



NOT MEASUREMENT  
SENSITIVE

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# DOE HANDBOOK

## AIRBORNE RELEASE FRACTIONS/RATES AND RESPIRABLE FRACTIONS FOR NONREACTOR NUCLEAR FACILITIES

Volume I - Analysis of Experimental Data



**U.S. Department of Energy**  
**Washington, D.C. 20585**

**AREA SAFT**

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*Airborne Release Fractions/Rates and Respirable Fractions*

*For Nonreactor Nuclear Facilities*

<b>Page / Section</b>	<b>Change</b>
p. 5-30, Section 5.4.1	Delete the first paragraph of this section since it contains erroneous information.



## 5.4 HEPA FILTERS

### 5.4.1 Thermal Stress

HEPA filters, both unused and removed from service due to high differential pressures (clogged), were tested using solid particles at a range of temperatures less than required for failure. The efficiencies of the filters prior to testing for 1.8  $\mu\text{m}$  particles ranged from 99.97% to 99.9999989%. Two high flow (2000 cfm) and one 1000 cfm HEPA filters with glass fiber media and various sealant and gasket materials were tested. No releases were found at temperatures below 150°C (175°C for one of the high flow filters). For the 1000 cfm type filter, the release rates for temperatures from 175°C and 190°C started at 1E-6/min and reduced to 5E-8/min within 1 hour (the lower limit of detection was 2E-8/min). The high flow HEPAs were tested to temperatures of 200°C and 250°C with release rates starting at 2E-4/min and 2E-5/min and reducing to 3E-7/min in 30 min and 2E-8/min in 60 min. The decay in release was exponential during the initial 30-minutes approaching the 60-min rate asymptotically. There was no release of contamination from a oven-fired, mineral sealant, high flow type filter at temperatures up to 350°C and the release in other types of HEPA filters is associated with the emission of smoke (binder, degradation of inert dust on filter, pyrolysis of gaskets). Thus, it appears that the heat-induced release from 1000 cfm HEPA filter prior to failure may be as high as 1E-5. It is assumed that HEPA filters destroyed by flame intrusion or by the impact of air at a temperature sufficiently high to melt the glass fiber are subjected to high temperature air to result in the release given above for heat-induced release. The RF is assumed to be 1.0 without an experimental basis. ARFs for high-flowrate HEPA filter may be an order of magnitude higher (1E-4). On these bases, bounding ARF and RF values for the impact of heat upon loaded HEPA filters are assessed to be 1E-4 and 1.0.