification applies to expanded packaging materials manufactured using the five "Class I" (CFCs) and Class II (HCFCs) governed by the Montreal Protocol as well as other CFC expansion agents known to be prohibited by environmental legislation by State, Local, National and/or International authorities.

As of January 1, 1994, the U. S. Clean Air Act prohibits the sale or distribution of any **nonessential** plastic foam product which contains or is manufactured with a Class II substance. The U. S. Environmental Protection Agency has classified **all** expanded foam cushioning material as **nonessential**.

See Appendix A for a comprehensive list of prohibited substances.

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3.0 Packaging Material Molding Process

The process of creating molded foam cushions involves four major steps:

1. Resin Manufacturer: Unexpanded Polymer
2. Resin Manufacturer: Pre-Expansion into Bead Form
3. Foam Molder: Secondary Expansion
4. Foam Molder: Finished Part Molding

Step 2 above indicates where, during foam manufacture, CFCs and HCFCs are employed for the purpose of bead expansion. In order to determine if CFCs or HCFCs are used in the foam manufacturing process, one should look beyond the immediate packaging material supplier (i.e. molder or fabricator) to the resin manufacturer. Resin manufacturers commonly pre-expand the resin and ship the bead in a pre-expanded state. It is during this initial expansion of olefin materials that CFC or HCFC blowing agents are sometimes used. Molders typically further expand or process the bead prior to its molding, however, the molder's processing is normally void of CFCs or HCFCs. CFCs and HCFCs are prohibited from *ALL* stages of the manufacturing process.

Suppliers of all types of expanded packaging material and chemical components used for the processing of expanded packaging material (i.e. foam-in-place urethane components) must ensure materials have not been manufactured with or contain chlorofluorocarbons (CFCs) or hydrogenated chlorofluorocarbons (HCFCs). This group of suppliers includes, but is not limited to, the following:

- Molded foam material of all types
- Plank foam material of all types
- Pre-molded foam-in-place cushions
- Foam-in-place chemical systems

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4.0 Alternatives to CFCs and HCFCs

Other alternatives to CFC and HCFC blowing agents include:

- Hydrocarbons (e.g. Pentane), and
- Water or steam

These two elements are acceptable alternatives to fully halogenated chlorofluorocarbons (CFCs) and hydrogenated chlorofluorocarbons (HCFCs) and their use is not restricted.

5.0 Responsibilities of IBM's Suppliers

1. These requirements apply to all expanded packaging materials used to make shipments to IBM. They also apply to all expanded packaging materials purchased by IBM, and subsequently used by IBM for its part and product shipments.
2. Suppliers who use expanded foam materials for shipments to IBM or sell expanded foam materials to IBM, but do not manufacture and monitor all phases of the expanded foam being shipped, shall verify that their supplier of foam or foam resin does not use CFCs or HCFCs.
3. Suppliers should be prepared to provide IBM Purchasing with written certification that the expanded foam purchased by IBM is CFC and HCFC-free.
4. Suppliers should contact IBM Purchasing at a manufacturing or distribution location if they are in need of assistance in meeting our elimination objectives.

6.0 Local IBM Responsibilities

It is recommended that local Purchasing and Packaging Engineering groups set up site audit programs to assure expanded foam entering the manufacturing or distribution site is CFC and HCFC-free. These programs may vary depending upon the number of suppliers, number of parts received, etc.

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Appendix A: Prohibited Expansion Agents

Chemical Compound	Designation	Chemical Composition
Chlorofluorocarbon-11	CFC-11	CCl_3F
Chlorofluorocarbon-12	CFC-12	CCl_2F_2
Chlorofluorocarbon-13	CFC-13	CH_2ClCF_3
Chlorofluorocarbon-112	CFC-112	$\text{C}_2\text{Cl}_3\text{F}_3$
Chlorofluorocarbon-113	CFC-113	$\text{C}_2\text{Cl}_3\text{F}_3$
Chlorofluorocarbon-114	CFC-114	$\text{C}_2\text{Cl}_2\text{F}_4$
Chlorofluorocarbon-115	CFC-115	C_2ClF_5

Chemical Compound	Designation	Chemical Compound	Designation
Hydrochlorofluorocarbon-21	HCFC-21	Hydrochlorofluorocarbon-22	HCFC-22
Hydrochlorofluorocarbon-31	HCFC-31	Hydrochlorofluorocarbon-121	HCFC-121
Hydrochlorofluorocarbon-122	HCFC-122	Hydrochlorofluorocarbon-123	HCFC-123
Hydrochlorofluorocarbon-124	HCFC-124	Hydrochlorofluorocarbon-131	HCFC-131
Hydrochlorofluorocarbon-132	HCFC-132	Hydrochlorofluorocarbon-133	HCFC-133
Hydrochlorofluorocarbon-141	HCFC-141	Hydrochlorofluorocarbon-142	HCFC-142
Hydrochlorofluorocarbon-221	HCFC-221	Hydrochlorofluorocarbon-222	HCFC-222
Hydrochlorofluorocarbon-223	HCFC-223	Hydrochlorofluorocarbon-224	HCFC-224
Hydrochlorofluorocarbon-225	HCFC-225	Hydrochlorofluorocarbon-226	HCFC-226
Hydrochlorofluorocarbon-231	HCFC-231	Hydrochlorofluorocarbon-232	HCFC-232
Hydrochlorofluorocarbon-233	HCFC-233	Hydrochlorofluorocarbon-234	HCFC-234
Hydrochlorofluorocarbon-235	HCFC-235	Hydrochlorofluorocarbon-241	HCFC-241
Hydrochlorofluorocarbon-242	HCFC-242	Hydrochlorofluorocarbon-243	HCFC-243
Hydrochlorofluorocarbon-244	HCFC-244	Hydrochlorofluorocarbon-251	HCFC-251
Hydrochlorofluorocarbon-252	HCFC-252	Hydrochlorofluorocarbon-253	HCFC-253
Hydrochlorofluorocarbon-261	HCFC-261	Hydrochlorofluorocarbon-262	HCFC-262
Hydrochlorofluorocarbon-271	HCFC-271		

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