

Viron® Exhaust Hoods



VIRON® fabricates all exhaust hoods to our standard or to customer specifications. The exhaust hood may be fabricated to any thickness, size or shape and may be vented up, down, or at the end of the exhaust hood. Exhaust hoods can be fabricated out of any material which will suit our customers needs: PVC, Polypropylene, Fiberglass Reinforced Plastics or SST.

Standard Materials:

1. Fiberglass (FRP)
2. Polyvinyl Chloride (PVC)
3. Polypropylene (PP)
4. Stainless Steel (SST)



Standard Design Parameters:

1. High Efficiency
2. Easy Maintenance
3. Minimum Operating Costs
4. Structural Integrity

Pivoted Fume Hood (Patent #6,846236) » » »

This uniquely designed hood can be rotated away from the plating tank to provide complete accessibility for service and maintenance.



« 6'-0" tall Wall Type Exhaust Hoods designed for a Plating Facility. These Viron® hoods are exhausting over 50,000 CFM of Acid-Copper fumes. Viron® designed, manufactured and installed this ventilation system in only one weekend.



"We will not allow our employees to clean or maintain the operation of our plating tanks without proper accessibility."
... Confidential Client
SAFETY-FIRST™

SYSTEM SOLUTIONS

A Case Study for the Plating Industry

Swing-Away™ Hoods

Patent Pending



The Challenge

Viron® International coined the phrase, "SAFETY FIRST" when it comes to maintenance issues facing the Plating Industry throughout the world. With open tanks filled to the rim with a variety of hazardous chemicals within a confined work area, there is always opportunity for an accident to occur. Workers everyday are faced with challenges in their jobs, without realizing it may compromise their safety. Viron International is presented with new challenges every day from our clients in hopes that a solution to their problem can be achieved.

Meeting The Challenge

Viron® International was presented with a challenge from one of this nations major plating shops located within the Mid-west. The success of this challenge balances on Viron International meeting three requirements.

The first requirement is to provide the ability of capturing the chemical fumes from the tanks and transfer them to the scrubber system. The scrubber system will efficiently remove the chemical fumes from the air stream before exhausting them into the environment. Capturing the chemical fumes will require a slotted hood engineered and manufactured by Viron® International's qualified design team.

The second requirement is to provide the ability for proper maintenance of the tank. This should allow accessibility for scheduled cleaning and barrel maintenance.

The third requirement is to provide the ability for workers to conveniently and safely fill the anode baskets in a timely fashion. In many cases, this has presented a problem by making it difficult for the worker to properly load the baskets and compromises their safety.

The Solution

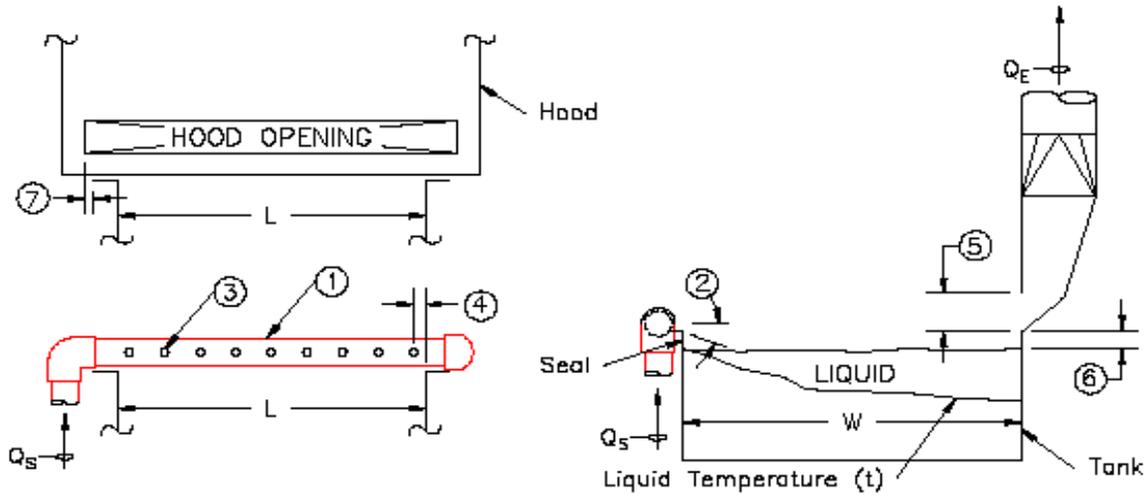
Viron® International not only met the challenges, but went way beyond the client's expectations to provide the solution. Introducing Viron® International's patent pending, swing-away hood system, entitled "The SWING-AWAY." When chemical fume removal, maintenance and SAFETY FIRST issues are a major concern, "The SWING-AWAY" takes major advances in hood design to achieve the client's goals since the days of standard hood design.

Viron® International finished the design, manufacturing and installation of the complete system, which included dampers, ductwork, scrubbers, fans and stacks for a "complete system solution."

