



Preventative Maintenance Program – Background-

Proper maintenance of and the overall safety of fume hoods have come to the forefront of safety programs in the last couple of years. There are a number of contributing factors that can affect fume hood performance and safety. These include the age of the unit, its maintenance history, its history of use and the Safety standards of the user.

AGE OF THE UNIT

Fume hoods have a life cycle of 10 to 15 years depending on the severity of the conditions they are exposed to and frequency of use. Just like any other mechanical system, components age and wear; sash glass becomes hazy and brittle, pulleys and cables wear, components rust, liners stain, crack and deform and valves corrode. Once these systems start to fail the function of the fume hood is compromised and the risk to the operator can increase. Norlab offers newer units with updated features and can offer greatly enhanced safety systems.

MAINTENANCE HISTORY

Most fume hoods have little to no maintenance history. Traditionally most users do not even consider a maintenance program for their fume hoods until an incident occurs. This is against recommended practice by both the manufacturers and CSA Z316.5-04 standards. CSA Z316 states that a preventative maintenance program be instituted from the first day of use. This includes daily, monthly, bi-annually and annual maintenance inspections and tests. Norlab can assist in creating the program for the daily, monthly and bi-annual inspections and provide service from a factory approved technician for the annual inspection.

HISTORY OF USE

Most fume hoods change function over their life cycle. It is not uncommon to have multiple services added and removed, lattice installed or VAV systems or alarms connected. Most often this work is completed by other mechanical trades than Norlab. These other trades do not fully understand how a fume hood functions, and quite often inadvertently affect the sash operation or baffle placement. Even small changes can have a huge impact; an electrical cable laid across the top of the hood can contact the sash cable and begin to fray the cable resulting in sash cable failure, an apparatus support attached to the side panel of the hood may have a screw head protrude into the cable channel, and wear on the cable resulting in sash cable failure. Norlab recommends scheduled maintenance before and after any changes to ensure issues are captured and corrected before failure can occur.

SAFETY STANDARDS

Safety programs have evolved considerably over the last 5 to 10 years in all fields of construction and science. Safety professionals are now recognizing fume hoods as a safety device, and more care is being given to how they are used, where they are placed, how they are constructed, and ensuring yearly certification of air flow maintenance schedules. Norlab and our suppliers are on the forefront of new safety designs and offer new fume hoods with the latest in enhanced containment and safety systems. This includes the Hamilton Concept line of fume hoods, which along with new containment features offer a chain and sprocket drive sash system. This is a low maintenance system that addresses the concern of sash cable breakage.



Mitigating Operator Risk

THE GREATEST RISK TO AN OPERATOR COMES FROM LOSS OF CONTAINMENT OR SASH CABLE BREAKAGE.

LOSS OF CONTAINMENT

Fume Hoods “pull” air from the room through the air foil and sash opening across the work-surface to the baffles and out the top of the exhaust. A complex system of interacting air currents work together to contain the contaminated air inside the fume hood and away from the user. A loss of containment can occur due to a number of reasons. These can include, but are not limited to;

- Mechanical failure of the air handling units. Fan, make-up air, VAV system
- Improper placement of, or missing baffles
- Disruption of air flow from equipment or apparatus placed inside the hood. Equipment blocking the rear baffle or front airfoil can interrupt air-flow.
- Improper hood placement in a room. Properly designing the air handling systems, professional system balancing and third-party certification of performance on a fume hood at time of installation along with yearly re-certification to air-flow levels
 - Only mechanical companies that have experience with Laboratory design, NFPA, Fire Code and applicable CSA specifications should be used.
 - Care must be taken to inform fume hood users on proper use of the fume hoods.
- In addition to proper design and fume hood layout criteria as per CSA Z316, Norlab recommends air-flow alarms to our customers to monitor the air flow and alert operators in case of a change in air velocity. This alerts the operator to potentially dangerous operating conditions and allows for proper actions to be taken.

