Raven FAQ'S
Technical Bulletin

MANUFACTURER

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DESCRIPTION

The following is a short list of common questions asked by Raven applicators.

What is the smallest tips size that can be used with 405 without damaging the product?

Tips size will not affect the product in any way. However, tip size should be selected based upon the viscosity of, and solid particle size contained in, the material. Desired flow rate and pattern size will also determine which tip is selected. Due to the solids contained in 405 a tip smaller than 0.031" will tend to clog often. For most surfaces and desired Mil thickness, a 0.035" tips will provide a controllable flow rate and a satisfactory application rate. Going to a larger tip size may be recommended for applications on larger surface areas at high Mil thickness to increase production. However, increased flow rate also reduces controllability and the likelihood of over application. A fan width of 10" is similarly controllable and productive. Through the experience of Raven and its applicators a 535 tip is recommended to spray 405. Note: Tip size nomenclature for Graco RACIV tips…the first digit is the fan width (multiply the first digit by two and that is the fan width at twelve inches from the surface), the last two digits is the orifice size in thousandths of an inch. Example: 535 tip will provide a 10" pattern and has an orifice size of 0.035".

Are there any considerations as to 405 or the spray unit when experimenting with different tips for desired flow rates or fan width?

When choosing a tip the material particle size determines the minimum size orifice required. From there the type of surface or structure and desired Mil thickness will determine how large an orifice to use and what fan width. The spray system itself is affected by tip size, flow rate and atomization pressure. Generally a larger tip orifice will require higher pressures and also increases the strokes per minute of the pump. Using too large of a tip will cause the system to stroke at higher rate than the feed pumps can sufficiently supply, therefore causing an off ratio situation.

Do other applications have any tip preferences other than 535, when using 405 for manhole coating?

In manhole applications the 535 seems to work the best because of the controllability of the flow rate and the size of the fan. Personal preference and skill of the applicator will determine if a change to a different tip is necessary. A smaller fan width may be more precise but will also cut down in production. A larger fan width may be too uncontrollable especially in areas around the frame and invert where overspray may be an issue. Larger orifice size will increase flow and thus application rate but also reduces controllability and may cause runs and sags.

What brand or type of whip hose is best suited for prolonged exposure to acetone?

A hose with a nylon internal tube is both suitable for solvent exposure and economical. A brand name such as Hytron or Synflex is recommended. Raven supplies whip hoses to its Certified Applicators at an economical price.

What are the psi ratings of the whip hose that Raven supplies with the spray unit?

The whip hoses sold by Raven are typically ¼" id. X 10', 20', and 30'. The rated pressure is typically 2750 psi with a burst pressure of 11000 psi. Typical spray pressure for 405 is nominally 2500 psi at the pump outlet. Gun pressure, depending upon hose length and heat may be 500-1000 psi less than pump outlet pressure. Higher pressure

rated whip hoses would be recommended in situations where higher pressures are constantly used. Although typical pressure required to atomize RLS products when heated and applied properly will generally not exceed these pressures.

What is the average life expectancy of a whip hose with prolonged exposure to acetone or MEK?

Life expectancy of a whip hose is most always determined by the degree of internal and external cleanliness. If properly flushed and cleaned, a whip hose will last a long time. If not in continual use the whip should be drained of solvent and stored with both ends plugged or capped. If internal buildup is noticed during inspection then the whip should be replaced and more thorough flushing should be carried out in the future. External cracking due to overspray buildup is the most common reason for short whip life. In addition the whip hose should not be used to support the weight of the spray hose and mix manifold.

What is the cracking pressure of the pressure relief valves?

On most of the existing Raven systems, the pressure relief valves will relieve pressure at approximately 4500 psi. However, due to the age and condition of the valve the actual cracking pressure may be lower. Whenever material is discharged there should be immediate concern for safety and off ratio mix. Since operating pressures should never be near 4500 psi under most circumstances, a discharge through the pressure relief valve is a sign that one side of the pump has lost pressure, thereby transferring the balance of force applied by the air motor to the other component. Thus, a pressure loss on one side caused by an unknown source has in turn caused an increase in pressure of the other component. Anytime a pressure relief valve discharges, the system should be shut down and examined for the cause. If the valve is discharging at a lower pressure than prescribed on the nameplate of the valve it should be disassembled cleaned, examine for wear and rebuilt or replaced. The rest of the system should also be examined to be sure that the loss of pressure has not caused a back flow of part A into part B hoses or vise-versa.

