

# WOODWORKING/WOOD REFINISHING SHOP

## *Minimum Requirements*

These guidelines are based, in part, on the following:

- **NFPA 30** (Flammable/Combustible Liquids Code)
- **NFPA 33** (Standard for Spray finishing of flammable/combustible Liquids)
- **NFPA 664** (Standard for Prevention of Fires and Explosions in Wood Processing and Woodworking Facilities)
- **NFPA 101** (Life Safety Code)
- **NFPA 51B** (Standard for Fire Prevention During Welding, Cutting and Other Hot Work)
- **NFPA 70** (National Electric Code)
- **NFPA 10** (Standard for Portable Fire Extinguishers)

In addition to other referenced NFPA Standards by one or more of the above listed standards.

### **Construction**

The woodworking shop area and the furniture refinishing/spray area should be separated from all other occupancies, if any, within the same building by 2-hour fire rated construction.

The wood shop area should be separated from the refinishing area/spray room or booth area by minimum of one hour fire rated construction.

Unless local codes are more restrictive, the minimum fire rating of all walls, floors, and ceilings should be 1-hour fire rated construction.

All doors and door frames between the woodworking shop/spray area and any other occupancy within the building should be 2 hour fire rated self closing fire doors.

All doors and door frames between the woodworking shop and the spray area should be self closing 1 hour fire rated doors.

Aluminum shall **not** be used for structural support members or for walls or ceilings within the spray booth or spray room enclosure. Aluminum shall also NOT be used for ventilation ductwork associated with a spray room or spray booth.

Spray rooms or spray booths shall maintain a minimum distance of 3 feet to surrounding structural members and/or **all** combustible materials.

Paint storage rooms of 150 square feet or less should have a construction fire rating of one hour. Storage rooms of 151 to 500 square feet (Maximum) should have a construction fire rating of 2 hours.

Flammable liquid storage room doors should be listed for 1.5 hour fire doors with self closing devices.

Noncombustible liquid tight raised door sills or ramps at least 4 inches in height should be present within the interior of all flammable liquid storage rooms near exit doors from this area.

### **Wiring Spray Rooms/Spray Booth and Flammable/Combustible Liquids Storage Room Area**

All wiring within the facility should be installed by a licensed electrician in accordance with the National Electric Code.

All wiring within the spray room/spray booth AND flammable/combustible liquids storage/mixing room should be listed for Class I Division 1 locations (Explosionproof Locations). If Flammable/Combustible liquids are stored within a UL Listed or Factory Mutual Approved Flammable Liquids storage cabinet, the wiring only in the mixing/dispensing room has to be listed for Class I Division 1 locations.

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All lights within the spray room or spray booth should be Class I Division 1 Explosion proof type. An alternative is to install conventional recessed lights within the walls or ceilings and protect them from flammable/combustible vapors by installing sealed covers of wired or tempered glass over the fixtures and bulbs. No portion of these recessed fixtures should extend beyond the interior wall or ceiling of the spray room or booth.

All wiring, switches, outlets or other electrical device outside the spray booth but within 3 feet of any opening into the booth must be Class 1 Division 2 (i.e. Explosionproof type).

Spray finishing of flammable/combustible liquids must be performed within an enclosed or open faced spray booth. Spraying flammable/combustible liquids in an open area outside of a spray booth does not meet GMRC underwriting guidelines.

If the exhaust ventilation system is interlocked with the spray equipment (i.e. spray equipment **cannot** operate unless the ventilation system is in operation), all wiring within 5 feet horizontally and 3 feet vertically from an open face or open front spray room or spray booth shall be listed for Class I Division 2 locations.

If the ventilation system is NOT interlocked with the spray equipment, the Class I Division 2 wiring should be located within 10 feet horizontally and 3 feet vertically from the open face or open front spray room or spray booth.

All wiring within 3 feet of any door opening within an enclosed or open front spray room or spray booth should be listed for Class I Division 2 locations (Even if the ventilation is interlocked with the spray equipment).

### **Wiring a Woodworking Shop**

All wiring within the woodworking shop should be listed for Class II Division 1 areas (i.e. Dust ignitionproof wiring).