VIRON® International is a leading manufacturer of Environmental Pollution Control Systems. Our industrial facilities in Michigan and Texas operate the most advanced and automotive equipment for fabricating and assembling the Corrosion Resistant PVC, Fiberglass, and Coated Stainless Steel ventilation products. VIRON's technical knowledge and product analysis assures the highest degree of quality available within the industry.

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Push nozzle manifold (1) - Circular, rectangular or square. Manifold cross-sectional area should be at least 2.5 times the total nozzle flow area.

Push nozzle angle (2) - 0' to 20' down.

Nozzle openings (3) - 1/8" to 1/4" slot or 5/32" to 1/4" dia. holes with 3 to 8 dia. spacing. Outer holes or slot ends (4) must be 1/2" to 1" inside tank inner edges.

Exhaust opening (5) - Size to achieve 2000 fpm slot velocity. Outer edges of opening (7) must extend to edge of tank including flanges.

Liquid surface (6) - Tank freeboard must not exceed 8" with parts removed.

Push nozzle supply $Q_j = 243 \sqrt{A_j}$

where Q_j = push nozzle supply, cfm/ft manifold length

A_j = total nozzle opening per foot of manifold length

Total push supply $Q_s = Q_j \times L$ cfm

Exhaust flow $Q_E = 75 \text{ cfm/ft}^2$ tank surface area for $t \leq 150 \text{ F}$

$Q_E = (0.4 T + 15) \text{ cfm/ft}^2$ tank surface area for $t > 150 \text{ F}$.

Tank surface area = L (length of tank) x W (width of tank)

Design Procedure: Select nozzle opening within above limits and calculate push supply and exhaust air flow. See VS-70-11 and VS-70-12.

Reference 10.70.1, 10.70.2, & 10.70.3

AMERICAN CONFERENCE

OF GOVERNMENTAL

INDUSTRIAL HYGIENISTS

PUSH-PULL HOOD DESIGN

DATA FOR WIDTHS UP TO 10'

DATE

4-94

FIGURE

VS-70-10

In push-pull ventilation, a nozzle pushes a jet of air across the vessel surface into an exhaust hood. Effectiveness of a push jet is a function of its momentum which can be related to the product of the nozzle supply air flow (Q_j) and the nozzle exit velocity (V_j). For a jet used for plating tanks or other open surface vessels, a push supply flow can be determined from:

$$Q_j = 243 \sqrt{A_j}$$

where: Q_j = push nozzle supply, cfm per foot of push nozzle plenum length

A_j = nozzle exit area, ft²/per foot of push nozzle plenum length

Using this approach, a push nozzle design is first selected and the nozzle exit area (A_j) determined.

The push nozzle manifold may be round, rectangular or square in cross-section. The push nozzle may be a 1/8" to 1/4" horizontal slot or 5/32" to 1/4" diameter drilled holes on 3 to 8 diameter spacing.

It is important that the airflow from the nozzle be evenly distributed along the length of the supply plenum. To achieve this, the total nozzle exit area should not exceed 40% of the plenum cross-sectional area. Multiple supply plenum inlets should be used where practical.

The push nozzle manifold should be located as near the vessel edge as possible to minimize the height above the liquid surface. The manifold should be adjustable to optimize the push jet angle. The manifold axis can be angled down a maximum of 20° to permit the jet to clear obstructions and to maintain the jet at the vessel surface. It is essential any opening between the manifold and tank be sealed.

An exhaust flow of 75cfm/ft² of vessel surface area should be used for tank liquid temperatures (t) of 120 F or lower. For tank liquid temperatures greater than 150 F use an exhaust flow of $(0.4t + 15)$ cfm/ft². These flow rates are independent of the "class" used in determining exhaust flow for side draft hoods. "Control velocity" is achieved by the push jet blowing over the tank and will be considerably higher than that which can be achieved by a side draft hood. The purpose of the exhaust hood is to capture and remove the jet—not to provide capture velocity. A flanged hood design is to be used wherever practical. The exhaust hood should be located at the vessel edge so as not to leave a gap between the hood and the vessel.

Design and location of an open surface vessel encompasses a number of variables. In some cases vessel shape, room location, cross-drafts, etc., may create conditions requiring adjustment of the push and/or pull flow rates in order to achieve effective control. Cross-draft velocities over 75 fpm, very wide vessels (eight feet or more), or very large or flat surface parts may require increased push and/or pull flows. To account for the effects of these variables, a flow adjustment of $\pm 20\%$ should be designed into the push and $+ 20\%$ into the pull flow system. Wherever practical, construction and evaluation of a pilot system is recommended. Once designed and installed, push-pull systems can be initially evaluated by use of a visual tracer technique and appropriate flow adjustments can be made as required.

The exhaust hood opening should be sized to assure even flow distribution across the opening. This can be achieved by sizing the slot for 2000 fpm slot velocity.

AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS	<i>DESIGN DATA</i> <i>PUSH-PULL HOOD</i>	
	DATE 4-94	FIGURE VS-70-11