

**Health, Safety and Environmental
Requirements for
Composite Materials**

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Safety and Health Considerations -
Composite Materials
in the Aerospace Industry**

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- o Data required by chemical users to evaluate new materials**
- o Many data elements are regulatory requirements**
- o Data elements are grouped by the stage of product development**
 - emphasis on practical aspects of use**
 - tied to SACMA/AIA working groups**

PHASE I (PRE-ENGINEERING) EVALUATION

I. General Data: for the product

- o Chemical identification for each chemical**
- o % (wt.) of each chemical present in product, including impurities**
- o CAS number for all chemicals**
- o Physical properties of the material**
 - vapor pressure at 25°C**
 - VOC content (mass percent which is volatile per 40 CFR 51.165)**

PHASE I (PRE-ENGINEERING) EVALUATION

II. Toxicology: for resins, fibers, adhesives and their constituents

- o Primary skin and eye irritation**
- o Oral LD-50 or inhalation LD-50; dermal LD-50**
- o Guinea pig sensitization**
- o Genotoxicity-Ames test**

PHASE I (PRE-ENGINEERING) EVALUATION

III. Industrial Hygiene: for the product

- o Manufacturer's handling procedures**
- o Initial glove material and protective clothing material recommendation**

PHASE I (PRE-ENGINEERING) EVALUATION

IV. Medical Concerns

- o Existing medical condition(s) potentially aggravated by exposure**
- o First-aid treatment**

PHASE I (PRE-ENGINEERING) EVALUATION

V. Fire/Safety: for the product

- o Storage requirements**
- o Incompatibilities**
- o Flash point**
- o NFPA rating**
- o Exotherms**
 - Conditions for occurrence**
 - How to handle exotherm**
 - Chemical identity of chemicals/classes that are released**

PHASE I (PRE-ENGINEERING) EVALUATION

VI. Environmental: for the product

- o Toxic Substances Control Act Status**
- o SARA 313 listing**
- o SARA 311/312 hazard classifications**
- o Shipping codes (DOT, IATA, UN/NA)**
- o RCRA waste codes**

PHASE II (ENGINEERING) EVALUATION

I. Toxicology: for resins, fibers, adhesives and their constituents

- o One to four week subchronic toxicity**

- inhalation or dermal**

- tied to effects shown in acute tox tests**

- o Genotoxicity**

- Mouse Lymphoma**

- In Vivo Rat Bone Marrow Cytogenetics**

PHASE II (ENGINEERING) EVALUATION

II. Industrial Hygiene: for the product

- o Identification of chemicals that off-gas**
 - when taken from cold storage to room temperature**
 - during hot-iron operations in lay-up**
 - when a heat gun is used during cure**
 - during normal cure cycle**

PHASE II (ENGINEERING) EVALUATION

II. Industrial Hygiene: for the product (continued)

- o Physical characterization
of dust from machining
operations on cured
materials**

- % fibers/ % particulates**

- % respirable**

- o Chemical characterization
of dust from machining
operations on cured
materials**

**(eg., are original sensitizing
constituents being
released)**

PHASE III (PRE-PRODUCTION) FEASIBILITY

I. Toxicology

- o Need for specific studies to be based on an evaluation by manufacturer's and user's toxicologists**
- o Specific studies should be tied to health effects revealed in completed tox tests or effects observed in the workforce**

PHASE III (PRE-PRODUCTION) FEASIBILITY

II. Industrial Hygiene

- o Monitoring methods for air and surfaces**
 - collection medium**
 - analytical method**
- o Recommended TWA/STEL**
- o Is a "SKIN" notation needed for TWA?**
- o Specific glove material and protective clothing material recommendation**

PHASE III (PRE-PRODUCTION) FEASIBILITY

III. Medical Concerns

- o Bio-monitoring methods for early exposure monitoring**
- o Special clinical exams**
 - part of routine, annual physical**
 - additional exams indicating exposure**

PHASE III (PRE-PRODUCTION) FEASIBILITY

IV. ENVIRONMENTAL: for the product and constituents

- o TSCA PAIR/CAIR Status**
- o TSCA Inventory status
Section 8(b) and Section 5**
- o Section 8(d) list status**
- o Section 4 test rule status**
- o Section 8(e) submissions**
- o Aquatic toxicology**
 - Acute LC-50 daphnia**
 - Acute LC-50 minnows**