Any areas handling dry wood waste shall have Class II Division 1 electrical wiring, lights and equipment.

### **Exhaust Fans in Spray Room or Spray Booth**

An exhaust fan to maintain flammable/combustible vapors to a minimum within the spray room or booth must be present. The wiring to the exhaust fan must be Class I Division 1 Explosion proof wiring.

Exhaust fan motors, if within a spray area, must be **explosion proof** type, not just spark proof.

Belt Driven exhaust fans in a spray booth or room should have the belt and pulley assembly fully enclosed. Electrical motors driving exhaust fans should not be located inside the spray area and/or should not be located within exhaust ducts where flammable/combustible vapors may travel across the motor, unless the motor is rated for Class I Division 1 Locations.

Exhaust fan motors outside of the spray room or booth and outside of the ventilation system ductwork are not required to be explosionproof. The motor may be located outside the ventilation ductwork with an enclosed belt between the motor and the fan blades within the ventilation ductwork. The fan blades are required to be nonferrous type only.

Supports and holders for filters shall be constructed of noncombustible materials.

Filters shall be noncombustible type specifically listed for use near flammable/combustible liquid spray areas.

Overspray collection filters shall be readily removable or accessible for cleaning or replacement.

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### **Heating Units**

All furnaces or heaters should be UL Listed, AGA Listed, or tested by a reputable testing laboratory to confirm that the heaters are capable of functioning as intended. Heating equipment should be installed in accordance with the Manufacturer's recommendations.

**Unlisted woodstoves and/or unlisted heating appliances of any type are not permitted within this commercial occupancy.**

Whenever possible, heating appliances should be located outside the woodworking or wood processing area.

Heating Appliances should be kept clean and free of sawdust accumulations on the exterior jacket of the unit and within the internal portion of the appliance cabinet. Vacuum equipment specifically listed for use in Class II Division 1 areas should be used to remove sawdust from heating appliances on a frequent basis to maintain sawdust to a minimum within and on the heating unit. Compressed air should **not be used at any time** to remove sawdust from heating appliances, shelving units or other flat surfaces where sawdust may settle within the facility. Placing sawdust in suspension through the use of compressed air increases the probability of a dust explosion within the building.

There should be **no** open flames, infra-red heaters, spark producing equipment or heat sources inside the spray booth/spray room.

Heating units should be separated from the spray room/spray booth by one hour fire rated construction with no openings less than 8 feet above the floor between the furnace room and the spray room/spray booth. All doors into the furnace room should be from outside the building.

Heat ducts should terminate flush with the interior walls/ceilings of the booth or spray room. They should **not** extend into the room or booth.

The cold air return for the heating unit should be obtained from outside the building. **No** cold air return should come from the spray booth or woodworking shop.

The duct outlet into the booth/spray room should contain a noncombustible filter to prevent overspray from accumulating within the duct.

Frequent removal of sawdust within and on the heat ductwork within the woodworking shop should be conducted via Class II Division 1 vacuum equipment. This should help to prevent combustible sawdust from being placed in suspension due to air movement through the heat ducts. This should improve general housekeeping within the facility thus helping to reduce the probability of a fire and/or dust explosion within the facility.

### **Static Electricity**

Where equipment is subject to the accumulation of static electric charge within the woodworking shop, the accumulation of static electric charge shall be controlled by one of the following:

- Permanent bonding and grounding of production equipment
- Grounded metal combs to provide discharge paths
- PVC piping shall not be used as a component of a dust collection system
- Dust collection hoses shall be conductive and shall dissipate static electricity and shall be grounded.

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## *Minimum Requirements, continued*

### **Foreign Materials**

Wood stock shall be inspected for foreign materials such as nails, fencing, wires, metal straps etc. prior to being processed.

Foreign materials should be removed prior to the wood entering the processing area.

Prevention of foreign materials in dust collection systems shall be accomplished by frequent visual inspection of raw materials received and the use of magnets throughout the production process.

### **Flammable/Combustible Liquid Storage**

For minimum construction requirements for flammable/combustible liquids storage rooms, please see **construction requirements** listed above.

For minimum electrical requirements within the flammable/combustible liquid storage room, please see **wiring spray room/booth or flammable liquids storage room**, listed above.

