Exhaust Fans and Systems

Treatment (i.e., filtration, scrubbing, etc.) is generally not required for laboratory and fume hood exhaust systems due to high dilution within the systems.

Exceptions include:

- Perchloric/hot acid digestion hoods where a water wash system is required
- Systems conveying radioactive or biological exhaust streams where HEPA filtration is required

When modeling or use estimates show that airborne levels of hazardous chemicals would exceed exposure limits at the point of discharge or exceed applicable community exposure levels at ground level, exhaust stream treatment may be required. Note also that a source control may also be necessary when modeling catastrophic releases of gases classified as ?toxic? or ?highly toxic? using local codes.

Exhaust fans shall be oriented in an up-blast orientation. Rain caps, bird screens, and goosenecks are prohibited.

Any other type of fan orientation increases the fan workload and increases the risk of exhaust emission reentrainment. See the above ASHRAE reference for more guidance about rain protection that does not interfere with exhaust fan function.

**UC Practice**
ASHRAE Handbook of Fundamentals, Chapter 14

Laboratory ventilation exhaust fans shall be spark-proof and constructed of materials or coated with corrosion-resistant materials for the chemicals being transported. V-belt drives shall be conductive.

Corrosion-resistant materials reduce the cost of ownership and should be used for this reason alone. In addition, they can prevent the development of unsafe situations due to loss of structural integrity, leakage into or out of ductwork, etc.

**UC Practice**
NFPA 45

Fans should be provided with:

- Outboard bearings
- A shaft seal
- An access door
- Multiple 150-percent-rated belts or direct drives, unless there are demonstrated sound reasons not to use them.
Laboratory exhaust fans shall be located as follows:

- Physically outside of the laboratory building and preferably on the highest-level roof of the building served. This is the preferred location since it generally minimizes the risk of personnel coming into contact with the exhaust airflow.
- In a roof penthouse or a roof mechanical equipment room that is always maintained at a negative static pressure with respect to the rest of the facility, providing direct fan discharge into the exhaust stack(s).

Each fan shall be the last element of the system so that the ductwork through the building is under negative pressure.

All laboratory exhaust fans shall include provisions to allow periodic shutdown for inspection and maintenance. Such provisions include:

- Ready access to all fans, motors, belts, drives, isolation dampers, associated control equipment, and the connecting ductwork. It shall not be necessary for workers to enter a plenum.
- Isolation dampers on the inlet side of all centralized exhaust system fans that have individual discharge arrangements or their own individual exhaust stacks.
- Isolation dampers on both the inlet and outlet sides of all centralized exhaust system fans that discharge into a common exhaust stack or plenum.
- Sufficient space to allow removal and replacement of a fan, its motor, and all other associated exhaust system components and equipment by personnel using PPE without affecting other mechanical equipment or the need to alter the building structure.

If a centralized exhaust system has multiple fans, and a fan replacement is necessary, the process should not require disconnecting piping or removing other building encumbrances that might lead to an indefinite postponement of the required work.

Vibration isolators shall be used to mount fans. Flexible connection sections to ductwork, such as neoprene-coated glass-fiber cloth, shall be used between the fan and its intake duct when such material is compatible with hood chemical use factors.

Each exhaust fan assembly shall be individually matched (cfm, static pressure, brake horsepower, etc.) to each laboratory ventilation system.