Are there any hoses, valves, fittings on the spray unit that are susceptible to failure at a lower psi than the relief valves cracking pressure after the HC outlets?

Once again, if properly heated, the pressures required to apply Raven coatings will typically fall in the range of 1500-3000 psi. Although, due to off-ratio or other circumstances, the system may produce higher pressures, the burst pressure of the components on the system will not be exceeded. The discretion of the operator and the thoroughness of routine inspection of components play an important part of the safety of the system. Should hoses be neglected and fittings not tightened, there is an increased likelihood of a rupture or leak. However, routine inspections and taking good care of the equipment will greatly reduce the risk of this occurring. Operating the system at the lowest possible pressures will also reduce wear on pump components and extend hose life. Abuse of the system will most definitely reduce pump and hose life and reduce the overall integrity of the system.

The air regulators on the feed pumps are set to 75 psi when spraying, what is the reasoning, or the tolerable range as to this setting, provided they are equal?

The pressures on the feed pumps are set to 75 psi in order to supply enough force to the drum pump air motor to produce a sufficient amount of fluid pressure to adequately supply the plural component pump with material. If the drum pump pressures are set too high the closure rate of the foot valve on the hydra-cart displacement pumps may be increased enough to effect ratio. This will also accentuate the pressure difference between up and down strokes of the plural component pump, which is ideally no greater than 500 psi.

As long as the air inlet pressure on the HC does not exceed 90 psi, is there a range beneath this setting that would cause pre- mature wear in any part of the system while operating with 405?

When applying any Raven material with 50-100 feet of hose and a 20' whip air inlet pressure will typically be 35-50 psi. Operating the plural component pump any higher than what is needed to atomize the material is only causing excess wear on pump parts and gun/tip and excessive overspray.

Does the product 405 contain any particulate from the manufacturer that would cause the high-pressure filters to accumulate enough material in a 10-hour day to plug them?

The part A of 405 does contain large enough solids that can cause accumulation in the high-pressure filters. It is recommended that the system be run without a High pressure filter in the Part A side. Extra care should be taken to keep debris from entering the system especially when opening the drum lid and inserting the pump. Utilizing inline Y-strainer's on both the Part A and Part B feed pumps along with cleaning the Y-strainers on a daily bases in recommended.

Graco recommends testing a spray tip for wear after spraying 30 to 50 gallons of latex paint. What would be a good rule of thumb for Raven coatings?

Tip wear becomes evident as the spray pattern begins to develop fingers at the top and bottom of the pattern, which do not sub- side with increases in pressure. Tip wear will depend greatly upon what material is being sprayed and the pressures applied. The higher the pressure, the faster the tip will wear out.

Is there any hard data available for comparing flow or viscosity of Raven coatings when heated to proper spray temperature?

Raven does provide viscosity / temperature charts, however, their application to spray temperatures and operating pressures are not readily beneficial as each application system is slightly different. Gauges, thermometers, temperature sensors all will read differently as the pumps themselves may have slightly different outputs. Therefore, the temperatures and pressures recommended by Raven are meant as a guideline, which the operator of the spray system should use as a starting point to base his systems typical operating procedures.

What is the easiest way to fine-tune or change a slight off-ratio problem?

Off-ratio spray is directly caused by one or more factors. The displacement pumps, when properly supplied with material and having a properly operating outlet, will pump exactly the same amount of material each stroke. Therefore, properly heating material, pumping it to the fixed ratio plural component pump at the right pressure, making sure the outlets are not restricted, and using the proper mixing/application equipment (mix manifold, static mixers, gun/tip) are all part of making the system operate correctly. There is no way to really fine tune the mix-ratio other than modifying the pumps themselves.