Storage cabinets used to store flammable/combustible liquids should be UL Listed or Factory Mutual Approved Flammable Liquids Storage cabinets. These cabinets should be clearly labeled as to their contents (i.e. Flammable/Combustible Liquids). Signs should be posted on and near the cabinet that no smoking or spark producing equipment should be in operation near these cabinets.

There shall be not more than 3 approved/listed flammable liquids storage cabinets within any single fire division or processing area.

Any Single cabinet shall contain NOT more than 120 gallons of Class I, Class II or Class IIIA liquids of which not more than 60 gallons shall be Class I and Class II liquids. (Consult the MSDS Sheets on each chemical to determine its classification).

Dispensing or transfer of flammable/combustible liquids from containers, mixing of liquids and filling of containers **shall** be done only in a mixing room or in a spray room or spray booth where wiring is listed for Class I Division 1 locations (explosionproof wiring).

### **Dust Explosion Prevention**

Dust collection systems shall be designed to incorporate dust explosion venting equipment/devices.

Windows, doors, lightweight building material panels and/or listed explosion venting devices should be installed within exterior walls and roofs to relieve the pressures of an explosion should such an event occur. The design of the building should be such that the release of pressure through windows, doors, lightweight building panels, etc. will not weaken the structural integrity of the building. The pressure release through these openings should not allow pressures to enter adjacent interior spaces within the structure or within exposure buildings in the area.

### **Dust Collection**

Dust collection equipment should be installed near all nonsparking woodworking machines. The equipment should be specifically listed for use in woodworking occupancies (i.e. shop vacuums are not acceptable).

Dust collection equipment **shall** be in operation whenever woodworking machines are in operation to control potential dust being placed into suspension.

Every section of the collection system shall be sized for not less than the minimum air velocity and volume required to collect and transport the sawdust through the duct system and into the collection equipment.

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## *Minimum Requirements, continued*

Ductwork shall be metallic. **Exception:** Flexible ducting shall be permitted for final machine connection in a length not exceeding the minimum required for machine operation.

**Non-conductive** ducts, such as PVC pipes, shall not be permitted.

Ductwork shall be bonded and grounded to control potential static electricity.

Hoods or enclosures shall be designed and located such that wood dust particles generated will fall, be projected or be drawn into hoods or enclosures so as to minimize dust emissions without interfering with the safe and satisfactory operation of the machine.

All hoods and enclosures shall be of noncombustible construction unless protected with an automatic Sprinkler system.

Dust collection equipment (i.e. holding tanks or containers for collected saw dust) shall be constructed of noncombustible materials (exception: filter bags and explosion vent diaphragms fabricated from combustible materials shall be permitted).

Dust collectors shall be located outside.

### **Housekeeping**

Documented housekeeping and inspection programs shall be developed and documented. In an effort to reduce a potential dust explosion, National Fire Protection Association standards recommend dust on flat surfaces within the building not exceed 1/8 of an inch over 5 percent of the square foot area of the woodworking shop.

Any waste material or debris found in large enough quantity that the material is heavily coated or is in any way impeding the operation of powered or manual equipment, shall be collected and removed from the building immediately.

Combustible waste (i.e. scrap wood, shop cloths, paper related products) shall be placed in covered metal receptacles until removed to a safe exterior location for **daily disposal!**

Any metal collected through the clean-up process shall be separated from wood debris or combustible waste to prevent entry into the wood processing, dust collection or scrap wood hog.

Spaces inaccessible to perform frequent routine housekeeping, shall be sealed to prevent dust accumulation.

Combustible or flammable liquid spills or leaks should be cleaned up immediately and clean up materials (shop cloths etc.) along with potential oil soaked cloths or waste materials should be disposed of within an approved metal safety can with self closing lid. The contents of these safety cans should be removed to the exterior of the building **daily!**

Removal of dust from surfaces shall be in a manner that minimizes the generation of dust clouds. Blowing down with steam or compressed air or even vigorous sweeping shall be permitted **only** if the following requirements are met:

- The floor area and equipment shall be vacuumed prior to blow down.
- Electrical power and other sources of ignition shall be shut down, removed from the area or the equipment being used should be classified for use in Class II Division 1 or Division 2 locations (i.e. dust ignition-proof equipment).