SASH CABLE BREAKAGE

The sash cable is part of the sash system and works together with the sash pulleys and weight basket. The cable is a 1/8" 17 wire x 9 strand stainless steel aircraft cable rated at over 12,000 lbs breaking strength. This far exceeds the weight of the sash; the cable will not break unless structurally compromised. The Pulleys the cable runs on are specifically designed for use with cables and consist of an outer concave housing with an independent bearing centre.

Sash cable breaks generally occur for two reasons;

- a. A sash cable pulley has failed causing the cable to drag across the pulley face. This increased friction causes the cable to fray and eventually break.
- b. A sash cable has come off the pulley and is rubbing on the frame of the fume hood. Where the frame bends sharp metal can be exposed that will fray and eventually break the cable.

PULLEY AND CABLE FAILURE IS COMPLETELY PREVENTABLE WITH PROPER MAINTENANCE SCHEDULES

Norlab can assist in creating the program for the daily, monthly and bi-annual inspections and provide service from a factory approved technician for the annual inspection.



CSA Z316.5-04 and Maintenance

CSA Z316.5-04 is the Canadian Standards Association Standard for Fume Hood design, construction and use in Canada. It defines what a fume hood is, how it functions, and to what standards it is built. The CSA standard also indicates a preventative maintenance schedule to prolong a fume hood's life cycle and improve safety.

The program consists of 4 types of maintenance. All activities should be documented in a maintenance log;

1. Daily Maintenance – verified daily by users
 - a. The work surface, baffles and sash are clean and free of debris
 - b. Controls for services such as water, gas and compressed air are labeled and functional
 - c. General illumination and switches are in working order
 - d. Sink drains are functional
 - e. Sash is operable and exhibits normal function. There should be no noticeable difference in the resistance of travel over previous function.
 - f. The airflow alarm is on and operational
2. Monthly Maintenance – Qualified maintenance staff and/or mechanical contractor
 - a. All GFCI plugs shall be tested
3. Bi-Annual Maintenance – The following shall be inspected and tested by qualified client maintenance staff and/or mechanical contractor;
 - a. Fan
 - b. Motor
 - c. Drive belt and shafts
 - d. Bearings
 - e. Visually inspect sash cable and pulley system. Verify cable is on rollers, no cable damage visible.
4. Annual Maintenance - The following shall be inspected and tested by qualified client maintenance staff and/or mechanical contractor (Mech/User) or Norlab (Norlab) as indicated;
 - a. Inspection of the sash mechanism (including sash and cables) for corrosion, damage, lubrication, proper operation and broken glass (Norlab)
 - b. Measuring of the fume hood face velocity, comparing the measurement to fume hood specifications (Norlab)
 - c. Verification of airflow monitor operation (Norlab)
 - d. Inspecting scrubbers (where equipped) and replacing media if necessary (Norlab)
 - e. Inspection and integrity of the liner (Norlab)



- f. Operation of the wash-down system (if equipped) (Norlab)
- g. Testing of the controls and services for proper operation (Norlab)
- h. Checking the stability and condition of the discharge stack (Mech/User)
Inspection of the sink drain for corrosion, leakage and blockage (Mech/User)
- i. Inspection of the fans (including fan blades, motors, drives and bearings) for proper operation and corrosion (Mech/User)
- j. Inspection of the condition of the exhaust ducting, particularly the integrity of the joints (Mech/User)
- k. Inspection of the interior ductwork, particularly at bends where substances can accumulate and cause corrosion and perforation (Mech/User)
- l. Verify the laboratory makeup air balance and it's temperature (Mech/User)
- m. 3rd party performance certification (Qualified testing company)

To assist with the inspection, Norlab provides a physical record of the inspection including the technician's notes on condition of the hood, sash systems and any work performed. Each form is individually numbered for ease of tracking. A corresponding numbered sticker is also placed on the side panel of the fume hood as a confirmation the yearly maintenance was performed and as a reminder for next year.