Is there any standardized way of measuring or gauging surface profile once it has been prepared for an epoxy application?

When dealing with steel or other metal substrates, blast profile can be measured using Testex tape and a micrometer. There are also blast profile comparators and other methods, which may or may not be as effective as the Testex tape. For concrete substrates the degree of profile and cleanliness become a very subjective matter. There are profile comparators available from the American Concrete Institute. However, the most important aspect of concrete preparation is to ensure the cleanliness and soundness of the surface layer. If the surface is weak or contaminated it is just like painting over rusty steel. Testing the surface for hydrocarbons can be as simple as looking for water to bead up. Use of an environmentally friendly degreaser such as EnviroRenew works well to emulsify hydrocarbons. Testing the surface for soundness and strength can be done using a hammer and screwdriver or even an elcometer, which will provide quantitative tensile strength results.

Is there a temperature / time ratio or formula that can estimate the change in pot life of Raven coatings in increments from ambient to maximum spray temperature?

When using the plural component spray system, the degree to which pot life is shortened by the application of heat is not generally a cause for concern until a certain threshold is achieved. When spraying at the recommended temperatures, most Raven materials will have sufficient pot life to allow the applicator a minimum of 30 seconds without having to trigger the gun. On some materials, such as 405FS a 15-20 degree increase in temperature will dramatically reduce pot life. On other materials such as 404, 405, or 400 an increase of 20-30 degrees will begin to

reduce pot life. The best rule of thumb is to always trigger the spray gun at least every 30 seconds for at least 2-3 seconds. If operating temperatures are increased, reduce the interval to compensate. Generally increasing operating temperature, unless elevated to extreme levels, will not significantly decrease cure rate. Consult with Raven before dramatically altering operating temperatures.

Would there be any advantage to setting the hose heat slightly above the desired spray temperature to compensate for heat loss in the whip hose?

Increasing hose heat may help marginally in colder weather, however, a more effective solution is to keep as much of the hose bundled up in the truck and to insulate the whip hose. Also, keeping the mix manifold and whip up off the ground in cold weather will reduce heat loss. As with any component, running at a level higher than actually required will cause unnecessary wear and possible premature failure.

What is the model number of the displacement pumps on the HC?

When operating at a 3:1 ratio (2) 222-012 are used to pump part A and (1) 222-017 is used to pump part B. At a 1:1 ratio (1) 222-012 is used for both A and B.

Have you observed the air inlet pressures used by other applicators to the fixed ratio plural component pump when applying 405? If so what ranges have you observed?

Most applicators are typically spraying 405 at 35-45 psi using 50-100' of heated hose, 20' whip and a 535 tip, while heating to 125-150 °F for part A and 95-130 °F for part B.

If 405 can be applied to moist or damp surfaces, how would you describe a surface to wet for coating?

Raven 405 can be applied to properly cleaned and sound, moist and damp surfaces. The water in the substrate must also be clean and without contaminants. Although 405 will bond to wet substrates, the less moisture content the substrate has, the better any coating will adhere. Simply put, 405 is formulated to reduce the amount of adhesion lost by the presence of moisture. If a structure or surface can easily be dried, then it is recommended to do so. Situations to be avoided would include: standing water on surfaces, flowing or running water of any type, water or moisture which is contaminated with any chemical, grease, or other detrimental agents, rain exposure, exposure to sudden flow or impact, high occurrence of condensation, or other situations which may introduce excessive amounts of water.

Is there a substantial drop in the line pressure from the fixed ratio plural component pump outlets to the actual spray tip?

There is typically a pressure drop of approximately 300-700 psi per 50' length of heated hose at the recommended spray temperatures. When spraying 405 in the shop with only 4' sections of unheated hose, outlet pressure was at 1200 psi. Therefore, if spraying with a 50' section of heated requires 1500-2000 psi, one can assume there is a pressure drop of 300-800 psi. The temperatures of the material, hose, mix manifold, whip and gun will play a significant role in the amount of pressure drop. When testing a 400' length of water heated hose pressure drop was less than 1500 psi (this 400' length consisted of properly sized graduations of hose diameter and was water heated to 150 F).