**No smoking should be permitted within any portion of the building.**

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## *Minimum Requirements, continued*

### **Hot Work**

Hot work would include, but not be limited to the following:

- Welding
- Cutting
- Grinding
- Use of power actuated tools

Repair maintenance and installation of new equipment as well as other processes involving hot work may on rare occasions need to be performed within areas which are classified as Hazardous Locations. Hazardous locations may include, but not be limited to, areas where processes generate combustible dust on a frequent or occasional basis, where spray finishing of flammable/combustible liquids is performed and in areas where flammable/combustible liquids are stored or handled.

Prior to performing hot work in a hazardous location, alternatives such as the following should be considered:

- Could the hot work be performed in nonhazardous locations? Perhaps components being cut, welded, etc. could be moved to a nonhazardous location, work could be performed and then machine components, ductwork, etc. could be moved back into the hazardous location and installed without using hot work processes.
- Could flammable/combustible liquids and/or combustible materials be moved out of the area prior to performing hot work?
- Can all combustible materials, including combustible dust, be removed from the area in a safe manner prior to performing any hot work?

If the above cannot be performed the following should be addressed prior to performing any hot work:

- All flammable/combustible liquid spray operations should be ceased a minimum of 30 minutes prior to performing hot work and should not resume until 30 minutes after hot work has been completed.
- All dust producing equipment should be shut down a minimum of 30 minutes prior to performing hot work and processes producing dust should not resume for a minimum of 30 minutes after hot work has been completed.
- A fire watch should be established prior to performing any hot work. This should include selecting an individual familiar with the hazards of hot work, ability to identify hazards of materials/processes in the area where hot work is being performed and the ability/experience in operating a portable fire extinguisher designed for the area where hot work is being performed. This individual's sole responsibility should be to remain in the immediate area where hot work is being performed to identify/extinguish any fire or smoldering materials. An ABC Dry Chemical portable fire extinguisher should be available for use in the immediate area of the fire watch employee. The individual assigned the fire watch responsibility should have the ability at any time to stop hot work operations if it is determined it is unsafe to proceed. The fire watch should continue to identify/extinguish any flames or smoldering materials a minimum of 30 minutes after the hot work has been completed.

### **Machine Bearings**

All machines/equipment operated within a combustible dust producing location shall be monitored for proper operation and lubricated frequently to prevent potential frictional heating.



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## *Minimum Requirements, concluded*

Consideration should be given to purchasing alarms/safety monitoring equipment for bearings and related machine parts. This equipment should alert personnel working in the immediate area of a potential for frictional heating of bearings and related machine parts.

### **Control of Ignition Sources**

An assessment/evaluation of all combustible dust producing areas should be conducted on a frequent basis to identify and eliminate all potential sources of ignition. Numerous potential sources of ignition have been identified throughout this document. Ignition sources would include, but should not be limited to:

- Electrical equipment and wiring not designed for Class II Division 1 locations
- Static electricity
- Careless smoking
- Hot Work
- Friction Heating from overheated bearings
- Metal hand tools coming into contact with concrete or metal materials
- Any appliance with an open flame

### **Life Safety**

A minimum of two exits (neither of which can be an overhead door) to the exterior of the building should be present from the woodworking shop.

The exit doors should swing with the path of travel to the exterior of the building.

Illuminated exit signs should be present within the building.

Emergency Lighting units shall be present if one or more of the following conditions exist:

- The building is windowless or any portion of the shop is located below ground level.
- The building is 2 or more stories in height.
- The occupancy is subject to 50 or more persons above or below ground level
- The entire building is subject to 300 or more persons.

The maximum travel distance to reach an exit should not exceed 75 feet.

### **Portable Fire Extinguishers**

At least one 10 pound ABC portable fire extinguisher should be present for each 1000 sq. feet within the building.

The maximum travel distance to reach a portable fire extinguisher should not exceed 30 feet.

All portable fire extinguishers should be wall mounted in visible and easily accessible areas.

All fire extinguishers should be serviced by an outside fire extinguishing service contractor on an annual basis.

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